



Sustainable Waste Management at the University of Tasmania - Discussion Paper

2019



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TABLE OF CONTENTS**

Glossary.....	1
INTRODUCTION.....	2
Context for waste management.....	2
Zero Waste: a challenge and opportunity.....	4
Higher Education sector response to waste management.....	5
University of Tasmania current waste management.....	11
Legislative Structures.....	12
Governance structures within the University.....	13
University waste and recycling data.....	14
Greenhouse Gas Emissions from Waste.....	18
Waste services and reduction initiatives.....	19
Managed waste streams.....	19
Waste reduction - construction, deconstruction and refurbishment.....	21
Organic waste.....	22
Consumables from Food and Catering Service Providers.....	24
Reusing and Repurposing University Items.....	26
Public Place and Building Recycling.....	27
E-waste Recycling.....	29
Sustainability within Procurement Practices and Contracts.....	29
Implementation of Engagement Activities.....	32
CONCLUSION.....	34
Recommendations.....	35
APPENDIX 1.....	36
APPENDIX 2.....	37
APPENDIX 3.....	40
APPENDIX 4.....	41

Glossary

Commingleable recyclables	Common recyclables, mostly packaging such as glass, plastics, aluminium and steel cans, cardboard, paper, liquid paperboard (milk cartons). 'Dry recyclables' excludes organic material
Construction and Demolition (C&D) waste	Construction and demolition waste. Material generated from commercial, government or residential building sites.
Commercial and Industrial (C&I) waste	Waste originating from commercial and/or industrial activities (non-municipal and not construction & demolition).
Composting	The biological process that converts organic material into a useful soil additive. This process diverts organic material from landfill and so prevents the production of methane (a powerful greenhouse gas).
E-waste	Electronic or electrical waste (anything with a plug or battery), such as televisions (cathode ray tubes), computers, fridges, printers, kettles, irons, microwaves etc. In Australia this is often used to refer to goods such as computers and their peripherals and televisions covered by product stewardship legislation.
General waste	Material that is intended for disposal to landfill normally what remains after the recyclables have been collected separately (also mentioned under 'mixed waste').
Green waste	Plant material generated from gardens and parks (e.g., grass clippings and vegetation prunings.)
Mixed waste	Waste (general waste and / or recyclables sent to landfill)
MRF	Materials Recovery Facility. Plant and equipment for sorting and pre-processing materials from the waste stream for resource recovery.
Organic waste	Separated food and/or 'green' material (e.g., grass clippings or vegetation prunings).
Public place services	Public place services are waste bins (and can be public place recycling bins) permanently located in public areas such as in parks and on the street.
Putrescible waste	Putrescible waste comprises waste capable of decomposition; examples include food organics, green waste, manures, paper and cardboard.
Recyclables	Materials that can be collected separately from the general waste and sent for recycling. For the purposes of this report it incorporates container glass, plastic, ferrous and non-ferrous metals, paper, cardboard and green waste, remembering that 'recyclable' is a location-specific term.
Recycling	A set of processes (including biological) that converts solid waste into useful materials or products, net of contaminants/residuals disposed.
Reuse	Recovering value from a discarded resource in its original state without reprocessing or remanufacture (e.g. moving clean sand from one construction site to another). The term 'reuse' can also be applied in circumstances where an otherwise disposable item is replaced by a more durable item hence avoiding the creation of waste (e.g., using a ceramic coffee mug in place of disposable cups).
Transfer station	Location where waste and recyclables are collected and stored temporarily before transport to their destination. Transfer stations may be at a landfill premises or at an independent site. Some sorting of recyclables may occur at these sites.
Waste audit	Detailed analysis of waste using physical sorting and weighing to identify composition and weight of each material in the waste stream.
Waste composition	The proportion of different materials or products present in a given waste streams (e.g., 10% glass, 50% general waste, 30% paper and cardboard, 10% plastics.)
Zero waste	Zero Waste is a philosophy that encourages the redesign of resource life cycles so that all products are reused. The goal is for no rubbish to be sent to landfills, incinerators, or the ocean. The process recommended is one like the way that resources are recycled and re-used in nature.

INTRODUCTION

The term waste conjures up imagery of overabundance, carelessness and of materials without value, use or purpose. However, the saying one person's garbage is another's treasure and observations that in nature nothing is wasted is a poignant reminder that the term 'waste' is starting to be addressed through approaches such as circular economy that seeks to eliminate waste. It is with this openness to the potential unrealised value of what is commonly termed waste that in this discussion paper waste is conceptualised as a potential resource.

The discussion paper responds to the University's commitment to be a 'sustainable university' that also drives sustainability within Tasmania and abroad. It focuses on ways the University can reduce natural resource consumption through sustainable waste management practices for the benefit of the environment, society and the University's financial bottom line. As a tertiary education institution deeply embedded in the communities it serves, sustainable waste management provides the opportunity for the University to continue to demonstrate leadership for societal change towards a more sustainable future.

Context for waste management

Despite the availability of recycling and re-use services and opportunities, total waste production in affluent countries like Australia continues to increase. As one of the most economically prosperous nations on earth, Australia is also one of the most wasteful. As a significant economic, social, environmental and cultural issue, waste production in Australia is influenced by many factors, including:

- prevalence of materialism and the feeding of these desire through advertising and marketing
- technologies and global markets which make consumption of natural resources and goods increasingly convenient
- profit agendas reliant on the inbuilt obsolescence of consumer goods
- social norms and habits of production and use shaping needs, wants, values and expectations
- a lack of waste recycling and recovery infrastructure and investment in same.

It is not only waste generated through the disposal of goods themselves that is of concern but also packaging used to make goods transportable and convenient for consumption. Hence, it is important to note that waste is not just an outcome of individual decisions and choices but also the outcome of economic, social and political structures within which modern societies live and work.

Two important legislative drivers for waste management in Australia are the *Product Stewardship Act 2011* and the *National Waste Policy 2009*. The *Product Stewardship Act 2011* provides a framework to effectively manage the environmental, health and safety impacts of products, and in particular, those impacts associated with the disposal of products. The framework includes voluntary, co-regulatory and

mandatory product stewardship for helping reduce and prevent harmful material ending up in landfill through resource recovery and recycling.

The *National Waste Policy 2009* sets out Australia's approach to waste management and planning out to 2020 through the following aims:

- avoid generation of waste, reduce the amount of waste (including hazardous waste) for disposal
- manage waste as a resource
- ensure that waste treatment, disposal, recovery and re-use is undertaken in a safe, scientific and environmentally sound manner
- contribute to a reduction in greenhouse gas emissions, energy conservation and production, water efficiency and the productivity of the land.

The *Australian National Waste Report 2016*, commissioned by the Department of the Environment and Energy highlights that in 2014-15 Australia was responsible for around 64 million tons of waste, up from 57 million tons in 2006-07. This figure comprises waste that is either disposed of through landfill, recycled and/or used to generate energy. In 2014-15, out of 28 Organisation for Economic Cooperation and Development (OECD) member nations, Australia was ranked 6th highest in terms of the disposal of municipal solid waste to landfill per capita. However, on a more positive note, over the period 2006-07 to 2014-15 recycling of total waste generated has increased from around 27Mt to 35 Mt, disposal to landfill has decreased from 29Mt to 27 Mt, and waste used for energy generation changed from 1.4 Mt to 2.3Mt.

In 2014-15, commercial and industrial waste (1308 kg per capita) represented the largest category of waste, followed by construction and demolition (831 kg per capita), then municipal waste (565 Kg per capita). Of these categories, masonry material, organic waste and fly ash represented almost two-thirds of waste generated. This report cites economic and population growth, availability of recycling markets, and government policy settings on greenhouse gas emissions and waste as significant factors influencing the production of waste and its management in Australia.¹

Complicating the waste management landscape, the 2018 decision by China and considerations by other waste importing nations to restrict what they will take into their processing streams has already had significant impact on the ability of all waste generators (read 'everyone') in Australia to deliver positive outcomes in the near term. It should be noted that this constraint may in the long term if addressed with a constructive problem-solving approach have positive outcomes across a range of sustainability issues.

¹ Blue Environment Pty 2017, 'Australian National Waste Report 2016', prepared for Department of Energy and Environment, Melbourne.

Zero Waste: a challenge and opportunity

With the cost to develop and manage landfills, their impact on climate change, and their potential for noise, air, and water pollution, many jurisdictions and government organisations in Australia have committed to targets to reduce waste to landfill, including some with goals of zero waste (e.g. City of Hobart, Inner West Council (NSW), Monash University). However, the nature of different waste streams produced by a university (e.g., quarantine, medical, cytotoxic, experimental etc.), means that the aspiration for zero waste to landfill can present both challenges and opportunities.

While technological change has influenced the ease through which modern society consumes resources and produces waste, at the same time technological changes have led to efficiencies in how resources are used and opened-up opportunities for resource recovery. On the supply-side, many industries have benefited from technological innovation in terms of resource efficiency and in turn increased their production per unit of input. While this may help to reduce the cost of production, it has not stemmed and if anything has fuelled, on the demand side, further consumerism and with it waste generation given current linear materials use models.

Investment into resource recovery technologies is one significant way to reduce waste. Recovery technologies for previously difficult to recycle items have improved in Australia, increasing the availability of recycling options. For example, expanded polystyrene (a type of plastic composed of 98% air) can now be collected for recycling in capital cities across Australia. In addition, recycling of soft plastics is provided through most major Australian supermarkets. Another example, more generally of different options for resource recovery, is the service offered by organisations such as TerraCycle². TerraCycle networks waste generators across the globe (including Australia) with both free and paid recycling and closed loop solutions for many difficult to recycle waste streams such as coffee capsules, plastics gloves, plastic bags, disposable cutlery, pens, tooth brushes, personal care product packaging, CD/DVDs, floppy disk, tapes, memory sticks, etc. The service offered by TerraCycle caters for individuals and corporates through to public collectors of waste and can be tailored to specific waste items.

As noted, the recent tightening by China on the import of foreign recyclables for processing provides a potential barrier including cost pressure in efforts to recycle and recover resources. However, with technological change, landfilling expected to become costlier, and the trend by local governments across Australia towards zero waste, recycling and keeping material and resources in use for longer is expected to become a more economically viable and sound option. That is, cost pressures regarding the processing of waste non-locally can lead to investment into local waste processing and re-use industries.

² www.terracycle.com.au

While non-localised waste processing and/or disposal can be simply taken as a cost consideration it also highlights the question whether those that generate waste should be responsible for this waste. For example, the controversy exposed by ABC Four Corners in 2017 on the dumping of waste from New South Wales into Queensland highlighted the perverse outcomes that eventuate when waste is simply taken as a financial burden. Similarly, China's decision to cease accepting low quality waste for recycling from the rest of the world also brings this into focus. Waste is a significant environmental and social issue where potential costs along these dimensions can easily become externalised onto distant communities. Hence, the management of waste is as much a moral burden as a financial one.

The controversies surrounding the locality of generating and processing waste discussed previously has led to a national discussion on the need for tighter controls on interstate waste haulage. Some have called for a national waste levy to even out different disposal costs across states and temper the attraction of dumping waste abroad. While the introduction of waste levies or increasing existing levies is a controversial political topic for governments, revenues generated through these mechanisms have the potential to be directed into resource recovery infrastructure as well as drive market demand.

In addition to justifying investment into resource recovery and recycling, issues of waste and responses such as zero waste targets can serve to place question marks around patterns of increasing consumption. After all, opportunities to reduce waste generation in the first place would seem a sensible place to start. This demands a complete rethink of economic and government policies and initiatives and would also apply to university growth agendas. Noting this, universities can play a key role in delivering sustainable waste management through:

- procurement decisions and its power to influence markets
- policy settings
- intellectual capacity for research, learning and teaching
- campus operational practices
- role in facilitating knowledge generation through collaboration with different sectors of society.

The power of universities to transform society rests in both their contribution to technological innovation and their facilitation of critical thinking and political imagination within the society of which they are part.

Higher Education sector response to waste management

The Australia university sector commitment to sustainable waste management practices is evidenced through membership in associations committed to sustainability as well as a myriad of waste management initiatives currently being implemented by universities. For example, the Tertiary Education Facilities Management Association (TEFMA) is a sectoral organisation supporting promotion and support of excellence in facilities management within tertiary education institutions across the Australasian

region. In 2002, TEFMA introduced an environmental data matrix into their annual benchmark survey. The data collected benchmarks performance by universities in their linking of practices for environmental sustainability within facilities management practice, including waste management. In 2016, the majority of universities in Australia reported under the TEFMA annual benchmark survey. As of February 2018, 32 Australian universities are also members of Australasian Campuses Towards Sustainability (ACTS). ACTS promotes, supports and builds capacity for change towards sustainability within the higher education sector of both Australia and New Zealand. Waste management is a significant theme of practice in ACTS workshops, professional development opportunities, awards and benchmark reporting.

Table 1 summarises the findings of a review carried out December 2017-January 2018 of the university websites of four Group of Eight (Go8) universities and public information about their waste management initiatives. The Go8 is represented by a coalition of Australia's leading universities. Universities included in this review were deemed to be some of the most advanced universities in terms of waste management and collectively encompass the range of different avenues for reducing waste to landfill from universities. This review highlights that these universities are taking actions to reduce waste and that similar approaches are adopted with consistent themes of focus, including:

- managed waste streams
- organic waste recycling
- consumables from food and catering service providers
- reusing and repurposing university items
- public place and building recycling
- e-waste recycling³
- sustainability within procurement practices and contracts
- implementation of engagement campaigns.


³ E-Waste refers to electrical appliances, either in a state of disrepair or simply unwanted or obsolete. This waste category includes everything from kettles and microwaves to mobile phones, computers, printers and other types of electrical equipment.

Table 1: Summary of Waste Management Initiatives of Four Australian Universities Considered Advanced in Terms of Approaches Adopted

University	Goal	Key Focus Theme							Implementation of Engagement Campaigns
		Managed Waste Streams	Organic Waste Recycling	Reusing and Repurposing University Items	Consumables from Food and Catering Service providers	Public Place and Building Recycling	E-Waste Recycling	Sustainability within Procurement practices and Contracts	
Monash University	Zero Waste goal supporting planned development and future growth of their campuses	<ul style="list-style-type: none"> Organic waste Cardboard Paper (including confidential documents) Printer cartridges and toners Batteries E-Waste Fluorescent tubes Metal Mobile phones and chargers Hazardous waste Furniture Construction, refurbishment and demolition waste 	<p>27 semi-below ground compost bins (Green Cones) placed in gardens around campus. Departments encouraged to voluntarily deposit their organic waste into bins.</p> <p>Collecting and utilising organic waste from several food vendors on Clayton Campus, their Facilities and Services section makes compost and mulch for use on campus gardens with the use of a commercial grade organic recycling unit.</p>	<p>A Furniture Re-Use Program services all of their 5 campuses. The program involves cataloguing re-useable furniture item, storing them in a central store, and providing access to these items via an online catalogue.</p>	<p>Encourage use of re-useable coffee cups through information, communication and engagement activities (e.g., departments can purchase 50% discounted 'Keep Cups').</p> <p>Event organiser and catering suppliers asked to comply with their Sustainability Catering Guide which includes amongst other environmental considerations providing reusable crockery and cutlery, tap water in jugs rather than plastic bottles, reduced packaging and commitment to reduce waste generally.</p>	<p>Mini Bin Program has resulted in office staff only being provided with a paper recycling box and a smaller table top general waste bin. Cleaners service the paper recycling boxes with staff responsible for emptying their general waste and recyclables into larger waste and commingle bins provided on each office floor.</p>	<p>Encourage staff to recycle old mobile phone through the Mobile Muster Program. Staff encouraged to set up their own collection points.</p> <p>A drop off point for e-waste provided on campus. Drop off to be via appointment. Equipment recycled through Engineers Without Borders, Monash Student Association welfare office and an accredited e-waste recycling company.</p>	<p>All tender responses are assessed in terms systems for environmental management, employment practices, corporate social responsibility and commitment to sustainability and demonstrated sustainability improvement. Tenders evaluated using 'EcoBuy Tool'.</p> <p>As part of their Green Program as all office are to create sustainable purchasing guidelines focusing on environmental impact of products, potential benefit of products on the environment, and encouraging staff to purchase 'Earth Saver' Products.</p>	<p>Runs a University 'Waste Wise Program' that is accredited through Sustainability Victoria. This program utilises Green Office Reps across university campuses in rolling out waste reduction behaviours change programs, awareness campaigns and campus initiatives. This program now sits within the universities award winning Green Program, their overarching sustainability engagement program for supporting and inspiring their university community to be more sustainable.</p>

Australian National University	<p>> Increase the recycling rate to 85 per cent by 2021</p> <p>> Recycle 95 per cent of e-waste by 2021</p> <p>> National best practice level for recycling of construction waste</p> <p>> Reduce waste to landfill by 20 per cent per person by 2021</p>	<ul style="list-style-type: none"> • Batteries, • mobiles and small electrical devices • paper and cardboard (secure and non-secure) • Hazardous waste • demolition and construction waste • toner cartridges and photocopier bottles • commingled glass, hard plastic, aluminium and steel • bulk steel • e-waste 	<p>Recycles all its green waste on site and uses it as mulch.</p>	<p>Staff encouraged to advertise re-useable furniture on public ANU web-based Billboard.</p>	<p>Promote the use of re-useable coffee cups. ANU Green KeepCups can purchased on campus.</p>	<p>Recycling bins provide in office buildings and across campus.</p> <p>Under desk paper recycling bins provided and serviced by cleaners.</p> <p>Utilise Building custodians to identify waste management needs of building occupants and organise waste collection, provide advice to staff on disposal.</p> <p>Encourages staff to drop off their polystyrene to 'Expanded Polystyrene Australia'.</p>	<p>Planning to create a campus wide e-waste recycling system for computers and other electrical equipment.</p> <p>Building custodian encouraged to apply directly to 'Close the Loop' or 'Cart Collect' for cartridge recycling boxes.</p> <p>Provide a campus drop off point for e-waste.</p>	<p>Ensure that waste service contractor focuses on recycling and quantification of waste to landfill and recycling levels. Waste bins and recycle bins are tracked using GPS and weight of bins emptied are recorded.</p>	<p>Under the auspices of ANUgreen, a program rolled out from their Facilities and Services Division, work directly with the university community to educate and empower staff and students to actively reduce the university's environmental impact. Waste reduction has been a focus of ANUgreen since 1999.</p>
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University of Adelaide	<p>Campus Sustainability Plan, which outlines a 50% landfill diversion rate by 2020 (from a 2015 baseline).</p>	<ul style="list-style-type: none"> • Batteries, • mobiles and small electrical devices • paper and cardboard (secure and non-secure) • demolition and construction waste • toner cartridges and photocopier bottles • commingled glass, hard plastic, aluminium and steel • Hazardous waste • bulk steel • e-waste. 	<p>Outdoor 'BioBin' compost green waste collect from campus grounds along with animal carcasses from the School of Animal & Veterinary Sciences.</p> <p>Provide recycling stations for organics waste near food outlets. Kitchen tea rooms are also provided with organic waste bins whereby staff can request extra bins.</p> <p>Excess food from eateries is donated to 'OzHarvest' who then redistribute it to homeless and disadvantaged member of the community.</p>	<p>Each semester, hundreds of excess office and stationery products are redistributed to students at university sustainability theme Events.</p> <p>Expired first aid items across campus donated to veterinary science school.</p>	<p>Regularly each semester give-away free KeepCups and promote reusable coffee cups. They have also encouraged their campus cafes to sign up to the 'Responsible Cafes' initiative where patrons get 50 cent discount for bringing their own coffee cups.</p>	<p>Through the Kick ya Bin Program has installed centralised recycling stations (paper, organics, commingled and general waste) across campus buildings and public areas. Individual general waste bins are removed from office and staff must take walk to closet recycling station to dispose of waste.</p>	<p>The university's Maintenance Service Centre provides a free e-waste service to staff and students through a partnership with Quinfotech. Quinfotech repurposes as many of these items as possible and donates them to community groups, refugee families and schools in underprivileged areas. Left over items are recycled.</p> <p>Through their Student Care Program, university PC's and laptops are repurposed for students without computers.</p> <p>Provide free recycling stations for mobile phones, batteries and accessories in key location across their campuses. Also provide the recycling solution to staff through their work request system for a small fee.</p> <p>Staff are encouraged to register for a free collection box for cartridges and toner bottles through Planet Ark.</p>	<p>Have developed an Ecoversity Ethical Purchasing Guideline for stationary and office products which provides information on how to source ethical products through their procurement system and how to ensure sustainable outcomes through purchase decisions. Their provider of office products 'Winc' also stock a fast array sustainability and ethical products and have existing partnerships with non-profits who are committed to sustainability outcomes.</p>	<p>Their Ecoversity Program provides a framework engaging all university stakeholders with sustainability issues, challenges and opportunities. It is a well-resourced program funding many of the university's sustainability initiatives for example \$100K is provided annually through their Green Project Fund. Individuals and Teams can apply for up to \$20k project that improve campus sustainability.</p> <p>Have implemented a Waste Watcher Program (funded through their Ecoversity Program) which encourage student and staff to use resources efficiently via posters, education campaigns, infrastructure retrofits, provision of recycling stations, removing individual waste bins, and environmental pledges.</p> <p>Developed by students, the Adelaide Sustainability association brings together staff, students, alumni and industry partners provide professional development opportunities for its members in how to be more sustainable at work and at home.</p> <p>The Ecoversity Bin Monster Program provides signage, social media campaigns and information on how to recycle on tables, bins and food and beverage containers, and provide prizes for recycling properly.</p> <p>Have gamified Waste Education through the development of an app which helps staff and students know how to sort and dispose of recyclables on campus.</p>
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<p>University of Melbourne</p> 		<ul style="list-style-type: none"> • batteries • Books, paper, cardboard, business cards, brochures, shredded security paper • E-waste • Scrap metal and steel cans • Mercury containing lamps • Polystyrene • commingled glass, hard plastic, aluminium and steel, and coffee cups 	<p>Encourage staff and students to voluntarily take up composting of organic waste on campus. Staff and students are allowed to buy and use their own organic waste bins in university tea rooms. Staff and students are responsible to purchase bins and then take way contents for composting at home or to donate for use in the University's community garden.</p>	<p>Run a Furniture and Equipment Re-use Online Service for faculties, department and affiliate organisations, so that unwanted university furniture and equipment can be re-used.</p> <p>A stationery swap is run throughout the year in conjunction with their student union to allow students to re-use different department unwanted stationery items</p>	<p>Provide to staff and students a 'Sustainable Event Checklist' which provides advice on how to achieve a zero-waste event.</p> <p>Promote the use of reusable takeaway cups and their community to get cafes to sign up to the 'Responsible Cafes' initiative. This initiative encourages cafes through their membership to the program to offer discounts if consumers use reusable takeaway cups. Non-reusable coffee cups can also be accommodated in commingle recycling bins.</p>	<p>Collection points for polystyrene managed by lab managers at their Parkville Campus and one at Burnley Campus location.</p> <p>The first Australian university to introduce a mini bin system across all work stations. Staff provided with a small general desktop waste bin and a larger commingle bin. Staff are responsible for emptying and cleaning the unlined general waste bins. Staff are required to empty their general waste bin into larger waste bin located within staff kitchen areas. Commingle recycle bins are cleaned and emptied daily by cleaners.</p>	<p>Staff are encouraged to recycle batteries through contracted services or the free Victorian Government 'Batteryback' Program.</p> <p>Provides a work request collection service for IT registered e-waste. As part of this service computers are recycled and not offered for sale or donation back to staff.</p> <p>Provide collection points for the recycling of mercury containing lamps. They have also signed the 'FluoroCycle Signatory Commitment', which is a voluntary product stewardship scheme that seeks to increase the national recycling rate of mercury containing lamps.</p> <p>Staff are encouraged to register for a free collection box for cartridges and toner bottles through Planet Ark.</p>	<p>The university's Procurement policy ensure procurement processes fulfil the University's broad social and environmental obligations set out under their Sustainability Charter and Plan.</p> <p>Promote a preferred catering supplier list whereby suppliers listed must be able to accommodate zero-waste events.</p>	<p>The University of Melbourne in 2017 committed to a pilot of the Green Impact Program. Green Impact is a sustainability engagement initiative developed by the National Union of Students UK and is now currently being rolled out across Australian universities through the auspices of Australian Campus Towards Sustainability. Green Impact provides a framework (a pre-designed toolkit) to empower students and staff to work together by forming teams to take sustainability actions on campus and celebrates their achievements through an end of year awards ceremony.</p>
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NOTE: Please note that the comprehensiveness of this review is limited by time constraints and only represents information made public and does not aim to represent the full raft of activities and initiatives that are currently being carried out or planned regarding each university's sustainable waste management practices.

University of Tasmania current waste management

With the University advancing its transformation to a city-embedded university within Tasmania, there will be significant changes to facility locations over the coming years. This will mean not only changes in waste management contract terms, but also significant generation of building and demolition waste and associated externalities of facility relocations. If not managed with sustainability in mind, this could result in significant waste generation.

As covered in the previous section, the University's waste management practices are heavily shaped by the communities in which its campuses are located and more broadly. As the communities in which university campuses are located begin to expect zero waste outcomes, the University will attract greater attention in terms of how their own operations and their broader role in society supports this goal. For example, the City of Hobart has committed to achieving zero waste to landfill by 2030. The Inner West Council in NSW, where the University has a campus, is also working towards zero waste.

In line with its zero waste aspirations the City of Hobart will be closing its landfill at McRobie's Gully and implementing a range of waste reduction actions as part of its *Waste Management Strategy 2015-2030*. A recent City of Hobart waste reduction initiative is the trialling of a recycling station/unit for smaller, difficult to recycle items, located at City of Hobart's Administration office⁴. City of Hobart residents are encouraged to drop off for recycling items such as light globes and fluorescent tubes, small household batteries (AAs and AAAs), toner cartridges, mobile phones and accessories, DVDs and CDs, X-rays, cosmetic containers, toothpaste tubes and brushes, mail satchels, pens, and small electronics such as remote controls. In 2019, the City of Hobart also passed a ban on single use plastics to be phased in over the next few years. Thus, keeping up with growing community expectations around zero waste is a required focus area for the University.

In Tasmania where most of the University's administrative functions are based and in which most of its activities are conducted, there is reason for both pessimism and optimism when it comes to delivering on zero waste goals. A major concern, despite commitments made in respect to zero waste by local governments within Tasmania, are several sobering waste statistics for Tasmania reported within the *Australian National Waste Report 2016*:

- Over a nine-year period up to 2014-2015 waste generation increased by 67% with overall waste per capita growing by 60%; and

⁴ Information on this initiative available at <https://www.hobartcity.com.au/Residents/Recycling-and-rubbish/Recycling-unit-for-difficult-to-recycle-items>.

- In 2014 - 2015 Tasmania had a resource recovery rate of 50%, 8% below the national average.

In addition, the University itself in its TEFMA reports performs well below our broader Tasmanian community. While commingled recycling rates were essentially zero in 2010 when the first efforts to introduce recycling bins for these materials were introduced, the best the University has achieved was a high of 16% in 2016 falling to 10% in 2018. This is abysmal even in relation to the poor Tasmanian recovery rates noted above.

On a more positive note the amount of waste recycled in Tasmania has increased by over 300% from 2006-07 to 2014-15⁵. Waste management technologies within Tasmania have advanced over the last decade, with construction of several new Materials Recovery Facilities (MRFs) for sorting mixed recyclables, opening of a sorting and recycling facility at Leslie Vale for construction and demolition waste, availability of mercury-processing in Launceston, and availability of council-run and commercially available organics kerbside collections around the state.

The company Environex provides another example of expanded recycling opportunities within Tasmania. Environex's Tasmanian manufacturing facility collects landfill bound rigid plastic waste from window manufactures, plastic waste from hospitals such as Poly Vinyl Chloride (PVC) IV bags, masks and tubing, and plastic waste from aquaculture, agriculture and mining industries turning them into new re-useable products. However, Tasmania as an island with few industries using recyclable materials at a large scale (glass being a notable exception), is challenged by economies of scale in respect to the viability of local waste processing facilities. This means that much of Tasmanian's common recyclables (Appendix 1) and most of the difficult to recycle items are sent for processing on the mainland and abroad or added to landfill streams. This means that there can be significant costs to recycle the full spectrum of different waste streams. Some areas of Tasmania have already voluntarily adopted a waste levy; however, this is not state-wide, with only landfill operators in the north of the state opting in. In comparison to other states, this levy is relatively low. This means that in Tasmania there are many untapped potentials for entrepreneurship, innovative economies, teaching, learning and research, cost reduction and collaborative partnerships based on resource recovery and recycling.

Legislative Structures

While the Australian government provides an overall policy setting for waste management, actual management responsibility is discharged to State and Territory governments, with operational responsibility the domain of local governments.

⁵ Blue Environment Pty 2017, 'Australian National Waste Report 2016', prepared for Department of Energy and Environment, Melbourne.

A number of legislative and governance instruments apply to management of waste in Tasmania.

The *Environmental Management and Pollution Control (Waste Management) Regulations 2010* is the legislative framework for the management of certain types of waste, including controlled waste (i.e., clinical and hazardous items and disposal of general waste). Transport of controlled waste is further regulated through the *Environmental Management and Pollution Control (Controlled Waste Tracking) Regulations 2010*. In Tasmania waste transfer stations are currently regulated by local government.

The *Tasmanian Waste and Resource Management Strategy 2009* commits to improving waste management and resource recovery services and practices with a vision for a resource-efficient society and clean, healthy and sustainable Tasmania.

As mentioned the University also has campuses in NSW, which has its own legislative instruments.

The *Protection of the Environment Operations Amendment (Illegal Waste Disposal) Act 2013* addresses illegal waste disposal and fraud in the waste sector.

The *Protection of the Environment Operations (Waste) Regulation 2014* - defines and classifies different types of waste, provides a measurement protocol for the waste contributions to be paid by occupiers of scheduled waste facilities, and sets out waste provisions for record-keeping, tracking, recycling of consumer packaging and transportation.

Waste Avoidance and Resource Recovery Act 2001 - promotes waste avoidance and resource recovery to achieve a continual reduction in waste generation. The Act provides for the development of a state-wide waste strategy and introduces a scheme to promote extended producer responsibility for product life-cycles.

NSW Waste and Resource Recovery Strategy 2014-21 - sets a 75% reduction target of waste to landfill by 2021 as well as a range of related targets and approaches for increasing recycling rates for solid, industrial and demolition waste, reducing litter and combating illegal dumping.

Governance structures within the University

The University first formalised its commitment to sustainability in 2005-2009 through adopting two *Governance Level Principles* relating to environmental management and environmental sustainability of the University's built environment, establishing an Environmental Management Group (EMG) comprised of academics and professional staff (volunteer membership), and appointment of a Sustainability Manager within infrastructure services. An outcome of this commitment was the *UTAS Environment*

Management Plan 2009-2011 (EMP) that included a goal to achieve best practice in recycling and waste management through data collection, reduced waste generation and a university wide recycling program.

Another important development in the University's sustainability journey was the signing of the *Talloires Declaration (1990)* on 21 October 2009. This declaration commits universities to embedding Education for Sustainability within its teaching, research, operations and outreach activities. This underpinned a whole of university approach to sustainability that requires involvement from a broad range of university stakeholders. Since 2009, sustainability was further embedded within governance structures through the conversion of the EMG into the Sustainability Committee in 2012. This committee includes a broad range of academics and administrative functions and reports directly to executive management.

Complementing the role of the Sustainability Committee was the approval of the *UTAS Sustainability Policy* and *UTAS Sustainability Mission Statement* in 2015. These university-wide governance structures place emphasis on reducing waste to landfill and increasing resource recovery as important to the goal of a more sustainable university. In 2019, the University is seeking to adopt a *Strategic Framework for Sustainability* that among other things includes a zero waste to landfill goal.

University waste and recycling data

The University started collecting detailed waste data in 2011 via waste audits. The contracted waste and recycling service from 2014 allowed more accurate data for waste to landfill and recycling from the Tasmanian campuses, although an estimation is still required. In 2018 the University's total waste management cost was over \$409,000 for Tasmanian operations. Assuming bins are on average 75% full when emptied, this equates to approximately 1730 tonnes of waste generated with 1561 tonnes landfilled and 169 tonnes recycled⁶. General waste is the largest contributor to the landfill amounts (Figure 1) with commingle⁷ the largest recycled category (Figure 2).

⁶ Data sourced from calculations as per UTAS' Scope 3 – Waste Emissions 2018 excel spreadsheet

⁷ Commingled refers to a system in which all paper fibres, plastics, metals, and other containers are mixed when collected, instead of being sorted separately.

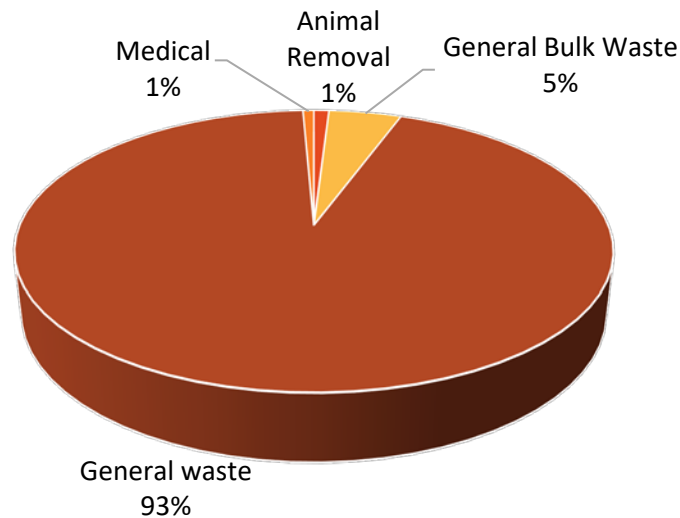


Figure 1: Waste type as proportion of overall landfilled waste in 2018

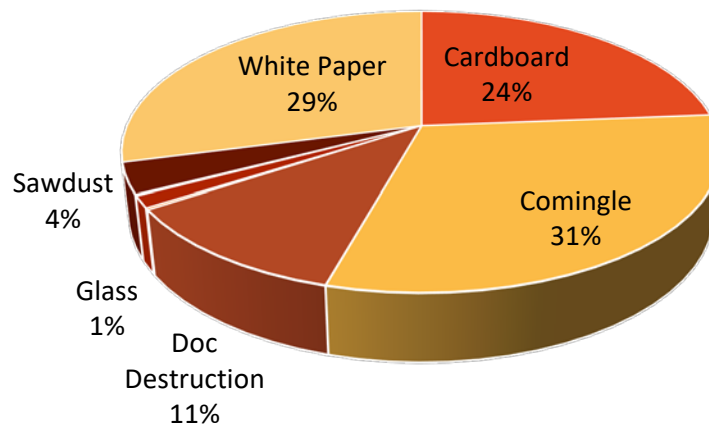


Figure 2: Waste type as proportion of overall recycled waste in 2018

In terms of the impact, University-wide waste management data collected from waste audits and contracted services show that waste to landfill decreased by 17% between 2014 and 2016, but has increased by 34% between 2016 and 2018. The total amount of recycling remained relatively stable over the same period but decreased by 24% in 2018 (Figure 3). This change may reflect greater re-use of items on campus, or simply be an anomaly related to random changes in waste generating activities on campus, or greater precision in data collection. Further data collection is needed to determine the exact nature and significance of this change and the degree to which it is related to sustainable waste management activities.

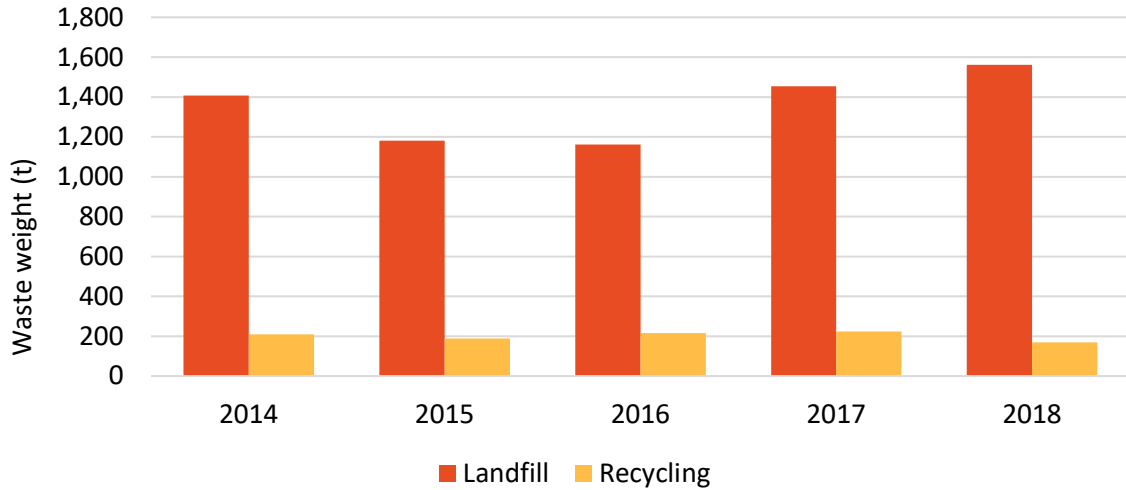


Figure 3. Tonnes of annual waste to landfill and recycling for 2014-2018, estimated from provider reports

Paper and cardboard waste diverted to recycling has been variable in the last few years (Figure 4), however the reasons for this are unclear, but may in part due to different estimation methods employed. The same would apply to commingles. It should also be noted that deployment over time of the MyPrint solution is already having an impact on reducing paper use, which should flow through to a reduction in paper volumes entering either the waste or recycling streams.

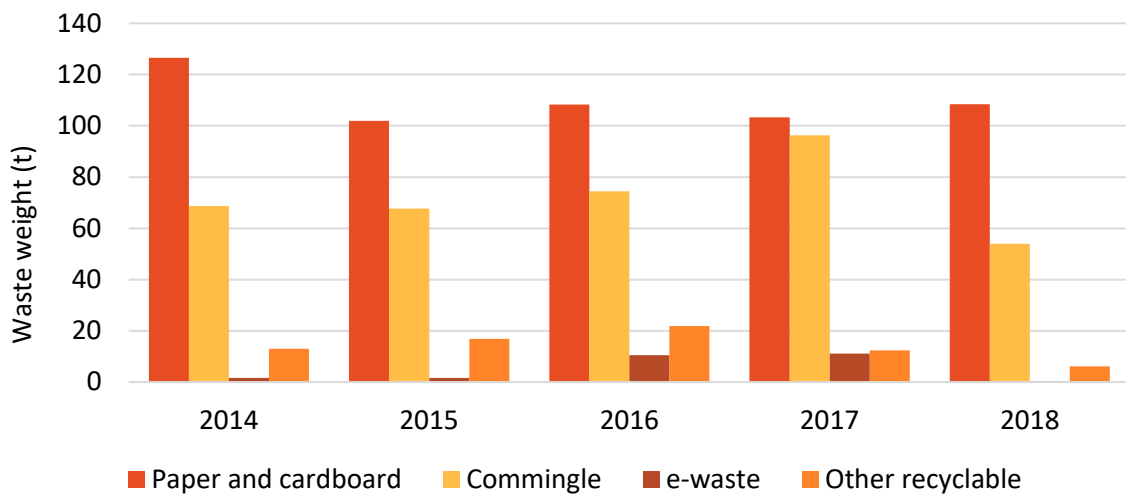


Figure 4. Amount of recycling at the University by recycling category for 2014-2018 (NB at time of writing e-waste data for 2018 was not yet available).

Over the period 2014-2018 cardboard recycling has been quite variable, however commingle recycling increased until 2017, then dropped in 2018. The variable trend in cardboard while hard to substantiate may be due to shifts in the type of packaging used to deliver goods to the university and/or the outcome

of changes in contract terms concerning packaging. For example, the University’s Information Technology Services (ITS) for a number of years has been working with their contractors regarding reducing the volume of cardboard packaging received. This trend may also be simply due to renewal policies of equipment used on campus. The increasing trend for commingle recycling may be due to the roll out of public place recycling bins across campus since 2011. Here commingle bins are collocated with general waste bins meaning that now there is greater potential to divert waste from landfill on campus. Figure 4 also shows that e-waste recycling has increased from 2014 to 2017, with 2018 data not yet available at time of writing. Since 2016, ITS has enacted a product stewardship agreement with their primary hardware supplier that includes a take-back end of life e-waste service. ITS where possible aims to donate or sell unwanted IT hardware before the e-waste service is activated. However, there remains much non-ITS-registered e-waste not tracked.

Overall Figure 3 highlights that the University has increasingly decreased waste to landfill from 2014-2016, with recycling level remaining relatively stable. However, waste landfill has increased, and recycling rates have decreased in the last two years. Additionally, the TEFMA annual benchmark survey provides an indication of where the University’s current performance in waste management sits in relation to other Australian universities. This survey benchmarks universities along a range of environmental metrics. The following figures highlight how the University is performing in terms of total amount of waste to landfill relative to the number of fulltime students enrolled (Figure 5) and the percentage of total waste recycled (Figure 6). This benchmarking highlights that in terms of key indicators of waste management the University is performing below average in comparison to the sector.

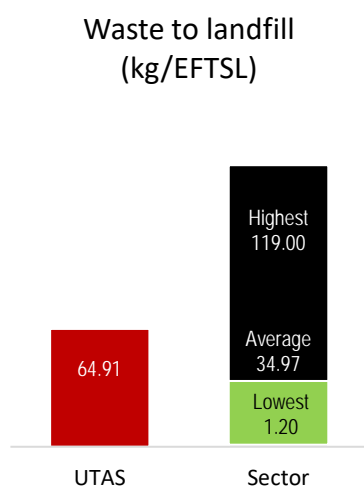


Figure 5. Total amount of waste to landfill relative to the number of fulltime students enrolled: 2017 TEFMA Report

Note: Best practice correlates with a low figure

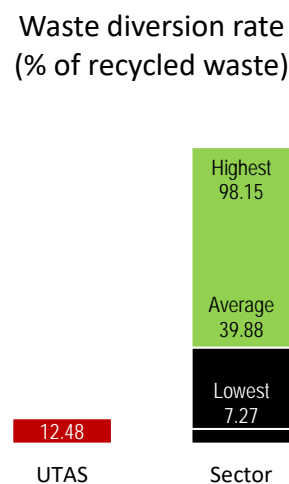


Figure 6. The percentage of total waste recycled: 2017 TEFMA Report

Note: Best practice correlates with a high figure

Greenhouse Gas Emissions from Waste

It is important to note that collection, recycling and disposal of resources incurs environmental costs that the University may have to report in the future. One such cost that the University does report on is the cost of waste on the climate via greenhouse gas emissions. There is increasing importance given to action on climate change and sustainability by universities both nationally and abroad. As a result, the University became certified carbon neutral from 2016. The University greenhouse gas emissions profile shows that waste to landfill is the sixth highest carbon emissions source (Figure 7).

Using the broad waste stream conversion factors for domestic and commercial waste to landfill (depending on waste category)⁸, this equates to an estimated 2,190 tCO₂-e for 2018. With the recent commitment of the University to retain certified carbon neutrality, the reduction of greenhouse gas emissions from waste management practices will become an increasing priority over coming years. By reducing the amount of waste produced in the first place through smarter procurement decisions, more efficient use of resources, and effective systems and processes for re-use, and providing greater opportunities for recycling the University can insure against future financial, environmental and social cost of generating waste.

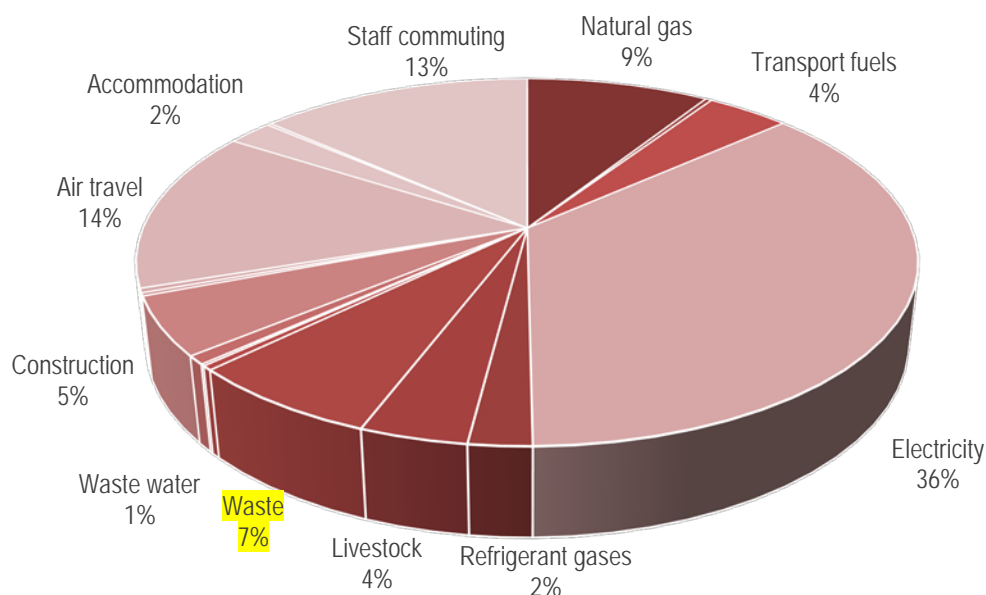


Figure 7: University emissions reported in 2018 by source

⁸ National Greenhouse Account Factors 2018 (<https://www.environment.gov.au/climate-change/climate-science-data/greenhouse-gas-measurement/tracking-emissions>)

Waste services and reduction initiatives

The following represents an account of current waste management practices across the University's main campuses. To achieve the overarching objective of reducing waste to landfill (thereby saving money and reducing carbon emissions) and moving toward zero waste, it is necessary to consider the implementation of an efficient, equitable, best practice resource recovery system and process at the University. However, as resourcing can be a major limiting factor to implementation goals of any nature, it is important to identify priority areas for action that may not address all potential areas for resolution but do focus on major areas of concern. In this respect, the following sections provide a list of priority areas for attention to reduce the generation of waste at the University. Noting that this effort is not starting at a zero-base given the University to date has implemented a range of waste services and reduction initiatives. Examples include amendments to contract terms for waste management to specific projects aiming to build better waste generation data sets, reduce waste and increase resource recovery. The following summarises these activities using the key focus themes outlined in Table 1. Furthermore, for each theme of focus, potential areas of improvement are discussed.

Managed waste streams

ISD provides a base level of waste and recycling services to the whole University that includes recycling for office paper, commingled materials (usually glass, aluminium, some plastics), cardboard, phone book, newsprint, some e-waste, batteries, lamps containing metal and mercury and waste to landfill (including general, bulk general, deep burial, medical, and chemical waste). Depending on waste type and service needs some services can be scheduled, on-call or a mixture of both with the responsibility borne by individuals via third parties, other sections of the university (i.e., in the case of ITS Registered Assets) and/or contractors (see Table 2).

TABLE 2: Summary of Current Waste or Recycling Services at the University

Waste or Recycling Service	Availability / locality	Service provision
General waste to landfill	All	Scheduled
Commingled recycling	All	Scheduled
Cardboard/phone book recycling	All	Mix of Scheduled and on call
White office paper recycling	All	Mix of Scheduled and on call
Shredded (secure) paper recycling	All	Mix of Scheduled and on call
Newsprint (incl newspapers, brochures, etc)	All	Mix of Scheduled and on call
Shredding and deep burial of tapes, CDs, videos, DVDs, etc	All	On call
E-waste (computers, televisions, technical/lab/field equipment)	All	On call/registered ITS Assets within Tasmania also recyclable through end of

		life contracts or donated / sold / recycled through disposal procedures
Mercury containing lamps	All	Via electrical subcontractors' agreement
Metals recovery (e.g., steel from School of Architecture & Design or Engineering)	Relevant sites	On call
E-Waste (Mobile phones and accessories)	All	On call / via MobileMuster / registered ITS Assets within Tasmania also recycled through end of life contracts
E-Waste (Toner cartridges)	All	On call / via Planet Ark / registered ITS Assets within Tasmania also recycled through end of life contracts
E-Waste (Batteries)	All	On call
Medical/Chemical/Animal Waste	Designated areas	Mix of scheduled and on call

Most accommodation facilities provide waste and commingled recycling, including facilities in Sandy Bay, Hobart, Newnham, Inveresk and Burnie. The following situations apply:

- Communal areas offer general waste and commingled recycling;
- Individual room waste is in general not collected via contract cleaners and is the responsibility of students to dispose into provided bins;
- Sandy Bay accommodation, Mount Nelson villas, and the Atrium apartments at Burnie have council provided wheelie bin kerb service for both waste and recycling. However, ISD does provide a general waste and commingle recycling service to service other users at every location except the University City Apartments (Hobart).
- The University City Apartments (Hobart) have a waste service through a third-party waste contract. Each floor has a waste and recycling chute next to elevators.

While there are several different waste streams covered through existing waste services provided by the University a number of these currently also rely on the discretion of individuals and or sub-contractors to organise a service either through ISD, ITS or external means (e.g., metal or mercury containing lamps, computers, televisions, technical/lab/field equipment, toner cartridges and batteries). Unless individuals are aware of recycling service options, items may end up in landfill. Hence, an area of improvement could involve better communication of services and options available for recyclable waste streams.

Another area of improvement could involve expanding the coverage of recycling, recovery and/or reuse services to include other items currently ending up in landfill, including:

- Organic waste (e.g., animal waste from experiments, food waste, and green waste)
- Consumables from cafes and university kitchens (e.g., disposable cutlery, coffee cups, coffee capsules, soft plastics)

- Packaging waste (e.g., expanded polystyrene, bubbles rap, poly foam packaging)
- Non-hazardous medical and experimental waste (e.g., PVC IV bags, masks and tubing, others generated through the University's research and teaching activities)
- Non-ITS registered e-waste (e.g., CD/DVDs, floppy disk, tapes, memory sticks, kitchen appliances, cabling, electrical lab equipment)
- Stationery waste (e.g., pens, folders, staplers or other office desk supplies)
- Bathroom waste (e.g., paper hand towels)
- University furniture items

These expanded opportunities for reuse and recycling could cover not only the waste streams produced by staff but also by students. For example, recycling of personal care products and containers may need greater attention in the case of students living on or near campus. Expanded provision of infrastructure for recycling streams should ensure consistent level of service across all facilities and campuses in response to the needs of staff and students.

Current waste services can also be made more effective by improving waste infrastructure on campus (i.e., locations and coverage of bin sets and bin signage). Consideration should also be given to exploring the efficacy of implementing new technologies. These may include segregation, compaction (particularly important for bulk cardboard waste), shredding, composting, and bin 'fullness' monitor technologies as well a different accounting and analytical software for waste management and life cycle assessment. These technologies present opportunities to reduce costs and environmental impacts by turning waste into a resource or minimising waste management costs through both hard and soft infrastructure.

Waste reduction - construction, deconstruction and refurbishment

A significant area of waste generation concerns the University's building construction, deconstruction, and refurbishment activities. While all new and refurbished building projects are required to adhere to the University's Sustainable Built Environment Design Policy, flexibility is built into this policy to allow different elements of sustainability to be incorporated depending on the nature of the project. While this is undoubtedly a sensible approach given the specifics of any one project and with the sustainable building sector changing so rapidly in term of what is possible, greater emphasis could be placed on sustainable waste management via an explicit and required commitment to waste minimisation and materials re-use. For all construction, deconstruction and refurbishment projects areas of focus in this respect should include:

- **Planning and design –**
 - Ensure new buildings and fit outs are justifiable
 - Where possible re-use existing materials and infrastructure

- Plan to reduce waste at project start – identify specific wastes expected, engage waste contractors and service providers for waste avoidance, target waste recycling opportunities and develop a sustainable waste management plan with defined goals
- Design new buildings or fit outs with future use and re-use in mind to increase the longevity of assets and materials
- Incentivise waste management efforts and identify associated responsibilities. Make all project managers, contractors and sub-contractors aware of their obligations to reduce waste and how to effectively use waste management systems. Instructions, incentives and other engagement tools may be required. Waste management should be a standing agenda item at project management meetings
- **On-site behaviour –**
 - Employ construction methods, materials and design that allow for re-use and recycling
 - Employ waste segregation, storage, handling and collection methods maximising re-use / recycling outcomes
 - Model waste reduction by implementing waste minimisation program at project meetings, events, and within administrative functions
- **Sustainable procurement to avoid waste –**
 - Implement material purchasing, transport, storage and installation agreements that reduce material waste and packaging
 - Use materials that maximise recycled content or come from re-purposed materials
 - Ensure that potential re-usable and recyclable items are recorded and managed through an asset register such that options for their recovery can be explored
- **Reflect on Waste Reduction Outcomes –**
 - Implement procedures and processes to quantify and evaluate waste management practices
 - Monitor progress regularly and modify practices where necessary
 - Communicate progress outlining what has worked and has not worked and obtain feedback on areas of improvement and celebrate success

Organic waste

Organic waste collection is dependent on participation by building occupants, cleaners, caterers and food service providers, and various contract managers. For example, for staff and student tea rooms, organics recycling is an available option at all campuses via the sustainability requirements of the University-wide waste management contract but has been only implemented in a few buildings due to budget and resourcing constraints. Furthermore, in the few instances it has been provided, it has been initiated by a few individuals who must take full responsibility for collection for disposal into larger waste contractor

provided organic bins. Staff and students have many competing demands on their time meaning that these types of self-initiated and managed project have struggled to survive long term.

A potential area of improvement for organic waste could be to centralise management of a comprehensive organics waste recycling program across all campuses in line with existing efforts for general waste, paper and commingled streams. A potential model for this type of program could be the various types of office bin programs currently being rolled out by universities in Table 1. Such a model could involve replacing existing workstation general waste bins with smaller versions and providing an additional organics bin, commingle bin and waste paper bin. These bins and larger versions of these bins provided within tea rooms (paper recycling bin are already located next to most photocopiers) could be serviced by contract cleaners. Furthermore, by requiring staff and students themselves to be responsible for emptying their general and organic waste bins into larger versions provided in tea rooms, initiating recycling and resource recovery within office building may be possible without imposing a significant increase in cleaning contracts. It would also help students and staff take more direct responsibility for waste generated, hopefully encouraging recycling behaviour. Any project of this nature would have to make sure that cleaning contracts use compostable and transparent bin liners that can be handled and accepted by organic waste and recycling service providers.

At present there are only a few contracted food venues on University campuses using an organics (i.e., food) recycling bin. For these bins, it is understood that the contamination rate can be so high that this type of recoverable waste is often ending up in landfill. Working with contracted food venue service providers on campus to educate patrons via signage and engagement campaigns on the benefits of organics recycling and how to properly dispose of organics would help reduce contamination rates. The non-contracted food service provider at Sandy Bay campus has for some time led the way on organic recycling by using an organic waste pick up service through one of the major waste service contractor providers within Tasmania. To support this initiative, they have also enacted the following waste reduction initiatives, which could serve as a model for contracted food venue providers on campus:

- All paper serviettes, disposable tableware, rubbish bin liners are 100% compostable
- Staff are provided with adequate training so that all food products, in fact anything which was once alive is put into organic waste bins
- Used oil from the deep fryer is recycled for use as biodiesel
- Re-usable cups for all takeaway hot drinks
- Minimising food waste by having a changing menu that allows dishes to be designed with what food is in the cool room with all stocks and sauces made from vegetable and meat off-cuts
- All off-site catering is delivered on good quality melamine platters, quality baskets and not disposable platters or cardboard boxes

Issues encountered by this non-contracted food venue provider in relation to their waste reduction goals has been the University's contract cleaners and passers-by using their exterior bins, resulting in contamination. Lockable bins, signage, informing contract cleaner not to use these bin and regular policing of bins could remedy this situation.

A recent project initiated by ISD and part funded by the City of Hobart involved studying the feasibility of collecting organic waste for composting from Sandy Bay campus and IMAS Taroona site. The project explored a range of technological and process options for composting organic food waste collected from campus caterers and tea rooms and fish waste collected from the fish hatchery at Taroona. Options investigated included an on-campus in-vessel anaerobic digester, vermiform (worm farm), windrow composting, as well as the potential for adding to City of Hobart's existing organic waste project at McRobies Gully Waste Management Centre. The study concluded that an on-campus in-vessel anaerobic digester would handle the estimated 90 tonnes of organics material produced each year at the Sandy Bay campus and have a return on investment of 6.8 years. Additional benefits from such a facility include mentoring opportunities to businesses, councils and other universities, and also leading research for sustainable waste technologies across Australia and internationally. Such a system has been successfully used for many years at the University of the Sunshine Coast called "OSCA"⁹.

Consumables from food and catering service providers

Each campus in Tasmania has at least one food and beverage outlet, primarily through the same contracted service provider. Separation of recyclables and waste to landfill is available within several outlets with improvements underway through the contract management process to ensure more sustainable outcomes are achieved. A key issue is the use of disposable food containers, cutlery and coffee cups that are not compostable or recyclable, which significantly influences University waste and recycling volumes. The City of Hobart's endorsed ban on single-use plastics will, if approved by the State Government Director of Local Government, necessitate a response by the contracted service provider to meet new requirements over the next two years.¹⁰ Other Tasmanian council areas are considering replicating this ban.

As noted, taking lessons from the experience and enactment of sustainability by Sandy Bay campus' non-contracted food venue provider could prove useful in making more sustainable the practices of contracted food service providers on campus. Some areas for consideration to reduce waste include ceasing use of non-compostable coffee cups and rubbish bin liners, not providing plastic water bottles for

⁹ <https://www.usc.edu.au/explore/sustainable-usc/waste-and-recycling/on-site-composting-apparatus-osca>

¹⁰ <https://www.hobartcity.com.au/Business/Food-businesses/Single-Use-Plastics-By-Law-Information>

catering, not providing single use petroleum based disposable cutlery, and providing a process to compost organic waste.

A further area of improvement could include minimising over-catering for events and enacting procedures to ensure that left-over food from catering and service provision can be accessible to students (such as through a 'FoodFinder' app as developed by University ICT students in 2018) or donated to organisations that have safe practices for the re-distribution of un-eaten quality food to those in need. These aspects of waste generation could be addressed by modifying contract terms and engaging contracted food service providers regarding benefits to them, the university and society in further enacting waste reduction procedures. In terms of the latter, the University could encourage contracted food service providers on campus to sign up to the 'Responsible Cafes' initiative¹¹.

The 'Responsible Cafes' initiative aims to connect waste-conscious cafes that offer discounts for bringing your own coffee cup with waste conscious consumers. The University could also direct the contracted food service providers on campus towards being involved in the 'Give a Fork Campaign'¹². Run by the Australian organisation 'Sustainable Table' the 'Give a Fork Campaign' gets participating cafes or restaurants to develop and sell menu specials that follow a set of rules to make this offering as sustainable as possible, with a portion of their sales donated back to 'Sustainable Table'. The organisation Restaurant & Catering Australia also provides an education and certification program called 'Green Table Australia' that supports and recognises Australian restaurants and cafes who take a range of actions to reduce negative impacts on the environment and society¹³. On the demand-side, education campaigns on sustainable food consumption on campus could involve producing a University endorsed and publicised 'Sustainable Food Consumption Guide and Checklist' that cover both food consumption at food venues on campus and during event organisation would be useful.

In addition, continuing to provide water refill stations across campuses and associated education campaigns on the negative effects of plastic waste will help reduce demand for plastic water bottles. In this respect, all catering service providers and event organisers could be encouraged by the University to provide options to avoid plastic bottled water at University events. To support this campaign the University could expand efforts to replace all bottled water coolers with permanent filtered water taps to all building tea rooms and provide re-usable water bottles as part of the campaign.

¹¹ For more information on the 'Responsible Cafes' initiative please see <https://www.responsiblecafes.org/>.

¹² For more information on the 'Give a Fork' campaign please see <https://sustainabletable.org.au/give-a-fork-campaign/>.

¹³ For more information on the 'Green Table Australian Environmental Sustainability Accreditation' please see <http://rca.asn.au/rca/accreditation-best-practice/#greentablesection%20>.

Re-using and re-purposing University items

While recycling helps to reduce the impacts of waste generation, action to reduce consumption in the first place maximises the preservation and conservation of natural resources. One way to reduce consumption at the University is through the re-purposing of unwanted items that normally would be diverted to landfill. To support this, ISD successfully implemented a Re-Use Program¹⁴ for all Tasmanian campuses in 2016-2017. The Re-Use Program allows staff to list, view and claim unwanted items suitable for re-use within the University on an online catalogue. In 2017 the Re-use Program saved the University operational budget an estimated \$111,499, and reduced waste by 11.8 tonnes and greenhouse gas emissions by 29.3 tonnes.¹⁵ Improving this program would involve expanding coverage to different types of items such as lab equipment, electrical appliances and office supplies. For lab equipment, lab managers, ITS and Procurement would need to be engaged to develop opportunities within existing processes. The program could also benefit from developing and providing additional avenues of disposal, such as purchase by staff and give-aways to students and charities. The program is currently for use only by the University's Tasmanian campuses, which presents an opportunity to explore re-use at the NSW campuses as well. Furthermore, students have expressed interest in having a similar platform for their personal use and as a way to minimise waste during accommodation move outs. The latter would involve engagement with the Tasmanian University Union (TUU), Student Life and Programmed Property Services (management agency for the accommodation buildings).

At the end of the year, the University's accommodation facilities produce a significant amount of waste as students leave for holidays or move out. To reduce waste to landfill, Accommodation Services in partnership with the ISD Sustainability Team has encouraged departing residents to put items into various bins for recycling and donation to charity or re-use via the Giving Tree initiative for several years. Newnham campus and Sandy Bay campus maintain on an ad hoc basis a very small store for the swapping of re-usable items by students. This has been valuable as students from interstate/overseas were found to often purchase smallgoods such as desk lamps, printers, DVD players, kettles or coffee machines at the start of their residence then simply throw them away at the end of their study periods. Despite this attempt to reduce waste to landfill, many useable items still end up in the waste skip with a range of items that could be recycled.

In addition, poor outcomes arise from cleaning contractors having little time to sort through and segregate waste into bins as well as poor signage, communication, and lack of options throughout the year to separate and segregate waste for re-use or recycling. With the move to outsourcing operational

¹⁴ <http://www.utas.edu.au/infrastructure-services-development/sustainability/recycling-and-waste-management/accordion-recycling/re-use-program>

¹⁵ Data Sourced from UTAS Re-Use (Warpit) Website/Monthly Reports.

control over maintenance and other contracted services of student accommodation, waste produced by accommodation students could become harder to manage for the University. To help ensure sustainable waste management outcomes are achieved the University has requested that the outsourced facilities management and service provider include a plan in respect to waste minimisation from accommodation facilities during the year and during annual cleanouts.

Public place and building recycling

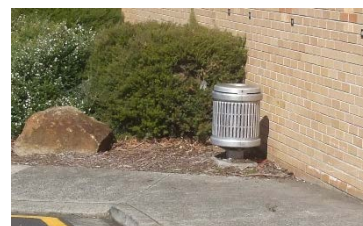


Since 2013, commingle recycling bins are generally co-located with general waste bins as part of the University's existing public place and building recycling service. However, a very large number of single litter bins (with no co-located recycling bin provided) still exist as well as a range of different public place recycling bin types and labelling/signage currently being used (even in one location).



Student research projects have demonstrated that this approach is resulting in high contamination rates. Contamination of recycling streams is a significant issue and a problem that undermines zero waste initiatives. Waste processing facilities can only handle a certain level of contamination when it comes to recycling. High contamination rates can result in recyclable items ending up in landfill. Better communication on how to recycle, easy to understand bin signage and engagement initiatives that create a recycling conscious culture would help reduce contamination rates. Furthermore, a range of studies

both within Tasmania and on the mainland demonstrate a greater recovery rate of recyclables if all general waste bins in public areas ('litter bins') are co-located with recycling bins. These studies also highlight the value of standardised bins, labelling, and communication media, and the co-location of all general waste bins with companion bins that provide for a range of different recycling options in addition to commingled as appropriate. Through partnerships with the Packaging Stewardship Forum and other key stakeholders the University can continue to replace single litter bins with co-located waste and recycling bin-sets. As part of reviewing the efficiency of waste services, removing redundant single litter bins that are in areas with bin sets or no longer frequented spaces should be a priority.



There is also potential to expand public place recycling options to cater for the many different types of potential recyclables. Recycling stations similar to that set up by the City of Hobart (Figure 8) could be set up to for each campus to not only provide expanded service options for a range of recyclables but also provide a means to engage the University community with sustainable waste management.



Figure 8: Photo of City of Hobart’s recycling unit for difficult to recycle items

There is scope to improve the current recycling system across all staff and student workstation and tea rooms. Again, the experience of universities in Table 1 could help provide a model and as described above under organic waste, such a model could involve replacing existing workstation general waste bins with smaller versions and providing an additional organics bin, commingle recyclable bin and office paper waste bin. These bins and larger versions of these bins (paper recycling bin already provided next to most photocopiers) provided within tea rooms could be serviced by contract cleaners rather than staff or students. Furthermore, by making staff and students themselves responsible for emptying their general waste bins into larger versions provided in tea room would facilitate greater consciousness over waste generated. It would also help to provide a cost-effective solution for expanded recycling opportunities within University buildings. Common rooms such as computer labs and student lounges will require more specific consideration on potential waste stream and engagement of cleaners for emptying. Any project of this nature would have to make sure that cleaning contractors use compostable and transparent bin liners that can be handled easily and accepted by organic waste and recycling service providers (noting that all commingled recyclables in bags need to be emptied into collection bins loosely – that is not in the bin liner bag).

E-waste recycling

For several years ISD in partnership with the ITS ran an ad-hoc e-waste collection service for its Tasmanian campuses. Recent years has seen this service cease with a formal end of life e-waste service contract taking its place for registered ITS assets.

Improvement in the area of e-waste would involve better communication of recycling services whether provided through the University's waste management contractor or other external parties. For example, while ITS provides e-waste recycling for ITS-registered assets through its contracted services, many staff are unaware of this provision. In addition, this service is currently not rolled at out in NSW, which ITS has flagged is being explored. There is also a lack of drop-off points for University e-waste associated with the registered assets (e.g., keyboards, mice, cords).

In addition, the University generates significant non-ITS registered e-waste equipment such as student mobile phones, printers, toner cartridges, etc that can be recycled. Toner cartridges and mobile phones have free drop off and collection points at most campuses, through Planet Ark, and Mobile Muster, respectively. Currently non-ITS electrical items such as microwaves, toasters, fans, and heaters can be recycled through the ISD contracted e-waste service. However, there are still gaps in this service as the option is not well known. There is also a need to develop a recycling option for remaining types of non-ITS-registered e-waste generated by both staff and students (e.g., USBs, cabling) that are not currently collected for e-waste through contracted services or Planet Ark and Mobile Muster. Many of these items, however, can be recycled through organisations such as Terra Cycle and other e-waste recyclers.

Procurement practices and contracts

The University Procurement Policy May 2017 includes the provision that all procurement activities must address social, environmental and sustainability considerations (see Appendix 2 for an excerpt). In this respect, and as an example of leadership and initiative the University's Integrated IT Services Contract, managed by ITS, now mandates compliance of contractors to sustainability requirements such as meeting ISO environmental standards, take back of e-waste, mobile devices, printers and toner cartridges. These contractual requirements also form part of the Tender Response Document (see Appendix 3 for excerpts from the University Integrated IT Services Contract and Tender Response Document). It would be useful to review the implementation of associated processes and systems with both initiatives. No doubt across the University there are many contract managers who also have experience embedding sustainability provisions within contracts. Hence, a community of practice¹⁶ could be formed involving contract

¹⁶ In the discussion paper a 'community of practice' is a group of people who share, as part of collective, their experience and learnings of developing, implementing and or enacting a particular practice or project so as to further develop their understanding of their practice and profession.

managers across the University so as to specifically improve sustainable waste management outcomes and in general deliver on sustainability aspirations sought by the University. Overall the University would benefit from the development of procurement guidelines and procedures on how to reduce waste as well as how to ensure purchasers first make use of re-useable items within the University then source where possible from suppliers who offer products made from recycled material.

In general, improvements to contracted services would improve waste management outcomes. One example is in mercury lamp recycling wherein currently unless ISD performs the servicing of mercury lighting, it is left up to electrical contractor to decide whether they recycle when replacing any mercury lamps. Provisions could be included in contracts to ensure recycling is mandated for electrical work.

The University currently has a state-wide Waste and Recycling Contract in Tasmania and a waste management service in place for NSW campuses. A contract has not been established for the latter due to relatively small amount of waste generated from these campuses. Collection of waste to landfill and recycling data is provided to the University as per contract requirements. However, this data is based on an estimation rather than actual weights. This is largely because waste removal vehicles in Tasmania are not equipped with weighing capabilities. This could be addressed through a negotiated contractor term requiring where possible accurate data and costing based on weight. While it is understandable there would be time constraints to this requirement being implemented, the waste contractor would be clear regarding University aspirations around accurate waste data and factor that into contract bids.

In the case of NSW campuses waste data is not collected as part of the waste management service, this will need to be rectified to ensure waste management activities are effective. Collaborating with other universities, local governments, and other institutions seeking waste reduction within NSW may prove helpful to address this data issue as well as achieving broader waste management goals.

Improvement to contracts also provides service users a means to not only be aware of current service options but can identify gaps in service needs, get assistance from contract managers in responding to these gaps in service, and importantly understand the consequences of centralised budget constraints in meeting their needs. The latter may encourage collaborative resourcing to provide solutions. The University cleaning contract complements the waste management contract as it also governs waste handling across campus which impacts costs associated with waste and resource recovery management. The waste and recycling contract provides a set cost rate (including bin provision and servicing) for each bin type by campus. In addition to the standard sizes and service costs, the University can incur additional costs for extended services such as if the bins are to be locked, or temporarily deployed for events or clean-outs, items requiring deep burial, or for loose collections requiring manual handling. The servicing of the bins by cleaners incurs a 'per service' charge for emptying internal bins under the cleaning

contract. In addition, the grounds contractors service external litter bins. All these need to be factored in when planning to introduce additional waste and recycling services (both within buildings and in public areas externally). Hence, configuration, scoping of and multiple contributions towards these contracted services with the flexibility to increase the comprehensiveness of services offered in response to changing needs is instrumental to achieving waste reduction goals and objectives.

Medical, research and trade waste

A comprehensive waste management plan would also include within its scope recycling and resource recovery of medical and research waste. Currently this waste is managed through on-call arrangements through different waste contracts. Furthermore, while ISD may contract out a collection service for medical and research waste it is largely handled and managed separately by the relevant College due to its hazardous, sensitive and specific nature. Examples include:

- Medical and clinical waste (e.g., Menzies, School of Medicine)
- Chemicals and paints (e.g., Chemistry, Architecture and Design)
- Large laboratory equipment
- Animal waste from laboratory experiment (e.g., IMAS/ Menzies/ Veterinary Science disciplines)
- Hazardous waste such as radioactive, asbestos, quarantine (e.g., Plant Science or IMAS)
- Trade waste from University sites

Beyond appropriate safe disposal (deep burial for many of these items), recycling and resource recovery initiatives have not been explored for medical and research waste. There are currently opportunities within Tasmania and abroad for recycling and resource recovery for non-hazardous components of this waste stream such PVC IV bags, masks and tubing¹⁷, however negotiating this within contracts may again be constrained by quantities produced and the economic viability of service provision. The University could work with other organisations that also produce this type of waste and negotiate a collaborative service agreement. To this end several staff from the Royal Hobart Hospital Environmental Group have expressed interest in establishing a collaborative project to reduce medical waste. Medical supplies such as out of date first aid kits may also be able to be re-used within the University or external parties. Another area worth exploring are the options around composting non-hazardous animal waste. The University could also learn from what other universities are doing in this space. For example, the

¹⁷ In addition to the service provided by Environex within Tasmania, Vinyl Council Australia could be approached as part of a collaborative project with other organisation interested in recycling PVC IV bags, masks and tubing. See <http://www.vinyl.org.au/pvc-recycling-in-hospitals> for further information.

University of Adelaide has successfully implemented a composting process on campus for animal waste from its School of Animal & Veterinary Sciences (Table 1) or via hot composting options employed by some local councils to address animal roadkill collections.

Signage and engagement

To support waste reduction at the University a waste engagement poster (Figure 9) was developed for use across all campuses and facilities. However, posters by themselves have minimal effect in behaviour change. Positive outcomes require effective signage and labelling alongside diverse engagement activities.

Regarding bin signage and labelling, many approaches have been applied (see Appendix 2 for examples), noting that these are generally in line with national standards for colours assigned to waste streams (usually following international standards). It will be important that the University ensure the signage approach it takes is consistent and complementary to that of the communities in which we operate,

especially city level signage. Given that the University operates across several jurisdictions, it might be that campus-specific signage is necessary, but with common elements employed for University staff and students that move between campuses.

Regarding engagement materials, there is increasing acknowledgment that one-size fit all solutions do not work and that information alone does little to change behaviours situated in different material, social, cultural, institutional and economic contexts. To encourage waste reduction behaviour by staff, students and visitors it is important to not only provide information and more effective communication to motivate change but also to provide appropriate infrastructure and services that make a given practice easy to take up. Another aspect of addressing the complexity of waste practices is to have sustainable waste management seen as important and integral part of the approach to creating a sustainable university. Explicit top-down leadership here is essential as well involving and collaborating with the broad range of university stakeholders in helping to identify and provide solution to unsustainable waste management practices. Stakeholders include staff, students, contractors and external parties such as local and state governments, other universities, institutions and industries.

**YOU DON'T NEED AN
ENVIRONMENTAL
SCIENCE DEGREE
TO CHOOSE
THE RIGHT BIN**



It is recognised that personal contact is an effective way to engage people in behaviour change. The University has a Sustainability Representatives network that provides a mean to engage people personally in sustainable behaviour change with this taken more broadly across all staff with implementation of the new Green Impact engagement program in 2019 after being trialled in 2018. This program involves staff and students who volunteer to act as ‘local champions’ to encourage sustainable behaviour change within their specific work areas. While this program has aimed to create a sustainability ethic generally within the work place, there is scope and demand to make waste reduction a specific focus. Beyond providing support and information to Sustainability Representative on current waste services and reduction initiatives, grants and incentives could be made available for carrying out or developing waste initiatives. This would further serve to empower these individuals and build ownership into practices for change.

Other general engagement strategies include:

- Ongoing consultation with staff, students and the wider community on the development and implementation of a waste reduction strategy and associated action plans.
- Communication of University waste reduction initiatives and opportunities to become involved using existing media outlets, bulk email, web, social media, online videos, news@UTAS, etc.
- Conducting surveys to understand the different meanings and values people place on reducing waste, identify opportunities and barriers to sustainable waste management and obtaining staff and student input on how things are working and could be improved.
- Conducting workshops and focus groups specifically to educate for sustainable campus waste management as well as further opportunities for staff and students to shape the University’s approach to waste management.
- Holding awareness raising events and campaign such as:
 - Waste reduction challenges, competitions, and/or pledges
 - Host waste reduction stalls at O-Week and through the year at various campuses
 - Complementary to a ‘Sustainable Food Consumption Guide and Checklist’ for university event management, develop educational signage for events that explain how to recycle
 - HACK style project where teams are formed to address waste problems on campus and/or which affect the University
 - Organise guided site visits throughout the year, for university staff and students, to material recovery facilities, re-use facilities, and landfills
 - Gamify waste reduction education and other developing other initiatives that make learning for sustainability fun and playful.

Another valuable way to directly engage both students and staff in operational waste management is through the Sustainability Integration Program for Students (SIPS). Developed by the University Sustainability team and the Education for Sustainability Community of Practice (EFS CoP), SIPS offers a cooperative arrangement between operations and academic areas to provide educational and experiential learning opportunities for students and researchers through collaboration with professional staff working on sustainability related projects. This allows sharing of expertise, skills and information for sustainability between academic and operational areas of the university. This program offers mutual benefit in that professional staff benefit from student work in solving operational problems and deepening their understanding of their practice and academic staff benefit in term understanding the nature of real issues on campus with the opportunity provided to shape the University sustainability.

By 2018 SIPS had encompassed over 110 projects across most campuses and sustainability-related subject areas, involved more than 1300 students, 32 staff, and 12 discipline areas. Past waste-related projects include organic waste collection trials, an organic waste to compost feasibility study, re-use furniture cataloguing, accommodation cleanouts waste reduction, waste auditing, signage design and testing, and case study development. These projects have proved valuable. For example, waste auditing has provided an understanding of contamination rates and potential areas for improvement.

CONCLUSION

The University has enacted a range of initiatives and measures that support sustainable waste management on campus. This discussion paper has highlighted, despite much effort to reduce waste, the University still has a long way to go to meet waste management performance indicators relevant to the Australian university sector let alone being a leader in the communities in which the University operates. Reflecting this, several areas for improvement to current waste management practices have been identified. What is clear is that the University already possesses the institutional structures and policy settings in which a concerted focus on sustainable waste management would be successful. To this end, it has implemented a range of programs which demonstrate commitment to sustainable waste management and improving engagement with sustainable practice at the University.

The drivers for action or inaction on waste is changing rapidly due to greater attention given to it by society in general and the recent controversies surrounding its environmental and economic impacts. It also has become a significant focus for those who see the power of addressing unsustainable resource consumption through a focus on waste. There several universities within Australia as well as local governments who are leading the charge towards the notion of producing zero waste. This laudable goal offers the potential to reinvigorate investment into local industries devoted to resource recovery and in

turn create circular economies based on resource conservation. While the goals of zero waste may present challenges for the University it also presents a range of opportunities. The University can play a key role in establishing a circular and collaborative community based around zero waste goals in Tasmania and abroad by helping business, industry and government innovate in terms of waste management practices and services. In this light, the following represent specific opportunities and natural advantages for the University from leadership in sustainable waste management, including:

- Existing governance structures in place to ensure transparency, initiative and collaboration in terms of sustainable waste management practices on campus
- Intellectual capacity and potential to innovative and lead research, education and operational practice and in the development of technologies, systems and processes
- Influence from University purchasing policies, contracts and general buying power has on Tasmanian and broader markets
- Economic, social and environmental benefits of better resource recovery processes and procedures, and efficient resource consumption practices
- Role and reputation as a generator and facilitator of networks and partnerships for cultural change between education, government, business, industry and the community sector.

Recommendations

The University's Sustainability Committee through the Sustainability Manager take carriage for the following:

1. Develop a Waste Reduction and Resource Recovery Strategic Plan in response to this paper.
2. Consult on the draft strategic plan with all relevant stakeholders including, but not limited to:
 - a. Internal stakeholders such as:
 - i. ITS, Procurement Section, all ISD units, TUU, Student Accommodation, Lab Managers and other academic staff responsible for waste generation through teaching and research activity,
 - ii. Student body, including non TUU student associations and groups,
 - b. External stakeholders: local and state government, waste service providers, cleaning contractors, contracted and non-contracted food service providers on campus, and in general all contractors who generate waste on or through servicing campuses.
3. Finalise the strategic plan in response to the consultation effort.
4. Seek endorsement and approval of the strategic plan from stakeholders, the Sustainability Committee, and University Executive Team (and University Council as appropriate).
5. The Sustainability Committee monitor implementation of the Waste Reduction and Resource Recovery Strategic Plan.

APPENDIX 1

Table 3: Waste streams and their fate

Southern Tasmania		
Waste Stream	Disposal Location	Final Destination
General Waste	Southern Waste Solutions, Lutana	Copping Landfill
Cardboard & Paper	JJ Richards Montrose baling facility	VISY Recycling, Coolaroo VIC
Comingle Recycling	SKM Recycling, Derwent Park	Various interstate recycling facilities
Security Shredding	Shred-x, Derwent Park	VISY Recycling, Coolaroo VIC
Electronic Waste	Toxfree, Rokeby	Toxfree, Dandenong VIC
Medical Waste	Southern Waste Solutions, Lutana	Copping Landfill

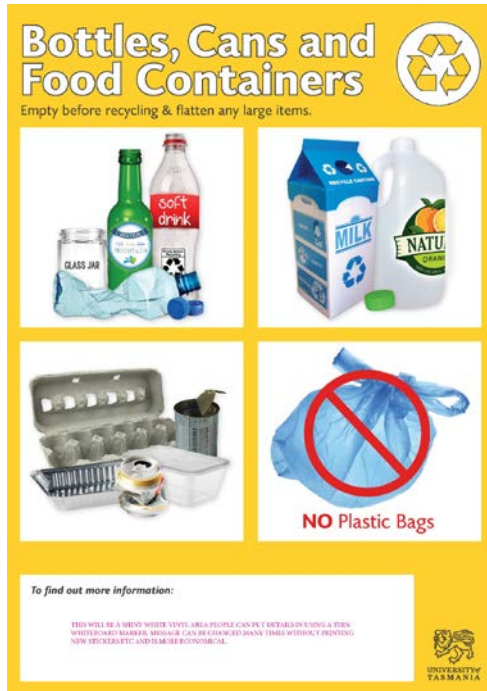
Northern Tasmania		
Waste Stream	Disposal Location	Final Destination
General Waste	Launceston City Council	LCC Landfill, Mowbray
Cardboard & Paper	JJ Richards Recycling Facility	VISY Recycling, Coolaroo VIC
Comingle Recycling	JJ Richards Recycling Facility	Various interstate recycling facilities
Security Shredding	Shred-x, Derwent Park	VISY Recycling, Coolaroo VIC
Electronic Waste	Recycal, Rocherlea	Various interstate metal merchants
Medical Waste	Southern Waste Solutions, Lutana	Copping Landfill

North-west Tasmania		
Waste Stream	Disposal Location	Final Destination
General Waste	Dulverton Waste Management	
Cardboard & Paper	JJ Richards Recycling Facility	VISY Recycling, Coolaroo VIC
Comingle Recycling	JJ Richards Recycling Facility	Various interstate recycling facilities
Security Shredding	Shred-x, Derwent Park	VISY Recycling, Coolaroo VIC
Electronic Waste	Recycal, Rocherlea	Various interstate metal merchants
Medical Waste	Southern Waste Solutions, Lutana	Copping Landfill

APPENDIX 2

Bin signage examples

University of Tasmania (draft versions)



University of the Sunshine Coast

University of Adelaide (2011)



Melbourne Airport



MONA bins



Unidentified location



University of Melbourne (2019)

ORGANIC WASTE ONLY

PLEASE SEPARATE FOOD SCRAPS FROM PACKAGING







**NO MEAT, CUPS, CANS,
PLATES, PLASTIC, PAPER,
BOTTLES OR WRAPPERS**

Landfill

All these items will be buried in landfill

- ✓ Paper towels
- ✓ Bioplastics
- ✓ Soft plastics
- ✓ Coffee cups
- ✓ Food waste
*where a compost bin is not available



DO NOT put e-waste or batteries in these bins.
There are separate collections for these items.
For further information please visit: sustainability@unimelb.edu.au



Recycling

Only these items can be recycled

- ✓ Tins & cans
- ✓ Glass bottles & jars
- ✓ Paper & cardboard
- ✓ Rigid plastic containers & bottles



DO NOT put e-waste or batteries in these bins.
There are separate collections for these items.
For further information please visit: sustainability@unimelb.edu.au



APPENDIX 3

Excerpt from the University Procurement Policy 2017 concerning sustainability.

3.5 Social, Environmental and Sustainability considerations

In line with the University's Statement of Values, all procurement activity must endeavour to address and take into account the following:

- engagement with, and consideration of, local community interests
- environmental and sustainability issues– specifically addressing the University's commitments in this area. Tenders should specifically reference these requirements and require tenderers to respond directly by addressing them in their tender submissions. Procurement will comply with the Sustainability Policy and with the goals of Sustainable Procurement.
- social responsibility - including considerations such as health and safety, human rights, ethical production processes, Fair Trade, diversity and other social impacts of procurement processes and the selection of goods and services. This responsibility extends also to the eventual disposal of goods.

APPENDIX 4

Excerpt from the University Integrated IT Services Contract concerning sustainability.

8.20 University Sustainability Requirements

- (a) The Contractor agrees to comply with any specific directions from the University regarding sustainability where relevant to the provision of the Products and/or the Services.
- (b) In particular, the Contractor must:
- (i) comply with ISO 14024 or ISO 14021 at the level of Electronic Product Environmental Assessment Tool (EPEAT) "Silver" rating or equivalent as a minimum standard for relevant Hardware being supplied under this Contract;
 - (ii) comply with the current version of ENERGY STAR® for any relevant Hardware supplied under this Contract (refer <http://www.energyrating.gov.au/programs/high-energy-performance-standards/energy-star-australia/>);
 - (iii) where no other disposal arrangements are specified for equipment supplied under this contract:
 - A. for ICT equipment covered by the National Television and Computer Recycling Scheme, the Contractor will take back the supplied equipment at end-of-use for re-use or resource recovery; and
 - B. for mobile devices/toner cartridges, the Contractor will either take back the devices/cartridges at end-of-use for re-use or resource recovery, or dispose of through a suitable recycling program;
 - (iv) be a signatory to the Australian Packaging Covenant or comply with the requirements of the National Environment Protection (Used Packaging Materials) Measure (unless exempt by legislation); and
 - (v) have an Environmental Management System aligned to the ISO 14001 standard or alternatively, implement business processes that are aligned to the ISO 14001 standard within six months after the commencement of this Contract.
- (c) Terms used in this clause that are not defined in this Contract, have the meaning attributed to them in the ICT Sustainability Plan.

Excerpt from the Tender Response Document

Section 6.4 Sustainability

Do you comply with any environmental management standards (for example ISO 14001-2004)? Provide evidence of where you apply these standards.

Response (250 words – add materials if required)

Does your organisation have a commitment to improving its sustainability performance?

Response

Does your organisation have a process to identify the sustainability issues which will have a major impact on your operations?

Response
