COMMISSIONER FOR SUSTAINABILITY AND THE ENVIRONMENT

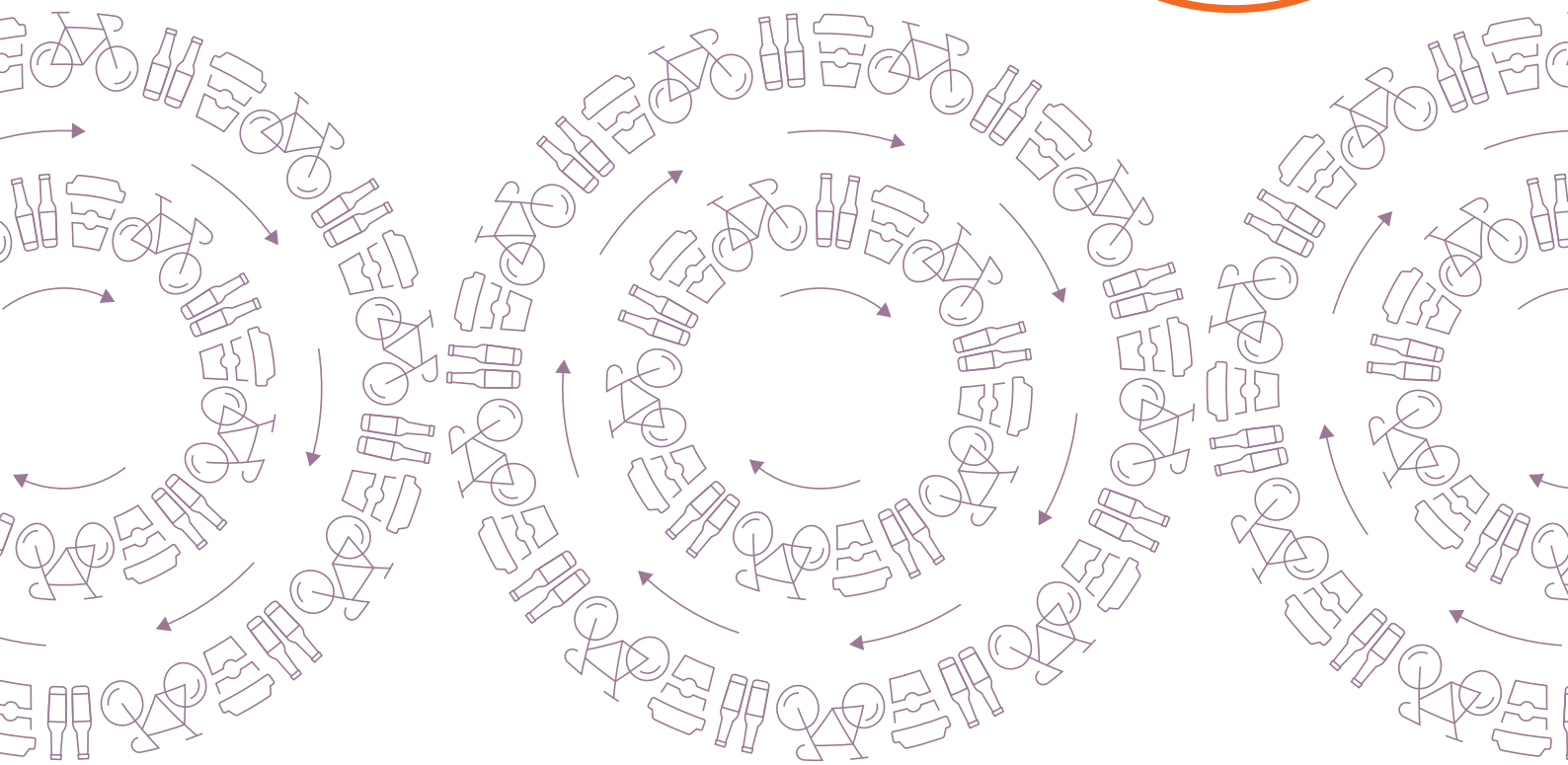
CIRCULAR CBR ECONOMY

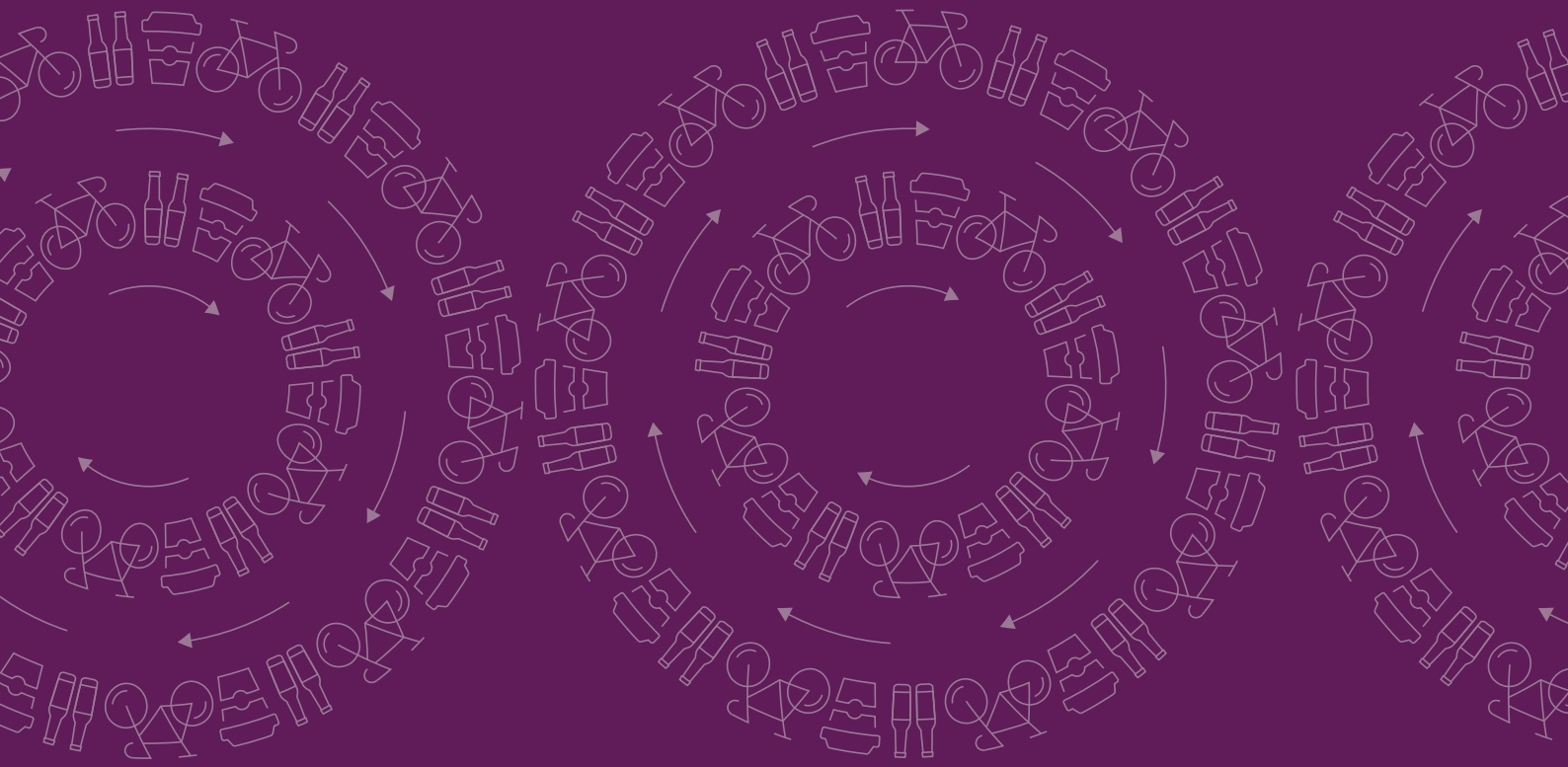
CIRCULAR_CBR – UNLOCKING THE POTENTIAL OF A CIRCULAR ECONOMY IN THE ACT

ISSUES PAPER 2019/3

UNRESTRICTED:
Suitable for all ages

September 2019





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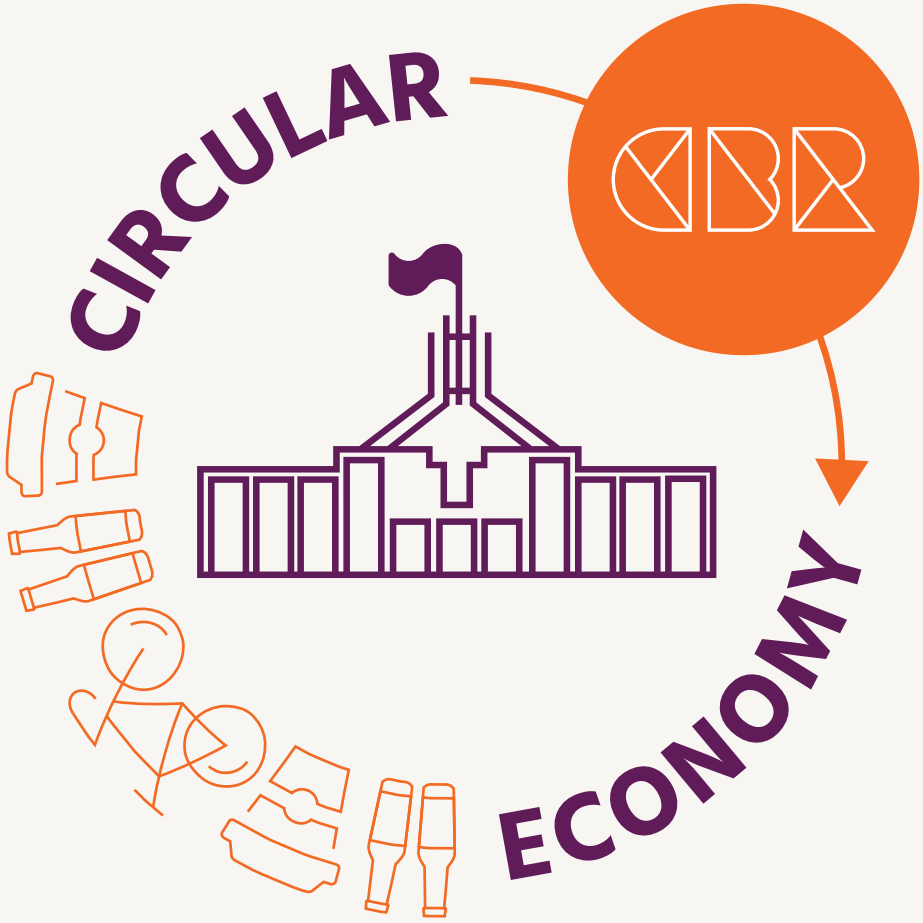

CIRCULAR
CBR
ECONOMY

1. Summary

This paper has been developed to inform the Commissioner and the ACT on the following issue:

What is the current status and future potential for a circular economy strategy for the ACT?

In light of the ACT Government declaring a climate change emergency on 16 May 2019, the transition to a circular economy is now even more urgent. 710 jurisdictions in 16 countries have declared a climate emergency. In Australia, 25 jurisdictions, representing ten per cent of the population have declared a climate emergency. The movement is working to mobilise local and global action against climate change.

This Issues Paper has identified the following key issues and opportunities:

2. Background

Issue

This paper has been developed to inform the Commissioner and the ACT on the following matter:

What is the current status and future potential for a circular economy strategy for the ACT?

This matter derives from the Unfantastic Plastic Minister Directed Investigation conducted in 2018 and is related to the preparation of the State of Environment Report 2019.

Purpose

The purpose of this paper is to:

- Inform the Commissioner of the performance status of the ACT,
- Raise awareness and understanding in the community, and
- Engage and motivate key stakeholders to take action.

Statutory Relationships of Issues Papers

The Commissioner is an independent statutory position established by the *Commissioner for Sustainability and the Environment Act 1993*.[1] The Commissioner undertakes the following functions and activities:

- Investigating complaints about the management of the environment by the Territory or a territory authority; and issues relating to ecologically sustainable development in the ACT;
- Conducting investigations as directed by the Minister;
- Conducting on the Commissioner's own initiative, investigations into actions of an agency where those actions would have a substantial impact on the environment of the ACT; and
- Delivery of state of the environment reports.

In exercising these functions, the Commissioner must take into account the objects of the Act. Outlined in Section 2(B), these are to:

- ensure regular and consistent reporting on matters relating to the condition and management of the environment in the Territory;
- ensure regular reporting on progress towards ecologically sustainable development by the Territory and Territory authorities;
- encourage decision making that facilitates ecologically sustainable development;
- enhance knowledge and understanding of issues relating to ecologically sustainable development and the environment; and
- encourage sound environmental practices and procedures to be adopted by the Territory and Territory authorities as a basis for ecologically sustainable development.

Under Section 12 (1)(c) of the *Commissioner for Sustainability and the Environment Act 1993*,[2] one of the Commissioner's functions is "conducting, on the Commissioner's own initiative, investigations into actions of an agency where those actions would have a *substantial impact* on the environment of the ACT."

In Section 19 (2) (e) (ii), the Commissioner must give a State of Environment Report to the Minister every four years that must include *any other matters, whether or not occurring within the triennium to which the report relates, that – the commissioner considers relevant*.

The Commissioner's Issues Papers are linked to these statutory requirements.

Issues Papers are a preliminary exploration into matters of environmental significance to the ACT, informing the Commissioner and Minister on matters to be considered for investigation.

There is no statutory requirement for Issues Papers to be tabled in the Legislative Assembly, or for recommendations to be presented. This is only required if the matter is elevated to an investigation.

1 https://www.legislation.act.gov.au/a/1993-37 Accessed 1 May 2019
2 https://www.envcomm.act.gov.au/about/our_role, accessed 25 January 2019

3. Introduction

We live in a world of limited resources. Our lifestyles have developed to a point where we consume more than our planet can sustain.

The latest results from the National Footprint Accounts for the year 2014 indicate that humanity's Ecological Footprint is 1.7 Earths, and that global ecological overshoot continues to grow.[1]

The ACT has an ecological footprint nearly 14 times the geographical area of the ACT.[2]

There has been considerable effort in Australia to recycle our waste.

We are slowly transitioning our energy infrastructure to renewables to reduce our reliance on fossil fuels.

But we still need to do more.

A transition to a circular economy is needed to make better use of our resources and minimise impacts to our natural environment. Governments and businesses globally are embracing this as a major opportunity to change patterns of production, consumption and waste.

FACT

The average ecological footprint of Canberrans is 8.9 global ha per person

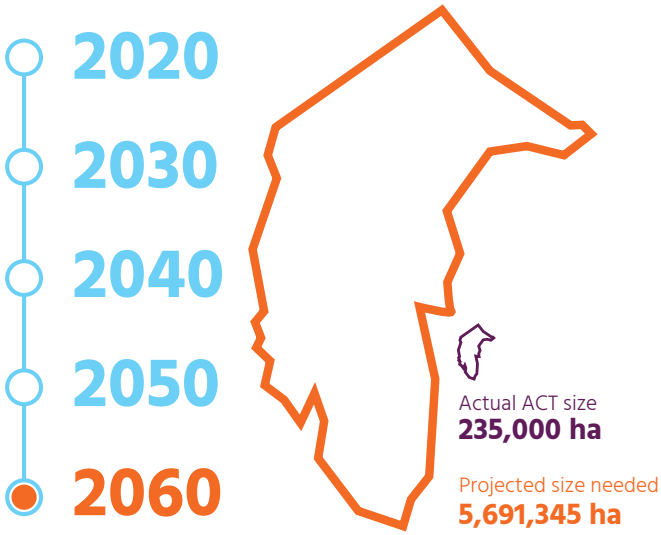
Based on 2011 - 2012 data

PROJECTION POPULATION GROWTH FROM

2016 → **2060**

396,675 PEOPLE **669,814 PEOPLE**

From the State of Environment Report 2015



1 Lin, D.; Hanscom, L.; Murthy, A.; Galli, A.; Evans, M.; Neill, E.; Mancini, M.S.; Martindill, J.; Medouar, F.-Z.; Huang, S.; Wackernagel, M. Ecological Footprint Accounting for Countries: Updates and Results of the National Footprint Accounts, 2012–2018. *Resources 2018*, *7*, 58

2 http://reports.envcomm.act.gov.au/actsoe2015/wp-content/uploads/EcologicalFootprint_-fact-sheet-pdf.pdf Accessed 22 May 2019

What is a Circular Economy?

A circular economy is centred on keeping our products, components and materials circulating in use for as long as possible at their highest intrinsic value.[3]

The ultimate aim of the circular economy is to minimise the amount of natural resources consumed and waste generated.[4]

Thinking about the way our economy works and our use of resources: it can be linear, or linear with a focus on recycling and reuse, or ultimately – circular.

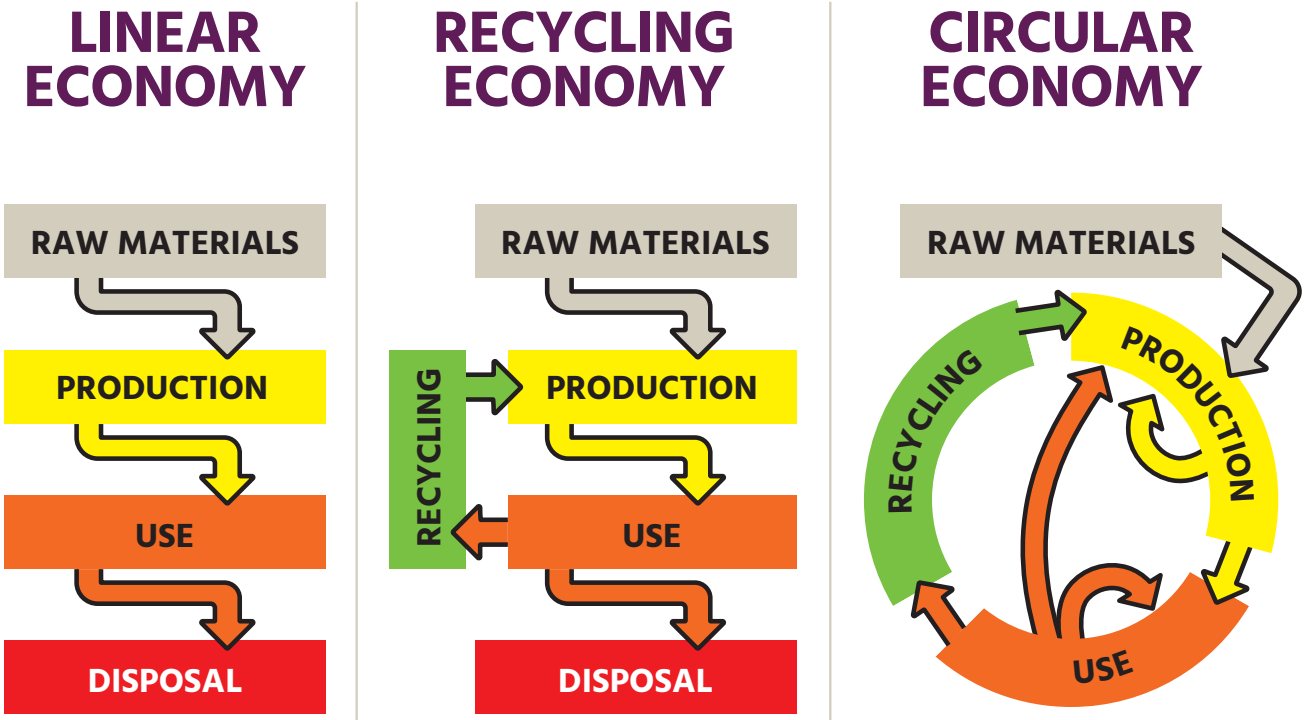
Underpinned by a transition to renewable energy sources, the circular model is based on three principles:

- design out waste and pollution,
- keep products and materials in use, and
- regenerate natural systems.

A critical element is to eliminate waste through design to make products more durable, able to be repaired and refurbished for reuse, and able to be disassembled.[5]

But rather than just focusing on waste and recycling, a circular economy approach analyses the whole supply chain of a system, identifies inputs and outputs and works to maximise economic value.[6] A supply chain is also referred to as a value chain.

A truly circular economy must include procurement and design principles that pursue substitution of natural resources.[7]



Source: **University of Technology Sydney (UTS), Institute for Sustainable Futures**

3 https://www.ellenmacarthurfoundation.org/circular-economy/concept accessed 17 December 2018
4 https://theconversation.com/the-planned-national-waste-policy-wont-deliver-a-truly-circular-economy-103908 accessed 5 February 2019
5 Arup 2016: *The Circular Economy and the Built Environment*
6 OEC 2008: *Measuring Material Flows and Resource Productivity*
7 https://www.irishtimes.com/news/science/reuse-and-recycle-it-s-the-circular-economy-stupid-1.3688457 Accessed 6 June 2019

A Step Forward through a Shared Economy

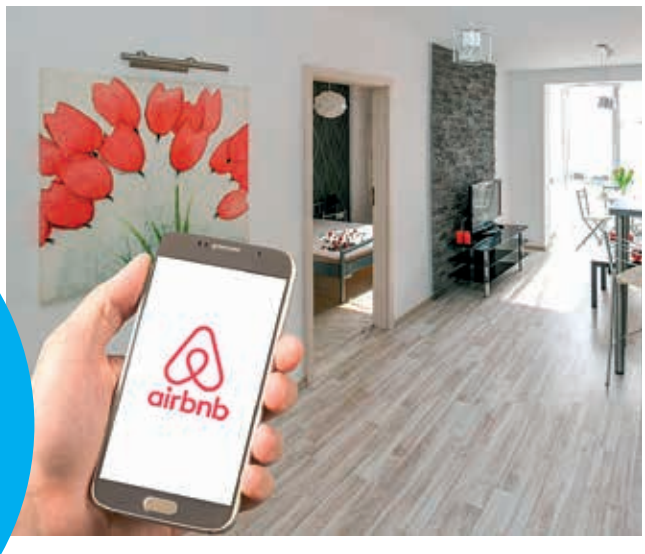
As a step forward, a shared economy is emerging, working to deliver a circular economy in a society that is moving away from ownership to sharing and leasing arrangements.

Car share (i.e. Goget, Uber), room share (Air BnB), bike share, clothes rental, electronic device leasing are all examples that are already in place. Toy libraries are an example of sharing at the local, non-business level. Sharing is not a 'fringe' activity.

Treating our products as services to share when not in use, could ultimately mean that fewer resources are needed as assets are more fully utilised and their lifecycles extended and diversified.

Shared Economies are established concepts specifically featuring in the ACT's strategic policies for transport in the form of ride/car/bike share.

Canberra also has a proliferation of community-based share economies (see page 26–27).



We have seen an explosion in the sharing economy and this trend is likely to continue.[8]

8 https://www.weforum.org/agenda/2019/01/sharing-economy/ Accessed 22 May 2019

Case Study

MORE THAN RECYCLING – NIKE, APPLE AND IKEA

International companies such as Nike[9] and Apple now have plans to source 100 per cent of their product-related materials from recycled goods. Apple is closing the loop by bringing back e-waste into its productions.[10]

Ikea aims to become a fully circular business by 2030. Its targets include designing products so they can be repurposed, phasing out virgin oil-based plastics from products and ensuring all packing materials are made from renewable or recycled material.[11] Ikea's purchasing strategy actively drives circular economy outcomes by seeking to optimise all parts of the value chain.

Ikea's procurement standard IWAY,[12] includes a code of conduct for suppliers. IWAY specifies proper practice for suppliers for environmental and social issues, such as:

- Forestry regulations
- Child Labour
- Forced and bonded labour
- Workplace discrimination
- Working conditions
- Minimum wages and overtime
- Environmental pollution
- Chemicals and hazardous substances
- Safety standards and workers accident insurance

The Commissioner's staff visit the Canberra Ikea Store with Ikea's Sustainability Manager

Source: Kirilly Dickson

9 https://purpose.nike.com/circular-innovation-challenge Accessed 6 June 2019
10 https://www.edie.net/news/5/Apple-to-launch-material-recovery-lab-after-ramping-up-circular-economy-drive/ Accessed 6 June 2019
11 https://highlights.ikea.com/2017/circular-economy/ Accessed 6 June 2019
12 https://www.ikea.com/ms/ar_QA/about_ikea/pdf/SCGlobal_IWAYSTDVers4.pdf Accessed 13 June 2019

Fact Box

WHAT DOES A CIRCULAR ECONOMY MEAN FOR ME?[13]

Households

Many households have already adopted circular economy principles, reusing, repairing and recycling items.

Households now have access to a much wider range of goods and services – that are often shared with other users in the community – without having to incur the cost of buying and maintaining them.

Generally, households are also becoming more discerning, looking for products that last longer and are easily repairable. Providing better information to consumers on the durability of products could promote better choices about what products they buy.

Businesses

Moving to a circular economy increases the resilience of local markets and industry to external shocks and stresses, particularly in resource commodity markets.

Moving to a circular economy will provide opportunities for innovation in process and product design, to assist businesses in becoming more resource and energy efficient.

Adopting a circular economy will develop new markets for recyclable material, increasing remanufacturing.

Sharing platforms and product repair are important components of a circular economy, and provide new and diverse ways of doing business. This results in job growth and supports the local economy.[14]

Fact Box

AUSTRALIAN PACKAGING COVENANT ORGANISATION (APCO)[15]

APCO is a co-regulatory, not for profit organisation, partnering with government and industry to reduce the environmental impact of packaging in Australia.

The Covenant was first developed in 1999 to bring all components of the packaging chain together, close the recycling loop and to create value by developing sustainable recycling systems.

It is an agreement between APCO, representing its industry members; and federal, state and territory Governments, endorsed by environment ministers. The ACT Government is a Covenant signatory.

The Covenant aims to reduce the environmental impacts of Consumer Packaging by supporting two goals:

- Optimising resource recovery of Consumer Packaging through the supply chain. By making changes in design, use and purchase of packaging and packaged products, packaging can use less resources and be more easily recycled. This enables packaging materials to be returned to the economy thereby minimising waste associated with packaging across the supply chain.
- Preventing the impacts of fugitive packaging on the environment. This is to be achieved by adopting approaches that support new innovations and find solutions to capture packaging materials or waste before it enters the environment, or support the adoption of new or alternative types of packaging.

The ACT Government actively contributes to achieving the National Packaging Target of 100% recycled, reusable or compostable packaging by 2025 or earlier.

13 https://engage.environment.nsw.gov.au/circular/faqs#38945
14 https://www.weforum.org/agenda/2019/01/sharing-economy/ Accessed 22 May 2019
15 https://www.packagingcovenant.org.au/ Accessed 6 June 2019

Case Study

GERMANY – TOTAL PRODUCT STEWARDSHIP[16]

In Germany, under waste management law, manufacturers are required to assume responsibility for any product that engenders waste, particularly when it comes to taking products back and recycling them.

Such stewardship is meant to encourage manufacturers to prevent waste during the product design and manufacturing phases, and to ensure that end-of-life products can be recycled.

The laws define the scope of product stewardship for packaging, motor vehicles, portable batteries, electric and electronic devices, and petroleum products.

This is one regulatory mechanism to drive the circular economy by motivating manufacturing design with pathways for deconstruction and reuse.

Case Study

AUSTRALIA – PARTIAL PRODUCT STEWARDSHIP[17]

Product stewardship is an approach to managing the environmental, economic and social impacts of various products and materials.

It acknowledges the shared responsibility to ensure that products or materials are managed to reduce their impact, throughout their lifecycle, on the environment and on human health and safety.

The Federal *Product Stewardship Act 2011*[18] provides the framework to effectively manage the environmental, health and safety impacts of products, and in particular those impacts associated with the disposal of products. The Act is currently under review.

The intention of the Act is to reduce waste and prevent harmful materials from ending up in landfill by increasing recycling and the recovery of valuable materials from products.

The Act relies on the industry to voluntarily apply the framework. There are currently no fully mandatory product stewardship schemes in place under the Act.[19]

Examples of Industries working to the Product Stewardship Act include Tyre Stewardship Australia, MobileMuster and Paintback. Paintback has been operating at the Mugga Lane and Mitchell transfer stations since 2017.

MobileMuster

MobileMuster gained accreditation in 2014 under the *Product Stewardship Act 2011.*

It is administered by the Australian Mobile Telecommunications Association (AMTA) on behalf of the mobile phone industry. Members of the scheme include all major handset manufacturers and all the network carriers. The members voluntarily fund the promotion, collection and recycling of mobile phones, their batteries, chargers, accessories, mobile modems and smart watches. This program is highly visible and actively promoted and communicated to the community. The process is shown in the graphic over page.

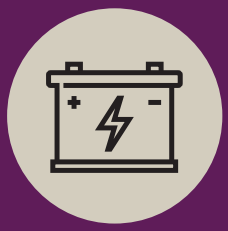
MobileMuster is available at Telstra, Optus and Vodafone stores across Australia, as well as other specific locations in the ACT such as the National Library as well as shopfronts for Salvos Stores, Battery World, Storage King, and Officeworks.

Paintback

Paintback has been operating since 2016 and collects and recycles old paints and packaging. In 2017 Paintback was an ABA100 Winner for Sustainability in the Australian Business Awards, and a finalist in the prestigious Banksia Sustainability Awards.[20] [21]

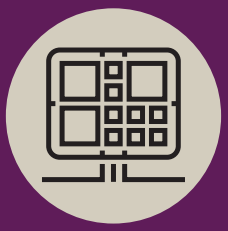
16 https://www.umweltbundesamt.de/en/topics/waste-resources/product-stewardship-waste-management accessed 5 February 2019
17 http://www.environment.gov.au/protection/waste-resource-recovery/product-stewardship accessed February 2019
18 http://www.environment.gov.au/protection/waste-resource-recovery/product-stewardship/legislation accessed 5 February 2019
19 https://www.environment.gov.au/protection/waste-resource-recovery/product-stewardship Accessed 22 May 2019
20 https://www.paintback.com.au
21 http://banksiafdn.com/2017-banksia-communication-for-change/

THE COMPONENTS WE BREAK MOBILES UP INTO INCLUDE:

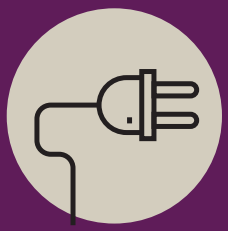


BATTERIES

PLASTICS



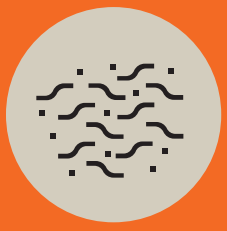
CIRCUITS



ACCESSORIES

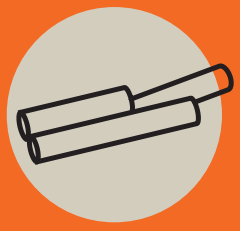
THE STUFF WE COLLECT:

PLASTICS



PRECIOUS METALS

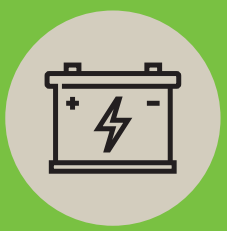
COPPER



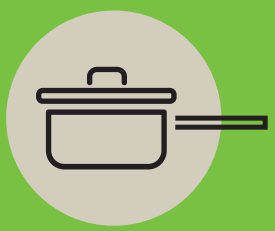
CADMIUM AND NICKEL

SOME OF THE THINGS THAT ARE MADE FROM RECOVERED RESOURCES:

PLASTIC PRODUCTS



BATTERIES



STAINLESS STEEL

Source: **Corporate Waste Solutions**

4.
A Spin Around the Globe

The Ellen MacArthur Foundation and World Economic Forum Developments

In 2013, the Ellen MacArthur Foundation produced the first economic report examining the potential of the circular economy model.[1] The report, which was launched at the World Economic Forum (WEF)[2]:

- highlighted the limits of the linear economy model,
- looked at the benefits that a circular economy model could provide, and
- laid out a roadmap for an accelerated transition towards a circular economy.

Similarly, in 2014, the WEF launched a report entitled Towards the Circular Economy: Accelerating the scale-up across global supply chains.[3] This report aimed to scale up a circular economy concept within the reality of a global economy and its complex, cross-jurisdictional, multi-tier supply chains.

The Senior Director at the World Economic Forum concluded that 'the economic case for shifting to a circular economy is compelling'.

The European Commission

In 2015, the European Commission launched its Circular Economy Package (CEP), with the aim of boosting competitiveness, creating jobs and generating sustainable growth.[4]

The CEP includes revised legislative proposals on waste, as well as an Action Plan that sets out measures to address the phases in the lifecycle of a product—including production, consumption, waste management and the market for secondary raw materials—with the aim of 'closing the loop'.

The CEP was ratified in May 2018 by the European Union Council, and the legislation came into effect in July 2018.[5] Clearly, this decade has seen an unparalleled pace of commitment by business, Governments and Nations to change economic models and reduce our consumption of resources. The closure of some waste markets has further hastened activity in respect of waste, if not the whole supply chain.

The Role of Cities

The Ellen MacArthur Foundation recognises cities as a focal point in the transition to a circular economy. City administrations are seeking ways to embrace change. The circular cities approach leads to wholly new ways of creating value, as well as opportunities to support key mayoral priorities around housing, mobility, and economic development.

The Foundation will soon launch the Circular Economy in Cities, a suite of easily accessible resources which provide a global reference on the topic. Its modules have been developed to respond to the growing interest in circular economy from city governments and mayors, and will offer insights to many other urban stakeholders.[6]

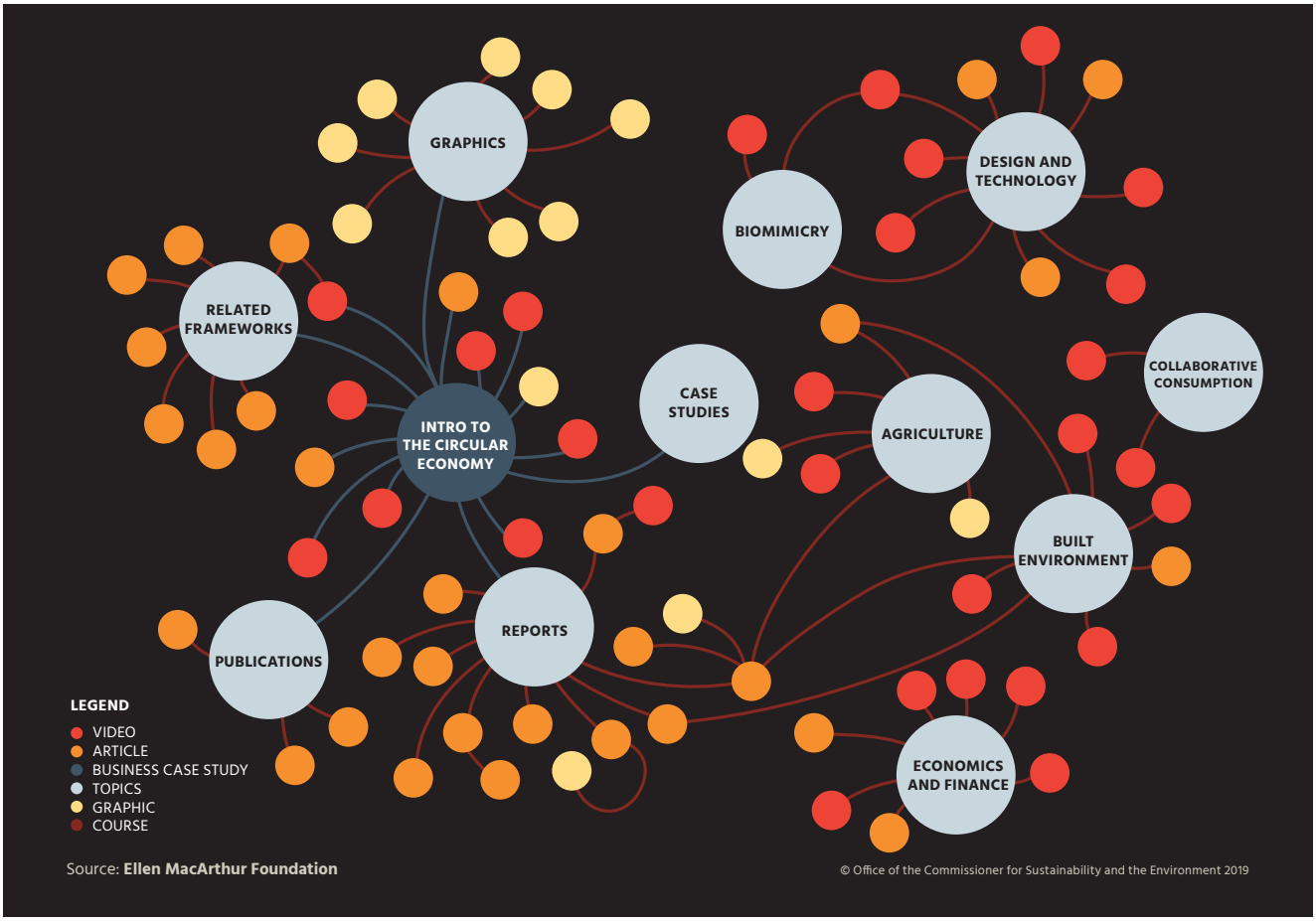
The Foundation provides a huge amount of resources for policymakers, consumers and educators alike. A resource map has been developed to assist people in finding the information they need. This can be seen on the next page.

Some of the key resources that have been developed by the Ellen MacArthur Foundation include:

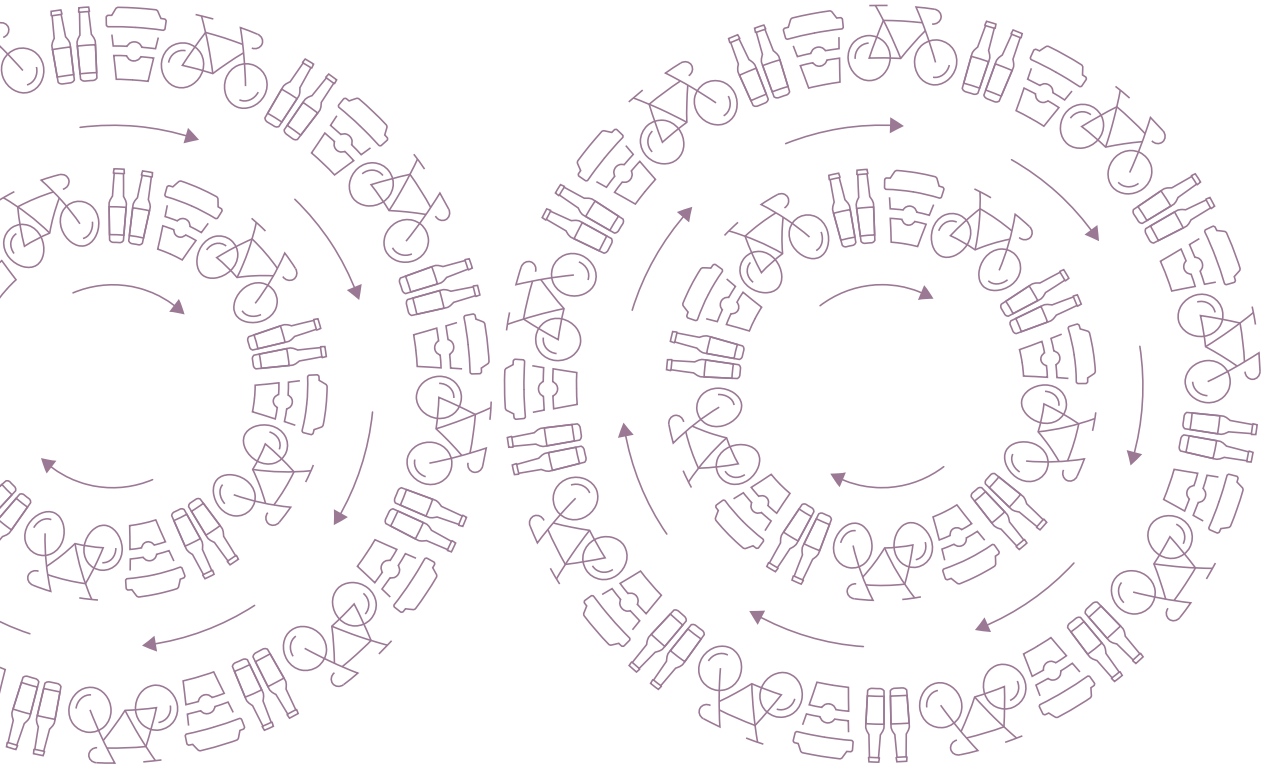
- the RESOLVE framework to help explore practical applications of the circular economy,
- a tool kit for policymakers to deliver a circular economy, and
- a monitoring framework to measure progress towards a circular economy.

These are depicted on the next page.

1 Ellen MacArthur Foundation (2013): *Towards the Circular Economy: Economic and business rationale for an accelerated transition*
2 https://www.weforum.org/
3 World Economic Forum (2014) Towards the Circular Economy: Accelerating the scale-up across global supply chains, Geneva, WEF
4 European Commission (2015) Closing the loop: Commission adopts ambitious new Circular Economy Package to boost competitiveness, create jobs and generate sustainable growth, media release, 2 December.
5 European Commission (2018) Circular Economy: New rules will make EU the global front-runner in waste management and recycling, media release, 22 May; and R. Cole (2018) 'EU circular economy package becomes law', Resource, 20 June
6 https://www.ellenmacarthurfoundation.org/assets/downloads/Circular-economy-in-cities-preview-paper.pdf accessed 22 March 2019



https://kumu.io/ellenmacarthurfoundation/educational-resources#ce-general-resources-map/key-for-general-resources-map



A CIRCULAR ECONOMY TOOLKIT

STEP-BY-STEP METHODOLOGY

1 ALIGN ON STARTING POINT, AMBITION AND FOCUS	2 ASSESS SECTOR OPPORTUNITIES	3 ANALYSE ECONOMY-WIDE IMPLICATIONS
1.1 Baseline circularity level and policy landscape	**2.1** Map circular economy opportunities in each focus sector	**3.1** Quantify economy-wide impact
1.2 Set ambition level	**2.2** Prioritise and detail circular economy opportunities	**3.2** Map economy-wide policy options
1.3 Select focus sectors	**2.3** Quantify sector impact	**3.3** Prioritise, package and sequence policy options
	2.4 Identify barriers	
	2.5 Map sector-specific policy options	

ENGAGE BUSINESSES AND OTHER STAKEHOLDERS

Source: **Ellen MacArthur Foundation**

THE RESOLVE FRAMEWORK

	EXAMPLES	
REGENERATE	• Shift to renewable energy and materials • Reclaim, retain, and restore health of ecosystems • Return recovered biological resources to the biosphere	NESPRESSO
SHARE	• Share assets (e.g. cars, rooms, appliances) • Reuse/secondhand • Prolong life through maintenance, design for durability, upgradability, etc.	airbnb
OPTIMISE	• Increase performance/efficiency of product • Remove waste in production and supply chain • Leverage big data, automation, remote sensing and steering	TOYOTA
LOOP	• Remanufacture products or components • Recycle materials • Digest anaerobic • Extract biochemicals from organic waste	VEOLIA
VIRTUALISE	• Dematerialise directly, e.g. books, CDs, DVDs, travel • Dematerialise indirectly, e.g. online shopping, autonomous vehicles	NETFLIX
EXPLORE	• Replace old with advanced non-renewable materials • Apply new technologies (e.g. 3D printing) • Choose new product/service (e.g. multimodal transport)	PHILIPS

Source: **Ellen MacArthur Foundation**

Developments in Australia

In June 2018, the Senate Environment and Communications References Committee published its report on the waste and recycling industry in Australia.[7] The first recommendation made by the Committee was that the Australian Government establish a circular economy.[8]

The report stated:

> *The committee is of the view that the Australian Government must act urgently to transition away from a linear economy to a circular economy which prioritises the collection, recovery and re-use of products, including within Australia. This transition must include a suite of regulatory and policy changes aimed at influencing behaviour, as well as investments in infrastructure and technology.*

The Governments of Victoria, South Australia, New South Wales, Queensland and the ACT have signalled support for the creation of a circular economy.[9]

The approaches that have been taken to date by the various jurisdictions has varied significantly.

- South Australia and Queensland – Business and industry development focus, Treasury support, building evidence base.
- New South Wales, ACT and Australia – Waste reuse and recovery focus, waste services and environment protection.

The ACT Government and other states and territories currently participate in a national working group tasked to develop a national circular economy strategy, which is likely to go beyond waste.

SOUTH AUSTRALIA – CREATING VALUE

In 2017, the Government of South Australia commissioned a report, Creating Value, into the potential economic benefits of a circular economy in South Australia.[10]

This made South Australia the first jurisdiction in Australia to quantify the benefits of a circular economy.[11] Analysis used input-output modelling based on material flows.

Creating Value found that, compared to a 'business as usual' scenario, implementing a more circular economy in South Australia by 2030 would create an additional 25,700 full-time-equivalent jobs and would reduce the state's greenhouse gas emissions by 27 per cent.

South Australia promotes this work and the journey to a circular economy on its Green Industries web platform.[12] It includes local business examples and links to key resources.

South Australia is currently producing case studies that showcase circular economy achievements. This approach intends to establish a credible evidence base and a platform for broader delivery.

At this stage, the waste, resource recovery and remanufacturing sectors are engaged. Outside of this sector, only sporadic engagement has occurred.[13]

In addition to the Government of South Australia's focus on evidence-based case studies – collaboration, training and investment in commercialisation of innovation are priorities. They have developed a five-day Global Leadership Program on the Circular Economy targeting business and government leaders to develop practical skills to make a difference in the circular economy.[14]

The principles are to:

- minimise consumption of finite resources,
- decouple economic growth from resource consumption,
- design out waste and pollution,
- keep products and materials in use,
- innovate in resource efficiency,
- give preference to higher order re-use and repair opportunities, and
- create new circular economy jobs.

7 https://www.wmrr.asn.au/ and https://www.nwric.com.au/ Accessed 24 May 2019
8 Senate Environment and Communications References Committee (2018) op. cit., p. ix
9 L. D'Ambrosio, Minister for Energy, Environment & Climate Change (2018) New fund to develop markets for recyclables, media release, 29 May; and L. D'Ambrosio, Minister for Energy, Environment & Climate Change (2018) Recycling boost for regional and rural Victoria, media release, 18 June. and Green Industries SA (date unknown) 'Our Priorities', Green Industries SA website; and New South Wales Government (date unknown) 'A circular economy for NSW', NSW Government website and http://statements.qld.gov.au/Statement/2019/2/25/australian-first-circular-economy-lab-opens accessed 22 May 2019
10 Lifecycles et al. (2017) *Creating value: The potential benefits of a Circular Economy in South Australia*, report prepared for Green Industries SA, Fitzroy, Lifecycles
11 Green Industries SA (2017) *Benefits of a Circular Economy in South Australia: Summary, Adelaide*, Green Industries SA
12 https://www.greenindustries.sa.gov.au/ accessed 19 March 2019
13 Pers. Comms, Green Industries SA, 20 March 2019, email
14 https://www.greenindustries.sa.gov.au/leadership-program accessed 21 March 2019

QUEENSLAND – CE LAB

In a first for Australia, a Circular Economy (CE) Lab was launched on 25 February 2019 in Brisbane.[15] The Queensland Government pledged $150,000 to start the initiative which will launch innovative projects to change the way people think about materials, resources and waste in Queensland.[16]

A key feature of the CE Lab will be to consolidate industry, research and government partnerships and expertise to identify and deliver circular economy pilot projects in the following themes:

- food and agriculture,
- the built environment,
- tourism and hospitality,
- retail industry,
- advanced manufacturing, and
- energy and resources.

An example of the Queensland pilot projects.

15 https://circularecolab.com/ accessed 19 March 2019
16 http://statements.qld.gov.au/Statement/2019/2/25/australian-first-circular-economy-lab-opens accessed 19 March 2019

Case Study

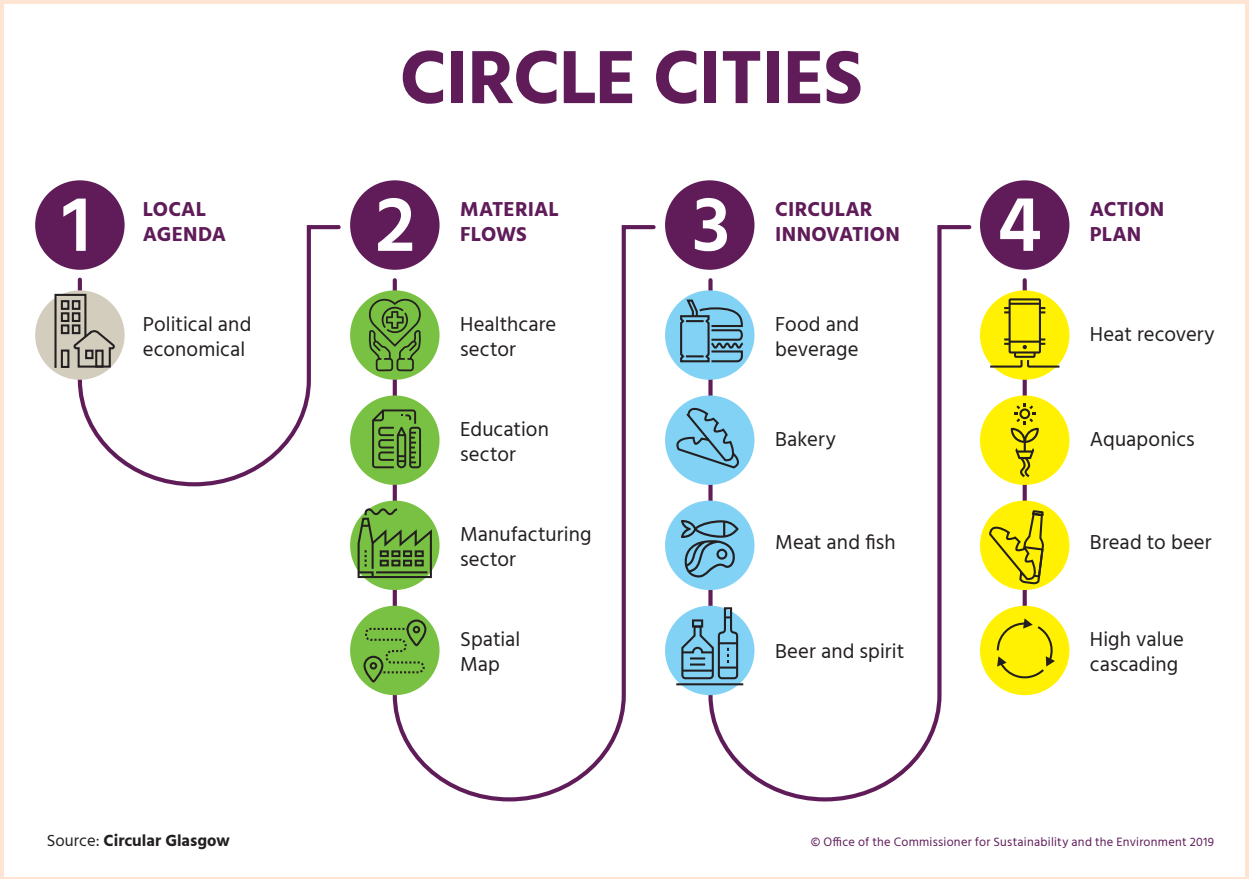
THE SCOTTISH APPROACH – COLLABORATING WITH BUSINESS

Scotland is a pioneering nation and government in the field of circular economy. Scotland has a country wide strategy, *Making Things Last*. It is focussed on collaboration of policy-makers and businesses to accelerate the transition.[17]

Zero Waste Scotland has launched an investment fund to support local businesses. It supports the ambitions of the Scottish Government's *Making Things Last* and its commitment to reducing food waste to 25% of current levels by 2025.

In the city of Glasgow, *Circular Glasgow* aims to build best practice and capacity on circular economy generally across Glasgow businesses – helping them to identify opportunities for support and implement circular ideas.[18] This is facilitated by:

- Workshops and events – a series of knowledge sharing business to business networking events;
- Circle Assessment – a tool which helps businesses understand opportunities to become more circular;
- Circle Lab – an online hackathon event to find a circular solution to a local challenge. Circle Lab sought solutions to make Glasgow's event industry more circular. From over 200 contributions, the three winning ideas include a deposit-based re-use system for food and drink containers, circular designs for event marketing and branding, and a scheme that will repurpose organic waste into energy and fertilisers. Ways to turn these ideas into pilot projects are now being explored.



Source: **Circular Glasgow**

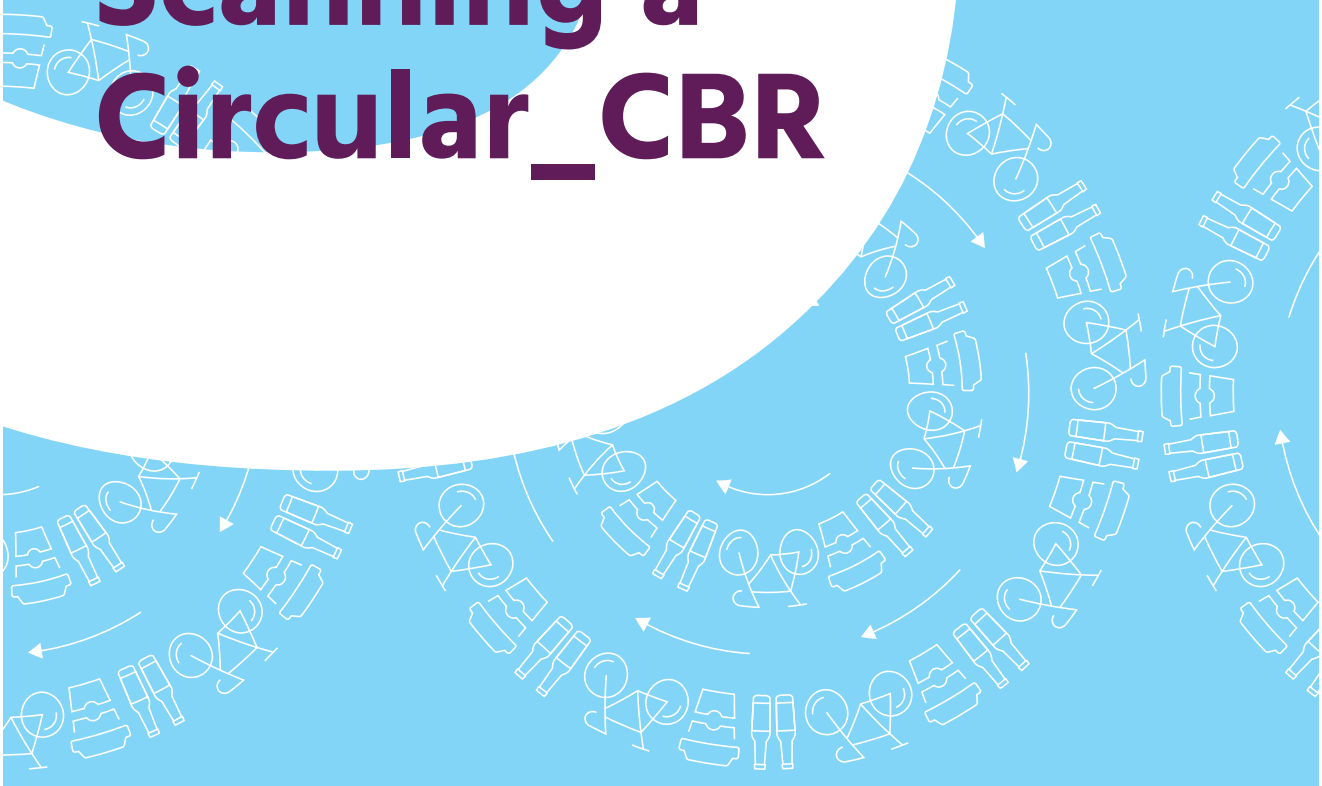
17 https://www.gov.scot/publications/making-things-last-circular-economy-strategy-scotland/ Accessed 22 May 2019
18 https://www.zerowastescotland.org.uk/circular-economy/circular-glasgow accessed 1 May 2019


THE GREEN SHED


ACT
MATERIALS
RECOVERY
FACILITY


OSCA

5. Scanning a Circular_CBR



The ACT is aiming to support a circular economy, where waste materials re-enter the economy by being reused or recycled, rather than 'thrown away'.[1]

The ACT Waste Management Strategy 2011–2025 guides the ACT in reducing waste and recovering resources to achieve a sustainable, carbon-neutral Canberra.

The ACT participated in the development of the National Waste Policy which was supported by the ACT Legislative Assembly and endorsed by the Meeting of Environment Ministers in 2018.

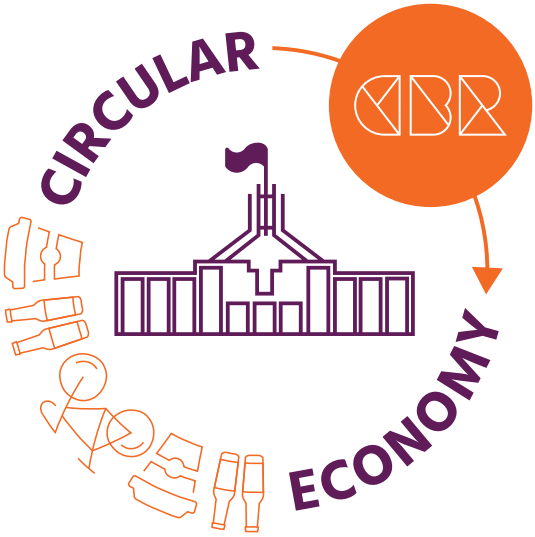
The ACT currently participates in an interjurisdictional working group which is developing the Action Plan that will support the National Waste Policy to implement the circular economy principles. The ACT also participates in an interjurisdictional working group dedicated to the circular economy.

Canberra Region Joint Organisation

The ACT is a member of the Canberra Region Joint Organisation (CRJO),[2] a strategic governance grouping of NSW councils in South East NSW (formerly the South East Regional Organisation of Councils or SEROC).[3]

Waste, including economic opportunities from waste stream processing, has long been an area of interest to the CRJO. Waste management and resource recovery is a priority area in the Memorandum of Understanding[4] between the CRJO and the ACT Government.

CRJO produced a report into waste opportunities in a Greater Capital Region Waste Stream Management Strategy in 2014. Their current Statement of Regional Priorities[5] identifies the need to develop a regional waste strategy. It is anticipated that opportunities for circular economy growth in the region would be an important element of this strategy.



Circular_CBR in Action

Noting a broad commitment to a circular economy by ACT Government, a strategy that builds local industry potential for a Circular_CBR based on comprehensive materials flow analysis has not yet been developed.

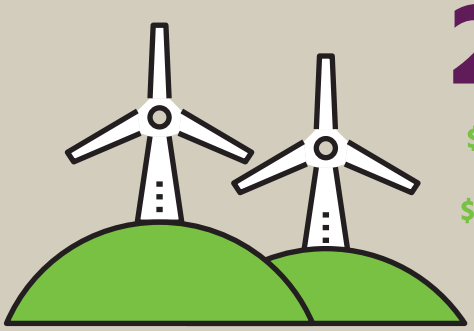
Even without a strategy, there are many industry, community and Government initiatives in the ACT that reflect elements of a circular economy, providing a foundation to build upon. This is not so surprising considering that the ACT is recognised to be the renewable capital of Australia[6] and there is strong community support to reduce waste.[7] This social will to reduce waste was a key finding of community consultation that informed the Unfantastic Plastic report by the Commissioner in 2018.[8]

A range of examples; government, business and community based, are shown over page.

1 https://www.actsmart.act.gov.au/what-is-the-government-doing/waste/waste-management-strategy-2011-2025 accessed 13 February 2019
2 https://crjo.nsw.gov.au/ Accessed 10 May 2019
3 Bega Valley, Eurobodalla, Goulburn Mulwaree, Hilltops, Queanbeyan-Palerang, Snowy Monaro, Snowy Valleys, Upper Lachlan, Wingecarribbee and Yass Valley.
4 http://www.cmd.act.gov.au/__data/assets/pdf_file/0004/1253299/2018-09-14-CRJO-ACT-MoU.pdf Accessed 31 July 2019
5 https://crjo.nsw.gov.au/ Accessed 10 May 2019
6 https://www.abc.net.au/news/2019-05-17/canberra-to-run-on-100-per-cent-renewables-from-october-1/11121676 Accessed 28 May 2019
7 https://www.cmtedd.act.gov.au/open_government/inform/act_government_media_releases/meegan-fitzharris-mla-media-releases/2018/canberras-war-on-waste-to-focus-on-reduce,-reuse-and-recycle-principles and https://www.tccs.act.gov.au/__data/assets/pdf_file/0019/1131814/noWasteby2010strategy.pdf Accessed 22 May 2019
8 https://www.envcomm.act.gov.au/investigations/unfantastic-plastic-review-of-the-act-plastic-shopping-bag-ban,-august-2018 Accessed 14 June 2019

LOCAL EXAMPLES OF A

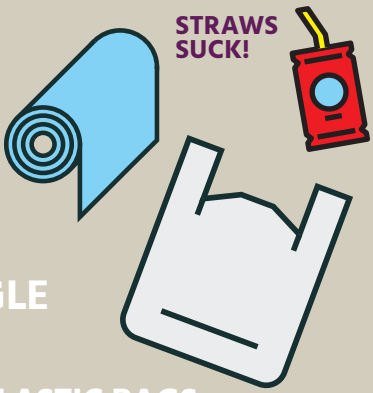
100% RENEWABLE ELECTRICITY BY 2020



- ZERO EMISSIONS
- COMMUNITY GRANTS

ACT PLASTIC BAG BAN

& MOVES TO PHASE OUT SINGLE USE PLASTICS

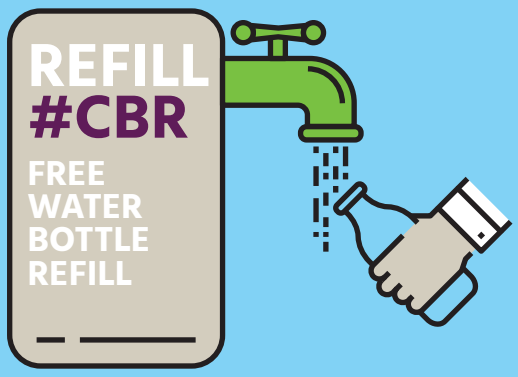


SAVED 55 MILLION PLASTIC BAGS FROM BEING USED IN 2018

REUSABLE COFFEE CUP ZONE TRIAL

REFILL #CBR

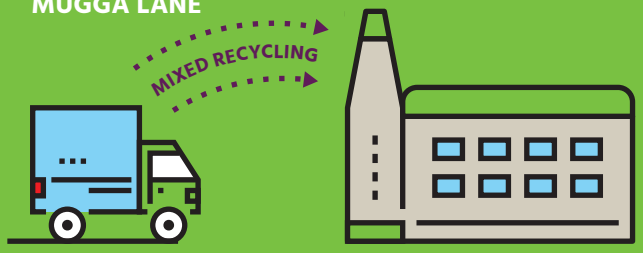
FREE WATER BOTTLE REFILL

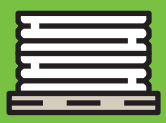


CONTAINER DEPOSIT SCHEME

ACT RESOURCE MANAGEMENT CENTRE

MUGGA LANE





E-WASTE
SOFT PLASTICS
BATTERIES
MOBILE PHONES
MATTRESSES

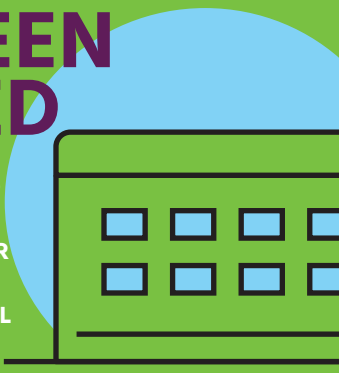
DISCOVERY HUB

ABOUT 4000 VISITED TO LEARN ABOUT RECYCLING SINCE 2018

THE GREEN SHED

SELLING UNWANTED GOODS

SAVED OVER 59 MILLION TONNES TO LANDFILL

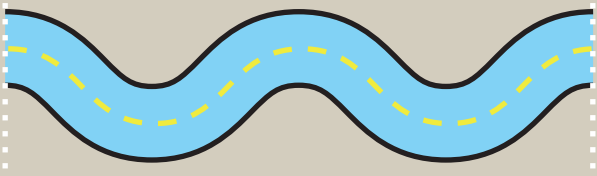


WASTE LEVY

TO BE INTRODUCED 2019-2020

CONSTRUCTION & DEMOLITION WASTE RECYCLING

ACT RECYCLING

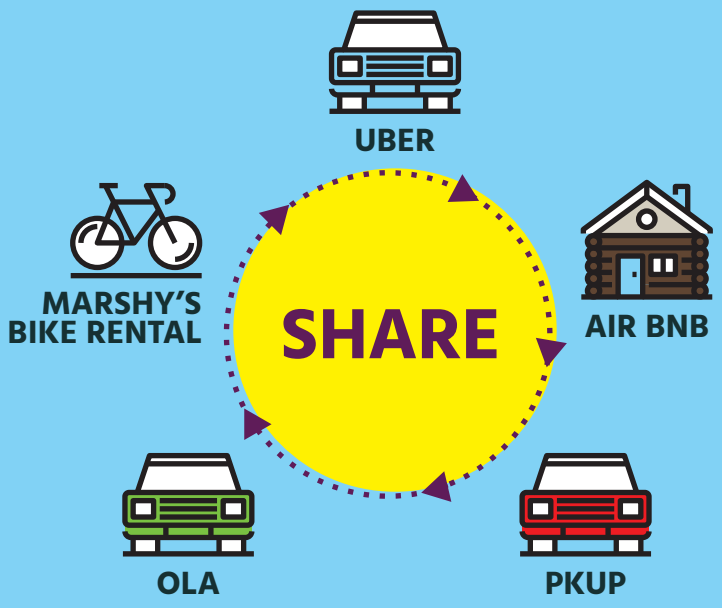


RECONOPHALT

MAKING ROADS OUT OF CRUSHED GLASS FROM CONTAINER AND PLASTIC DEPOSIT SCHEME

EVER EXTENDING KERBSIDE COLLECTION

CIRCULAR #CBR



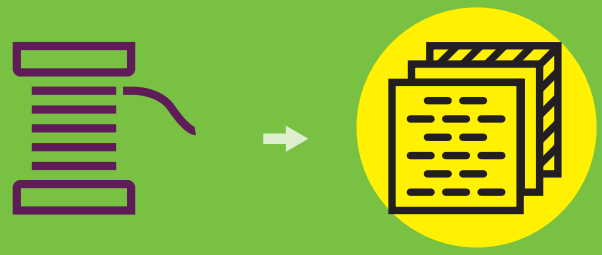
26 – 27

GUMTREE
FACEBOOK
SWAP & SELL
OP SHOPS

THOR'S HAMMER

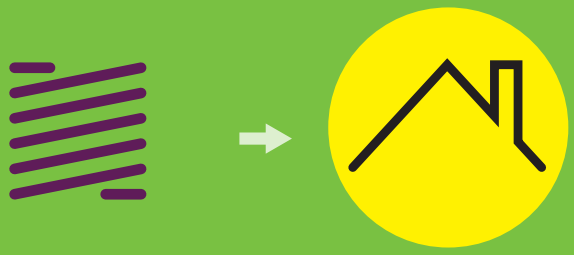
SOFT LANDINGS

75% OF USED MATTRESS COMPONENTS ARE CURRENTLY RECYCLED



TEXTILE

R&D INTO WASTE TO ENERGY AND OTHER END-USE PRODUCTS.

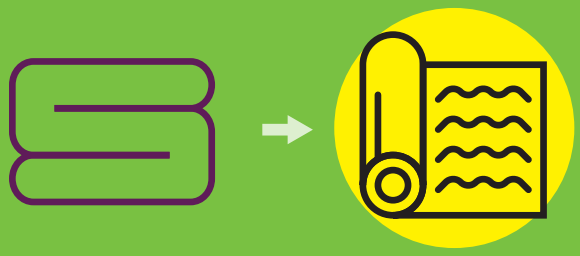


STEEL SPRINGS

RECYCLED INTO PRODUCTS SUCH AS ROOF SHEETING.

TIMBER & HUSK

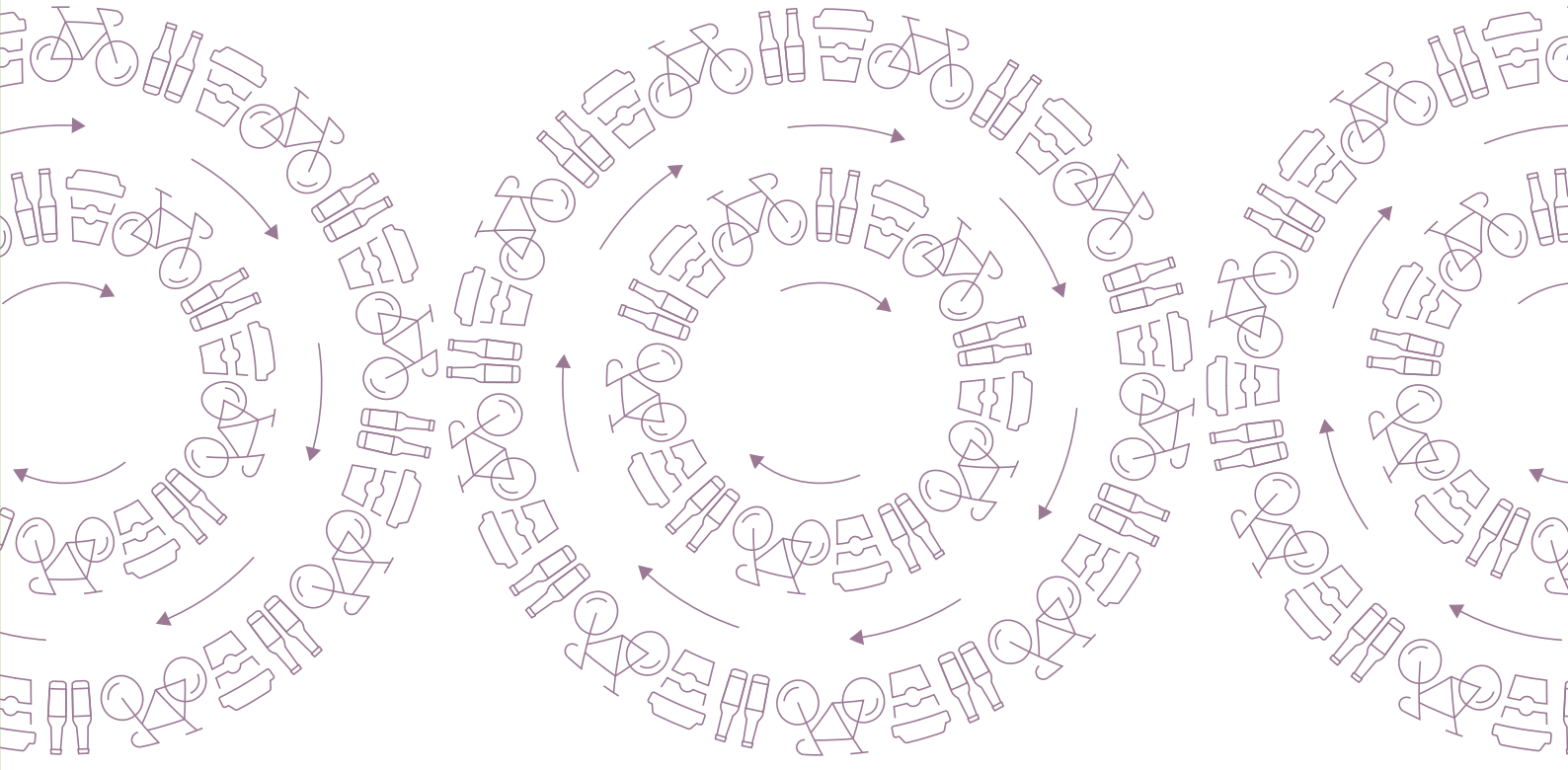
RECYCLED INTO PRODUCTS SUCH AS KINDLING, WEED MATTING, MULCH AND ANIMAL BEDDING.



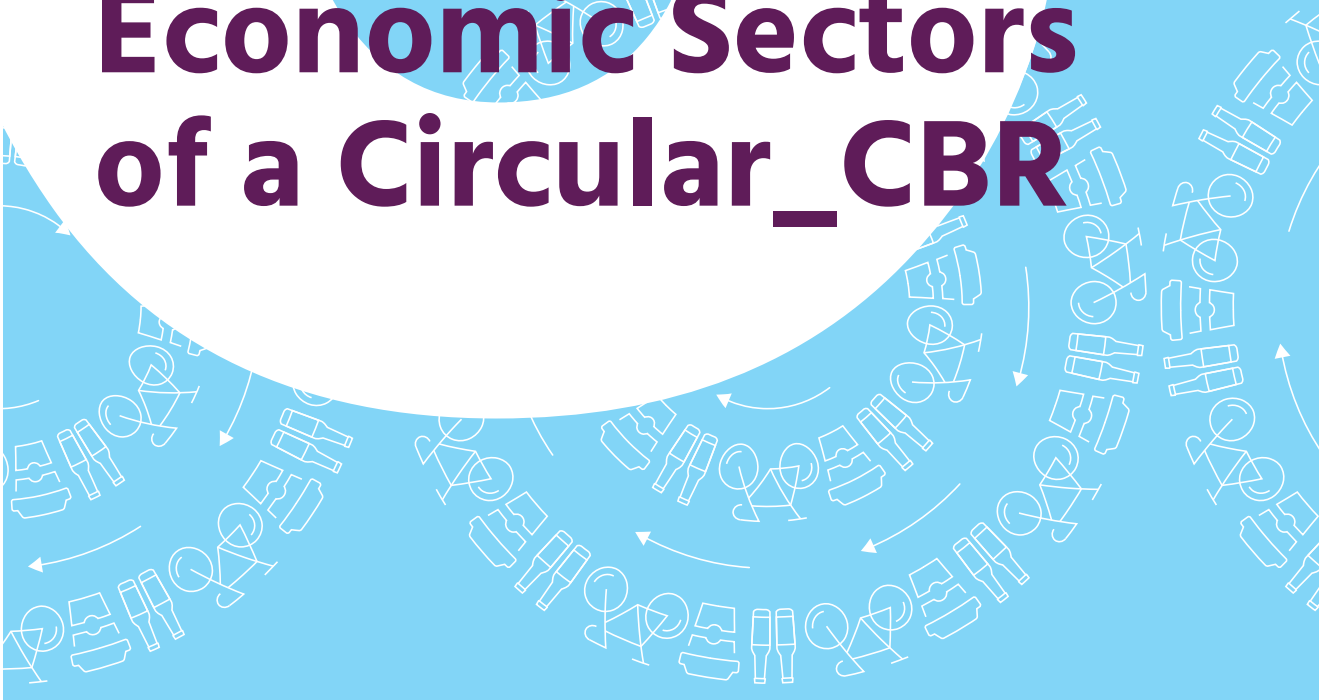
FOAM

RECYCLED INTO CARPET UNDERLAY.

Source: **Soft Landings Business Model, softlanding.com.au**



6. Significant Economic Sectors of a Circular_CBR



The ACT has not undertaken input-output material flow analysis to analyse and identify the benefits of a circular economy approach to an industry or the ACT as a system.

Public Administration is the biggest sector in the ACT, mainly Commonwealth Departments. Government procurement activities could facilitate notable change in the ACT's performance as a circular economy. The Commonwealth and ACT Governments are actively exploring opportunities to support the circular economy through government procurement practices.

ACT Government is currently exploring how the ACT's Sustainable Procurement Policy can better influence the transition towards a circular economy in terms of encouraging higher uptake of recycled content through procurement.

The most significant issues at present are providing the economic business cases and verifying the sustainability claim credibility by suppliers.

The construction industry is the biggest 'manufacturing' sector in the ACT. The industry includes significant Government procurement and local and global firms, small to larger in size.

These two significant economic sectors in the ACT need detailed analysis for circular economic benefits across the complete supply chain. A brief discussion is included below on Construction opportunities before moving into three demonstration systems (Refer to page 35).

Circular Construction #CBR

The construction industry is a large sector in the ACT and includes private enterprises. Construction waste is not just represented in the raw materials itself, but in the energy and embodied impacts related to the production of the materials.

Concrete is the largest consumer of energy in the construction sector by mass. Production and consumption of concrete in the construction industry has huge implications in terms of emissions.

The Canberra Business Chamber released a paper in December 2014 that looked at opportunities to better manage construction waste. [1] The study found that construction and demolition waste from the residential sector in the ACT was around 399,000 tonnes per year. The construction and demolition industry generally all recycle **some** of its waste. However most of the waste is disposed to landfill due to non-sorting and contamination and lack of facilities to sort and/or capacity to remanufacture into reusable materials.

Case Study

CANBERRA – BREMA: DEMOLITION WITH PURPOSE

Brema Group is a demolition company in the ACT whose operations achieve over 85 per cent recycling of waste.[2] Their efforts have seen them win several awards since 2007 including Actsmart's biggest recycler in the ACT in 2016.

Key to their operations is their strategy to sort all waste on their own facilities to maximise the recycling potential and economic return.

Construction in #CBR, Source Kirilly Dickson

1 https://www.canberrabusiness.com/publication/building-construction-waste-material/ Accessed 10 May 2019
2 https://bremagroup.com.au/service/recycling Accessed 10 May 2019

The recent announcement of a waste levy in the ACT is designed to create a more circular approach to construction waste management by sending a strong price signal to industry that recovery is better than landfilling.

Industry has put forward two new waste facility proposals for materials recovery facilities in Fyshwick, Canberra.

These are unsolicited proposals which are currently undergoing the planning approval processes:

- Capital Recycling Solutions' proposed waste stream includes commercial and industrial waste
- Hi Quality's proposed waste stream includes construction and demolition waste.

The circular economy has great potential to help meet global sustainability targets and the Paris Agreement's goals in particular. The built environment, consuming almost half of the world's resources extracted every year and responsible for a massive environmental footprint, is a fundamental sector in the transition from a linear to a circular, more sustainable world.

Moving towards a circular built environment involves a shift in roles and business models for stakeholders active in this sector. However, barriers related to culture, regulations, market, technology and education are slowing down the transition.

World Business Council for Sustainable Development[3]

An example of construction transition to circular economy can be seen in the Circle City initiative in Rotterdam. Following initial assessment, a report[4] found that reducing the city's 350,000 tonnes of construction waste is possible by building houses and offices differently, namely:

- in a way that allows for easy disassembly or renovation instead of demolition;
- using sturdy, long-life materials;
- reusing materials and components in a way that construction and demolition is connected.

Ultimately, the challenge for the industry is how to decouple the relationship between industrial production and resource consumption.

Significant benefits may be facilitated through a detailed circular economy assessment of the construction industry in the ACT, along the complete supply chain from procurement to deconstruction.

3 https://www.wbcsd.org/Programs/Circular-Economy/Factor-10/Resources/pathways-for-business-and-government Accessed 11 June 2019
4 https://www.metabolic.nl/news/rotterdam-a-circular-economy-powerhouse/ Accessed 10 May 2019

Case Study

GLOBAL BECHTEL: CONSTRUCTING CIRCULAR PROJECTS[5]

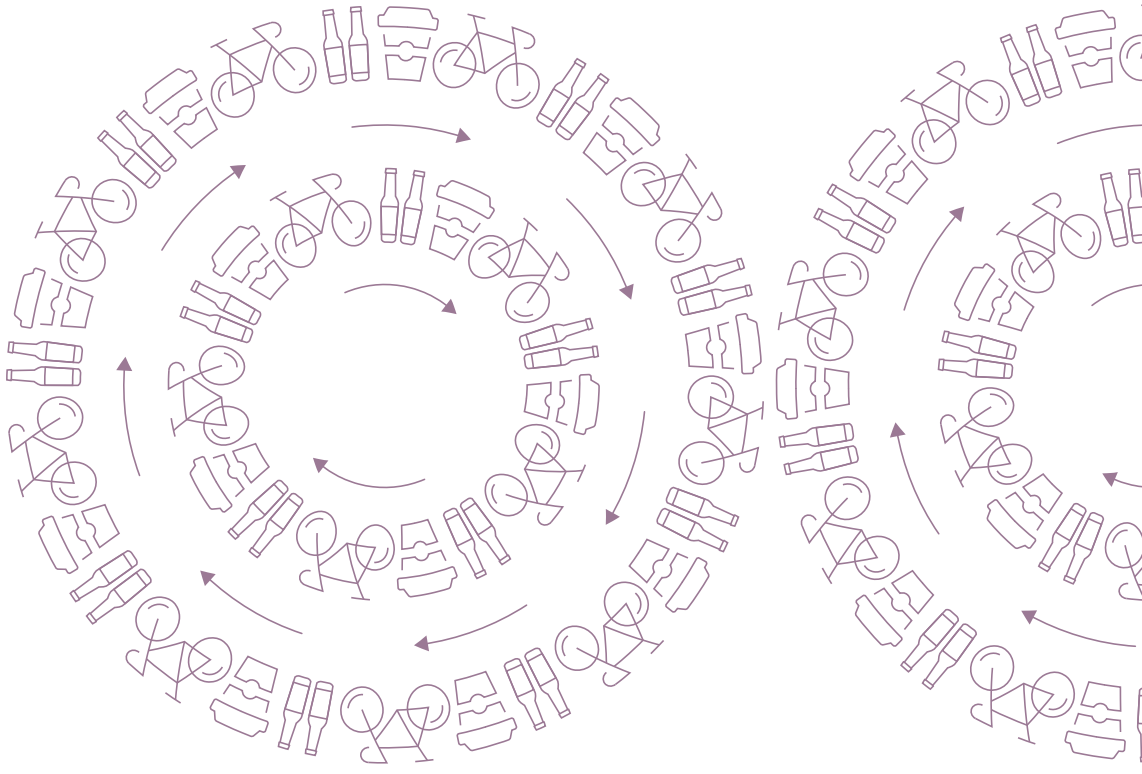
Bechtel is a global engineering, construction, and project management company that is committed to delivering to the United Nations Global Sustainable Development Goals, and incorporating circular economy approaches into its projects.[6]

Bechtel projects track material and energy inputs and outputs. The data provide an important opportunity to manage the sourcing, use, and disposal of individual materials at different points in the project life cycle.

As the construction contractor on a pipeline project in the Republic of Georgia, Bechtel employed a range of circular economy concepts, including design, material procurement, technology, and community interaction to soften the project's environmental footprint.

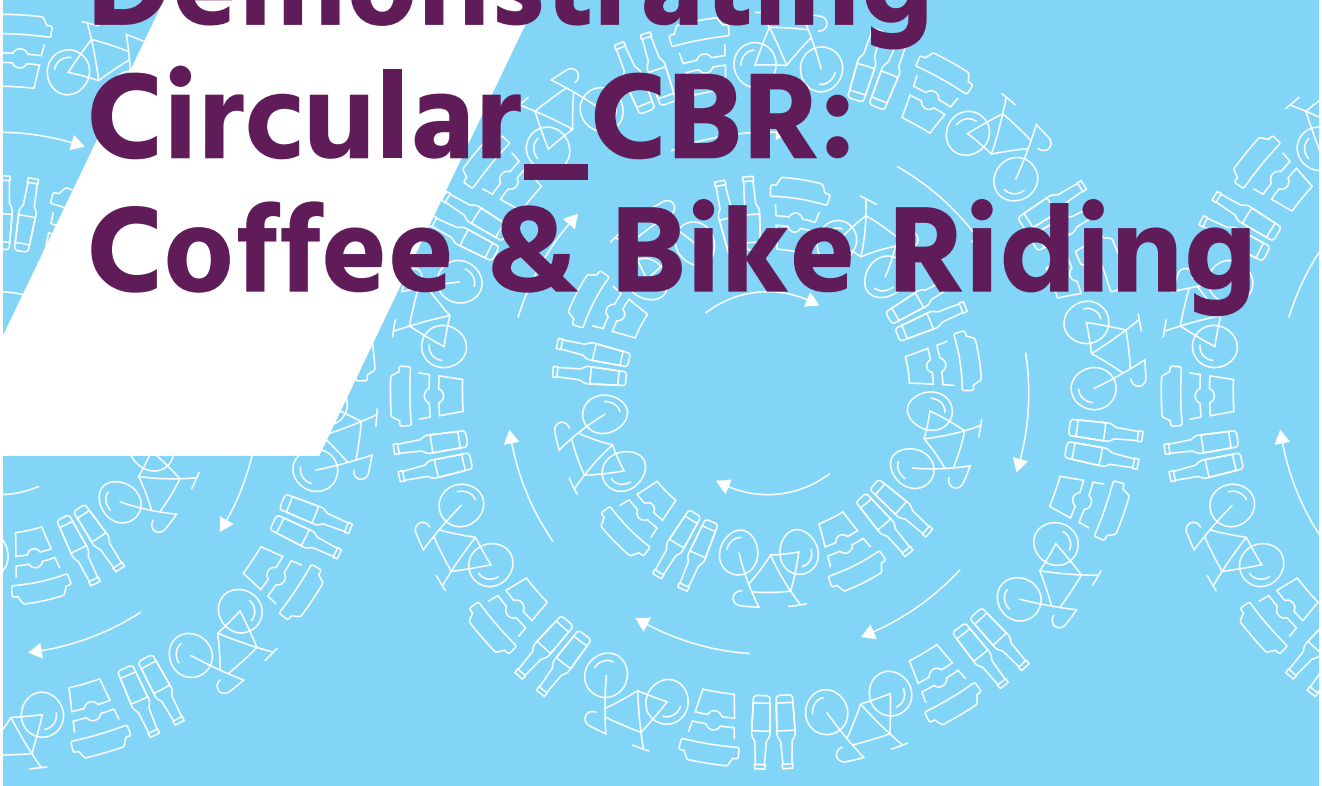
Overall, the approach on the project helped:

- Save an average of 1.4 million litres per year of fuel, which equates to removing nearly 700 cars from the road.
- Prevented an average of approximately 3,300 tonnes of emissions per year.
- Conserved an average of 378,541 litres of water per year.
- Reduced 90 per cent (990 kilograms per workday) of food waste, equal to about 365 tonnes of waste on average per year.
- Recovered, reused, and recycled 40 per cent construction waste annually.



5 https://www.bechtel.com/blog/sustainability/may-2017/the-circular-economy-advantage-on-bechtel-projects/ Accessed 11 June 2019
6 https://www.bechtel.com/sustainability/2030-goals-targets/ Accessed 14 June 2019

7.
Demonstrating Circular_CBR: Coffee & Bike Riding



To illustrate the potential of a Circular_CBR, three demonstration systems are explored in this paper, based on best available information. These systems indicate potential for commercial and community benefits that can be leveraged through circular economy application.

The logic behind selection of these pilot projects is summarised below, and detailed in the following sections of this chapter:

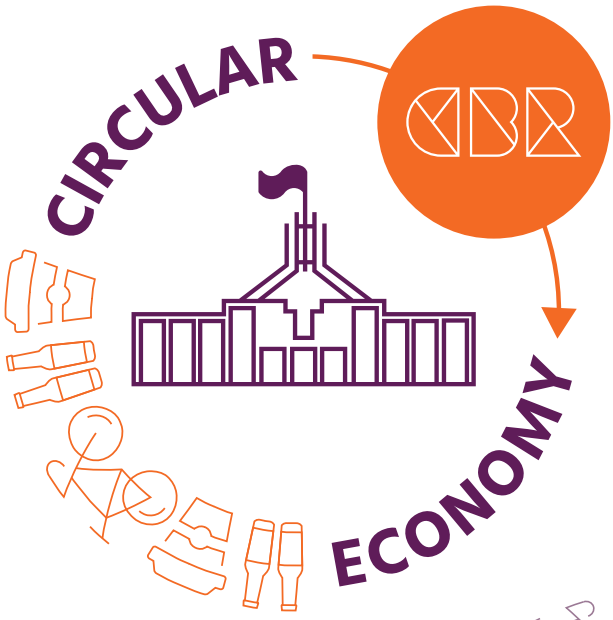
Coffee – we drink more coffee than any other capital city in Australia1

Bike Riding – we use bikes for transport more than any other city in Australia[2]

Coffee and Bike Riding (#CBR), on face value appear, to have good communication and engagement potential, primarily because:

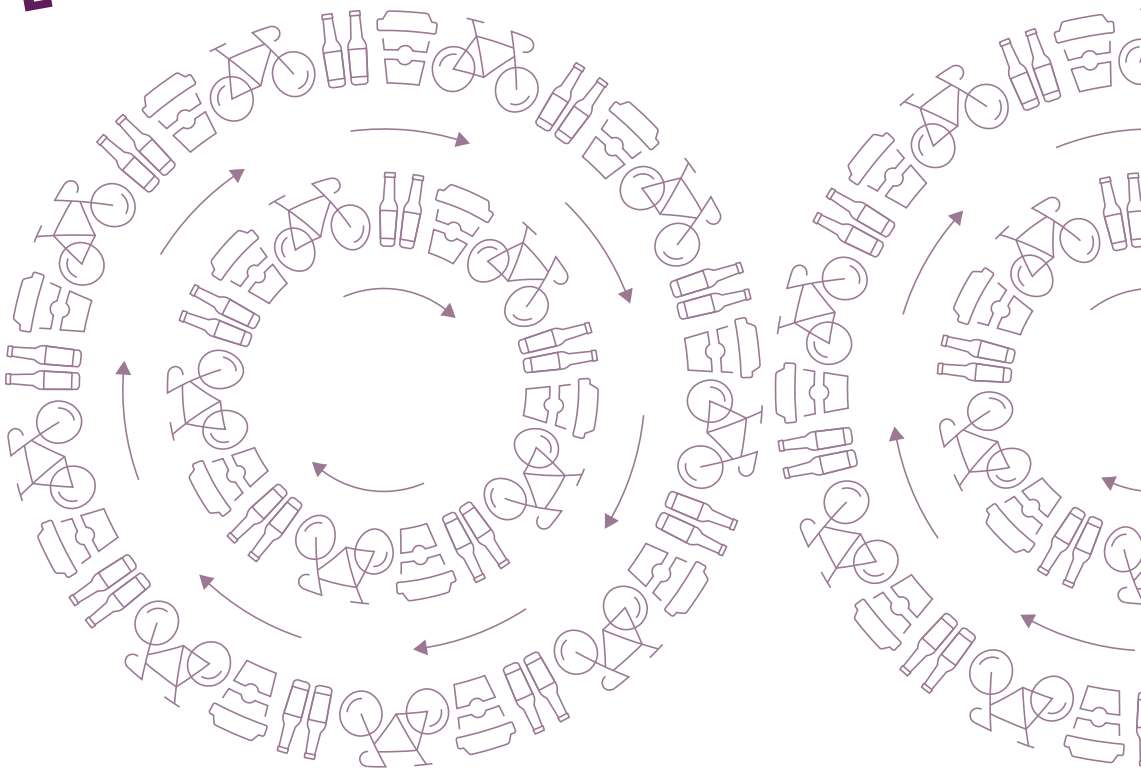
Coffee – has real potential to provide economic and environmental benefits

Bike Riding – presents complex integrated themes of emissions reductions, city planning, transport, product stewardship, sharing, and reuse



These demonstration systems only provide a qualitative indication of the benefits of a Circular_CBR.

These are a small range of examples and do not uncover the full supply chain value that is able to be accessed through a larger system approach, like construction or Government procurement.



1 https://the-riotact.com/does-canberra-have-too-many-coffee-shops/150166 Accessed 16 April 2019
2 http://www.population.net.au/population-of-australian-capital-territory/ Accessed 23 April 2019

Coffee in Circular_CBR

Canberra's coffee scene is bustling and new cafés continue to pop up. In 2015, research found that 68 per cent of us had visited a café for coffee in the last three months – beating Melbourne and Sydney in caffeine consumption.[3]

Our coffee is exceptional – our baristas have received national and international recognition.[4]

COFFEE AND ITS WASTE

But in terms of waste, our caffeine habit is shocking. Harvesting, processing, roasting and brewing coffee discards an estimated 99.7 per cent of the biomass.

While only 0.2 per cent acquires value on the market, the remainder – rich in caffeine – is wasted.[5]

99.7 per cent of coffee biomass is discarded.

Worldwide – an estimated 12 million tonnes of coffee waste is left to rot, generating millions of tonnes of methane gas, contributing to climate change.[6]

This makes coffee one of the most wasteful consumer products.

So how can we transition our coffee obsession to a Circular_CBR so we can enjoy our fix without guilt for our planet?

3 https://the-riotact.com/does-canberra-have-too-many-coffee-shops/150166 Accessed 16 April 2019
4 https://www.abc.net.au/news/2015-04-13/canberra-barista-wins-world-championship/6388170 Accessed 16 April 2019
5 https://www.theblueeconomy.org/uploads/7/1/4/9/71490689/case_3_coffee__export_crop_provides_food_security.pdf Accessed 16 April 2019
6 Methane is one of the most potent greenhouse gases in Earth's atmosphere

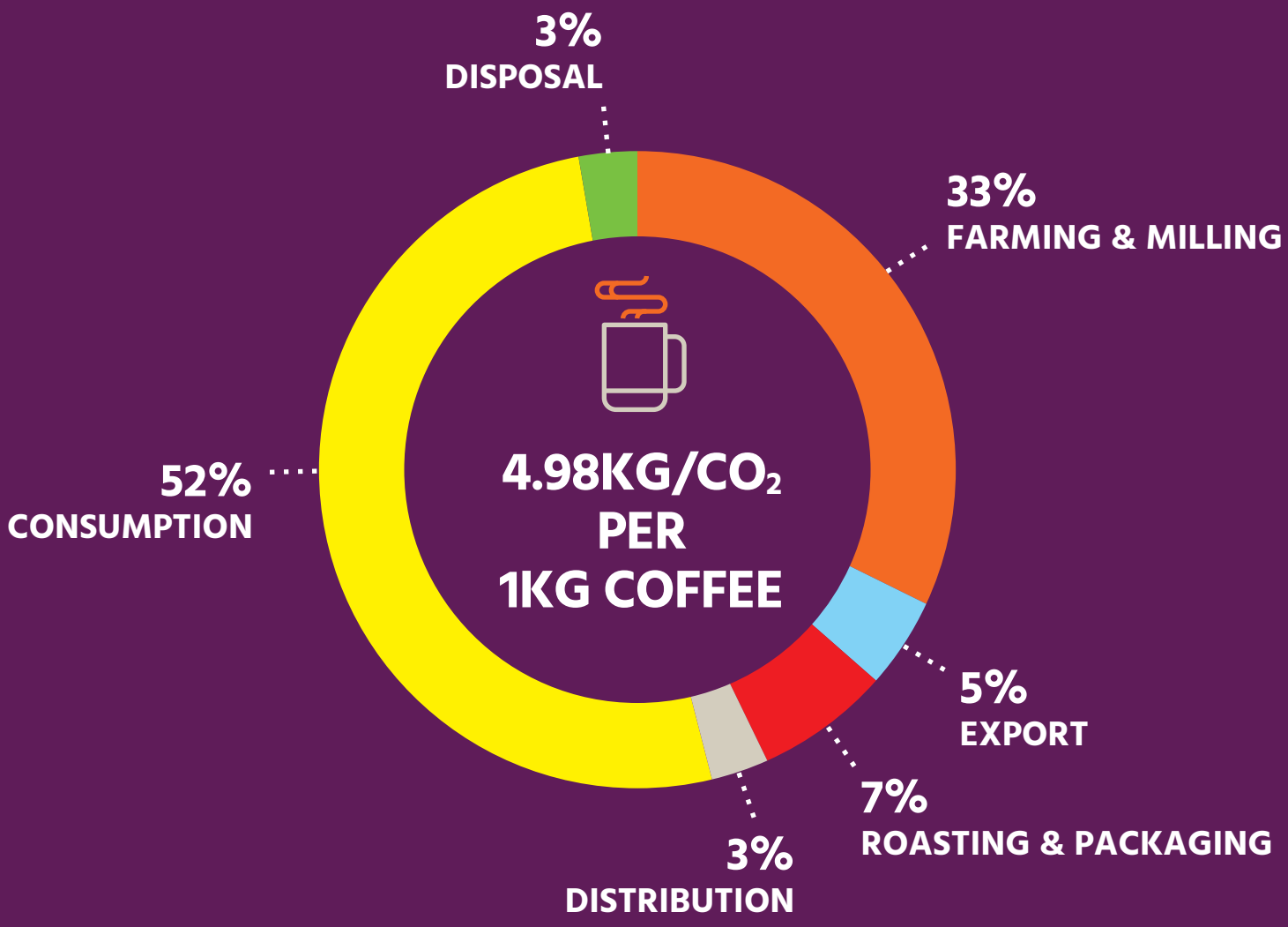
COFFEE & CARBON

FARM TO CUP

To produce 1kg of green coffee it takes 477 litres of fresh-water

Growing 1kg of green coffee emits 1.93kg of CO_2 into the atmosphere

Surprisingly, only about 8% of CO_2 emissions occur due to movement of the coffee



The majority of carbon is emitted after the coffee reaches the consumer, during preparation and use

How far a product is transported before being consumed is referred to as its food miles

One large cargo ship emits as much asthma and cancer causing pollutants as 50 million cars

Coffee is transported across the globe to consumers, on a journey of up to 25,750 km

Source: **Costan Rican Coffee to Europe & Coffee's Grande Water Footprint**

COFFEE WASTE – MAXIMISING VALUE

If coffee grounds are recycled, valuable organic matter and nutrients[7] can be recaptured for use as soil fertilisers,[8] conditioners and mulch;[9] and methane can be captured for electricity generation.[10]

Including coffee grounds into a general organics collection program will help to reduce the impact of these organics going to landfill. But this mixed organic approach does not capitalise on this significant and valuable resource.

Some cafes offer free spent coffee grounds for customers to take home and use in the garden. In theory, this is a great initiative, but the reality is that fresh coffee grounds are high in caffeine, chlorogenic acid and tannins that are beneficial to humans but toxic to plants. Spent coffee must be detoxified by composting for a minimum of 98 days for plants to benefit from the potassium and nitrogen contained in the roasted beans.[11]

Coffee waste can be composted and returned to grow vegetables and other crops. Companies like Reground in Melbourne offer these types of services.[12] They provide bins for retailers to store waste coffee, they then collect it, and then send it to community and home gardeners.

Although there are some operators in the ACT who collect coffee grounds from businesses for composting, there does not appear to be a locally driven initiative to maximise the value of the waste on its own and build economic value in the ACT.[13]

Fact Box

AUSTRALIA'S COFFEE INDUSTRY[14]

- Revenue $10 billion
- Businesses 20,375
- Employees 139,091

7 https://www.sunset.com/garden/earth-friendly/starbucks-coffee-compost-test Accessed 22 May 2019
8 https://www.gardeningknowhow.com/composting/ingredients/coffee-grounds-gardening.htm Accessed 22 May 2019
9 https://businessrecycling.com.au/recycle/coffee-grounds Accessed 23 April 2019
10 https://www.businessinsider.com.au/climate-change-methane-coffee-grounds-capture-storage-geoengineering-2015-9?r=US&IR=T Accessed 22 May 2019
11 http://theconversation.com/going-to-ground-how-used-coffee-beans-can-help-your-garden-and-your-health-88645 Accessed 2 May 2019
12 https://www.reground.com.au/how-it-works Accessed 18 April 2019
13 https://businessrecycling.com.au/search/ and http://ableorganic.com.au/ Accessed 23 April 2019
14 https://www.ibisworld.com.au/industry-trends/market-research-reports/accommodation-food-services/cafes-coffee-shops.html Accessed 24 May 2019

Case Study

CITY OF SYDNEY – COUNTING COFFEE WITH PLANET ARK

In 2016, with the support of the City of Sydney, Planet Ark released a feasibility study into the collection and recycling of spent coffee grounds.

This report showed that 93 per cent was sent to landfill with only 7 per cent repurposed or recycled.

The diagram below depicts the current status in Sydney and the potential of a circular economy.

Late 2018, Planet Ark undertook a two month trial with the several coffee producers[15] to trial a collection and recycling program in Sydney.[16]

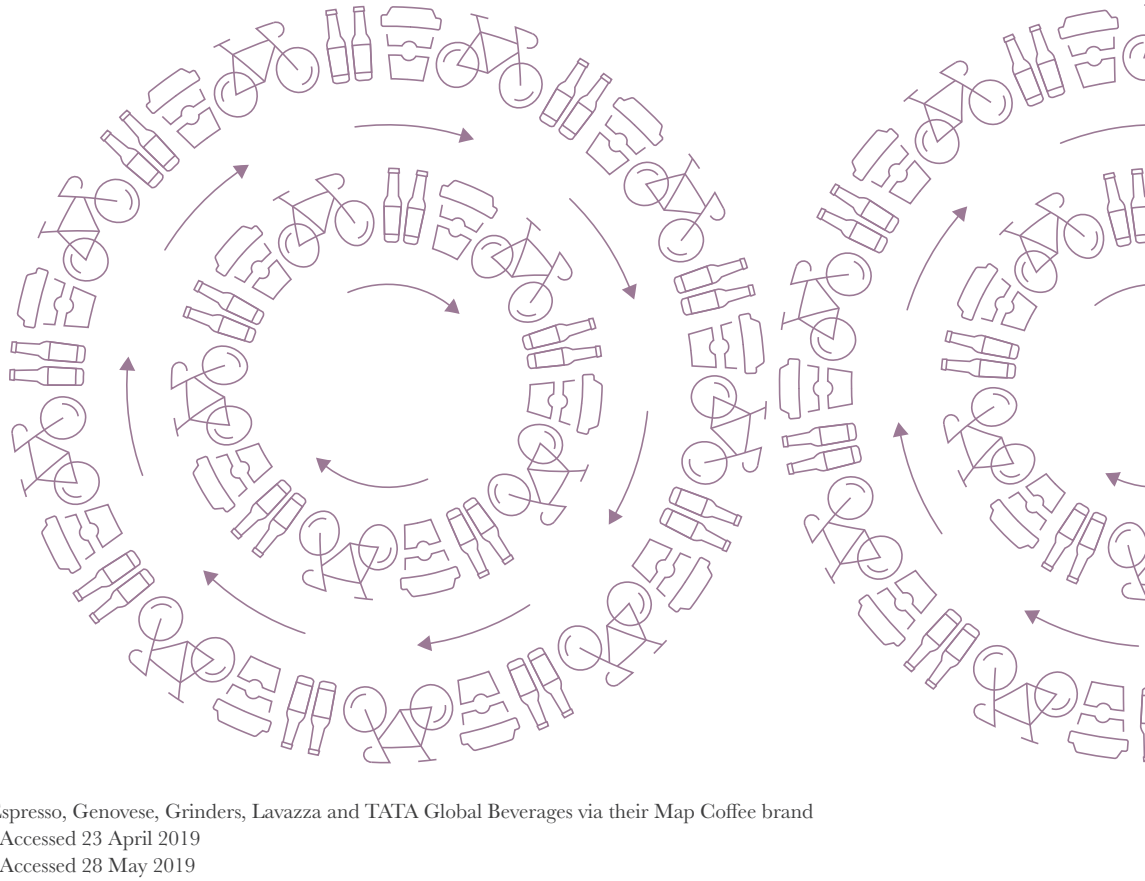
Over this trial Planet Ark:[17]

- Repurposed over 13 tonnes of spent coffee grounds. This is equivalent to repurposing the grounds from over 550,000 coffees.
- Saved over 8.5 tonnes for carbon dioxide equivalent from entering the atmosphere.

Planet Ark's aim is to not only divert spent coffee grounds from landfill, but to repurpose them into innovative and higher value end uses. They intend to establish a research and development fund to come up with long term solutions for the large volume of coffee waste produced in Australia.[18]

In May 2019, the Federal Government announced it would fund Planet Ark with $1.6 million in funding to develop a National Circular Economy Hub and Marketplace, which will be Australia's leading platform to help Australian businesses implement circular economy principles.[19]

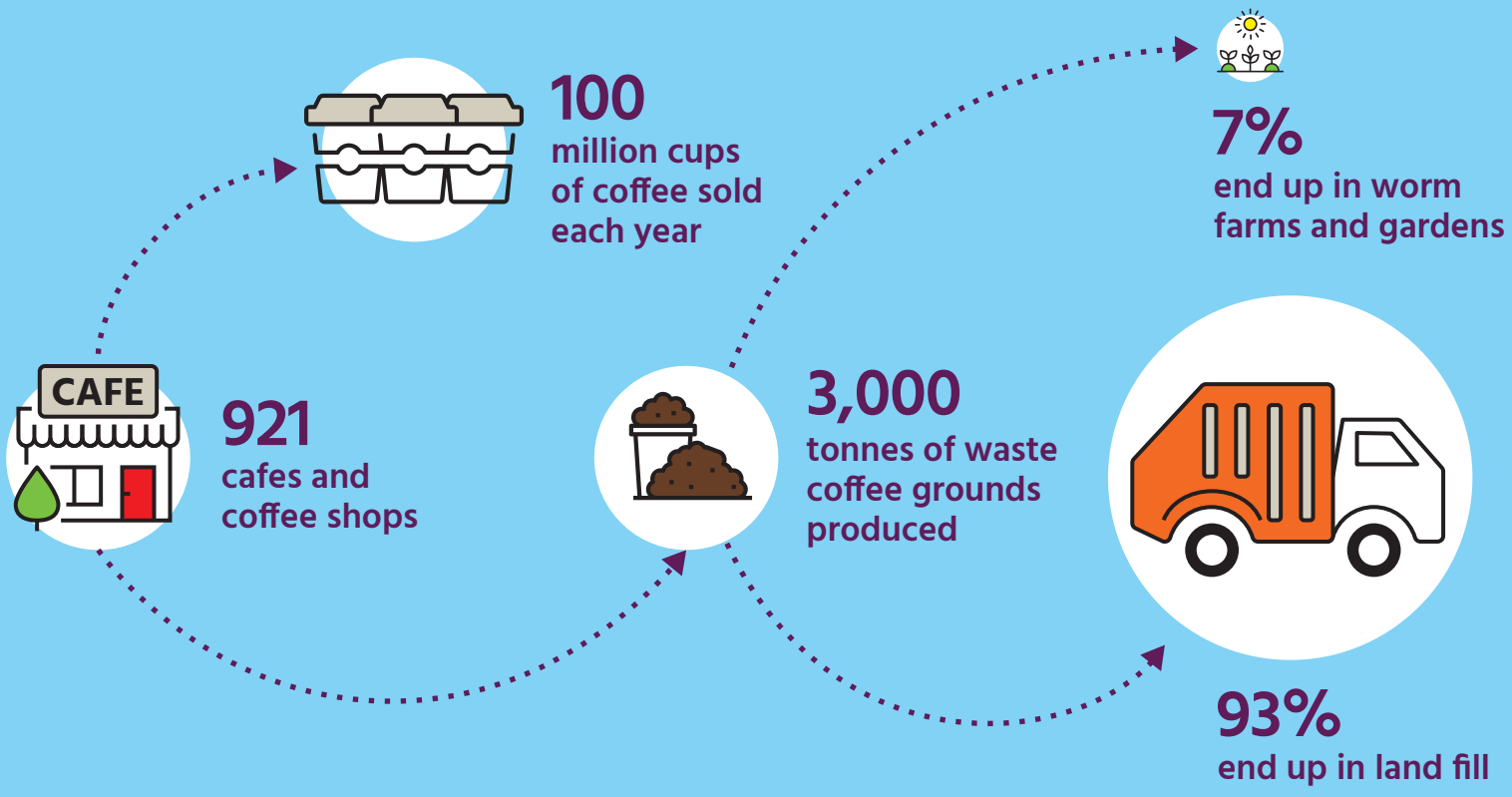
Planet Ark are also working to assist government procurement of sustainable products and services through bridging the information gap required on the economic business case and the ability to verify sustainability claims.



15 Founding Members, Allpress Espresso, Genovese, Grinders, Lavazza and TATA Global Beverages via their Map Coffee brand
16 https://planetark.org/coffee/ Accessed 23 April 2019
17 https://planetark.org/coffee/ Accessed 28 May 2019
18 https://planetark.org/news/display/2507 Accessed 28 May 2019
19 https://planetark.org/news/display/2713 Accessed 11 June 2019

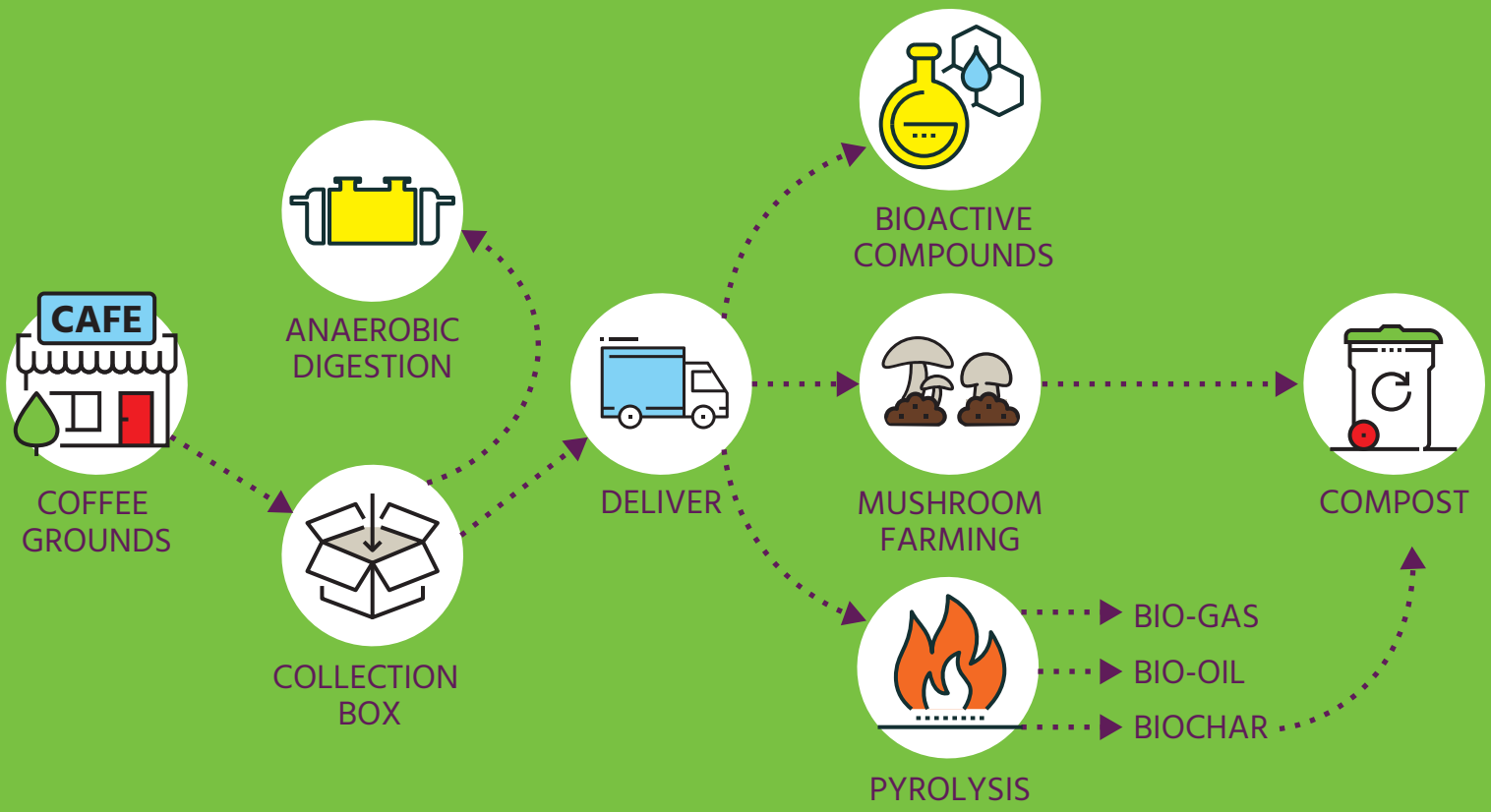
CURRENT SYSTEM OF COFFEE WASTE IN THE CITY OF SYDNEY

(LINEAR)



PROPOSED SPENT COFFEE GROUNDS COLLECTION SYSTEM AND END-USES

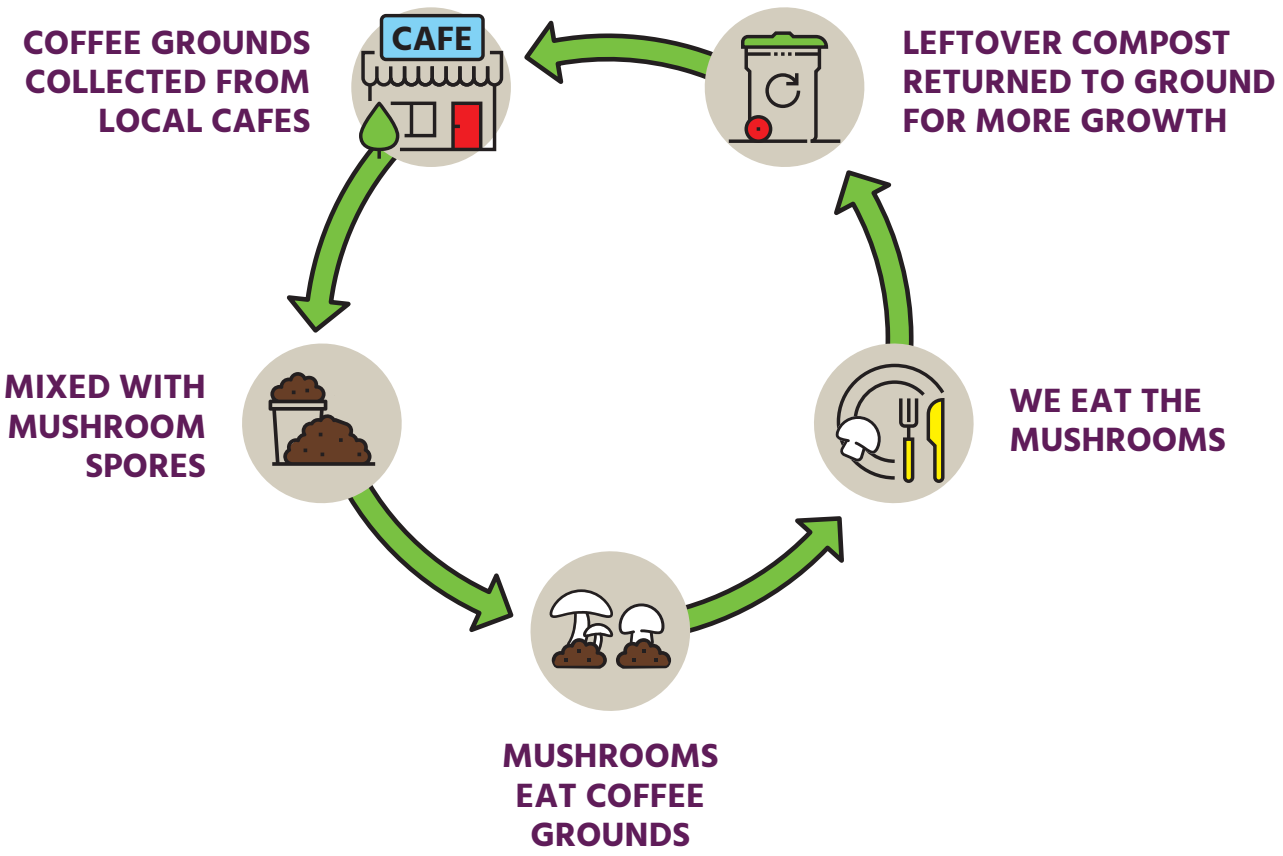
(CIRCULAR)



Source: **Planet Ark**

COMMERCIAL OPPORTUNITIES FOR COFFEE WASTE AND MUSHROOMS

A market option for coffee waste is to use the coffee grounds' rich biomass to grow high value mushrooms.



Farming mushrooms requires bacterial control at high energy cost. Growing mushrooms using coffee grounds is effective in managing the bacteria and can reduce energy costs significantly.[20] It is important that only fresh coffee grounds are used (less than 24 hours) to maintain its sterilisation achieved through brewing.

Anyone with access to biomass rich in either caffeine or hardwood fibres, or both, now has the opportunity to start seeding mushrooms competitively. This generates jobs, provides food security and creates revenues while eliminating the need for increased hardwood trees and eliminating the need for increased logging due to rising demand from vegetarians and gourmets alike.

Gunter Pauli, the Blue Economy[21]

Grocycle is a UK based social enterprise that has been collecting used coffee grounds to grow mushrooms since 2011.[22] They even offer 'grow your own' mushroom boxes for home use, and supply restaurants and businesses with mushrooms and education activities to help others establish their own mushroom farm.[23]

Grocycle has an estimated annual revenue of USD$2.5 million and over 400 employees.[24]

20 https://grocycle.com/growing-mushrooms-in-coffee-grounds/ Accessed
21 https://www.theblueeconomy.org/uploads/7/1/4/9/71490689/case_3_coffee__export_crop_provides_food_security.pdf Accessed 16 April 2019
22 https://grocycle.com/growing-mushrooms-in-coffee-grounds/
23 https://dailycoffeenews.com/2018/07/19/more-than-cups-considering-sustainability-in-the-coffee-shop-industry/
24 https://www.owler.com/company/grocycle Accessed 24 May 2019

Life Cykel was started in 2015 in Western Australia and has continued to build its business of turning coffee waste to mushroom production.[26] They now produce a variety of mushroom based products that are available across Australia.

Life Cykel's crowdfunding campaign received $23.6K on September 2016. As of November 2018, Life Cykel has 7.5K fans on Facebook and 714 followers on Twitter. Life Cykel has an estimated revenue of <$1M and an estimate of less <10 employees.[27]

In Melbourne alone the amount of coffee waste is estimated to be about 5,000 tonnes a week.

Since 2011 Grocycle have recycled more than 75,000 kilograms of coffee grounds and turned them into more than 20 tonnes of mushrooms.[25]

In 2018, a central Victorian disability service, Windarring, started its own mushroom farm in a large climate-controlled shipping container following the closure of its core photocopy business. The initiative has the potential to grow up to 100 kilograms of organic oyster mushrooms a week and provide meaningful employment opportunities for people living with a disability.[28]

25 https://grocycle.com/growing-mushrooms-in-coffee-grounds/ Accessed 1 May 2019
26 https://lifecykel.com/pages/about-us Accessed 18 April 2019
27 https://www.owler.com/company/lifecykel Accessed 24 May 2019
28 https://www.abc.net.au/news/2018-05-03/farming-mushrooms-coffee-waste-castlemaine-disability-service/9719814 Accessed 18 April 2019

CANBERRA'S COFFEE WASTE POTENTIAL FOR MUSHROOMS

Currently there does not appear to be any service providers operating in the region that collect coffee waste as a discrete recycling stream. Nor does there appear to be any local horticulturists using spent coffee grounds for commercial mushroom production.

There are several providers who will collect and compost mixed organics to return to soil for food and crop production benefits. But this is not maximising the economic value of the coffee waste characteristics.

There is limited information on the amount of coffee consumed and coffee waste produced in the ACT. Information from brief discussions with several coffee retailers in Canberra has indicated that:

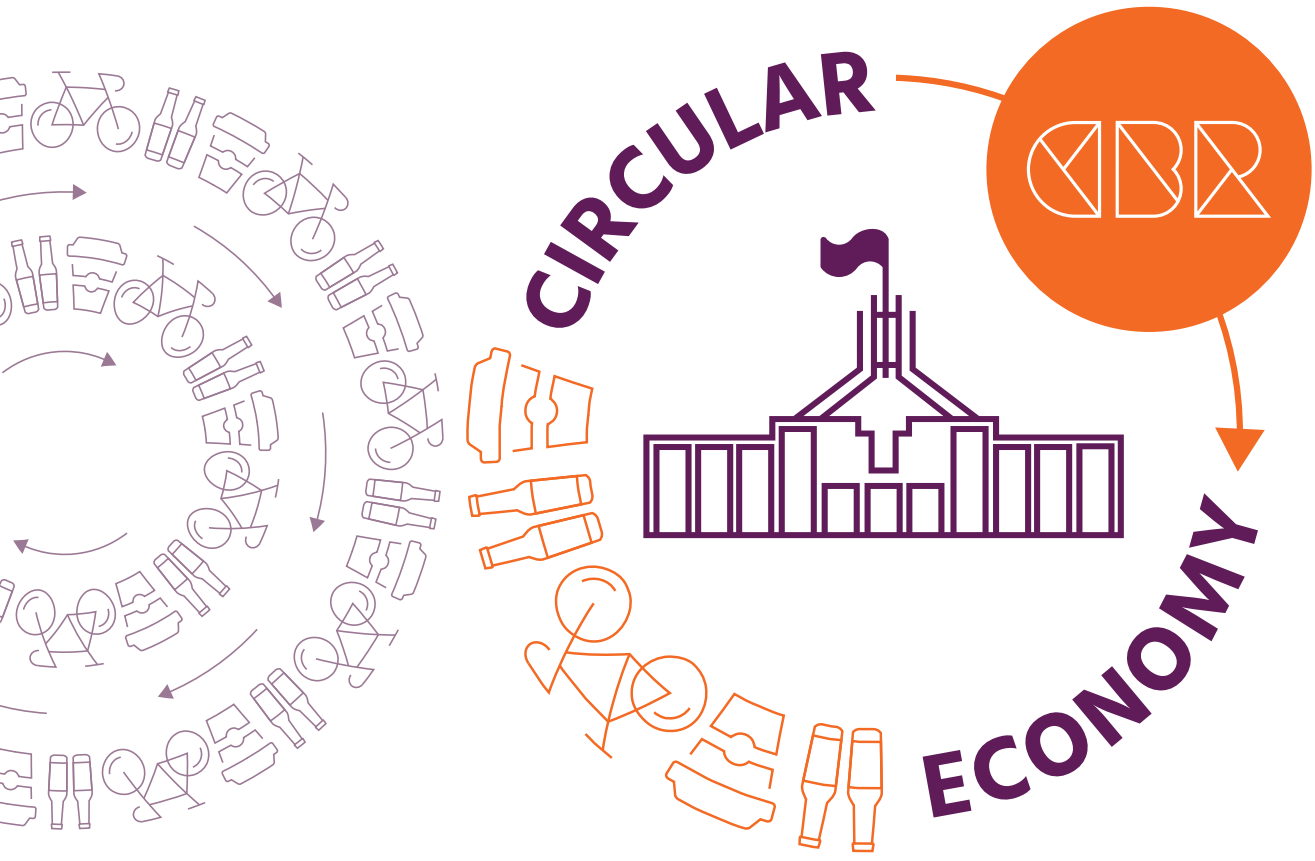
- a small proportion (estimated at less than 20 per cent) currently send their coffee waste to organic composting,
- most coffee retailers are disposing of their grounds to landfill, and
- retailers are not tracking the volumes of coffee waste with any accuracy.

Cost and time were suggested as the two biggest constraints for retailers to consider conducting their operations differently.

From a market perspective it could be simply said that:

- We drink a lot of coffee,
- We eat mushrooms,[29] and
- We like sustainable and local produce.

The potential for leveraging these attributes in to a circular economy seem obvious.



29 https://www.abc.net.au/news/rural/2018-03-24/do-you-think-all-mushrooms-grow-in-the-dark/9535132 Accessed 1 May 2019

BACK OF THE ENVELOPE ESTIMATES – SOME PROXY FIGURES

The following estimations are based on examples quoted from similar applications elsewhere. They are provided here to stimulate dialogue and raise understanding, not for commercial considerations.

Oyster mushrooms are sold by producers for $30 to $40 per kilograms.[30]

75,000 kilograms coffee waste can be used to grow 20 tonnes or 20,000 kilograms mushrooms.[31]

For every 1 kilogram of coffee waste, 0.266 kilograms of mushrooms might be produced. This equates to a potential income of $8 from mushroom sales.

Each cafe might produce about 35 kilograms coffee grounds per week.[32] This current waste stream could be used to produce about $14,000 of oyster mushrooms in a year for each café. This would divert almost 2 tonnes of waste from landfill each year, for every cafe.

In a busy district there might be about 200 cafes – a potential to produce almost $3 million per year worth of oyster mushrooms from the coffee waste and divert around 350 tonnes from landfill each year.

For every tonne of coffee waste that does not go to landfill, about 0.65 tonnes of carbon dioxide equivalent are avoided. If 200 cafes divert their coffee waste from landfill to, say, mushroom production; about 260 tonnes carbon dioxide equivalent each year are avoided.[33]

There would also be emissions savings through reduced transport associated with a change to local mushroom produce.

Given the strong linkage between the circular economy and carbon emissions – existing Government programs may be leveraged to promote innovation for a circular economy in the ACT.

For example, the Zero Emissions Community grants[34] might be applicable for the development of a coffee waste circular economy.

A focus on an initial pilot street/ hub would serve to test the systems and prove the economic benefits of this concept.

30 https://www.harrisfarm.com.au/collections/mushrooms Accessed 1 May 2019
31 https://grocycle.com/growing-mushrooms-in-coffee-grounds/ Accessed 1 May 2019
32 https://www.kickstarter.com/projects/1492646835/life-cykel-melbournes-first-coffee-waste-mushroom Accessed 2 May 2019
33 Estimate based on Planet Ark figures quoted previously in paper.
34 https://www.environment.act.gov.au/cc/community-zero-emissions-grants Accessed 28 May 2019

USING COFFEE WASTE FOR BIOFUELS

Founded in the United Kingdom in 2013, bio-bean became the first company to industrialise the process of recycling waste coffee grounds into advanced biofuels and biochemical.[35]

Bio-bean has an estimated annual revenue of USD$7 million and around 40 employees.[36]

Coffee grounds are highly calorific and contain valuable compounds, making them an ideal feedstock from which to produce second-generation products- like heating briquettes. The concept is based on research from the University of Nevada, which analysed used grounds for oil content and found they contained on average about 10 to 15 per cent oil by weight.[37]

Bio-bean's factory in North London is designed to turn waste coffee into biodiesel, barbecue coals and biomass pellets. The company is exploring the possibility of selling these pellets back to coffee shops to be used to roast coffee or boil water. This would create a true circular economy operation, with waste becoming the input power for the production activities that created it. Biofuel from coffee waste has even been trialled with London's buses.[38]

Biofuel produced from used coffee grounds is a "second generation" biofuel, meaning it isn't made from crops that could otherwise be used as food. In a world of food scarcity, where the production of fuel from corn and sugar cane has led to skyrocketing food prices for the world's poorest, second generation biofuels are particularly promising.[39]

35 https://www.bio-bean.com/case-studies/ Accessed 23 April 2019
36 https://www.owler.com/company/bio-bean Accessed 28 May 2019
37 https://dailycoffeenews.com/2018/10/09/what-goes-around-how-coffee-waste-is-fueling-a-circular-economy/ Accessed 23 Aril 2019
38 https://www.abc.net.au/news/2017-11-21/london-buses-to-be-powered-by-waste-coffee-grounds/9174660 and https://www.shell.co.uk/make-the-future/cleaner-mobility/bio-bean-helping-power-londons-buses-with-coffee.html and http://www.climateaction.org/news/london-buses-to-run-on-biofuels-from-coffee-waste Accessed 28 May 2019
39 https://www.biomedcentral.com/about/press-centre/science-press-releases/30-01-2015 Accessed 28 May 2019

Case Study

RECOVERING CONTAINERS AND THE CONTAINER DEPOSIT SCHEME

The ACT has a fairly mature recycling system and has had co-mingled recycling bins in the kerbside pickup for the community since 1994.[40]

On 30 June 2018 the ACT commenced its Container Deposit Scheme (CDS).

The scheme works to commit beverage producers to take greater responsibility for container packaging.[41]

Container Deposit Schemes can have economic, environmental and social outcomes, including:[42]

- Capturing valuable resources
- Recovering clean, source separated input material for recyclers, enabling bottle-to-bottle recycling
- Changing behaviour within society
- Reducing littering and associated costs to local authorities
- Achieving reduction to landfill and higher recycling rates
- Creating new green jobs
- Generating income for charities
- Creating opportunities for social enterprise
- Improving environmental standards

There may be further opportunities for Government to promote circular economy principles and maximise the Container Deposit Scheme through direct engagement of the local microbrewery industry.

This might include small interventions such as including drop off points at their major retail facilities.

40 http://wastemanagementreview.com.au/actsmart-business-recycling/ Accessed 6 June 2019

41 https://www.cmtedd.act.gov.au/open_government/inform/act_government_media_releases/meegan-fitzharris-mla-media-releases/2018/canberras-container-deposit-scheme-to-start-on-30-june Accessed 2 May 2019

42 https://www.boomerangalliance.org.au/cash_for_containers Accessed 3 May 2019

Case Study

ROADS MADE OF PLASTIC AND GLASS

A new type of asphalt, made from recycled material such as plastic and glass, is being trialled on Canberra roads, starting with Gungahlin.[43]

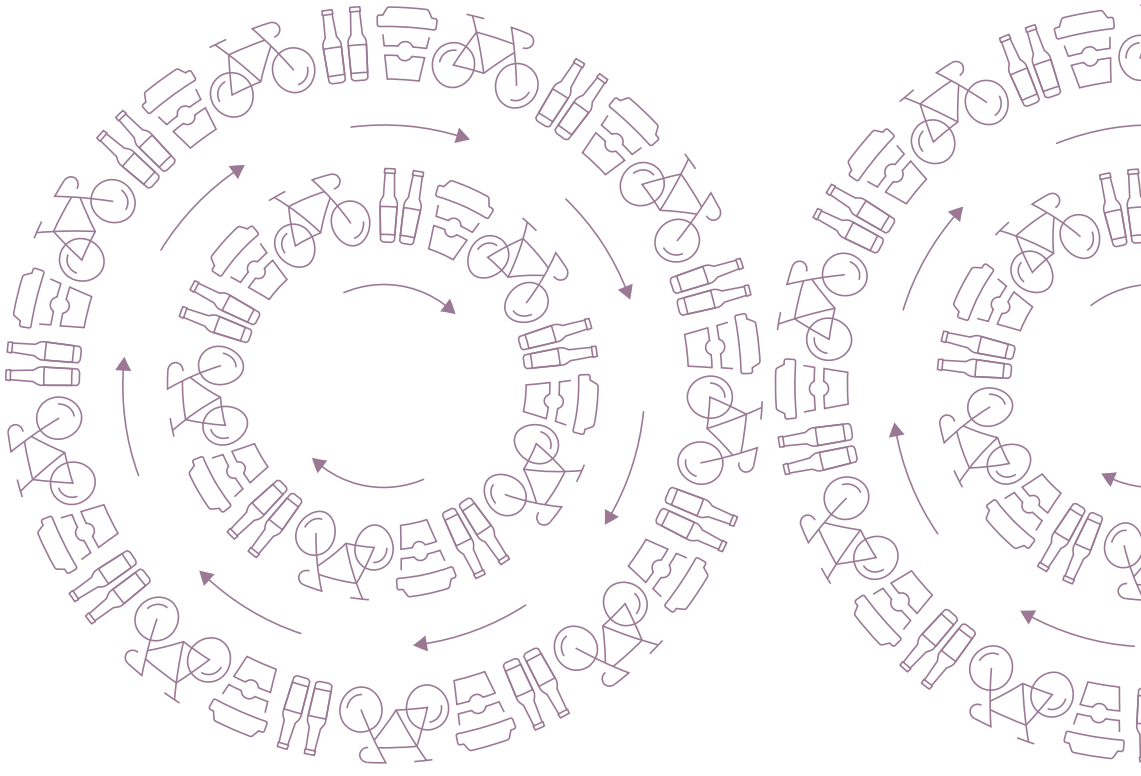
Some of the glass bottles and plastic bags Canberrans have been bringing to the ACT Container Deposit Scheme return points are being recycled and processed to create this unique asphalt, Reconophalt.

The composition of Reconophalt produces a very strong surface that is resistant to wear from traffic.

This is a great example of treating 'waste' as a resource and diverting existing waste materials from landfill back into the economy.

Promoting circular economy principles, this innovation offsets the need to source natural resources such as stone, blue metal, and sand from the environment for road construction.

Each tonne of the asphalt is composed of around 800 plastic bags, 300 glass bottles, 18 used printer toner cartridges and 250 kilograms of reclaimed asphalt.



43 https://actcds.com.au/act_news/canberra-to-trial-roads-made-of-recycled-plastic-and-glass/

Riding in Circular_CBR

A higher percentage of people use a bicycle as their main form of transport in the ACT than anywhere else in Australia.[44]

Canberra has designated bike lanes on main roads, an extensive network of bike paths weaving their way throughout the city, and infrastructure that connects with public transport.

We have embarked on the use of technology to streamline and mainstream this trend. This will only increase overtime.

The ACT already has some elements related to cycling that reflects a circular economy including:

- planning of our city incorporates active travel connectors and bike paths,
- the ACT has a bike rental pilot underway,
- electric bikes are allowed and potentially other personal mobility devices such as e-scooters are being considered in associated regulations, and
- Promoting active travel for health and wellbeing.

Riding bikes is a remarkably efficient and environmentally friendly way to get around.

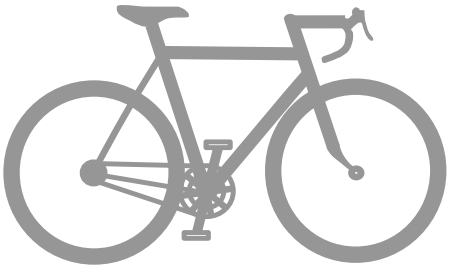
Source: Peter Brasser

44 http://www.population.net.au/population-of-australian-capital-territory/ Accessed 23 April 2019

Pedal Power ACT

any bike, any where, any time

Based on data from the 2015 National Cycling Participation Survey



ACT cycling numbers have increased by

3.7% ↗

Since 2011.

81,900

people in the ACT ride their bike at least once a week.

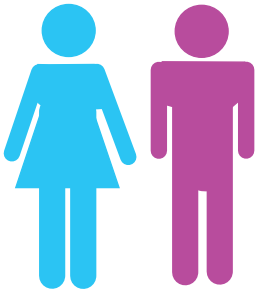
4.4% ↗

people have started riding their bike since 2011.

The participation rate is

23% ↑

higher than the national average.



83%

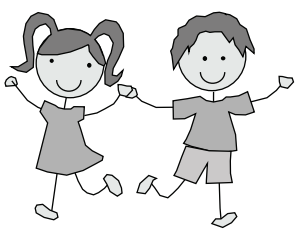
of people surveyed over the age of 15 said they were comfortable riding a bike

The participation rate of children between 0-9yrs is only

34%

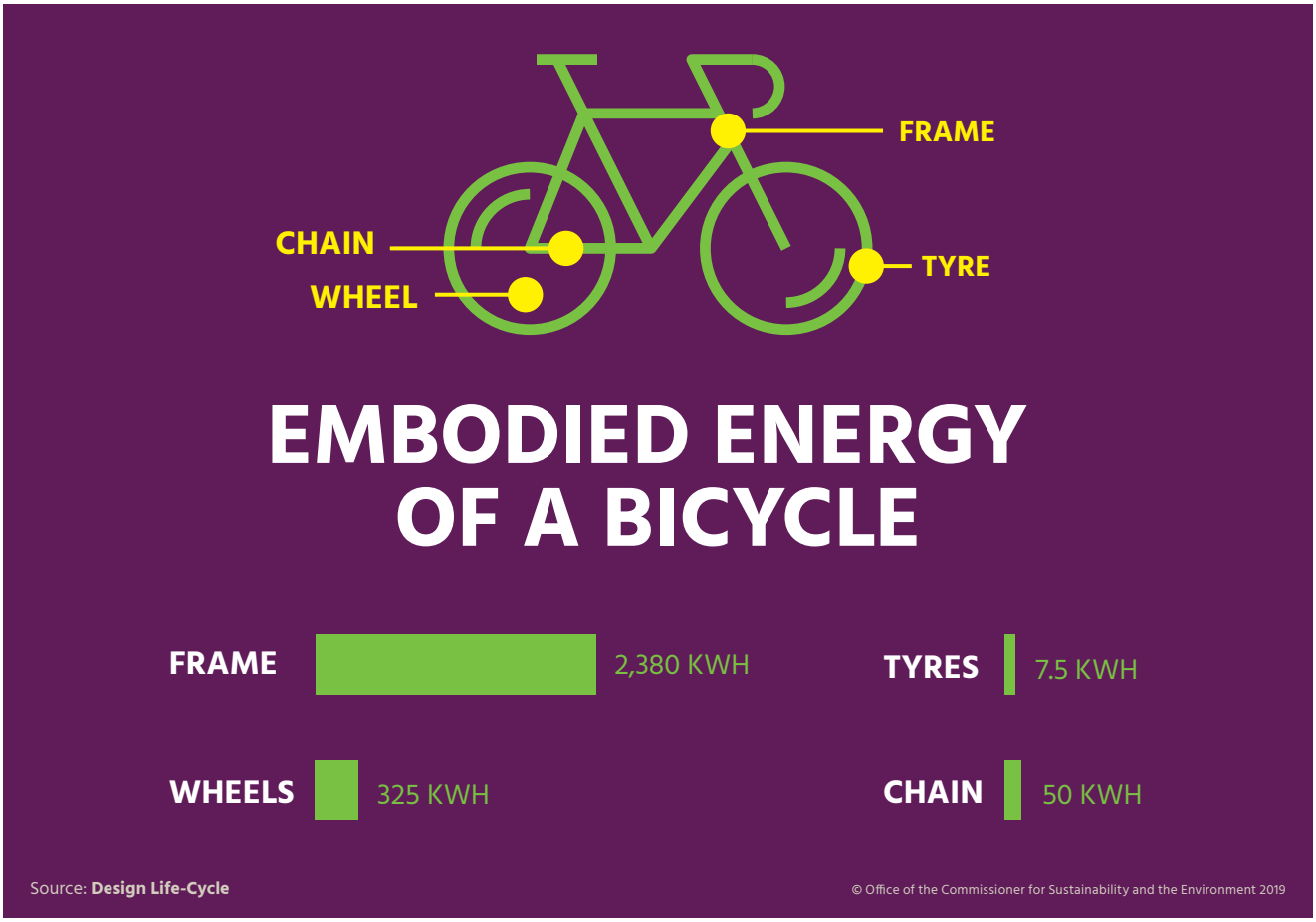
That's below the national average of

49%



Designed by E.Mosley

Source Pedal Power ACT



However, manufacturing bicycles is quite linear. They are built to be light for ease of use, and of course speed, and are often not strong enough to last a big stack!

To make a bike, raw materials are extracted and turned into products that are used (sometimes) and when finished with, discarded, all too often into landfill.[45]

The energy involved in the production of a bicycle could far outweigh the emissions avoided in transport choices if the bike is not used frequently over a long period of time.

A more intense assessment of how to maximise the circular economy potential of riding personal mobility devices in #CBR would be an interesting and ground-breaking demonstration system for the ACT.

Opportunities will range across several circular economy principles including reducing emissions, sharing assets, design and production, social enterprise, recycling, health and transport.

45 https://pushbikes.org.uk/content/cycling-and-circular-economy Accessed 3 May 2019

Case Study

THE RECYCLERY AT THE CANBERRA ENVIRONMENT CENTRE

The Canberra Environment Centre runs the Recyclery from its office in Acton.

Unwanted bikes can be dropped off, where they are repaired and sold as economic alternatives of transport. Bikes are often dumped around the city in an unusable state.

The Canberra Environment Centre runs off a small grant from the Government and relies on volunteers.

The bikes are sold to cover the costs from the centre. Mended bikes are also provided to vulnerable members of the community when possible.

The Recyclery demonstrates how organic a circular economy can be.

Case Study

IMAGINE REDESIGNING BIKES

The Imagine Project in the UK is a pioneering attempt to rethink the way bicycles are made and supplied.[46]

The aim is to design bicycles so that they last much longer, and when they finally reach the end of their lives, all raw materials can be separated and reused.

This project has the potential to change manufacturing processes and, by encouraging the circular economy, help reduce waste and pollution. It could also reduce costs and shorten supply chains, while stimulating growth and employment.

The Imagine Project also adopts a very different way for a company to engage with its customers.

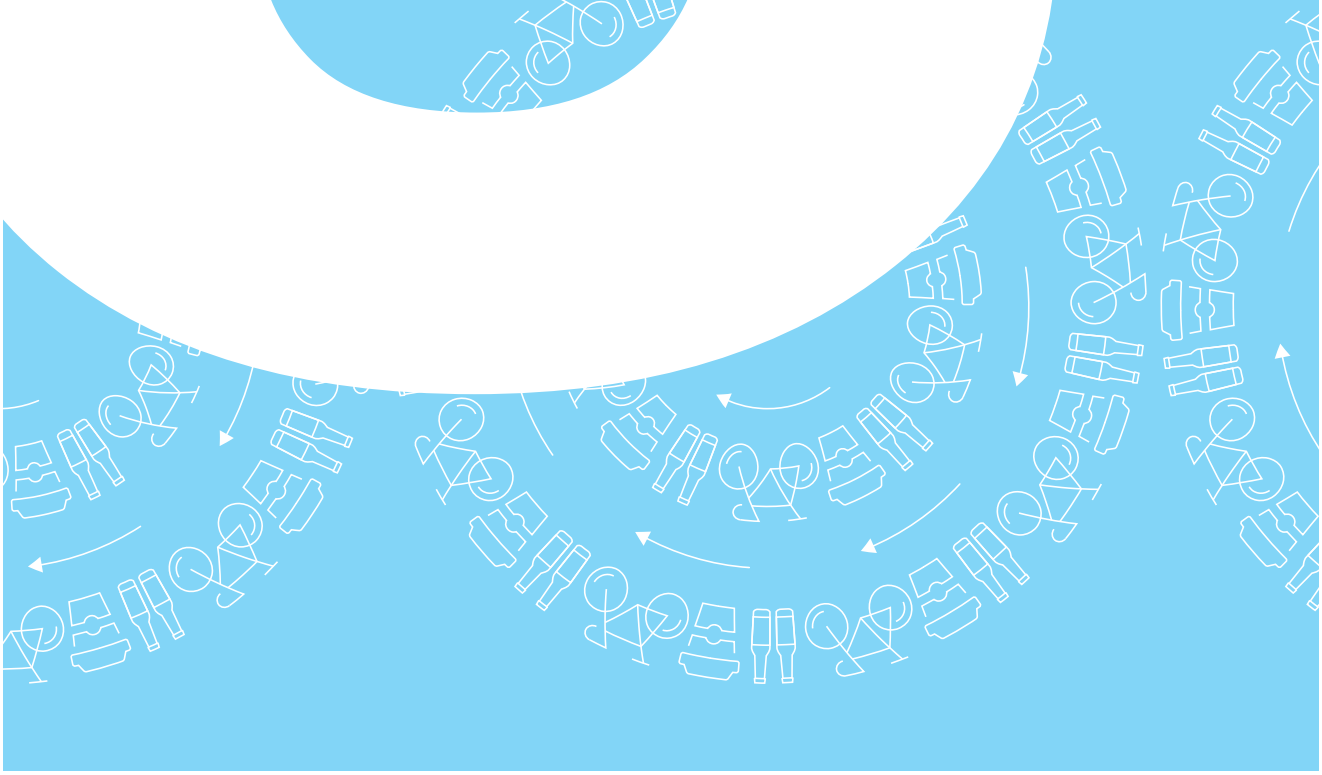
A slight variation on this is more akin to a rental model. A consumer rents a bike from a bike manufacturer that maintains responsibility indefinitely of all of the resources used to construct the bike. When the bike is returned, it is refurbished and rented to the next person.

This incentivises the use of less resources by encouraging manufacturers to design bikes that last as long as possible.

The Imagine Project also allows for more efficient resource use in general, because should the consumer is not riding the bike, it would be returned and available for other people.

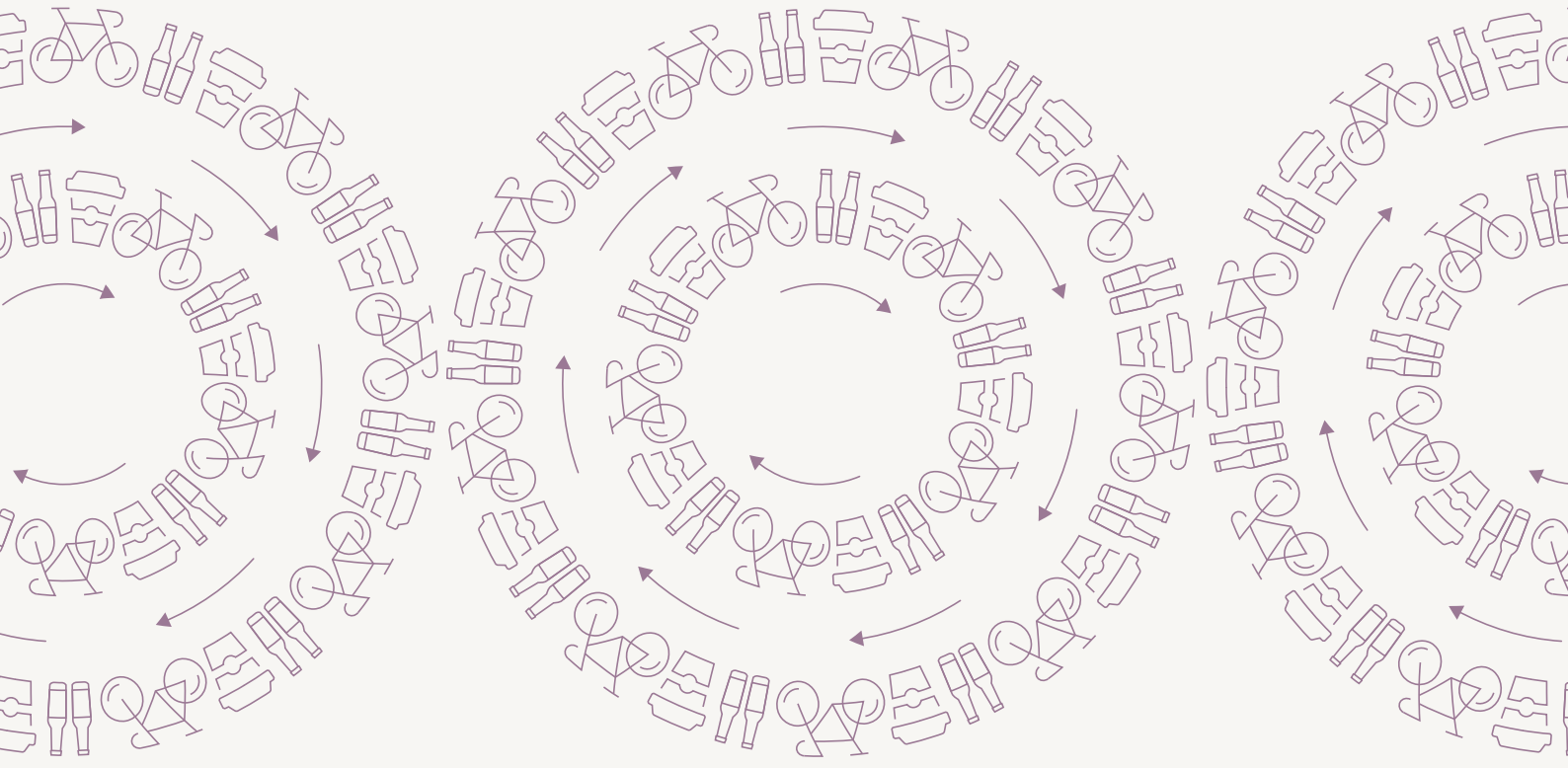
46 https://www.cyclingabout.com/reduce-waste-circular-economy-bikes/ accessed 3 May 2019

8.
Issues



In light of the ACT Government declaring a climate change emergency on 16 May 2019, the transition to a circular economy is now even more urgent.

This Issues Paper has identified the following key issues and opportunities:



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