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Introduction

There has been considerable concern in Australia in recent years about recycling efforts, and what happens to our products once they are recycled. This was brought into focus by China’s decision to ban the import of foreign waste from January 2018. Australia exports recyclable material to over 100 countries; the three main categories of which are metals, paper and cardboard, and plastics. In 2016–17 Australia exported some 4.23 mega tonnes of recycled materials, a considerable amount of which went to China. Therefore, the decision made by China to ban the import of foreign waste has a direct impact on recycling and waste management practices in Australia.

One idea put forward in response to the issue of recycling and waste management is of the transition to a circular economy. Essentially, the objective of a circular economy is to maximise value at each point in a product’s life. A circular economy seeks to close industrial loops and to turn outputs from one manufacturer into inputs for another and, in doing so, reduce the consumption of virgin materials and the generation of waste.

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

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 Victorian Government has also recently signalled its support for the creation of a circular economy, as have the Governments of South Australia and New South Wales.

So what is the circular economy, exactly? This explainer provides an overview of the circular economy concept, what it looks like and why it’s being talked about. It also discusses recent research and developments in the circular economy space, and some of the challenges that may arise in its implementation. Additionally, it includes a number of examples from other jurisdictions where circular initiatives are being realised, and considers developments taking place in Australia.

1 Senate Environment and Communications References Committee (2018) Never waste a crisis: the waste and recycling industry in Australia, Canberra, Commonwealth of Australia, June, p. 20.
2 ibid.
3 ibid., p. 75.
6 Senate Environment and Communications References Committee (2018) op. cit., p. ix.
7 ibid., p. 132.
9 See, for example: 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.
1. What is the circular economy?

In Australia, our use of resources generally exists in what can be called a linear economy, where we take resources to make into products that we then use, and dispose of. This process is depicted in Figure 1.

![Figure 1: Linear Economy](source)

The circular economy is an alternative to the traditional linear model, where the goal is to ‘keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life’.  

In other words, a circular economy seeks to eliminate waste and to keep resources in a continually flowing loop, as depicted in Figure 2.

![Figure 2: Circular Economy](source)

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2. How does it work?

Some of the essential elements necessary for a circular economy are to:

- design and manufacture products that are made from recycled materials (rather than virgin resources), that can be repaired and/or recycled back into the system;
- establish repair centres as part of this design and manufacture process, so that items can be repaired;
- establish collection systems so that items unable to be repaired are collected, rather than disposed of in landfill;
- ensure that there is adequate and appropriate recycling facility infrastructure in place, taking into account location and sorting capacity; and
- encourage manufacturers to purchase recycled materials, thereby closing the production loop.\(^{11}\)

One example of the circular economy in action is certain forms of metal recycling. Metal is mined, refined, made into a product, used, disposed of via recycling and then a new product is made out of it—the metal keeps going around. Contrastingly, with many items in the linear economy—such as a plastic container, for example—oil is mined, refined and then made into a plastic item and, while some of the product is recycled, much is disposed of in landfill where the resource is never used again.\(^ {12}\)

The Ellen MacArthur Foundation, which has as its mission to accelerate the transition to a circular economy, argues that the circular model relies on system-wide innovation and builds economic, natural and social capital.\(^ {13}\) Further, the circular economy model is driven by renewable resources, rather than finite ones. In practice, this means that a circular economy depends on renewable energy, such as wind, solar and bioenergy, rather than coal and other finite fossil fuels.\(^ {14}\)

There are two primary business models under the circular economy: those that foster reuse and extend the life of a product through repair, remanufacture, upgrades and retrofits; and those that turn old goods at the end of their service life into as-new resources by recycling the materials they contain.\(^ {15}\)

The circular economy cycle can be further broken down into two distinct processes—one for biological materials and the other for technical materials, with a continuous flow of materials through the cycle.\(^ {16}\) This distinction is depicted in the circular economy system diagram (Figure 3, overleaf).

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\(^{11}\) Dr T. Thornton, School of Life and Environmental Science, Deakin University (2018) personal communication with the author, 8 September 2018.

\(^{12}\) ibid.


\(^{14}\) Green Industries SA (date unknown) ‘What is a circular economy?’, Government of SA website.

\(^{15}\) W. R. Stahel (2016) op. cit., p. 435.

Figure 3: Circular Economy System Diagram

CIRCULAR ECONOMY - an industrial system that is restorative by design

- Biological cycles
- Restoration
- Biogas
- Anaerobic digestion/composting
- Biochemical feedstock
- Farming/collection
- Parts manufacturer
- Product manufacturer
- Service provider
- User
- Collection
- Collection
- Energy recovery
- Landfill
- Refrigeration
- Retrofits/remanufacture
- Refurbish/remanufacture
- Reuse/redistribute
- Technical cycles
- Mining/materials manufacturing

Source: Ellen MacArthur Foundation (date unknown) ‘Systems Map’, Ellen MacArthur Foundation website
3. Why are people talking about it?

So why are people talking about the circular economy?

Too much waste is being produced

One reason is that the industrial and technological revolutions have meant that the speed at which items are produced has changed. For example, between 1860 and 1920, production in the United States increased 12–14 times, whereas the population only tripled. The outcome of producing items at an increasing rate in the current linear model is that a growing amount of waste is also being produced. And, in Australia, the waste we produce is growing at double the rate of our population—with 52 mega tonnes generated each year.

The Organisation for Economic Co-operation and Development’s (OECD) most recent Environment at a Glance publication indicated that Australia was ranked fifth of all OECD countries for generating the most municipal waste per capita (Figure 4). The OECD defines municipal waste as waste collected by, or on behalf of, municipalities and includes ‘household waste originating from households (i.e. waste generated by the domestic activity of households) and similar waste from small commercial activities, office buildings, institutions such as schools and government buildings, and small businesses that treat or dispose of waste at the same facilities used for municipally collected waste’.

Figure 4: Municipal waste generation intensities in OECD countries by kilograms per capita, 2013

Although about half the waste we generate in Australia is being recycled, the continued growth in economic output has meant that the volume of waste going into landfill is actually on the rise. Compounding this effect is the fact that there are an increasing number of people on the planet, and that consumer affluence is also growing. Researchers have highlighted that three billion new middle-class consumers are set to enter the global market in the next 15 years, meaning that the throw-away culture in the current linear economy can only get worse if the model remains unchanged.

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20 ibid., p. 48.
22 ibid.
Resources are finite

Another reason people are talking about the circular economy is that the world is experiencing a period of severe natural resource depletion.\(^23\) This means that the linear economy model is inherently unsustainable, as finite resources are taken, used, then lost forever. The challenge of resource depletion asks that resources are conceived of differently. As one academic has noted, ‘concerns over resource security, ethics and safety as well as greenhouse-gas reductions are shifting our approach to seeing materials as assets to be preserved, rather than continually consumed’.\(^{24}\) The circular economy seeks to address these resource losses, and presents a more ‘restorative’ process, where materials and components can be reused many times over.\(^25\) For this reason, some researchers have argued that the only solution to the world’s resource-security problem is to move away from the linear economy and to embrace the circular economy.\(^26\)

Potential for economic benefit

Advocates of the circular model have highlighted that there is also a considerable economic argument in favour of a transition to a circular economy. A study by the Ellen MacArthur Foundation found that a transition scenario in the European Union would generate annual net material cost savings of up to USD 380 billion, and up to USD 630 billion in an advanced transition scenario.\(^27\) This was the case when considering a subset of EU manufacturing sectors only, meaning that an economy-wide transition could theoretically produce greater savings. Further, in Canada, the Circular Economy Leadership Coalition has noted that current circular economy practices will lead to upwards of USD 4.5 trillion in economic activity by 2030, through innovation, job creation and resource shortage mitigation.\(^28\) As some academics have noted, ‘recycled, regenerated and locally sourced raw materials are usually cheaper’.\(^29\)

Closer to home, it’s been argued that the transition to a circular economy—with the increased recycling such a transition would entail—could lead to greater employment in Australia. For example, in a submission to the Senate inquiry into the waste and recycling industry, the Waste Management Association of Australia stated that ‘for every 10,000 tonnes of waste recycled, 9.2 jobs are created’.\(^30\) South Australian data has also revealed that some 25,000 jobs would be created over five years if waste was recycled and reused, rather than dumped or exported.\(^31\)

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\(^{25}\) S. Benn & D. Giurco (2014) *op. cit.*


\(^{30}\) Cited in Senate Environment and Communications References Committee (2018) *op. cit.*, p. 112.

4. Research and developments

Significant research on the circular economy has been undertaken in recent years, and a number of publications have sought to understand what a transition to a fully circular economy could look like. For example, in 2012 Chatham House, the Royal Institute of International Affairs, produced a briefing paper on the circular economy, arguing that a ‘fundamentally new model of industrial organization is needed to de-link rising prosperity from resource consumption growth – one that goes beyond incremental efficiency gains to deliver transformative change’.  

In 2013, the Ellen MacArthur Foundation produced the first economic report examining the potential of the circular economy model. The report, which was launched at the World Economic Forum (WEF), highlighted the limits of the linear economy model, looked at the benefits that a circular 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. This report aimed to reconcile the concept of scaling a circular economy within the reality of a global economy and its complex, multi-tier supply chains. The Senior Director at the WEF concluded that ‘the economic case for shifting to a circular economy is compelling’.  

In 2015, the European Commission launched its Circular Economy Package (CEP), with the aim of boosting competitiveness, creating jobs and generating sustainable growth. 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 package was ratified in May 2018 by the EU Council, and the legislation came into effect in July 2018.  

Also, in March 2016, the multidisciplinary scientific journal, Nature, produced a special issue on the circular economy. One of the feature articles asserted that a circular economy would ‘change economic logic’, as it ‘replaces production with sufficiency: reuse what you can, recycle what cannot be reused, repair what is broken, remanufacture what cannot be repaired’. Similarly, in 2017, the interdisciplinary Journal of Industrial Ecology also produced a special issue exploring the circular economy, noting that the circular economy concept had gained traction across a number of domains.  

[35] ibid., p. 4.
Further, the OECD has started the RE-CIRCLE project for member countries, providing policy guidance on resource efficiency and the transition to a circular economy.\textsuperscript{42} And in 2017, BSI, the national standards body in the United Kingdom, launched a new standard for the circular economy that provides guidance and recommendations to assist organisations wishing to put circular economy theory into practice.\textsuperscript{43} This standard is the first of its kind, both in the UK and globally.\textsuperscript{44}
5. Challenges

Transitioning to a circular economy would present a number of challenges. Firstly, some researchers have expressed concern that the discussion around any transition has focused primarily on economic factors, without grappling with the institutional and social dimensions necessary for societal transitions to a circular economy. They argue that questions relating to labour conditions, wealth distribution and governance systems remain to be addressed. On the other hand, an environmental charity in the United Kingdom has argued that a circular economy is actually good for people when the right policy is in place, as it can cut unemployment and save people money.

Secondly, some researchers have questioned whether or not the circular economy, with its aim of closing material and product loops, would even decrease primary production at all. In fact, they argue, circular economy activities can actually increase overall production, thereby partially or fully offsetting the benefits that a circular economy seeks to provide. They term this effect the ‘circular economy rebound’, and explain that this occurs ‘when circular economy activities, which have lower per-unit-production impacts, also cause increased levels of production, reducing their benefit’. In terms of the coordination between industries that would be required for a transition to a circular economy, there is an added complication in that they are often regulated in very different ways. For example, the waste management sector is regulated in a different way to the water and energy sectors and contains a mixture of public and privately-owned entities, which further complicates the ability to have a coordinated transition to a circular economy.

Thirdly, another concern relates to the potential difficulty in getting companies at different points on the supply chain to collaborate on a transition. For example, while the final product may be produced by a company that has implemented a transition to a circular economy, parts manufacturers along the supply chain may not have done so. Further, while products may be manufactured in one location, they may contain components from different jurisdictions. Researchers have noted that a primary obstacle is ‘getting firms linked by supply chains to cooperate in turning outputs into inputs’. Although the term ‘transition’ implies that companies will ultimately move at their own pace, if the aim is to reduce waste and use of virgin resources then the argument made by advocates of the circular economy is that the more companies that transition sooner, the better.

Additionally, another challenge that the circular economy poses relates to human behaviour—specifically, the connection we may have to our possessions, and our preferences for whether they are new or used. Bruce Hood, professor of developmental psychology, has argued that our psychological bias to value exclusivity (a perceived ‘luxury’ item) and authenticity (whether an item is ‘real’ or reproduced/fake) actually undermines the principles of recycling and reuse. Hood argues that this ‘essentialism’ poses ‘a formidable obstacle to accepting—as we must—that all materials can and should be reused or recycled. To realize a circular economy—in which resources are kept in use for as long as possible—the perceived status and value of reused materials must be changed’.

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46 ibid.
49 ibid.
51 B. Hood (2016) op. cit., p. 439.
52 B. Hood (2016) op. cit., p. 439.
Potential solutions
Several ideas have been put forward to manage the transition to a circular economy and to address challenges such as those discussed above. For example, some researchers have argued that better circular economy metrics need to be developed, and suggest that the OECD draw up reporting guidelines for countries to follow.\textsuperscript{53} Others have advocated for the development of a typology for design for product integrity, which includes guiding principles, design strategies and methods, to ensure the integrity of a product—the ultimate goal of which is ‘to minimize and ideally eliminate environmental costs by preserving or restoring the product’s added economic value over time’.\textsuperscript{54} Others still have suggested that when more recycled material has been used in an object, the more this should be advertised—and rewarded with relevant tax breaks and other market levers.\textsuperscript{55} This could mean that manufactured goods be required to indicate the extent of their recycled content, for both the product and its packaging.\textsuperscript{56}

To make the transition easier for manufacturers and consumers, one researcher has advocated for the creation of commercial markets and collection points, so that discarded garments, bottles, furniture, computer equipment and building components can be collected and either repurposed or recycled.\textsuperscript{57} Stahel explains the process in that ‘[g]oods that can be reused may be cleaned and re-marketed; recyclables are dismantled and the parts are classified according to their residual value. Worn parts are sold for remanufacturing, broken ones for recycling’.\textsuperscript{58}

In relation to the possibilities of collaboration and cooperation along the supply chain, two researchers provide the example of China and its industrial parks, where waste from one manufacturer can be used as an input for another manufacturer. China has an advantage in that more than 50 per cent of its manufacturing activities are conducted in industrial parks and export processing zones, meaning that targeting these parks for supply-chain waste management has been very effective and is beginning to reduce the intensity of the country’s resource use.\textsuperscript{59} However, some industries are arguably more suited to circular economies than others—for example, the recirculation of scrap metal is apparently straightforward, whereas other recycling practices are not.\textsuperscript{60}

Additionally, in terms of the potential psychological changes needed, Hood argues that humans need to shift from valuing objects on the basis of their exclusivity, to a valuation that prioritises historical reuse. This could be achieved, he asserts, through policy measures that encourage non-consumption, through innovation, and through stringent product labelling.\textsuperscript{61} Hood maintains that this would assist a societal transition away from the appeal of the ‘brand new’ to the ‘brand renewed’.\textsuperscript{62}

\textsuperscript{53} J. A. Mathews & H. Tan (2016) op. cit., p. 442.
\textsuperscript{55} B. Hood (2016) op. cit., p. 440.
\textsuperscript{56} ibid.
\textsuperscript{57} W. R. Stahel (2016) op. cit., p. 436.
\textsuperscript{58} ibid., pp. 436–7.
\textsuperscript{59} J. A. Mathews & H. Tan (2016) op. cit., p. 441.
\textsuperscript{60} ibid., p. 442.
\textsuperscript{61} B. Hood (2016) op. cit., p. 440.
\textsuperscript{62} ibid.
6. Circular economy initiatives around the world

This section provides a brief insight into some of the circular economy initiatives occurring in selected overseas jurisdictions, and also includes some examples of initiatives in Australia.

Canada

The Government of Canada has a policy position on moving towards zero plastic waste. In implementing this initiative, the government has stated its intention to create a more circular economy and is working with international and domestic partners to make it a reality—specifically, through improving how plastics are made, used and recycled, and through preventing their release into the environment.63 In 2017, the Canadian Government’s Policy Horizons unit published a policy paper on how the development of a circular economy may be facilitated by the Internet of Things, with a potential transition to a circular economy hastening the shift towards a ‘more sustainable economic paradigm’.

Other circular economy initiatives that are occurring within Canada include the Circular Economy Lab—launched in 2016 by a non-profit organisation in the sustainability sector—which has as its mission to ‘accelerate the transition to a low-carbon, circular economy in Canada and beyond’;65 and the National Zero Waste Council, which has identified the circular economy as one of its areas of focus.66 Similarly, the country’s Waste Reduction Week initiative, held in October 2018, has also identified the circular economy as one of its key priorities—the Recycling Council of Ontario, which coordinates the event, has indicated that each of the themes discussed during the week will be ‘presented through the lens of its contribution to advancing a Circular Economy’.67

A new organisation, called the Circular Economy Leadership Coalition, was formally launched in September 2018.68

China

China has also implemented a range of initiatives to assist in its transition to a circular economy. For example, in 2005, China’s State Council published a policy paper acknowledging the environmental and economic risks of the country’s heavy resource exploitation, and identified the circular economy as the principal means to deal with these risks.69 Also, in the country’s eleventh Five-Year Plan (for the period 2006–2010), a whole chapter was dedicated to the circular economy; and, in its twelfth Five-Year Plan (for 2011–2015), the circular economy was upgraded to a national development strategy.70

In 2012, the finance ministry and the National Development and Reform Commission (NDRC) called for 50 per cent of the country’s industrial parks to implement circular-economy transformation initiatives by 2015, with an aim of reaching close to zero discharge of pollutants.71 In 2013, the State

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70 ibid.
71 ibid.
The Circular Economy: An explainer

Council released a national strategy for achieving a circular economy—said to be the world’s first such strategy.\textsuperscript{72}

A practical example of how the circular economy is being implemented in the country is the Suzhou New District, near Shanghai. The District is a 52-square kilometre region for technological and industrial development, and counts some 4,000 manufacturing firms that operate there. Waste from some regions in the park is used as an input for other manufacturers—for example, instead of using virgin copper, manufacturers of printed circuit boards are using copper that is recovered as a waste product of other manufacturers on site.\textsuperscript{73}

Denmark

There has been considerable research into the implementation of a circular economy in Denmark. For example, in November 2015, the Ellen MacArthur Foundation published a case study looking at Denmark’s potential for a circular economy.\textsuperscript{74} In 2016, a non-profit, public-private partnership called State of Green published a circular economy white paper, which had the purpose of ‘contribute to the common understanding of the concept of the circular economy and, through practical examples, illustrating how Danish companies are providing solutions that help progress the transition towards a circular economy’.\textsuperscript{75} In June 2017, the Danish government’s Advisory Board for Circular Economy delivered 27 recommendations for specific efforts Denmark can make to promote the transition to a circular economy;\textsuperscript{76} the recommendations were grouped under four general themes: the circular value chain; design and production; consumption; and recycling.\textsuperscript{77}

A practical example of a circular initiative already in place in Denmark is the Danish town of Kalundborg. Kalundborg hosts the Kalundborg Symbiosis, an eco-industrial park that has been in operation since 1972 and is advertised as the world’s first industrial symbiosis following the circular approach.\textsuperscript{78} The Symbiosis is currently a partnership between nine public and private companies, who share energy, water, materials and waste recycling processes.\textsuperscript{79}

An example of a private-led initiative in Denmark is the LEGO Group, which has announced its intention to use 100 per cent sustainable materials in its packaging by 2025, in order to divert all packaging from landfill.\textsuperscript{80} The company is also seeking to eliminate its use of petroleum-based plastics and to instead build its products from plant-based or recycled materials, by 2030.\textsuperscript{81}

\textsuperscript{72} J. A. Mathews & H. Tan (2016) op. cit., p. 441.
\textsuperscript{73} ibid.
\textsuperscript{75} State of Green (date unknown) ‘Circular economy’, State of Green website.
\textsuperscript{77} Ministry of Environment and Food of Denmark (date unknown) ‘Circular Economy’, Ministry of Environment and Food of Denmark website.
\textsuperscript{78} Kalundborg Symbiosis (date unknown) ‘Explore the Kalundborg Symbiose’, Kalundborg Symbiosis website.
\textsuperscript{79} ibid.
\textsuperscript{80} B. Gherasim, Lego Group (2018) \textit{The Lego Group aims for 100% sustainable packaging by 2025}, media release, 22 April.
European Union

As mentioned earlier, the European Commission launched its Circular Economy Package in 2015, which was ratified in May 2018 by the EU Council and came into legislative effect in July 2018.\(^\text{82}\) The CEP includes an EU Action Plan for the Circular Economy, which establishes ‘a concrete and ambitious programme of action’, and contains measures covering the whole life cycle of a product—such as production, consumption and waste management.\(^\text{83}\)

In January 2018, the Commission adopted a new set of measures as part of its ‘continuous effort to transform Europe’s economy into a more sustainable one and to implement the ambitious Circular Economy Action Plan’.\(^\text{84}\) One such measure is the EU Strategy for Plastics in the Circular Economy, which seeks to transform the way plastics and plastic products are designed, produced, used and recycled, with the aim that all plastics packaging be recyclable by 2030.\(^\text{85}\) Another measure involves a Monitoring Framework on progress towards the circular economy at the EU and national level. The Framework comprises ten key indicators that relate to the various stages in the process—including production and consumption, waste management, and secondary raw materials, as well as competitiveness and innovation—and is intended to be a tool by which to assess the effectiveness of circular economy initiatives that have been put in place in the EU.\(^\text{86}\)

Additionally, since the adoption of its CEP, the Commission has revised its legislative proposals on waste to set clear targets for waste reduction and to ‘establish an ambitious and credible long-term path for waste management and recycling’.\(^\text{87}\) Key elements of the revised waste proposal include the implementation by 2030 of a common EU target for recycling 65 per cent of municipal waste and 75 per cent of packaging waste, as well as a binding target to reduce landfill to a maximum of ten per cent of municipal waste.\(^\text{88}\) The EU has also established, as part of its Europe 2020 strategy, resource-related policy goals that extend as far ahead as 2050 and, in many cases, these goals are guided by relevant targets and indicators to track implementation.\(^\text{89}\)

Finland

The Finnish Innovation Fund, Sitra, was gifted by the Finnish Parliament to Finland on the country’s 50th anniversary. Sitra’s operations are funded by returns from an endowment originally granted by the Parliament, and the Fund reports directly to the Parliament.\(^\text{90}\) Sitra’s stated task is ‘to build a successful Finland for tomorrow’.\(^\text{91}\) In recent years, the fund has focused an extensive amount of work on the circular economy and, in 2018, Sitra was awarded the WEF Award for Circular Economy in the Public Sector.\(^\text{92}\) The Fund’s director stated that its ‘future-oriented work aims at making Finland

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\(^\text{84}\) ibid.

\(^\text{85}\) ibid.


\(^\text{88}\) ibid.

\(^\text{89}\) World Economic Forum (2014) op. cit., p. 27.

\(^\text{90}\) Sitra (date unknown) ‘Sitra is Finland’s fund for the future’, Sitra website.


succeed as a pioneer of sustainable well-being. We strongly believe that the next era of well-being should be based on a fair and competitive circular economy’.  

In 2016, Sitra produced the world’s first roadmap to a circular economy, to help implement the Finnish government’s target to make Finland a global leader in the circular economy by 2025. The roadmap proposes a number of actions categorised into three levels—policy actions, key projects, and pilots. It also identifies five target areas to promote the growth of a circular economy, including: a sustainable food system; forest-based loops; technical loops; transport and logistics; and common action (Figure 5). In October 2018, the Fund will co-host the World Circular Economy Forum 2018 with the Ministry of Environment of Japan, with the event to take place in Yokohama.

Another initiative in Finland is seen in the non-profit Helsinki Metropolitan Smart & Clean Foundation, which seeks to make the metropolitan area and municipality of Lahti ‘the world’s best test bed for smart and clean solutions by 2021’. According to the Foundation’s website, the core of its work is to gather initiatives to address climate change and to advance the circular economy. It does this through interaction with cities, government, companies, and research and education institutions. All actions undertaken by the Foundation are guided by a clear set of criteria, which stipulate that actions must improve citizens’ quality of life, decrease emissions and utilise resources efficiently. One example of an action by the Foundation is to have all buses, work machines and city trucks switch to 100 per cent waste-based biofuels by 2020.

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93 ibid., p. 43.
95 Sitra (2016) op. cit., p. 4.
99 ibid.
100 ibid.
Figure 5: Circular Economy Roadmap Infographic, Finland

Source: Sitra (date unknown) ‘This is how we create a circular economy in Finland’, Sitra website.
France
In October 2017, the French Government announced its intention to create a roadmap for the circular economy, with the aim of reducing the amount of waste going to landfill by half and recycling 100 per cent of plastics, by 2025. The roadmap was launched by the Prime Minister in April 2018 and contained 50 measures to assist in the transition to a circular economy, relating to the key theme areas of production, consumption, waste and community action/engagement.

Examples of some existing circular initiatives in France include the Textiles Recycling Valley in Northern France, which seeks to sort/capture 50 per cent of waste fabric and reuse/recycle 95 per cent of it, by 2019; and the Renault factory in Choisy-le-Roi, which remanufactures automotive parts and sends no waste to landfill.

Germany
Germany has a comprehensive plan for recycling in place, as per its Act for Promoting Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal, which came into force in 1996. The country has also had the German Resource Efficiency Programme (ProgRess) in place since February 2012, making it one of the first countries to put measures in place for the protection of natural resources.

In conjunction with ProgRess, the German government submits a progress report on the development of resource efficiency in Germany every four years, and updates the programme accordingly. In November 2016, an updated report was released, and was based upon the same four guiding principles as the first report in 2012—one of which is ‘making economic and production activities in Germany depend less and less on primary resources, and developing and expanding the circular economy’.

Examples of circular initiatives in Germany include Circular Economy Solutions GmbH, a company that specialises in closing the loop for automotive parts, and the sustainable model district of Vauban.

Japan
In response to its scarcity of natural resources, Japan has actively taken steps to implement more sustainable practices and to transition to a circular economy. According to the WEF, this transition has followed a three-pronged approach involving structural adjustments, legislation, and societal participation. This three-pronged approach has proven very successful in Japan. For example, the

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108 ibid.
country’s recycling rate for metal is 98 per cent, and is also high for other materials. The majority of electronic appliances and electrical products are recycled, and up to 89 per cent of the materials they contain are recovered—most of which are used to make the same type of products. In 2007, only 5 per cent of Japan’s waste went into landfill.

While a range of policies and laws implemented in the country since the 1970s have advanced the circular economy, there has been a significant amount of legislative progress since 2000. For example, the Law for the Promotion of Efficient Utilization of Resources was ratified in 2000 and sought to minimise producer and consumer waste. It was described as ‘epoch-making and unprecedented in the world’ and covered the entire lifespan of a product from upstream to downstream.

An example of a circular initiative in Japan is being implemented by the Nissan car company, which has joined with another company to take used batteries from one of their electric car models and reuse them to store the electricity created by solar panels built on a disused landfill site. The facility can produce up to ten megawatts of electricity, which can then be either fed into the power grid, or stored in banks of used batteries from electric vehicles.

Japan’s Ministry of Environment is co-hosting the World Circular Economy Forum 2018 with the Finnish Innovation Fund, Sitra.

The Netherlands
In September 2016, the Government of the Netherlands launched its government-wide Programme for a Circular Economy, to be achieved by 2050. In a letter to the Dutch parliament announcing the programme, the Minister for the Environment and the Minister of Economic Affairs stated that the programme outlines ‘a vision of a future-proof, sustainable economy and a liveable earth for future generations’. The Programme identifies five priority areas for the transition to a circular economy: biomass and food; plastics; the manufacturing industry; the construction sector; and consumer goods.

One of the interim measures mentioned in the Ministers’ letter is to reduce the use of primary raw materials by 50 per cent, by 2030. Three strategic objectives are identified to assist in achieving this goal, including: that raw materials in existing supply chains be used in a high-quality manner (to reduce the need for raw materials in future); that new fossil fuel-based raw materials be replaced by sustainable and renewable materials, wherever possible; and that new production methods be developed, new products designed, and relevant sectors restructured.

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113 ibid.
114 ibid.
115 ibid.
116 ibid.
118 ibid.
123 ibid., p. 5.
A private-sector circular economy initiative in the Netherlands can be seen in the fashion company, G-Star RAW. In 2016, the company joined with Circle Economy, an Amsterdam-based social enterprise specialising in circularity, to collaborate on creating a closed loop in textiles manufacturing. G-Star RAW has since produced a denim fabric that is 98 per cent recyclable—and recycles all water used in its manufacture—and is the first denim in the world to receive Gold Certification from the Cradle to Cradle Products Innovation Institute.

New Zealand

The Government of New Zealand’s Ministry for the Environment administers the Waste Minimisation Fund, which aims to fund projects that promote or achieve a reduction in waste. In 2018, the fund requested applications for projects that focused specifically on accelerating the country’s transition to a circular economy. The government has also stated its intention of working with key sectors to develop and adopt circular economy principles, and has set up a taskforce to work with local government and the waste and resource efficiency sector.

In 2017, the country’s Sustainable Business Network partnered with Auckland Council, among others, to create the Circular Economy Accelerator, an organisation which has as its vision to make New Zealand an exemplar circular economy nation. In 2018, New Zealand’s first-ever Circular Economy Summit was organised by the Sustainable Business Network and WasteMINZ, the largest representative body of the waste, resource recovery and contaminated land sectors in New Zealand. The Summit’s aim was to ‘set a course for New Zealand’s transition to a world-leading circular economy’.

A private-sector example of a circular initiative in New Zealand comes from Wishbone Design Studio, which has developed a children’s balance bike that is made from 100 per cent post-consumer recycled carpet and is stated to be the world’s first bicycle made from 100 per cent recycled material.

United Kingdom

In December 2015, the London Waste and Recycling Board (LWARB) released a report into the circular economy that set out the context and opportunities for transition to a circular economy in London. The report aimed to inform the city’s policy development, raise awareness about the circular economy

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128 New Zealand Government Ministry for the Environment (date unknown) ‘What the Government is doing to help New Zealand transition to a circular economy and design out waste’, Ministry for the Environment website.
in the public and private sectors, and engage stakeholders keen to work with LWARB.\(^{134}\) It identified five focus areas: built environment, food, textiles, electricals, and plastics.\(^{135}\)

In June 2017, LWARB then launched its Circular Economy Route Map, which had the aim of accelerating London’s transition to a circular city.\(^{136}\) The route map set out eight cross-cutting themes as being central to creating the right conditions for a circular economy to flourish in London. These are: communications; collaboration; policy; procurement and market development; finance; business support; demonstration; and innovation.\(^{137}\) For each of the themes, the route map put forward recommendations to assist the city’s transition. For example, under the theme of collaboration, it was recommended that a working group be established to provide insight into developing the market for re-used and reclaimed materials in London.\(^{138}\)

In 2016, the Scottish Government produced a report on a circular economy strategy for Scotland. The strategy identified four priority areas, including: food and drink, and the broader bio-economy; remanufacture; construction and the built environment; and energy infrastructure.\(^{139}\) It also included a food waste reduction target, to cut food waste by one third by 2025.\(^{140}\) Also, the Glasgow Chamber of Commerce has partnered with Glasgow City Council, Zero Waste Scotland, the University of Strathclyde and Circle Economy to produce Circular Glasgow. Funded by the European Regional Development Fund, Circular Glasgow is described as ‘a movement to inspire businesses of all sizes to innovate and become future-proof by adopting circular strategies’.\(^{141}\)

Other initiatives in the United Kingdom include the Waste and Resources Action Programme, a registered charity that works with governments, businesses and communities to promote the sustainable use of resources. It focuses on three priority sectors—food and drink, clothing and textiles, and electricals and electronics—and has a strong focus on the circular economy.\(^{142}\)

The University of Exeter’s business school has also recently launched its Centre for Circular Economy.\(^{143}\)

**United States of America**

In the USA, the US Chamber of Commerce Foundation convenes a yearly Sustainability and Circular Economy Summit.\(^{144}\) Its Corporate Citizenship Center also convenes a Sustainability and Circular Economy Program for companies.\(^{145}\) In terms of circular initiatives, a number of US cities have implemented programs to reduce waste. For example, the City of San Francisco has implemented a zero-waste initiative, with the intention of diverting all waste from landfill or high-temperature destruction by 2020.\(^{146}\) To achieve this, products are to be designed and used according to the

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\(^{134}\) ibid., p. 4.

\(^{135}\) ibid., p. 15.


\(^{138}\) ibid., p. 22.


\(^{140}\) ibid., p. 9.


following waste reduction hierarchy: prevent waste; reduce and reuse; recycle and compost. In 2012, San Francisco diverted nearly 80 per cent of its waste from landfill—the highest rate of any major US city. Other cities implementing zero-waste initiatives include Seattle and Austin, among others.

A practical example of a circular initiative in the USA is The Plant, a building in Chicago that hosts a collaborative community of food businesses that are all focused on growing, producing and/or sourcing a variety of food products. It has been described as a ‘net-zero, closed loop urban system for food production, energy conservation and material use’. Essentially, The Plant—founded on a model of closing waste, resource, and energy loops—seeks to be a working example of what sustainable food production and economic development looks like. The building also plays host to Plant Chicago, an educational non-profit that seeks to cultivate local circular economies and provides community-driven, hands-on programs and tech demonstration projects at the premises.

Initiatives in Australia
There are a number of initiatives taking place in Australia that rethink the ways in which waste and recycling practices operate. Some brief examples are outlined below.

City of Melbourne, Victoria
In 2013, the City of Melbourne launched the Degraves Street Recycling Facility, with the aim of changing the waste and amenity culture in the café precinct and providing for food waste, cardboard and commingled recycling. Key achievements of the program include a resource recovery rate of nearly 67 per cent and a combined total of 392 tonnes of recycling diverted from landfill. Local parks and gardens were also supplied with a compost-like soil conditioner made from food waste processed by the facility’s food dehydrator. The Degraves Street Recycling Facility is one of ten initiatives identified in the city’s Waste and Resource Recovery Plan 2015–18, the objectives of which are to increase resource recovery, reduce waste to landfill, and improve local amenity.

Government of South Australia
In 2017, the Government of SA commissioned a report into the potential benefits of a circular economy in South Australia. This endeavour made South Australia the first jurisdiction in Australia to quantify the benefits of a circular economy. The report 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.

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149 See, for example: City of Seattle (date unknown) ‘Zero Waste’, City of Seattle website; and City of Austin (date unknown) ‘Zero Waste by 2040’, City of Austin website.
151 Bubbly Dynamics LLC (date unknown) ‘The Plant’, Bubbly Dynamics website.
154 Ibid.
159 Ibid., p. 7.
In June 2018, South Australia hosted a global leadership program on the circular economy.  

James Cook University, Queensland

James Cook University (JCU) has become the first university in Australia to implement an innovative food waste disposal system, known as the Bio-Regen, which takes food waste and converts it into a liquid bio-fertiliser. The system is processing up to a tonne of food waste from JCU’s commercial kitchens each week, and the resultant high-value fertiliser is being sold to Asian farmers. This practice not only keeps food waste out of landfill, but also demonstrates a way in which the food production loop can be closed.

Kwinana, Western Australia

Construction is currently underway on a new waste-to-energy facility in the city of Kwinana. The facility will be the first of its kind in Australia and will be able to process some 400,000 tonnes of waste per year, which is expected to generate around 40MW of energy. When completed, the facility is expected to divert up to half of the residential, post-recycling rubbish collection in the Perth metropolitan area from landfill.

New South Wales Government

In March 2018, the NSW Legislative Council Committee on Planning and Environment released its final report into ‘Energy from waste’ technology. Recommendation 35 of the report was that the NSW Environment Protection Authority ‘investigate opportunities to embed zero waste strategies and the circular economy in New South Wales’. In its response to that recommendation, the NSW Government stated its commitment to developing a NSW-specific circular economy policy, and to supporting the development of a circular economy policy at the national level.

In October 2018, the NSW Government launched its draft Circular Economy Policy. The Policy Statement sets out the circular economy principles that the Government will adopt and also defines the role that the Government will play in implementing them. 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.

The Policy Statement commits New South Wales to embedding these principles in the state’s public and private sector decision-making by 2025. A Discussion Paper was also released and proposes the Government’s next steps and priority focus areas. A consultation period on the draft Circular Economy Policy has since begun.

Simply Cups
Simply Cups is Australia’s first coffee cup recycling program. Created in the UK in 2014, Simply Cups came to Australia in 2016 and recycles and upcycles takeaway cups into recycled, and recyclable products—effectively, creating a circular economy. Through the recycling process, takeaway cups are combined with other plastic materials that would otherwise go to landfill to create a resin suitable to be upcycled into new products, such as bench seats, kerbing and car stops. The company also produces a reusable cup made from recycled coffee cups.

Sustainability Victoria
In 2018, Sustainability Victoria released its updated Statewide Waste and Resource Recovery Infrastructure Plan. First published in 2015, the Plan provides ‘a long-term vision and roadmap to guide future planning for waste and resource recovery infrastructure in the state’. In the Plan’s foreword, the Minister for Energy, Environment and Climate Change stated that ‘[i]ncreasing the recovery of waste will not only protect our environment, it builds an economy that is circular – one that maximises the productive use and reuse of valuable resources’.

Sustainability Victoria also administers the Resource Recovery Infrastructure Fund, which provides grants for infrastructure for collection, sorting or processing. Fourteen projects were announced in 2017 and between them are expected to recover 90,000 tonnes of plastics, 2,100 tonnes of food organics, 1,000 tonnes of end-of-life tyres and 100,000 tonnes of timber—diverting some 350,000 tonnes of waste from landfill per year.

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169 ibid.
172 Simply Cups (date unknown) ‘Our Story’, Simply Cups website.
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