



EMBEDDING CIRCULAR PRINCIPLES INTO PLASTIC
PACKAGING REGULATION IN AUSTRALIA:
CHALLENGES AND SOLUTIONS

A Thesis submitted by

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ABSTRACT

The Circular Economy is an alternative economic model, focused on resource efficiency and regenerative systems,¹ which aims to systematically alter society's patterns of natural resource use and waste generation in pursuit of sustainable production and consumption practices.² Centred on generating material 'loops' through the recirculation of *waste* into further production cycles,³ the circular economy is dependent on the continuous re-use of materials from products that have been designed and manufactured for re-use, reparability, upgradability and recyclability.⁴

Given the weight afforded to product design within the literature, specifically the need for manufacturers to produce circular compatible products for the generation of material loops, this thesis proposes that a lack of appropriate regulatory interventions focused on start-of-life design of products, is a current legal barrier that hinders the transition toward a circular economy in Australia.

To investigate possible mechanisms to overcome this barrier, this thesis utilises a case study focused on plastic packaging, to establish a best practise approach to regulating manufacturers for improved circular plastic packaging. To demonstrate use, and application of the best practice approach, these principles will be then be employed to identify and review existing regulation that applies to manufacturers of plastic packaging in Australia. Application of these principles in this review, will establish not only an understanding of the ways in which manufactures are currently being regulated in Australia, but will also highlight potential regulatory gaps that may require attention in this area.

Guided by the outcome of this review, this thesis will conclude by proposing a number of reform recommendations intended to improve these instruments in line with the proposed best practice approach in pursuit of a circular economy for plastic packaging in Australia.

¹ See Martin Geissdoerfer et al, 'The Circular Economy – A New Sustainability Paradigm?' (2017) 143 *Journal of Cleaner Production* 757, 759, 766.

² Julian Kirchherr, Denise Reike and Marko Hekkert, 'Conceptualizing the Circular Economy: An Analysis of 114 Definitions' (2017) 127 *Resources, Conservation & Recycling. Elsevier* 221, 227, 229. In this article, Kirchherr et al identifies and includes sustainable development in their concluding definition of a CE overall. However, this article also highlights how currently a degree of fragmentation exists between the CE and sustainable development, and it is suggested that the links between the two concepts should be further strengthened, particularly in the area of social equality. See also Ibid 760, 764.

³ Department of Agriculture, Water and the Environment, '2018 National Waste Policy: Less Waste, More Resources' 17 <<http://www.environment.gov.au/>> ('*National Waste Policy*').

⁴ See, eg, Eléonore Maitre-Ekern, *Environmental Law and Economics -The Choice of Regulatory Instruments for a Circular Economy*, vol 4 (Springer International Publishing, 2017) 312 <<https://link-springer-com.ezp01.library.qut.edu.au/content/pdf/10.1007%2F978-3-319-50932-7.pdf>>; Ellen MacArthur Foundation, 'What Is a Circular Economy?' <<https://www.ellenmacarthurfoundation.org/circular-economy/concept>> ('*What Is a Circular Economy?*'); Ellen MacArthur Foundation, 'Circular Economy Schools Of Thought' (July 2019) <<https://www.ellenmacarthurfoundation.org/circular-economy/concept/schools-of-thought>>; Thibaut Wautelet, *The Concept of Circular Economy: Its Origins and Its Evolution* (17 January 2018) <[file:///C:/Users/bousgas/Downloads/ResearchPaper_Theconceptofcirculareconomy-itsoriginsanditsevolution_WAUTELET%20\(3\).pdf](file:///C:/Users/bousgas/Downloads/ResearchPaper_Theconceptofcirculareconomy-itsoriginsanditsevolution_WAUTELET%20(3).pdf)>; Material Economics Consultants, Dr Jonathan Cullen and Professor Frank Geels, *The Circular Economy: A Powerful Force for Climate Mitigation* (2018) 176 <<https://media.sitra.fi/2018/06/12132041/the-circular-economy-a-powerful-force-for-climate-mitigation.pdf>>.

CERTIFICATION OF THESIS

This Thesis is entirely the work of Anastasia Louisa Bousgas except where otherwise acknowledged. The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Principal Supervisor: Associate Professor Noeleen McNamara

Associate Supervisor: Dr Bob Zhoa

Student and supervisors' signatures of endorsement are held at the University

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This thesis has been a challenging yet enriching personal experience. It has allowed me to develop confidence in my skills and abilities, and has confirmed my love of research and the environment. It has also highlighted just how multifaceted some of society's current issues are, and as a result, how multidimensional the subsequent solutions for overcoming these issues will need to be.

What can I say, completing this thesis during 2020 was certainly an interesting experience. I don't know how many people can say they completed a thesis in the midst of a global pandemic. I guess one of the biggest positives to have arisen from COVID, as it related to my studies, is that usual life distractions, such as socialising and going out, were effectively removed from my life, and replaced with long hours of indoor time in which I had little else to do but research, work and write. Jokes aside - the only other thing I have to say about COVID, is that although devastating, I hope that the uncertainty and changes that have resulted from this life altering experience can be used to create positive and beneficial advancements for the people, and for the planet.

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LIST OF ABBREVIATIONS

APC: Australian Packaging Covenant

APCO: Australian Packaging Covenant Organisation

NEPM: National Environmental Protection (Used Packaging Material) Measure

PP: Plastic Packaging

SPG: Sustainable Packaging Guidelines

*“If it cannot be reduced, repaired, rebuilt, refurbished, resold, recycled or composted,
then it should be restricted, redesigned or removed from production.”*

Pete Seege

CHAPTER 1: SCOPE AND OBJECTIVES OF THIS RESEARCH

1.1 INTRODUCTION

There is growing consensus within the international community, that one of the major contributors to the increasing detrimental environmental effects of resource consumption and waste generation, is the linear design of global economies.⁵ From extraction, to production, consumption to final disposal, the linear system is built on a foundation centred on the unlimited availability of natural resources, coupled with the endless possibility for growth. Yet, the linear model contains a significant flaw in that it fails to account for the benefits afforded to the system by the natural environment.⁶ As such, although society continues to pursue the linear model, the ever-increasing prevalence of environmental degradation in the form of natural resource loss and waste accumulation, suggests that this system might be close to reaching its limits.⁷

Similarly to the rest of the world, Australia's economy is dictated by the *take, make, use, dispose* principles of the linear economy, with the subsequent negative environmental effects of this system evident throughout the country.⁸ In an attempt to curb and address unsustainable consumption of resources and generation of waste, Australia,⁹ like a growing number of international jurisdictions,¹⁰ has evidenced an intention to pursue the circular economy.¹¹ Contrary to the linear model, that requires unlimited exploitation of natural resources, the circular economy is based on resource efficiency and regenerative systems.¹² It centres on the continuous re-use of materials and products through material 'loops', and promotes systematic change in the way in which products and services are marketed and offered to consumers.

⁵ See Alan Murray, Keith Skene and Kathryn Haynes, 'The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context' (2017) 140(3) *Journal of Business Ethics* 369, 371.

⁶ In this instance, the natural environmental supports our linear economy through the provision of raw materials. It also supports this system as a 'sink' that absorbs the waste emitted from these processes. See Eléonore Maitre-Ekern (n 4) 305.

⁷ See Johan Rockström et al, 'Planetary Boundaries: Exploring the Safe Operating Space for Humanity' (2009) 14(2) *Ecology and Society* <<https://www.ecologyandsociety.org/vol14/iss2/art32/>> ('Planetary Boundaries').

⁸ There are a significant number of articles that discuss the issues caused by natural resource extraction and waste creation in Australia. See, eg, JL Lavers et al, 'Significant Plastic Accumulation on the Cocos (Keeling) Islands, Australia' (2019) 9(1) *Scientific Reports* 7102; Dr Graeme F Clark, Professor Emma L Johnston and Commonwealth Government, *Australia State of the Environment 2016: Coasts* (University of New South Wales, 2016) 167, 3, 18, 29, 31 <<https://soe.environment.gov.au/sites/default/files/soe2016-coasts-launch-17feb.pdf?v=1488793015>>; Rob White, 'Resource Extraction Leaves Something Behind: Environmental Justice and Mining' (2013) 2(1) *International Journal for Crime, Justice and Social Democracy* 50 ('Resource Extraction Leaves Something Behind').

⁹ 'Australia is moving towards a circular economy... This move is also happening across the globe, including in the European Union, Canada, and Australia's major trading partners, including China..' Department of Agriculture, Water and the Environment, 'National Waste Policy' (n 3) 3.

¹⁰ See, eg, European Union, 'Joint Statement of the 20th EU-China Summit', *EEAS - European External Action Service - European Commission* (Press Release, 180716_2, 17, July 2018) [30] <https://eeas.europa.eu/delegations/china/48424/joint-statement-20th-eu-china-summit_en>.

¹¹ This intention is strongly evidenced within the country's recent National Waste Policy (n 5) 3,7. The opening pages of the National Waste Policy states that 'The 2018 National Waste Policy embodies a circular economy, shifting away from 'take, make, use and dispose' to a more circular approach where we maintain the value of resources for as long as possible.' The document also clearly identifies that the pursuit of the CE is being undertaken in support of the Goal 12 of the United Nations' Sustainable Development Goals, which relates to sustainable consumption and production. See also Federal Government Department of the Environment and Energy, *National Waste Policy Action Plan* (2019) <<https://www.environment.gov.au/protection/waste-resource-recovery/publications/national-waste-policy-action-plan>> ('*National Waste Policy Action Plan*').

¹² Martin Geissdoerfer et al, 'The Circular Economy – A New Sustainability Paradigm?' (2017) 143 *Journal of Cleaner Production* 757, 759, 766.

One specific product receiving increasing attention as a priority for a transition to a circular economy is Plastic Packaging (PP).¹³ PP would appear to be a perfect candidate for such a transition. Although plastic is an appealing product for manufacturers,¹⁴ it is heavily reliant of non-renewable fossil fuel resources for its production.¹⁵ At the same time, the continuing uptake of plastic material for linear single use PP applications has meant that PP has become a highly generated form of waste. Ironically, the very characteristics that make plastic so appealing for use in production, pose significant challenges to stakeholders involved in the *end-of-use* segment of these products lifecycle.¹⁶ Moreover, mismanaged PP has, and continues to cause, catastrophic negative impacts on the environment.¹⁷ Being a synthetic material, PP is unable to be benignly reabsorbed into the natural environment, and instead accumulates and breaks down into potentially dangerous microplastics that can exist in the environment for hundreds of years.¹⁸

Yet, with linear practices deeply entrenched in today's economic markets, and PP highly prevalent within Australian society,¹⁹ it would appear that in order to shift society's current production, consumption, and disposal habits to a more sustainable circular system, Australia will need to adopt an array of appropriate regulatory measures.²⁰

¹³ This is the case both internationally, and within Australia. For example. Plastic packaging has been specifically mentioned as a focus product for waste management in Australia within the National Waste Policy and the National Waste Policy Action Plan - see especially Target 2, Target 4, and Target 5 of the Action Plan, which specifically sets action points for plastic packaging. See National Waste Policy (n 5); National Waste Policy Action Plan (n 7). See also, European Commission, *A European Strategy for Plastics in the Circular Economy* (2018) COM:2018:28:FIN>.

¹⁴ Some of the appealing benefits of plastics are that they are inexpensive, easily moulded, lightweight and strong. See Richard C Thompson et al, 'Our Plastic Age' (2009) 364(1526) *Philosophical Transactions of the Royal Society B: Biological Sciences* 1973.

¹⁵ Ellen MacArthur Foundation and Project MainStream, *The New Plastics Economy - Rethinking the Future of Plastics* (2016) 16 <https://www.newplasticseconomy.org/assets/doc/EllenMacArthurFoundation_TheNewPlasticsEconomy_Pages.pdf>.

¹⁶ The two waste management options that are most prevalent for PP in Australia include landfilling and recycling, undertaken either onshore or via offshore through material export. Overall, onshore plastic recycling levels have remained very low at around 9%. Offshore processing was previously Australia's greatest recycling option, with China being the largest export market for used plastics taking up to 19% of the countries collected waste. However, in January 2018, China introduced the National Sword Policy, which effectively banned the import of plastic waste into the country. This has caused significant problems for plastic waste within Australia. Additionally, issues exist in the physical processing of plastic waste onshore due to the vast variety of plastic in the market. These variations cause problems in the processing and separation of plastic material within processing centres. See Kyle O'Farrell and Australian Government Department of the Environment and Energy, *2017-18 Australian Plastics Recycling Survey National Report - Final Report* (Envisage Works, 30 January 2019) 1 <<http://www.environment.gov.au/>>; Phil Lasker, Jenya Goloubeva and China correspondent Bill Birtles, 'Here's How Australia Is Planning to Deal with China's Ban on Foreign Waste', *ABC News* (Text, 10 December 2017) <<http://www.abc.net.au/news/2017-12-10/china-ban-on-foreign-rubbish-leaves-recycling-industry-in-a-mess/9243184>>; Phillip Lasker and Jenya Goloubeva, 'Recycling Industry Demands Federal Action as Mountains of Rubbish Build Up', *ABC News* (Text, 14 April 2019) <<https://www.abc.net.au/news/2019-04-14/recycling-industry-demands-federal-action-as-waste-piles-up/10993218>>; B Madden and N Florin, *Characterising the Material Flows through the Australian Waste Packaging System* (Institute for Sustainable Futures, 2019) 46 <<https://www.packagingcovenant.org.au/documents/item/2171>>.

¹⁷ See, eg, Lisa Anne Hamilton, Steven Feit, and Center for International Environmental Law, *Plastic & Climate - The Hidden Cost of a Plastic Planet* (15 May 2019) <<https://www.ciel.org/wp-content/uploads/2019/05/Plastic-and-Climate-FINAL-2019.pdf>>; Kevin Linton - TopInfo Consulting (n 8).

¹⁸ There is an increasing area of research related to the potential negative effects of plastics and microplastics within the environment. For example, the potential toxic build-up of microplastics within marine creatures subsequently consumed by humans, and whether the consumption of these marine creatures can be toxic. See, eg, Marta Llorca et al, 'Microplastics in Mediterranean Coastal Area: Toxicity and Impact for the Environment and Human Health' (2020) 27 *Trends in Environmental Analytical Chemistry* e00090 ('Microplastics in Mediterranean Coastal Area'). See also Joana Correia Prata et al, 'Environmental Exposure to Microplastics: An Overview on Possible Human Health Effects' (2020) 702 *Science of The Total Environment* 134455 ('Environmental Exposure to Microplastics'); The Guardian, 'Microplastic Particles Now Discoverable in Human Organs', *the Guardian* (online, 18 August 2020) <<http://www.theguardian.com/environment/2020/aug/17/microplastic-particles-discovered-in-human-organs>>.

¹⁹ This has been assumed given the trends in international utilisation of plastic globally. See Ricardo Barra et al, *Plastics and the Circular Economy: A STAP Document* (UN Environment Programme, Scientific and Technical Advisory Panel, June 2018) <<https://www.thegef.org/sites/default/files/publications/PLASTICS%20for%20posting.pdf>>.

²⁰ Almost all of the literature relating to the implementation of a circular economy outline the need for strong, uniform regulatory and policy directions, instigated at a national level to drive consistent change in this area. See, eg, Ricardo Barra et al (n 14); Ellen MacArthur Foundation,

Building on the central assumption that regulation should play a role in transitioning Australia towards a circular economy,²¹ this thesis explores how principles that underpin the circular economy might be embedded into environmental laws and regulation in order to shift the present linear paradigm to a more circular system, using regulation associated with PP as a case study.

1.2 UNDERSTANDING THE CIRCULAR ECONOMY

1.2.1 The Linear Economic System

Since the industrial revolution, our global economy has pursued a linear model of production and consumption, known as a linear economy.²² Allan Murray et al. describes the linear economy as the process of ‘... converting natural resources into waste, via production.’²³ As part of the linear system, natural resources are extracted or harvested from the natural environment as input for the manufacture of goods. These goods are consumed, and subsequently discarded at the end of their useful life, as output known as waste.²⁴

With raw materials, energy, and labour seemingly infinite at the time of the industrial revolution,²⁵ principles of the linear economy were subsequently based on a foundation centred on the unlimited availability of natural resources, together with the endless possibility for growth. Furthermore, natural resource input and the ability of the environment to absorb waste output were viewed as respectively free to the overall system.²⁶ Based on this premise, the linear system ultimately failed to internalise the value afforded to the overall system by the natural environment, or recognise the benefits associated with conserving ecological systems for the continuation of this

Towards the Circular Economy (2013) 60, 81 <<https://www.ellenmacarthurfoundation.org/assets/downloads/publications/ElLEN-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf>>; Ellen MacArthur Foundation, *The New Plastics Economy - Catalysing Action* (2017) <https://www.newplasticseconomy.org/assets/doc/New-Plastics-Economy_Catalysing-Action_13-1-17.pdf>.

²¹ This is an assumption made by the researcher based on the literature in this area, which calls for strong uniform regulatory and policy actions at national levels to drive consistent change for the implementation of a circular economy. See, eg, Barra et al (n 15); World Economic Forum, *The New Plastics Economy Rethinking the Future* (January 2016) <http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf>; Ellen MacArthur Foundation (n 15). Finally, Eléonore Maitre-Ekern indicates ‘that the existing forces of the market economy cannot in themselves accomplish the necessary shift towards a circular economy [without intervention]’. Eléonore Maitre-Ekern (n 4).

²² Henning Wilts, Nadja Von Gries and Bettina Bahn-Walkowiak, ‘From Waste Management to Resource Efficiency. The Need for Policy Mixes’ (2016) 8(7) *Sustainability* 622, 2 citing European Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Towards a Circular Economy: A Zero Waste Programme for Europe*; COM (2014) 398 final; European Commission: Brussels, Belgium, 2014.

²³ This process has become known as the linear model of production and consumption. Alan Murray, Keith Skene and Kathryn Haynes, ‘The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context’ (2017) 140(3) *Journal of Business Ethics* 369, 371.

²⁴ Eléonore Maitre-Ekern (n 4) 306, 307.

²⁵ Ellen MacArthur Foundation, ‘What Is the Circular Economy?’ (Web page, 1 July 2020) <<https://www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy>>.

²⁶ Eléonore Maitre-Ekern (n 4) 308.

overall system. As a result, the linear model has led to increasing levels of environmental degradation, which have presented themselves in two primary ways.²⁷

The first relates to the reduction of natural stocks, or ‘natural capital’, within the environment.²⁸ As indicated above, to produce products, resources, or natural capital, must be removed from the environment. Although the act of removal can be destructive in itself, the primary effect of extraction practices, is the reduction of the extracted resource from the total environmental stocks available. Once stocks are removed, the natural environment needs time to either replenish the resource removed, or in the case of non-renewable resources, the resource will continue to reduce, and eventually be depleted.²⁹ As advancing technology continues to develop faster production and consumption material flows, the demand for natural resources continues to increase,³⁰ placing greater strain on the ability of the environment to replenish natural stocks, and arguably push non-renewable capital towards depletion faster than is necessary. Research continues to demonstrate the ways in which current patterns of consumption under the linear system is unsustainable,³¹ and with urbanisation, economic development,³² and global population projected to increase in the future,³³ suggests that unless linear systems are reformed, the demand for natural resources will likely exceed earth’s planetary boundaries.³⁴

²⁷ Murray, Skene and Haynes (n 5) 371.

²⁸ ‘Natural resources’ or ‘Natural Capital’ are resources provided by the Earth. These include environmental materials (air, water and soil) as well as other omnipresent resources (such as sunlight, wind, hydropower and geothermal), raw materials (minerals, trees), animal life and space. See Eléonore Maitre-Ekern (n 4) 320. Also see Paul Hawken, Amory Lovins and L Hunter Lovins, *Natural Capitalism - Creating the Next Industrial Revolution* (Little, Brown and Company, 90th ed, 1999).

²⁹ In this context, non-renewable resources is the term used to describe resources that are limited in quantity and have no natural ability to replenish themselves over time. These resources include such items as metals, minerals and fossil energy sources (oil, coal, gas). On the other hand, natural resources termed ‘renewable’, have the potential to regenerate (or renew) themselves within a human relevant period. This is however, provided that the rate of their use does not exceed the rate of their regenerative capacity (for example regrowing trees for wood). See Eléonore Maitre-Ekern (n 4).

³⁰ See generally Robert Angus Buchanan, ‘History of Technology’, *Encyclopedia Britannica* (Article, 18 November 2020) <<https://www.britannica.com/technology/history-of-technology>>; Robert Victor, ‘How Technology Affects Modern Product Distribution’, *Hollingsworth* (20 June 2017) <<https://www.hollingsworthllc.com/technology-affects-modern-product-distribution/>>.

³¹ See eg, Mathis Wackernagel et al, ‘Tracking the Ecological Overshoot of the Human Economy’ (2002) 99(14) *Proceedings of the National Academy of Sciences* 9266; Barrett, Mike, et al, *Living Planet Report 2018: Aiming Higher* (World Wide Fund for Nature bi-annual report, 2018) <https://d2ouvy59p0dg6k.cloudfront.net/downloads/lpr_living_planet_report_2006.pdf>; Peter M Vitousek et al, ‘Human Domination of Earth’s Ecosystems’ (1997) 277(5325) *Science* 494; Dennis Meadows, Dennis Meadows and Jorgen Randers, *Beyond the Limits: Confronting Global Collapse Envisioning a Sustainable Future* (Chelsea Green Publishing Company, 1992).

³² United Nations Department of Economic and Social Affairs, ‘Experts Explore Potential of Global Transition to Circular Economy’ (New York, online, 18 October 2018) <<https://www.un.org/development/desa/en/news/intergovernmental-coordination/potential-of-transition-to-circular-economy.html>>.

³³ The 2019 ‘World Population Prospects’ report of the Population Division of the United Nations has projected that the global population will increase by 2 billion persons over the next 30 years. This will see a population of 9.7 billion in the year 2050, with a further peak in population to occur in 2100, with a global population of around 11 billion persons. See United Nations Department of Economic and Social Affairs, *World Population Prospects 2019: Highlights*, UN doc ST/ESA/SER.A/423 (17 June 2019) <https://population.un.org/wpp/Publications/Files/WPP2019_Highlights.pdf>. In Australia, the population is predicted to increase from 24.6 million persons in 2017 to 37.4 to 49.2 million persons in 2066. See Australian Bureau of Statistics, *Population Projections, Australia, 2017 (Base) - 2066* (No Catalogue 3222.0, 22 November 2018).

³⁴ ‘Planetary’ boundaries are a research area that proposes a new approach to determining what is sought from global sustainability, by setting operating boundaries in which humanity can be expected to live and operate within safely. See Rockström et al (n 7).

The second detrimental effect of the linear economy, relates to the generation and accumulation of *waste*.³⁵ Waste is generated by almost every function undertaken by humankind,³⁶ including along every stage of the production lifecycle.³⁷ Under current linear practices, once the majority of products reach the end of their useful life, they lose their material value and become viewed as waste. At this stage, without any associated value, economics dictate that this material be disposed of as cheaply as possible.³⁸ It is the decisions surrounding the management of this waste where the potential risk of harm from that product is increased. This is particularly the case, if the cheapest method of disposal involves the reassimilation of that material back into the natural environment.³⁹ All waste has the ability to affect the integrity of the natural environment, damaging biodiversity, impacting water, air, and soil integrity, with an accumulative effect of increasing pressure on ecosystems to support life.⁴⁰

1.2.2 The Circular Economy as an Alternative Economic System

As opposed to the linear system, the circular economy is an alternative economic approach, centred on resource efficiency and regenerative systems.⁴¹ The circular economy has been described as a tangible solution, or a practical direction through which issues relating to the unsustainable production and consumption of resources and generation of waste might be addressed.⁴² Research often links the achievement of a circular economy, as a move towards achieving goal 12 of the United Nations Sustainable Development Goals related to Sustainable Production and Consumption.⁴³

³⁵ Although there are a wide range of definitions for waste, for the purpose of this thesis, waste can be defined as any combination of solid, liquid or gaseous material or energy that is a surplus product or unwanted by-product of any activity that is discarded, discharged or emitted by establishments and/or households through processes of production, consumption or accumulation. See Peter Allan and Sustainable Resource Use Pty Ltd, *Australian Waste Definitions: Defining Waste Related Terms by Jurisdiction in Australia* (No R01-02-A11306, 2012) 28; and Canadian Government, 'Human Activity and the Environment - Section 1: Introduction' (Government Web Page, 27 November 2015) <<https://www150.statcan.gc.ca/n1/pub/16-201-x/2012000/part-partie1-eng.htm> >.

³⁶ Australian Bureau of Statistics, *Human Activity Trends Australia's Environment: Issues and Trends, 2006* (No Catalogue 4613.0, 10 November 2006).

³⁷ Ellen MacArthur Foundation, 'Circular Economy a New Economy Is Emerging' (June 2012) <<https://www.ellenmacarthurfoundation.org/news/circular-economy>>. With regards to waste and plastics see also Lisa Anne Hamilton, Steven Feit and Centre for International Environmental Law, *Plastic & Climate - The Hidden Cost of a Plastic Planet* (Report, 15 May 2019) 1, 8, 83 <<https://www.ciel.org/wp-content/uploads/2019/05/Plastic-and-Climate-FINAL-2019.pdf>>.

³⁸ Stephen Tromans, 'EC Waste Law-A Complete Mess?' (2001) 13(2) *Journal of Environmental Law* 133, 3.

³⁹ Put another way one of the main reasons environment damages occur is that polluting remains the cheapest way to 'deal' with waste. Barry C Field and Martha L Field, *Environmental Economics: An Introduction* (6th ed., 2013) 4.

⁴⁰ Eléonore Maitre-Ekern (n 4) 306–309.

⁴¹ Geissdoerfer et al (n 8) 759.

⁴² Julian Kirchherr, Denise Reike and Marko Hekkert, 'Conceptualizing the Circular Economy: An Analysis of 114 Definitions' (2017) 127 *Resources, Conservation & Recycling. Elsevier* 221, 227, 229. In this article, Kirchherr et al identifies and includes sustainable development in their concluding definition of a circular economy overall. However, this article also highlights how currently a degree of fragmentation exists between the CE and sustainable development, and it is suggested that the links between the two concepts be further strengthened, particularly in the area of social equality. See also Ibid 760, 764.

⁴³ Sustainable Development goal 12 is featured alongside the circular economy within Australia's 2018 National Waste Policy. See National Waste Policy (n 5) 7, 8. Also see United Nations, *Transforming our world: the 2030 Agenda for Sustainable Development*, GA Res 70/1, UN Doc A Res 70/1 (21 October 2015, adopted 25 September 2015) 14.

At its core, the circular economy aims to advance industrial development,⁴⁴ environmental protection and social equity,⁴⁵ by gradually decoupling the pressure for resources from the pursuit of economic growth.⁴⁶ To achieve this, a circular economy seeks to ‘change the patterns of natural resource use in the economy, by slowing, narrowing and closing material loops,’ across the manufacturing, consumption and end-of-use stages of a products lifecycle.⁴⁷

To close material loops, the current *end-of-life*, or *waste* stage of a product’s lifecycle would become obsolete. Subsequently, material that had previously been considered waste within the linear system, would become feed stock within the circular system, with these materials used for further production applications. This would subsequently reduce the need for input from virgin natural resources, and otherwise limit the output and production of waste.

To slow material loops and reduce the use of natural resources, all consumers (individuals and companies alike), would need to avoid the unnecessary utilisation of resources, alternatively reuse material in their current state, then recover and recycle materials throughout the processes of consumption, production, and distribution.⁴⁸ Thus the circular economy would appear to possess links with the 4R’s as well as the progression featured within the waste hierarchy, as seen below in **Figure 1.1**, insofar as the commonly shared order of preference for reduction, re-use and recycling in the management of waste.⁴⁹

⁴⁴ K Winans, A Kendall and H Deng, ‘The History and Current Applications of the Circular Economy Concept’ (2017) 68 *Renewable and Sustainable Energy Reviews* 825.

⁴⁵ See, eg, Kirchherr, Reike and Hekkert (n 36) 229; Martin Geissdoerfer et al, ‘Business Models and Supply Chains for the Circular Economy’ (2018) 190 *Journal of Cleaner Production* 712.

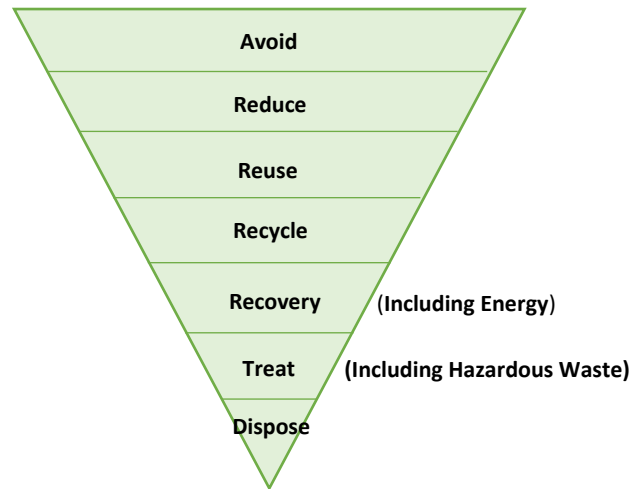
⁴⁶ Ellen MacArthur Foundation, ‘What Is a Circular Economy? A Framework for an Economy That Is Restorative and Regenerative by Design’ (Web Page, 2019) <<https://www.ellenmacarthurfoundation.org/circular-economy/concept>>.

⁴⁷ Australian Government Department of the Environment and Energy (n 1) 17.

⁴⁸ Similar to the 4R’s. See, eg, Kirchherr, Reike and Hekkert (n 2); Ellen MacArthur Foundation, *Circular Economy Schools Of Thought* (n 4); Patrizia Ghaisellini, Catia Cialani and Sergio Ulgiati, ‘A Review on Circular Economy: The Expected Transition to a Balanced Interplay of Environmental and Economic Systems’ (2016) 114 *Journal of Cleaner Production* 11 (‘A Review on Circular Economy’).

⁴⁹ The waste hierarchy is a mechanism used in Australia, and other governments and intergovernmental bodies, to frame and prioritise interventions relating to current linear waste management practices. As indicated in the body of the text, the circular economy and waste hierarchy share a similar ordered preference for reduction, re-use and recycling for the management of ‘waste’. See National Waste Policy (n 5); Kirchherr, Reike and Hekkert (n 36). However, it was noted by Hollander et al., that the waste hierarchy is only compatible with the circular economy insofar as is commonly shares the ordered preference circular economy for reduction, re-use and recycling, otherwise this article states the waste hierarchy is incompatible with the circular economy because ‘waste’ is not recognised under a circular economy. See Ibid 518.

Figure 1.1 - The Waste Hierarchy



The circular economy also appears to compliment, and build on previous environmental policy model concepts such as ‘zero waste’ and ‘product stewardship’. For example, the concept of zero waste, which is often used interchangeably with the circular economy, is similarly concerned with the conservation of resources and the minimisation of material going to landfill and incineration by means of responsible production, consumption, reuse, and recovery of material.⁵⁰ However, while zero waste focuses on keeping waste out of the environment, a circular economy goes further by striving to generate regenerative systems that benefits and improves the health of the environment. Another slightly more abstract difference, is that zero waste merely establishes a set of principles that guide us towards a goal of zero waste, while the circular economy provides a systematic framework aimed at minimising waste and improving production and consumption practices. In other words, zero waste can be thought of as a goal, with the circular economy positioned as a means to achieving it.⁵¹

Similarly, product stewardship (discussed further below in 3.3.1),⁵² is an environmental management principle that recognises that all individuals throughout all stages of the products' life cycle possess differing yet common responsibilities for minimising a product's environmental impact.⁵³ In this regard, the circular economy and product stewardship hold similar views. However, product stewardship has until now, largely been confined to managing waste already in

⁵⁰ United States Environmental Protection Agency, ‘How Communities Have Defined Zero Waste’ (website 1 December 2016) <<https://www.epa.gov/transforming-waste-tool/how-communities-have-defined-zero-waste/>>.

⁵¹ Zerowaste, ‘Zero Waste vs Circular Economy - Your Guide to Getting in the Loop’, *Zero Waste* (website 27 January 2021) <<https://www.zerowaste.com/blog/zero-waste-vs-circular-economy-a-guide/>>.

⁵² Lewis (n 145) 3.

⁵³ In her review of the concept, Monroe defined Product Stewardship as the act of ‘minimizing health, safety, environmental and social impacts, and maximizing economic benefits of a product and its packaging throughout all lifecycle stages.’ Leila Monroe, ‘Tailoring Product Stewardship and Extended Producer Responsibility to Prevent Marine Plastic Pollution Plastic Pollution’ (2013) 27 *Tulane Environmental Law Journal* 219, 224.

existence as a means of mitigating environmental impact, with responsibility for these actions being predominately allocated to consumers, and to a lesser degree manufacturers. Yet the primary waste focus of product stewardship fails to consider the mitigating benefits associated with improved product design, which among other things can include improved resource efficiency and the ability to mitigate the creation of waste in the first instance. As such, although still used as a policy tool in the implementation of the circular economy, the circular economy goes beyond product stewardship insofar as its focus on design considerations in addition to waste management practises.

The literature highlights several benefits associated with achieving a circular economy. Firstly, reutilising materials previously disposed of as waste would create additional pools of feedstock to utilise in production. This would in turn slow resource depletion at one end of the value chain, while simultaneously lowering pollution from waste at the other.⁵⁴ Reports also indicate that a circular economy could greatly benefit the environment through significantly reducing carbon emissions, which is beneficial for climate change.⁵⁵ The circular economy also offers possible social gains, with projected increases in direct employment associated with its implementation.⁵⁶ Finally, a reduction in waste would elevate many of the problems associated with pollution. This reduced pollution would in turn improve the state of the environment benefiting the health and wellbeing of all life.⁵⁷

1.2.3 Achieving a Circular Economy

The circular economy is a technical, yet comprehensive goal, and operates as a useful objective for regulators. However, the circular economy as a concept appears to lack instrumental value, in other words, the concept and its associated literature provides little clear guidance with regards to practical ways in which to implement or achieve it.⁵⁸ Yet, by drawing on the literature

⁵⁴ Ellen MacArthur Foundation and Material Economics Consultants, *Completing the Picture How the Circular Economy Tackles Climate Change* (26 September 2019) 22–23, 27.

⁵⁵ Material Economics Consultants, Cullen and Geels (n 4) 8.

⁵⁶ Senate of the Commonwealth of Australia, Environment and Communications, and References Committee, *Never Waste a Crisis: The Waste and Recycling Industry in Australia* (June 2018) 85

<https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/WasteandRecycling/Report>.

⁵⁷ See Kirchherr, Reike and Hekkert (n 36); Ellen MacArthur Foundation, *Circular Economy Schools of Thought* (n 42).

⁵⁸ The circular economy is still considered a relatively young concept with respect to its practical applications to modern economic systems and industrial processes. In fact 73% of the concept definitions has occurred within the literature over the last five years. See Kirchherr, Reike and Hekkert (n 36) 226. As a concept, the circular economy is said to be distinguishable by its characteristics and principles, as opposed to a single idea, with the origins of the concept having developed over time from an accumulation of theoretical influences. The prominent theoretical works associated with influencing this concept include *Industrial Ecology*, *Performance Economy*, *Cradle-to-Cradle*, *Biomimicry*, *Natural Capitalism*, *Blue Economy* and *Regenerative Design*. See, eg, Wautelet (n 4); Ellen MacArthur Foundation, *Circular Economy Schools Of Thought* (n 4); Winans, Kendall and Deng (n 44). There is currently no single commonly accepted definition of the circular economy, and limited legal definitions

in this area it is possible to highlight a number of commonly cited, interconnected conditions that will be necessary to progress in order to transfer our current linear system into a circular one. The researcher has identified six major conditions that will need to be achieved in order to transform the linear approach into a circular model:

1. Lifecycle Reductions in Resource Consumption

An important aspect of the circular economy, is the need to reduce the overall consumption of material used within our global economy. Reducing consumption extends across the entire lifecycle of production and consumption activities, and applies to all actions undertaken across a products lifecycle. For example, for manufacturers reducing material consumption would include preventing overproduction and oversupply, as well as ensuring material efficiency is achieved throughout production activities.⁵⁹ From a consumer perspective, reducing consumption would include addressing individual consumption habits, particularly with respects to the disparity between high, a low-income countries.⁶⁰ Obviously, on face value, these aims would appear to conflict with our current economic pursuit of growth. However, circular economy literature suggests that reduced consumption while maintaining growth can be achieved through revising existing business models so that services become the main focus of business. Similarly, the leasing of goods over individual ownership is also promoted.

2. Incorporating Holistic Collaboration throughout the Life Cycle

The circular economy requires lifecycle stakeholders to holistically consider the decisions and actions undertaken within their sphere as they relate and impact other stakeholders along the

likewise exist which describe the term. As a result, a certain degree of conceptual fragmentation is evident in the literature associated with this research area. Currently, the most prominent and commonly accepted definition for the term, comes from the work of the Ellen MacArthur Foundation is a NGO, charity and global leaders in circular economy research and education. See Ellen MacArthur Foundation, *Towards the Circular Economy - Economic and Business Rationale for an Accelerated Transition* (Report, 2013) 7. See also Kirchherr, Reike and Hekkert (n 36) 229. There have also been a few examples of attempts to create legal definitions of the term see Terraqui-Christian Morron Lingl and Roser Puig Marcó, *First EU Attempt of a Legal Definition of "Circular Economy"*, (Online Article, 18 March 2019), Lexology' <<https://www.lexology.com/library/detail.aspx?g=6aa8a7d7-abb1-4511-b1e1-c07f05c767be>>. Additionally, a few definitions are also now appearing within state and national legislation and policy, see eg, *Green Industries Act 2004* (SA); *Statutes Amendment (Budget 2016) Act 2016* (SA); National Waste Policy (n 5) 17; Queensland Government Department of Environment and Heritage Protection, *Waste Management and Resource Recovery Strategy* (Text) <<https://www.qld.gov.au/environment/pollution/management/waste/recovery/energy-waste>>.

⁵⁹ See, eg, CSIRO, 'Circular Economy and Waste Management' <<https://www.csiro.au/en/Research/Environment/Circular-Economy>>; David McGinty, 'How to Build a Circular Economy', *World Resources Institute* (6 August 2020) <<https://www.wri.org/blog/2020/08/how-to-circular-economy>>.

⁶⁰ For example, currently individuals from high-income countries consume around 10 times higher quantities of materials than low-income countries. To address this, a reduction in the individual consumption of high-income countries to allow a levelling out of consumption to meet basic needs within low-income countries will need to become a focus of decision makers. See United Nations Environment Programme, *Resource Efficiency for Sustainable Development: Key Messages for the Group of 20* (International Resource Council, 2018) <https://www.resourcepanel.org/sites/default/files/documents/document/media/thinkpiece_-_resource_efficiency_-_key_messages_for_the_g20_270818.pdf>.

lifecycle.⁶¹ This notion tends to suggest the need to generate and support holistic collaboration in order to support circular economic advancement.⁶² Holistic collaboration would subsequently centre on the establishment of ongoing communications between all stakeholders across each segment of the lifecycle of any given product/services, in order to ensure that the unique activities undertaken by each stakeholder are understood, and the unique characteristic of each segment are adequately encompassed in the decision-making or regulatory processes undertaken in support of a circular economy transition.⁶³

3. Circular Product Design

Product design is consistently referenced as the cornerstone consideration for the transition to a circular economy.⁶⁴ Circular product design requires manufacturers to take greater responsibility for their products by incorporate holistic considerations at the start-of-life stage to ensure they are compatible for a circular system. The goal of circular product design for manufacturers, is to design and produce products that are durable, with the ability for re-use, reparability, upgradability and recyclability.⁶⁵ Hence, the practice of single-use products would be discouraged under a circular economy, as would the continued production of hard-to-recycle or hazardous materials.⁶⁶ Decisions made under this criterion should also consider energy input and resource-efficiency practices with an increase in the use of renewable alternative materials and energy input to produce products specifically encouraged. Finally, all considerations made

⁶¹ See generally, Mariale Moreno et al, 'A Conceptual Framework for Circular Design' (2016) 8(9) *Sustainability* 937; Omar Romero-Hernández and Sergio Romero, 'Maximizing the Value of Waste: From Waste Management to the Circular Economy' (2018) 60(5) *Thunderbird International Business Review* 757 ('Maximizing the Value of Waste') who reference the purpose of holistic considerations when discussing design and waste management.

⁶² Defining the concept of holistic collaboration at its most basic level can be ascertained by reference to the dictionary definitions associated with each individual term. For example, the term 'holistic' is the notion that all segments of a system or process are 'broadly applied; all-encompassing'. At the same time, the term 'collaboration' is a verb describing a 'united effort put into a project...produced by [a]united effort; cooperation'. Macquarie Dictionary, 'Holistic' <https://www.macquariedictionary-com-au.ezp01.library.qut.edu.au/features/word/search/?search_word_type=Dictionary&word=holistic>. Macquarie Dictionary, 'Collaboration' <https://www.macquariedictionary-com-au.ezp01.library.qut.edu.au/features/word/search/?search_word_type=Dictionary&word=collaboration>.

⁶³ The focus on all levels of government is important to include due to the fact that the responsibilities allocated between the various levels of government in Australia require unique consideration. For example, state and territory governments are responsible for generating environmental policy generally, yet local governments hold a significant portion of responsibility, both physically and financially, with regards to the collection of PP waste materials from consumers via kerbside collection services, yet maintain limited revenue raising capability. See, eg, IG Thomas, 'Environmental Policy and Local Government in Australia' (2010) 15(2) *Local Environment* 121.

⁶⁴ See, eg, Walter R Stahel, 'The Circular Economy' (2016) 531(7595) *Nature News* 435; Murray, Skene and Haynes (n 1); Ellen MacArthur Foundation, *Towards the Circular Economy - Economic and Business Rationale for an Accelerated Transition* (2013); If we also consider the prominent theoretical works that underpins the concept of the circular economy, such as *Cradle-to-Cradle, Biomimicry, and Regenerative Design* it is evident that product design, and the choices surrounding product design is a significant component of the circular economy. See, eg, Ellen MacArthur Foundation, *Circular Economy Schools of Thought* (n 42); 'What Is the Circular Economy?' (n 19); Marcel C den Hollander, Conny A Bakker and Erik Jan Hultink, 'Product Design in a Circular Economy: Development of a Typology of Key Concepts and Terms' (2017) 21(3) *Journal of Industrial Ecology* 517;

⁶⁵ Eléonore Maitre-Ekern (n 4) 312; Ellen MacArthur Foundation, 'What Is a Circular Economy? A Framework for an Economy That Is Restorative and Regenerative by Design' (2019) <<https://www.ellenmacarthurfoundation.org/circular-economy/concept>> ('*What Is a Circular Economy?*'); Ellen MacArthur Foundation, *Circular Economy Schools Of Thought* (n 4); Wautelet (n 4); Material Economics Consultants, Cullen and Geels (n 4).

⁶⁶ See, eg, Ellen MacArthur Foundation, 'The New Plastics Economy - Catalysing Action' (n 20).

in accordance with product design for a circular economy should be evidenced backed and aim to improve the current products environmental impacts, as opposed to causing alternative environmental problems. To do this, the internalisation of external costs of products should be incorporated into the lifecycle analysis of each product.⁶⁷

4. Increased Circular Business Models

Business models dictate the ways in which products are marketed and offered to consumers. Circular business models favour performance-oriented business practices, in which the ownership of assets are retained by manufactures and returned or collected by manufactures after use. This form of business-model would appear compatible to existing take-back schemes, in which products are collected by producers after use for re-use and refurbishing of materials.⁶⁸ The objective pursued in association with circular business models suggests that this condition, and the wider circular economy overall, is compatible with the international environmental law ideology surrounding the Polluter Pays Principle,⁶⁹ and in particularly the concept of extended producer responsibility.⁷⁰ The polluter pays principle is a fundamental principle of international environmental law,⁷¹ with extended producer responsibility considered an extension of this concept. Under extended producer responsibility, producers are responsible for the end-of-life segment of their product's useful life. This responsibility can be displayed financially, through contributing to disposal operations, or physically through the existence of take back requirements.⁷² Overall, extended producer responsibility take-back arrangements are

⁶⁷ A *life-cycle analysis*, is an evaluation tool often cited in association with sustainable development. It is used to evaluate the potential environmental impacts of a product, material, process, or activity. This includes all the direct and indirect environmental impacts this product might have across its entire life cycle - from materials acquisition, to manufacturing, to use, and to final disposition (disposal or reuse). See ML Brusseau, 'Chapter 32 - Sustainable Development and Other Solutions to Pollution and Global Change' in Mark L Brusseau, Ian L Pepper and Charles P Gerba (eds), *Environmental and Pollution Science (Third Edition)* (Academic Press, 2019) 585, 32.5.1 <<https://www.sciencedirect.com/science/article/pii/B978012814719100032X>>.

⁶⁸ Patrick Planing, 'Business Model Innovation in a Circular Economy Reasons for Non-Acceptance of Circular Business Models' [2015] *Open Journal of Business Model Innovation* 1, 4 <<https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.966.1992&rep=rep1&type=pdf>>.

⁶⁹ This international environmental law principle stipulates that the party responsible for producing the pollution should be responsible for paying for the damage done to the natural environment. See Sally-Ann Joseph, 'The Polluter Pays Principles and Land Remediation: A Comparison of the United Kingdom and Australian Approaches' (2014) 1(1) *Australian Journal of Environmental Law* 24 <<http://classic.austlii.edu.au/au/journals/AUJEnvLaw/2014/2.html>>.

⁷⁰ See Thomas Lindhqvist, 'Extended Producer Responsibility in Cleaner Production: Policy Principle to Promote Environmental Improvements of Product Systems' (The International Institute for Industrial Environmental Economics Lund University, 2000) <<https://lup.lub.lu.se/search/ws/files/4433708/1002025.pdf>>. See also Multi-Material Stewardship Western, 'History of EPR' <<https://www.mmsk.ca/residents/history-epr/>>.

⁷¹ The Polluter Pays Principle is defined in accordance with Principle 16 of the 1992 Rio Declaration on Environment and Development as follows: 'national authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.' See Lance N Antrim, 'The United Nations Conference on Environment and Development' in Allan E Goodman (ed), *The Diplomatic Record 1992-1993* (Routledge, 1st ed, 2019) 189 <<https://www.taylorfrancis.com/books/9781000244090/chapters/10.4324/9780429310089-10>>.

⁷² In practice, extended producer responsibility consists of collecting products that have become waste and sorting them before treatment according to the waste hierarchy. See Karen Raubenheimer and Niko Urho, 'Rethinking Global Governance of Plastics – The Role of Industry' (2020) 113 *Marine Policy* 103802, 113, 2 [4].

compatible with circular economy as they allow for the formation of reverse logistic networks,⁷³ with reverse logistic networks being a form of infrastructure that allows for material ‘loop’ formation through materials being returned back to manufactures for reprocessing and reuse.

5. Circular Consumers

Consumer preferences play a significant role in the ways products are designed and marketed within the economy.⁷⁴ The desire to appease these preferences and gain competitive advantage within the market, has led to a disproportionate level of investment by manufacturers into product and material development over end-of-use processing and recycling capability.⁷⁵ To address these issues, circular consumers must be active participants in the market, and use their purchasing power in favour of products based notably on their environmental qualities. This preferential feedback will ultimately place additional pressure on manufacturers to meet the new circular preferences.⁷⁶ They must also actively participate in the correct disposal of materials after use.⁷⁷

6. Improved Material Management

Under a circular economy, used materials need to be collected, sorted, and processed to maintain high-level material integrity for repurposing within the circular system. This initially requires society to reposition the way in which we view and understand the concept of *waste*. Use of the term *waste* denotes the end-of-life of a product and reduces the material value to zero. Instead, all material in use in the economy needs to be repositioned to be viewed as a resource. Such a repositioning would help ensure the value of material is maintained past the end-of-use stage of the products lifecycle. Until now, a heavy focus for waste management

⁷³ World Economic Forum, ‘Set up Global Reverse Networks’, *Towards the circular economy* <<https://reports.weforum.org/toward-the-circular-economy-accelerating-the-scale-up-across-global-supply-chains/set-up-global-reverse-networks/>>.

⁷⁴ This is a significant research area in the discipline of marketing. See, eg, Mariëlle EH Creusen and Jan PL Schoormans, ‘The Influence of Observation Time on the Role of the Product Design in Consumer Preference’ (1998) NA-25 *ACR North American Advances* <<https://www.acrwebsite.org/volumes/8210/volumes/v25/NA-25/full>>; Mariëlle EH Creusen and Jan PL Schoormans, ‘The Different Roles of Product Appearance in Consumer Choice’ (2005) 22(1) *Journal of Product Innovation Management* 63.

⁷⁵ An example of this can be seen in the history associated with plastic. After the success of Bakelite after its invention in 1907, major chemical companies invested heavily in the research and development of new polymer products for identification sake, with the aim of finding consumer uses for these products at a later date. ‘The History and Future of Plastics’, *Science History Institute* (18 July 2016) <<https://www.sciencehistory.org/the-history-and-future-of-plastics>>.

⁷⁶ See Eléonore Maitre-Ekern (n 4) 325; Patrick Planing (n 64).

⁷⁷ Stephen M Jones, *Advancing a Circular Economy: A Future without Waste?* (Springer International Publishing, 2021) 5–6 <<http://link.springer.com/10.1007/978-3-030-66564-7>> (‘*Advancing a Circular Economy*’).

policies have been on mitigating point source waste materials already created.⁷⁸ However, alternatively under a circular economy, policies will need to become more focused on promoting re-use and recycling practices for the creation of secondary material markets to supplement and reduce virgin resource consumption.⁷⁹ In addition to this, due to the ongoing need to collect, sort and process used materials, investment in logistical infrastructure supporting the flow of high-quality materials as well as professional and specialised reuse, refurbishment and remanufacturing operations will need to be increased.⁸⁰

1.2.4 The Role of Regulation in the Transition to a Circular Economy

It is clear that operationalising a circular economy as a way to bring about more sustainable production and consumption practices will be complex, with the need to generate collective, system-wide transformations, amongst multiple stakeholders across borders.⁸¹ Fundamentally, every area of a product's lifecycle will need to be examined and uniquely changed depending on the industry, material and product in question. From the criteria above it is clear that source reduction, achievable through reductions in overall production of products, is a core goal of the circular economy. Similarly, resource efficiency, and the push to extend the useful life of products and materials through improved product design that allows for the refurbishment, reuse, remanufacturing of existing products, and recycling of all other products with the highest possible material value maintained is required.⁸² Moreover, collaborative consumption, improved business models and enabling factors such as supportive uniform regulatory directions at a national level, are vital to drive consistent change in this area.⁸³

⁷⁸ For example, the mitigation of the environmental impacts arising out of the use of PP products has traditionally been combined within the broader regulatory responses associated with general waste law. By this time, the chance to mitigate the creation of waste in the first instance has passed, and the only action to be taken is how to process the end waste product. Australia Government Department of the Environment Water, Heritage and the Arts, *National Waste Report 2010* 386, 237 <<https://www.environment.gov.au/system/files/resources/af649966-5c11-4993-8390-ab300b081f65/files/national-waste-report-2010.pdf>>.

⁷⁹ Eléonore Maitre-Ekern (n 4) 311.

⁸⁰ See generally Chris Nuttall, Joanna Hartga and Evan Williams, *A Regulation and Circular Economy Review - Final Report* (Ricardo-AEA, 2014) <<https://www.sepa.org.uk/media/163260/regulatory-levers-to-stimulate-circular-economy-review-final-report-issue-2.pdf>>.

⁸¹ See, eg, Mark Esposito, Terence Tse and Khaled Soufani, 'Introducing a Circular Economy: New Thinking with New Managerial and Policy Implications' (2018) 60(3) *California Management Review* 5 ('Introducing a Circular Economy'); Ghaisellini, Cialani and Ulgiati (n 48).

⁸² See, eg, Ellen MacArthur Foundation, 'The Circular Economy In Detail' <https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-detail?gclid=Cj0KCQiAfwf39BRCCARIsALXWETy16qTAvZ7H9HImPiGa3OMPcMSH8R11BSmr_7d1VFZQIPc8gID20QEaAkDKEALw_wcB>; Eléonore Maitre-Ekern (n 4) 311, 312; Ghaisellini, Cialani and Ulgiati (n 48) 15; Esposito, Tse and Soufani (n 77) 7, 8. (IMPACT RATING LOW) This is also reflected in the Ellen MacArthur definition which holds that a circular economy is 'an industrial system that is restorative or regenerative by intention and design. It replaces the 'end-of-life' concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals that impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models.' Ellen MacArthur Foundation, *Towards the Circular Economy - Economic and Business Rationale for an Accelerated Transition* (Report, 2013) 7 <<https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Elle-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf>>.

⁸³ Almost all of the literature relating to implementation of a circular economy outline the need for strong, uniform regulatory and policy directions at national levels to drive consistent change in this area. See eg, Barra et al (n 14); World Economic Forum, *The New Plastics Economy Rethinking the Future* (January 2016) <http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf>; Ellen MacArthur Foundation (n 15).

Traditionally when addressing environmental issues such as waste under a linear system, domestic environmental policies have predominantly focused on the mitigation of point source pollution associated with the end-of-life segment of the products lifecycle.⁸⁴ The problem with this approach is that it does not allow for the consideration of the entire scope of environmental harm that arises from the economic activities associated with the particular linear products, particularly, start of life product design.⁸⁵ Consequentially, the end-of-life waste management focus overlooks opportunities to prevent materials from becoming waste in the first instance.

In comparison, a circular economy emphasises the whole of the supply chain including production processes, and repositions the traditional views and values afforded to waste. This suggests that to support the implementation and operation of a circular economy, a shift in the traditional scope of environmental regulation will need to take place.

Although there are numerous options for regulatory intervention that exists along a products lifecycle that would support the transition to a circular economy, what is clear from the literature is that product design is a fundamental enabling factor associated with the transition to a circular economy, and is pivotal to closing material loops. As such, in order to support a transition to a circular economy, regulatory responses will need to shift away from traditional waste reductionist focused, to a mix of regulatory responses that incorporate multidimensional, holistic considerations and intervene right from the start of life manufacture of products.⁸⁶ This focus would ensure efficient consumption of materials is realised and products are fit for circular application further along the products lifecycle.⁸⁷

To expand on this idea, it is necessary to once again highlight that the circular economy is not merely a process for improved waste collection and recycling,⁸⁸ but instead is a systematic shift in the way in which waste is viewed and the way in which materials and products are valued.⁸⁹ Furthermore, the circular economy suggests a change in the traditional policy propensity of focusing on *managing waste* to one that focuses on *preserving resources*.⁹⁰

However, an increased focus on product design regulation with an onus on manufacturers, does not detract from the need to maintain waste management in the pursuit a circular economy. In

⁸⁴ See Australia Government Department of the Environment Water, Heritage and the Arts (n 74) 237.

⁸⁵ Eléonore Maitre-Ekern (n 4) 323.

⁸⁶ The Ellen MacArthur Foundation highlights the need for product regulation within various documents associated with their work in conceptualising the circular economy. Some policy intervention options suggested include design regulation, extended warranties and product passports' Ellen MacArthur Foundation, *Delivering the Circular Economy - A Toolkit for Policymakers* 47, 63, 71 <https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_PolicymakerToolkit.pdf>.

⁸⁷ Eléonore Maitre-Ekern (n 4) 319.

⁸⁸ Kirchherr, Reike and Hekkert (n 2) 226.

⁸⁹ Chris Backes, *Law for a Circular Economy* (Eleven International Publishing, 2017) 14 <https://www.uu.nl/sites/default/files/rgl-ucowsl-backes-law_for_a_circular_economy.pdf>.

⁹⁰ Julie Elizabeth Hill, 'The Circular Economy: From Waste to Resource Stewardship, Part I' (2015) 168(1) *Proceedings of the Institution of Civil Engineers - Waste and Resource Management* 3.

fact, if we consider the six conditions for a circular economy outlined in 1.2.3 above, it becomes apparent that an increased focus on the maintenance and improvement of waste management regulation will also be necessary. With a large focus of the circular economy associated with recycling it is essential that waste-related governance seek to increase collection and improve the quality of recycled material. However, for operational purposes, products must be recyclable in the first instances. As such, further investigation into increasing regulatory responses that intervene at the start-of-life manufacture stage, with the aim of improving product design and production is of equal importance, and will be the focus on this research.

1.2.4.1 Regulating Manufacturers for Improve PP Products

Regulation remains an essential tool of governments and policymakers of all levels, to manage diverse societies and economies, and the complex and diverse matters that arise with respect to the operation of both.⁹¹ At its broadest sense, regulation can be viewed as an umbrella term used to embrace any actions undertaken by a state or other body that is designed to influence business or social behaviour with the aim of achieving a central outcome.⁹²

A variety of regulatory design strategies are available to policymakers in pursuit of the central aim of a circular economy. These options range from light handed self-regulated free market approaches, through to incentive-based economic regimes, market-harnessing controls, disclosure or education regimes, nudge strategies, as well as more prescriptive command-and-control style interventions.⁹³ Parties regulated under these broad models, also hold varying degrees of involvement requirements for interacting and contributing to the development and implementation of the regulatory strategies central aim, with these involvement requirements ranging in strength from voluntary, to command or required involvement. Yet, regardless of the regulatory strategy employed or involvement required, at the centre of the choice to utilise regulation is the aim of producing behaviour or results in favour of the public interest,⁹⁴ with the key factor for determining regulatory effectiveness determined with reference to how well the

⁹¹ See generally Organisation for Economic Co-Operation and Development, *OECD Reviews of Regulatory Reform - Regulatory Policies in OECD Countries From Interventionism to Regulatory Governance* (OECD Publications Service, 2002) <<https://www-oecd-ilibrary-org.ezp01.library.qut.edu.au/docserver/9789264177437-en.pdf?expires=1607912987&id=id&accname=ocid1951112&checksum=46A927D2366553E5EFB6578E233BD397>> ('*OECD Reviews of Regulatory Reform*').

⁹² Robert Baldwin, Martin Cave and Martin Lodge, *Understanding Regulation: Theory, Strategy, and Practice* (Oxford University Press USA, 2nd ed, 2011) 3 <<http://ebookcentral.proquest.com/lib/qut/detail.action?docID=829488>> ('*Understanding Regulation*').

⁹³ Neil Gunningham and P.N Grabosky, *Smart Regulation: Designing Environmental Policy* (Clarendon Press, New York, 1998) 54 ('*Smart Regulation*').

⁹⁴ Baldwin, Cave and Lodge (n 88) 15.

regulatory instrument, or greater regulatory framework, operates to achieve the established policy objectives.⁹⁵

Trends and preferences for specific regulatory strategies and theory associated with effective regulation, has changed over the years, influenced by both our understanding of environmental issues as well as the effect of our global economic structures. Like many jurisdictions around the world, environmental regulation in Australia began to increase in the 1970's, as the level of public awareness to environmental degradation began to increase. The social and political calls for increased environmental protections led to an increase of both international and national approaches that aimed to reduce environmental degradation from point source pollution.⁹⁶ Initially, 'command-and-control' based strategies, aimed specifically at decreasing the level of pollution emitted at point sources through the implementation of prescriptive standard, were favoured.⁹⁷ When coupled with strong community support, command-and-control style regulatory intervention were and remain relatively successful in curbing simpler instances of point-source pollution.⁹⁸ However, the high costs associated with implementing and enforcing these schemes, as well as the requirement for regulators to have comprehensive and accurate knowledge of the workings of the industry being regulated, means that at times, this form of regulation can lead to ineffective and restrictive outcomes.⁹⁹

In the 1980's a rise in the deregulatory outsourcing of state functions to market actors began to increase in an attempt to lessen the perceived overregulation of the 1970's.¹⁰⁰ These actions led to a rise in economic incentive based schemes and subsidies.¹⁰¹ These schemes were often enforced voluntarily, or by means of other 'light-handed' policy initiatives such as partnerships and cooperation.¹⁰² While market-based strategies achieved some success, they typically failed to deliver acceptable levels of industry-wide compliance, particularly where the

⁹⁵ Christine Parker and Kirsi Kuuttiniemi, *Reducing the Risk of Policy Failure: Challenges for Regulatory Compliance* (Organisation for Economic Co-operation and Development, 2000) 7 <<https://www.semanticscholar.org/paper/1-REDUCING-THE-RISK-OF-POLICY-FAILURE-%3A-CHALLENGES-Jacobs/80e439cdd75bcad3c97194e0c4435ba7831a82c2>>.

⁹⁶ Parliament of Australia, 'History of The Commonwealth's Environmental Role - The Commonwealth's Role in Environmental Protection and Management', *History of The Commonwealth's Environmental Role* (text) <https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Completed_inquiries/1999-02/bio/report/c02>.

⁹⁷ Eléonore Maitre-Ekern (n 4) 329; Cameron Holley, 'Environmental Regulation and Governance' in Peter Drahos (ed), *Regulatory Theory: Foundations and Applications* (ANU Press, 1st ed, 2017) 741, 743 <<http://press-files.anu.edu.au/downloads/press/n2304/pdf/ch42.pdf>>.

⁹⁸ Cameron Holley, Neil Gunningham, and Clifford Shering, *The New Environmental Governance* (Earthscan, 2012) 4 <<https://www-taylorfrancis-com.ezp01.library.qut.edu.au/books/9781315067278>>.

⁹⁹ Furthermore, because these schemes are focused on controlling specific areas of point source pollution, they are only able to address simpler 'low hanging fruit' environmental issues. Neil Gunningham and P.N Grabosky (n 89) 7 & 57.

¹⁰⁰ This resulted from the rise in neoliberal economic critics sceptical of command and control schemes and 'the regulatory state'. According to those working within the market-based governance paradigm, the vision of an 'invisible hand', conceptualised by philosopher Adam Smith's, would lead rational, self-maximising individuals to promote 'public interests' without the need for forceful government interference. See Adam Smith, *An Inquiry into the Nature and Cause of the Wealth of Nations*, ed Edwin Cannan (The University of Chicago Press, 1977) <<https://ebookcentral.proquest.com/lib/qut/detail.action?docID=515713>>.

¹⁰¹ Holley (n 79) 744.

¹⁰² Ibid 741.

gap between private interests of business (most often involved making profit margins) and the public interest (the preservation of the environmental) was substantial.¹⁰³

The rise of globalisation at the end of the 1990's saw the emergence of new environmental governance arrangements.¹⁰⁴ Concerned with the integration of creative regulatory mixes, these governance arrangements focused on the promotion of information sharing and collaboration between a diverse array of private, public, and non-government stakeholders working together to achieve mutually negotiated objectives. The most notable theories in this area include Responsive Regulation, which working on the premise of Legal Pluralism introduced the notion of enforced self-regulation. This era also saw the introduction of Smart Regulation, which proposed principles for designing regulation based on complimentary regulatory mixes as well as the incorporation of responsive regulation based regulatory and enforcement pyramids, with the regulatory pyramid displaying the regulatory strategies available to regulators as the means for escalating strategies to achieve the regulatory outcome, and the enforcement pyramid displaying the levels of deterrence achievable through the use of a mixture of enforcement measures.¹⁰⁵ When combined, both theories work on the premise that environmental regulation is most successful when a broad range of instruments, or 'regulatory mixes', and institutions are incorporated by regulatory instruments. Furthermore, it is optimal that regulators employ regulatory options that are the least prescriptive first, and then work up to more prescriptive measures backed with heavier sanctioned enforcement measures until a time when the underlying regulatory aim is achieved. With the intention to pursue a circular economy increasing both domestically and internationally, methods for designing regulatory interventions to support the transition to a circular economy is necessary. Yet currently, very limited research related to the kinds of specific regulatory interventions that might be employed to improve product design at a national level currently exists.¹⁰⁶

Taking into consideration the current regulatory options available to regulators, as discussed above, it would appear that regulatory strategies such as responsive and smart regulation may be particularly beneficial to regulating for a circular economy. This is because both strategies aim to promote, collaboration and information sharing, which coincides with the circular economy concept of holistic collaboration as outlined in 1.2.3. Other potentially beneficial regulatory options can also be identified from the limited research that currently exists in this area, including

¹⁰³ Ibid 745–746.

¹⁰⁴ See Cameron Holley, Neil Gunningham, and Clifford Shering (n 94) 4.

¹⁰⁵ Ian Ayres and John Braithwaite, *Responsive Regulation: Transcending the Deregulation Debate* (Oxford University Press, Incorporated, 1992) <<http://ebookcentral.proquest.com/lib/qut/detail.action?docID=272606>> ('*Responsive Regulation*'). Also see Neil Gunningham and P.N Grabosky (n 89) 387–422; Ayres and Braithwaite 36.

¹⁰⁶ Limited research currently exists that contemplates the specific type of regulation strategies and design functions that might be engaged for implementing a circular economy, but overall this area remains very limited. See, eg, Barra et al (n 15); World Economic Forum (n 57); Ellen MacArthur Foundation (n 15); Eléonore Maitre-Ekern (n 4).

extended producer responsibility, which would appear compatible with the progression of a circular economy due to its ability to create reverse logistic networks necessary in a circular economy to return materials back to manufacturers to assist in closing material loops.¹⁰⁷ In saying this, although potentially able to generate reverse logistical networks in accordance with Eléonore Maitre-Ekern as far as influencing product design ‘[t]here is to date little evidence that extended producer responsibility schemes...hav[e] strong positive impacts on the design of products.’¹⁰⁸ To address this, Eléonore Maitre-Ekern proposes the use of well-placed incentives be utilised to support and build circular momentum.¹⁰⁹ Alternatively, Leonidas Milios suggested the need for appropriate policy mixes that compliment and build on the strengths and weaknesses of other instruments be employed to progress the circular economy. This suggestion reflecting the work of Gunningham and Sinclair in association with smart regulation.¹¹⁰ Subsequently, Milios proposed that the use of extended producer responsibility in conjunction with eco-design style directives be employed in order to balance the shortcomings for product design evident in utilising extended producer responsibility schemes alone.¹¹¹

Overall, despite the emergence of preliminary research that considers possible regulatory options compatible with advancing a circular economy, generally research that considers regulatory intervention for progressing circular product design is limited. Also lacking, yet arguably of equal importance, is research that considers what circular economy principles should underpin regulatory responses made in pursuit of improved circular design, or how such principles might be practically embedded into environmental laws and regulation to improve circular product design. This thesis aims to address this gap.

¹⁰⁷ Reverse logistical networks in discussed under ‘circular business models’ in 1.2.3. See, eg, Smart Prosperity Institute (n 10); Ibid 17–20; Ellen MacArthur Foundation, The Pew Charitable Trusts, and SYSTEMIQ, *Breaking the Plastic Wave’ Study The Circular Economy Solution to Plastic Pollution* (July 2020) 8 <https://www.systemiq.earth/wp-content/uploads/2020/07/BreakingThePlasticWave_MainReport.pdf>; Kieran Campbell-Johnston et al, ‘How Circular Is Your Tyre: Experiences with Extended Producer Responsibility from a Circular Economy Perspective’ (2020) 270 *Journal of Cleaner Production* 122042 (‘How Circular Is Your Tyre’).

¹⁰⁸ Eléonore Maitre-Ekern (n 4) 331, citing European Commission – DG Environment, *Development of Guidance on Extended Producer Responsibility (EPR) Final Report* (2014) 23 <https://ec.europa.eu/environment/waste/pdf/target_review/Guidance%20on%20EPR%20-%20Final%20Report.pdf>.

¹⁰⁹ See Eléonore Maitre-Ekern (n 4) 330.

¹¹⁰ See Cameron Holley, Neil Gunningham, and Clifford Shering (n 82) 4; Neil Gunningham and P.N Grabosky (n 77) 387–422; Ayres and Braithwaite (n 89) 36; Neil Gunningham and Darren Sinclair, ‘Regulatory Pluralism: Designing Policy Mixes for Environmental Protection’ 28, 1.

¹¹¹ See Leonidas Milios, ‘Advancing to a Circular Economy: Three Essential Ingredients for a Comprehensive Policy Mix’ (2018) 13(3) *Sustainability Science* 861, 872–875 (‘Advancing to a Circular Economy’) 868 - 875. Milios also suggests three areas for intervention for regulators on the path to the CE, including product design, public procurement as well as strengthening secondary resources markets. See also Ellen MacArthur Foundation, *Delivering the Circular Economy - A Toolkit for Policymakers* 47, 63, 71 <https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_PolicymakerToolkit.pdf>.

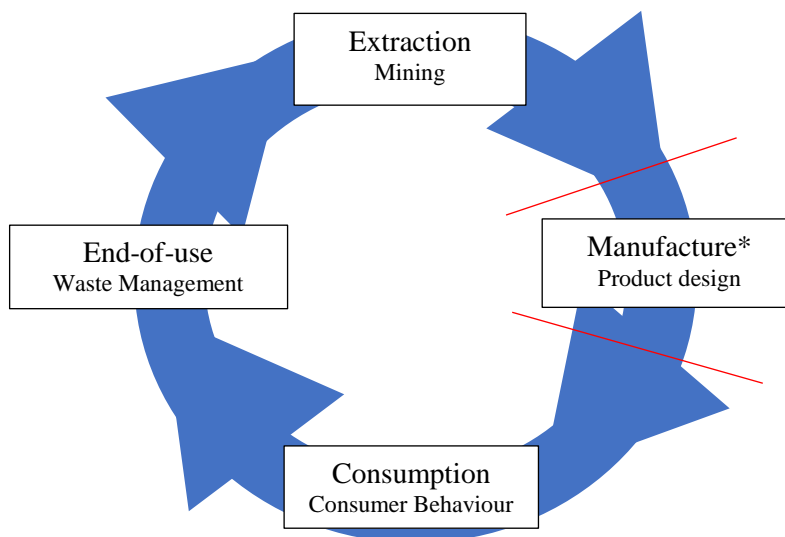
1.3 THE OUTLINE OF THIS THESIS

Having established a broad understanding of the circular economy in the first half of this chapter, the remainder of this chapter will be focused on outlining the research particulars relevant to this thesis.

1.3.1 Aims and Scope of this Research

This thesis aims to explore how principles that underpin circular product design might be embedded into environmental laws and regulation in order to initiate a shift in the present linear paradigm to a more circular system, using regulation associated with PP as a case study. A visual representation of the scope of this research is depicted below in *Figure 1.2*.

Figure 1.2 Visual Representation of the Scope of this Research



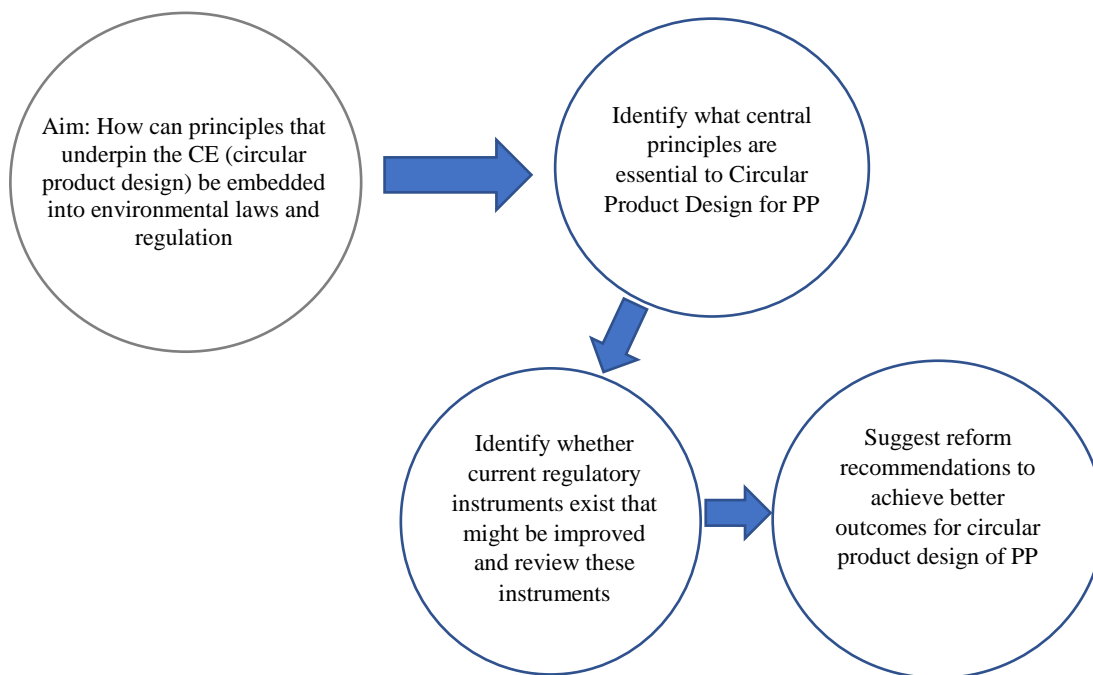
Basic lifecycle of PP, showing segments available for potential regulatory intervention

*Definition on the manner in which the researcher utilises this term is outlined below in 1.3.2

In order to achieve this research aim, the researcher will first determine what design principles underpin circular product design for PP, and translate these principles into a set of criteria that can be used to help inform regulatory approaches in this area. Once established, this criteria will then be utilised to review relevant regulatory instruments that currently regulate PP manufactures for the purpose of demonstrating how these principles can be applied not only to

guide regulatory design, but also how these principle could benefit and improve current regulation relevant in this area.¹¹² Guided by the outcome of this review, this thesis will conclude by proposing a number of reform recommendations intended to better entrench circular design principles for PP into these instruments with the aim of encouraging manufacturers to produce more circular PP products. The overall aim of this thesis is visually depicted in *Figure 1.3* below.

Figure 1.3: Visual representation of how the aims of this research will be investigated



1.3.2 Research Limitations

Due to the complexities associated with supporting a transition to a circular economy, and the limited scope of this research, there will be a number of areas that this thesis cannot address. Initially, with regards to the concept of the circular economy generally, currently literature exists that questions the validity of this concept, specifically with regards to its compatibility with the current growth focused parameters of the global economy.¹¹³ Furthermore, due to the lack of clear practical guidelines for implementation of the concept, as indicated above, there are critics who suggest that the circular economy could easily become discredited as a refurbished form of

¹¹² It should be noted that the existence of circular product design elements may already be present in some of these instruments given the fact that the CE is underpinned by a number of existing waste management strategies and methods such as recycling and the waste hierarchy.

¹¹³ See, eg, Martin Calisto Friant, Walter JV Vermeulen and Roberta Salomone, 'A Typology of Circular Economy Discourses: Navigating the Diverse Visions of a Contested Paradigm' (2020) 161 *Resources, Conservation and Recycling* 104917 ('A Typology of Circular Economy Discourses').

'greenwashing' in which industry and government use their discretion to interpret and implement the concept in a manner that maintains the status quo.¹¹⁴ The researcher concedes that although these are valid points, Australia has already evidenced an intention to pursue the circular economy through the *National Waste Policy and Action Plan*,¹¹⁵ and ratified the concept into several state policy documents.¹¹⁶ In light of this, the researcher has chosen to concentrate on undertaking research focused on examining methods for implementing the circular economy. As such, a detailed examination of the validity of the circular economy will not be undertaken.

Secondly, this thesis will not engage with an examination of areas of law outside those covered under domestic instruments that regulate manufacturers of PP. For example, although it is understood that other areas of law and economic policy, such as international trade law, will likely affect Australia's response to this issue, it is not within the scope of this work to further investigate the impact of this body of law. As noted in 1.2.3 '...every area of a product's lifecycle will need to be examined and uniquely changed depending on the industry, material and product in question.' Due to the expansive subject matter this statement uncovers, the researcher has concluded that it is not feasible to examine all products and the associated regulation in this thesis. As such, only regulation related to PP will form the basis of examination in this research.

Finally, although there are numerous options for regulatory intervention along the lifecycle of PP, this research is focused on product design considerations only. As such, this thesis does not connect the principle of design with other life-cycle segments of PP (for example the role of consumer behaviour) in detail, nor give weight to these segments in this discussion.

1.3.3 Terminology

For the purpose of clarification and consistency, it is important to define a number of terms that have been used by the researchers in this thesis. Firstly, the term '*manufacturer*' has been used broadly within this research to encompass all upstream operations that apply to the start life of a PP products. This includes all industry and organisations involved in the making, producing, designing and manufacturing of packaging products that use plastic, including retailers using

¹¹⁴ Ibid.

¹¹⁵ National Waste Policy Action Plan (n 7).

¹¹⁶ See, eg, Queensland Government, *Waste Reduction and Recycling Act 2011* (Qld); Government of New South Wales, *NSW Circular Economy Policy Statement Too Good to Waste* (2019) <<https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/recycling/19p1379-circular-economy-policy-final.pdf?la=en&hash=F80151EA9C2C3E27BA889D15D18041CDF7A4D25A>>.

additional PP products up until the point of sale.¹¹⁷ This does not include the process of mineral or raw material extraction.

Reference to '*plastic packaging*' (PP) has been defined to include all packaging products made of plastic material, or made of a combination of plastic and other materials, for the containment, protection, marketing or handling of consumer products. This definition includes plastic distribution packaging.¹¹⁸

1.3.4 Research Questions

Three research questions will underpin this work. They are -

1. What principles should underpin regulatory responses in pursuit of circular product design for PP in Australia, and how can these principles be used to guide and review regulatory instruments that govern manufacturers of PP?
2. How well does the current regulation of manufactures of PP align with circular economy design principles?
3. How should current regulatory instruments be reformed, to achieve better outcomes in encouraging manufactures to design PP products for circularity?

1.3.5 Research Methodology and Design

This research is multidisciplinary in nature, and as such, employs mixed research methodologies. Initially, this thesis has elected to employ the use of a case study specifically focused on the examination of regulation attached to manufactures of PP.¹¹⁹ This methodology has been selected in order to condense the scope of the overall subject area, and to allow for a more detailed examination into how regulation might improve product design and compatibility with a circular economy. Similarly PP as a product, has been selected by the researcher due to increasing global attention for plastic, including PP, to become a priority for a transition to a circular economy due to its heavy reliance of non-renewable fossil fuel resources in its production, and highly publicised waste and end-of-life management issues. Furthermore, utilising PP as a case study, limits the number of potential start-of-life regulatory instruments that might be reviewable in association with this investigation. This is favourable, as it subsequently allows the researcher to undertake a more comprehensive evaluation of the regulation uncovered, as well as

¹¹⁷ This definition was influenced by the definition included in the National Environment Protection (Used Packaging Materials) Measure 2011 (Cth).

¹¹⁸ Ibid.

¹¹⁹ See Pamela Baxter and Susan Jack, 'Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers' 18 544.

devise more detailed regulatory recommendations for how product regulation might be undertaken within a circular economy.¹²⁰

As highlighted by Ibolya Losoncz, regulatory research requires the explanation of complex interactions between structural and systematic conditions and actors, along with institutional power, action and ambition.¹²¹ In light of this, in addition to the use of a case study, socio-legal research will be the overarching methodology utilised throughout this project. Socio-legal research allows researchers to examine complex relationship by undertaking theoretical and empirical analyses of the nature of law and its relationship to society through the analysis of the social, economic and political factors leading to the development of the law and legal process, which is relevant to understand the operation of the identified regulatory instruments of this study.¹²²

For the remainder of this research, specifically relating to the review of potential regulatory instruments uncovered in related to the design of PP, a combination of Doctrinal Legal Research and Historical Legal Research will be employed. Doctrinal legal research is a form of qualitative research central to the discipline of law. It involves undertaking a thorough analysis of relevant legal texts to determine and interpret existing laws in light of a particular context. In this instance, doctrinal legal research will be employed to examine and analyse identified instruments that regulate manufacturers of PP to determine how these instruments operate, and whether they encourage manufacturers to design circular PP products.¹²³ To compliment doctrinal legal research for the purpose of establishing a more in-depth understanding of the regulatory instruments uncovered, historical legal research will be incorporated to attempt to provide meaning to the origins and development of the regulatory instruments in question.¹²⁴ The inclusion of an historic analysis of this regulatory framework, will allow the researcher to gain a more well-rounded understanding of this area of law, in particular, what influences have impacted the development of this area of law in the past, and what might influence changes to influence reform recommendation made in this thesis.

¹²⁰ In accordance with Baxter et al, the use of a case study is instrumental in deconstructing complex problems and allows a researcher the ability to give focus to more complex issues. Pamela Baxter and Susan Jack, 'Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers' 18 544.

¹²¹ See Ibolya Losoncz, 'Methodological Approaches and Considerations in Regulatory Research' in Peter Drahos (ed), *Regulatory Theory* (ANU Press, 2017) 77 <<https://www.jstor.org/stable/j.ctt1q1crtm.12>>.

¹²² See, eg, David Cowan and Daniel Wincott (eds), *Exploring the 'Legal' in Socio-Legal Studies* (Palgrave Macmillan UK, 2016) 6–7 <<http://link.springer.com/10.1007/978-1-137-34437-3>>.

¹²³ Amrit Kharel, *Doctrinal Legal Research* (SSRN Scholarly Paper No ID 3130525, Social Science Research Network, 26 February 2018) <<https://papers.ssrn.com/abstract=3130525>>.

¹²⁴ Historic Legal Research, involves undertaking an examination of past events to gain a more complete understanding surrounding the ways in which historical events, both legal and non-legal, influence the development of legal rules and practices. The utilisation of history can be particularly useful in determining why a certain law has developed and how it may have developed or changed over time. See Jim Phillips 'Why Legal History Matters' (2010) 41 *Victoria University Wellington Law Review* 293, 316.

1.3.6 Contribution of this Thesis

This thesis will make two original contributions to the current literature in this area. Firstly, it will provide an assessment of circular design and conceptualise the principal elements of this subject for the benefit of lawmakers embarking on the task of generating momentum for the implementation of this concept in Australia.¹²⁵ This conceptualisation is important as it will offer insight into areas that should be the focus of regulation designed to encourage improved circular product design. A second, and perhaps more important contribution of this research, is that it utilises circular economy principles to critically analyse current regulatory tools being utilised within Australia to regulate manufacturers of PP products. Examining the current regulatory framework in this manner will act as an example of how Australia's current regulation might be reviewed to determine their circular compatibility. Such a review also specifically allows for the identification and determination into whether current instruments that regulate manufacturers of PP operate in a manner consistent with principal elements of the circular economy, and if not, whether they may be improved to better align with circular economy design principles overall. Establishing such an understanding not only allows for the identification of possible areas of reform needed within the current system to better support the transition to a circular economy, but also subsequently allows lawmakers the opportunity to strengthen or refocus weak areas under the current legal framework. Alternatively, it also allows policy makers the ability to decide whether other regulatory interventions are required to progress circular product design in pursuit of a circular economy for PP in Australia.

1.4 STRUCTURE OF THIS THESIS

To recap, Chapter 1 has reviewed the current state of the literature concerning the concept of the circular economy. It has outlined how the principles that underpin a circular economy requires a shift in the traditional focus of environmental regulation away from solely end-of-pipe point source waste mitigation, towards an increased focus on product regulation, specifically regarding how products are designed. The Chapter then outlined the overall purpose and design of this research project, including the overarching aim, scope, limitations, research questions, methodologies, design, and research significance.

Chapter 2, will be dedicated to addressing research question 1, by outlining the current linear utilisation of PP within Australia and how a circular economy for PP as an alternative

¹²⁵ See *National Waste Policy* (n 3).

economic system might look within Australia. With this information a set of principles that should underpin the regulation for improved circular product design will be devised.

Utilising these principles, Chapter 3 will assess the existence of any relevant regulatory instruments that apply to manufacturers of PP design in Australia, and review these instruments to determine whether the current scheme/s have the ability to encourage manufactures to contribute to the circular economy for PP, by designing products compatible with a circular system.

Building on the results of Chapter 3, Chapter 4 will offer recommendations for improvements for these regulatory instruments for the purpose of improving circular economy design of PP products.

Finally, Chapter 5 will summarise the overall findings of this research, as well as offer some concluding remarks and areas for future research in this area.

CHAPTER 2: PRINCIPLES OF CIRCULAR ECONOMIC PRODUCT DESIGN

2.1 OVERVIEW

This chapter is concerned primarily with answering research question 1.¹²⁶ It identifies design elements that are central to circular product design for PP, and draws on these findings to develop principles that can be translated into regulatory approaches to support the pursuit of circular product design for PP in Australia.

To arrive at these principles, this chapter begins by outlining the current linear use of PP within Australia, including the issues that have arisen as a result of this system, and the ways in which traditional legal and policy responses have been employed to try and address these issues. With an understanding of PP as it exists under the linear system, Chapter 2 then outlines the goals for PP under a circular economy, and identifies specific PP design elements necessary to progress PP in this transition. To do this, the researcher will employ the general principles referenced in the literature related to the circular economy as outlined in Chapter 1, as well as draw on the work of the Ellen MacArthur Foundation related to the New Plastics Economy.¹²⁷ The Ellen MacArthur Foundation is a UK-based NGO, globally recognised as a leader in the conceptualisation and popularisation of the circular economy, and has conceptualised how a circular economy for PP might operate, including a number of focus areas vital to its achievement.¹²⁸ Being a leader in the field, the Ellen MacArthur Foundation has become influential on an international level, and has featured prominently in the reports of several significant international bodies as well as influenced the policy documents of a number of jurisdictions around the world.¹²⁹ Considering this information, and in an attempt to maintain a degree of consistency between Australia's actions in pursuit of a circular economy for PP with the global trends developing in this space, the researcher has elected to incorporate the principles contained in the New Plastics Economy to direct and inform regulatory intervention principles for improved circular PP design.

¹²⁶ Research question 1 - What principles should underpin regulatory responses in pursuit of circular product design for PP in Australia, and how can these principles be used to guide and review regulatory instruments that govern manufacturers of PP?

¹²⁷ The New Plastics Economy is made up of two reports. These reports include the Ellen MacArthur Foundation and Project MainStream, *The New Plastics Economy - Rethinking the Future of Plastics* (2016)

<https://www.newplasticseconomy.org/assets/doc/EllenMacArthurFoundation_TheNewPlasticsEconomy_Pages.pdf>; and the Ellen MacArthur Foundation, 'The New Plastics Economy - Catalysing Action' (n 15). The New Plastics Economy will be discussed in more detail below in 2.3.

¹²⁸ Launched, as a charity foundation in 2010, the EMF has become a world leader in research central to the conceptualisation of a circular economy generally, and works with NGO's, corporations and governments to create a uniform direction for pursuit of a circular economy around the world. This includes a particular focus on and accelerated implementation of a circular economy for PP to address the environmental impacts of plastic waste. See generally The Ellen MacArthur Foundation, 'Our Mission Is to Accelerate the Transition to a Circular Economy'

<<https://www.ellenmacarthurfoundation.org/>>.

¹²⁹ See examples, Smart Prosperity Institute (n 85), Circular Economy Leadership Coalition (n 46); European Commission, Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions *EU Strategy for Plastics in the Circular Economy. A European Strategy for Plastics in a Circular Economy*, Doc No 52018DC0028 COM(2018) 28 final, 16 January 2018 <<https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1516265440535&uri=COM:2018:28:FIN>>; Ricardo Barra et al (n 14).

Ultimately, by examining how PP is currently designed and used within the linear system, and comparing this to the goal for PP design under a circular economy, the researcher will be in a position to identify the current differences that exist between the two systems. With this information the researchers will then be in a position to suggest a number of circular economy design principles (subsequently referred to as the ‘*Circular Regulatory Design Principles*’ or ‘*Circular Design Principles*’) that can be used to inform regulatory approaches for improved circular PP product design in support of the transition to a circular economy for PP in Australia.

2.2 PLASTIC PACKAGING IN THE LINEAR ECONOMY

Packaging is the term afforded to material used to enclose or protect products during distribution, storage, sale, and use.¹³⁰ Two main categories of PP exist within the market, the first, known as business-to-consumer or B2C, is a PP product consumed by companies to enclose their products for sale to consumers. The second, known as business-to-business or B2B, is a PP product used to wrap bundles of product together for distribution to other businesses for sale.¹³¹

As a product, PP has become integral to our modern linear system of production and consumption. Yet, although PP has positively contributed to several areas within domestic and global society,¹³² the prevalence of PP within Australia and the wider international community and the prominence of linear single-use PP products, has caused significant plastic waste to accumulate within the natural environment. What is particularly problematic about this fact, is that the very properties that make plastics so appealing and useful, including its durability and resistance to degradation, also makes it impossible for nature to reassimilate as waste.¹³³

2.2.1 Resource Use and Waste Generation

While the concept and use of packaging has existed for millennia,¹³⁴ plastic as a material for producing packaging is still considered relatively new,¹³⁵ having only been utilised since the

¹³⁰ Macquarie Dictionary, ‘Packaging’ (2020) <https://www.macquariedictionary-com-au.ezp01.library.qut.edu.au/features/word/search/?search_word_type=Dictionary&word=packaging>.

¹³¹ Ellen MacArthur Foundation and Project MainStream (n 15) 62–67, 102.

¹³² Some of these benefits include, increased sanitation and tamper prevention important for medical or food products, increased shelf life of goods, increased access to a wide variety of different forms and portions of food and beverage products. Plastic has allowed third world countries access to clean bottled water and has provided consumers with ever-increasing convenience options for food consumption. It has also allowed companies almost limitless variations for displaying their products within the consumer market. See Anthony L Andrady and Mike A Neal, ‘Applications and Societal Benefits of Plastics’ (2009) 364(1526) *Philosophical Transactions of the Royal Society B: Biological Sciences* 1977. PP has also benefited material conservation in product transportation. Franklin Associates, *Life Cycle Impacts of Plastic Packaging Compared to Substitutes in the United States and Canada Theoretical Substitution Analysis* (2018) 146 <<https://plastics.americanchemistry.com/Reports-and-Publications/LCA-of-Plastic-Packaging-Compared-to-Substitutes.pdf>>.

¹³³ Ali Chamas et al, ‘Degradation Rates of Plastics in the Environment’ (2020) 8(9) *ACS Sustainable Chemistry & Engineering* 3494.

¹³⁴ Luz Claudio, ‘Our Food: Packaging & Public Health’ (2012) 120(6) *Environmental Health Perspectives* a232, a234.

¹³⁵ The verb ‘Plastic’ is derived from the Latin word *plasticus* and the Greek word *plastikos*, both meaning ‘able to be moulded, pertaining to moulding’. Although hundreds of plastic polymers are commercially available, only six of these are utilised within the market due to their safety

1950's.¹³⁶ Nevertheless, since its introduction, the packaging industry has become the world's largest user of plastics, accounting for approximately 42% of global production.¹³⁷

As a resource consumer, conventional plastic production is highly dependent on input from non-renewable virgin fossil fuel most commonly in the form of oil and gas,¹³⁸ with over 90% of the world's current plastic production derived from fossil hydrocarbons.¹³⁹ This accounts for approximately 8% of total global oil production, with this figure projected to increase to 20% by 2050.¹⁴⁰ Plastic production is also highly dependent on water, with 185 litres of water required to produce 1 kilogram of plastic.¹⁴¹

One unique aspect of PP, is that it is largely intended to be used for single-use applications. This means that PP within the linear system, is predominately designed to be disposed of after just one use.¹⁴² Due to its prominence within modern society, and the propensity for it to be utilised for single-use applications, PP has become a dominant generator of overall plastic waste accounting for almost half of the global total of plastic waste produced.¹⁴³ What is particularly difficult about this waste stream, is that additives and lightweight qualities make it particularly difficult to process. Moreover, if mismanaged, plastic waste can leak into the natural environment and as a synthetic material, can never be completely reassimilated back into nature.¹⁴⁴ As such, PP waste

and relatively low price. These six polymer types however, account for approximately 90 per cent of the total demand. These include Low-density polyethylene (LDPE), high-density PE (HDPE), polypropylene (PP), PVC, PS and polyethylene terephthalate (PET). See 'The History and Future of Plastics' (n 71); Andrady and Neal (n 116); Ohio State University, 'A History of Packaging', *Ohioline* (11 May 2017) <<https://ohioline.osu.edu/factsheet/cdfs-133>>.

¹³⁶ Prior to plastic, packaging was made of materials such as paper, glass, and aluminium, and particularly glass bottles, were returned for re-use. See Ohio State University (n 131). It is claimed that the first natural polymer Celluloid was invented in 1863, with the first synthetic polymer invented by Leo Bakeland 1907. As this product could be moulded and used for a magnitude of purposes, large investments by the major chemical companies into research and development of new polymers commenced, with uses for these new materials to be found at a later date was seen. See 'The History and Future of Plastics' (n 71).

¹³⁷ The next highest user of plastic, at 16.0%, is the Building and Construction sector. See Hannah Ritchie and Max Roser, 'Plastic Pollution' (2018) *Our World in Data* <<https://ourworldindata.org/plastic-pollution>>; United Nations Environment Programme, *Single-Use Plastics, a Roadmap for Sustainability*. (2018) 16 <<https://www.unenvironment.org/resources/report/single-use-plastics-roadmap-sustainability>>.

¹³⁸ Barra et al (n 14).

¹³⁹ Ellen MacArthur Foundation and Project MainStream (n 15) 16.

¹⁴⁰ World Economic Forum, *The New Plastics Economy Rethinking the Future* (Report, January 2016) 13 <http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf>. Furthermore, plastic production accounts for 15% of the world's annual carbon budget. See Ellen MacArthur Foundation, 'The New Plastics Economy - Catalysing Action' (n 20) 22.

¹⁴¹ Joanne Zygmunt and Waterwise, *Hidden Waters* (Report, February 2007) 20 <https://waterfootprint.org/media/downloads/Zygmunt_2007.pdf>.

¹⁴² WWF, '10 Worst Single-Use Plastics and Eco-Friendly Alternatives' (1 July 2020) <<https://www.wwf.org.au/news/blogs/10-worst-single-use-plastics-and-eco-friendly-alternatives>>. In accordance with Geyer et al., roughly 8.3 billion metric tons of plastic has been produced since mass commercialisation commenced in the 1950's, with approximately 6.3 billion tons of this total now waste. Roland Geyer, Jenna R Jambeck and Kara Lavender Law, 'Production, Use, and Fate of All Plastics Ever Made' (2017) 3(7) *Science Advances* e1700782; World Wide Fund for Nature and Dalberg Advisors, *Solving Plastic Pollution through Accountability* (2019) 33

<http://d2ouvy59p0dg6k.cloudfront.net/downloads/solving_plastic_pollution_through_accountability_eng_singles.pdf>. In Australia, resources lost to waste is growing at an unsustainable rate, many times greater than population growth. Australia's municipal waste was 628.3kg per capita in 2010-11, 18.5% above the OECD average of 530.2kg per capita. Australian Packaging Covenant, *Australian Packaging Covenant Strategic Plan 2017-2022* (2019) 11 <<https://www.environment.gov.au/system/files/resources/e2f0f12e-fa6e-4a4b-94e3-1268d9cd1360/files/australian-packaging-covenant-strategic-plan-2017-2022.pdf>>. Figures contained within the National Waste Policy suggests that Australian's generate 67 million tonnes of waste per annum, 4.4 million tonnes of which is plastic. See National Waste Policy (n 5). Furthermore, due to the propensity for single use products the Ellen McArthur Foundation indicates that 95% of plastic packaging material value, or USD 80–120 billion, is lost within the linear economy every year after just one use. Ellen MacArthur Foundation and Project MainStream (n 15) 17.

¹⁴³ United Nations Environment Programme, *Single-Use Plastics, a Roadmap for Sustainability*. (2018) i <<https://www.unenvironment.org/resources/report/single-use-plastics-roadmap-sustainability>>.

¹⁴⁴ *Ibid* 2.

has accumulated in large quantities, detrimentally affecting the ability of the environment to not only regenerate natural capital for use in the economy, but also impeding the ability of the environment to function for the ongoing support of all life.¹⁴⁵

2.2.1 Linear use of PP in Australia

Surprisingly, little historical information exists with respect to the uptake of PP products within Australia. However, it would appear that the rise of PP has occurred, and has continued to increase, in unison with the rise of globalisation and the adoption of this product by Multinational Corporations within their own unique product lines.¹⁴⁶ Possibly the most notable introduction of linear PP products in Australia, was the uptake of Polyethylene terephthalate (PET) plastic bottles by Coco-Cola in the 1970's. This decision subsequently led to the discontinuation of re-fillable glass bottles previously in circulation within the country.¹⁴⁷ While, the introduction of PET bottles was revolutionary for industry in terms of product differentiation,¹⁴⁸ because these bottles were intended for single-use, PET bottles soon become a highly visible component of the waste and litter streams in Australia.¹⁴⁹

Compared to global PP use, Australia is a relatively small overall contributor to linear production and upstream material consumption of plastic material. Australia is also not a large

¹⁴⁵ In 2014, the UN Environment estimated 'the natural capital cost of plastics, from environmental degradation, climate change and health, to be about USD 75 billion annually, with this sum expected to increase should current business as usual practices continue.' See United Nations Environment Programme et al, *Valuing Plastics: The Business Case for Measuring, Managing and Disclosing Plastic Use in the Consumer Goods Industry* (2014) 28 <<http://www.unep.org/pdf/ValuingPlastic>> ('*Valuing Plastics*'). There is also significant literature that exists regarding the detrimental environmental damage, include climate change; marine pollution, biodiversity, and chemical contamination, resulting from plastic waste. See, eg, Barra et al (n 14); European Commission Environment, 'Our Oceans, Seas and Coasts' (10 May 2019) <https://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/index_en.htm>. Within two decades of the mass commercialisation of plastic, the scientific community began publishing literature highlighting the early presence, and accumulation of plastic waste within the terrestrial and marine environment. In the early 1980's, literature was published which attributed the origin of approximately 80% of global marine plastic waste to land-based consumer product sources. See Karl W Kenyon and Eugene Kridler, 'Laysan Albatrosses Swallow Indigestible Matter' (1969) 86(2) *The Auk* 339. Literature regarding the potential health threats posed by plastic against both animals and humans began increasing in the early 2000's, with the discovery of micro plastics in both the marine and terrestrial environment. Today scientific literature continues to examine the ways in which microplastics and plastic consumed by marine animals, and absorbed by crops may be infiltrating the food chain, and to what degree this might threaten food security. See, eg, Barra et al (n 14); Peter G Ryan, 'A Brief History of Marine Litter Research' in Melanie Bergmann, Lars Gutow and Michael Klages (eds), *Marine Anthropogenic Litter* (Springer International Publishing, 2015) 1; Anthony L Andrady, 'Microplastics in the Marine Environment' (2011) 62(8) *Marine Pollution Bulletin* 1596; Jan A van Franeker et al, 'Monitoring Plastic Ingestion by the Northern Fulmar Fulmarus Glacialis in the North Sea' (2011) 159(10) *Environmental Pollution* 2609; Ellen MacArthur Foundation and Project MainStream (n 115) 15, 17.

¹⁴⁶ Plastic offered companies a cheap, strong, lightweight method of storing, transporting and promoting their products within the market, with little thought afforded to the waste aspect that compounded as more and more companies assumed similar PP products. The literature on the topic of the history associated with the rise of plastics, is focused primarily on the rise of plastics in the United States. See, eg, Ecotourism Australia, 'The Rise and Fall of Plastic' <<https://www.ecotourism.org.au/news/the-rise-and-fall-of-plastic/>>.

¹⁴⁷ Norman L Dean, *The Man Behind the Bottle* (Xlibris Corporation, 2010) 149.

¹⁴⁸ In so far as it allowed consumers to consume soda on the go. The bottles were unbreakable and were able to be resealed meaning sizes could be increased and consumers did not have to ingest the entire serving in one sitting. See *Ibid*.

¹⁴⁹ The visible evidence of plastic waste led to a steady rise in public concern surrounding PP waste and wider issues surrounding the effect of modern consumption patterns on the environment. However, Australia has been imbedded in a 'blame game' regarding who should be responsible for reducing the environmental impacts of such waste. Some argue that industry groups have successfully campaigned over many years for voluntary solutions that would place responsibility for recycling on local government, rather than industry itself, and tended to blame consumer for packaging waste and litter issues. An example of the ongoing consumer focus can be seen with the 'Do the Right Thing' waste campaign launched in 1979, which placed waste and litter as the environmental problem, which was up to consumers and local governments to manage. See Helen Lewis, 'Defining Product Stewardship and Sustainability in the Australian Packaging Industry' (2005) 8(1) *Environmental Science & Policy* 45, 46.

domestic producer of PP, generating between 38-42% of the plastic consumed within the country.¹⁵⁰ Australia is however, a large per capital consumer of PP generally, and is a country disproportionately responsible for high waste generation.¹⁵¹ Generally, Australia consumes over 3.5 million tonnes of plastics per annum, of which over 900,000 tonnes is PP.¹⁵² Of this amount, only 287,502 tonnes of PP waste is recovered for processing,¹⁵³ with the remaining 600,000 tonnes unsustainably landfilled or leaked into the natural environment.

In Australia, as with the wider international community, the most highly publicised issue associated with linear PP practices, is its detrimental impacts on the terrestrial and marine environment.¹⁵⁴ However, in Australia like the rest of the world, PP waste also causes social,¹⁵⁵ and economic damage within the country.¹⁵⁶

2.2.2 Linear Attempts to Manage Waste in Australia

As highlighted in Chapter 1, in Australia the management of PP has traditionally been combined with the broader regulatory responses to the management of waste, as part of environmental laws for protecting the environment.¹⁵⁷ Although the Australian Constitution divides up the powers of federal and state governments, it does not create specific responsibilities

¹⁵⁰ Around 58% of plastic consumption, including PP, was through imported finished and semi-finished goods, with only 38% of consumption through local manufacturing using virgin resins (either locally manufactured or imported), with a further 4% of PP produced onshore using locally processed recycle based resins. See Kyle O'Farrell, '2017-18 Australian Plastics Recycling Survey - National Report' 55, 9. The Australia plastic packaging market was valued at USD 3454.57 million in 2019, and is expected to reach USD 4309.98 million by 2025. Mordor Intelligence, Australia Plastic Packaging Market Growth, Trends, and Forecast (2020-2025) (2019) <<https://www.mordorintelligence.com/industry-reports/australia-plastic-packaging-market>>. In comparison the global plastic packaging market is projected to reach USD 320.94 billion by 2027. 'Plastic Packaging Market Size Worth \$320.9 Billion by 2027' <<https://www.grandviewresearch.com/press-release/global-plastic-packaging-market>>.

¹⁵¹ See Parliament of Australia, 'Chapter 2 - Trends in Waste Production in Australia' (text) <https://www.aph.gov.au/parliamentary_business/committees/senate/environment_and_communications/completed_inquiries/2008-10/austwastestreams/report/c02>; insidewaste, 'Australia One of Few Countries Responsible for High Waste Generation', *Inside Waste* (online, 15 July 2019) <<https://www.insidewaste.com.au/index.php/2019/07/15/australia-one-of-few-countries-responsible-for-high-waste-generation/>>.

¹⁵² Kyle O'Farrell and Australian Government Department of the Environment and Energy, '2017-18 Australian Plastics Recycling Survey - National Report' 55, 1; Australian Packaging Covenant, *APCO Packaging Material Flow Analysis 2018* (28 February 2019) <<https://www.packagingcovenant.org.au/documents/item/2171>>.

¹⁵³ Collected for processing refers to the amount of PP collected through national recycling collection measures such as kerbside collection. Of the PP collected in this regards, up to 19% was exported offshore for processing, 4% was being held in storage, and only around 9.4% of the plastic collected was being recycled. *Australian Packaging Covenant* (n 248) 5, 6.

¹⁵⁴ See generally G Ryan, 'A Brief History of Marine Litter Research' in Melanie Bergmann, Lars Gutow and Michael Klages (eds), *Marine Anthropogenic Litter* (Springer International Publishing, 2015) 1. In accordance with Boomerang Alliance, thousands of sea birds die every year along the coast of the country as a result of plastic ingestion. Studies undertaken in the Moreton Bay region, have found that plastic debris ingestion is responsible for around 30% of all turtle deaths, with a further 6% of deaths due to entanglement. *Queensland's Plastic Pollution Crisis, Container Deposit & Other Solutions* (Report, June 2015) <https://d3n8a8pro7vnm.cloudfront.net/boomerangalliance/pages/65/attachments/original/1434695777/CDSOLUTIONS_QLD.pdf?1434695777>.

¹⁵⁵ Joleah B Lamb et al, has coined plastic as the second biggest threat to coral reefs after climate change. Australia possesses the largest coral reefs in the world, with Deloitte estimating that the Great Barrier Reef contributed an estimate economic contribution of A\$6.4 billion per year to the national economy. Subsequently, destruction of the reef would cause devastating losses to the tourism industry suggesting more is needed to be done to address plastics. See Joleah B Lamb et al, 'Plastic Waste Associated with Disease on Coral Reefs' (2018) 359(6374) *Science* 460; Deloitte Access Economics, *At What Price? The Economic, Social and Iconic Value of the Great Barrier Reef* (Report, 2016) 14 <<https://www2.deloitte.com/au/en/pages/economics/articles/great-barrier-reef.html>>.

¹⁵⁶ A few examples of cost expenditure for plastic clean-up activities include the figures from Clean up Australia, who undertook an estimate of the comparative labour cost associated with holding their Clean up Australia Day. This figure was held to be approximately \$35.216 million per annum. See, eg, Terrie Ann Johnson, *Senate Inquiry: The Threat of Marine Plastic Pollution in Australia* (Clean up Australia, 2015) 5-7 <file:///C:/Users/bousgas/Downloads/Environment&Communications%20marine%20plastic_sub09.pdf>.

¹⁵⁷ In Australia, the management of waste is primarily the responsibility of state and territory governments who regulate and manage waste in accordance with their respective legislation, policies and programs. Australian Government Department of Environment and Energy, 'Policies and Governance for Waste', *Department of the Environment and Energy* <<http://www.environment.gov.au/>>.

for matters of environmental protection including waste management. As such, the state and territory governments, out of necessity, have predominantly assumed responsibility in governing waste management.¹⁵⁸ As a result, various regulatory instruments have been implemented within the jurisdictions, which has resulted in fragmented and varied waste management approaches.¹⁵⁹ In recognition of this, and in an attempt to coordinate waste management responses, in 2009 the federal, state and territory governments established the country's first *National Waste Policy*. This Policy outlined a number of national directions to increase consistency between the waste management governance within the country, as well as improve nationwide collection and waste data.¹⁶⁰

Traditionally, Australian states and territories waste management regulations have generally focused on the mitigation of the negative environmental impacts associated with the end-of-pipe solutions i.e. the waste segment of the products lifecycle.¹⁶¹ Subsequently, state and territory governments have focused on the physical and financial aspects associated with collecting and processing municipal waste, and devolved its responsibilities to the local government as *waste collector* with little overall responsibility historically afforded to PP product manufacturers.¹⁶²

2.2.2.2 Options for Waste Management

Once collected, options for managing PP waste includes landfilling, recycling (both domestically and internationally via export), incineration, storage, and more recently 'waste-to-energy' options.¹⁶³ As the cheapest form of disposal, landfilling continues to be the dominant

¹⁵⁸ This omission can arguably be explained due to the fact that at the time of the drafting of the Constitution in the late nineteenth century there was little, if any, environmental consciousness or concern with the preservation of the natural environment. Rather framers of the Constitution viewed the natural environment as something to be '*tamed and exploited*', rather than something requiring protection. Commonwealth Parliament, 'Commonwealth Powers Relating to Environmental Protection and Ecologically Sustainable Development' (text) 2.9

<https://www.aph.gov.au/parliamentary_business/committees/senate/environment_and_communications/completed_inquiries/1999-02/enviropowers/report/c02>. Subsequently as environmental issue begun to arise at the end of the nineteenth century within respective jurisdictions, States and Territories begun enacting environmental policies out of necessity, and while the Federal Government raises the most revenue, the states and territories bear the brunt of the financial costs associated with undertaking these responsibilities. See Thomas (n 57) 121.

¹⁵⁹ See generally, Stephen Jones, 'Waste Management in Australia Is an Environmental Crisis: What Needs to Change so Adaptive Governance Can Help?' (2020) 12(21) *Sustainability* 9212 ('Waste Management in Australia Is an Environmental Crisis'); The Allen Consulting Group, *National Waste Policy Regulatory Impact Statement - Report to the Department of the Environment, Water, Heritage and the Arts* (October 2009) v.

¹⁶⁰ See Parliament of Australia, 'Chapter 2 - Waste Management and Recycling in Australia' (text) 2.38-2.46

<https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/WasteandRecycling/Report/c02>; National Waste Policy (n 5) 7.

¹⁶¹ Whereby regulation is concerned with regulating the individuals and companies responsible for emitting that waste once it already exists and needs to be managed. See Rob White and Diane Heckenberg, 'Legislation, Regulatory Models and Approaches to Compliance and Enforcement' 27, 3.

¹⁶² Thomas (n 57).

¹⁶³ Although still not largely utilised, Australia has recently been evidencing an intention to pursue waste-to-energy option. See, eg, Council of Australian Governments, *COAG Waste Export Bans* (2020) 20, 21 <<https://www.coag.gov.au/sites/default/files/communique/phasing-out-waste-exports-response-strategy.pdf>>. 'Seventh Meeting of Environmental Ministers Agreed Statement – 27 April 2018, Melbourne' <<https://www.environment.gov.au/system/files/pages/4f59b654-53aa-43df-b9d1-b21f9caa500c/files/mem7-agreed-statement.pdf>>. This is not an optimal option under a circular economy as the material is immediately destroyed without the chance for any further *loops* within the economy.

management option for PP, and all waste in Australia, with 44% of packaging waste landfilled annually.¹⁶⁴ Landfills are used as a means to store waste as opposed to break down or otherwise process this material,¹⁶⁵ with waste disposed in landfill considered to have reached final disposal. As such, the problem with landfilling from a circular economy standpoint, is that this method of waste management effectively negates the ability for materials to be processed and used for further applications within the economy.¹⁶⁶

Recycling has also been a popular form of waste management within Australia. Kerbside recycling programs have been running within the country for almost 30 years, with recycling regulation first implemented in the early 1990's.¹⁶⁷ Recycling can occur both domestically - where the material is processed within local waste processing facilities, as well as through the export of material for processing offshore. Although viewed as a sustainable option for waste management,¹⁶⁸ since its incorporation, Australia has maintained a low rate of recycling for PP, with figures sitting at around 9%.¹⁶⁹ The reasons why recycling rates remain low are complex, but broadly the fundamental reasons for why this rate has remained so low includes the high cost of collecting, sorting and recycling materials compared with other forms of acceptable disposal.¹⁷⁰ The fluctuating costs associated with obtaining and utilising recycled polymers compared to virgin material is also a major issue.¹⁷¹ Moreover, technical inefficiencies leading to an overall lack of information regarding the availability of recycled plastics, the quality of the polymers produced,¹⁷²

¹⁶⁴ This is arguably due to the fact that Australia has geographical more room available to landfill waste compared to many European countries. See Madden and Florin (n 16) 6.

¹⁶⁵ Molika Ashford-Life's Little Mysteries Contributor August 25 and 2010, 'What Happens Inside a Landfill?', *livescience.com* <<https://www.livescience.com/32786-what-happens-inside-a-landfill.html>>.

¹⁶⁶ In addition to this, landfilling also has a number of other adverse environmental outcomes. For example, all landfilling facilities inevitably reach capacity at some stage, at which time that landfill pit will be buried. Due to storage practices of landfilling, bacteria in this compacted and buried waste produces methane gas, which in older landfilling facilities, is highly flammable and dangerous if allowed to collect underground. Although more modern facilities capture this gas for use in alternative energy production, in older facilities, these gases were simply vented straight into the atmosphere. *Ibid.*

¹⁶⁷ These include the National Packaging Guidelines 1991, the National Kerbside Recycling Strategy 1992 (Cth), and the National Waste Minimisation and Recycling Strategy 1992. The latter was released in June 1992 after being prepared through consultation between the Commonwealth Environmental and Protection Agency and the Australian and New Zealand Environmental and Conservation Council (ANZECC). This strategy set a national target of 50 percent for waste reduction by 2000. This aim, has still not come to fruition. See Nicole Sommer, 'It's Not My Bag Baby - Responsibility for Packaging and the National Packaging Covenant' (2006) 10(2) *The Australasian Journal of Natural Resources Law and Policy* 242 <<https://search.informit.com.au/fullText;dn=200700191;res=IELAPA>>.

¹⁶⁸ Malak Anshassi, Steven J Laux and Timothy G Townsend, 'Approaches to Integrate Sustainable Materials Management into Waste Management Planning and Policy' (2019) 148 *Resources, Conservation and Recycling* 55.

¹⁶⁹ O'Farrell and Australian Government Department of the Environment and Energy (n 15) 1.

¹⁷⁰ See, eg, Thomas (n 57).

¹⁷¹ Two main factors are said to affect the economic viability of recycled material value, the first relates to the quality of plastic being processed, along with the quality of plastics. However ultimately, the economic value of used plastic material is dictated by the existence of an end markets willing to purchase this recycled material. Previously China had been a major market for used plastics serving as Australia's largest waste export market taking up to 19% of the countries collected waste. However, in January 2018, China introduced its National Sword Policy effectively banning the import of PP materials from a number of countries including Australia. This policy has decimated the export market for this product for Australia and continues to hamper Australia's waste management options for PP overall. See generally 'It's All Downcycled from Here', *Freshkills Park* (5 February 2020) <<https://freshkillspark.org/blog/its-all-downcycled-from-here>>; Ellen MacArthur Foundation, 'The New Plastics Economy - Catalysing Action' (n 20) 36. See also Phil Lasker, Jenya Goloubeva and China correspondent Bill Birtles, 'Here's How Australia Is Planning to Deal with China's Ban on Foreign Waste', *ABC News* (Text, 10 December 2017) <<http://www.abc.net.au/news/2017-12-10/china-ban-on-foreign-rubbish-leaves-recycling-industry-in-a-mess/9243184>>. Australian Packaging Covenant, *Soft Plastic Packaging Working Group 2019* (March 2019) <<https://www.packagingcovenant.org.au/documents/item/2179>>.

¹⁷² Overall, a certain level of purity must be maintained if recycled plastics are to be considered as substitute for virgin polymers in the production of goods. This allows for recycled feed to maintain compatibility with the property requirements of new plastic product manufacturing. The variety

and its suitability for use for further applications acts as a disincentive for using recycled material.¹⁷³

Finally, because PP products within the linear model are not designed to be truly recycled, linear use of the term *recycling* is in fact a process known as ‘downcycling’ whereby plastic products experience a downgrade in material quality allowing, in most instances, only one additional lifecycle loop. This subsequently ‘limits usability and maintains the linear, cradle-to-grave dynamic of the material flow system.’¹⁷⁴

2.3 AN ALTERNATIVE OPTION FOR PLASTIC PACKAGING

As outlined in 1.2.2, the fundamental aim of circular product design is centred on closing the material loops of goods through products designed and produced for durability, re-use, reparability, upgradability and recyclability.¹⁷⁵ As such, the ultimate aim for a circular economy for PP would be the achievement of a continued use, and reuse of plastic material for the production of further plastic products for use in the economy. However, as has been highlighted above, the current use of PP under the linear system has evidenced a preference for single-use PP applications, using landfilling as the dominant waste management option. This suggests that significant work will need to occur in order to shift to a circular economy for PP.

In an effort to obtain further insight into the focus areas necessary to improved circular product design for PP through regulatory intervention, this next section draws on the concepts outlined in association with the New Plastics Economy from the Ellen MacArthur Foundation for the reasons outlined in 2.1.

of plastic types are not compatible with each other because of inherent immiscibility at the molecular level. For example, a small amount of Polyvinyl chloride (PVC) contaminant present in a PET recycle stream will degrade the recycled PET resin owing to the addition of hydrochloric acid gas from the PVC which requires a higher temperature to melt and reprocess the remaining PET. See Jefferson Hopewell, Robert Dvorak and Edward Kosior, ‘Plastics Recycling: Challenges and Opportunities’ (2009) 364(1526) *Philosophical Transactions of the Royal Society B: Biological Sciences* 2115 (‘Plastics Recycling’); Australian Packaging Covenant, *Soft Plastic Packaging Working Group 2019* (March 2019) 20 <<https://www.packagingCovenant.org.au/documents/item/2179>> 2119.

¹⁷³ Hopewell, Dvorak and Kosior (n 168) 2122.

¹⁷⁴ Ellen MacArthur Foundation, ‘Towards the Circular Economy’ (n 20) 24. An example of true recycling can be seen with aluminium, which is 100% recyclable, meaning it retains its material integrity indefinitely The Aluminium Association, ‘Recycling’ <<https://www.aluminum.org/industries/production/recycling>>.

¹⁷⁵ Eléonore Maitre-Ekern (n 4) 312; Ellen MacArthur Foundation, *What Is a Circular Economy?* (n 59); Ellen MacArthur Foundation, *Circular Economy Schools of Thought* (n 4); Wautelet (n 4); Material Economics (n 4).

2.3.1 A Circular Economy for Plastic Packaging under the New Plastics Economy

The New Plastics Economy is a project made up of two reports. The first report, *The New Plastics Economy - Rethinking the Future of Plastics*, was published in 2016 in collaboration with the World Economic Forum.¹⁷⁶ This report outlines the vision for a circular economy in PP, as well as the three primary aims for shifting the plastics industry toward circularity. The second report, *The New Plastics Economy Catalysing Action*,¹⁷⁷ published in 2017, expands on the work outlined in the 2016 report, and includes a more in-depth focus on specific design elements central to the achievement of the aims outlined in the 2016 report.¹⁷⁸ Although the New Plastics Economy is concerned with plastics as an overall material, there is a large focus on single-use plastic and PP. Furthermore, as PP is a product made of plastic, the principles contained in the New Plastics Economy have been determined as relevant for application in this instance.

With a vision for a circular economy in which plastic ‘...never become[s] waste; [but instead] re-enters the economy as valuable technical or biological nutrients...’¹⁷⁹ for re-use in the production of new PP within the economy, the New Plastics Economy aims ‘...to deliver better system-wide economic and environmental outcomes...’ for PP within the economy. Yet, despite a recognition of the environmental damage caused by the linear use of PP within society, the New Plastics Economy acknowledges the ongoing value and continued place for PP within society. Furthermore, due to the prevalence of PP within modern society, the New Plastics Economy does not consider the initial aim for progressing PP to a circular economy to include a sudden reduction in the volume of PP overall due to unknown environmental consequences.¹⁸⁰ Subsequently, to generate change and close the material loop for plastic, the New Plastics Economy’s focus is primarily centred on improving and increasing the rate of material recycling for PP, with recycled plastic material used for the production of further plastic products. The New Plastics Economy also promotes a scaling up of re-use PP products, as well as an increase in the use of compostable and material alternatives that are bio-benign if leaked into the environment. However, in addition to recycling, the New Plastics Economy vision calls for a reduction or avoidance in the unnecessary consumption of PP,¹⁸¹ and promotes the need to reduce material consumption for the prevention of waste in the first instance. Prioritising the prevention of unnecessary products not

¹⁷⁶ Ellen MacArthur Foundation and Project MainStream (n 15).

¹⁷⁷ Ellen MacArthur Foundation, ‘The New Plastics Economy - Catalysing Action’ (n 20).

¹⁷⁸ This aim related to the generation of an effective after use economy for plastic, particularly improving PP design. See Ellen MacArthur Foundation and Project MainStream (n 15).

¹⁷⁹ Ibid 18.

¹⁸⁰ Ibid.

¹⁸¹ The New Plastics Economy suggesting that ‘reduction[s] should be pursued where possible and beneficial, by dematerialising, moving away from single use as the default, and substituting other materials.’ Ibid.

only avoids the generation of waste overall, but is also the only option that addresses unnecessary resource use which for PP would not only include the immediate physical virgin fossil fuel inputs, but also all periphery resources that go into producing PP products.¹⁸²

To achieve this vision, the New Plastics Economy outlines necessary changes in three specific areas of the current linear use of PP in society. These include ‘...creating an effective after-use plastics economy, drastically reducing the leakage of plastics into natural systems...and decoupling plastics from fossil feedstock...’¹⁸³ **Figure 2.1** below outlines the visual representation of the envisioned transition from the current linear to circular use of PP.

Figure 2.1: Comparison between the current Linear System to the Envisioned Circular Economy for Plastics



2.3.1.1 Designing PP for an Effective After use Economy

With a focus centred on plastic recycling, the fundamental area of focus in the New Plastics Economy is the creation of an effective after-use economy for PP.¹⁸⁴ To improve and increase the rate of material recycling for PP three circular design improvements to the current linear system are proposed. These include re-designing PP products for

1. improved material recycling;
2. re-use;
3. targeted PP products to incorporate more compostable materials.

¹⁸² Such as water. The idea of prevention has existed previously in waste management systems, with a limited level of success. See, eg, Rudolph Messner, Carol Richards and Hope Johnson, ‘The “Prevention Paradox”: Food Waste Prevention and the Quandary of Systemic Surplus Production’ (2020) 37(3) *Agriculture and Human Values* 805, 807 (‘The “Prevention Paradox”’).

¹⁸³ Ellen MacArthur Foundation and Project MainStream (n 15) 18.

¹⁸⁴ Ibid 33. ‘Not only is it crucial to capture more material value and increase resource productivity, it also provides a direct economic incentive to avoid leakage into natural systems and will help enable the transition to renewably sourced feedstock by reducing the scale of the transition.’

1. Re-design for Improved Material Recycling

As mentioned above, recycling is currently utilised as a waste management option for PP within Australia, however maintains low rates of utilisation due to both technical inefficiencies and economic fluctuations.¹⁸⁵ At a basic level, the shift to a circular economy in the case of PP will require not only a dramatic increase in the recycling rates within Australia, but will require an increased level of material purity to be maintained in order for recycled plastics to be a viable substitute for virgin polymer in the production of goods.¹⁸⁶ This will require a drastic improvement in the quality and purity of end-of-use recycling processes, as well as an increase in incorporation of post-consumer recycled content in new packaging products. Manufacturers will subsequently be required to play a role in both of these areas, by producing higher quality recyclable PP products, and subsequently incorporating this material into new packaging products.

Although a number of the current issues associated with this aim cannot be pursued at this time due to technological gaps,¹⁸⁷ several areas for improvement are possible through design considerations, and subsequently should be the focus of PP design decisions of manufacturers. Two categories of design options are suggested under the New Plastics Economy the first of which relates to physical packaging redesign of PP products, and the second concerns packaging additive decisions.

Category 1 - Physical Redesign of PP Products

In accordance with the New Plastics Economy, the physical redesign of a number of current PP applications, would allow for recycling to become more economically viable for up to 50% of PP materials.¹⁸⁸ Three current PP segments are highlighted for change, as currently these products do not have a viable reuse or recycling pathway now or in the foreseeable future.¹⁸⁹

¹⁸⁵ See 'It's All Downcycled from Here' (n 167).

¹⁸⁶ This allows for recycled product to maintain compatibility with the property requirements of further plastic product production. As previously stated, a number of current plastic types (mostly mixed plastics labelled 7 'other') are not compatible with others because of inherent immiscibility at the molecular level caused by various additives included in design and production. In theory it is currently possible for closed-loop recycle most thermoplastics, however, a major challenge for producing recycled resins from plastic packaging waste is the fact that PP innovation has largely overtaken the ability of current material recovery facilities (MRF) to sort, process and recycle a large portion of current PCP products. This could arguably be attributed to the fact that the plastic industry has previously not been held accountable for their products and as such have funnelled research into innovative new material types, while waste management has been largely underfunded and as such has PP products have long surpassed the ability of MRF to process these materials. See 'The History and Future of Plastics' (n 68); Eartheasy, 'Plastics by the Numbers' (2012) <<https://learn.eartheasy.com/articles/plastics-by-the-numbers/>>. Hopewell, Dvorak and Kosior (n 164).

¹⁸⁷ This suggests further research will be required as a part of product design. This will be discussed in more detail in 2.4 below.

¹⁸⁸ Ellen MacArthur Foundation and Project MainStream (n 15) 33.

¹⁸⁹ Ellen MacArthur Foundation, 'The New Plastics Economy - Catalysing Action' (n 20) 27.

1. ***Small-format packaging*** - is packaging weighing between 1g-3g, or PET bottles with total volume of 10g-15g. Examples of these products include sachets, tear-offs, lids, straw packages, sweet wrappers and small pots. Being too small for collection, small-format packaging is a high litter product, and is at a high risk of leaking into the natural environment.¹⁹⁰ A phase out or a potential substitution to compostable or bio-benign materials could be implemented for these products.¹⁹¹
2. ***Multi-material packaging*** - The use of multiple materials, like those combining plastic and aluminium layers in tetra-paks, are economically, and in some cases technically unrecyclable. As such alternatives or redesign of these PP products should be an aim for manufacturers.¹⁹²
3. ***Uncommon plastic materials*** - PP that incorporates and contains low overall volumes of uncommon plastic within its material mix makes recycling of those products unaffordable and should subsequently be revised. Currently, Polyvinyl chloride (PVC), Polystyrene (PS), and Expanded Polystyrene (EPS) collectively make up 85% of the uncommon plastic packaging materials. A phasing out of these materials within PP products would improve the cost and quality of plastics end recycled mix.¹⁹³

Category 2 - Packaging Additives

Certain additives options add cost to the end recycling process which in turn can lead to either viable or unviability of recycling goods. For example, format design decisions surrounding labels, inks, glues, pumps, and tear-offs can impact the economic viability recycling.¹⁹⁴ Similarly, the use of certain pigment colour choices, such as carbon black, can affect recycling viability as it is not detected by near-infra-red machines commonly used for automatic sorting.¹⁹⁵ Finally, as discussed above, the inclusion of uncommon polymers, such as PVC are added to the PP product can affect the cost of recycling.¹⁹⁶ With the aim of upholding the purity of polymers to allow for

¹⁹⁰ Ibid 28.

¹⁹¹ Ibid.

¹⁹² Ibid.

¹⁹³ Ibid. For example, a small amount of PVC contaminant present in a PET recycle stream will degrade the recycled PET resin owing to evolution of hydrochloric acid gas from the PVC at a higher temperature required to melt and reprocess PET. See Australian Packaging Covenant, *Soft Plastic Packaging Working Group 2019* (March 2019) 20 <<https://www.packagingCovenant.org.au/documents/item/2179>> 21 19.

¹⁹⁴ These design decisions can affect the viability of these products of up to USD 44-88 per tonne. See Hopewell, Dvorak and Kosior (n 168) 2120; Ellen MacArthur Foundation and Project MainStream (n 15) 29.

¹⁹⁵ Ellen MacArthur Foundation, 'The New Plastics Economy - Catalysing Action' (n 20) 38. Calculations assume that packaging with carbon black effects the viability of recycling by up to USD 200 per tonne. Currently this product is being collected for recycling at the same average rate as other plastic packaging, then lost into the residual waste stream during sorting. The share of packaging with carbon black follows published estimates at 1.5%-2% of packaging.

¹⁹⁶ Additive choices of polymers including a complex blend of additives such as stabilisers, plasticisers and pigments, affect the economic viability of recycling for plastics as they cause impurities and contaminants in recycled material. Although more research is needed in this area to fully understand the effects of various combinations of additives, can affect the viability of recycling up to USD 25-40 per tonne. Some present

high quality recycled plastics, would suggest that certain additives should be discouraged or phased out.

2. Re-designing PP for Re-use

A key principle of the circular economy is that products and materials are circulated within the economy at their highest value at all times to allow for the slowing and narrowing of overall material loop system, and minimal resource input and waste output throughout the technical cycle.¹⁹⁷ Subsequently, after prevention, the uptake and use of re-used PP products in their original form is the preferable option for manufacturers for PP within a circular economy.¹⁹⁸ In accordance with the Ellen MacArthur Foundation, new innovations in current delivery models and evolving patterns of use within businesses are unlocking a reuse opportunity for at least 20% of the current plastic market,¹⁹⁹ suggesting these options should be supported through incentives. Reuse options exist for manufacturers at both a business-to-business as well as business-to-consumer level,²⁰⁰ with the greatest opportunity for re-use models currently existing within B2B²⁰¹ applications due to current consumer behaviour.²⁰²

3. Re-designing targeted PP products to incorporate more compostable materials.

substances of concern include bisphenol A (BPA) and certain phthalates, which are used as plasticisers in polyvinyl chloride (PVC) with these additives also posing a potential risk to human health and the environment. Ellen MacArthur Foundation and Project MainStream (n 15) 29.

¹⁹⁷ Ibid 47.

¹⁹⁸ Ultimately, re-use in the original state is the preferred option whenever possible, then recycling material for remanufacture Ibid.

¹⁹⁹ Ellen MacArthur Foundation, 'The New Plastics Economy - Catalysing Action' (n 20) 17.

²⁰⁰ An explanation of both common forms of PP was featured in section 2.2, however for ease of reference two main types of PP exist within the market, the first known as business-to-consumer PP (B2C) is plastic packaging consumed by companies to enclose their products for sale to consumers. This also includes the point-of-sale addition of plastic shopping bags to group products to take away from a retailer. Business-to-business (B2B) is PP used to wrap these products for distribution to other businesses for sale.

²⁰¹ The greatest opportunity for reuse packaging currently exists in the overall market is within B2B applications. With lesser value attached to the appearance of this type of PP in comparison to B2C where marketing plays a role in consumer choices. There is considerable scope for reuse of PP in the B2B segment with regards to transportation materials. Examples of such re-usable PP products include containers and pallets used in haulage and the transportation of goods, pallet film as well as wraps, which is currently estimated to contribute around 5 million-6 million tonnes of waste annually. Both options have the potential for reuse options, with the ability to implement standardised returnable rigid packaging systems for transportation products, as well as lid and strap system options for pallet wraps. The critical part of success for such an option is establishing reverse logistics where crates or pallets are able to be sent back for re-use. To overcome this, a logistics system based on 'standardised, modularised and reusable containers, using open networks across industries with pooled assets and protocols across a wide and dense network of companies, leading to significant logistics savings.' See Ellen MacArthur Foundation, 'The New Plastics Economy - Catalysing Action' (n 20) 34; 'Stretch and Shrink Film Market Size | Global Industry Report, 2020-2027' <<https://www.grandviewresearch.com/industry-analysis/stretch-and-shrink-films-market>>.

²⁰² In the current packaging market, B2C business models continue to focus on convenience as the overall driver with respect to product delivery. As such take-back and refilling schemes are still generally considered a niche activity for local businesses rather than a realistic large-scale strategy to reduce packaging waste overall. Current limitations to the broader application of rigid container re-use relate primarily to logistics, with distribution and collection points physical distant from centralized product-filling factories would result in considerable back-haul distances, increasing overall emissions. Additionally, the need for a wide range of containers and packs for branding and marketing purposes makes direct take-back and refilling difficult under current infrastructure. See Hopewell, Dvorak and Kosior (n 168) 2118. Despite these difficulties, opportunities exist in the B2C area for reuse products. Examples which already exist, particularly in Australia, is the replacement of plastic carrier bags with re-usable alternatives. There is also the potential to increase reuse packaging in the personal care segment where food safety requirements are not as stringent. This could contribute to 6 million tonnes of material savings. See Ellen MacArthur Foundation, 'The New Plastics Economy - Catalysing Action' (n 20) 31; Mirage News, 'Woolworths and TerraCycle to Bring Revolutionary "Loop" Platform to Australia to Tackle Plastic | Mirage News' (29 October 2019) <<https://www.miragenews.com/woolworths-and-terracycle-to-bring-revolutionary-loop-platform-to-australia-to-tackle-plastic/>, <https://www.miragenews.com/woolworths-and-terracycle-to-bring-revolutionary-loop-platform-to-australia-to-tackle-plastic>>.

In current linear recycling processes, the presence of contaminants such as organic matter directly affects the ability to recover resources effectively, and affects the overall quality of the recycled material after processing.²⁰³ Compostable and biodegradable plastics have the potential to solve a number of waste-management issues, especially for short life disposable PP that cannot be easily separated from organic waste contaminants.²⁰⁴ The scale up of compostable materials for these PP applications would allow for these materials to be disposed in organic bins together with its contents. This would improve the overall plastic recyclate stream while also increasing the value capture of organic material through composting or anaerobic digestion. The methane produced and captured in this process can be further used for alternative energy use.²⁰⁵

Yet, the upscale of compostable and biodegradable plastics will require a simultaneous scale up of appropriate technical infrastructure and handling systems to process this product. Furthermore, this addition also has the potential to complicate waste management systems as further consumer education relating to the specifics of each term and the disposal requirements of each will need attention.²⁰⁶ Additionally, significant issues may also arise as a side-effect of sourcing biomass sufficient to replace large proportions of current polymers, indicating the need for evidenced backed research prior to significant transition decisions.²⁰⁷

Although the topic of compostable packaging is too complex to cover in depth in this thesis and will evidently require further research prior to large scale use as an alternative to synthetic PP, even at this stage, regulatory actions that complement current waste-management schemes may be used to stimulate activity in this segment. A few examples of such action could include the development of consistent uniform definitions for existing compostable and degradable plastics, along with uniformed labelling of these products to maintain consistency within the industry.²⁰⁸ Furthermore, R&D incentives to better understand this alternative material option will be required.

²⁰³ ‘What Is Recycling Contamination?’, *Cleanaway* <<https://www.cleanaway.com.au/sustainable-future/contamination-main/>>.

²⁰⁴ Examples of these products include PP within fast food restaurants, canteens or festivals, tea bags, and coffee pods. Ellen MacArthur Foundation and Project MainStream (n 15) 33.

²⁰⁵ Ellen MacArthur Foundation, ‘The New Plastics Economy - Catalysing Action’ (n 20) 31.

²⁰⁶ Ellen MacArthur Foundation and Project MainStream (n 15) 68–72.

²⁰⁷ See generally Wim Soetaert and Erick Vandamme, ‘The Impact of Industrial Biotechnology’ (2006) 1(7–8) *Biotechnology Journal* 756, 765–769.

²⁰⁸ See Ellen MacArthur Foundation, ‘The New Plastics Economy - Catalysing Action’ (n 20) 31; Ellen MacArthur Foundation and Project MainStream (n 15) 4; Hopewell, Dvorak and Kosior (n 168) 5.

2.3.1.2 Reducing the Leakage of Plastics and Decoupling Plastics from Fossil Feedstock

As mentioned above, the detrimental impacts of PP leakage into the environment is the most widely known and documented issue associated with the linear use of PP within society, which is a matter that should theoretically be improved within a circular economy for PP. In accordance with the Ellen McArthur Foundation, in the short term, the initial vision underpinning the New Plastics Economy includes reducing use of plastic overall, improving plastic recycling and general waste management systems to improve the negative effects of resource use and waste generation. Yet, even with an improved after-use economy, the New Plastics Economy suggests that PP leakage is still likely to remain a significant issue within the economy. To address this issue long term, the New Plastics Economy aims to change the ways in which society utilises plastic by looking to alternative materials to substitute current fossil fuel-based material input in plastic production.

Ultimately, plastic can be produced from any feedstock containing carbon and hydrogen,²⁰⁹ and as such, there is potential for material input for plastic production from non-fossil fuel-based sources. Three material substitution options are subsequently encouraged, including substituting fossil fuels with alternative greenhouse gases like methane and carbon dioxide (Green House Gas or GHG-based sources), biomass (bio-based sources), or alternatively identifying and substituting plastic with other bio-benign material alternatives.²¹⁰

Overall, for progression in this area, further research into identifying viable bio-benign alternative to plastics, such as GHG based and biomass-based plastics, will need to occur. As such, supporting research in these areas as well as generating incentives to support upscaling alternative niche' to de-stabilise current unsustainable practices for more sustainable options will need to become a focus for government.

2.3.2 Summary – From Linear to Circular

With a goal centred on 'closing material loops', the New Plastics Economy outlines a vision for a circular economy for PP that aims to close the material loop of PP primarily through

²⁰⁹ Richard C Thompson et al, 'Our Plastic Age' (2009) 364(1526) *Philosophical Transactions of the Royal Society B: Biological Sciences* 1973, 364.

²¹⁰ There has been initial research in the area Green House Gas (GHG)-based and bio-based sources, with innovators suggesting that production of GHG-based plastics is already cost competitive to current fossil-based plastics for certain applications and qualify as carbon negative materials. There are currently also examples of bio-based plastic alternatives already being used within the market, such as sugar cane plastics. However, there is limited knowledge of the environmental effect of switching large-scale PP product lines to organic alternatives. The problem with switching from synthetic carbon molecules to alternative organic replacements is the potential for swapping out one environmentally destructive product and causing a similar environmentally destructive situation. Overall, using bio-based sources without creating significant externalities in other domains will require applying regenerative agricultural principles and taking into account the other environmental impacts, such as land use and potential biodiversity loss, otherwise associated with agricultural processes. See World Economic Forum Project MainStream, Ellen MacArthur Foundation, and McKinsey & Company (n 115) 34, 42.

improved material recycling, with recycled material utilised for further plastic applications. In addition to recycling, the New Plastics Economy promotes the scaling up re-use PP products, the elimination of hazardous chemical, uncommon polymers and small format PP products. It also promotes an increase in compostable and alternatives plastic material that are bio-benign if leaked into the environment. Finally, and most importantly, the New Plastics Economy calls for a reduction in the use of PP for the prevention of waste generation in the first instance.²¹¹

The focus on continued and improved recycling of PP within the New Plastics Economy, suggests that waste management practices currently undertaken within Australia will need to be continued and improved. In contrast, landfilling and waste to energy options should be discouraged, with both options destroying the material value of plastic material and ultimately extinguishes the potential for further circular applications of that material within the economy.

Overall, it is clear from the New Plastics Economy that product design will play a major role in the ability and success of a circular economy transition for PP. As mentioned in 2.2.2, currently local government and consumers are physically and financially responsible for the collection and processing of PP waste at the end-of-use segment of the product lifecycle. However, in order to process these materials and establish material loops, both local government and consumers are reliant on the industry designing circular compatible products to maintain material value for recycled plastics and to assist consumers to correctly identify, dispose and process these products. This suggests that in order to progress a circular economy, PP product manufacturers will need to take more responsibility of the decisions made in association with PP product design at the production stage. Furthermore, consultation between manufacturers as product designers, and waste management companies and local government as waste processors, could be valuable in establishing what PP products need to be produced in order for compatibility at end-of-use processing. Consumer input, as PP disposers, is also relevant to understanding how PP product design can assist in influencing correct consumer disposal.

As such, regulation under a circular economy concerning circular product design, will need to be utilised as a means to place a greater onus manufactures of PP to produce products that are more compatible with the overall circular system. This will include pressure to upscale B2B reusable packaging, reduce consumption, and improve the overall purity of PP product by avoiding the use of excessive or hazardous additives, phasing out problematic or unnecessary PP, and eliminating the use of uncommon plastics that would otherwise unnecessarily degrade the quality

²¹¹ This focus on prevention is something shared with the previously discussed waste hierarchy. Ellen MacArthur Foundation, 'New Circular Economy: A Vision of a Circular Economy for Plastics' <<https://www.newplasticseconomy.org/assets/doc/npec-vision.pdf>>.

of plastic recycled material. It will also need to generate consultation between various lifecycle stages of PP products, and priorities research for bio-benign plastic material alternatives.

2.4 ESTABLISHING THE CIRCULAR REGULATORY DESIGN PRINCIPLES

In light of the New Plastics Economy and the general conditions discussed in Chapter 1, the researcher proposes that contrary to the traditional legal and policy responses to PP under the linear system, regulation enacted in pursuit of circular product design as a fundamental condition of a circular economy for PP, should focus primarily on products and materials at the start of life/manufacture stage for the achievement of environmental protection.²¹² In the context of PP, including the material's low recyclability as highlighted in 2.2.2, a circular economy approach to regulation should focus on, inter alia, how PP is manufactured, specifically the design and material convergence decisions of manufactures, with the goal of encouraging PP products to be designed for circular applications.²¹³ There has been consistent acknowledgement within the literature for the need for strong uniform regulatory and policy directions at national levels to drive consistent change for the implementation of a circular economy as mentioned in 1.2.4, and as such, it is suggested that this regulation optimally be instigated on a national level.²¹⁴

With regards to specific focus areas or principles that should be used to underpin regulatory design in setting the direction for manufacturers to design PP products for circularity within Australia, the researcher proposes five best practice Circular Regulatory Design Principles. These principles will be used in the remainder of this thesis as the basis for reviewing Australia's existing regulation of manufactures of PP to determine its ability to encourage the manufacturer of circular PP products.

As a prelude to outlining these principles, it is necessary to specify that it is not the intention of the researcher that each of the five principles established below collectively feature within any single regulatory instrument developed in the pursuit of a circular economy for PP per se. However, it is proposed that all principles should feature collectively in any regulatory framework developed for PP going forward. Along these same lines, it is further proposed that regulatory efforts in this area should attempt to move away from a reliance on single 'instrument solutions' and instead operate as a framework of regulatory mixes to better reflect aspects of smart

²¹² Backes (n 85).

²¹³ Ibid 23.

²¹⁴ See Barra et al (n 14); World Economic Forum Project MainStream, Ellen MacArthur Foundation, and McKinsey & Company (n 115); Ellen MacArthur Foundation, 'The New Plastics Economy Catalysing Action' (n 77).

regulation as proposed by Gunningham and Sinclair.²¹⁵ In light of these factors, the following Circular Regulatory Design Principles are proposed.

Principle 1 – Regulation Encourages Meaningful Participation of Stakeholders

Building on the element of holistic collaboration as outlined in 1.2.3, the aim of principle 1 is concerned with actively generating and maintaining communication avenues between all stakeholders of PP products lifecycle in order to generate holistic design direction for PP products. Although design considerations for PP products are physically the responsibility of upstream manufacturers, the decisions made by manufactures related to design, can greatly impact the ability of consumer, local government, and waste management stakeholders to undertake their own lifecycle roles.²¹⁶ As such, regulation in this area should aim to generate communication between all stakeholders within the lifecycle of PP (such as consumers, end-of-use waste management and all levels of government). Encouraging meaningful participation of lifecycle stakeholders will allow for the better capture of the unique activities undertaken by each stakeholder, and ensure the unique characteristic of each segment of the lifecycle are encompassed in the decisions and actions taken by manufacturers to improve PP product design.²¹⁷

Principle 2 – Regulation Priorities Reductions in Material Consumption

As highlighted above, the underlying focus of the New Plastics Economy centres on an overall reduction in consumption practises of all players along the lifecycle value chain for PP.²¹⁸ Although generally, economics dictate that the majority of manufacturers will

²¹⁵ Due to the evident strengths and weaknesses associated with each individual regulatory strategy as highlighted in regulatory theory, Gunningham and Sinclair suggest utilising regulatory instruments in combination for smarter and cheaper policy mixes that can complimentary operate more effectively achieve the policy goals – for example ‘accordingly, a better strategy will seek to harness the strengths of individual mechanisms while compensating for their weaknesses through the use of additional and complimentary instruments. That is, in a large majority of circumstances (though certainly not all), a mix of instruments is required, tailored to specific policy goals.’ See Baldwin, Cave and Lodge (n 73) 103–164; Gunningham and Sinclair (n 106) 1.

²¹⁶ As mentioned in the information above, the inclusion of certain additives, tear offs as well as inks and labels can make recycling of a product uneconomical. This suggests that the design choices of manufacturers plays a role in the wiliness of waste management to collect and process these products. Similarly, the design choice to include disposal instructions on products, although not a guarantee of consumer disposal, has the ability to guide consumers to making the correct disposal choice as part of their role in the products lifecycle. Of course, it is understood that the ability of these lifecycle stakeholders aren’t completely dependent on design, the availability of disposal and processing infrastructure also plays a role in correct disposal.

²¹⁷ This would include PP product manufacturers, consumers, end-of-life processors as well as all levels of government. The inclusion of all levels of government is important in this instance, as both state and territory governments are responsible for generating environmental policy generally, and local government has a significant portion of responsibility with regards to the collection of PP waste materials from consumers via kerbside collection services.

²¹⁸ In accordance with the latest 2020 report of the Ellen MacArthur Foundation, plastic use should be reduced by nearly 50% by 2040 compared to business-as-usual. See specifically Ellen MacArthur Foundation, *Perspective on ‘Breaking the Plastic Wave’ Study. The Circular Economy Solutions to Plastic Pollution* (2020) 7 <https://www.ellenmacarthurfoundation.org/assets/downloads/The_circular_economy_solution_to_plastic_pollution_July_2020.pdf>. See generally the full study Ellen MacArthur Foundation, The Pew Charitable Trusts and SYSTEMIQ, *Breaking the Plastic Wave’ Study The Circular*

already be using close to the minimum required material necessary for any given product, this principle is often offset against additional material used for aesthetics, convenience, and marketing benefits and can lead to over packaging.²¹⁹ Other reasons for over packaging can be a result of the company's investment in certain production processes, which leads to a reluctance to make changes in line with best practice developments.²²⁰

To promote reduced material consumption, regulation should aim to encourage reduced consumption in both the production and consumption practices of manufactures. This could include a reduction in the use of virgin material in the production of PP, the use of less material per item, the increased use of recycled material, as well as a reduction in unnecessary or over packaging.²²¹ It could also be supported through incentives for uptake of newer technology. Yet, material reduction is not suggesting that manufacturers swap one problem product with another that utilises less material resources. As such, material reductions should be evidence backed with consideration afforded to whether the PP format produced can still be processed at the end-of-use stage segments of the lifecycle.²²²

Principle 3 – Regulation establishes clear rules, aims and standards using standardised definitions related to product re-design reflective of waste infrastructure capabilities and CE design trends

This principle is concerned primarily with steering manufactures to re-design PP products by outlining material, aesthetic and additive decisions that should be considered by manufacturers to improve the ability of PP to be processed at the end-of-use stage of their lifecycle. As highlighted in the New Plastics Economy, a number of PP products possess physical design inclusions that are incompatible with current recycling technologies or cause certain PP products to be uneconomically recycled (see 2.3). To address these issues, regulation should aim to encourage industry to review their PP product lines taking

Economy Solution to Plastic Pollution (July 2020) <https://www.systemiq.earth/wp-content/uploads/2020/07/BreakingThePlasticWave_MainReport.pdf>.

²¹⁹ Hopewell, Dvorak and Kosior (n 168).

²²⁰ Ibid 2117.

²²¹ Although out of the scope of this research project, it is also worth noting that the need for a reduction of consumption runs deeper than merely using less resources in each product made. There is currently a vast inequality of resource consumption between high- and low-income countries that need to be addressed. As such, it is arguably necessary for an intervention and reduction in the overall consumption practices related to individual products particularly in high income nations, which consume 10 times the material resources than those in low-income countries. See United Nations Environment Programme, *Resource Efficiency for Sustainable Development: Key Messages for the Group of 20* (International Resource Council, 2018) <https://www.resourcepanel.org/sites/default/files/documents/document/media/thinkpiece_-_resource_efficiency_-_key_messages_for_the_g20_270818.pdf>.

²²² This idea links back to the discussion in 1.2.3 with regards to life-cycle analysis as mentioned in reference 61.

particular note of each component of their PP, and make changes where possible to those products identified as incompatible.²²³

Principle 4 – Regulation Contains Effective Compliance and Review Mechanisms to Compel the Regulated Target Group to Comply with the Rules.

To further improve the ability of regulation in encouraging re-design in this manner, regulatory instruments for improved circular design, should contain sufficient enforcement mechanisms to compel the regulated target group to comply with the rules in accordance with OECD principles related to supporting successful regulatory interventions.²²⁴ To remain in line with smart and responsive regulation principles, these mechanisms should ideally be scalable from least prescriptive, to more coercive responses where non-compliance continues.

Principle 5 – Regulation Mobilises Resources for circular economic research projects and design innovations

As intimated above, at this stage, not all aims presented for the vision of a circular economy for PP in this chapter are currently pursuable due to the lack of data related to the environmental ramification of incorporating alternatives to plastic. Both government and industry have a role to play in supporting research in these areas, and as such regulation should encourage the mobilisation of resources for the identification of relevant circular economy projects. These projects could include, undertaking research to advance our understanding of material alternatives and renewable energy options for PP production,²²⁵ identifying PP alternatives, understanding the effects of scaling up material alternatives to

²²³ When making changes to PP, manufacturers should be encouraged to give first preference to designing re-use of PP products in their current state. Next, improve on the recyclability of PP products, through the re-design or phasing out small format, multilayered and uncommon plastic, problematic dyes and toxic additives. Finally, while encouraging manufacturers to review their product lines for the purpose of identifying high organic contaminate products would allow research incentives for the scale up of compostable packaging for high-risk contaminated products. Aesthetic decisions made in relation to PP packaging also have the ability to influence the actions of later stakeholders in the PP lifecycle such as educating on proper disposal and processing. As such, regulation should encourage the addition of clear, unambiguous labelling on PP products for the correct disposal of PP products after use. This is derived from research and discussion undertaken above. See Barra et al (n 14); World Economic Forum Project MainStream, Ellen MacArthur Foundation, and McKinsey & Company (n 115); Ellen MacArthur Foundation, ‘The New Plastics Economy Catalysing Action’ (n 77).

²²⁴ Parker and Kirsi Kuuttiniemi (n 91) 7.

²²⁵ Although improving recycling and increasing compostable material within PP products is crucial to establishing a circular economy for PP, as expressed by the Ellen MacArthur Foundation, it is not enough to overcome the overall issues currently associated with plastics. As such, the New Plastics Economy’s longer-term aims is for the gradual decoupling of plastics from the consumption of finite fossil fuel resources. This will involve the substitute of fossil fuels for alternatives, with the production of these products undertaken by renewable energy. See World Economic Forum Project MainStream, Ellen MacArthur Foundation, and McKinsey & Company (n 115) 92–96; Ellen MacArthur Foundation, *New Circular Economy: A Vision of a Circular Economy for Plastics* (n 207).

plastic on the environment, the effect of material additives, chemicals and dyes as it relates to recycling, as well as many other design-based issues are vital to ensuring evidenced based decisions can be made in this area. The overall aim of this principle is ultimately, to support the growth of alternative niches within the economy that can cause systematic change and the de-stabilisation of the current linear status-quo.

2.4.1 Adapting these Principles to Review Regulation

Although the circular regulatory design principles have been formed primarily as a means to inform regulatory approaches to PP, these principles can be simply adapted to form criteria which can be used to review current regulatory instruments and guide reform recommendation in the remainder of this thesis. This can be done by simply restructuring these principles to be read in the form of questions. Subsequently, in determining the circularity of a relevant regulatory instrument in Chapter 3, these principles will be converted into questions and applied to the instruments to determine whether they uphold any of the Circular Regulatory Design Principles. For example, does the instrument generate meaningful participation of stakeholders; Priorities reductions in material consumption; Establish clear rules, aims and standards around product re-design reflective of waste infrastructure capabilities and circular economy design trends; contain effective compliance and review mechanisms to compel the regulated target group to comply with these rules; and/or allocate resources to undertake circular economy research for design innovation?

2.5 CHAPTER CONCLUSION

This chapter undertook to address research question 1, by identifying what elements underpin circular product design for PP and determining how these elements could be used to underpin regulatory responses in pursuit of circular product design for PP in Australia. It also aimed to outline how these principles would be used to guide and review current regulatory instruments in this area.

Initially, to establish these principles, Chapter 2 utilised the Ellen McArthur Foundations envisioned goal for PP under a circular economy as outlined in the New Plastics Economy, as well as the general literature principles related to the circular economy as highlighted in Chapter 1. Drawing on this information and comparing it with the current linear system operating in Australia, five Circular Regulatory Design Principles were established. By undertaking slight adaptations as outlined in 2.4.2, these principles can be used to not only to guide regulators when

generating regulatory responses for improved circular product design for PP products, but also to review current regulatory instruments in Australia in its pursuit of a circular economy for PP. These Circular Regulatory Design Principles will be utilised in the remaining chapters to identify and analyse existing regulatory instrument within Australia, and will be used as the basis for recommendations to improve the circularity of these instruments.

CHAPTER 3: CIRCULAR ECONOMIC COMPATIBLE REGULATION IN AUSTRALIA

3.1 OVERVIEW

Having captured the fundamental principles that underpin circular product design within the Circular Regulatory Design Principles in Chapter 2, it is now possible to demonstrate application of these principles for the review and improvement of existing environmental laws and regulations that attempt to regulate for improved design of PP. This chapter focuses on identifying and examining existing regulatory instruments that have the scope to influence the product design of PP in Australia, and reviewing these instruments using the Circular Regulatory Design Principles. In doing so, this chapter aims to demonstrate application of the Circular Regulatory Design Principles, specifically, how they can be used to improve existing regulatory instruments in force in Australia. To do this, these Principles will be applied to the identified regulatory instruments to determine the possible existence of circular compatible targets currently contained within them, and with this knowledge, identify where improvements may need to be made to better embed these principles into existing schemes. The outcome of this investigation will subsequently answer research question 2.²²⁶ Moreover, the information uncovered as a result of this examination will establish the state of the current regulatory landscape that exists in Australia with regards to manufacturers of PP, and operate as a starting point for circular economy recommendations to be made in Chapter 4.

3.1.1 Method for Identifying Relevant Regulation for Review in this Chapter

While the researcher acknowledges that a wider regulatory framework may exist that may influence PP product design,²²⁷ for the purpose of this review, and in keeping with the aims of this research, a focus on key regulatory instruments that have the ability to influence the design of PP products will be examined.

To identify these start-of-life instruments, the researcher has drawn on the design elements requirement for improving PP products circularity as highlighted in Chapter 2. Relevant regulatory documents for review in this chapter have therefore been identified in instances where the instrument has been found to establish a scope that captures manufacturers of PP products, and attempts to regulate them to:

1. Reduce the consumption of plastic throughout manufacture activities,

²²⁶ For ease of reference, question 2 asks 'How well does the current regulation of manufactures of PP align with circular economy design principles?'

²²⁷ In areas such as employment, environment, health and safety, food safety, planning and building controls, fire safety, procurement and data protection requirements.

2. Influence the physical design decisions of PP products for the purpose of:
 - a. encouraging improved recycling along further segments of PP lifecycle
 - b. promoting an increase in B2B and B2C re-use PP, or
 - c. encouraging the uptake of compostable material for PP products at high risk of organic contamination.
 - d. applying educational material onto the physical surface of PP products for the purpose of encouraging consumer behaviour in favour of the actions listed above in 2a, b or handling of c.

From application of these criteria, two regulatory schemes were ultimately identified and will become the focus for review in this chapter. These include:

1. Plastic Shopping Bag Bans – which indirectly regulates manufacturers to reduce the consumption of PP as listed in (1); and
2. Australian Packaging Covenant (APC) – whose subject matter directly regulates manufacturers to encourage more environmental PP design as listed above in (2).

Although, both of the abovementioned schemes will be considered to determine how they contribute to a framework for regulating circular product design for PP, because the APC arrangement applies to the entire packaging industry and is, as will be highlighted below, a regulatory framework best positioned to promote the shift toward circular product design for PP products, the review of this arrangement will be afforded the greatest weight in this chapter.

3.1.2 Method for Determining the Circularity of these Schemes

The OECD highlights two specific components of regulatory design that has the ability to increase the likelihood of success for regulatory interventions.²²⁸ The first is the need to include clearly established rules, aims or standards of behaviour that the regulatory party must uphold, and the second is the presence of sufficient incentives, positive attitudes, or pressure from sufficient enforcement mechanisms to compel the regulated target party to comply with the rules.²²⁹ It is held by the researcher, that both of these components should feature in any regulatory intervention

²²⁸ Organisation for Economic Co-operation and Development and Parker (n 76).

²²⁹ Ibid 7.

enacted in pursuit of circular PP products. This stance is subsequently reflected with the incorporation of Principle 3 and 4 of the Circular Regulatory Design Principles.²³⁰

In addition to outlining the ways in which each of the identified regulatory instruments operates, each regulatory scheme will be reviewed with particular focus on the standards established under the instrument, together with the enforcement mechanism employed to encourage compliance.²³¹ Subsequently, the underlying examination of each of the identified instruments will focus primarily on the schemes operation goals such as KPI's, targets and/or priorities, together with the schemes reporting requirements, performance standards and enforcement strategies to identify the presence of any of the Circular Regulatory Design Principles.

3.2 THE REGULATORY BAN OF PLASTIC SHOPPING BAGS

Plastic Shopping Bags are a form of single-use PP product commonly produced from high or low-density polyethylene. These products are most commonly utilised at point-of-sale transactions for grouping and carrying consumer products from retailer premises. Although only a segment of overall PP, since the 1980's, plastic shopping bags have become a highly visible litter item and are possibly the most highly publicised form of PP discussed within the media.²³² Subsequently, the consequences of plastic shopping bag waste, and its overall impacts on the wider environment particularly with respect to marine pollution, have become widely recognised within the Australian community.²³³

²³⁰ For clarity, Principle 3 of the Circular Regulatory Design Principles states that circular economy design regulation should aim to 'establish clear rules, aims and standards around product re-design reflective of waste infrastructure capabilities and circular economy design trends and contains effective compliance and review mechanisms to compel the regulated target group to comply with these rules'. This principle subsequently incorporates the suggested features of the OECD with regards to improving the success of regulatory schemes (including the presence of clearly established rules, aims or standards and the presence of sufficient incentives, positive attitudes, or pressure from sufficient enforcement mechanisms to compel the regulated target group to comply with the rules), as well as the aims of the circular economy regarding the generation of material loops.

²³¹ Put another way, in this instance the presence of circular principles in the operation of key aspects of the identified regulatory scheme, and the ability of these instruments to monitor and enforce these principles against the respective parties to the scheme, is intrinsic to the ability of the regulatory scheme to influence manufacturers to transition to circular PP product design at the production stages. Ibid.

²³² The one-piece polyethylene shopping bag was invented in 1965 and quickly gained popularity in the 1980's as the cheapest product available to retailers to supply consumers for the transportation of goods from their retail premises. See 'From Birth to Ban: A History of the Plastic Shopping Bag' <<https://www.unenvironment.org/news-and-stories/story/birth-ban-history-plastic-shopping-bag>>.

²³³ See, eg, Peter G Ryan, 'A Brief History of Marine Litter Research' in Melanie Bergmann, Lars Gutow and Michael Klages (eds), *Marine Anthropogenic Litter* (Springer International Publishing, 2015) 1 <https://doi.org/10.1007/978-3-319-16510-3_1>; Dave West and Boomerange Alliance, 'Submission to Senate Enquiry: The Treat of Marine Plastic Pollution in Australia' (2015) <https://d3n8a8pro7vnmx.cloudfront.net/boomerangalliance/pages/158/attachments/original/1445317763/Environment_Communications_marine_plastic_sub77.pdf?1445317763>; Joleah B Lamb et al, 'Plastic Waste Associated with Disease on Coral Reefs' (2018) 359(6374) *Science* 460; Deloitte Access Economics, *At What Price? The Economic, Social and Iconic Value of the Great Barrier Reef* (2016) <<https://www2.deloitte.com/au/en/pages/economics/articles/great-barrier-reef.html>> ('Need a Reason to Save the Great Barrier Reef?').

3.2.1 Plastic Shopping Bags Regulatory History

Due to the level of public awareness, calls for regulatory intervention to mitigate the environmental effects of plastic shopping bags began to increase in the 1980's, yet it was not until the early 2000's that notable regulatory intervention began to emerge in this space. Due to the high consumption rate and low product lifespan of plastic shopping bags,²³⁴ early regulatory aims to mitigate the environmental impacts of this product, focused on reducing consumption and increasing recycling practices of this product by consumers.²³⁵ To achieve these aims, economic regulatory strategies to curb consumer consumption of plastic shopping bags through the use of levies were initially proposed. However, this proposal was subsequently rejected. Instead, the Federal Environment Protection and Heritage Council (EPHC) 'challenged' the Australian Retailers Association to meet a range of targets relating to the reduction and recycling of retail carry bags, with a subsequent voluntary Code of Practice enacted by the Australian Retailers Association in 2003.²³⁶ Unfortunately, the voluntary Code did little to improve the consumption or recycling efforts seen for this product.²³⁷ This was largely due to the fact that the economic viability and incentive to recycle plastic shopping bags is low. Although technically recyclable, plastic shopping bags are made of low-quality plastic material. This means that the quality of recycled plastic achieved through the recycling process is very low.²³⁸ Furthermore, currently only a handful of councils in Australia possess the requisite facilities to process this product as a part of kerbside recycling. For the remainder of councils, plastic shopping bags pose significant issues for processing facilities and are widely responsible for damaging processing machines inside sorting facilities.²³⁹

²³⁴ In accordance with Nolan et al, prior to plastic shopping bag bans, Australian's were consuming approximately 6 billion plastic shopping bags per annum. Plastic shopping bags consume relatively high levels of non-renewable fossil fuels resources, with 8.7 plastic shopping bags said to contain enough embodied petroleum energy to drive a car 1 kilometre. See NolanITU, *Department of Environment and Heritage Plastic Retail Carry Bag Use - 2002-2004 Consumption Interim Report* (2005) 20.

²³⁵ Lewis (n 136) 47; Australian Retailers Association, *Phasing out Light-Weight Plastic Bags ARA Submission* (2006) <https://www.pc.gov.au/_data/assets/pdf_file/0004/24988/subdr271.pdf>. 'Plastic Shopping Bags: Options Paper' 37, 4.

²³⁶ NolanITU (n 230) 5.

²³⁷ In accordance with The Allen Consulting Group report to the Federal Environment Protection and Heritage Council, despite the voluntary code, the overwhelming majority of plastic bags used in Australia ended in landfill (97.1 per cent), including those that were re-used. Furthermore, although it was noted that a reduction in the demand for LWPBs would increase the demand for different types of bag, such as bin-liners, it was estimated that the rate of substitution would still be favourable under a ban. For example one bin-liner re-used was for every seven plastic bags consumed. Furthermore, the Australian Retailers Association Code only addressed the conduct of a small percentage of the total number of retailers as opposed to the subsequent bans. See The Allen Consulting Group Pty Ltd, *Report to the Environment Protection and Heritage Council - Phasing Out Light-Weight Plastic Bags Costs and Benefits of Alternative Approaches* (May 2006) 6, 7, 12 <<https://www.nepc.gov.au/system/files/resources/0c513e54-d968-ac04-758b-3b7613af0d07/files/ps-pbag-rpt-acg-phasing-out-light-weight-plastic-bags-cba-200605.pdf>>.

²³⁸ Plastic shopping bags fall into the soft plastics category for recycling. Currently flexible plastic cannot practically be made into more flexible plastic packaging material through recycling processes. Instead, it can only be reprocessed into other plastic items such as park benches, and there is currently insufficient demand from end users for these products. See, eg, 'Demand Will Drive Soft Plastics Recycling' (28 May 2020) <<http://sustainabilitymatters.net.au/content/waste/article/demand-will-drive-soft-plastics-recycling-1311372333>>.

²³⁹ This is due to entanglement issues of plastic shopping bags in machines. See SUEZ Australia & New Zealand, 'Plastic Bags' <<https://www.suez.com.au/en-au/sustainability-tips/recycling-tips/plastic-bags>>.

By 2008, a significant increase in the global trend of jurisdictions implementing plastic shopping bag bans and implementing levies on the use of plastic bags to reduce the litter of this product had increased.²⁴⁰ Public awareness of such bans subsequently led to an increase in public support for similar actions to be undertaken in Australia. As a result, a re-examination of the country's initial regulatory responses was undertaken.²⁴¹ At this time, calls for a national ban on plastic shopping bags was proposed, however following the outcome of regulatory cost-benefit analysis presented in a Regulatory Impact Statement on plastic bags, EPHC resolved not to endorse uniform regulatory action to ban or place a charge on plastic bags, and subsequently this issue was left up to the states and territories to regulate in accordance with their respective environmental regulatory powers.

3.2.2 The subsequent Plastic Shopping Bag Bans Regulatory Schemes

Since 2008, nearly all states and territories have enacted their own respective bans on the use of plastic shopping bags using direct, or 'command-and-control' style regulation. These schemes effectively operate to ban retailers from providing any person with low-density polyethylene plastic shopping bag.²⁴²

Although these instruments have been enacted respectively within each state and territory, which would in most instances lead to potential fragmentation to the aim and uniformity of the overall scheme, in this instance the majority of regulatory instruments appear to have been similarly drafted.²⁴³ As such, the bans collectively appear to share a central aim of reducing the number of plastic bags that become waste and enter the environment as litter, and ban similarly defined bags as a part of their scope.

Due to the number of regulatory instruments associated with this scheme, the particulars of each of the state and territory regulatory instruments in association with the plastic shopping bag bans have been summarised in *Table 3.1* below.

²⁴⁰ Over 127 countries have enacting legislation that bans particular single-use plastics. See UNEP, *Legal Limits on Single-Use Plastics and Microplastics* (United Nations Environment Program, 6 December 2018) 3 <<http://www.unenvironment.org/resources/report/legal-limits-single-use-plastics-and-microplastics>>.

²⁴¹ See, eg, Parliament of Australia, 'Source Reduction – Product Stewardship and Legislative and Regulatory Frameworks' (text) 7.48 <https://www.aph.gov.au/parliamentary_business/committees/senate/environment_and_communications/marine_plastics/Report/c07>. The Allen Consulting Group Pty Ltd, *Report to the Environment Protection and Heritage Council. Phasing Out Light-Weight Plastic Bags Costs and Benefits of Alternative Approaches* (text, May 2006) v <<https://www.nepc.gov.au/system/files/resources/0c513e54-d968-ac04-758b-3b7613af0d07/files/ps-pbag-rpt-acg-phasing-out-light-weight-plastic-bags-cba-200605.pdf>>.

²⁴² Retailers fall under the definition of manufacturers in accordance with the terminology section above in 1.3.3.

²⁴³ For example each instrument similarly bans the same type of plastic shopping bag (low-density polyethylene bags).

Table 3.1: Summary of the States and Territories legislative Plastic Bag Bans

Jurisdiction	Instrument	Requirement	Penalty
QLD	Part 3A <i>Waste Reduction and Recycling Amendment Act 2017 (Qld)</i> ²⁴⁴ Came into effect on 1 July 2018	Retailers, defined as a person who sells goods in trade or commerce, is not to provide banned shopping bags to a person to carry goods the retailer sells from the retailer’s premises, ²⁴⁵ provide misleading information about banned shopping bags and may charge for alternative shopping bags. ²⁴⁶ Plastic shopping bags are defined as carry bag with handles made, in whole or part, of plastic that has a thickness of less than the thickness prescribed by regulation, or 35 microns ²⁴⁷ including plastic that is degradable.	50 penalty points per offence. ²⁴⁸
NSW	The NSW Government are yet to enact legislation in this space; however, the NSW government has indicated an intention to take action on this issue in 2021. ²⁴⁹		
ACT	<i>Plastic Shopping Bags Ban Act 2010 (ACT)</i> ²⁵⁰ came into effect 1 November 2011	Retailers, defined as a person who sells goods in trade or commerce, is not to provide banned shopping bags to a person to carry goods the retailer sells from the retailer’s premises. ²⁵¹ Plastic shopping bag defined as carry bag with handles made, in whole or part, of plastic that has a thickness of less than the thickness prescribed by regulation, or 35 microns ²⁵² Does not include biodegradable material	Maximum penalty: 50 penalty units. ²⁵³
VIC	<i>Environment Protection Act 1970 (Vic)</i> . ²⁵⁴ Came into effect on 1 November 2019	Retailers, defined as a person who sells goods in trade or commerce, is not to provide banned shopping bags to a person to carry goods the retailer sells from the retailer’s premises, ²⁵⁵ or provide misleading information about banned shopping bags. Banned plastic bag, is defined as a plastic bag with handles that comprises, either wholly or partly, plastic, whether or not that plastic is biodegradable, degradable or compostable that has a thickness of 35 micrometres or less. ²⁵⁶	No penalty expressly provided so falls under s 67 whereby liable to penalty not more than 120 penalty units. ²⁵⁷

²⁴⁴ *Waste Reduction and Recycling Amendment Act 2017 (Qld)*.

²⁴⁵ *Ibid* s 99D.

²⁴⁶ *Waste Reduction and Recycling Amendment Act 2017 (Qld)* s 99E & F.

²⁴⁷ *Ibid* s 99B(1)(a).

²⁴⁸ *Waste Reduction and Recycling Amendment Act 2017 (Qld)* ss 99D & 99E.

²⁴⁹ National Retail Association, ‘Plastic Bag Bans – Australia – Info for Australian Retailers’ (2021) <<https://bagban.com.au/>>.

²⁵⁰ *Plastic Shopping Bags Ban Act 2010 (ACT)*.

²⁵¹ *Ibid* s 7.

²⁵² *Waste Reduction and Recycling Amendment Act 2017 (Qld)* s 99B(1)(a).

²⁵³ *Plastic Shopping Bags Ban Act 2010 (ACT)* s 7.

²⁵⁴ *Environment Protection Act 1970 (Vic)*.

²⁵⁵ *Ibid* ss 45ZM & 45ZN.

²⁵⁶ *Ibid* s 4.

²⁵⁷ *Environmental Protection Act 1970 (Vic)* s 67.

<p>TAS</p>	<p><i>Plastic Shopping Bags Ban Act 2013</i> (Tas) came into effect 1 November 2013</p>	<p>A retailer, defined as a person who sells goods in trade or commerce, must not provide to a person a plastic shopping bag for the purpose of enabling goods sold, or to be sold, by the retailer, to be carried from the retailer's premises.²⁵⁸</p> <p>A retailer must not give to a person information, about the composition of a plastic shopping bag that the retailer knows, or ought to reasonably be expected to know, is false or misleading.²⁵⁹</p> <p>Plastic shopping bag means a bag, with handles made, in whole or in part, of polyethylene with a thickness of less than 35 microns a bag of a type prescribed by regulations. Not including biodegradable bags barrier bags or other none, plastic bag defined plastic shopping bags.</p>	<p>Penalty - 20 penalty units for individuals, 50 penalty units for body corporates.²⁶⁰</p> <p>Penalty – 50 to 100 penalty units.²⁶¹</p>
<p>SA</p>	<p><i>Plastic Shopping Bags (Waste Avoidance) Act 2008</i> (SA) came into effect 4 May 2009</p>	<p>Retailers must not provide to a person a plastic shopping bag for the purpose of enabling goods sold, or to be sold, by the retailer, to be carried from the retailer's premises.²⁶² Person must not represent that supplied plastic shopping bag is not a plastic shopping bag.²⁶³</p> <p>Plastic shopping bag in whole or in part made up of polyethylene with a thickness of less than 35 microns a bag of a type prescribed by regulations with handles. Not including biodegradable bags, barrier bags or other non-plastic bag defined plastic shopping bags.</p>	<p>Maximum penalty: \$5000</p> <p>Maximum penalty: \$20 000</p>
<p>WA</p>	<p><i>Environmental Protection (Plastic Bags) Regulations 2018</i> (WA associated with the <i>Environmental Protection Act 1986</i> (WA) came into effect 1 July 2018</p>	<p>Retailers, defined as a person who sells goods in trade or commerce. Offence to give false or misleading information about a prescribed plastic bag</p> <p>Prescribed plastic bag means a bag that is made in whole or in part of plastic; and has handles; has a thickness of 35 microns or less, not including a barrier bag; or a plastic bag that is, or is an integral part of, the packaging in which goods are sealed for sale; or a plastic bag provided by a medical care provider to a person receiving services from that medical care provider.²⁶⁴</p>	<p>Penalty: a fine of \$5000.²⁶⁵</p>

²⁵⁸ *Plastic Shopping Bags Ban Act 2013* (Tas) s 4(1).

²⁵⁹ *Ibid* s 4(2).

²⁶⁰ *Ibid* s 4(1).

²⁶¹ *Ibid* s 4(2).

²⁶² *Plastic Shopping Bags (Waste Avoidance) Act 2008* (SA) s 5.

²⁶³ *Ibid* s 6.

²⁶⁴ *Environmental Protection (Plastic Bags) Regulations 2018* (WA) s 3.

²⁶⁵ *Ibid* s 5.

NT	Part 3 <i>Environment Protection (Beverage Containers and Plastic Bags) Act 2011</i> (NT). Ban came into effect on 1 September 2011	<p>A retailer must not, on or after the prohibition day, make a prohibited plastic bag available to a customer for carrying goods purchased, or to be purchased, from the retailer.²⁶⁶</p> <p>Manufacturers and distributors must not represent prohibited plastic bags are not prohibited plastic bags.²⁶⁷</p> <p>Prohibited plastic bag defined as a carry bag the body of which comprises (in whole or part) polyethylene with a thickness of less than 35 microns; and has handles. Excluding biodegradable bags and a plastic bag that is, or forms an integral part of, the packaging in which goods are sealed prior to sale.²⁶⁸</p>	<p>Maximum penalty: 50 penalty units. This section applies whether or not the customer is charged a fee for the prohibited plastic bag.²⁶⁹</p> <p>Maximum penalty: 200 penalty units.²⁷⁰</p>
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3.2.3 Assessing the Circularity of Plastic Shopping Bag Bans

Prior to commencing an assessment of the circularity of the plastic shopping bag bans, it is worth noting that the plastic shopping bag bans are examples of command-and-control or direct regulation. Direct regulation consists of public authorities mandating explicit behaviour in pursuit of the achievement of a specific socially desirable behaviour or outcome, with the use of enforcement mechanisms such as courts, fines, inspection undertaken to persuade individuals to obey that law.²⁷¹ Subsequently, the key aspects of the identified regulatory scheme are clearly outlined by the regulatory instruments, with the incentive to uphold these requirements backed by enforceable penalties. This *prime facie* suggests that these bans should comply with principle 3 and 4 of the Circular Regulatory Design Principles.

3.2.4.1 The Presence of Clear Circular Aims

As evident from the table above, the collective target of the regulatory bans on plastic shopping bags, is to prohibit retailers from providing any person with low-density polyethylene plastic shopping bags on the retailer's premises. Several of these instruments also include a requirement that retailer's not supply information to any person relating to the composition of a plastic shopping bag product, where the retailer knows, or ought to reasonably be expected to know, it to be false or misleading. This is obviously to avoid misleading consumers with regards

²⁶⁶ *Environment Protection (Beverage Containers and Plastic Bags) Act 2011* (NT) ss 51 & 52.

²⁶⁷ *Environment Protection (Beverage Containers and Plastic Bags) Act 2011* (NT) s 58.

²⁶⁸ *Environment Protection (Beverage Containers and Plastic Bags) Act 2011* (NT) s 57.

²⁶⁹ *Ibid.*

²⁷⁰ *Environment Protection (Beverage Containers and Plastic Bags) Act 2011* (NT) s 58.

²⁷¹ Neil Gunningham and P.N Grabosky (n 211) 38–50; Eléonore Maitre-Ekern (n 4) 317.

to the material characteristics of any plastic shopping bags that might be distributed on their premises.

Command-and-control or direct regulation theoretically possess both strengths and weaknesses, however use of command-and-control instrument in this instance has allowed for the imposition of direct obligations and clear targets to ban the issue of all plastic shopping bags defined as carry bag with handles made, in whole or part, of plastic that has a thickness of less than the thickness prescribed by regulation (35 microns) by retailers.²⁷² It is noted that despite each state/territory possessing fairly consistent definitions of low-density carry bags, some jurisdictions include compostable and/or biodegradable plastic shopping bags within the bans in their jurisdictions. This establishes a degree of inconsistency between each instrument and an operational variation between some of the states and territories.

With regards to the circularity of these aims, it is difficult to determine with certainty whether legislative bans focused on prohibiting retailers from distributing plastic shopping bag products sends a direct message to plastic bag manufacturers on the need to redesign/eliminate low-density polyethylene plastic shopping bag on the market. However, it is assumed that such bans would indirectly send a message to manufacturers that low-density shopping bags are not favourable within the Australian retail market overall, and therefore production of such a product in the retail market sector is no longer as profitable or favourable. Such a message would also likely be directly translated to low-density plastic bag producers from retailers who would likely be pursuing smaller orders of this kind of product.

Regardless, banning plastic shopping bag in this manner effectually reduces the overall consumption of low-density shopping bags within the retail market.²⁷³ Whether this results in an overall material reduction is debatable, as different kinds of unregulated plastic or materials could easily be substituted and used by consumers that are more or equally resource-intensive to produce and dispose of.²⁷⁴ However, as far as low-density shopping bags, there have been noted reductions in the consumption of these products and as such a reduction in the use of virgin fossil

²⁷² The researcher notes that some state vary in the definition, however commonly, plastic shopping bags are defined as a carry bag with handles made with plastic that has a thickness of 35 micrometres or less and used for the purpose of carrying goods purchased, or to be purchased, out of the retail premise. (see specific definition of each instruments in the table above)

²⁷³ As mentioned above although it has been noted that a reduction in the demand for low density plastic shopping bags would lead to an increase in the demand for different types of bag, such as bin-liners, it was estimated that the rate of substitution would still be favourable. For example one bin-liner re-used was for every seven plastic bags consumed. See The Allen Consulting Group Pty Ltd (n 228) 6; ABC news, 'Does a Plastic Bag Ban Cause a Spike in Bin Liner Sales?' (online, 28 August 2017) <<https://www.abc.net.au/news/specials/curious-canberra/2017-08-28/does-a-plastic-bag-ban-cause-a-spike-in-the-use-of-bin-bags/8819504>>; Andrew Macintosh et al, 'Plastic Bag Bans: Lessons from the Australian Capital Territory' (2020) 154 *Resources, Conservation and Recycling* 104638 ('Plastic Bag Bans').

²⁷⁴ Rebecca LC Taylor, 'Bag Leakage: The Effect of Disposable Carryout Bag Regulations on Unregulated Bags' (2019) 93 *Journal of Environmental Economics and Management* 254 ('Bag Leakage').

fuel otherwise necessary to produce these products.²⁷⁵ Furthermore, the bans effectively operate to reduce or eliminate this form of problematic PP product from wider circulation. In fact, with ‘reduction’ a priority in both waste management practices as well as within the New Plastics Economy, the bans on plastic shopping bag products can be viewed as one of the few examples of genuine waste reduction interventions that exist in law and policy. This is favourable because although recycling of PP products is a large component of the New Plastics Economy, in opting to ban low-density shopping bag products as opposed to continuing to pursue increased recycling in this instance operates in line with the ordered progression of managing materials as contained within the waste hierarchy, circular economy and the New Plastics Economy.²⁷⁶ Waste prevention at the production stage of PP products is also particularly favourable because it operates to preserve the direct and indirect natural resources that would otherwise have been used to produce a product in the first instance. This act subsequently mitigates harm caused to the environment as a result of virgin material extraction, as well as reduces the potential for this product to become a waste material or pollution after use.²⁷⁷

These bans are also favourable on a practical level in light of the issues that currently exist with regards to the ability of plastic bags to actually be recycled in Australia as mentioned in 3.2.1. For example, the low incentive to recycle this product,²⁷⁸ together with the limited council facilities available in Australia to process this product as part of kerbside recycling.²⁷⁹ For these reasons it is concluded that the ban on plastic shopping bags is compatible with the aims of both Circular Regulatory Design Principles 2 and 3.

3.2.4.2 The Presence of Sufficient Monitoring and Enforcement Mechanisms

As outlined in 3.1.2 and captured by Circular Regulatory Design Principle 4, in order to encourage compliance with the bans on plastic bags the regulatory instruments prohibiting these products must contain ways to identify and enforce breaches of the regulatory aim. One of the weaknesses often associated with any regulatory strategy and particularly direct regulation, is the

²⁷⁵ See The Allen Consulting Group Pty Ltd (n 228) 6; This point is also supported by the example in the ACT which saw an increase in other plastic bags increase by 31 per cent, less than half of the predicted increase of 70%. See ABC news, ‘Does a Plastic Bag Ban Cause a Spike in Bin Liner Sales?’ (online, 28 August 2017) <<https://www.abc.net.au/news/specials/curious-canberra/2017-08-28/does-a-plastic-bag-ban-cause-a-spike-in-the-use-of-bin-bags/8819504>>. But see Andrew Macintosh et al, ‘Plastic Bag Bans: Lessons from the Australian Capital Territory’ (2020) 154 *Resources, Conservation and Recycling* 104638 (‘Plastic Bag Bans’) who notes that although bans are not as effective at reducing bag consumption there are overall reductions in consumption overall.

²⁷⁶ As previously mentioned in 1.2.2, the waste hierarchy affords preference to prevention or reduction of waste prior to pursuit of re-use or recycling of existing material. There is also a primary focus on the prevention of the use of material in the circular economy and New Plastics Economy.

²⁷⁷ In other words, if the product never exists it cannot become waste.

²⁷⁸ See, eg, ‘Demand Will Drive Soft Plastics Recycling’ (n 234).

²⁷⁹ See, eg, *Ibid.* See also SUEZ Australia & New Zealand (n 235).

high costs associated with implementation and enforcement, as well as the requirement for regulators to have comprehensive and accurate knowledge of the workings and capacity of the industry being regulated. This means that at times this form of regulation can lead to ineffective and restrictive outcomes.²⁸⁰ These issues can be somewhat offset when coupled with strong community support, and where simpler instances of point-source pollution are being addressed.²⁸¹

In this instance, there are clearly identifiable and defined penalties associated with breach of the overall ban on plastic shopping bags as demonstrated above in the table in 3.2.2. However, the ability of the states/territories to monitor and enforce the legislative bans is more difficult to ascertain. Overall, the administration of the respective plastic bag bans are the responsibility of the respective state/ territory's Environmental Protection Agencies (EPA) who work in conjunction with the National Retail Association to monitor and educate retailers surrounding compliance.²⁸² Community-led feedback mechanisms also exist, with the public actively encouraged to submit complaints of instances of alleged non-compliant behaviour.²⁸³ Working together and encouraging involvement in this manner can be seen to demonstrate basic level holistic collaboration, however does not include all members of the lifecycle of this product as proposed under Circular Regulatory Design Principle 1.

Although the compliance and enforcement powers of the EPA allows authorised officers to audit retail premises issuing powers to enter and remove bags for sampling as a part of compliance monitoring,²⁸⁴ it is not clear how often these audits occur. The researcher was also unable to readily obtain information regarding the number of instances of non-compliance or penalties that have been issued for breaches of plastic shopping bag bans. What is evident however, is that the plastic shopping bag scheme relies heavily on public feedback for enforcement. This does little to indicate the success of enforcement overall, but given the widespread community knowledge associated with these bans and general public support for the overall reduction of plastic, as

²⁸⁰ According to regulatory theory Baldwin et al indicates that the strengths of command and control regulation include their ability to impose fixed standards with immediacy and to prohibit activity not conforming to such standards. Yet command and control regulations has been subjected to a lot of criticism from economists accused of being inflexible, arbitrary, of stifling innovation and creating enforcement difficulties. Weaknesses in these schemes include the possibility for regulatory Capture - whereby the pursuit of the public good is weakened as the relationships between the regulators and the regulated become too close and the pursuit of the regulated enterprises' interests replace those of the public at large. It has also been alleged that direct regulation can have the propensity to produce unnecessarily complex and inflexible rules, and indeed, a proliferation of rules that leads to over-regulation, legalism, delay intrusion on managerial freedoms, and the strangling of competition and enterprise. This has led to these schemes having only been able to address simpler "*low hanging fruit*" environmental issues Neil Gunningham and P.N Grabosky (n 189) 7 & 56; Baldwin, Cave and Lodge (n 85) 107; Eléonore Maitre-Ekern (n 4) 317.

²⁸¹ See Baldwin, Cave and Lodge (n 88) 110. Also see Cameron Holley, Neil Gunningham, and Clifford Shering (n 94) 4.

²⁸² See, eg, Queensland Government (n 253); Environment Protection Authority Victoria, 'Comply with the Plastic Bag Ban' (Text) <<https://www.epa.vic.gov.au/for-business/how-to/comply-with-plastic-bag-ban>>.

²⁸³ For example, the Queensland PSB website actively encourages members of the community and retailers who witness a breach in the standards to 'contact the National Retail Association to report retailers who they believe are not complying with the ban or a bag supplier who has provided false information about a banned plastic shopping bag'. See Queensland Government, *How the Ban Is Being Enforced | Plastic Bag Ban* (n 278).

²⁸⁴ See, eg, Environment Protection Authority Victoria (n 278).

highlighted above in 3.2.1, may suggest that this form of monitoring may be sufficient in this instance. Furthermore, because the plastic shopping bag bans are well publicised and relatively easy for individuals to identify, community feedback mechanisms for reporting breaches occurring at a retail level may create enough of a ‘threat’ to encourage retailer compliance. This combined with the fact that retailers no longer need to incur the costs previously associated with providing free plastic shopping bags to their customers may also act as an incentive to upholding these standards.

Overall, the researcher holds that the threat of community reporting and audits together with the threat of heavy penalties for breach of these bans may encourage compliance in this instance, but monitoring and enforcement mechanisms in these schemes could be improved.

3.2.4 Summary - The Circularity of Plastic Shopping Bag Bans

Although not initially enacted with the circular economy in mind,²⁸⁵ the plastic shopping ban schemes appear to demonstrate evidence of a significant number of the Circular Regulatory Design Principle, including Principle 2 and 3, part of principle 1 and 4. Ultimately, the operational effect of the plastic shopping bag bans can be viewed as an example of circular compatible legislation in pursuit of circular product design. By banning the use of low-density polyethylene plastic shopping bags, these regulatory instruments not only directly mitigate the detrimental environmental impacts arising from the use of these type of PP products within the wider community,²⁸⁶ but also effectively operate to reduce the overall consumption of the virgin fossil fuel input necessary for the production of these products. Furthermore, preventing these products from becoming waste in the first instance, means that these often difficult to process PP products are greatly reduced within the waste stream or otherwise leaked into the environment.

As such, although not exhibiting all Circular Regulatory Design Principles in their entirety in this instance (omitting principle 5), the plastic shopping bags bans, and any further bans on PP products, are entirely consistent with waste reduction and operate to reduce material consumption. As such, product bans can be viewed as one of the few examples of genuine waste reduction interventions in law and policy compatible with a circular economy. In light of these facts, it is proposed by the researcher, that clear bans of incompatible circular PP products are an important regulatory option in the overall framework to encourage circular product design. As such, it is felt

²⁸⁵ As highlighted above, this regulatory action was primarily enacted as a mean to mitigate the detrimental environmental impacts arising from the use of plastic shopping bags.

²⁸⁶ the use of ‘these types of PP products’ relates specifically to the reduction in low-density polyethylene plastic shopping bags weighing 35 microns.

that bans focused on phasing out and eliminating other unnecessary or incompatible PP products in pursuit of the circular economy should be increased.

Although the current bans on plastic shopping bags operate effectively to reduce consumption of low-density shopping bags,²⁸⁷ it is noted that the scope of these bans are fairly limited, and issues of material consumption in other unregulated products could offset some of the material reductions achieved through the limited bans. This issue should be addressed through increasing the scope of these bans. These issues will be discussed in more detail in Chapter 4.

3.3 THE AUSTRALIAN PACKAGING COVENANT

For more than two decades, the Australian Packaging Covenant (*'the Covenant'* or *'APC'*),²⁸⁸ previously the National Packaging Covenant, has been the principal national instrument in Australia with the aim of *'...reducing the environmental impacts of consumer packaging in Australia.'*²⁸⁹ In essence, the APC is a voluntary agreement between members of the packaging industry, and all levels of government based on the principles of *product stewardship* and *shared responsibility*.²⁹⁰

Importantly, the Covenant directly encompasses design and production of packaging up until point-of-sale as part of its scope,²⁹¹ and as such, the APC is a regulatory framework best positioned to promote a large-scale shift toward circular design for PP products in Australia. Although the Covenant encompasses all packaging, PP is a form of packaging making this scheme relevant for discussion.

The Covenant agreements operate in 5-yearly periods, and is currently in its fourth iteration. The current Covenant subject of this review, is scheduled to operate from 2017 – 2022.²⁹² At the outset of this regulatory review it is prudent to note that the APC arrangement is very complex with respect to both its design and operation, and as this review will show, contains a number of major flaws with regards to the complexity associated with the operation of this scheme. It also demonstrates a general lack of accountability of the actors associated with the instrument, as well as vague, and at times confusing requirements.

²⁸⁷ See National Retail Association, '1.5 Billion Single Use Plastic Bags Eliminated since July', *National Retail Association* (3 December 2018) <<https://www.nra.net.au/1-5-billion-single-use-plastic-bags-eliminated-since-july/>>.

²⁸⁸ Department of the Environment and Energy, *Australian Packaging Covenant 2017* (2017) <<http://www.environment.gov.au/>>.

²⁸⁹ *Ibid* 1.

²⁹⁰ See *Ibid*; *National Environment Protection (Used Packaging Materials) Measure 2011* (n 246) s 5(1).

²⁹¹ Design is a responsibility afforded to manufacturers as their responsibility under shared responsibility. *Australian Packaging Covenant* (n 248).

²⁹² This Covenant version came into effect in 2017 and replaces the previous 2010 APC. *Australian Packaging Covenant* (n 248).

3.3.1 Product Stewardship as the Foundation for the Covenant

As mentioned, the APC is based on the concepts of *product stewardship* and *shared responsibility*. The concept of product stewardship emerged as an environmental management strategy in the 1980's,²⁹³ based on the *polluter pays principle*, which is an environmental law principle stipulating that the party responsible for producing pollution should be responsible for paying for the damage done to the natural environment.²⁹⁴ Product stewardship encapsulates the idea that actors throughout a supply chain retain some responsibility for the environmental impacts of the materials produced and consumed. Accordingly, product stewardship suggests that all individuals throughout all stages of the products' life cycle, have differing but common responsibilities for minimising that product's impact.²⁹⁵ Importantly, product stewardship infers that the level of responsibility is greatest for manufactures, as they hold the greatest ability to affect the full lifecycle impacts of their product. Countries have tended to adopt and enact differing conceptualisations and related regulatory regimes based on this principle. For example, on one side of the spectrum is the European Union, favour *extended producer responsibility* as a principle for weighting responsibilities in accordance to product stewardship'.²⁹⁶ Extended producer responsibility recognises that producer's responsibility for their product extends to post-consumer management of that product, and as such, provides a rationale for governments to pursue producers for the cost of disposal of the products they produce. Countries in the EU, in particular, have adopted regulatory schemes based on extended producer responsibility, with one such example witnessed with the Ordinance on the Avoidance of Packaging Waste enacted in Germany in 1991.²⁹⁷

On the other side of the spectrum, Australia, like the United States, has developed strategies in favour of the concept of *shared responsibility*.²⁹⁸ Shared responsibility is a looser application of product stewardship, which recognises that all members along the products lifecycle accept a share of the responsibility for the environmental impacts associated with their sphere of activity in relation to any particular product.²⁹⁹ For manufacturers of PP products, this sphere

²⁹³ Lewis (n 145) 3.

²⁹⁴ Sally-Ann Joseph, 'The Polluter Pays Principles and Land Remediation: A Comparison of the United Kingdom and Australian Approaches' <file:///C:/Users/annas/Downloads/law-ajel_2014-joseph.pdf>.

²⁹⁵ In her review of the concept, Monroe defined Product Stewardship as the act of 'minimizing health, safety, environmental and social impacts, and maximizing economic benefits of a product and its packaging throughout all lifecycle stages.' Leila Monroe, 'Tailoring Product Stewardship and Extended Producer Responsibility to Prevent Marine Plastic Pollution' (2013) 27 *Tulane Environmental Law Journal* 219, 224.

²⁹⁶ This is due to these jurisdictions incorporation of work of Swedish Professor Thomas Lindhqvist. See Thomas Lindhqvist (n 66).

²⁹⁷ An example of this, can be seen in Germany with the Ordinance on the Avoidance of Packaging Waste in 1991. This scheme set mandatory recycling rates for packaging materials, and requires companies to recover and take back their packaging from consumers. See Edoardo Croci (ed), *The Handbook of Environmental Voluntary Agreements: Design, Implementation and Evaluation Issues* (Springer, 2005) 287 ('*The Handbook of Environmental Voluntary Agreements*').

²⁹⁸ Lewis (n 145) 49; Croci (n 293) 289.

²⁹⁹ A list of lifecycle members could include, raw material suppliers, designers, manufacturers, retailers, consumers, collection agencies, and all spheres of government.

subsequently includes design, production and other activities up until point-of-sale of that product.³⁰⁰ In his review of the concept, Nollkaemper highlighted that although shared responsibility can be an important governance tool to addressing an issue, sharing responsibility ‘...can lead to a diffusion of responsibility that makes it more difficult to determine who is responsible for what...’ this in itself can generate a number of responsibility gaps along the product lifecycle.³⁰¹

3.3.1.1 Relevant Background to Understanding the Covenant

Despite acceptance of shared responsibility within Australia in the 1980’s, Australia’s first national approach for mitigating the environmental impacts of packaging waste was not equally shared between each member of the products lifecycle. In fact, the first national approach for packaging waste focused on end-of-life kerbside recycling programs. Under these schemes, responsibility for the implementation and costs associated with same was split between ratepayers or *waste disposers* and local government/*waste collectors*. Omission of manufacturers from this initial approach subsequently caused a number of notable impacts. The first being that manufacturers were permitted to continue using virgin packaging products in line with market price fluctuations, which ultimately created volatility within recycled material economics and undermined the countries attempts to maintain recycling programs.³⁰² Such market freedom also meant that no incentives existed for manufactures to assess or change the types of packaging products they placed on the market, or consider how these products might be processed at their end-of-life stage.³⁰³ As a means to compel industry to contribute to the management of their products waste, extended producer responsibility schemes begun to be introduced and increased in Europe in the mid 1990’s.³⁰⁴ However, as a means to avoid the enactment of these schemes or other stricter methods of intervention such as legislative targets, Australia’s packaging industry approached the Federal government to negotiate an option for accepting a level of responsibility

³⁰⁰ Lewis (n 136) 49. Croci (n 293) 289.

³⁰¹ Andre Nollkaemper, ‘The Duality of Shared Responsibility’ (2018) 24(5) *Contemporary Politics* 524, 525.

³⁰² Evidence of this last point can be witnessed over time as states and local government were having to allocate more of their traditional budgets to maintain these programs. As outlined by Thomas, waste management, as an environmental issue, makes up a significant portion of the budget for the ‘2002–2003 environmental expenditure by local governments of \$A4.1 billion accounted for more than half of total environmental spending across Australia’s three spheres of government. This high relative importance given to spending on environmental matters by local governments is also shown by the budget priority given to environmental expenditure; which accounted for more than a quarter of the total annual expenditure of local governments, but only 6% of state government expenditure, and 1% of Australian Government expenditure’. See Thomas (n 58); Nicole Sommer (n 124) 244.

³⁰³ This issue also goes to the allocation of environmental responsibility of the three spheres of government.

³⁰⁴ See Nicole Sommer (n 163) 242–245.

for their products.³⁰⁵ After three years of subsequent negotiations, the first National Packaging Covenant agreement was enacted in 1999.³⁰⁶

The 1999-2005 Covenant, marked the first national regulatory framework in Australia to extend a degree of responsibility for the environmental impact of packaging to members to the packaging industry. The first version of the Covenant, like all subsequent versions, operated for a period of five years (from 1999 -2004).³⁰⁷ Despite the Covenant enacted to signify the allocation of responsibility of packaging waste to industry, the 1999 Covenant continued its attention on maintaining the status quo, with the act of mitigating packaging waste focused on end-of-life recycling strategies.³⁰⁸ Furthermore, responsibility for the cost and management of waste collection and processing activities remained the sole responsibility of consumers and state/local government.³⁰⁹ At its first review in July 2004, a number of amendments to the Covenant were suggested after it was concluded that the scheme failed to engage ‘a significant number of stakeholders, especially local governments.’ Furthermore, it was found that the Covenant failed to ‘provide effective data and feedback in order to reflect its achievements....’ due to ‘....so much inherent flexibility for companies that progress could not be measured effectively....’ It was also felt that while the National Environmental Protection (Used Packaging Material) Measure (NEPM),³¹⁰ was an effective regulatory safety net for signatories, ‘the NEPM enforcement would need to be more visible and rigorous.’³¹¹

In July 2005-2010 the second iteration of the Covenant came into effect.³¹² Focused on ‘building recycling infrastructure and incorporating the outcomes of an extensive review undertaken in 2004’, the second Covenant set ambitious target for 35% of all waste material within the country to be recycled by the conclusion of the 5 year cycle.³¹³ The review of the

³⁰⁵ In November 1996 the Australian and New Zealand Environment and Conservation Council, now the EPHC directed its Standing Committee to commence negotiations for a national packaging agreement to manage the environmental impacts of packaging. See Ibid.

³⁰⁶ Negotiations were undertaken between ANZECC officials, Australian Local Government Association and industry representing members from the food and beverage, supermarket, packaging, and plastics industries. See Croci (n 293) 288.

³⁰⁷ With an agreement that all parties would review the progress of this agreement at the conclusion of this time.

³⁰⁸ As opposed to alternative methods of collection such as extended producer responsibility or reducing the use of overall resources by industry in the manufacture of packaging products overall. ‘Two Decades of the Australian Packaging Covenant Explored’, *Inside Waste* (9 October 2019) <<https://www.insidewaste.com.au/index.php/2019/10/09/two-decades-of-the-australian-packaging-covenant-explored/>>; Nicole Sommer (n 163). The 1999 Covenant aimed to reduce the environmental impact of packaging by focusing on improving recycling economics and reducing litter and overall waste sent to landfill through increased utilisation of recycling.

³⁰⁹ In doing so, the 1999 Covenant did not seem to mark a significant shift from the existing regulatory response already being undertaken within the country. One of the ongoing issues with the continued allocation of responsibility to consumers and government, is that local government and consumers are physically and financially reliant on industry to comply with the design/production stages in order to fulfil their portion of their shared role at time of disposal.

³¹⁰ *National Environment Protection (Used Packaging Materials) Measure 2011* (Cth).

³¹¹ Martin Stewardship & Management Strategies Pty Ltd, *Waste Generation & Resource Efficiency of Packaging Submission to the Productivity Commission’s Waste Generation & Resource Efficiency Inquiry* (February 2006) 6 <https://www.pc.gov.au/__data/assets/pdf_file/0020/22673/sub092part1.pdf>.

³¹² Nicole Sommer (n 163) 225.

³¹³ Nicole Sommer (n 163). With recycling rates today sitting at just over 9%, none of the recycling targets of under the Covenant have been achieved in the last 2 decades of the agreement. See O’Farrell and Australian Government Department of the Environment and Energy (n 15) 1.

second Covenant iteration at the end of the 5 year running period, not only found that the recycling targets had not been achieved,³¹⁴ but also generally concluded that the KPIs included in the Covenant set quantitative measures that were challenging for members to collect, and could not be aggregated to measure overall performance of the agreement.³¹⁵

The third Covenant of 2010-2015, focused on addressing ‘packaging design, recycling and product stewardship’, and aimed to address the environmental effects of packaging through improved ‘workplace and public place recycling and litter reduction programs.’³¹⁶ However, again, review of this iteration concluded that the targets in this scheme were ‘very broad’, and at least one of them (KPI 3 related to product stewardship) was too ‘ambiguous’ to contain any measurable outcome.³¹⁷

Overall, although the Covenant was enacted in order to industry to accept greater responsibility for their packaging products, this does not appear to have translated into the aims of the previous agreements with all previous Covenants maintaining their focus on recycling without any real attention afforded to design.

3.3.1.2 The Covenant Operating Alongside Formal Product Stewardship Legislation

The Covenant arrangement, exists and operates alongside Australia’s formal legislative instrument *Recycling and Waste Reduction Act 2020* (Cth).³¹⁸ The *Recycling and Waste Reduction Act* previously known as the *Product Stewardship Act 2011* (Cth),³¹⁹ allows the Federal government to instigate voluntary, co-regulatory and mandatory stewardship responsibilities onto industry in certain instances and related to certain products. Largely focused on the end-of-life collection solutions, schemes established under the legislation would appear to operate more in line with the concept of extended producer responsibility rather than tackling the full lifecycle of products.³²⁰

³¹⁴ In fact none of the recycling targets set under the Covenant in the past two decades have ever been met. Recycling for plastic remains at only 9%. See O’Farrell and Australian Government Department of the Environment and Energy (n 15) 1.

³¹⁵ Scott Kelly and University of Technology Sydney: Institute for Sustainable Futures, *Packaging Sustainability Framework for APCO Members* (2017) 106, 1 <<https://www.packagingcovenant.org.au/documents/item/1043>>.

³¹⁶ *Australian Packaging Covenant* (n 248) 6.

³¹⁷ Kelly and University of Technology Sydney: Institute for Sustainable Futures (n 311) 1.

³¹⁸ *Recycling and Waste Reduction Act 2020* (Cth).

³¹⁹ *Product Stewardship Act 2011* (Cth).

³²⁰ Schemes established under the Product Stewardship Act set material recovery levels for those areas it directly regulates, operating more similarly to an extended producer liability schemes. There are currently there are no mandatory schemes under the Product Stewardship Act. Australia does have one mandatory product stewardship scheme which relates to oil, but this is covered by its own legislation. There is one co-regulatory scheme under the Act (TVs and computers) and two accredited voluntary arrangements (MobileMuster and FluoroCycle). ‘Several other voluntary schemes exist but have not been accredited, including schemes for tyres, agricultural chemical containers, paint, PVC and newspapers’. See Mike Richie, ‘Is Australia’s Product Stewardship Act Effective?’, *Corporate Waste Solutions* (March 2017) <<https://www.fmmedia.com.au/sectors/australias-product-stewardship-effective/>>. Also see Senate of the Commonwealth of Australia, Environment and Communications, and References Committee (n 52) 118.

To be liable for regulation under a product stewardship scheme within the *Recycling and Waste Reduction Act*, the Minister for the Environment must first deem formal regulation necessary for that product. To do this, the product must first be added to the ‘federal product list’ by the Minister, then reviewed by the Minister.³²¹ In 2011, under the *Product Stewardship Act*, packaging, including subsets of packaging such as consumer packaging and beverage packaging, was added to the product list for consideration.³²² It was also carried onto the list for consideration in 2013/2014. However, packaging was removed from subsequent product lists 2015 without reason given.³²³ This possibly suggests that the Covenant agreement is the preferred regulatory strategy for packaging waste in Australia. It also tends to indicate Australia’s ongoing reluctance to formally regulate the packaging industry overall.

3.3.2 Operational Aspects of the Covenant Arrangement

The Covenant is a novel co-regulatory arrangement that combines a voluntary agreement (the Covenant),³²⁴ with command-and-control (NEPM) measures in pursuit of the central environmental aim.³²⁵ Under this co-regulatory arrangement, industry, with oversight from government, are responsible for the formulation of rules and codes of conduct in pursuit of the Covenant environmental aims. Industry is also responsible for the administration of these arrangements, with this task undertaken by the Australian Packaging Covenant Organisation Ltd (APCO) acting as industry representative. The APCO is responsible for administering the operational aspects associated with the pursuit of the APC aim, including the formation of strategies, research activities and involvement in government interaction as well as the costs associated with these activities.³²⁶ All of these duties are overseen by a Board made up of an independent Chair, Brand Owner and industry association representatives.³²⁷

³²¹ See Australian Government Department of Agriculture, Water and the Environment, ‘Product Stewardship Schemes and Priorities’, *Department of Agriculture, Water and the Environment* <<http://www.environment.gov.au/>>; Australian Government Department of Agriculture, Water and the Environment, ‘2020-21 Priority Products’, *Department of Agriculture, Water and the Environment* <<http://www.environment.gov.au/>>; *Product Stewardship Act* (Cth) s 108A.

³²² Federal Government Department of the Environment and Energy, ‘Product Notice - Packaging - 19/12/2011’, *Department of Agriculture, Water and the Environment* <<http://www.environment.gov.au/>>.

³²³ There was no explanation or action taken, ‘packaging’ was simply not included on the 2015/16 product list. See Federal Government Department of the Environment and Energy, ‘Product List and Notices 2013-14 Product List’, *Department of Agriculture, Water and the Environment* (30 June 2013) <<http://www.environment.gov.au/>>. ‘Is Australia’s Product Stewardship Act Effective?’, *FM Media* <<https://www.fmmedia.com.au/sectors/australias-product-stewardship-effective/>>.

³²⁴ Australian Government Australian Law Reform Commission, ‘Regulatory Forms’, *ALRC* 13.13 <<https://www.alrc.gov.au/publication/classification-content-regulation-and-convergent-media-alrc-report-118/13-codes-and-co-regulation/regulatory-forms-2/>>.

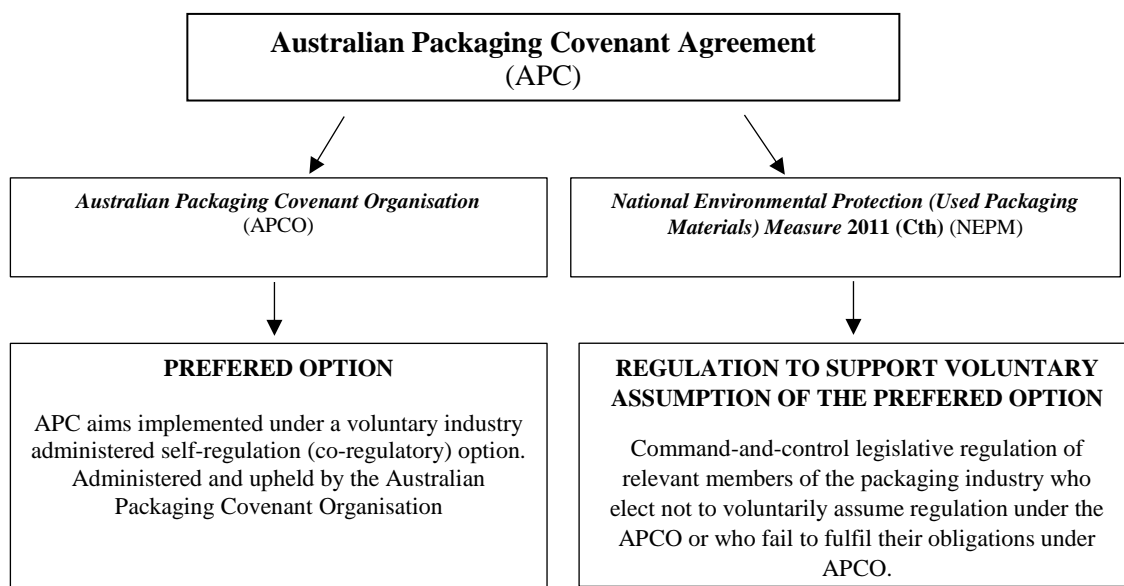
³²⁵ For clarity, this aim is mentioned above ‘...reducing the environmental impacts of consumer packaging in Australia.’ See Department of the Environment and Energy, *Australian Packaging Covenant 2017* (2017) <<http://www.environment.gov.au/>>.

³²⁶ The APCO is a public company limited by guarantee registered under the Australian Securities Investment Commission Australian Packaging Covenant Organisation Ltd and Australian Government, *Australian Packaging Covenant* (1 January 2017) 9 <<https://www.environment.gov.au/protection/waste/publications/australian-packaging-covenant-2017/>> (*‘Australian Packaging Covenant’*).

³²⁷ These costs are gathered through membership fees of industry. The APCO includes Stakeholder Advisory Committee and the Technical Reference Group. Two non-governance advisory groups advise the APCO. The Stakeholder Advisory Committee relates to the shareholders of the

In order to support and encourage industry involvement with the voluntary Covenant arrangement, the government provides legislative backing in the form of the NEPM.³²⁸ These measures outline national consistent aims for state and territory legislation to be enacted in support of the voluntary Covenant agreement. These legislative instruments are administered by the relevant environmental agencies within the relevant state/territory in which the brand owner operates.³²⁹ In combining two main strategies in this way, the APC effectually establishes two interconnected regulatory arrangements, as outlined in *Figure 3.1* below.

Figure 3.1: The structure of the regulatory arrangement under the APC



3.3.2.1 Scope of Agreement

Although the APC is an agreement between the packaging industry and government, not every member of the packaging industry is automatically captured by the regulatory scheme. The Covenant stipulates that only *brand owners* within the packaging industry are subject to the Covenant objectives.³³⁰ Under the Covenant, *brand owners* are defined to include all industry

company. The Technical Reference Group consists of “subject matter experts that provide advice to APCO management on technical packaging sustainability issues and assessment of research and project proposals” there is no clear information about who this group consists of. So it is unclear whether this is made up completely of industry members or a holistic mix of individuals across the lifecycle. Ibid.

³²⁸ *National Environmental Protection (Used Packaging Materials) Measure 2011 (Cth)*.

³²⁹ A third option appears to exist under s 11(b) of the NEPM which suggests that relevant members of the packaging industry will be exempt from regulation under the Covenant where ‘other industries or industry sectors for which the participating jurisdiction is satisfied that arrangements exist for the industry or industry sector that produce equivalent outcomes to those achieved through the Covenant.’ See *National Environment Protection (Used Packaging Materials) Measure 2011 (Cth)* s 11(b).

³³⁰ In accordance with obligations under the APC, the Commonwealth annually identifies potential Brand Owners that may be eligible under the Covenant and provides this information to APCO. APCO is then responsible for writing to relevant businesses to explain the national co-regulatory arrangements (Covenant and NEPM) for the sustainable management of packaging materials, and - invite the business to become a Signatory within 40 days. *Australian Packaging Covenant* (n 248) 26.

members within the supply chain that ‘are consumers of packaging or packaged products’ that make an annual turnover of \$AUD5 million or more.³³¹ The *packaging industry* is defined to including ‘all manufacturing, industrial, commercial, wholesale, or retail activity or process that can result in the generation, recycling, treatment, transport, storage, or disposal of consumer packaging waste,’³³² with the scope of *consumer packaging* defined to include

‘...any material, or combination of materials, for the containment, protection, marketing, and handling of retail consumer products. This also includes distribution packaging that contains multiples of products intended for direct consumer purchase,³³³ and also includes material used for

1. packaging retail products consumed in industrial, commercial, and domestic premises and public places; and
2. used for packaging food and beverages intended for consumption in public places or in commercial provision of food services to individuals in hotels and restaurants; and
3. distribution packaging that contains multiples of products intended for consumer use.’³³⁴

Subsequently, the scope of actors covered by the regime is extensive, and includes retail stakeholder, through to packaging importers and packaging manufacturers of products and distribution protective packaging from both domestic and international sources. *Figure 3.2* below provides a visual representation of the scope of the APC.

³³¹ The Commonwealth is responsible for providing APCO, on an annual basis, a list of possible Brand Owners that may be eligible under the Covenant, from available Commonwealth sources. In June 2006, the National Environment Protection Council endorsed an application threshold for Brand Owners (see Section 10) in Australia with an annual turnover of \$5 million or greater, to be subject to obligations under the NEPM. The threshold was set on the basis that it was not the intent of the NEPM to unduly penalise those who do not contribute to the packaging waste stream. Ibid 2.

³³² *National Environment Protection (Used Packaging Materials) Measure 2011* (Cth) s 3; *Australian Packaging Covenant* (n 248) 19.

³³³ *National Environment Protection (Used Packaging Materials) Measure 2011* (Cth) s 3.

³³⁴ Agriculture, *National Environment Protection (Used Packaging Materials) Measure 2011* (Cth) s7.

Figure 3.2: Visual representation of the scope of the APC

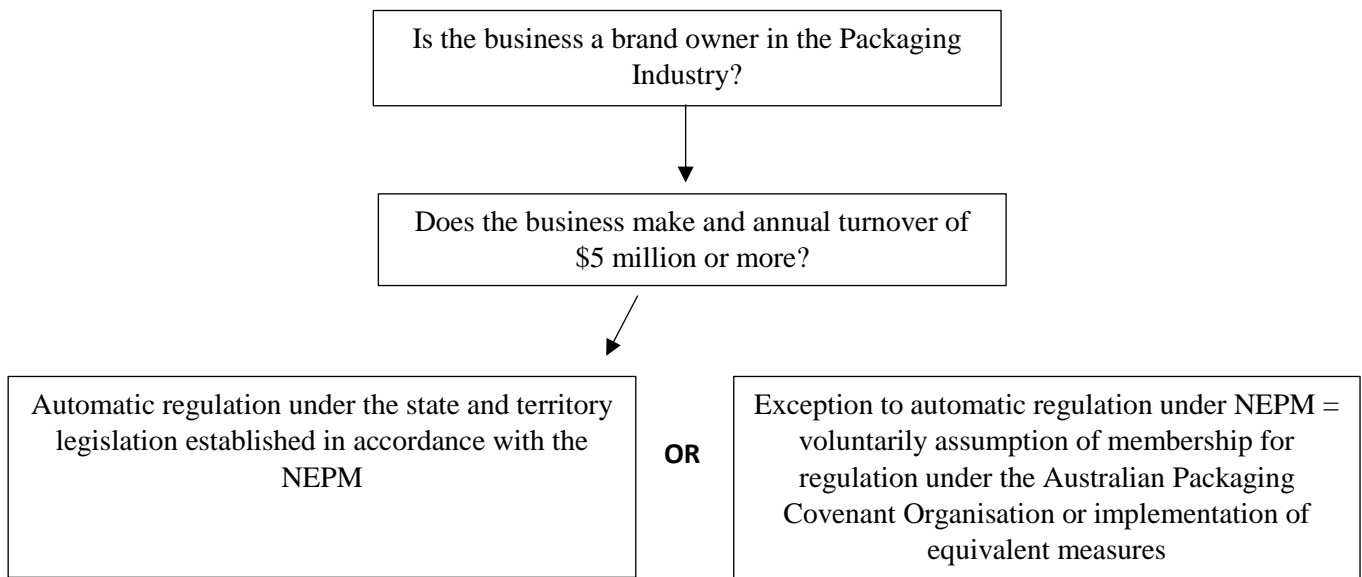


Once defined as a brand owner, members of the packaging industry automatically become liable to regulation under the provisions of the NEPM.³³⁵ However, brand owners can choose to avoid direct regulation by the state where they elect to voluntarily accept membership with the APCO for regulation under the Covenant or otherwise agree to implement equivalent standards and processes.³³⁶ This suggests that the Covenant is the preferred method of regulating industry under this scheme. See *Figure 3.3* below.

³³⁵ *National Environmental Protection (Used Packaging Materials) Measure 2011* (Cth). The Covenant will apply to all brand owners within the packaging industry. It is the obligation of the federal government to determine a brand owner, with this information then supplied to the APCO who is responsible for initiating membership discussions with the relevant business. This process is initiated by sending a letter to the brand owner with this letter containing a 40 day limit to join the APCO or be regulated under NEPM. If the Brand Owner fails to become a Signatory within the period of the notice, APCO refers the details of the business to all state and territory governments. See *Australian Packaging Covenant* (n 248) 26-27.

³³⁶ *National Environmental Protection (Used Packaging Materials) Measure 2011* (Cth) s11. As outlined in the NEPM, which states the goal of the NEPM is 'supporting and complementing the voluntary strategies in the Covenant and by assisting the assessment of the performance of the Covenant.' See *Ibid* s 6.

Figure 3.3: Activation of APC agreement



Although, industry members are the primary focus of the APC, to encourage collaboration between industry, government and other actors across the packaging supply chain, local government associations and community groups are also encouraged to contribute to the APCO by signing up as non-brand owner members with the APCO. All non-industry members are not obligated to fulfil the requirements that would otherwise apply to industry signatories (such as payment of fees).³³⁷ This inclusion means that a variety of individuals including academics and experts, as well as local government and waste processing stakeholders, can weigh in on the undertakings of the Covenants operations.

In utilising a combination of regulatory strategies in this way while also involving governments, industry and third parties in this regulatory arrangement, the overall APC scheme can be classified as an example of *smart regulation*.³³⁸

Gunningham et al originally advocated the concept of smart regulation in the late 1990's, building off the work of Ayres and Braithwaite and Responsive Regulation.³³⁹ Smart regulation advocates the use of context specific, creative combinations of regulatory instruments, such as the Covenant and NEPM, as a means to regulate for complex environmental problems. The concept is underpinned by a series of regulatory design principles that assist regulator's in choosing

³³⁷ Industry obligations under the Covenant are listed under clause 10. All non-industry signatories are however exempt from the otherwise prescribed obligations established for industry members under the Covenant in section 10. For example, all on-brand owner signatories are not required to contribute funds to the Covenant, submit an action plan or annual report, or meet obligations under the NEPM. *Australian Packaging Covenant* (n 248) 14.

³³⁸ Neil Gunningham, Peter Grabosky, and Darren Sinclair, *Smart Regulation* (Oxford University Press, 1998).

³³⁹ Ayres and Braithwaite (n 101).

complimentary instruments to suit the specific environmental, political, economic and social context within which the specific environmental problem exists.³⁴⁰ Overall, this concept operates to the premise that regulation is most successful when regulator's employ less prescriptive and less coercive forms of regulation first, and move up to more prescriptive regulatory options until a time when the underlying environmental aim is achieved.³⁴¹ As such, voluntary agreements, such as the Covenant, are often perused first, with such arrangements enacted as a mean to persuade parties to achieve favourable environmental outcomes prior to enacting more prescriptive enforcement of punitive punishment.³⁴² However, the existence of tough sanctions exist theoretically, with this threat acting as a warning by regulators to entice industry to comply with the less intrusive regulatory options. In saying this in order to operate as a threat, the use of tougher options or moving up the regulatory pyramid needs to be backed up with evidence that it is a viable threat.³⁴³

3.3.3 Regulation under the Covenant

The Covenant document outlines the operational aspect of the regulatory arrangement, along with the aims and responsibilities of each of the parties under the agreement.³⁴⁴

Aim of the Covenant

As has remained consistent across all Covenant agreements, the overarching aim of the APC remains centred on 'reduc[ing] the environmental impacts of consumer packaging' within Australia.³⁴⁵ To guide the action of Covenant members in pursuit of this overall aim, the 2017 APC outlines two supporting goals associated with this central aim. The first, is concerned with optimising resource recovery of consumer packaging throughout the supply chain, so that 'packaging material [can be] returned to the economy thereby minimising waste associated with the generation and consumption... across the supply chain'.³⁴⁶ Under this goal, Covenant members are encouraged to adopt approaches that improve procurement practices and product design so that packaging uses less resources and might be 'more easily recycled.'

³⁴⁰ Neil Gunningham and P.N Grabosky (n 89) 4.

³⁴¹ *Smart regulation* proscribes principles for designing regulation which incorporates responsive regulation based regulatory and enforcement pyramids. The regulatory pyramid displays the regulatory strategies available to regulators, with the enforcement pyramid displays levels of deterrence achievable through the use of a mixture of enforcement measures. Ibid 387–422; Ayres and Braithwaite (n 101) 36.

³⁴² This is especially the case 'in industries where technological and environmental realities change so quickly that the regulations that give detailed content to the law cannot keep up to date' which is the case with packaging. See Ayres and Braithwaite (n 101) 26.

³⁴³ Such as giving parties a set time before enacting the tougher regulatory options or harsher enforcement mechanisms. Ibid.

³⁴⁴ This information is contained in the Covenant document which contains four Parts and five Schedules.

³⁴⁵ Ibid 1.

³⁴⁶ Wording of the original goal from APC reads 'Optimising resource recovery of Consumer Packaging through the supply chain by adopting approaches that make changes in the way we design use and buy packaging and packaged products so that packaging uses less resources and is more easily recycled, and enable packaging materials to be returned to the economy thereby minimising waste associated with the generation and consumption of Consumer Packaging across the supply chain.' Ibid.

The second goal aims to prevent the impacts of fugitive packaging on the environment by adopting approaches that support innovations for capturing waste,³⁴⁷ as well as by ‘adopting approaches... that support the adoption of new or alternative packaging materials’ that might, if utilised, lessen the degree of degradation to the environment.³⁴⁸

Concerning the circularity of the overall aim and goals of the Covenant, although the ACP does not reference the circular economy specifically, there is evidence that the Covenant has incorporated a degree of circularity within its underpinning aim and goals. Initially, the underlying aim of Covenant focuses in reducing the environmental effects of packaging. This can be linked to the aims of the circular economy which similarly focuses on improving the state of the environment by reducing resource use and waste generation. But the circular economy is also concerned with social and economic improvements in addition to environmental improvements, yet this is not reflective in this Covenants aim. The Covenants overarching aim is very broad, and on its own does little to indicate how reductions to the environmental effects of packaging will be achieved. This broad aim subsequently affords industry a wide discretion with respect to what it subsequently focuses on to achieve this underlying aim. Although the inclusion of the two goals does reduce this discretion to a degree.

With respect to the circularity of the two accompanying goals, goal 1 would appear to be the most circular as it focuses on optimising resource recovery across the supply chain for the purpose of returning packaging material back to the economy through improved design and procurement practices of industry. The goal to increase resource recovery in order to reuse material to reduce waste is similar in nature to the idea of material loops which lie at the heart of the circular economy. However, this goal on its own is very general, and does not specify how or what aspect of design might be improved or targeted to increase the recyclability of PP overall.³⁴⁹ Goal 2 is focused on

‘preventing the impacts of fugitive packaging on the environment 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’,³⁵⁰

³⁴⁷ With the term *fugitive packaging* defined as ‘Packaging that is littered or leaked from collection systems such as recycling or landfill.’ *Australian Packaging Covenant* (n 248) 19.

³⁴⁸ Original goal - ‘Preventing the impacts of fugitive packaging on the environment 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.’ *Australian Packaging Covenant* (n 248) 1.

³⁴⁹ This is also possibly because the APC covers all packaging materials, and subsequently does not have the ability to focus on the particular challenges of various packaging material types separately. This is itself a weakness of the Covenant overall.

³⁵⁰ *Australian Packaging Covenant Organisation Ltd and Australian Government* (n 322) 1.

Fugitive packaging is defined in this goal as littered leaked from the collection systems of landfill. There would appear to be two distinct aims contained within this goal. The first, relates to adopting innovations and solutions to capture waste before it leaks into the environment, the second pledges support and where necessary, the adoption of new or alternative types of packaging.

It would appear that the first part of goal 2 focuses on ensuring that industry's waste disposal processes are improved to avoid leakage into the environment of waste resulting from their production actions. In this case, part one could be viewed as circular as reducing leaked plastics into the environment is a core aim shared by the circular economy. Similarly, the second part of goal 2 can be viewed as circular and compatible with Circular Regulatory Design Principles 5. However, use of terms such as 'adopts approaches' leaves ambiguity surrounding the processes for determining what innovations should be adopted in fulfilment of this goal, or who is responsible for developing these new innovations and materials.

Obligations of Parties to the Covenant

As a voluntary agreement,³⁵¹ industry is theoretically under no direct obligation to interact with the APC, and if they choose to voluntarily assume involvement are permitted to withdraw at any time. The ability to withdraw is also extended to the APCO, who may terminate the APC with 12 months written notice to government.³⁵²

3.3.3.1 Implementation Mechanisms of the Covenant

The APCO

The APCO is responsible for implementing the Covenants aims by drafting measurable targets, or KPI's, to be implemented by its industry members. These targets are outlined in two published documents known as the Strategic Plan and Statement of Intent. Clause 3 of the Covenant, outlines the requirements for developing Strategic Plan targets with a requirement that the APCO undertake consultation with all signatories, as well as give weight to strategies in line with domestic and international movements and trends.³⁵³ Requirements further hold, that Strategic Plans should also include performance indicators to monitor whether the Plan is

³⁵¹ The Covenant is voluntary in so far as the agreement to enter into the agreement between government and members of the packaging industry. It is also somewhat voluntary with regards to whether relevant brand owners elect to assume membership with the APCO arrangement. However, the term voluntary is loosely utilised in the latter scenario as voluntary regulatory arrangements are theoretically defined as agreeing to do the right thing without any basis in coercion. However, dependent on how you view the existence of the NEPM this arrangement might not operate strictly as voluntary. See Neil Gunningham and P.N Grabosky (n 89) 57.

³⁵² Withdrawal of membership by industry must be made in writing. Termination of the ACP agreement can be made by government or industry by giving 12 months' notice. Ibid 13, 17.

³⁵³ *Australian Packaging Covenant* (n 248) 7.

achieving its desired outcomes.³⁵⁴ In accordance with obligations set under the Covenant, the APCO is responsible for producing a Strategic Plan every five-years coinciding with the timeline of new Covenant discussions. All Strategic Plans require ascent by commonwealth, state, and territory environmental ministers within the National Environmental Protection Council prior to implementation.³⁵⁵

To support the Strategic Plan and provide clarity relating to the proposed implementation of the Strategic Plan objectives, the APCO are further required to supply a Statement of Intent every two years. The Statement of Intent is developed, reviewed, and updated by APCO annually, with the initial Statement of Intent incorporated into the Strategic Plan at the commencement of the APC 5-year cycle, and a second released halfway through the cycle.³⁵⁶

Brand Owners/Industry Signatories

Clause 10 of the Covenant, outlines the obligations of industry signatories with respect to implementing the aims of the Covenant. In accordance with clause 10, brand owners are required to draft individual Action Plans that ‘sets out what the signatory proposes to do to contribute to the Covenant’s aim and meets the obligations published by APCO.’³⁵⁷ The Covenant also requires signatories to ‘consider’ the Sustainable Packaging Guidelines (SPG),³⁵⁸ or a sufficient alternative to the guidelines, and review all new and ‘existing consumer packaging within a reasonable timeframe’ against the principles contained in these Guidelines.³⁵⁹

Although the requirement to implement an Action Plan and consider the SPG are listed as signatory obligations under the Covenant, the interplay between the physical implementation requirements associated with the Action Plan, and the obligation to implement the SPG is somewhat complex to ascertain. This is because the Covenant fails to set minimum requirement with respect to what is to be incorporated in industry members when drafting their Action Plans,

³⁵⁴ This section also states that Strategic Plan must include an indication of the level of funding to support the activities to be undertaken to provide benefits to all Signatories that contribute membership fees to the Covenant. Australian Packaging Covenant Organisation Ltd and Australian Government (n 322) 7.

³⁵⁵ The APCO is permitted to make changes to the Strategic Plan but must first obtain endorsement from National Environmental Protection Council for ascent. Ibid 22.

³⁵⁶ This first version of the Statement of Intent is subject to environment minister’s review, with the subsequent version provided to the Government Officials Group for examination and ascent. Ibid 8.

³⁵⁷ The Action Plan must be submitted within three months of becoming a Signatory Ibid 15. There is no clarification within the Covenant or associated documents that indicates what should be included in Industry signatory Action Plans. The only additional information appears in the Frequently Asked Questions leaflet of the APCO which states ‘Following the submission of an annual report, Members are required to submit an action plan that sets out what the Member proposes to do to fulfil the goals of the Covenant and strategic plan.’ the obligations surrounding the Action Plan. Australian Packaging Covenant Organisation, *Frequently Asked Questions All about APCO and the Covenant 1157.Pdf* (2018) 4 <<https://www.packagingCovenant.org.au/documents/item/1157>>.

³⁵⁸ Australian Packaging Covenant, *The Sustainable Packaging Guidelines* (2020) <[³⁵⁹ See *Australian Packaging Covenant* \(n 248\) 16.](https://documents.packagingcovenant.org.au/public-documents/Sustainable%20Packaging%20Guidelines%20(SPGs)#:~:text=The%20Covenant%20states%20that%20in,the%20potential%20for%20fugitive%20packaging.>>.</p></div><div data-bbox=)

and is similar vague as to the level of implementation necessary to satisfy the requirements of the SPG. For example, the Covenant appears to uphold the SPG as vital to the realisation of the aims of the Covenant,³⁶⁰ however conflicting wording exists in association with the implementation of the SPG under the Covenant, with the requirement that industry member merely ‘consider’ the SPG as part of their obligation.³⁶¹ Furthermore, the APCO describe the SPG under the Covenant as being ‘...intended for guidance only..’ and only to be used as a resource for industry members to guide the ‘implement[ation of] a packaging sustainability strategy.’³⁶² Furthermore there are no timeframes stipulated for considering the SPG, and evidence of consideration is only required to be provided to the APCO in the event of an audit. Yet, it is not evident how often or how many audits the APCO conducts making it difficult to ascertain whether this is a viable threat to encourage industry to fulfil this obligation. This will be discussed in more detail below.

Similarly, the placement of the Action Plan within the Covenant under clause 10, suggests that the formulation of Action Plans by industry signatories is a core obligation under the Covenant. However, unlike the requirements outlined in the APC that guide the development of the Strategic Plan by the APCO,³⁶³ the Covenant supplies no additional guiding principles or further information associated with drafting an appropriate Action Plan. The Covenant is also silent with respects to how long these Action Plans are to operate.³⁶⁴ It is true that the SPG somewhat offers options for how industry members might draft their Action Plans, suggesting that industry signatories draft their Action Plans based on the outcomes of the self-review and application of the SPG,³⁶⁵ however again, there is no real requirement for the SPG to be applied per se. Furthermore, with no timeline set for reviewing packaging against the SPG these Guidelines might not be considered for implementation into Action Plans for some time.

The removal of Action Plan requirements is a recent addition to the 2017 Covenant, with previous Action Plan guidelines removed in 2017 ‘...to improve efficiencies in delivery...’³⁶⁶ As a measure introduced to ‘improve’ efficiencies, the removal of Action Plan requirements has been

³⁶⁰ The SPG is described under the Covenant as playing an ‘essential role in optimising the outcomes of the Covenant.’ Ibid 8.

³⁶¹ Ibid.

³⁶² *The Sustainable Packaging Guidelines* (n 322) 17.

³⁶³ Under the APC, APCO Strategic Plan are listed to include: - strategies that have been guided by adequate consultation with Signatories to the Covenant, and domestic and international movements and trends - strategies and actions that are nationally applicable, to provide leadership in finding solutions to better manage packaging so it doesn’t become waste, and to provide benefits to all Signatories that contribute membership fees to the Covenant - performance indicators, to monitor whether the Plan is achieving its desired outcomes, which must be meaningful, measurable and can be evaluated - how the Strategic Plan is to be evaluated and reported, and - an indication of the level of funding to support the activities to be undertaken. *Australian Packaging Covenant* (n 248) 7.

³⁶⁴ Although it can be assumed that an Action Plan spans for a period of 5 years in line with the Covenant. *Australian Packaging Covenant* (n 248) 15.

³⁶⁵ The SPG suggests that reviewing your packaging against the SPG ‘will establish your baseline position and allow you to build new actions and targets into your APCO Action Plan.’ See *The Sustainable Packaging Guidelines* (n 322) 23.

³⁶⁶ ‘...the Sustainable Packaging Guidelines and details on Signatory Action Plans and annual reports were removed from the 2017 Covenant and no longer require environment ministers to endorse amendments to them.’ *Australian Packaging Covenant* (n 248) 6.

described as an action designed to cut ‘green tap’ for industry under the Covenant. However, in practice removing these requirements effectually reduces industry’s overall obligations under the Covenant. This is because removing the drafting requirements means there are no established minimum standards required from industry to fulfil their Action Plan drafting requirements. Consequently, industry signatories maintain a wide degree of discretion relating to how and what they choose to implement within their Action Plans, including which, if any, APCO guideline they aim to pursue.³⁶⁷ This level of industry discretion subsequently makes it difficult for the APCO to collectively direct signatories or wider industry to work towards, or to effect changes in a specific focus area associated with the APC aim. It also effects the ability of the APCO to measure the outcomes of certain targets associated with the measurable KPI’s established under the APCO Strategic Plans, and determine progress of the Covenant and appears reflective of the first Covenant iteration as discussed in 3.3.2.2.³⁶⁸

3.3.3.2 Monitoring and Reporting Requirements

The APCO

The APCO is responsible for the administration of the Covenant, which includes monitoring the progress of projects established in pursuit of the Covenant’s aim.³⁶⁹ All monitoring activities are undertaken in accordance with the evaluation framework agreed between the APCO and the Government Officials Group.³⁷⁰ The Covenant establishes two distinct reporting requirements for the APCO. The first, relates to the progression of the Strategic Plan, with the second concerned with the monitoring of signatories’ compliance with the obligations established under the Covenant.

With respect to the former, the Covenant specifies that the APCO is required to undertake annual reporting assessments, as well as meet with the Government Officials Group bi-annually, to discuss industry progress with respect to the Strategic Plan. The APCO are also required to conduct an independent evaluation of the Covenant’s performance at the end of the five-year term as shown in **Figure 3.4**.³⁷¹

³⁶⁷ Although signatories may gauge inspiration from the or the Sustainable Packaging Guidelines or Framework under the signatory reporting tool, there is no specific obligation to incorporate these documents and subsequently Annual Report subject matter relating to goals is completely at the discretion of signatories. See Scott Kelly, ‘APCO Packaging Sustainability Framework’.

³⁶⁸ The lack of industry direction appears to have been a problem for the Covenant previously. As mentioned in 3.3.2.2, the review of the 1999 Covenant noted that the agreement included too much inherent flexibility for companies. This meant that progress of the Covenant agreement could not be effectively ascertained. See Martin Stewardship & Management Strategies Pty Ltd (n 292) 6.

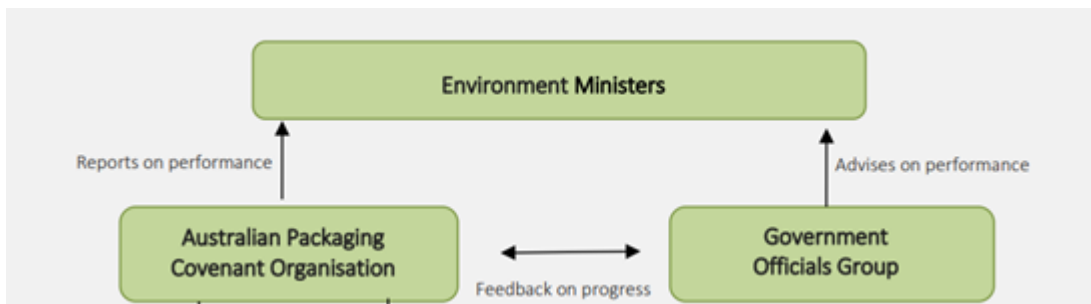
³⁶⁹ *Australian Packaging Covenant* (n 248) 12.

³⁷⁰ *Ibid.*

³⁷¹ *Ibid* 13.

Annual reporting is undertaken to assess the Covenants progress with respect to its underlying aim, with progress determined with reference to the achievement of the KPI's contained in the APCO's Strategic Plan, data collected from signatories, as well as the progress and outcomes of projects and other activities undertaken by the APCO.³⁷² All progress reports compiled by APCO are submitted to the Government Officials Group who review the information and determine the progress and success of the APCO's actions in achieving the Covenant's aims. The Government Officials Group then prepare their own report, which is presented to the Environmental Ministers to inform them of the progress of the Covenant.

Figure 3.4: The Reporting arrangements for APCO



The Covenant states that the APCO reports are to be made available to all Signatories as well as to the public which establishes a degree of transparency within the reporting process, allowing public access to information. However, a lack of procedural transparency appears to exist in this process particular with relation to who makes up the members of the Government Officials Group. Despite holding significant power with regards to assessing and informing Environmental Ministers on the progress of the Covenant, there is no information available with regards to who makes up the members of the Government Officials Group except that it is made up of 'senior officials from the federal and all state and territory governments.'³⁷³ Furthermore, there is no evidence available regarding the 'evaluation framework' agreed upon between the APCO and the Government Officials Group used as the basis for monitoring the progress of the APCO targets. This makes it difficult to ascertain how an assessment of the Covenants progress is determined overall.

³⁷² Ibid.

³⁷³ Australian Packaging Covenant, *The Australian Packaging Covenant Organisation 2018/19 Annual Report* 15 <<https://www.packagingCovenant.org.au/documents/item/3160>>.

Brand Owners/Industry Signatories

Monitoring industry signatory's obligation with regards to both application of the SPG and drafting and implementing of industry Action Plans appears to be dependent on audits undertaken by the APCO. As such, industry signatories are required to 'maintain and make available records of implementation of Action Plans...' as well as prepare clear documentation evidencing 'their process for reviewing their packaging and the initiatives they undertake to make their packaging more sustainable,' with respect to the SPG.³⁷⁴ This documentation is to be supplied to the APCO in the event of an audit.³⁷⁵ However, while the APCO has the right to audit industry signatories, there is no clear information about how many audits the APCO actually conducts, nor the process it utilises to determine which industry member is audited. This makes it difficult to ascertain the thoroughness of this compliance mechanism.

In addition to maintaining records, monitoring of industry signatories' actions requires brand owners to 'submit an annual report that outlines performance against all of the action plan commitments and meets the reporting obligations as published by APCO,'³⁷⁶ with signatories further required to publish their annual reports and their respective scores online for public review.

Since 2017, the preferred method of annual reporting has been through use of the online Annual Reporting Tool.³⁷⁷ Although the researcher was unable to access the online reporting tool to validate how it operates in practice,³⁷⁸ the framework used within this online tool is accessible online, with industry signatories' progress being monitored under the annual tool through use of the Packaging Sustainability Framework.³⁷⁹ The Packaging Sustainability Framework consists of thirteen independent criteria separated into three categories, including Leadership; Packaging Processes and Outcomes; and Operations.³⁸⁰ The thirteen criteria are further divided into six core criteria (green) and seven recommended criteria (yellow), with an on-site waste diversion criteria which is 'strongly encouraged'. Each criterion has five levels of performance ranging from

³⁷⁴ Australian Packaging Covenant Organisation Ltd and Australian Government (n 322) 16.

³⁷⁵ Department of the Environment and Energy (n 284) 16. Auditing is a responsibility of the APCO under the Covenant, with the obligation to 'undertaking independent audits of Signatory annual reports and action plans, including the implementation of the Sustainable Packaging Guidelines (see Section 10), based on a robust method for the random selection of participants and ensuring proportional representation of different types and sizes of businesses in the audit.' Failure to evidence this documentation can result in a show cause letter being issued to the industry Signatory. However, it is unclear how many and how often audits occur with regards to this statement. See Ibid 12. There appears to be increasing promotion for industry uptake of this resource since the release of the National Packaging Targets and the SP2019. Furthermore, APCO have suggested that they have dramatically increased undertaking member audits, to encourage the uptake of the SPG by industry members. However, the number of actual audits and the results uncovered by these audits are not accessible, which brings with it a lack of transparency. See Waste Management Review, 'APCO Conduct Brand Audit for 2025 Recycling Target', *Waste Management Review* (26 June 2018) <<https://wastemanagementreview.com.au/apco-conduct-brand-audit-2025-recycling-target/>>. (IS THIS NUMBER CORRECT?).

³⁷⁶ Annual reports are required by 31 March of each year, commencing in the financial year following the year in which a company becomes a Signatory. *Australian Packaging Covenant* (n 248) 10, 15.

³⁷⁷ With the data collected through this tool used by the APCO in their annual reporting to Government Officials Group Australian Packaging Covenant, 'The Australian Packaging Covenant Organisation 2018/19 Annual Report' (n 329) 19.

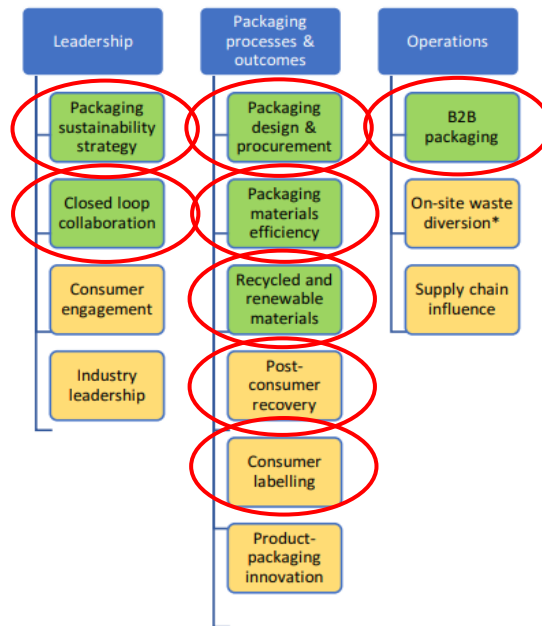
³⁷⁸ Access to this tool is reserved for members of the APCO only.

³⁷⁹ Scott Kelly and University of Technology Sydney: Institute for Sustainable Futures, *Packaging Sustainability Framework for APCO Members* (2017) 106, 26 <<https://www.packagingCovenant.org.au/documents/item/1043>>.

³⁸⁰ The reporting tools was introduced in 2017 to make it simpler for signatories to complete reporting tasks Kelly (n 271) 1.

‘Getting Started’ to ‘Beyond best practice’.³⁸¹ Although the framework does not coincide with individual Action Plans, it was noted that a number of the framework are compatible with the SPG as represented in *Figure 3.5* below by the red circles.³⁸²

Figure 3.5: Overlap between the Packaging Sustainability Framework and SPG



* not a core criterion, but packaging companies are strongly encouraged to report on on-site waste diversion

The disconnect between the framework and the aims included in individual Action Plan’s, suggests that although the annual reporting tool may be adequate in ascertaining the progress of individual signatory members with regards to the SPG, this tool does little to monitor progress of the implementation of Action Plans. This may be a problem considering that industry members are merely encouraged to use the SPG and are afforded the discretion to incorporate alternatives to the SPG if desired. Overall, the lack of compatibility between the implementation mechanisms outlined for industry members under the Covenant, and the tools used to monitor industry member’s actual implementation, brings into question the validity of the reporting structure of the Covenant. It also brings into question how the data collected through this tool could contribute to determining the progress of industry in achieving the Covenant’s aims at all.

³⁸¹ Ibid 34.

³⁸² The Packaging Sustainability Framework criteria are compatible with the 8 of the 10 Sustainable Packaging Guideline principles. See *The Sustainable Packaging Guidelines* (n 322) 8–16; Kelly (n 325) v.

3.3.3.3 Enforcement and Penalties

As indicated above in 3.3.3.2, in addition to progress reporting, the APCO is responsible for monitoring industry compliance with their obligations under the Covenant.³⁸³ A full list of the compliance responsibilities of the APCO are outlined in clause 6.³⁸⁴

Where industry signatories fail to comply with their requirements as stipulated under the Covenant, they are liable to penalty as outlined in the compliance procedures located in Schedule 5 of the Covenant.³⁸⁵ The APCO is responsible for administering compliance proceedings under Schedule 5, and once they become aware of an industry signatory non-compliance, are 'required to give notice to the Signatory asking it to show cause as to why it should not be deemed non-compliant with the Covenant's obligations.' Signatories are subsequently afforded 30 days to respond to this original notice prior to a second notice being issued in which signatories are warned of a possible removal from the APCO. During both notice periods, signatories are able to remedy the non-compliant behaviour and maintain their membership with the APCO, however failure to do so can result in referral to the relevant state or territory by the APCO, for regulation under NEPM.³⁸⁶ The right to report is subsequently the highest penalty available to the APCO for use under the Covenant.

3.3.4 Regulation under National Environmental Protection Measures (NEPM)

The NEPM is a Commonwealth measure originally drafted and submitted for enactment by the National Environmental Protection Council in accordance with their powers under s14 (1) of the *National Environment Protection Council Act 1994* (Cth).³⁸⁷ The NEPM operates to direct state and territory governments in creating nationally consistent legislation in their respective jurisdiction that 'support[s] and complement[s] the voluntary strategies [of] the Covenant.'³⁸⁸ The NEPM does this by implementing required obligations onto non-complaint and non-interactive industry members, that mitigates possible competitive disadvantage that might arise for brand owners who voluntarily complying with the Covenant requirements.³⁸⁹ The NEPM subsequently

³⁸³ *Australian Packaging Covenant* (n 248) 11.

³⁸⁴ *Australian Packaging Covenant* (n 248) 11, 12.

³⁸⁵ *Australian Packaging Covenant* (n 248) 26–27.

³⁸⁶ *Ibid* 26.

³⁸⁷ See *National Environment Protection Council Act 1994* (Cth) s 14(1).

³⁸⁸ Australian Government, 'National Environment Protection (Used Packaging Materials) Measure 2011 Explanatory Statement' <[http://www.legislation.gov.au/Details/F2011L02093/Explanatory Statement/Text](http://www.legislation.gov.au/Details/F2011L02093/Explanatory%20Statement/Text)>; Agriculture, *National Environment Protection (Used Packaging Materials) Measure 2011* (n 286) s9.

³⁸⁹ The idea of the free rider issues, is closely connected with the concept of public good and has been the subject of extensive theoretical and empirical research. It is seen to occur when an individual or organizations enjoy the benefits of a good, contributed or paid for by another, without contributing to its provision. Subsequently individuals are reluctant to be involved in voluntary measures if they feel they will be financially burdened for undertaking a public good where another party may not do anything but benefit from the outcomes or improvements that arise from those involved in a scheme. For example, in this instance being voluntary means that industry have the means to opt-out of

exists to offset the issue of *free-riders* commonly featured from voluntary arrangements.³⁹⁰

Similarly to the Covenant arrangement, the NEPM is subject to review every 5 years and can be amended to reflect changes incorporated within the Covenant agreement.³⁹¹

As indicated above, the NEPM applies to all relevant brand-owners within the packaging industry who do not voluntarily assume membership under the APCO or enact sufficient alternative arrangements that are seen to achieve similar outcomes as those pursued under the Covenant.³⁹² The NEPM also comes into effect in instances where relevant brand owners have been deemed non-compliant with their obligations under the Covenant. Once identified as non-compliant, brand owner membership under the APCO is terminated and the brand owner is referred to the relevant state/territory environmental authority by the APCO for regulation under the NEPM.³⁹³ Once identified and reported, each state/territory government is required to take action to ensure that the brand owner complies with the relevant legislation or other arrangements that implement the NEPM in its jurisdiction.

3.3.4.1 NEPM instruments of the States and Territories

States and territory NEPM regulatory instruments, are all forms of direct or command-and-control legislation.³⁹⁴ With a central goal similar to the Covenant, the NEPM aims ‘to reduce environmental degradation arising from the disposal of used packaging and conserve virgin materials,’³⁹⁵ by ‘supporting and complementing the voluntary strategies in the Covenant’ and by assisting the ‘assessment of the performance of the Covenant.’³⁹⁶ As mentioned above, to support interaction with the Covenant, the NEPM establishes a number of responsibilities for industry that ‘ensur[e] that signatories to the Covenant are not competitively disadvantaged in the market place by fulfilling their commitments under the Covenant.’³⁹⁷ These responsibilities include prescriptive

undertaking measures to improve the environment from the effects of packaging. This could include packaging innovations that could then be used by the non-participating industry member to improve their own packaging line, thus benefiting but contributing nothing. The inclusion of the NEPM aims to add a layer of ‘burden’ to all industry who opt-out of undertaking their required obligations under the Covenant. See Scott Rockart, ‘Free-Rider Problem, The’ in Mie Augier and David J Teece (eds), *The Palgrave Encyclopedia of Strategic Management* (Palgrave Macmillan UK, 2016) 1 <https://doi.org/10.1057/978-1-349-94848-2_736-1>.

³⁹⁰ Under the Covenant the free rider is defined in the NEPM to mean ‘a brand owner or organisation that is a participant in the packaging chain and is not a signatory to the Covenant, and is not producing equivalent outcomes to those achieved through the Covenant’. For clarity, a free rider is a Business that is a Brand Owner that, although required to, is not a signatory to the Covenant nor complied with the NEPM or relevant state or territory instruments.’ See *National Environment Protection (Used Packaging Materials) Measure 2011* (Cth) s 3; *Australian Packaging Covenant* (n 248) 19.

³⁹¹ Agriculture, *National Environment Protection (Used Packaging Materials) Measure 2011* (n 286) s 22.

³⁹² *National Environment Protection (Used Packaging Materials) Measure 2011* s 11.

³⁹³ This will depend on where the brand owner company sells its products. Australian Packaging Covenant, *Australian Packaging Covenant a Commitment by Governments and Industry to the Sustainable Design, Use and Recovery of Packaging* (July 2010)

<<http://www.nepc.gov.au/system/files/resources/46216819-a2fc-cbd4-8da3-3f274335c896/files/upm-aust-packaging-Covenant-1-jul-2010.pdf>>.

³⁹⁴ The theory associated with this type of regulatory strategy has already been outlined above in 3.2.3 so will not be discussed in this section.

³⁹⁵ *Ibid* s 6.

³⁹⁶ *Ibid*.

³⁹⁷ *National Environment Protection (Used Packaging Materials) Measure 2011* (Cth) s 9(1).

recording and reporting requirements to ‘oblige’ brand owners to manage a percentage of the end-of-use segment of their own, or similar packaging products,³⁹⁸ in line with the waste hierarchy.³⁹⁹ The NEPM also sets collection and reporting requirements for local councils to record the total weight of waste material types collected for comparison to how much is sold in the Australia market. Legislation under NEPM also includes fines for non-compliance. Brand owners are subject to the relevant enacted NEPM as established by the state/territory within which the company sells its products,⁴⁰⁰ and both the monitoring and enforcement obligations under the NEPM schemes are the responsibility of the state/territory under which the brand owner is regulated.⁴⁰¹

Most state/territory jurisdictions have enacted a form of NEPM legislation, the relevant state/territory instruments have been summarised in *Table 3.2* below.

³⁹⁸ Ibid s 9(2)(a)-(d).

³⁹⁹ The waste to energy option is at odds with the preferred method for material management under the circular economy as this process does not allow for additional material loops because it destroys this material.

⁴⁰⁰ Australian Packaging Covenant, *Australian Packaging Covenant a Commitment by Governments and Industry to the Sustainable Design, Use and Recovery of Packaging* (July 2010) <<http://www.nepc.gov.au/system/files/resources/46216819-a2fc-cbd4-8da3-3f274335c896/files/upm-aust-packaging-Covenant-1-jul-2010.pdf>>.

⁴⁰¹ Ibid.

Table 3.2: Summary of the States and Territories NEPM based legislation

State	Relevant instrument	Obligation	Penalties
QLD	<i>Waste Reduction and Recycling Act 2011</i> (Qld). ⁴⁰² Detailed operation of the responsibilities of brand owners outlined in Part 5A <i>Waste Reduction and Recycling Regulation 2011</i> (Qld). ⁴⁰³ Administered through the Queensland Department of Environmental Heritage Protection.	<ol style="list-style-type: none"> 1. Recovery and recycling rate of at least 70%⁴⁰⁴ 2. Brand owners are also liable to submit an Action Plan outlining how these recovery targets are to be met, and the use that will occur for these recovered materials with a preference that materials be used ‘<i>in the brand owner’s consumer packaging material; within the State as a secondary resource; within Australia as a secondary resource or for export as a secondary resource</i>’ or that the brand owner ‘<i>considers it will be impracticable to recover the consumer packaging materials in the preferred order</i>’.⁴⁰⁵ 3. Brand Owners must keep records relating to last 5 years, relating to the number, weight and type of consumer packaging material sold, as well as how much of that material was recovered for re-use, recycling, export, energy, landfilled and how much consumer education was provided.⁴⁰⁶ 	<p>Chief executive may give notice to a brand owner they reasonably believe does not comply with the requirements listed under sections 41I, 41J or 41K.⁴⁰⁷ Penalty under sections 41I, 41J or 41K is 20 penalty units.</p> <p>Exemptions apply for commercial confidentiality.⁴⁰⁸</p>
NSW	<i>Waste Avoidance and Resource Recovery Act 2001</i> (NSW), ⁴⁰⁹ detailed obligations featured in Part 8 of the <i>Protection of the Environment Operations (Waste) Regulation 2014</i> (NSW). ⁴¹⁰ Administered by the Environmental Protection Authority.	<ol style="list-style-type: none"> 1. The EPA is to set recovery targets, which are outlined and published in the Gazette, for brand owners. Targets are set with reference to targets set in the APC.⁴¹¹ Current recovery targets are that 80 per cent of all material used in packaging products is to be recycled, and 100 per cent of new and existing packaging must be reviewed using the Sustainable Packaging Guidelines.⁴¹² 2. Recovered items must be re-used or recycled by the brand owner, or if not practicable- re-used or recycled within Australia, or re-use or recycled outside of Australia.⁴¹³ 3. Brand owners are required to prepare a Waste Action plan within one month after notice by EPA.⁴¹⁴ 	<p>Failure to recover and evidence processing in accordance with the listed preference as well as review packaging design against Sustainable Packaging Guidelines, failure to submit Action, or failure keep required records will incur 200 penalty units (corporation) \$22,000 or 100 penalty units (individual) \$11,000</p>

⁴⁰² *Waste Reduction and Recycling Act 2011* (Qld).

⁴⁰³ *Waste Reduction and Recycling Regulation 2011* (Qld).

⁴⁰⁴ *Ibid* s 41I.

⁴⁰⁵ *Ibid* s 41L (d)(i) & (ii).

⁴⁰⁶ *Ibid* s 41N (1)(a) & (b).

⁴⁰⁷ *Ibid* ss 41I, 41J or 41K.

⁴⁰⁸ *Ibid* s 41M.

⁴⁰⁹ *Waste Avoidance and Resource Recovery Act 2001* (NSW).

⁴¹⁰ *Protection of the Environment Operations (Waste) Regulation 2014* (NSW).

⁴¹¹ *Protection of the Environment Operations (Waste) Regulation 2014* (NSW) s 86.

⁴¹² New South Wales Environmental Protection Agency, ‘Packaging Waste’, *Product Stewardship Schemes* (20 November 2020) <<https://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/warr-strategy/product-stewardship-schemes>>.

⁴¹³ *Protection of the Environment Operations (Waste) Regulation 2014* (NSW) s 87 (1)(a) & (b).

⁴¹⁴ *Ibid* s 88(1).

		4. Record keeping for the past 5 years, relating to weight and material used in packaging, recovery, re-use, consumer education must be undertaken. ⁴¹⁵	
VIC	<i>Environmental Protection Act 1970</i> (Vic), ⁴¹⁶ outlined in Victorian Government Gazette - <i>Waste Management Policy (Used Packaging)</i> . ⁴¹⁷ Administered by Environmental Protection Authority	<ol style="list-style-type: none"> 1. Brand owners are required to Overall recovery rate of 70%⁴¹⁸ and demonstrate that materials recovered are re-used in brand owners packaging, used within Australia as a secondary material or exported as a secondary resource.⁴¹⁹ 2. Brand owners must record use and collection data including weight, type, and amount recycled, re-used, waste to energy or landfilled.⁴²⁰ 3. Keep records for a period of 5 years.⁴²¹ 	Brand owners will not be penalised unless notice of failure of obligations is issued. No further information about penalties in this document. ⁴²²
SA	Part 2 <i>Environment Protection (Used Packaging Materials) Policy 2012</i> (SA), ⁴²³ under the <i>Environment Protection Act 1993</i> (SA). ⁴²⁴ Administered by the Environmental Protection Agency SA.	<ol style="list-style-type: none"> 1. Prepare and comply with Action Plan consistent with the SPG.⁴²⁵ 2. Keep records relating to consumer product sold, what material was recycled, re-used, or undertook other resource recovery option and what was disposed into landfill.⁴²⁶ 3. No recovery target specified. 	Category B offence \$250,000 to \$4,000 depending on proof of intention. ⁴²⁷
WA	<i>Environmental Protection Act 1986</i> (WA), ⁴²⁸ outlined in <i>Environmental Protection (NEPM-UPM) Regulations 2013</i> (WA), ⁴²⁹ Administered by Environmental Protection Authority	<ol style="list-style-type: none"> 1. Must prepare and Action Plan, which must be reviewed and approved⁴³⁰ 2. Overall recovery rate of 60% for high density HDPE and PET 35% for low density HDPE and PET plastic.⁴³¹ 	\$5,000 respectively for each month offence continues
TAS	The NEPM is a state policy under the <i>State Policies and Projects Act 1993</i>	There is no specific Act in Tasmania, and subsequently no recovery target specified, instead, the state applies the NEPM directly and as such is	

⁴¹⁵ Ibid s 89.

⁴¹⁶ *Environmental Protection Act 1970* (Vic).

⁴¹⁷ Victoria, *Victorian Government Gazette*, No, G17, 'Waste Management Policy (Used Packaging Materials)', 26 April 2012, 859 (*Waste Management Policy (Used Packaging)*).

⁴¹⁸ Ibid s 11(3).

⁴¹⁹ Ibid s 11(2)(c).

⁴²⁰ Ibid s 12(1).

⁴²¹ Ibid s 12(3).

⁴²² Ibid s 13.

⁴²³ *Environment Protection (Used Packaging Materials) Policy 2012* (SA).

⁴²⁴ *Environment Protection Act 1993* (SA).

⁴²⁵ The action plan must outline (a) the processes, technologies or systems to be used by the brand owner to enable resource recovery in relation to consumer packaging for which the brand owner has responsibility; (b) the quantity of each type of such consumer packaging proposed to be dealt with in that way (which must be at least equivalent to the performance target set out in the Covenant for consumer packaging of that kind); (c) how the brand owner intends to inform the public of the action to be taken by the brand owner under paragraph (a). *Environment Protection (Used Packaging Materials) Policy 2012* (SA) s 7.

⁴²⁶ *Environment Protection (Used Packaging Materials) Policy 2012* (SA) s 8.

⁴²⁷ *Environment Protection Act 1993* (SA) Division 2.

⁴²⁸ *Environmental Protection Act 1986* (WA).

⁴²⁹ *Environmental Protection (NEPM-UPM) Regulations 2013* (WA).

⁴³⁰ *Environmental Protection (NEPM-UPM) Regulations 2013* (WA) s 6-8.

⁴³¹ *Environmental Protection (NEPM-UPM) Regulations 2013* (WA) s 9.

	(TAS). ⁴³² Administered by Environmental Protection Authority Tasmania	required to collect data from local government, relating to the percentage of waste collected through kerbside collection, to report to Covenant Council. ⁴³³	
ACT	An instrument to implement the NEPM has not been put in place in the ACT following commencement of the <i>Waste Management and Resource Recovery Act 2016</i> (ACT), which repealed the previous <i>Waste Minimisation (Used Packaging Materials Industry Waste Reduction Plan) Approval 2013 (No 1)</i> (ACT). ⁴³⁴	No recovery target specified.	
NT	<i>Waste Management and Pollution Control Act 1998</i> (NT).	There are no known major brand owners based in the NT who are likely to have obligations under the NEPM. There is provision under the <i>Waste Management and Pollution Control Act 1998</i> (NT) to enforce the NEPM if needed. ⁴³⁵ However, there is no recovery target specified within the state.	

3.3.4.2 The ability of the NEPM to act as an incentive and penalty

The current NEPM arrangement is strongly supported by the packaging industry as an effective support mechanism of the Covenant and sufficient deterrent to the issue of *free-riding*, and is seen to encourage high levels of participation in the APC.⁴³⁶ However, despite industry support, the ability of NEPM instruments to act as a sufficient incentive for industry participation in the APCO, or as a punishment for those companies who fail to meeting their obligations under the Covenant, remains questionable.

Theoretically, in order to act as an incentive, legislation under NEPM should be significantly more onerous than the responsibilities under the Covenant, otherwise no strong incentives exist to sign up to the Covenant which carries with it additional administrative duties and obligations. To allow for this the NEPM permits jurisdictions and local government the ability to recover the costs of collection, sorting, and recycling of packaging waste, with this approach broadly reminiscent of extended producer responsibility arrangement.⁴³⁷ In doing so, the obligation

⁴³² Environmental Protection Agency Tasmania, 'Legislative Context - Resource Recovery & Waste' <<https://epa.tas.gov.au/epa/resource-recovery-waste/legislative-context-resource-recovery-waste>>.

⁴³³ *National Environment Protection (Used Packaging Materials) Measure 2011* (CTH) s 17.

⁴³⁴ *The Sustainable Packaging Guidelines* (n 322) 32.

⁴³⁵ *Ibid.*

⁴³⁶ NEPC Service Corporation, 'Packaging Impacts Decision Regulation Impact Statement' (March 2014) 7 <<https://www.environment.gov.au/system/files/resources/0d61a8da-4263-4844-928c-e4f9e07472ef/files/packaging-impacts-decision-ris.pdf>>.

⁴³⁷ *National Environment Protection (Used Packaging Materials) Measure 2011* (Cth) s 9(6).

for companies to collect and evidence processing and recycling of their own of similar products would appear more onerous than the requirements under the APCO. However, when we examine the NEPM arrangements in more detail, a number of issues undermine this original assumption.

Initially, as is evidenced in the table above, the ability of NEPM to harmonise instruments between jurisdictions has been limited, with discrepancies evident between the NEPM instruments that have been enacted by each state/territory jurisdiction, with some jurisdictions failing to include collection targets and others failing to enact legislative schemes at all. For example, no recovery targets have been set within SA, TAS, ACT or NT.

Monitoring of compliance also appears to be an issue under the respective instruments, for example, in theory, a company's compliance with the NEPM is monitored by the EPA of the respective state/territory, who carries out both inspections (pro-active compliance) and investigations on complaints of non-compliance (a more reactive approach).⁴³⁸ However, in accordance with the Annual Report of the National Environment Protection Council, for the entire operating period of the current Covenant arrangement, no complaints regarding brand owners or Covenant signatories were noted as being received, and no investigations or prosecutions had been undertaken by the relevant state/territory authority.⁴³⁹ This suggests that either all NEPM regulated companies are meeting their requirements under the NEPM, or that the state/territory governments are not effectively pro-actively monitoring for non-compliance of the NEPM requirements.

Ultimately, the effectiveness of the NEPM based regimes rely on consistent and robust enforcement by state/territory governments. However, being a command-and-control scheme, the cost associated with enforcing breaches of the prescribed requirements is also the responsibility of the respective state/territory. As such, possible capacity constraints of the relative state or territory could subsequently impede the ability of that jurisdiction to enforce the requirements of NEPM. When we examine this in conjunction with the fact that local governments are currently also responsible for the cost of collecting and recycling used packaging material under shared responsibility, it becomes apparent that the states and local governments are disproportionately burdened financially under the Covenant arrangement compared to industry. As such, due to the

⁴³⁸ See, eg, Queensland Government Department of Environment and Science, 'Compliance and Enforcement', *Environment | Department of Environment and Science, Queensland* (20 October 2009) <<https://environment.des.qld.gov.au/management/compliance-enforcement>>.

⁴³⁹ National Environment Protection Council, *National Environment Protection Council 2015–16 Annual Report* <<http://www.nepc.gov.au/system/files/resources/b759bd66-4618-4fd6-96fa-f40693536030/files/nepc-annual-report-2015-16.pdf>>; National Environment Protection Council, *National Environment Protection Council Annual Report 2016–17* (2017 2016) <<http://www.nepc.gov.au/system/files/resources/afef0a22-b780-41ed-ab10-416162bb201e/files/nepc-annual-report-2016-17.pdf>>; National Environment Protection Council, *National Environment Protection Council Annual Report 2017–18* <<http://www.nepc.gov.au/system/files/resources/1ed358dc-9aee-442f-9821-78ce95bf20a6/files/nepc-annual-report-2017-18.pdf>>; National Environment Protection Council, *National Environment Protection Council Annual Report 2018–19* <<http://www.nepc.gov.au/system/files/resources/162bbdba-7379-4bdd-8873-660ce7142d97/files/nepc-annual-report-2018-19.pdf>>..

differing level of resources available within each state/territory, the ability of the NEPM instruments to act as an incentive is questionable and ultimately determinate on the financial and resourcing capacity of the respective government agency.⁴⁴⁰

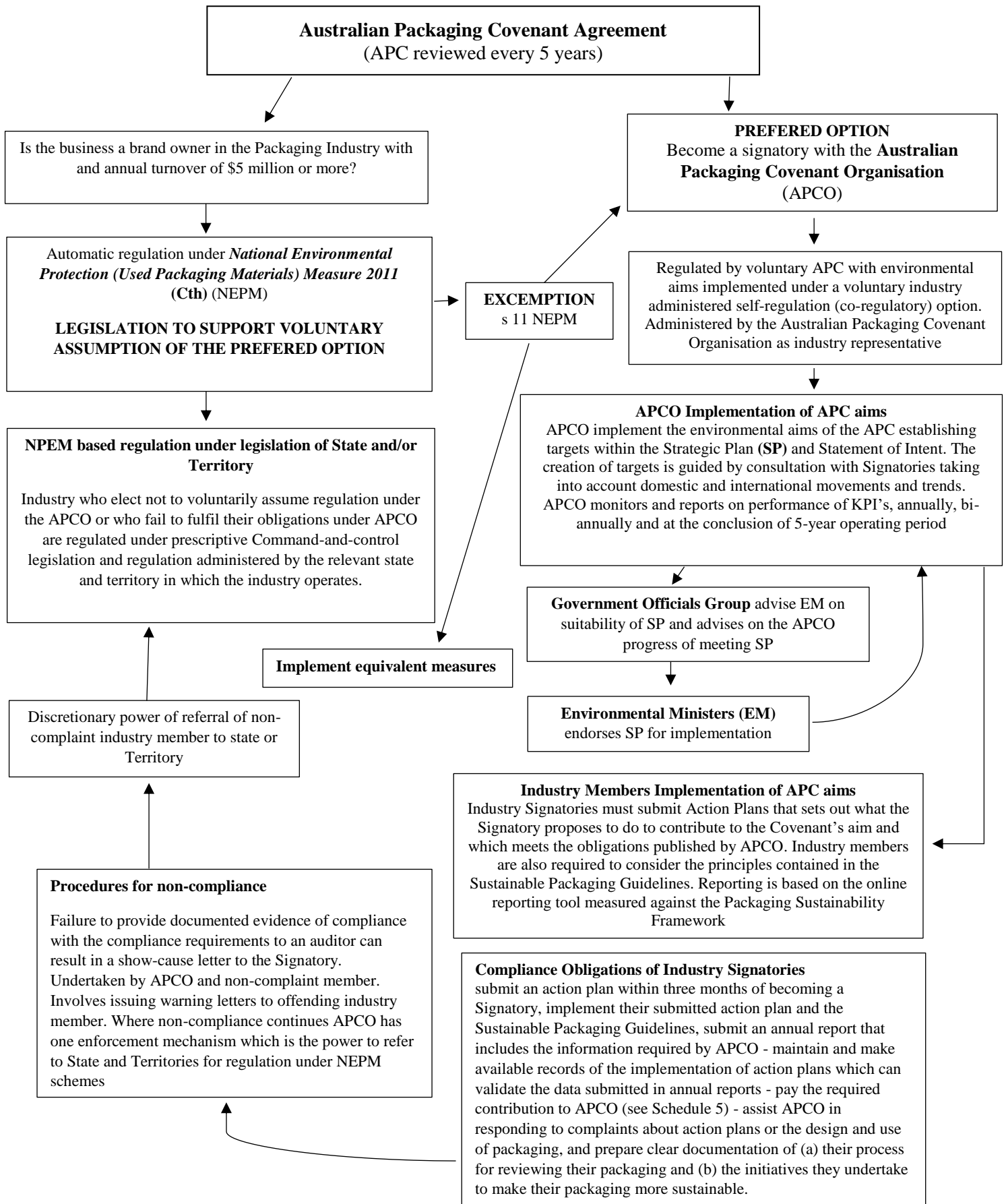
It is also noted that the penalties contained for breaches of these obligations are set rather low, which brings into question whether fines issued under these instruments would in fact act as a deterrent or punishment for non-compliance of obligations set under these instruments.⁴⁴¹ Finally, and most notably, the NEPM does not contain any mechanisms that would allow it to compel industry to make changes to their PP in favour of circular economy design characteristics, which suggests that the NEPM existence, overall, does not contribute to regulating PP for a circular economy.

Figure 3.6 below offers a visual representation of the operation of the Covenant and NEPM arrangements overall.

⁴⁴⁰ Enforcement, particular the potential cost associated with enforcement in complex regimes, is one of the common theoretical weaknesses of command-and-control regimes. See Baldwin, Cave and Lodge (n 88) 110.

⁴⁴¹ This is discussed in greater detail in 3.3.6.4. In saying this the, it would be possible that the monetary penalties imposed under the schemes could quickly add up depending on the size of the company and depending on whether the brand owners operate in more than one jurisdiction and subsequently are liable under various combinations of the schemes above.

Figure 3.6 - Basic Visual Outline of the Operation of the Covenant Arrangement



3.3.5 Reviewing the Covenant against the Circular Regulatory Design Principles

With a focus on assessing the ability of regulatory strategies to encourage manufacturers to produce circular PP products, in order to determine the circularity of the APC arrangement, it is highly relevant to assess whether the APC pursues circular packaging aims, and can encourage manufacturers to pursue these aims.⁴⁴²

3.3.5.1 Reviewing the Covenants Aims

As previously stated in 3.1.2, to determine the circularity of the APC agreement, the overall Covenant arrangement with specific focus on the targets and KPI's established by the APCO will be reviewed against the Circular Regulatory Design Principles established in Chapter 2 and outlined in 2.4. Next, the monitoring and enforcement mechanisms established under the Covenant will be reviewed to determine the ability of the Covenant to influence industry signatories to achieve the established targets. As has been made evident from the outline of the Covenant's operations above, although the Covenant outlines the central aim and supporting goals that underpins the purpose of the Covenant arrangement, the APCO is responsible for the interpretation and practical industry implementation of these aims. This is undertaken primarily through the development of specific targets outlined within the APCO Strategic Plan.⁴⁴³ As the Strategic Plan establishes KPI's for both the APCO as a representative body, as well as industry members respectively, this document is relevant for review in this section.

In addition, although the APCO is responsible for determining the targets for physical implementation of the Covenant's environmental aim, the achievement of these targets, and more generally, the potential for changes to packaging design overall can only transpire as a result of the decisions and actions taken by individual industry members. As far as signatories are concerned, the SPG appears to hold the greatest potential to influence physical PP product design.⁴⁴⁴ As such, in addition to the Covenant and Strategic Plan, the SPG is a relevant document for review in this section.

⁴⁴² To do so would require the presence of effective monitoring and enforcement mechanisms. In the instance where gaps are identified with regards to the circularity of the APCO aims, or the lack of enforcement, these will form the basis for reform recommendations in Chapter 4.

⁴⁴³ *Australian Packaging Covenant* (n 248) 10.

⁴⁴⁴ Considering the principles outline APCO vision for sustainable packaging and the Covenant obliges all industry signatories to consider this document as part of their Covenant obligations. The Covenant stipulates that 'Brand Owner Signatories are required to take the following actions....(which includes) allow[ing] independent audits of annual reports and the implementation of action plans, including allowing access to relevant supporting documentation demonstrating application of the Sustainable Packaging Guidelines, or an alternative to the Guidelines.' See *Australian Packaging Covenant* (n 248) cl 10.

The Strategic Plan

Prior to commencing review of the targets contained within the Strategic Plan, it is prudent to note that there has been sufficient movement in Australia's waste policies over the past three years. These changes have subsequently influenced the content and focus of the targets contained in the APCO's Strategic Plan. As mentioned above in 3.3.3.1, the Strategic Plan operates alongside the APC agreement, and is operational for a period of 5 years. Subsequently, the APCO implemented an initial Strategic Plan in 2017 coinciding with the APC agreement. This Strategic Plan was scheduled to operate from 2017-2022, as approved by environmental ministers in 2017.

However in 2019, the APCO amended their original Strategic Plan in response to the Commonwealth Government's announcement of the National Packaging Targets in 2018.⁴⁴⁵ This amended version of the Strategic Plan is scheduled to operate for the remainder of the 2017 APC agreement from 2019-2022.⁴⁴⁶ Established in response to China's National Sword Policy which effectually banned the import of a large portion of Australia's export plastic recycling,⁴⁴⁷ the National Packaging Targets were introduced by the Federal Government as a means to boost Australia's domestic recycling industry. The National Packaging Targets established a goal for the packaging industry whereby 100 percent of packaging in Australia, including all packaging made, used, or sold within the country, are to be reusable, recyclable, or compostable by 2025 or earlier.⁴⁴⁸

Although the National Packaging Targets are not binding in any legal sense, and do not include any explanations as to how the terms 'recyclable, re-useable or compostable' are to be defined, the introduction of the National Packaging Targets in 2018 led to a refocusing of the

⁴⁴⁵ On the 27th of April 2018, under the Seventh Meeting of the Federal, States, and Territory Ministers for the Environment agreed to six aims in establishing a sustainable path for Australia's recyclable waste see 'Mem7-Agreed-Statement.Pdf' (n 159). The National Packaging Targets were subsequently included in the 2019 National Waste Policy Action Plan as agreed to by environment ministers, and the President of the Australian Local Government Association, Australian Packaging Covenant, *Australian Packaging Covenant Strategic Plan 2017–2022 Version 2 - January 1, 2019* (2019) 2 <<https://www.environment.gov.au/system/files/resources/e2f0f12e-fa6e-4a4b-94e3-1268d9cd1360/files/australian-packaging-covenant-strategic-plan-2017-2022.pdf>>; Federal Government Department of the Environment and Energy, 'National Waste Policy Action Plan 2019' (n 7) see 1 & 5.

⁴⁴⁶ Australian Packaging Covenant, 'Australian Packaging Covenant Strategic Plan 2017–2022 Version 2 - January 1, 2019' (n 390) 5.

⁴⁴⁷ See generally, Rowena Maguire et al, *A Review of Single-Use Plastic Waste Policy in 2018: What Will 2019 Hold in Store?* <<https://eprints.qut.edu.au/127711/2/127711.pdf>>. The content of the original Strategic Plan underwent a rather substantial amendment in 2019 in response to a number of changes in the policy landscape enacted in response to the ban on plastic waste imports as a result of China's National Sword Policy in January 2018. The National Sword Policy effectively banned the import of PP materials from several countries including Australia, which as a large export market for the country, decimated Australia's largest PP waste export market. See O'Farrell and Australian Government Department of the Environment and Energy (n 148) 19. Subsequently, in an attempt to boost Australia's recycling industry, in 2018 the Federal Government in agreement with the State and Territory Governments enacted the country's second National Waste Policy and implementing the intention to implement a circular economy within the country. See Federal Government Department of the Environment and Energy, '2018 National Waste Policy: Less Waste, More Resources', *Department of the Environment and Energy* (June 2019) <<http://www.environment.gov.au/>>. Under priority 4 of the policy, plastic packaging became a specific focus which was further upheld within the National Waste Policy Action Plan (NWPAP) in 2019. See Federal Government Department of the Environment and Energy, 'National Waste Policy Action Plan' (n 11).

⁴⁴⁸ Since 2018 the NPT have been included within the National Waste Policy Action Plan as agreed to by environment ministers, and the President of the Australian Local Government Association, Australian Packaging Covenant, 'Australian Packaging Covenant Strategic Plan 2017–2022 Version 2 - January 1, 2019' (n 390) 2; Federal Government Department of the Environment and Energy, 'National Waste Policy Action Plan 2019' (n 7) see 1 & 5.

KPI's contained within the 2017 Strategic Plan, with the National Packaging Targets becoming the main focus for the target established by the APCO for themselves and their members from the packaging industry.

Despite the circular economy not being clearly referenced by the National Packaging Targets, the targets overall aim for industry to produce 100% of packaging to be re-useable, recyclable or compostable coincides with the overall aim for PP packaging within the New Plastics Economy. As such, by incorporating the National Packaging Targets, the 2019 Strategic Plan has subsequently incorporated a more circular design focus into the Strategic Plan. Moreover, in addition to the National Packaging Targets, the APCO sets additional targets within their Strategic Plan such as an aim for industry to achieve a target of 70% of PP being recycled or composted by 2022, and a 20% average incorporation of recycled content into the production of PP products. It also aims to phase out 'problematic and unnecessary single-use plastic packaging through redesign, innovation or alternative delivery methods.'⁴⁴⁹

To deliver the National Packaging Targets through the 2019 Strategic Plan, the APCO developed three key priority areas to guide their KPI's. These include a focus on

1. Improving packaging design, with the aim for industry to 'make packaging that is recyclable, reusable or compostable and reduce problematic and unnecessary waste.'
2. Increase systems and education, which calls for APCO to facilitate 'education of stakeholders.... through research initiatives, strategic development and facilitating collaboration...'
3. Improve materials circularity, whereby the APCO aims to drive commercially viable outputs for recycled material by 'support[ing] technological and market place initiatives to improve use of recyclable, reusable and compostable packaging materials.'⁴⁵⁰

Underpinned by these central pillars, the 2019 Strategic Plan subsequently establishes 9 KPI's perusable by the APCO and industry as the focus of the Covenant.⁴⁵¹ Of these KPI's, seven are scheduled to be implemented between 2019 until 2021, with the remaining two KPI's to be implemented between 2021 and the end of the APC in 2022. With the overall collection of annual review data, and the evaluation of this data the method outlined as central to identifying the success of these goals.

⁴⁴⁹ Australian Packaging Covenant, 'Australian Packaging Covenant Strategic Plan 2017–2022 Version 2 - January 1, 2019' (n 390) 2.

⁴⁵⁰ Ibid 3–4.

⁴⁵¹ Ibid 6.

Looking at the targets set by these KPI's, it is evident that the majority of the KPI's set within the Strategic Plan are targeted primarily toward the APCO, with only a small number of sub-targets established for industry. Of the nine targets, the first seven propose that the APCO develop collaboration groups⁴⁵² for research and identification of pilot projects,⁴⁵³ as well as an aim to grow the involvement of industry with the Covenant through increased membership of industry to the APCO.⁴⁵⁴ The sub-targets established for industry signatories establish aims for industry to engage with the Packaging Recycling Label program,⁴⁵⁵ as well as generate continued increase in the use of the online reporting tool as discussed in 3.3.3.2.⁴⁵⁶ The two KPI's remaining do not impose any requirements on industry signatories and are instead focused on the evaluation of pilot projects and a determination of whether the 'National Packaging Targets measures are on track' with the potential for 'additional KPIs and measures for the realization phase [to] be considered as part of the 2022–2027 strategic plan.'⁴⁵⁷ These dates in themselves indicate achievement of the National Packaging Targets is unlikely.

The Sustainable Packaging Guidelines

First implemented as part of the 2010-2015 Covenant,⁴⁵⁸ the SPG were developed by APCO to assist industry members in the 'design and manufacture of packaging that meets the sometimes-conflicting demands of the market, consumer protection and the environment,'⁴⁵⁹ and are described under the Covenant as a process that 'companies can apply to review their packaging and demonstrate that it has been designed for resource efficiency and reduced environmental impact'.⁴⁶⁰ As mentioned above, the SPG is focused on packaging design and outlines guidance to industry for the re-design of packaging for improve sustainability and as such, as far as signatories are concerned, is the only attempt under the Covenant to actually influence PP product design overall.⁴⁶¹

⁴⁵² 'KPI 3: Partnerships and, CAG and working groups established and delivering tangible outcomes.' Ibid.

⁴⁵³ 'KPI 5: CAG and Working Groups have developed tangible outcomes.' Ibid.

⁴⁵⁴ 'KPI 7: Level of engagement across the supply chain with sustainable packaging initiatives.' Ibid.

⁴⁵⁵ 'KPI 1: Proven industry engagement with the APCO Packaging Recycling Label program.' Ibid.

⁴⁵⁶ 'KPI 4: Monitoring and Reporting frameworks established; Measure: 70% of APCO Members have reported on the 2025 National Packaging Targets through the ART by 2020; Measure: Robust audit protocols for ART, PREP and ARL users have been implemented by 2020' Ibid.

⁴⁵⁷ 'KPI 8: Pilot projects have been established and outcomes evaluated. Ibid.

⁴⁵⁸ The SPG, replacing the Environmental Code of Practice for Packaging, were incorporated into the new 2010 Covenant, and remains within the 2017 APC. *Australian Packaging Covenant* (n 248) 6.

⁴⁵⁹ *The Sustainable Packaging Guidelines* (n 322) 3.

⁴⁶⁰ *Australian Packaging Covenant* (n 248) 8.

⁴⁶¹ This is despite the shared responsibility of manufacturers and the focus of the Covenant being product design. For obligations related to the SPG under the Covenant, see *Australian Packaging Covenant* (n 248) cl 10.

The SPG establishes 10 principles to assist industry design and produce Sustainable Packaging.⁴⁶² As stipulated under the Covenant, the SPG document is at times liable to changes by APCO who are responsible for ‘maintaining and updating the guidelines and providing information on the changes to the Government Officials Group.’⁴⁶³ Although consideration of the SPG is a requirement of the Covenant, the application of the various principles under the SPG varies depending on the nature of the signatories’ operations, as well as the size of their organisation.⁴⁶⁴ Under the SPG, the number of principles a signatory is required to apply when considering the SPG depends on the businesses annual income, with the SPG classifying industry signatories as either small organisations (companies with an annual turnover less than \$50 million dollars), medium (companies with an annual turnover \$50 million and \$750 million) or large members (companies with an annual turnover over \$750 million). From here, it is surprisingly difficult to ascertain which of the 10 principles need to be considered by each signatory due to the fact that the SPG contains conflicting information to this regard. For example, the introductory information surrounding the implementation of the SPG principles suggests that all new members are required to consider principle 1 only. From here the consideration of additional principles and the level of progress a company wants to achieve (from *good* to *beyond best practice*) will require the consideration of additional principles depending of the size of each member’s organisations.⁴⁶⁵ However, each of the 10 principles contain a section that outlines the minimum requirements of each principle. When reviewing the minimum standard of each of the 10 SPG principles it becomes evident that the minimum requirement under the SPG requires small and medium sized organisations to consider principle 1 only, with large businesses required to consider all 10 principles.⁴⁶⁶

Further complexity becomes evident with the existence of an exception contained within the SPG, whereby the Covenant allows signatories the option to consider alternative guidelines that bypass the SPG in instances where they feel they can achieve equivalent outcomes to the SPG.⁴⁶⁷ This can be a potential issue for monitoring, particularly if there are multiple guidelines being used by various brand owners.

Finally, it is relevant to note, that due to the fact that the Covenant is concerned with all packaging material types, the principles contained within this document need to remain broad to

⁴⁶² See Australian Packaging Covenant Organisation, ‘Sustainable Packaging Guidelines SPG’s’ (n 268).

⁴⁶³ *Australian Packaging Covenant* (n 248) 8; *The Sustainable Packaging Guidelines* (n 322) 5.

⁴⁶⁴ *Australian Packaging Covenant* (n 248) 8.

⁴⁶⁵ *The Sustainable Packaging Guidelines* (n 322) 4.

⁴⁶⁶ *The Sustainable Packaging Guidelines* (n 322) 8-16.

⁴⁶⁷ The obligations of industry to consider the Sustainable Packaging Covenant has been discussed under 3.3.3.1. This obligation is outlined under the Covenant under section 10. See *Australian Packaging Covenant* (n 248) 16.

encompass all packaging types. In doing so, the SPG fails to reflect the specific challenges that face specific packaging materials. Subsequently, the principles pursued under the SPG may not be specific enough to make necessary changes to packaging especially with regards to PP products.

3.3.5.2 Application of the Circular Regulatory Design Principles to the Covenant

Principle 1 – *Generates Meaningful Participation of Lifecycle Stakeholders*

Principle 1 of the Circular Regulatory Design Principles is concerned with generating and maintaining communication activities with all members from all segments of the PP lifecycle, including manufacturers, consumers, end-of-use processors as well as all levels of government.⁴⁶⁸ The importance of meaningful collaboration has previously been discussed in 1.2.3 and 2.4.⁴⁶⁹ For the purpose of this review, to evidence satisfaction of this criteria, the Covenant should both incorporate relevant lifecycle stakeholders when formulating their targets as well as maintain meaningful participation of stakeholders within the projects and operations the APCO undertakes. This will ensure that the unique activities and problems faced by each stakeholder in PP lifecycle is understood, and each member of the lifecycle can work together to advise manufacturers as to what actions should be taken to improve PP product design for the generation of circular material loops.

With respect to the former, as has been highlighted in 3.3.3.1, the Covenant outlines the requirements associated with the formation of the APCO targets, with these targets developed in consultation with all signatories to the Covenant giving regard to national and international trends. As mentioned in 3.3.2.1, the APCO provides a number of types of non-brand owner memberships for affiliate contribution and support of the Covenant.⁴⁷⁰ This *prime facie* indicates that there is potential for stakeholder input with respect to the development of targets under the Strategic Plan. Yet, from the information available, it is unclear whether these memberships allow for involvement with the targets established under the Strategic Plan. Overall, it can be assumed that although government and other life-cycle stakeholders are entitled to be signatory under the

⁴⁶⁸ The inclusion of all levels of government is important in this instance, because state and territory governments are responsible for generating environmental policy generally, and local government has a significant allocation of responsibility with regards to the collection of PP waste materials from consumers via kerbside collection services.

⁴⁶⁹ To reiterate, the importance of meaningful collaboration is because although design considerations for PP products are physically the responsibility of upstream manufacturers, as a fundamental aim to the circular economy overall, regulation in this area should aim to generate communication between all stakeholders within the lifecycle of PP. Moreover, in order to generate material loops PP products will need to be able to be circularly processed (re-used, recycled, repaired or reprocessed) at later stages of the products lifecycle. In order to do this, manufacturers will need to produce PP products that are able to be processed in this way. To create such PP product, manufacturers will need to understand the unique activities undertaken by each stakeholder in PP lifecycle as well as adequately encompass these activities and issues into the decisions and actions taken by manufacturers to design new and improve existing PP product.

⁴⁷⁰ This includes industry association, government, international affiliation and sustainability professional with various perks and access available in association with these memberships. The various membership groups allow various levels of features, which can include 'exclusive access to the APCO Member Centre, including case studies, webinars, technical guides...events, industry roundtables, training and discounted partner events...one annual consultation session with APCO staff..' See 'ApcoWeb' <<https://apco.org.au/about-membership>>.

Covenant,⁴⁷¹ the majority of signatories under the APCO are industry members. Subsequently, it can be assumed that industry members hold the majority of weight in the compilation of the APCO targets and strategies. Similarly, the APCO are responsible for ‘maintaining and updating the guidelines’,⁴⁷² which are agreed to by the government without input from any further lifecycle stakeholders.⁴⁷³ This indicates that with respect to target generation, the Covenant does not currently generate meaningful lifecycle collaboration.

Despite the lack of stakeholder collaboration in the development of APCO targets, there is clear evidence that the APCO appears to foster collaboration within multiple stakeholders with the projects and operations it undertaken in accordance with the Covenant.⁴⁷⁴ Evidence of such collaborative actions is outlined on the APCO website, and includes interactions between the APCO and government, industry and strategic partners such as not-for-profits, environmental groups, as well as influential waste management and recycling companies.⁴⁷⁵ Meaningful collaboration also features as the focus of the KPI’s of the Strategic Plan, which outlines the importance and the need for ‘whole-of-supply chain collaboration’ between ‘many stakeholders’.⁴⁷⁶ This recognition is subsequently reflected within the targets of the Strategic Plan, with a number of targets aimed at developing collaboration groups⁴⁷⁷ for research and identification of pilot projects by the APCO.⁴⁷⁸

Overall, despite the lack of involvement associated with generating the Strategic Plan targets and the lack of collaboration evident in the drafting on the SPG, the APCO appears to have made significant attempts to foster meaningful collaboration between stakeholders relevant to the PP lifecycle. One notable group absent in this collaboration however are consumers. As noted, consumers are responsible in the lifecycle of PP products for the physical disposal of PP *waste*. As such, it would be assumed that consumers groups as representatives for consumers would have a

⁴⁷¹ Australian Packaging Covenant (n 248) 10.

⁴⁷² Australian Packaging Covenant (n 248) 8; *The Sustainable Packaging Guidelines* (n 322) 5.

⁴⁷³ *The Sustainable Packaging Guidelines* (n 322).

⁴⁷⁴ Australian Packaging Covenant, ‘ApcoWeb Collaboration with Government’ <<https://apco.org.au/collaborating-with-governments>>; Australian Packaging Covenant, ‘ApcoWeb Collaboration with Industry’ <<https://apco.org.au/collaborating-with-industry-sectors>>; Australian Packaging Covenant, ‘ApcoWeb Collaboration with Strategic Partners’ <<https://apco.org.au/collaborating-with-strategic-partners>>; Australian Packaging Covenant Organisation, ‘ApcoWeb Collective Action Group’ <<https://apco.org.au/the-collective-action-group>>.

⁴⁷⁵ These include affiliates from Planet Ark, PrepDesign, Redcycle and the waste management Review. See Waste Management Review, ‘About’, *Waste Management Review* <<https://wastemanagementreview.com.au/about/>>; Australian Packaging Covenant, *ApcoWeb Collaboration with Strategic Partners* (n 416).

⁴⁷⁶ Australian Packaging Covenant, ‘Australian Packaging Covenant Strategic Plan 2017–2022 Version 2 - January 1, 2019’ (n 441) 8.

⁴⁷⁷ *Ibid* 6.

⁴⁷⁸ For example, KPI 3 centres on generating partnerships and aims to establish the Collective Action Group and working groups. The Collective Action Group is described as a group of experts from the entire value chain for all packaging, from packaging manufacturers, brand owners, retail, civil society, governments and recovery sectors. The current members of the Collective Action Group are transparently published online, and while the group has successfully incorporated experienced representatives from most segments of the packaging lifecycle there is no representation for consumer groups. Members of the working groups are less clear however, and are listed to include ‘representatives from government, industry, academia and the community sector.’ See *Ibid*; Australian Packaging Covenant Organisation, *ApcoWeb Collective Action Group* (n 419); ‘APCO Working Groups - Australian Packaging Covenant Organisation Ltd.’ <<https://www.packagingcovenant.org.au/who-we-are/apco-working-groups>>.

degree of involvement or input into how packaging might play a role in encouraging favourable consumer behaviour related to this task. The lack of input in this way indicates a potential weakness in this scheme. Another notable group absent in the APC scheme are all industry businesses exempt as non-brand owners under the Covenant (meaning they make an annual income less than \$5mill). Although it is appreciated that the ‘brand owner’ exception has been included to avoid unfairly burdening small business and if reversed might create a significant additional cost to the APCO to monitor and administer the Covenant arrangement, there is a need for small businesses to incorporate some form of circular considerations into the packaging they chose within their business operations. This is especially the case considering that small and medium size businesses make up 98 per cent of Australian businesses, but less than 40% of these businesses consider sustainability as part of their operating practices.⁴⁷⁹ Furthermore the circular economy concept applies to all areas of the economy and encompasses all products in its scope. This suggests that all PP products design should be addressed in order to ensure material loops are successfully created, and further suggests that this exemption might warrant revision.

Principle 2 - Promotes Reductions in Material Consumption

The underlying focus for a circular economy for PP under the New Plastics Economy involves an overall reduction in material consumption achievable through the recirculation of plastic material in production loops. Reductions in material consumption can also be achieved through using less material per item (reduced volume), producing less items overall, as well as incorporating more re-use and recycled items into the system.⁴⁸⁰ However, reducing material consumption does not involve merely swapping one problem product with another that merely utilises less material resources for reduced material consumption. As such, when pursuing a reduction in consumption, consideration must also be afforded to whether the PP packaging format incorporated remains compatible with circular recycling at the end-of-use lifecycle segment.⁴⁸¹

With regards to the Covenant, although recognition of the need to avoid increasing material consumption is mentioned within the Strategic Plan, there are no KPI’s set for reducing

⁴⁷⁹ According to the Australia Post white paper of 2021, small and medium size businesses make up 98 per cent of Australian businesses, contribute over \$4 billion to the Australian economy and employ close to half the nation’s workforce Australia Post and Banksia Foundation, *Small Business Sustainability in a COVID-19 World* (January 2021) 28, 7 <https://auspost.com.au/content/dam/auspost_corp/media/documents/sustainability-white-paper.pdf>.

⁴⁸⁰ Another way in which industry appear to be reducing material consumption for PP, is by incorporating a percentage of renewable material into their product. Although technically reducing the volume of virgin plastic needed for that product, this action still generates the same amount of waste which is not degradable if leaked into the environment. Furthermore, it is unclear whether this hybrid packaging is compatible with recycling processes. It might be assumed however, that more additives included within this hybrid PP product would make it less compatible and would potentially further reduce the quality of that recycled material.

⁴⁸¹ See Ellen MacArthur Foundation, The Pew Charitable Trusts, and SYSTEMIQ (n 103) 9.

consumption included in the Covenant's Strategic Plan.⁴⁸² This means there are no measurable targets focused on achieving a reduction in material consumption within the Covenant. A less stringent target for reduced consumption is featured within the SPG under principle 2 of the SPG however. Aimed at 'optimis[ing] material efficiency' and reducing the consumption of material, consideration of this principle is reserved for large industry members only, meaning reducing consumption is not an industry wide focus.

Pursuit of reduced consumption through reduced weight would appear *prime facie* compatible with Design Principle 2. However, as discussed, because the Covenant applies broadly to all packaging materials the principles of the SPG have had to have been broadly drafted to encompass all packaging types. As such, although reducing product weight is generally a means to reduce material input, preferencing weight reductions across all packaging types equally under principle 2 may not elicit the environmental benefits intended under a circular economy. In fact, promoting broad material weight reductions across all packaging materials may encourage industry to incorporate more soft-plastics packaging into their particular packaging range.⁴⁸³ This is because technically PP products are lighter than other packaging material alternatives, such as glass.⁴⁸⁴ As such, industry members may fulfil principle 2 by reducing the weight of their packaging by swapping out glass products for soft-plastic products at reduced material weight. The issue with incorporating more soft plastic PP however, is that currently soft plastics are the hardest to recycle, travel the furthest when leaked into the natural environment, and are subsequently the least economically desirable within the recycling material market. As such, although the SPG contains a principle focused on reducing material consumption, the lack of material specific focus of this principle means that principle 2 is not currently compatible with reducing consumption to the manner desirable under a circular economy.

For the reasons above, it is concluded that the current Covenant does not uphold Design Principle 2.⁴⁸⁵

⁴⁸² Australian Packaging Covenant, 'Australian Packaging Covenant Strategic Plan 2017–2022 Version 2 - January 1, 2019' (n 390) 2.

⁴⁸³ This exact outcome has been evidence previously, as a weight focus for reduced consumption has in fact existed since 2005. At this time industry were quoted as indicating that they had incorporated more soft 'lighter, multi-material laminates' as a means to fulfil this aim. See Nicole Sommer (n 163) 280.

⁴⁸⁴ Generally, the call for reduced material consumption through reduced weight under the SPG appears to be the preferred method for the APCO to encourage reduced consumption, over the incorporation of other material reduction options are highlighted above. In fact, reduced consumption through reduced weight has been a target of the APCO since 2005, with the incorporation of lighter packaging deemed to be evidence of material reduction and fulfilment of this obligation by industry. See Ibid 280.

⁴⁸⁵ To address this, the Covenant, particularly the SPG, should enact material specific targets and specify that material reductions for PP should be evidence backed with consideration afforded to whether the PP product subsequently produced can still be processed at the end-of-use stage segments of the lifecycle. Another way in which industry appear to be reducing material consumption for PP, is by incorporating a percentage of renewable material into their product. Although technically reducing the volume of virgin plastic needed for that product, this action still generates the same amount of waste which is not degradable if leaked into the environment. Furthermore, it is unclear whether this hybrid packaging is compatible with recycling processes. It might be assumed however, that more additives included within this hybrid PP product would make it less compatible and would potentially further reduce the quality of that recycled material.

Principle 3 – Includes Clearly Defined Circular Product re-design aims using standardised definitions and Circular design trends

As has been continuously highlighted throughout this thesis, design choices related to the physical makeup of PP products is a fundamental cornerstone for the production of circular PP products. As such, to improve circularity under this criterion, targets established under the Covenant would need to clearly outline aims for PP product re-design that encourage manufacturers to produce PP products that are re-usable, recyclable or compostable. Drawing on examples outlined in 2.3.1, the way in which Covenant could evidence incorporation of Principle 3 would be in instances where they set aims or targets for the phasing out toxic additives, small format packaging, problematic dyes, or encouraged the uptake of the use of recycled materials into PP products amongst other things.⁴⁸⁶

With regards to the Covenant arrangement, *prime facie* the introduction and incorporation of the National Packaging Targets by the APCO may be viewed as an attempt to incorporate circular economy focused PP product re-design aims into the Covenant agreement. In fact, it is appreciated that were industry to successfully achieve the National Packaging Targets they would have undertaken all they could to support the generation of material loops for PP in pursuit of a circular economy. However, the National Packaging Targets are not defined or enforceable as they stand, and rely solely on industry interpretation and uptake for their achievement. This being said, although the National Packaging Targets are mentioned within the APCO Strategic Plan, little physical implementation of these targets appears to have translated into the measurable KPI's of the Covenant. In fact, the only KPI that focuses in anyway on the physical aesthetic design of packaging, is KPI 1. KPI 1 sets a target for 50% of industry members to feature the Australian Recycling Label upon their packaging,⁴⁸⁷ and commence utilisation of the Packaging Recyclability Evaluation Portal (PREP) system by 2020.

The Australian Recycling Label features on a number of packaging products available for consumer purchase already. The label clearly identifies the various components of the packaging of a product and utilises visual symbols to instruct consumers on how to properly dispose of these

⁴⁸⁶ Other examples would include aims for the scale up of compostable packaging for high-risk contaminated products would be encouraged. These examples have been highlighted within the New Plastics Economy and discussed in 2.3.1 as physical PP design characteristics that need to be addressed to improve the circularity of PP products. See Ellen MacArthur Foundation and Project MainStream (n 15); Ellen MacArthur Foundation, 'The New Plastics Economy Catalysing Action' (n 79).

⁴⁸⁷ This target is also supported under the SPG under principle 3 - 'Design to reduce product waste', aims for manufacturers to 'design packaging to eliminate or reduce avoidable product waste. This includes information on the label to assist consumers to reduce waste.' *The Sustainable Packaging Guidelines* (n 322) 11.

products. *Figure 3.7* below demonstrates the three symbols that make up the Australian Recycling Label.

Figure 3.7: Australian Recycling Label Symbols



To be used in conjunction with the Australian Recycling Label, the PREP system is an online tool established by the APCO for use by industry to determine the recyclability of their packaging in order to apply the correct Australian Recycling Label onto their product. PREP allows industry members to enter the specifics of their packaging products to determine whether the product is recyclable, non-recyclable, or conditionally recyclable, as well as the availability of collection services, and how the packaging will behave in a Materials Recovery Facilities or other processing facilities.⁴⁸⁸

Both the Australian Recycling Label and PREP system are excellent initiatives established by APCO and can be used to support the generation of material loops. For example, the Australian Recycling Label has the ability to educate consumers with regards to how to properly dispose of their PP products after use and may favourably reduce the occurrence of waste contamination for recycled material. Similarly, the PREP system has the ability to assist industry in identifying the recyclability of the PP products within their packaging lines and improve the recyclability of these products if desired.

However, use of the Australian Recycling Label alone without addressing any other necessary design considerations, will not improve the circularity of PP products. Furthermore, focusing solely on consumer education for disposal without examining the processing ability of PP products as a measurable target continues to support the pre-existing idea that waste is a consumer and local government issue. This is a problem especially insofar as the generation of material loops, because it fails to address the fact that consumer disposal and local government

⁴⁸⁸ See generally Australian Packaging Covenant and Planet Ark, 'PREP - Removing Confusion from Recycling' <<https://prep.org.au/main/content/home>>.

processing capacity for the creation of circular material loops is highly dependent on the design choices and PP products produced by manufacturers. Instead, the targets of the Strategic Plan should incorporate more circular re-design aims. For example, the APCO could encourage industry members to address the incompatibilities with their current PP products by linking the results of the PREP system to the drafting of individual Action Plans as an obligation under the Covenant. As part of this obligation, industry members would be required to make improvements to their PP products in line with the identified recyclable issued identified under the PREP system.

The SPG similarly encompasses the National Packaging Targets under principle 1 '*design for recovery*', which is a principle to be considered by all industry members under the Covenant.⁴⁸⁹ Overall, Principles 1 promotes the redesign of products to achieve the National Packaging Targets, as well as promotes the need to incorporate the recycling label discussed above onto packaging to help influence the consumer segment to correctly dispose of packaging products. Although this principle promotes the redesign of packaging in line with the National Packaging Targets, it also features and promotes redesign in favour of the waste hierarchy. This means that principle 1 preferences re/designing products in favour of circular principles such as promoting re-use, recycling and also includes composting of material, but also allows redesign with the aim of waste to energy, which is not a circular economy aim.⁴⁹⁰

As mentioned above, currently the National Packaging Targets does not define re-use, recyclable or compostable, as such it is promising to see that the APCO has elected to define these terms in a surprisingly circular compatible manner. In fact, the definitions of these terms appear to coincide closely with the definitions contained within the New Plastics Economy.⁴⁹¹ For example the defined aim of re-use under principle 1, is 'to extend the life of packaging through multiple uses prior to recycling'. For packaging to be viewed as recyclable under principle 1, it must be able to maintain '...the same level of quality when possible'. Finally, pursuit of compostable packaging is flagged as an option for packaging that 'is not recyclable through material recycling systems, or that might become food-contaminated'. Subsequently, this sets a clear standard to industry as to what each packaging options entails. The only negative issue that might be highlighted here, is that although the terms under this principle has been well defined there is no additional material specific resources available to industry that outlines what specific design

⁴⁸⁹ *The Sustainable Packaging Guidelines* (n 322) 8.

⁴⁹⁰ The Sustainable Packaging Guidelines states that 'material recycling can be achieved by using recyclable materials, by avoiding materials or components that may contaminate the recycling process, and by informing consumers about appropriate options for recovery prior to responsible disposal. To contribute to a circular economy, packaging is to be recycled into applications having the same level of quality when possible.' See *Ibid* 9.

⁴⁹¹ *Ibid* 9–10.

changes might be focused on in order to achieve packaging that is re-usable, recyclable or compostable for individual packaging material, such as PP.⁴⁹²

In addition to principle 1, there are also a number of additional principles within the SPG that correlate with the Design Principle 3. For example, principle 4 of the SPG encourages members to consider the elimination of hazardous materials,⁴⁹³ the use of recycled materials in packaging content,⁴⁹⁴ as well as the use of renewable alternatives.⁴⁹⁵ However, these additional principles need only be considered by large industry members only.

Ultimately, although there is some evidence that the SPG contains circular economy compatible product re-design aims as required under Design Principle 3, the lack of material specific direction of these aims makes it difficult for industry to determine what is required for producing circular compatible packaging. This will need to be addressed.

Principle 4 - *Contains Effective Compliance and Enforcement Mechanisms*

Monitoring systems

Credible and reliable reporting and monitoring mechanisms are essential for determining both members compliance with the Covenant's obligations, as well as the degree of success obtained in the implementation and performance of the KPI's and aims of the Covenant overall. This requirement links to Regulatory Design Principle 3.

As outlined in 3.3.3.2 both the ACPO and signatories have their own unique reporting requirements established under the Covenant. On one hand the APCO, as industry representative, is responsible for monitoring both signatory compliance in upholding their obligations under the Covenant, as well as monitoring the success of industry in achieving the overall aims of the Covenant.

With respect to the latter, the Covenant requires progress reports to be undertaken by the APCO annually, bi-annually and at the conclusion of the 5-year term of the Covenant to monitor industry progress. All three of these reports are compiled by the APCO, using annual review data collected from industry, as well as the outcome and completion of the APCO own measurable KPI targets. These reports are subsequently submitted to the Government Officials Group, who review the submitted information and draft their own report concluding the success of the APCO in

⁴⁹² The SPG does reference one quick guide in association with this principle, but this source is very broad. See, eg, 'Quickstart Guide Design for Recovery - Reuse, Recycling or Composting' <<https://www.packagingcovenant.org.au/documents/item/3153>>.

⁴⁹³ *The Sustainable Packaging Guidelines* (n 322) 12.

⁴⁹⁴ *Ibid* 13.

⁴⁹⁵ *Ibid*.

achieving the Covenant's overall aims. The report of the Government Officials Group is then submitted to the Environmental Ministers to update them on the packaging industry's progress.

While determining the fulfilment of the APCO's own measurable KPI targets would be relatively simple for the APCO to ascertain,⁴⁹⁶ progress of the Covenant is also determined by reference to industry data. However, the ability of the APCO to establish the progress of industry signatories with regards to their collective progress in line with the Covenants overall aim is questionable.⁴⁹⁷ As previously stated, the Covenant requires industry to demonstrate their pursuits in line with the Covenants aim by submitting an Action Plan. However, as detailed in 3.3.3.1, there are no guidelines to indicate what industry members should aim to incorporate into this document. As a result, a significant degree of operational discretion exists with regards to this obligation.⁴⁹⁸ The obvious degree of discretion, and the vast possibility of potential individual targets set by industry as a result of this discretion, means that it would be extremely difficult for the APCO to track the progress of each individual industry member without a comprehensive reporting system in place.

As noted in 3.3.3.2, the preferred method for industry to submit reporting information to the APCO is through use of the online Annual Reporting Tool.⁴⁹⁹ This tool utilises the Packaging Sustainability Framework criteria as a means to measure individual industry progress under the Covenant. However, when we examine the Packaging Sustainability Framework it becomes apparent that this criterion does not coincide with the individual targets featured within members own Action Plans, but instead, appears to overlap with a number of the principles outlined in the SPG.⁵⁰⁰ A number of issues arise from this fact. The first, is that use of the Packaging Sustainability Framework suggests that industry progress under the Covenant is not actually determined with regards to the targets established under their own individual Action Plans, but instead coincides with the uptake and implementation of the principles contained within the SPG. However as discussed, currently the obligation of industry in relation to the SPG is only to consider this guide. Furthermore, there are no timeframes outlined within the Covenant in which

⁴⁹⁶ Insofar as they either successfully met the target or didn't.

⁴⁹⁷ As indicated above in 3.3.3.2, the annual reporting tool is an online tool that measures signatory progress in relation to thirteen criteria separated into three categories, with six core and seven recommended criteria. Results from the report allow signatories to identify their strengths and weaknesses in relation to the framework, and provides signatories with recommendations and advice on how the organisation can progress to the next level within each criterion in the framework. See Australian Packaging Covenant, 'The Australian Packaging Covenant Organisation 2018/19 Annual Report' (n 329) 19; As Leadership; Packaging Processes and Outcomes; and Operations Kelly and University of Technology Sydney: Institute for Sustainable Futures (n 311) 26.

⁴⁹⁸ Although signatories may gauge inspiration from the or the SPG or Packaging Sustainability Framework under the signatory reporting tool, there is no specific obligation to incorporate these documents and subsequently Annual Report subject matter pertaining to goals is completely at the discretion of signatories. Scott Kelly, 'APCO Packaging Sustainability Framework'.

⁴⁹⁹ See Kelly (n 271) 1.

⁵⁰⁰ Eight of the Packaging Sustainability Framework criteria are compatible with the 10 SPG principles. Compare *Ibid* v; *The Sustainable Packaging Guidelines* (n 322) 8–16.

the obligation to consider the SPG is to be undertaken. Finally, the SPG is described under the Covenant as a guide only, with industry permitted to ‘implement equivalent measures’ to the SPG overall,⁵⁰¹ this means that there is no real requirement for industry to consider the SPG at all. The combination of this information suggests that the current monitoring and reporting mechanisms are insufficient for determining industry progress as it relates to the Covenant’s aim, but also brings into question the validity of obligation to draft discretionary industry Action Plan’s at all.

Finally, transparency issues appear to exist within the monitoring and reporting processes of the Covenant, particularly with respects to the interactions between the APCO and the Government Officials Group. As mentioned above, the Government Officials Group are ultimately responsible for informing the Environmental Ministers with regards to APCO’s progress as it relates to the Covenants central aim. However, despite such a significant task, neither the members of this group nor the processes used to determine the APCO’s success as it related to the Covenant’s aim, is made known to the public. This means that there is no way for academics or members of the public to determine or scrutinise how this group has determined the success of the Covenant.

Enforcement Mechanisms and Penalties

Under the Covenant, industry signatories are subject to enforcement proceedings in instances where they fail to comply with the obligations established under the Covenant. Industry non-compliance arises in instances where one or more of the obligations as outlined under clause 10 of the Covenant have not been undertaken.⁵⁰² As mentioned above (3.3.3.3), the ACPO is responsible for tracking the compliance of industry members in this regard. In viewing the obligation set out in clause 10, it is apparent that the vast majority of these requirements do not feature any timeframe for completion. Furthermore, there is no information regarding the process used by the APCO to assess each industry member’s compliance, nor how often this process is undertaken. Subsequently, it is hard to determine how the APCO is able to assess industry compliance in this regard. Despite this, instances of non-compliance evidently exist under the current Covenant, with a list of non-compliant industry members transparently published on the APCO website.⁵⁰³

⁵⁰¹ *National Environment Protection (Used Packaging Materials) Measure 2011* (Cth) s11.

⁵⁰² Schedule 5 of the Covenant entitled ‘non-compliance’ outlines the and include the requirement to ‘submit an action plan within three months of becoming a Signatory, implement their submitted action plan and the Sustainable Packaging Guidelines.....submit an annual report that includes the information required by APCO, maintain and make available records of the implementation of action plans which can validate the data submitted in annual reports - pay the required contribution to APCO, assist APCO in responding to complaints about action plans or the design and use of packaging.’ *Australian Packaging Covenant* (n 248) 16.

⁵⁰³ Australian Packaging Covenant, ‘ApcoWeb Non-Compliant and Withdrawn Signatories’ <<https://apco.org.au/withdrawn-signatories>>.

When found to be non-compliant, the APCO is entitled to pursue compliance procedures under schedule 5 against all non-compliant members.⁵⁰⁴ These proceedings involve the issuing of a number of show cause letters to the non-compliant industry members, and stipulates a set time period in which the non-compliant member is permitted to address and amend their non-compliant behaviour.⁵⁰⁵ Yet, although the APC contains procedure for addressing non-compliant signatories, there are no mechanisms established within the Covenant that would allow for the imposition of actual penalties to be issued by the APCO for non-compliant industry members. Instead, the only option available to the APCO for ongoing instances of non-compliance, is the right to report or refer non-compliant members to the relevant state or territory in which a business sells or distributes its products for compulsory regulation under the NEPM. Expulsion from the APCO for compulsory regulation under the NEPM may be viewed as a viable threat for industry, considering that the NEPM dictates compulsory requirements for industry members for recovery and processing of packaging material (as discussed in 3.3.4). However, this options arguably only becomes a viable penalty for industry in instances where regulation under the NEPM generates more onerous requirements for industry that are created under the APCO.

As discussed in 3.3.3.3, although these responsibilities appear *prima facie* more onerous than the requirements under the APCO, when the penalties contained for breaches of these obligations is examined, it becomes apparent that these monetary penalties are set rather low. As such, it is questionable whether these monetary fines issued to non-compliance brand owner under these instruments would in fact act as a deterrent. Furthermore, in accordance with the Annual Report of the National Environment Protection Council, for the past 5 years no complaints regarding brand owners or Covenant signatories were received by the relevant state/territory.⁵⁰⁶ Furthermore, no investigations or prosecutions have been undertaken by the relevant State or Territory and as such no monetary fines have been issued by any of the relevant state or territories agencies for non-compliance.⁵⁰⁷ This either suggests that all NEPM regulated industries are complying with their requirements under the NEPM, or that monitoring and enforcement of these requirements are not being strenuously undertaken.

Finally, there is no motivation, as far as penalty or enforcement mechanism, for the APCO to achieve their KPI's outlined in their Strategic Plan in pursuit of the aims of the Covenant overall. This is because the Covenant is silent with respect to penalties or ramifications against

⁵⁰⁴ Australian Packaging Covenant Organisation Ltd and Australian Government (n 322) 26.

⁵⁰⁵ Ibid.

⁵⁰⁶ *National Environment Protection Council 2015–16 Annual Report* (n 435); *National Environment Protection Council Annual Report 2016–17* (n 435); National Environment Protection Council, 'National Environment Protection Council Annual Report 2017–18' (n 435).

⁵⁰⁷ Ibid.

APCO for failing to achieve the KPI's covered under the Strategic Plan. This is a problem when we consider that the APCO has not once achieved one of their recycling targets over the 20 years the Covenant has existed.⁵⁰⁸

Principle 5 - Mobilise Resources for Circular Economy research projects and design innovations

To evidence Regulatory Design Principle 4, the Covenant should include evidence of resource allocation for undertaking circular research projects in such areas as design innovation, material disposal and processing advancements. When looking at the targets and activities undertaken by the APCO, it is clear that this entity are focused strongly on supporting and undertaking research activities, in fact, since 2010 the APCO has collectively invested \$33 million in over 45 projects relating to packaging, including on the ground clean-up programs, infrastructure support and pilot programs.⁵⁰⁹ These projects and activities are industry funded and utilise the membership fees of the individual industry signatories to the Covenant.

It would appear that research activities remain a strong focus of the KPI's within the 2019 Strategic Plan as well, with a third of the KPI's featured in the current APCO Strategic Plan targeted at generating and undertaking research projects. For example, KPI3 of the Strategic Plan sets a target for the APCO to establish working groups, partnerships,⁵¹⁰ and a 'Collective Action Group' for the purpose of devising and undertake research projects as well as generating collaboration between members along the packaging lifecycle.⁵¹¹ As of 2018, KPI3 has been progressed by the APCO, with five working groups being created and containing members made up of 'eighty experts, including manufacturers, brand owners, independent experts, resource recovery and recyclers, and all levels of government.'⁵¹² These working groups are said to have been created to undertake research for the purpose of establishing plans for the phase out of high priority

⁵⁰⁸ This is a comment made by the researcher after comparing targets set in previous Covenants to the percentage level Australia currently recycling data. For example, in 2005 the Covenant set a target for 35% of all material to be recycled by 2010, yet Australia's current recycling rate for PP is only less than 9%. See O'Farrell and Australian Government Department of the Environment and Energy (n 15) 1; Nicole Sommer (n 163) 225.

⁵⁰⁹ Australian Packaging Covenant, *Australian Packaging Covenant Strategic Plan 2017 – 2022 - Incorporating the 2017 – 2019 Statement of Intent* (2017) 7 <<https://www.packagingcovenant.org.au/documents/item/1036>>.

⁵¹⁰ Most recently 2020, the APCO formed ANZPAC which will form part of the Ellen MacArthur Foundation's Global Plastics Pact Network to work to address the nation's plastics crisis. It Australian Packaging Covenant Organisation, 'The ANZPAC Plastics Pact - Australian Packaging Covenant Organisation Ltd.' (March 2020) <<https://www.packagingcovenant.org.au/who-we-are/the-anzpac-plastics-pact>>.

⁵¹¹ These groups are made up of 12 leading representatives from across the supply chain and government, charged with overseeing the progress of Australia's 2025 National Packaging Targets. The members of this group are published online and include industry members, grocery stores, government, recycling council and NGO Planet Ark. Australian Packaging Covenant Organisation Ltd., 'Leading Industry & Government Representatives Announced as Part of Collective Action Group to Drive 2025 National Packaging Targets' <<https://www.packagingcovenant.org.au/news/leading-industry-government-representatives-announced-as-part-of-collective-action-group-to-drive-2025-national-packaging-targets>>.

⁵¹² The outcome of this research has identified that bar Glass and Biodegradable and Compostable Packaging, all difficult materials relate to PP products. This includes PP such as Expanded Polystyrene, Polymer Coated Paperboard and Soft Plastics Australian Packaging Covenant Organisation Ltd., '2018 Working Groups- Key Findings Now Available' <<https://www.packagingcovenant.org.au/news/2018-working-groups-key-findings-now-available>>.

materials, which are defined to include those packaging materials that pose the greatest challenge for recovery and recycling in Australia.⁵¹³ So far to date, these working groups have commenced programs focused on the identification of single-use, problematic and unnecessary plastic packaging. With these research projects selected to link together with the priority focuses outlined by the federal government and contained within the National Waste Policy Action Plan.⁵¹⁴

Although the outcome of these research projects has yet to be determined given the Covenant is still progressing through its current iteration, the topics being researched by these projects appear to correlate with the research topics relevant to circular PP product design as highlighted under Regulatory Design Principle 5. Furthermore, the way in which the working groups have been established in association with KPI3, sees the inclusion of members from the majority of segments of the product lifecycle in order to promote collaboration along the research in this area. As such, in addition to the presence of Regulatory Design Principle 5, research undertaken under the Covenant appears to uphold holistic collaboration, as outlined in Design Principle 1 as well.

3.3.5.3 The Overall Circularity of the APC after Application of the Criteria

The Covenant is an innovative voluntary arrangement which is nationally administered and combines various regulatory mixes making it a form of smart regulation making it compatible with the criteria attached to the Regulatory Design Principles. The Covenant has successfully generated a degree of meaningful stakeholder collaboration and research, and features a favourable 5-yearly review system which allows the scheme to be changed and improved in line with national and international trends. Yet, although the APC establishes a number of promising features it is clear from the review above that this arrangement does not currently possess the requisite mechanisms to enact the systematic design changes necessary to improve the circularity of PP products in Australia.

As highlighted above, there are several reasons for this, these include issues regarding foundational aspects of the arrangement (in other words what principles underpin the operation and structure of this regulatory arrangement), issues with the aims and targets established in

⁵¹³ The outcome of this research has identified that bar Glass and Biodegradable and Compostable Packaging, all difficult materials relate to PP products. This includes PP such as Expanded Polystyrene, Polymer Coated Paperboard and Soft Plastics Ibid.

⁵¹⁴ Australian Packaging Covenant, *Single-Use, Problematic and Unnecessary Plastic Packaging* (24 December 2019) 9 <<https://www.packagingCovenant.org.au/documents/item/3183>>.

pursuit of the Covenant, as well as fundamental issues with the overall monitoring and enforcement mechanisms of the agreement.

Foundational Issues

Firstly, at the most fundamental level, the voluntary nature of the Covenant means that the obligations included in this agreement cannot be overly onerous to a point where industry do not voluntarily interact with the scheme. This is the case despite the existence of the NEPM, which has been enacted for the purpose of improving the likelihood of voluntary involvement with the APCO. It is recognised that although the NEPM allows for the inclusion of slightly more stringent targets than might be included were the ACP to operate as a purely voluntary arrangement, targets set by the APCO still need to remain less onerous than the obligations established under the NEPM arrangement or there will be no incentive to continue involvement with the APCO. As a result, and as has been highlighted above, this has led to rather soft targets and compliance obligations being established under the Covenant for both the APCO as well as industry members.

The second foundational issue with the Covenant, is that it has been formulated on the principle of product stewardship in the form of shared responsibility. Although shared responsibility *prime facie* operates to allocate the logical operational sphere of influence to the correct stakeholders along PP product lifecycle, in practice, product stewardship and the APC structure overall does not operationally allow for the creation of incentives or sanctions to induce manufactures to change current design processes. As such, product stewardship does not place sufficient onus on the packaging industry to make the requisite circular design changes. One of the reasons for this is that shared responsibility can lead to a diffusion or blurring of specific responsibility of each lifecycle component making it difficult to determine who is responsible for what action along the lifecycle progression. As such, more difficult matters or areas needing attention, will not readily be addressed by any specific member in the lifecycle where that additional task incurs cost. This can ultimately stall overall regulatory aims and intentions, and can undermine the effectiveness of governance arrangements as well as generate a new set of responsibility gaps especially where the pursuit of circular product design is concerned.⁵¹⁵ A second reason for this, is that shared responsibility allocates consumers with the responsibility for utilising their purchasing power to influence the markets while also allocating them with responsibility for correct disposal practices. In association with this allocation, it is assumed that

⁵¹⁵ Nollkaemper (n 297).

consumers are able to make purchasing choices in accordance with the waste hierarchy and further dispose these items in a responsible manner. However, in reality consumer purchasing and disposal practices, and local government processing capacity in these matters are highly dependent on the design choices and product options that exist on the market. It is also dependant on the availability and accessibility of the correct disposal options and disposal infrastructure.⁵¹⁶ Ultimately, manufacturers still hold the greatest ability to initiate changes to PP that would positively impact the ability for these lifecycle stakeholders to undertake their allocated roles. This suggests that industry needs to take more responsibility for end-of-life processing of PP products and the Covenant needs to establish greater incentives to make design changes to PP products.

Finally, it is concluded by the researcher that the continued existence and operation of the NEPM is not in the best interest for the pursuit of circular product design. This is because the NEPM is focused on point source waste mitigation, and as such fails to include mechanisms to encourage design changes for industry regulated under this alternative scheme.

It is also worth mentioning, that although the current scope of the Covenant is promising with regards to its potential ability to capture a large portion the packaging industry, one issue that might be reviewed or revisited is the ongoing exemption of brand owners under \$5million annual turnover.⁵¹⁷ The annual turnover exemption was introduced in 2006 on the basis that ‘it was not the intent of the NEPM to unduly penalise those who do not contribute to the packaging waste stream.’⁵¹⁸ However given the time period that has elapsed since the introduction of this exemption, and in light of nations circular economy pursuits, this exemption may need to be re-examined to determine its continued relevance.⁵¹⁹ Similarly, although the Covenant operates to promote collaboration between various members of the packaging lifecycle, it was noted that consumers were absent from the Covenant process at all levels and this might also be an issue worth addressing.

⁵¹⁶ Nicole Sommer (n 163) 289.

⁵¹⁷ *Australian Packaging Covenant* (n 248) 5.

⁵¹⁸ *Ibid.*

⁵¹⁹ Although, in saying this, it is appreciated that this might affect the ability of the Government and the APCO to regulate such large groups of businesses. Yet, in order to generate a circular economy for PP, plastic material must circular to help close material loop for plastic. This would suggest that regulator schemes should attempt to include as many within the packaging industry as possible. Currently, large portions of packaging waste contributors are not required to interact with the Covenant. Although it is not clear the number of businesses excluded under this exemption, with inferences can be drawn when we consider that in accordance with the Australian Taxation Office, small businesses account for 98.45% of all Australian businesses. More than half of Australian businesses have a turnover of less than \$200,000. Australian Government Small Business and Family Enterprise Ombudsman, *Small Business Counts - Small Business in the Australian Economy* (July 2019) 8 <<https://www.asbfeo.gov.au/sites/default/files/documents/ASBFEO-small-business-counts2019.pdf>>. Of course not all of these businesses utilise large volumes of PP, however In a 2017 survey undertaken by the UTS: Institute for Sustainable Futures in the process of developing the Packaging Sustainability Framework, it was found that 35% of small businesses in Australia have a formalised approach to sustainability, with the remaining 65% not undertaking any kind of sustainability considerations at all. See Kelly (n 365) 7.

Target Issues

With respect to the Covenant's targets, although the introduction of the National Packaging Targets by the Federal Government in 2018 appears to have significantly refocused the APCO targets, it is evident from the review above that the aims and targets of the APCO are not sufficient to achieve industry consistent circular economy design changes. This is fundamentally due to the fact that a significant degree of discretion currently exists with respect to not only what industry members are required to consider and incorporate when outlining their Action Plan, but also, what principles need to be reviewed when considering the SPG. This is an issue because ultimately the APCO has no real means to require members to implement the KPI's into their Action Plans in pursuit of the Covenant's aim. Without the ability to direct industries actions collectively in pursuit of any one target, the APCO has no real ability to direct industry consistently towards any particular design-oriented goal.⁵²⁰

Overall, the success of achieving the KPI's hinge on the ability of all signatories to work together in order to deliver the APCO targets.⁵²¹ Furthermore, the targets will require 'mandatory uptake' by signatories if the Covenant Targets are to be achieved.⁵²² However, as it stands, the Covenant is voluntary, and as such does not establish sufficient mechanisms to allow the APCO to enforce mandatory uptake of the established KPI's or related resources. Furthermore, it is evident that the achievement of the National Packaging Targets, and the New Plastics Economy for PP will require a degree of coordination and cooperation between not only all industry members, but all remaining lifecycle segments, however under shared responsibility this may prove unobtainable without further regulatory instruments that operate in a manner to foster a greater level of coordination across the lifecycle of PP.

Finally, on the topic of actual targets, it is clear that the SPG is the primary source of guidance for industry regarding decisions linked to packaging and its sustainability. Yet, this document is not well incorporated into the Covenant as an obligation for industry, particularly with respect to the fact that it is referred to as a guide only, and there are no time limits attached to undertaking consideration of this document. Moreover, although the SPG and the overall operations conducted by the ACPO fulfilled many of the design criteria from the perspective of the Circular Regulatory Design Principles, the fact that the SPG applies to all packaging materials, means that the targets

⁵²⁰ This might explain why a significant number of KPI's contained within the SP2019 are directed on actions of the APCO such as undertaking research and creating collaboration groups and attempting to increase membership with the APCO by members. Australian Packaging Covenant, 'Australian Packaging Covenant Strategic Plan 2017–2022 Version 2 - January 1, 2019' (n 243) 6.

⁵²¹ The 2019 Strategic Plan, acknowledges that the APCO 'do[es] not hold all the levers needed to meet the targets' and that which suggests that all players along the supply chain will need to play their part in achieving these targets, with the targets requiring 'mandatory uptake' by signatories. See Australian Packaging Covenant (n 248) 7, 8.

⁵²² Ibid.

established under this document lacks relevant material specific goals. This suggests that not only should industry obligations in respect to the SPG need to be strengthened, but the APCO needs to increase levels of material specific targets included in the SPG to better direct industry as to what design changes will need to be made for specific packaging material types.

Transparent Monitoring, Enforcement and Penalty Issues

Finally, it is necessary to note, that no matter how well the APCO draft targets or upholds circular economy design principles, without the existence of adequate monitoring or enforcement mechanisms backed up with sufficient penalties there will be no real incentive for industry to make changes to PP packaging design. From review of the APC above, it is clear that the Covenant does not possess the requisite monitoring and enforcement mechanisms to hold members accountable to fulfilment of their targets. Overall, it is difficult to determine the ability of the current monitoring processes to either determine the success of the Covenant's goals or determine non-compliance of signatories under the Covenant. Questions remain, surrounding whether the current annual reporting tool can adequately reflect industry progress in line with the aims of the Covenant, due to the evident incompatibility between the goal setting requirements of industry members, with the reporting tools framework.

Similarly, although clause 10 clearly outlines behaviour deemed non-compliant under the Covenant, it is apparent that the vast majority of these requirements do not feature any timeframe for completion. Furthermore, there is no information regarding the process used by the APCO to assess each industry member's compliance or how often this process is undertaken. Subsequently, it is hard to determine how the APCO is able to assess industry compliance in this regard.

Transparency issues also exists within the APCO reporting process, particularly related to who makes up the Government Officials Group and the process they use to determine overall progress and success of the Covenant.

The combination of issues that exist within regards to industry obligations and monitoring mechanisms ultimately impacts the ability and effectiveness of the Covenants associated enforcement abilities and penalties. Although, the APC contains procedure for addressing non-compliant signatories, there are no mechanism established within the APC that would allow the APCO to impose actual penalties for non-compliance. In fact, the only penalty available to the APCO is the power to refer non-complaint members to the state/territory for regulation under NEPM schemes. As such, the question of the existence of adequate penalties becomes whether regulation under NEPM establishes sufficiently onerous obligations and penalties in itself. As to

this point, it was uncovered by this examination that for the past 5 years, there has been no investigations or prosecutions undertaken by the relevant State or Territory with regards to breaches of the relevant NEPM arrangement.⁵²³ This suggests that the penalty of regulation under NEPM may be insufficient.

Finally, from a larger agreement wide perspective, the complete lack of ramifications that exists against the APCO for failure to fulfil its overall goals under the Covenant is a significant issue that ultimately undermines the overall validity of the APC agreement to achieve any of its aims. This is a valid statement when we consider that despite having operated as Australia's primary regulatory instrument for the mitigation of the environmental effects of packaging for over 20 years, none of the recycling targets established under this agreement have been met.⁵²⁴ It is for the reasons above that it would appear that it is time for the APC arrangement to be reviewed and reformed to improve not only its circularity, but also its overall general operation.

3.4 CHAPTER CONCLUSION

Chapter 3 has explored the first phase of determining how circular economy design principles might be embedded into environmental laws and regulation by identifying, and reviewing the two identified regulatory schemes, for the purpose of identifying how these schemes operate.

From review of the bans of plastic shopping bags, it was established that although this regulatory scheme did not uphold all of the Circular Regulatory Design Principles, this arrangement, and subsequently command-and-control regulatory bans on PP products overall, were an important regulatory option to the overall framework for encouraging circular product design for PP in Australia. This is because these schemes operate to reduce the overall consumption of PP products and in turn reduce the overall input of virgin fossil fuel resources, as well as preventing the creation of waste. However, although command-and-control regulation allows for the direct and immediate changes to certain behaviours,⁵²⁵ it was recognised that direct regulatory interventions display a number of weaknesses including, difficulties defining scope as well as issues in the area of enforcement. These were issues noted to exist within the plastic shopping bag schemes.

⁵²³ *National Environment Protection Council 2015–16 Annual Report* (n 435); *National Environment Protection Council Annual Report 2016–17* (n 435); National Environment Protection Council, 'National Environment Protection Council Annual Report 2017–18' (n 435).

⁵²⁴ In the recent senate motion initiated by Senator Whish-Wilson it was highlighted that in 2005 the APC set a target for 35% recycling for all material, and has more recently set a recycling target for 70%. Current Australian recycling rates for plastic sit at 9%. See National Packaging Covenant Council, 'National Packaging Covenant -15 July 2005 to 30 June 2010' 100, 1.

⁵²⁵ Baldwin, Cave and Lodge (n 88) 107.

The APC is a novel co-regulatory scheme that combines a voluntary agreement with command-and-control measures in pursuit of the environmental aim of ‘reducing the environmental impacts of consumer packaging in Australia.’⁵²⁶ By utilising a combination of stakeholders and regulatory strategies, the Covenant arrangement was classified as an example of smart regulation.⁵²⁷ Overall, the APC arrangement was found to be very complex with respects to both its design and overall operation, with major flaws identified within this arrangement. In particular the Covenant was found to generate significant complexity associated with its operation, lacked accountability associated with the actors covered under the scheme, and displayed vague and at time conflicting requirements. For these reasons it was held that the APC arrangement should be reformed to improve not only its circularity, but also its general operation overall.

⁵²⁶ *Australian Packaging Covenant* (n 248) 1.

⁵²⁷ Neil Gunningham, Peter Grabosky, and Darren Sinclair (n 334).

CHAPTER 4: IMPROVING THE CIRCULARITY OF AUSTRALIA'S REGULATION

4.1 OVERVIEW

This chapter aims to answer research question 3,⁵²⁸ by outlining reform recommendation for the purpose of establishing how the regulatory framework reviewed in Chapter 3, might be reformed to better uphold the circular economy design principles. To do so, Chapter 4 will commence by addressing the issues identified in association with the plastic shopping bag bans and APC at the conclusion of Chapter 3, and propose possible reform recommendations for addressing these identified issues.

4.2 EXPANDING THE SCOPE OF PLASTIC PACKAGING PRODUCT BANS

As discussed above, although not initially enacted with the circular economy in mind,⁵²⁹ it was concluded that the operational effect of command-and-control style regulatory product bans, such as the plastic shopping bag bans, can be viewed as an example of circular compatible legislation in pursuit of circular product design. This is because, although these bans do not have the ability to specify what is required from manufacturers with regards to circular product design overall, they are a direct way in which state and territory jurisdictions can eliminate problematic products from the market. They also have the ability to prevent resource consumption, and are the only real example of regulatory interventions that upholds prevention in line with the preference upheld by the waste hierarchy. As such, although regulatory bans might not exhibit all of the Circular Regulatory Design Principles in their entirety, this thesis proposes that increasing the scope of PP bans enacted in conjunction with more wide-reaching schemes focused on PP product design, is an important aspect of the overall regulatory response to encourage manufacturers to improve circular product design for PP.

The researcher identifies two main possibilities for expanding PP product bans; the first includes increasing the scope of the current state and territory regulation to include bans on additional products; the second, includes incorporation of PP product bans within the function of the Covenant scheme in order to nationalise bans.

⁵²⁸ Question 3 – ‘How should current regulatory instruments be reformed, to achieve better outcomes in encouraging manufactures to design PP products for circularity?’

⁵²⁹ As highlighted in 3.2.1, this regulatory action was primarily enacted as a mean to mitigate the detrimental environmental impacts arising from the use of plastic shopping bags.

With respect to option one, although the direct bans on plastic shopping bags operate effectively to stop consumption of a significant number of low-density plastic shopping bags,⁵³⁰ they are overall, fairly limited with regards to the scope of PP product they ban, and as such currently allow for the continued consumption of similar plastic shopping bag products, such as those bags heavier than 35 microns. An example of such plastic bags outside of the current scope include produce bags and other single use plastic products. As proposed in 3.2.4, this issue could be addressed by increasing the scope of single-use PP product bans. This prospect already appears to be probable in several states and territory, with additional bans on PP products such as single use straws, stirrers and cutlery, being rolled out in South Australia, and current consultation for further bans being undertaken in Queensland.⁵³¹

However, in saying this, it will be important to keep in mind the known weaknesses associated with command-and-control regulatory strategies when increasing such potential bans, as increasing PP product bans through legislation has the potential to exacerbate the weaknesses associated with command-and-control style regulation. For example, the potential for unnecessary complexity associated with increasing scope of PP bans may negate the ability of state and territory legislators to set clear standards related to addition product bans.⁵³² This would be contrary to the requirement as set out in Regulatory Design Principle 3. Furthermore, increasing product bans might make enforcement less viable, specifically by reducing the ability of the community to identify, monitor and report instances of non-compliance across state and territory borders.⁵³³ Finally, increasing PP product bans independently within each of the states and territories might exacerbate the operational inconsistencies between the various instruments in each state and territory and create confusion for industry members operating in multiple jurisdictions.

This last issue could itself be addressed by the second option mentioned above for extending PP product bans, which involves incorporation of PP product bans into the function of the Covenant. As outlined in 3.3.2.1, the scope established in association with the Covenant means the APC arrangement has the potential to operationally administer product bans of certain

⁵³⁰ See, eg, The Allen Consulting Group Pty Ltd (n 233) 6; ABC news (n 269); Macintosh et al (n 269).

⁵³¹ A ban on single use plastic straws in Queensland appears imminent for enactment in September 2021. See, eg, Queensland Government, 'Single-Use Plastic Products Ban - Plastic Pollution Reduction' (Text) <<https://www.qld.gov.au/environment/pollution/management/waste/recovery/reduction/plastic-pollution/single-use-plastic-products-ban>>; SBS News Australia, 'Single-Use Plastics like Straws and Cutlery Are Now Banned in South Australia', SBS News (online, 3 January 2021) <<https://www.sbs.com.au/news/single-use-plastics-like-straws-and-cutlery-are-now-banned-in-south-australia>>.

⁵³² This links back to the design aspects of the regulatory strategy as highlighted in 3.1.2. In accordance with the OECD two particular areas can support the success of regulatory intervention, the first being clearly established rules, aims or standards of behaviour. There is complexities associated with establishing clearly defined standards including technical understands. As mentioned in 3.1.2 the O' See Baldwin, Cave and Lodge (n 70) 110.

⁵³³ This is because, although current plastic shopping bag bans have fairly consistently enacted, lists of banned products may soon become fragmented as each state and territory increase their own PP product bans in accordance with their environmental state powers. This can lead to inconsistency and confusion for consumers and businesses.

identified problematic PP products as part of its functions. If this were to occur, nationally consistent PP product phase outs and bans could be achieved. This would elevate the current and potential future fragmentation that may occur with the enactment of further individual state and territory direct legislative PP product bans. Yet, such a proposal would be dependent on improvements being made to Covenant targets, including the APCO Strategic Plans and Covenant obligations. It would also depend on the creation of adequate enforcement mechanisms being afforded the APCO including a greater ability to enforce such bans. The recommendations related to the APC will be discussed below.

Overall, direct legislative bans are an important tool in the overall circular legislative framework for the progression of circular product design for PP. These schemes allow state and territory jurisdictions the ability to ban certain unnecessary and harmful PP products that may be incompatible with the end-of-use processing capacity of that particular jurisdiction. Were the APCO to take up administration of certain product bans to maintain national consistency for the eradication of certain national products, it would be advised that the states and territories retain the ability to ban certain single use PP products as it sees fit and as it relates to the technical capacities of each jurisdiction.

4.3 REFORMING THE AUSTRALIAN PACKAGING COVENANT

The APC is a national instrument that directly encompasses design and production of packaging up until point-of-sale as part of its scope.⁵³⁴ As such, the Covenant is currently a regulatory framework best positioned to promote the shift toward circular design for PP products in Australia. Although the APC arrangement establishes a number of favourable aspects for generating favourable design changes to PP products,⁵³⁵ the review of Chapter 3 highlighted a number of significant flaws present in the current Covenant arrangement. Overall, it was concluded that the APC agreement in its current format is not capable of generating the requisite pressure on manufacturers to produced PP product design changes necessary to improve the circularity of PP products in Australia. Inefficiencies that existed within the Covenant were grouped and discussed at the conclusion of Chapter 3 in three main categories, these included *foundational issues*, *target issues* established in pursuit of the Covenant’s aim, as well as

⁵³⁴ As is the responsibility recognised as applicable to manufacturers through the implementation of shared responsibility.

⁵³⁵ These favourable characteristics were highlighted in Chapter 3. Such characteristics include having generated a degree of meaningful stakeholder collaboration between the majority of stakeholders along the PP lifecycle, suggesting compatibility with Circular Regulatory Design Principle 1, as well as the fact that it can be reviewed, reevaluated and potentially continually updated in line with national and international trends with each 5 year cycle.

transparent monitoring, enforcement and penalty issues of the agreement. These categories, and the respective reform recommendations will be addressed below.

4.3.1 Reforming the Covenant's Foundational Issues

Considering the identified issues discussed in Chapter 3, the researcher proposes two reform recommendations to improve the foundational issues of the current Covenant arrangement. The first of these, involves the need to increase the level of involvement required from each of the regulated parties of the Covenant from that of voluntary to a mandatory. Because the Covenant is currently a voluntary agreement, the obligations established in association with this agreement cannot be overtly onerous to a point where industry are discouraged from voluntarily interacting with the scheme.⁵³⁶ As such, the current targets/KPI's that feature under the present arrangement are not onerous enough to produce the degree of change to PP packaging necessary to satisfy circular economy design principles. Increasing the level of required involvement of industry to mandatory, would allow for increased targets to be set for PP reductions and circular economy design expectations.

Making the Covenant mandatory for industry brand owners, while maintaining its co-regulatory design, would allow much of the other operational features of the Covenant to remain the same. For example, currently government is responsible for identifying and supplying the APCO with information regarding relevant industry 'brand owners' liable for regulation under the Covenant. From here, the APCO assumes responsibility for contacting and outlining the regulatory options of that brand owner. This would continue under a mandatory scheme as it allows for checks to take place between government and the APCO with respect to ensuring brand owners are captured under the Covenant arrangement. Similarly, the maintenance of the current obligation of the APCO to draft industry obligations in pursuit of the Covenant's aim should also be maintained. This would allow for expert input from the packaging industry in drafting the targets of the APCO while also allowing for the continued ability for checks and balances to be imposed by the relevant government officials to ensure that the targets devised remain in line with the circular economy aims for the country. The 5-yearly review period should also remain in the Covenant, as this feature allows for the whole scheme to be updated and improved in line with international trends and PP design innovations as they continue to progress globally.

⁵³⁶ This is the case despite the existence of the NEPM, which merely raises the onus of the Covenant's obligations to a degree in line with but not exceeding the alternative regulation under the NEPM arrangement.

Increasing the level of engagement to mandatory would also ultimately negate the ongoing alternative regulation under the NEPM, which as highlighted above in 3.3.4 is favourable because currently brand owners regulated under this instrument are not required to consider product design as a requirement under NEPM. This does not contribute to the need for circular economy product design changes overall.⁵³⁷ This option would also be favourable as it would elevate the costs otherwise incurred by the states/territories in administering this scheme. However, the ability of this option to be successful would require that the state or federal government hold the power to enact enforcement mechanisms against the APCO to ensure they continue to undertake their responsibilities as well as uphold the aims established under the Covenant scheme. It would also subsequently require an increase in the enforcement penalties of the APCO against non-compliant industry members, to ensure their own compliance. This latter option will be discussed further below.

The second recommendation proposed, relates to product stewardship, specifically the need for the packaging industry to take more responsibility for end-of-life processing of PP products in order to create the reverse logistics needed to help close the material loop for PP. As discussed above in association with product stewardship, it would appear that in order to promote reverse logistical loops the most obvious regulatory option would be the introduction of an extended producer responsibility scheme. However, as highlighted by Leonidas Milios,⁵³⁸ the popular extended producer responsibility schemes currently in operation in Europe require all companies to share the collection costs of products and subsequently generate ‘practically no incentive to invest extra resources on improving their products’ design to reduce [its] impacts...’⁵³⁹ Although extended producer responsibility schemes have the ability to strongly influence the:

‘...collection and recycling of products, they fail to induce the necessary product design changes that would increase the volume, quality and efficiency of recycling, and ultimately lead to increased material circulation in the economy....’⁵⁴⁰

In light of this information, it is proposed that the initial pursuit of additional responsibility from industry for the creation of reverse logistical loops commence with members under APCO making additional contributions to end-of-life collection and infrastructure through their fee

⁵³⁷ Although an additional option were the NEPM to remain, would be to incorporate consideration of the SPG into the NEPM agreement as compulsory obligation for brand owners regulated under the scheme. However, this is not the most favourable option for reform in this section as it would add significant monitoring and enforcement costs onto state and territories governments. This would further add to the financial discrepancies that already exist between industry and the State and local government under shared responsibility.

⁵³⁸ See Milios (n 107). This work was previously discussed in 1.2.4.

⁵³⁹ Ibid 872.

⁵⁴⁰ Ibid.

contributions. These contributions could be determined based on how much PP the particular industry signatory contributes to the Australian market, with the larger industry producers liable for the greatest contribution. These funds should subsequently be used by the APCO to offset collection costs currently borne by local governments. Additionally, through increased collaboration with end-of-life industries to increase its understanding of the issues this segment of the lifecycle face in processing current PP products, these funds should also be used to implement material take back and reuse options for the generation of reverse logistical networks.

At the same time, the APCO should maintain and improve the circular design of PP products by strengthening the SPG to act more like eco-design rules currently utilised in Europe.⁵⁴¹ This combination of strategies would subsequently operate more in line with the broad proposal suggested by Milios with regards to general policy mixes for effective circular policy approaches, in which it was suggested that a combination of ‘mandatory eco-design rules within an improved extended producer responsibility systems’ was a more favourable and effective policy intervention than extended producer responsibility alone.⁵⁴²

Finally, although not a primary recommendation in this section, it is also worth mentioning that the current exemption within the APC which excuses all brand owners who make less than a \$5million annual turnover from regulation under the Covenant, as was originally introduced in 2006,⁵⁴³ should be re-examined to determine its continued relevance. Under a circular economy all actors will be required to undertake changes to design in order to transition from the current linear paradigm. Yet, the effect of this exemption is that a large segment of PP producing businesses of Australia are excused from considering sustainable packaging as part of their business practices.⁵⁴⁴ To address this issue, it is proposed that small industry be incorporated into the Covenant in a manner that would compel them to consider circular packaging strategies, while not overly

⁵⁴¹ See, eg, Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 Establishing a Framework for the Setting of Ecodesign Requirements for Energy-Related Products (Text with EEA Relevance) 2009 (285).

⁵⁴² Milios (n 107) 872.

⁵⁴³ This exemption was introduced on the basis that ‘it was not the intent of the NEPM to unduly penalise those who do not contribute to the packaging waste stream’ *Australian Packaging Covenant* (n 248) 5.

⁵⁴⁴ Currently, a large portions of packaging waste contributors are not required to interact with the Covenant. Although the exact number of businesses excluded under this exemption is not clear, inferences can be drawn when we consider that in accordance with the Australian Taxation Office small businesses account for 98.45% of all Australian businesses. More than half of Australian businesses have a turnover of less than \$200,000. Australian Government Small Business and Family Enterprise Ombudsman (n 515) 8. Of course not all of these businesses utilise large volumes of PP, however for compatibility with a circular economy, regulatory schemes should attempt to include as many within the packaging industry as possible. In saying this, it is appreciated that the option to incorporate small earners into the Covenant in operation could affect the ability of the Government and the APCO to regulate such large groups of businesses. Ultimately, the APCO will still need sufficient funds to carry out its operations with regards to the remaining larger waste contributing companies. Yet it is also clear, that without guidance, few businesses voluntarily elect to pursue sustainable options within their business practises. For example, in a 2017 survey undertaken by the UTS: Institute for Sustainable Futures in the process of developing the Packaging Sustainability Framework, it was found that only 35% of small businesses in Australia had a formalised approach to sustainability as part of their business, with the remaining not including any sustainability considerations in their work. See Kelly (n 365) 7.

burdening these entities, government or the APCO.⁵⁴⁵ This recommendation could potentially be achieved, were the APCO to voluntarily offer smaller businesses lower, or no membership fee options for involvement with the Covenant. The APCO would also need to lessen the obligations associated with small business members compared to traditionally defined brand owners under the Covenant. Together, these actions would allow small businesses to access and benefit from the resources generated by the APCO, in relation to sustainable packaging options, while not over burdening them with the financial obligations otherwise associated with Covenant membership.

Additionally, and for completeness, as noted in 3.3.5.3, although consumers were originally mentioned as ‘*participants in the packaging chain*’ in the original 1999 Covenant,⁵⁴⁶ consumers were subsequently removed from Covenant operations in 2005 due to the fact that consumers could not be signatories. This omission means that input from the consumer segment of the PP lifecycle is currently absent overall. Yet, there is potential to have a form of consumer representation involved in the overall Covenant agenda if agencies such as CHOICE were afforded memberships or consulted as part of the work of the APCO. This would allow consumers to be represented in the Covenant without the need for them to be signatories under the scheme, and would ultimately allow them a presence in this arrangement in accordance with Regulatory Design Principle 1.

4.3.2 The Need for Material Specific Targets

Currently, in addition to KPI’s, the Covenant relies heavily on the SPG as the primary resource for guiding industry to design more sustainable packaging. However, although the Covenant review highlighted a number of targets that appeared *prime facie* to uphold circular economy design principles, it was concluded that overall, the principles contained in this document did not operate in a manner that imposed sufficient pressure on industry to change PP product design. Furthermore, it was held that the Covenant afforded industry a large degree of discretion with regards to setting individual aims and goals, and failed to make clear to signatories what targets or pursuits were required to be implemented in accordance with their obligations as a member of the APC, making it difficult to generate whole of industry movement.⁵⁴⁷

⁵⁴⁵ This would be caused primarily due to the costs associated with the incorporation of these businesses into this scheme to exponentially increase for.

⁵⁴⁶ Nicole Sommer (n 163) 225.

⁵⁴⁷ As previously highlighted, the level of discretion afforded to industry signatories surrounding what they are both required to consider and incorporate when outlining their own proposed Action Plans in pursuit of the Covenant’s overall environmental aim makes it difficult for the APCO to work toward common goals under the Covenant. The issue with discretion has featured previously within the Covenant and was at that time highlighted as a problem. In fact, at its first review in July 2004, a number of amendments to the Covenant were suggested after it was concluded that the Covenant failed to ‘provide effective data and feedback in order to reflect its achievements...’ due to ‘...so much inherent flexibility for companies that progress could not be measured effectively...’ See Martin Stewardship & Management Strategies Pty Ltd (n 307) 6.

Two reform recommendations are proposed to address these issues. The first requires the Covenant to make clear to signatories what targets or pursuits are to be implemented in order to fulfil their obligations under the Covenant. This should be done by re-inserting Action Plan specifications into the Covenant to outline not only what needs to be evidenced in individual Action Plans, but also what principles of the SPG need to be considered as part of industries obligation under the Covenant. This should also include adding timeframes in which these targets should be undertaken by brand owners in order to clearly identify instances of non-compliance. Clarifying targets in this way, would also allow for more efficient monitoring of the Covenant's progress overall.

The second area for reform, involves improving the specific focus and clarity of the measurable targets of the APCO's Strategic Plan, and the principles included in the SPG. Overall, industry signatories under the Covenant are best placed to effect design changes to their own PP products. As such, the APCO as industry representative, should ensure that the KPI's contained within the Covenants Strategic Plans, as well as the principles contained within the SPG, clearly outline what design changes are required to be made by individual industry signatories. Subsequently, the onus is on the APCO to be more prescriptive in the goals it produces for the KPI's and the principles it established in association with the SPG. Currently one of the biggest issues with the Covenant, is that the targets of the APCO are not sufficiently clear or onerous with respects to outlining what industry need to focus on to ensure their products are circularly compatible when it comes to the specific material, such as plastic. Instead, these principles, and even the National Packaging Targets, set broad packaging targets and principles that may operate in an unintended manner when it comes to re-designing or reducing the amount of PP products on the market (see 3.3.5).

Subsequently, it is recommended that the principles contained within the SPG be amended to incorporate more specific circular design requirements for packaging including prioritising a reduction in material consumption, elimination of problematic PP products, and improvement in ink, dye and small format packaging choices that currently impact recyclability of PP products. Furthermore, principles contained in the SPG should be linked with the measurable targets contained in the Strategic Plan. This will ensure the principles of the SPG have measurable targeted outcomes. Along these same lines, the APCO should ensure they set more material specific priority targets. This will ensure that companies are focusing their actions on working to eliminate the most urgent packaging product materials, such as PP in the form of small format

packaging, hazardous materials, multi-layered PP packaging and additives such as PVC and unnecessary PP products.⁵⁴⁸

Finally, and more broadly, it is recommended that the APCO and government work together to clarify their terminology, such as those used to define compostable and other materials, and make it clear to industry what is required for the manufacture of circular compatible packaging. The APCO should subsequently incorporate more circular terminology into both their KPI's and associated resources for industry members, as well as undertake to educate members on this concept.

4.3.3 Improvements in Monitoring and Enforcement Mechanisms

To operate effectively as a regulatory scheme, the APCO must be able to effectively monitor and enforce signatory's obligations under the Covenant. This will ensure changes made by industry progress in line with the Covenant's aim, and in pursuit of circular product design. Industry will not comply voluntarily, especially if the pursuit of the public interest under the instrument is contrary to economic rationality.⁵⁴⁹

Transparent Monitoring

As highlighted above, the act of monitoring the progress of industry in conjunction with the Covenant's aims, as well as monitoring industry member's compliance under the Covenant, is the responsibility of the APCO. With all monitoring in relation to the APCO progress under the Covenant undertaken in accordance with the evaluation framework as agreed between the APCO and the Government Officials Group. As outlined in 3.3.3.2, progress reporting is undertaken by the APCO with progress ascertained primarily with regard to advancement of the targets established within the Strategic Plan, however data collected from signatories reporting as well as against the progress and outcomes of projects are also taken into account. Two issues arise from this process require reform. The first relates to the weight afforded to the KPI's as a measure of progress, and the second relates to the current reporting tool utilised to collect progress data from industry signatories.

⁵⁴⁸ This list could also start by targeting PP products already identified in the APCO previous research as needing to be eliminated. See Australian Packaging Covenant, 'Single-Use, Problematic and Unnecessary Plastic Packaging' (n 442).

⁵⁴⁹ Ayres and Braithwaite (n 101) 19.

With regards to the former, has been previously concluded that the KPI's contained within the Strategic Plans are not stringent enough to progress re-design for PP or any packaging, as not only do they not contain design related targets, but the majority of targets are primarily focused on the APCO as opposed to individual industry members. This is an issue, especially considering industry signatories are the only entities able to influence product design in favour of circular PP products. The APCO has a duty to impose more design focused targets within the Strategic Plans and it is particularly recommended that if the SPG are to remain the primary guide for industry in designing sustainable or circular packaging, a target related to the consideration or implementation of the SPG by individual brand owners, should feature as a measurable target under the Strategic Plan.

Secondly, with regards to the ability to ascertain progress from signatory data, as mentioned in 3.3.3.2, the framework criteria currently used in the reporting tool appears to be somewhat standalone in so far as it does not appear to correlate with the APCO KPI's or industry members individual Action Plans. Instead, these criteria correlate more with a number of the principles of the SPG.⁵⁵⁰ Yet, the obligation to consider the SPG by industry is quite lax under the Covenant. The evident separation between target setting and reporting, makes it difficult to ascertain how the APCO could monitor the progress of individual industry members in order to determine progress toward the Covenant's aim. This suggests that if the APCO are invested in continuing their use of the online reporting tool, they need to work to better link the reporting criteria of this tool to the obligations for drafting industry Action Plans, the SPG and the KPI's of the overall Strategic Plan. This will ensure that the targets and actions undertaken by industry are compatible with not only the KPI's, but are also reflect the criteria used to assess and monitor the progress of the Covenant.

Finally, transparency should be upheld within the Covenant in order to allow for greater legitimacy of the processes of the APCO, as well as allow for public scrutiny and involvement which can act somewhat as an incentive in the absences of actual penalties.⁵⁵¹ Currently, two primary transparency issues associated with progress reporting exists within the Covenant. The first relates to the lack of accessible information surrounding who makes up the members of the Government Officials Group. The second, relates to a lack of accessible data related to what process is undertaken in association with the 'evaluation framework', which is stated being the

⁵⁵⁰ This reporting is undertaken by signatories through the APCO This was introduced in 2017 to make it simpler for signatories to complete reporting tasks Kelly (n 271) 1.

⁵⁵¹ These ideas are similarly proposed by Nicole Sommer Nicole Sommer (n 163) 291.

method followed when undertaking Covenant progress monitoring. To address this, the APCO or government should publish the evaluation framework process used to determine progress made under the Covenant. This would allow for public scrutiny and add legitimacy to the ongoing continuation of this regulatory scheme. It would also be beneficial if members sitting on the Government Official Group be made publicly known, in order to evidence the legitimacy of this group.

Monitoring industry member's compliance

Again, due to transparency issues surrounding the process used to monitor compliance of signatories, it is difficult to determine the effectiveness of this process and whether it operates to compel signatories to undertake their obligations as outlined in the Covenant.

Although the APCO has evidently identified a number of non-compliant signatories from the information published on their website, the lack of identifiable process used to identify these non-compliant signatories is an issue under the Covenant. For example, when we consider that a number of the obligations under the Covenant do not have any timelines for completion, it is difficult to ascertain how the APCO has ultimately identified instances of non-compliance. To address this, the APCO should outline how they determine non-compliant members in more detail, as well as set out timeframes for meeting obligations. They should also publish how, and how often industry members are being audited, as well as the outcome of these audits in order for consumers to exercise their consumer purchasing power against poor performing industry members.

Penalties

A major identified deficiency in the Covenant, and the power of the APCO generally, is that the Covenant does not establish a range of penalties for use by the APCO against non-compliant members. As outlined in 3.3.5.3, schedule 5 of the Covenant sets out the proceedings that can be implemented against non-complaint industry signatories. Overall, these proceedings commence with the issuance of a number of letters and a period of time is then given to the non-compliant member to rectify their actions prior to being expelled from the APCO for regulation under the relevant NEPM legislation. The progression and escalation of the penalties under schedule 5 can subsequently be likened, to some degree, to an enforcement pyramid style system, in which the severity of penalties are able to be escalated in an attempt to reach the favourable

outcome of compliance.⁵⁵² Yet ultimately, the APCO still lacks the power to impose its own meaningful penalties, such as financial penalties, to encourage compliance with the Covenant.

One of the ways this might be addressed based on the current Covenant /NEPM arrangement, is by instigating an enforcement pyramid re-worked from a similar enforcement pyramid proposed by Sommer and outlined in *Figure 4.1*.⁵⁵³ This set of enforcement activities would be instigated with the aim of increasing enforceability to influence compliance with the Covenant.⁵⁵⁴ For example, the APCO would commence action against non-compliant members through issuing a ‘show cause’ notice when an instance of non-compliance is identified. These notices should specify the period of time industry members have to respond to these claims before the implementation of harsher penalties apply. At this time, the relevant state environmental agency should be notified of the issuing of the original notice to put the agency on notice of potential future action against this brand owner.⁵⁵⁵ Failure to respond or rectify the non-compliant behaviour within the required time period would incur the commencement of financial penalties by the APCO. In order for consumers to be given the opportunity to implement their market purchasing powers to discourage non-compliance, once financial penalties are enacted the APCO should notify the public of the non-compliance and that potential suspension from the Covenant is imminent. In the event that suspension occurs, the relevant state and territory agencies should continue imposing the financial penalties of the APCO until such time as the non-compliant industry member evidences compliance with the requirements of the NEPM. This would act as a continued incentive to uphold compliance.

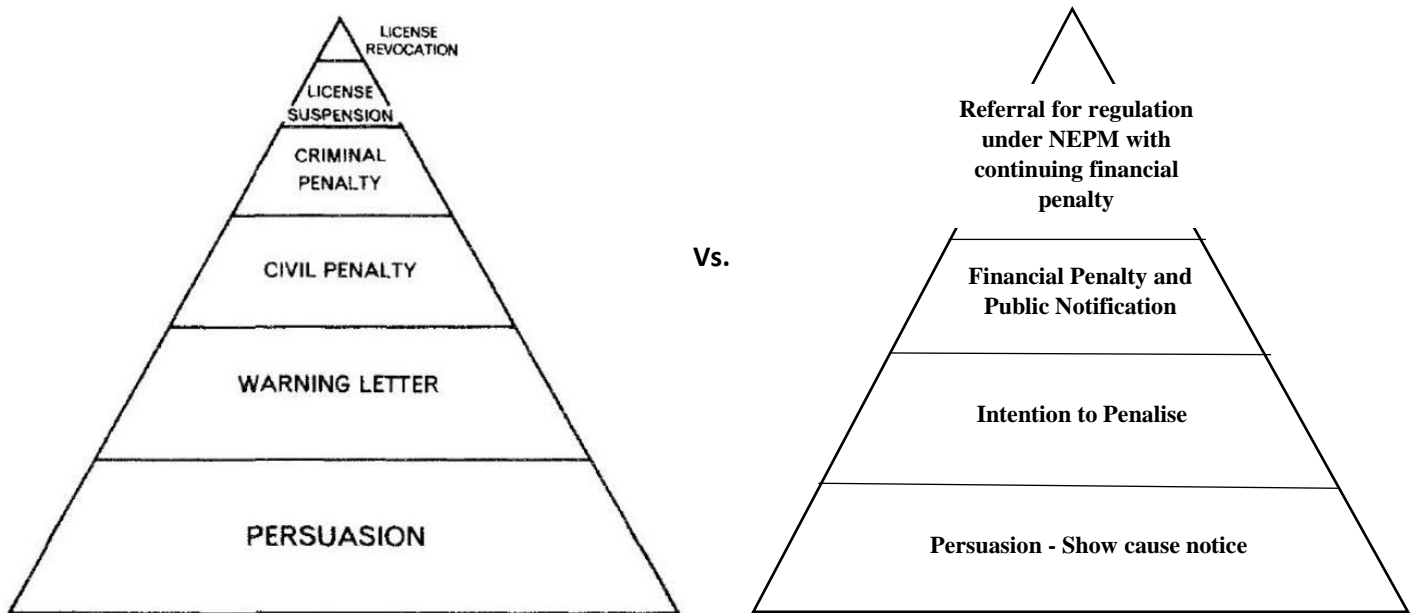
⁵⁵² This is in line with the work of Responsive Regulation. See Ayres and Braithwaite (n 101).

⁵⁵³ Nicole Sommer (n 163) 294.

⁵⁵⁴ Ibid 292.

⁵⁵⁵ This would work to avoid potential regulatory capture that may occur between the APCO and the non-compliant industry member as the escalation of proceeding continue To elaborate on this point, currently compliance proceedings are undertaken between the APCO and individual members. However, as industry representatives, this might lead to instances of regulatory capture in instances where the APCO could ‘go easy’ on an individual business in instances where they feel the behaviour is good enough. Having the backing of a third party brings an additional layer of legitimacy to the compliance process.

Figure 4.1: The Enforcement Pyramid vs. the Potential APCO Enforcement Options⁵⁵⁶



Alternatively, were the Covenant to become mandatory for industry, negating the ongoing use of NEPM, an alternative option for improving penalties would include the implementation of an enforcement pyramid as outlined above with the difference being the removal of the top of the pyramid regarding the ‘referral for regulation under NEPM with continuing financial penalty’ to an option where a financial penalty would continue until the non-compliance behaviour is rectified. At this time non-compliant industry signatories should be advertised to the public in order for public scrutiny to act as an additional deterrent.⁵⁵⁷

The funds collected from financial penalties imposed on non-compliant members could subsequently be used to reimburse specific state and territory governments for the ‘damage’ caused by non-compliance (as these jurisdictions still finance end-of-life collection services). These funds could also be used for improving collection/processing infrastructure for better end-of-life processing infrastructure and activities.⁵⁵⁸ This is arguably compatible with the current purpose for funds raised through membership fees, as listed within the Covenant, which states that ‘funds are [to be] used to support the administration of the Covenant, services to Signatories, and projects, or activities, that support the delivery of the Covenant’s aim and strategies within the Strategic Plan.’⁵⁵⁹ Finally, if funds raised through financial penalties distributed only to Covenant

⁵⁵⁶ Ayres and Braithwaite (n 101) 36.

⁵⁵⁷ A similar proposal was suggested by Nicole Sommer (n 163) 294.

⁵⁵⁸ This damage relates to the fact that consumers and collection and processing segments are reliant on manufacturers to undertake efforts to design and redesign packaging that is compatible with circular processes including recycling later along the lifecycle. Non-compliance is a direct failure to undertake this requirement and subsequently impacts the ability of local government to undertake their responsibilities.

⁵⁵⁹ *Australian Packaging Covenant* (n 248) 10.

member states and territories to rectify damage incurred from non-compliance, this would in itself act as an incentive to encourage more state and local government interaction with the Covenant, increasing overall membership, and collaboration favourable to Regulatory Design Principle 1.

Yet, in order for this penalties system to operate in a manner that could influence design changes to PP products, the Covenant would need to link the achievement of individual industry members Action Plans or fulfilment of measurable targets as a required obligation under the Covenant. This will also include the need to re-add drafting requirements for industry member Action Plan as discussed above. Such inclusion, would ensure that all signatories understand the minimum standard of action required of them under the Covenant, and establish a degree of collective industry movement in favour of achieving certain design specific goals such as the National Packaging Targets. To further improve the chances that circular economy design changes are realised, the requirement to consider the SPG should be increased. This includes the requirements linked to the obligation of industry to incorporate the principles contained within the SPG, the timeframe in which this should be undertaken, and the way in which compliance with this obligation can be evidenced, for example paperwork etc. This will assist in monitoring functions and also assist in determining instances of non-compliance.

Finally, the Covenant must specifically define the levels at which non-compliant behaviour would incur a financial penalty, such as a sliding scale of obligations. For example, whether financial penalties would be issued in instances such as failure to pay membership fees, or instead only apply in instances of non-compliance with regards to review of the SPG within the specified timeframe. Determining when financial penalties would be issued would make it clear to all industry members what is expected of them with regards to their obligations under the Covenant, as well as the penalties signatories can expect to face if these are not upheld.

4.3 CHAPTER CONCLUSION

Building on the information uncovered by the regulatory reviews in Chapter 3, this chapter addressed research question 3, by outlining reform recommendation to line with the Circular Regulatory Design Principles to achieve better outcomes in encouraging manufactures to design PP products for circularity.

A summary of the overall findings in this chapter, as well as the overall conclusions outlined in this thesis, will be undertaken in Chapter 5 below.

CHAPTER 5: CONCLUSIONS

This thesis set out to explore how principles that underpin circular product design might be embedded into environmental laws and regulation in order to initiate a shift in the present linear paradigm to a more circular system. Utilising information uncovered within the literature review in Chapter 1, together with the work of the Ellen MacArthur Foundation's New Plastic Economy, and by employing a case study focused on PP as a means to narrow this broad aim, this research ultimately established a novel best practice approach for regulating manufacturers for improved circular compatible products in pursuit of a circular economy for PP. To demonstrate application and the potential importance of this best practice criteria, this thesis next employed these principles to identify and review existing regulation that apply to manufacturers of PP in Australia in order to assess their compatibility with the circular economy design principles, as well as highlight any potential regulatory gaps that may require attention. Guided by the outcome of this review, reform recommendations were subsequently made in relation to these regulatory schemes with the intention of improving these instruments in line with the suggested circular economy best practice approach.

Chapter 5 is a conclusion chapter, that has been structured to summarise the outcomes uncovered by this thesis, including the answers and findings related to the research questions posed at the outset of this research. It also aims to comment on the broader themes and issues with which this thesis intersects, including the areas for further research going forward.

5.1 RECAPPING THE FINDINGS OF THIS THESIS

As has been a point derived from the literature in this area, and consistently highlighted throughout this thesis, changes to PP products with respect to both design and production practices is essential for ensuring PP products are fit for circular application and processing at later stages of the products lifecycle. Subsequently, in order to shift the present linear paradigm to a more circular system, regulatory instruments must encourage manufacturers to produce circular compatible PP products. Whilst manufacturers are continually permitted to produce PP products that are not re-useable, recyclable or compostable in practice, there is limited ability to close the material loop for PP, regardless of how well remaining stakeholders along the PP lifecycle undertake their respective responsibilities. As such, unless effective pressure can be generated by regulation at the start of manufacturing stage of the PP lifecycle, the achievement of a circular economy for PP will not be likely.

Having reached this conclusion, and guided by the aim of this thesis, an investigation was established to examine and determine what design principles should underpin regulatory responses in pursuit of circular product design for PP in Australia, and how these principles could be used to guide and review regulatory instruments that govern manufacturers of PP.

5.1.1 The Circular Economy Design Principles and their Impact on Manufactures

To determine what design principles should underpin regulatory responses in pursuit of circular product design for PP in Australia,⁵⁶⁰ this thesis began by developing a normative basis for reviewing identified regulation to determine the circularity of these schemes utilising the New Plastic Economy as published by the Ellen McArthur Foundation, combined with the general literature identified as relevant to the concept of the circular economy, as discussed in Chapter 1. Five principles, coined the ‘Circular Regulatory Design Principles’ were subsequently proposed and are summarised in *Table 5.1* below.

Table 5.1: The Circular Regulatory Design Principles

<i>Principle</i>	<i>Aim</i>
Principle 1	Regulation Encourages meaningful participation of stakeholders
Principle 2	Regulation Priorities Reductions in Material Consumption
Principle 3	Regulation establishes clear rules, aims and standards using standardised definitions related to product re-design reflective of waste infrastructure capabilities and circular economy design trends
Principle 4	Regulation Contains Effective Compliance and Review Mechanisms to Compel the Regulated Target Group to Comply with these Rules
Principle 5	Regulation Mobilises Resources for circular economy research projects and design innovations

Although derived with a specific focus on PP, these principles are applicable to other products in the general pursuit of circular economy product design, and as such, could be employed generally by policy makers concerned with pursuing this goal.

For the purpose of adapting these principles to form criteria that could be used to review current regulatory instruments and guide reform recommendation in the remainder of this thesis, it

⁵⁶⁰ To answer research question 1 which asked ‘What circular economy design principles should underpin regulatory responses in pursuit of circular product design for PP in Australia, and how can these principles be used to guide and review regulatory instruments that govern manufacturers of PP?’

was proposed that the principles be restructured into questions that the identified regulatory instruments could be compared against as outlined in 2.4.2.

5.1.2 Australia’s Regulatory Landscape and its Compatibility with the Design Principles

The identification of relevant regulatory instruments was undertaken in Chapter 3, using the method as outlined in 3.1.1.⁵⁶¹ Two regulatory schemes were identified including the Plastic Shopping Bag Bans and the APC, however of the two the APC was determined to be best positioned to promote the shift toward circular product design for PP products as its scope applied to the entire packaging industry. A systematic analysis using the Circular Regulatory Design Principles in the manner outlined in 3.1.2 was then undertaken. The results of this analysis, as well as the reform recommendations suggested, are collated together in the table featured below.

5.1.3 How Australia’s Regulation of Plastic Packaging Manufactures can be improved

Through the analysis in Chapter 3, this thesis has been able to identify the start of a potential regulatory framework in this area. It has also been able to identify the strength and weaknesses of each regulatory instruments that exists within this framework, and subsequently been able to determine and propose reform recommendations with the aim of better steering manufacturers of PP to producing more circularly compatible products in the pursuit of the circular economy for PP in Australia. These recommendations were proposed and discussed in Chapter 4, and have been summarised in the table below.⁵⁶²

⁵⁶¹ This review subsequently answered research question 2, which asked ‘How well does the current regulation of manufactures of PP align with circular economy design principles?’

⁵⁶² These reform recommendations made ultimately answered research question 3, which asked ‘How should these regulatory instruments be reformed to achieve better outcomes in encouraging manufactures to design PP products for circularity?’

Core Recommendations for the plastic shopping bag bans

Direct legislative PP product bans were viewed as an important tool in the overall circular legislative framework, and on a state and territory level, allows these jurisdictions the ability to ban certain unnecessary and harmful PP products that may be incompatible with the end-of-use processing capacity of that particular state or territory. In light of these findings, the following recommendations were proposed as outlined in *Table 5.2* below.

Table 5.2: Reform Recommendations for Plastic Product Bans

Topic	Recommendation
Increasing PP bans of incompatible circular PP products to phase out and eliminate other unnecessary or incompatible PP products	<p>The first recommendation, involved increasing the scope of the current state and territory regulation, to ban additional PP products. However, in saying this, it was noted that when increasing PP bans regulators will need to be mindful of the known weaknesses associated with command-and-control regulatory strategy's which could potentially affect the ability of these additional bans to outline clear aims as well as enforce instances of non-compliance, as well as exacerbate operational inconsistencies between the various instruments between each state and territory.</p> <p>Alternatively, in pursuit of nationally consistent, the second option for extending PP product bans was the incorporation of this function within the Covenant operations. The scope established in association with the Covenant, suggests that the APC arrangement has the potential to operationally administer bans of certain identified problematic PP as part of its functions. In doing so, such bans would allow for nationally consistent PP product phase outs to be pursued.</p> <p>Yet such a proposal would be dependent on the improvement of the Covenant targets and the creation of adequate enforcement mechanisms to give the APCO more ability to enforce such bans.</p>

Core Recommendations for reforming the Australian Packaging Covenant

As a national agreement focused on product design and production of packaging up until point-of-sale, and with a scope encompassing all upstream PP actors including those producing packaging from domestic and international sources,⁵⁶³ the Covenant agreement is currently the regulatory scheme best positioned to promote the shift toward circular design for PP products in Australia. Overall, the Covenant has made evident attempts to establish and uphold meaningful participation of stakeholders, and appears to have undertaken significant research programs in pursuit of improved packaging design, *prime facie* demonstrating fulfilment of Circular Regulatory Design Principle 1 and 2. However, to Covenant scheme's general lack of accountability mechanisms, the vague and at times confusing obligations established under this agreement, as well as the existence of a number of interrelated inefficiencies in the operation of the overall scheme need to be addressed to improve its ability to impact circular economy PP product design. To improve these inefficiencies and further embed circular product design principle into the APC, the following recommendations have been proposed as outlined in **Table 5.3** below.

⁵⁶³ Of course, this exempts industry members that make less than the prescribed annual turnover of \$5 million per annum.

Table 5.3: Reform Recommendations for The Australian Packaging Covenant

Topic	Issue	Recommendation
<p><i>Covenant's Foundational issues</i></p>	<p>Voluntary Involvement & regulation under NEPM</p> <p>Underpinned by principles of Product Stewardship in the form of Shared Responsibility</p>	<p>It was suggested that involvement with the Covenant was increased from voluntary to mandatory co-regulation. This change would require all industry involvement with the Covenant, yet allow expert industry input in drafting the targets of the APCO 5-yearly review period. Furthermore, increasing the level of engagement to mandatory would negate need for the ongoing alternative regulation under the NEPM. This would eradicate the undue costs on states and territories in administering these schemes, and would address the lack of design considerations for those ultimately regulated under this scheme.</p> <p>The packaging industry must take more responsibility for end-of-life processing of PP products in order to help close the material loop for this product, as well as help generate reverse logistics for access to processed plastic material for further applications by industry. Shy of implementing an extended producer responsibility type scheme in order to achieve this, memberships fees increased to allow the APCO to contribute to more end-of-life collection and processing infrastructure, while maintaining the otherwise favourable aim of improving industries design of PP products for circular application through strengthening the SPG to act more like eco-design rules is advised.⁵⁶⁴</p>

⁵⁶⁴ This policy mix of extended producer responsibility and eco-design for circular economy product design is in line with the broad proposal suggested by Leonidas Milios with regards to general policy mixes he thought favourable to encouraging the achievement of a circular economy. In his article Milios suggests a combination of 'mandatory eco-design rules within an improved extended producer responsibility system' as a more favourable and effective policy option, as he noted the lack of design considerations contained within extended producer responsibility schemes currently could be mitigated by the inclusion of specific eco-design objectives. Milios (n 107) 872.

<p><i>Covenant's Target issues</i></p>	<p>Currently the Covenant fails to make clear to signatories what targets or pursuits are required to be implemented in accordance with their obligations as a member of the APC</p> <p>The APCO relies heavily on the SPG as the primary resource to guide industry to design sustainable packaging, however the measure of the Covenants success is primarily focused on the KPI's within the Strategic Plan which do not contain design goals despite the introduction of the National Packaging Targets</p>	<p>To resolve this, the Covenant needs to make it clearer to signatories what targets or pursuits by re-inserting Action Plan specifications into the Covenant and making it clear what principles of the SPG should be considered as a part of compliance with the Covenant.</p> <p>As industry signatories under the Covenant, are best placed to effect design changes to PP products, the principles established under the SPG should be improved -</p> <ul style="list-style-type: none"> a. In line with the Circular Regulatory Design Principles, whereby the SPG incorporate more specific circular design requirements for packaging in line with circular economy design trends, as well as prioritise reductions in material consumption, encouraging meaningful participation of stakeholders and mobilise resources for circular economy research projects and design innovations. b. Each packaging material has its own specific challenges and as such, priority targets should be set that are materially specific, with relevant targets set for each respective packaging material in order to focus changes in line with the material issues faced by each respective packaging material. <p>The principles contained in the SPG also incorporated into the Strategic Plans KPI's to ensure targets have measurable outcomes. This would allow the success and progress of the Covenant to be assessed with respect to the application of the SPG.</p>
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<p><i>Covenant's Monitoring, Enforcement and Penalties Mechanisms Issues</i></p>	<p>Monitoring - Annual progress reporting is undertaken by the APCO and determined primarily with regard to progress against the targets established within the Strategic Plan, however the targets under this document are primarily focused on the APCO as opposed to industry signatories. Furthermore, industry signatories are the only entities able to influence product design in favour of improve circular economy PP products, yet the reporting mechanisms of the Covenant do not measure industry progress against their obligated Action Plans. This makes it difficult to ascertain how the APCO determine progress under the Covenant.</p> <p>Finally, procedural transparency issues surrounding the process form monitoring between the APCO and the Government Officials Group currently exists.</p> <p>Penalties - A major identified deficiency in the Covenant and the power of the APCO overall, is that it does not establish a range of penalties for use by the APCO for non-compliance.</p>	<ul style="list-style-type: none"> • Similarly, to the recommendation above, the APCO has a duty to impose more design focused targets within the Strategic Plan, and particularly it is recommended that if the SPG are to remain the primary guide for industry in designing sustainable or circular packaging, specific SPG goals should become part of the measurable targets under the Strategic Plan. • If the APCO are invested in continuing their use of the online reporting tool, they need to work to better link the 13 reporting criteria of this tool to the obligations for drafting industry Action Plans and the KPI's of the overall Strategic Plan. As they already currently somewhat compatible to the SPG, as mentioned above, the onus to consider the SPG should become a more heavily weighted obligation for industry under the Covenant, as well as form part of the measurable targets of the Strategic Plan. This will ensure that the targets and actions undertaken by industry are compatible with not only the KPI's but are also reflect the criteria used to assess and monitor the progress of the Covenant. • The inclusion of more material specific targets and design aims should also be included in both the SPG as well as the Strategic Plan to address more complex packaging materials. • To address transparency issues, the APCO should publish the process used to monitor progress of industry under the Covenant, as well as outline the members of the Government Official Group. This would allow public scrutiny of the process, improve the legitimacy of the assessment of progress made by this group and allow the public the chance to be informed to use their purchasing power in favour of circular economy compatible products. • An enforcement pyramid that includes the ability for the APCO to impose financial penalties or fines for non-compliance should be implemented. The Covenant must specifically define the levels at which non-compliant behaviour would incur a financial penalty, such as a sliding scale of obligations.
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5.2 AREAS FOR FURTHER RESEARCH FINAL REMARKS

Overall, it is evident that our current linear economic model has progressed to a point where this system not only threatens the operation of our economy, but also our very existence on this planet. As such, there is a clear urgency for a new type of economy to be introduced, that respects and protects the environment, and contributes to the realisation of sustainable production and consumption practises. Having set a course towards the circular economy as this alternative, the act of operationalising this goal will be complex. Fundamentally, every area of a products lifecycle will need to be examined and uniquely changed depending on the industry, material and product in question. Supportive uniform regulatory directions set at a national level will play a significant role in the drive for consistent change in this area.⁵⁶⁵ With this in mind, this thesis aimed to offer guidance with respect to how regulation could be used to aid in the transition toward a circular economy.

Given the weight afforded to product design within the literature, specifically the need for manufacturers to produce circular economy compatible products in order to generate material loops, suggested that linear environmental regulatory parameters will need to be expanded, specifically the current tendency of environmental regulation to primarily focus on the mitigation of point source pollution associated with the end-of-life segment of the products lifecycle. Instead, environmental regulation, will need to expand its scope to encompass regulatory interventions focused on start-of-life manufacture of products encouraging improved circular design, as well as enhance end-of-use ‘waste’ practises. This would allow for the necessary promotion of the idea of ‘material management’ over the currently recognised ‘waste management’ as the new circular focus for environmental protection. This is a shift required to take place in the minds of regulators in order to destabilise the linear status quo. To assist regulators with designing such regulatory interventions, this thesis has generated and applied a number of best practice regulatory design principle that although developed with a specific focus on PP, can easily be translated to apply to other products within the economy, and as such would be useful for regulators in pursuit of circular economy product design generally. However, as has been noted from the case study of PP of this research, each material within the economy possesses their own unique end-of-use or waste management challenges. As such, when devising regulatory interventions directed at improving circular product design using these principles, the unique waste management challenges should be considered and incorporated in design responses accordingly.

⁵⁶⁵ Almost all of the literature relating to implementation of a circular economy outline the need for strong, uniform regulatory and policy directions at national levels to drive consistent change in this area. See eg, Barra et al (n 14); World Economic Forum, *The New Plastics Economy Rethinking the Future* (January 2016) <http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf>; Ellen MacArthur Foundation (n 15).

Ultimately, it is recognised by the researcher that because there are various options for regulatory intervention along the lifecycle of PP, and numerous stakeholders involved in and along PP products lifecycle that will play a role in the transition to the circular economy, even if the suggested or similar recommendations are implemented in the manner proposed above, failures in other remaining segments could impact the likely success of a transition to a circular economy overall. Despite this, it is felt that these principles, and the amendments made to the reviewed regulatory instruments in the manner discussed above, would greatly assist in improving PP product design in favour of circular economy requirements.

Overall, the analysis and findings of this research are novel and exploratory in nature, and introduce the potential for future research in this area. Firstly, remaining on the topic of circular economy product design and the Circular Regulatory Design Principles established in this research, it is proposed that further research in this area work to build and/or improve on the original principles proposed in this thesis. For example, it is recognised that to achieve full circularity there is a need to co-operate across borders in which case Australia's engagement with its trading partners with respect to the reuse, reparability, and recyclability should be taken into account. As such, it would be favourable for further research to be undertaken to understand the impact these principles, and the law reform recommendations made on the basis of these principles, would have on Australia's major trading partners. It would also be particularly relevant to understand how international trade laws might impact any proposed or actual regulatory actions taken to improve the circularity of PP products in Australia, particularly considering the percentage of finished PP products Australia imports into the local market.⁵⁶⁶

Secondly, the viability of regulatory strategies proposed in this research, such as the possibility for the creation and implementation of a mixed Extended Producer and eco-design style regulatory instrument, would be useful. It would also be beneficial for research to be undertaken that identifies and considers how current regulatory and legal actions in Australia interact to support or undermine other regulatory or legal instruments within the country enacted in pursuit of circular economy product design for PP. For example, how subsidies of government to fossil fuel companies that support extraction and uphold cheap virgin fossil fuel plastic impacts incentives to

⁵⁶⁶ Around 58% of plastics consumption, including PP, was through imported finished and semi-finished goods, with only 38% of consumption through local manufacturing using virgin resins (either locally manufactured or imported), and 4% of consumption using locally processed recycle based resins. See O'Farrell (n 146) 9. The Australia plastic packaging market was valued at USD 3454.57 million in 2019, and is expected to reach USD 4309.98 million by 2025. Mordor Intelligence, *Australia Plastic Packaging Market Growth, Trends, and Forecast (2020-2025)* (2019) <<https://www.mordorintelligence.com/industry-reports/australia-plastic-packaging-market>>. In comparison the global plastic packaging market is projected to reach USD 320.94 billion by 2027. 'Plastic Packaging Market Size Worth \$320.9 Billion by 2027' <<https://www.grandviewresearch.com/press-release/global-plastic-packaging-market>>.

incorporate recycled PP material at the PP product design at the manufacturing stage of the product lifecycle.

Lastly, on a broader level, it would be favourable for research to be undertaken that considers regulatory options and central regulatory guiding principle for the remainder of the lifecycle segments of PP in order to complete the picture for this product. This would include the mineral extraction, consumers and end-of-life segments.

REFERENCE LIST

Articles, Books, and Reports

Adam Smith, *An Inquiry into the Nature and Cause of the Wealth of Nations*, ed Edwin Cannan (The University of Chicago Press, 1977)

<<https://ebookcentral.proquest.com/lib/qut/detail.action?docID=515713>>

Andrady, Anthony L and Mike A Neal, 'Applications and Societal Benefits of Plastics' (2009) 364(1526) *Philosophical Transactions of the Royal Society B: Biological Sciences* 1977

Anshassi, Malak, Steven J Laux and Timothy G Townsend, 'Approaches to Integrate Sustainable Materials Management into Waste Management Planning and Policy' (2019) 148 *Resources, Conservation and Recycling* 55

Antrim, Lance N, 'The United Nations Conference on Environment and Development' in Allan E Goodman (ed), *The Diplomatic Record 1992-1993* (Routledge, 1st ed, 2019) 189

<<https://www.taylorfrancis.com/books/9781000244090/chapters/10.4324/9780429310089-10>>

Australia Government Department of the Environment Water, Heritage and the Arts, *National Waste Report 2010* 386 <<https://www.environment.gov.au/system/files/resources/af649966-5c11-4993-8390-ab300b081f65/files/national-waste-report-2010.pdf>>

Australian Government Small Business and Family Enterprise Ombudsman, *Small Business Counts - Small Business in the Australian Economy* (July 2019)

<<https://www.asbfeo.gov.au/sites/default/files/documents/ASBFEO-small-business-counts2019.pdf>>.

Australia Post and Banksia Foundation, *Small Business Sustainability in a COVID-19 World* (January 2021) 28 <https://auspost.com.au/content/dam/auspost_corp/media/documents/sustainability-white-paper.pdf>

Australian Government Department of the Environment and Energy, *National Waste Policy. Less Waste, More Resources* (2018) <<https://www.environment.gov.au/system/files/resources/d523f4e9-d958-466b-9fd1-3b7d6283f006/files/national-waste-policy-2018.pdf>>

Australian Packaging Covenant, *APCO Packaging Material Flow Analysis 2018* (28 February 2019)

<<https://www.packagingcovenant.org.au/documents/item/2171>>

Australian Packaging Covenant, *Australian Packaging Covenant a Commitment by Governments and Industry to the Sustainable Design, Use and Recovery of Packaging* (July 2010)

<<http://www.nepc.gov.au/system/files/resources/46216819-a2fc-cbd4-8da3-3f274335c896/files/upm-aust-packaging-covenant-1-jul-2010.pdf>>

Australian Packaging Covenant, *Australian Packaging Covenant Strategic Plan 2017 – 2022 - Incorporating the 2017 – 2019 Statement of Intent* (2017)

<<https://www.packagingcovenant.org.au/documents/item/1036>>

Australian Packaging Covenant, *Australian Packaging Covenant Strategic Plan 2017–2022 Version 2 - January 1, 2019* (2019) <<https://www.environment.gov.au/system/files/resources/e2f0f12e-fa6e-4a4b-94e3-1268d9cd1360/files/australian-packaging-covenant-strategic-plan-2017-2022.pdf>>

Australian Packaging Covenant, *Single-Use, Problematic and Unnecessary Plastic Packaging* (24 December 2019) <<https://www.packagingcovenant.org.au/documents/item/3183>>

Australian Packaging Covenant, *Soft Plastic Packaging Working Group 2019* (March 2019)

<<https://www.packagingcovenant.org.au/documents/item/2179>>

Australian Packaging Covenant, *The Australian Packaging Covenant Organisation 2018/19 Annual Report* (2018) <<https://documents.packagingcovenant.org.au/public-documents/APCO%202018-19%20Annual%20Report>>

Australian Packaging Covenant, *The Sustainable Packaging Guidelines* (2020)

<[https://documents.packagingcovenant.org.au/public-documents/Sustainable%20Packaging%20Guidelines%20\(SPGs\)#:~:text=The%20Covenant%20states%20that%20in,the%20potential%20for%20fugitive%20packaging.>](https://documents.packagingcovenant.org.au/public-documents/Sustainable%20Packaging%20Guidelines%20(SPGs)#:~:text=The%20Covenant%20states%20that%20in,the%20potential%20for%20fugitive%20packaging.>)

Australian Packaging Covenant Organisation, *Frequently Asked Questions All about APCO and the Covenant1157.Pdf* (2018) <<https://www.packagingcovenant.org.au/documents/item/1157>>

Australian Packaging Covenant Organisation, *Sustainable Packaging Guidelines SPG's* (2019)

<<https://www.packagingcovenant.org.au/documents/item/1091>>

Australian Packaging Covenant Organisation Ltd and Australian Government, *Australian Packaging Covenant* (1 January 2017) <<https://www.environment.gov.au/protection/waste/publications/australian-packaging-covenant-2017>>

Australian Retailers Association, *Phasing out Light-Weight Plastic Bags ARA Submission* (2006)

<https://www.pc.gov.au/__data/assets/pdf_file/0004/24988/subdr271.pdf>

Ayres, Ian and John Braithwaite, *Responsive Regulation: Transcending the Deregulation Debate* (Oxford University Press, Incorporated, 1992)

<<http://ebookcentral.proquest.com/lib/qut/detail.action?docID=272606>>

Backes, Chris, *Law for a Circular Economy* (Eleven International Publishing, 2017)

<https://www.uu.nl/sites/default/files/rgl-ucowsl-backes-law_for_a_circular_economy.pdf>

Baldwin, Robert, Martin Cave and Martin Lodge, *Understanding Regulation: Theory, Strategy, and Practice* (Oxford University Press USA, 2nd ed, 2011)

<<http://ebookcentral.proquest.com/lib/qut/detail.action?docID=829488>>

Baxter, Pamela and Susan Jack, 'Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers' 18

Brusseau, ML, 'Chapter 32 - Sustainable Development and Other Solutions to Pollution and Global Change' in Mark L Brusseau, Ian L Pepper and Charles P Gerba (eds), *Environmental and Pollution Science (Third Edition)* (Academic Press, 2019) 585

<<https://www.sciencedirect.com/science/article/pii/B978012814719100032X>>

Calisto Friant, Martin, Walter JV Vermeulen and Roberta Salomone, 'A Typology of Circular Economy Discourses: Navigating the Diverse Visions of a Contested Paradigm' (2020) 161 *Resources, Conservation and Recycling* 104917

Cameron Holley, 'Environmental Regulation and Governance' in Peter Drahos (ed), *Regulatory Theory: Foundations and Applications* (ANU Press, 1st ed, 2017) 741 <<http://press-files.anu.edu.au/downloads/press/n2304/pdf/ch42.pdf>>

Cameron Holley, Neil Gunningham, and Clifford Shering, *The New Environmental Governance* (Earthscan, 2012) <<https://www-taylorfrancis-com.ezp01.library.qut.edu.au/books/9781315067278>>

Campbell-Johnston, Kieran et al, 'How Circular Is Your Tyre: Experiences with Extended Producer Responsibility from a Circular Economy Perspective' (2020) 270 *Journal of Cleaner Production* 122042

Chamas, Ali et al, 'Degradation Rates of Plastics in the Environment' (2020) 8(9) *ACS Sustainable Chemistry & Engineering* 3494

Clark, Dr Graeme F, Professor Emma L Johnston, and Commonwealth Government, *Australia State of the Environment 2016: Coasts* (University of New South Wales, 2016) 167

<<https://soe.environment.gov.au/sites/default/files/soe2016-coasts-launch-17feb.pdf?v=1488793015>>

Claudio, Luz, 'Our Food: Packaging & Public Health' (2012) 120(6) *Environmental Health Perspectives* a232

Council of Australian Governments, *Phasing out exports of waste plastic, paper, glass and tyres - Response strategy to implement the August 2019 agreement of the Council of Australian Governments* (2020) <<https://www.coag.gov.au/sites/default/files/communique/phasing-out-waste-exports-response-strategy.pdf>>

Cowan, David and Daniel Wincott (eds), *Exploring the 'Legal' in Socio-Legal Studies* (Palgrave Macmillan UK, 2016) <<http://link.springer.com/10.1007/978-1-137-34437-3>>

Creusen, Mariëlle EH and Jan PL Schoormans, 'The Influence of Observation Time on the Role of the Product Design in Consumer Preference' (1998) NA-25 *ACR North American Advances* <<https://www.acrwebsite.org/volumes/8210/volumes/v25/NA-25/full>>

Creusen, Mariëlle EH and Jan PL Schoormans, 'The Different Roles of Product Appearance in Consumer Choice*' (2005) 22(1) *Journal of Product Innovation Management* 63

Croci, Edoardo (ed), *The Handbook of Environmental Voluntary Agreements: Design, Implementation and Evaluation Issues* (Springer, 2005)

Dean, Norman L, *The Man Behind the Bottle* (Xlibris Corporation, 2010)

Deloitte Access Economics, *At What Price? The Economic, Social and Iconic Value of the Great Barrier Reef* (2016) <<https://www2.deloitte.com/au/en/pages/economics/articles/great-barrier-reef.html>>

Department of the Environment and Energy, *Australian Packaging Covenant 2017* (2017) <<http://www.environment.gov.au/>>

Eléonore Maitre-Ekern, *Environmental Law and Economics -The Choice of Regulatory Instruments for a Circular Economy*, vol 4 (Springer International Publishing, 2017) <<https://link.springer.com.ezp01.library.qut.edu.au/content/pdf/10.1007%2F978-3-319-50932-7.pdf>>

Ellen MacArthur Foundation, *Delivering the Circular Economy - A Toolkit for Policymakers* <https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_PolicymakerToolkit.pdf>

Ellen MacArthur Foundation, *Perspective on 'Breaking the Plastic Wave' Study. The Circular Economy Solutions to Plastic Pollution* (2020) <https://www.ellenmacarthurfoundation.org/assets/downloads/The_circular_economy_solution_to_plastic_pollution_July_2020.pdf>

Ellen MacArthur Foundation, *The New Plastics Economy - Catalysing Action* (2017)

<https://www.newplasticseconomy.org/assets/doc/New-Plastics-Economy_Catalysing-Action_13-1-17.pdf>

Ellen MacArthur Foundation, *New Plastics Economy - A Vision of a Circular Economy for Plastics* (2020)

<<https://www.newplasticseconomy.org/assets/doc/npec-vision.pdf>>

Ellen MacArthur Foundation, *Towards the Circular Economy - Economic and Business Rationale for an Accelerated Transition* (2013)

<<https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf>>

Ellen MacArthur Foundation and Material Economics Consultants, *Completing the Picture How the Circular Economy Tackles Climate Change* (26 September 2019)

<https://www.ellenmacarthurfoundation.org/assets/downloads/Completing_The_Picture_How_The_Circular_Economy-_Tackles_Climate_Change_V3_26_September.pdf>

Ellen MacArthur Foundation and Project MainStream, *The New Plastics Economy - Rethinking the Future of Plastics* (2016)

<https://www.newplasticseconomy.org/assets/doc/EllenMacArthurFoundation_TheNewPlasticsEconomy_Pages.pdf>

Ellen MacArthur Foundation, The Pew Charitable Trusts, and SYSTEMIQ, *Breaking the Plastic Wave' Study the Circular Economy Solution to Plastic Pollution* (July 2020)

<https://www.systemiq.earth/wp-content/uploads/2020/07/BreakingThePlasticWave_MainReport.pdf>

Esposito, Mark, Terence Tse and Khaled Soufani, 'Introducing a Circular Economy: New Thinking with New Managerial and Policy Implications' (2018) 60(3) *California Management Review* 5

European Commission – DG Environment, *Development of Guidance on Extended Producer Responsibility (EPR) Final Report* (2014)

<https://ec.europa.eu/environment/waste/pdf/target_review/Guidance%20on%20EPR%20-%20Final%20Report.pdf>

European Commission, *A European Strategy for Plastics in the Circular Economy* (2018) COM:2018:28.

European Greens Party, *Resolution on Circular Economy* (May 2016)

<<https://europeangreens.eu/sites/europeangreens.eu/files/6%20EGP%20Resolution%20on%20Circular%20Economy%20as%20adopted.pdf>>

Federal Government Department of the Environment and Energy, *National Waste Policy Action Plan* (2019) 41 <<https://www.environment.gov.au/protection/waste-resource-recovery/publications/national-waste-policy-action-plan>>

Franklin Associates, *Life Cycle Impacts of Plastic Packaging Compared to Substitutes in the United States and Canada Theoretical Substitution Analysis* (2018) <<https://plastics.americanchemistry.com/Reports-and-Publications/LCA-of-Plastic-Packaging-Compared-to-Substitutes.pdf>>

Geissdoerfer, Martin et al, 'Business Models and Supply Chains for the Circular Economy' (2018) 190 *Journal of Cleaner Production* 712

Geissdoerfer, Martin et al, 'The Circular Economy – A New Sustainability Paradigm?' (2017) 143 *Journal of Cleaner Production* 757

Geyer, Roland, Jenna R Jambeck and Kara Lavender Law, 'Production, Use, and Fate of All Plastics Ever Made' (2017) 3(7) *Science Advances* e1700782

Ghaisellini, Patrizia, Catia Cialani and Sergio Ulgiati, 'A Review on Circular Economy: The Expected Transition to a Balanced Interplay of Environmental and Economic Systems' (2016) 114 *Journal of Cleaner Production* 11

Government of New South Wales, *NSW Circular Economy Policy Statement Too Good to Waste* (2019) <<https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/recycling/19p1379-circular-economy-policy-final.pdf?la=en&hash=F80151EA9C2C3E27BA889D15D18041CDF7A4D25A>>

Grand View Research, *Stretch and Shrink Film Market Size - Global Industry Report, 2020-2027* (February 2020) <<https://www.grandviewresearch.com/industry-analysis/stretch-and-shrink-films-market>>.

Gunningham, Neil and Darren Sinclair, 'Regulatory Pluralism: Designing Policy Mixes for Environmental Protection' 28

Hamilton, Lisa Anne, Steven Feit, and Center for International Environmental Law, *Plastic & Climate - The Hidden Cost of a Plastic Planet* (15 May 2019) <<https://www.ciel.org/wp-content/uploads/2019/05/Plastic-and-Climate-FINAL-2019.pdf>>

Hill, Julie Elizabeth, 'The Circular Economy: From Waste to Resource Stewardship, Part I' (2015) 168(1) *Proceedings of the Institution of Civil Engineers - Waste and Resource Management* 3

Hollander, Marcel C den, Conny A Bakker and Erik Jan Hultink, 'Product Design in a Circular Economy: Development of a Typology of Key Concepts and Terms' (2017) 21(3) *Journal of Industrial Ecology* 517

Hopewell, Jefferson, Robert Dvorak and Edward Kosior, 'Plastics Recycling: Challenges and Opportunities' (2009) 364(1526) *Philosophical Transactions of the Royal Society B: Biological Sciences* 2115

Jones, Stephen M, *Advancing a Circular Economy: A Future without Waste?* (Springer International Publishing, 2021) 5–6 <<http://link.springer.com/10.1007/978-3-030-66564-7>> ('Advancing a Circular Economy').

Jones, Stephen 'Waste Management in Australia Is an Environmental Crisis: What Needs to Change so Adaptive Governance Can Help?' (2020) 12(21) *Sustainability* 9212

Kelly, Scott and University of Technology Sydney: Institute for Sustainable Futures, *Packaging Sustainability Framework for APCO Members* (2017) 106
<<https://www.packagingcovenant.org.au/documents/item/1043>>

Kevin Linton - TopInfo Consulting, *The Threat of Marine Plastic Pollution in Australia and Australian Waters*
<[file:///C:/Users/bousgas/Downloads/Environment&Communications%20marine%20plastic_sub10%20\(1\).pdf](file:///C:/Users/bousgas/Downloads/Environment&Communications%20marine%20plastic_sub10%20(1).pdf)>

Kirchherr, Julian, Denise Reike and Marko Hekkert, 'Conceptualizing the Circular Economy: An Analysis of 114 Definitions' (2017) 127 *Resources, Conservation & Recycling. Elsevier* 221

Lamb, Joleah B et al, 'Plastic Waste Associated with Disease on Coral Reefs' (2018) 359(6374) *Science* 460

Lavers, JL et al, 'Significant Plastic Accumulation on the Cocos (Keeling) Islands, Australia' (2019) 9(1) *Scientific Reports* 7102

Lewis, Helen, 'Defining Product Stewardship and Sustainability in the Australian Packaging Industry' (2005) 8(1) *Environmental Science & Policy* 45

Llorca, Marta et al, 'Microplastics in Mediterranean Coastal Area: Toxicity and Impact for the Environment and Human Health' (2020) 27 *Trends in Environmental Analytical Chemistry* e00090

Losoncz, Ibolya, 'Methodological Approaches and Considerations in Regulatory Research' in Peter Drahos (ed), *Regulatory Theory* (ANU Press, 2017) 77 <<https://www.jstor.org/stable/j.ctt1q1crtm.12>>

Macintosh, Andrew et al, 'Plastic Bag Bans: Lessons from the Australian Capital Territory' (2020) 154 *Resources, Conservation and Recycling* 104638

Madden, B and N Florin, *Characterising the Material Flows through the Australian Waste Packaging System* (Institute for Sustainable Futures, 2019)

<<https://www.packagingcovenant.org.au/documents/item/2171>>

Maguire, Rowena et al, *A Review of Single-Use Plastic Waste Policy in 2018: What Will 2019 Hold in Store?* <<https://eprints.qut.edu.au/127711/2/127711.pdf>>.

Martin Stewardship & Management Strategies Pty Ltd, *Waste Generation & Resource Efficiency of Packaging Submission to the Productivity Commission's Waste Generation & Resource Efficiency Inquiry* (February 2006) <https://www.pc.gov.au/__data/assets/pdf_file/0020/22673/sub092part1.pdf>

Material Economics Consultants, Dr Jonathan Cullen and Professor Frank Geels, *The Circular Economy: A Powerful Force for Climate Mitigation* (2018) 176 <<https://media.sitra.fi/2018/06/12132041/the-circular-economy-a-powerful-force-for-climate-mitigation.pdf>>

Messner, Rudolf, Carol Richards and Hope Johnson, 'The "Prevention Paradox": Food Waste Prevention and the Quandary of Systemic Surplus Production' (2020) 37(3) *Agriculture and Human Values* 805

Milios, Leonidas, 'Advancing to a Circular Economy: Three Essential Ingredients for a Comprehensive Policy Mix' (2018) 13(3) *Sustainability Science* 861

Monroe, Leila, 'Tailoring Product Stewardship and Extended Producer Responsibility to Prevent Marine Plastic Pollution' (2013) 27 *Tulane Environmental Law Journal* 219

Mordor Intelligence, *Australia Plastic Packaging Market Growth, Trends, and Forecast (2020-2025)* (2019) <<https://www.mordorintelligence.com/industry-reports/australia-plastic-packaging-market>>

Murray, Alan, Keith Skene and Kathryn Haynes, 'The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context' (2017) 140(3) *Journal of Business Ethics* 369

National Environment Protection Council, *National Environment Protection Council Annual Report 2017–18* <<http://www.nepc.gov.au/system/files/resources/1ed358dc-9aee-442f-9821-78ce95bf20a6/files/nepc-annual-report-2017-18.pdf>>

National Environment Protection Council, *National Environment Protection Council 2015–16 Annual Report* <<http://www.nepc.gov.au/system/files/resources/b759bd66-4618-4fd6-96fa-f40693536030/files/nepc-annual-report-2015-16.pdf>>

National Environment Protection Council, *National Environment Protection Council Annual Report 2016–17* (2017-2016) <<http://www.nepc.gov.au/system/files/resources/afef0a22-b780-41ed-ab10-416162bb201e/files/nepc-annual-report-2016-17.pdf>>

National Packaging Covenant Council, 'National Packaging Covenant -15 July 2005 to 30 June 2010' 100

Neil Gunningham, Peter Grabosky, and Darren Sinclair, *Smart Regulation* (Oxford University Press, 1998)

Neil Gunningham and P.N Grabosky, *Smart Regulation: Designing Environmental Policy* (Clarendon Press, New York, 1998)

Nicole Sommer, 'It's Not My Bag Baby - Responsibility for Packaging and the National Packaging Covenant' (2006) 10(2) *The Australasian Journal of Natural Resources Law and Policy* <<https://search.informit.com.au/fullText;dn=200700191;res=IELAPA>>

NolanITU, *Department of Environment and Heritage Plastic Retail Carry Bag Use - 2002-2004 Consumption Interim Report* (2005) 20

Nollkaemper, Andre, 'The Duality of Shared Responsibility' (2018) 24(5) *Contemporary Politics* 524

Nuttall, Chris, Joanna Hartga and Evan Williams, *A Regulation and Circular Economy Review - Final Report* (Ricardo-AEA, 2014) <<https://www.sepa.org.uk/media/163260/regulatory-levers-to-stimulate-circular-economy-review-final-report-issue-2.pdf>>

O'Farrell, Kyle and Australian Government Department of the Environment and Energy, *2017-18 Australian Plastics Recycling Survey National Report - Final Report* (Envisage Works, 30 January 2019) <<https://www.environment.gov.au/system/files/resources/3f275bb3-218f-4a3d-ae1d-424ff4cc52cd/files/australian-plastics-recycling-survey-report-2017-18.pdf>>

Organisation for Economic Co-Operation and Development, *OECD Reviews of Regulatory Reform - Regulatory Policies in OECD Countries From Interventionism to Regulatory Governance* (OECD Publications Service, 2002) <<https://www-oecd-ilibrary-org.ezp01.library.qut.edu.au/docserver/9789264177437-en.pdf?expires=1607912987&id=id&accname=ocid195112&checksum=46A927D2366553E5EFB6578E233BD397>>

Parker, Christine and Kirsi Kuuttiniemi, *Reducing the Risk of Policy Failure: Challenges for Regulatory Compliance* (Organisation for Economic Co-operation and Development, 2000) <<https://www.semanticscholar.org/paper/1-REDUCING-THE-RISK-OF-POLICY-FAILURE-%3A-CHALLENGES-Jacobs/80e439cdd75bcad3c97194e0c4435ba7831a82c2>>

Patrick Planing, 'Business Model Innovation in a Circular Economy Reasons for Non-Acceptance of Circular Business Models' [2015] *Open Journal of Business Model Innovation* 1

Environment Protection Authority of New South Wales, 'Plastic Shopping Bags: Options Paper - Practical actions for plastic shopping bags' (2016) 37

Prata, Joana Correia et al, 'Environmental Exposure to Microplastics: An Overview on Possible Human Health Effects' (2020) 702 *Science of the Total Environment* 134455

Raubenheimer, Karen and Niko Urho, 'Rethinking Global Governance of Plastics – The Role of Industry' (2020) 113 *Marine Policy* 103802

Ricardo Barra et al, *Plastics and the Circular Economy: A STAP Document* (UN Environment Programme, Scientific and Technical Advisory Panel, June 2018)
<<https://www.thegef.org/sites/default/files/publications/PLASTICS%20for%20posting.pdf>>

Rockart, Scott, 'Free-Rider Problem, The' in Mie Augier and David J Teece (eds), *The Palgrave Encyclopaedia of Strategic Management* (Palgrave Macmillan UK, 2016) 1 <https://doi.org/10.1057/978-1-349-94848-2_736-1>

Rockström, Johan et al, 'Planetary Boundaries: Exploring the Safe Operating Space for Humanity' (2009) 14(2) *Ecology and Society* <<https://www.ecologyandsociety.org/vol14/iss2/art32/>>

Ryan, Peter G, 'A Brief History of Marine Litter Research' in Melanie Bergmann, Lars Gutow and Michael Klages (eds), *Marine Anthropogenic Litter* (Springer International Publishing, 2015) 1
<https://doi.org/10.1007/978-3-319-16510-3_1>

Sally-Ann Joseph, 'The Polluter Pays Principles and Land Remediation: A Comparison of the United Kingdom and Australian Approaches' (2014) 1(1) *Australian Journal of Environmental Law* 24

Senate of the Commonwealth of Australia Environment and Communications, and References Committee, *Never Waste a Crisis: The Waste and Recycling Industry in Australia* (June 2018)
<https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/WasteandRecycling/Report>.

Smart Prosperity Institute, *A Vision for a Circular Economy for Plastics in Canada. The Benefits of Plastics Without the Waste and How We Get It Right* (2019)
<<https://institute.smartprosperity.ca/sites/default/files/report-circulareconomy-february14-final.pdf>>

Soetaert, Wim and Erick Vandamme, 'The Impact of Industrial Biotechnology' (2006) 1(7–8) *Biotechnology Journal* 756

Stahel, Walter R, 'The Circular Economy' (2016) 531(7595) *Nature News* 435

Terrie Ann Johnson, *Senate Inquiry: The Threat of Marine Plastic Pollution in Australia* (Clean up Australia, 2015)

<file:///C:/Users/bousgas/Downloads/Environment&Communications%20marine%20plastic_sub09.pdf>

The Allen Consulting Group, *National Waste Policy Regulatory Impact Statement - Report to the Department of the Environment, Water, Heritage and the Arts* (October 2009)

The Allen Consulting Group Pty Ltd, *Report to the Environment Protection and Heritage Council - Phasing Out Light-Weight Plastic Bags Costs and Benefits of Alternative Approaches* (May 2006)

<<https://www.nepc.gov.au/system/files/resources/0c513e54-d968-ac04-758b-3b7613af0d07/files/ps-pbag-rpt-acg-phasing-out-light-weight-plastic-bags-cba-200605.pdf>>

The Allen Consulting Group Pty Ltd, *Report to the Environment Protection and Heritage Council. Phasing out Light-Weight Plastic Bags Costs and Benefits of Alternative Approaches* (text, May 2006)

<<https://www.nepc.gov.au/system/files/resources/0c513e54-d968-ac04-758b-3b7613af0d07/files/ps-pbag-rpt-acg-phasing-out-light-weight-plastic-bags-cba-200605.pdf>>

Thomas, IG, 'Environmental Policy and Local Government in Australia' (2010) 15(2) *Local Environment* 121

Thompson, Richard C et al, 'Our Plastic Age' (2009) 364(1526) *Philosophical Transactions of the Royal Society B: Biological Sciences* 1973

Tromans, Stephen, 'EC Waste Law—A Complete Mess?' (2001) 13(2) *Journal of Environmental Law* 133

UNEP, *Legal Limits on Single-Use Plastics and Microplastics* (United Nations Environment Program, 6 December 2018) <<http://www.unenvironment.org/resources/report/legal-limits-single-use-plastics-and-microplastics>>

United Nations Department of Economic and Social Affairs, 'Experts Explore Potential of Global Transition to Circular Economy' (New York, online, 18 October 2018)

<<https://www.un.org/development/desa/en/news/intergovernmental-coordination/potential-of-transition-to-circular-economy.html>>

United Nations Environment Programme, *Resource Efficiency for Sustainable Development: Key Messages for the Group of 20* (International Resource Council, 2018)

<https://www.resourcepanel.org/sites/default/files/documents/document/media/thinkpiece_-_resource_efficiency_-_key_messages_for_the_g20_270818.pdf>

United Nations Environment Programme, *Single-Use Plastics, a Roadmap for Sustainability*. (2018)
<<https://www.unenvironment.org/resources/report/single-use-plastics-roadmap-sustainability>>

United Nations Environment Programme et al, *Valuing Plastics: The Business Case for Measuring, Managing and Disclosing Plastic Use in the Consumer Goods Industry* (2014)
<<http://www.unep.org/pdf/ValuingPlastic>>

Wautelet, Thibaut, *The Concept of Circular Economy: Its Origins and Its Evolution* (17 January 2018)
<[file:///C:/Users/bousgas/Downloads/ResearchPaper_Theconceptofcirculareconomy-itsoriginsanditsevolution_WAUTELET%20\(3\).pdf](file:///C:/Users/bousgas/Downloads/ResearchPaper_Theconceptofcirculareconomy-itsoriginsanditsevolution_WAUTELET%20(3).pdf)>

White, Rob, 'Resource Extraction Leaves Something Behind: Environmental Justice and Mining' (2013)
2(1) *International Journal for Crime, Justice and Social Democracy* 50

White, Rob and Diane Heckenberg, 'Legislation, Regulatory Models and Approaches to Compliance and Enforcement' 27

Winans, K, A Kendall and H Deng, 'The History and Current Applications of the Circular Economy Concept' (2017) 68 *Renewable and Sustainable Energy Reviews* 825

World Economic Forum, *The New Plastics Economy Rethinking the Future* (January 2016)
<http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf>

World Wide Fund for Nature and Dalberg Advisors, *Solving Plastic Pollution through Accountability* (2019)
<http://d2ouvy59p0dg6k.cloudfront.net/downloads/solving_plastic_pollution_through_accountability_eng_singles.pdf>

Legislation

Environment Protection Act 1970 (Vic)

Environment Protection Act 1993 (SA)

Environmental Protection Act 1986 (WA)

Environment Protection (Beverage Containers and Plastic Bags) Act 2011 (NT)

Environmental Protection (NEPM-UPM) Regulations 2013 (WA)

Environmental Protection (Plastic Bags) Regulations 2018 (WA)

Environment Protection (Used Packaging Materials) Policy 2012 (SA)

National Environment Protection Council Act 1994 (Cth)

National Environment Protection (Used Packaging Materials) Measure 2011 (Cth)

Plastic Shopping Bags Ban Act 2010 (ACT)

Plastic Shopping Bags Ban Act 2013 (Tas)

Plastic Shopping Bags (Waste Avoidance) Act 2008 (SA)

Product Stewardship Act 2011 (Cth)

Waste Avoidance and Resource Recovery Act 2001 (NSW)

Waste Management Policy (Used Packaging) 2000 (Qld)

Waste Reduction and Recycling Act 2011 (Qld)

Waste Reduction and Recycling Amendment Act 2017 (Qld)

Waste Reduction and Recycling Regulation 2011 (Qld)

Other Sources including websites

ABC news, 'Does a Plastic Bag Ban Cause a Spike in Bin Liner Sales?' (online, 28 August 2017)

<<https://www.abc.net.au/news/specials/curious-canberra/2017-08-28/does-a-plastic-bag-ban-cause-a-spike-in-the-use-of-bin-bags/8819504>>

APCO, 'Design for Recovery - Reuse, Recycling or Composting', *Quickstart Guide* (text)

<<https://www.packagingcovenant.org.au/documents/item/3153>>

Australian Government Australian Law Reform Commission, 'Regulatory Forms', *ALRC*

<<https://www.alrc.gov.au/publication/classification-content-regulation-and-convergent-media-alrc-report-118/13-codes-and-co-regulation/regulatory-forms-2/>>

Australian Government Department of Environment and Energy, *Policies and Governance for Waste* (Web page) <<http://www.environment.gov.au/>>

Australian Government Department of Agriculture, Water and the Environment, *Product Stewardship Schemes and Priorities* (Web page) <<http://www.environment.gov.au/>>

Australian Government Department of Agriculture, Water and the Environment, *2020-21 Priority Products* (Web page) <<http://www.environment.gov.au/>>

Australian Government Small Business and Family Enterprise Ombudsman, 'Small Business Counts2019.Pdf' <<https://www.asbfeo.gov.au/sites/default/files/documents/ASBFEO-small-business-counts2019.pdf>>

Australian Packaging Covenant and Planet Ark, *PREP - Removing Confusion from Recycling* (Web page) <<https://prep.org.au/main/content/home>>

Australian Packaging Covenant, 'Collaboration with Government', *ApcoWeb* (Web page) <<https://apco.org.au/collaborating-with-governments>>

Australian Packaging Covenant, 'Collaboration with Industry', *ApcoWeb* (Web page) <<https://apco.org.au/collaborating-with-industry-sectors>>

Australian Packaging Covenant, 'Collaboration with Strategic Partners', *ApcoWeb* (Web page) <<https://apco.org.au/collaborating-with-strategic-partners>>

Australian Packaging Covenant Organisation, 'Collective Action Group', *ApcoWeb* (Web page) <<https://apco.org.au/the-collective-action-group>>

Australian Packaging Covenant Organisation Ltd., 'Leading Industry & Government Representatives Announced as Part of Collective Action Group to Drive 2025 National Packaging Targets', *ApcoWeb* (Web page) <<https://www.packagingcovenant.org.au/news/leading-industry-government-representatives-announced-as-part-of-collective-action-group-to-drive-2025-national-packaging-targets>>

Australian Packaging Covenant, 'Non-Compliant and Withdrawn Signatories', *ApcoWeb* (Web page) <<https://apco.org.au/withdrawn-signatories>>

Australian Packaging Covenant, 'Sustainable Packaging Guidelines', *ApcoWeb* (Web page) <<https://apco.org.au/sustainable-packaging-guidelines>>

Australian Packaging Covenant Organisation, 'The ANZPAC Plastics Pact - Australian Packaging Covenant Organisation Ltd', (Web page, March 2020) <<https://www.packagingcovenant.org.au/who-we-are/the-anzpac-plastics-pact>>

Australian Packaging Covenant Organisation Ltd, 'Working Groups', *ApcoWeb* (Web page)

<<https://www.packagingcovenant.org.au/who-we-are/apco-working-groups>>

Australian Packaging Covenant Organisation Ltd, 'Membership Options', *ApcoWeb* (Web page)

<<https://apco.org.au/about-membership>>

Australian Packaging Covenant Organisation Ltd., '2018 Working Groups- Key Findings', *ApcoWeb* (Web page) <<https://www.packagingcovenant.org.au/news/2018-working-groups-key-findings-now-available>>

Buchanan, Robert Angus, 'History of Technology', *Encyclopaedia Britannica* (online, 18 November 2020)

<<https://www.britannica.com/technology/history-of-technology>>

Cleanaway, 'What Is Recycling Contamination?' (Web page, 5 November 2018)

<<https://www.cleanaway.com.au/sustainable-future/contamination-main/>>

Commonwealth Parliament of Australia, 'Commonwealth Powers Relating to Environmental Protection and Ecologically Sustainable Development', *The Nature of Commonwealth Powers under the Australian Constitution* (text)

<https://www.aph.gov.au/parliamentary_business/committees/senate/environment_and_communications/completed_inquiries/1999-02/enviropowers/report/c02>

Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions, A New Circular Economy Action Plan for a Cleaner and More Competitive Europe, COM/2020/98 final (11 March 2020)

Corporate Waste Solutions, 'Is Australia's Product Stewardship Act Effective?', (Web page, 22 March 2017)

<<https://www.fmmedia.com.au/sectors/australias-product-stewardship-effective/>>

CSIRO, 'Circular Economy and Waste Management', *Overview* (Web page, 17 December 2020)

<<https://www.csiro.au/en/Research/Environment/Circular-Economy>>

David McGinty, 'How to Build a Circular Economy', *World Resources Institute* (Web page, 6 August 2020)

<<https://www.wri.org/blog/2020/08/how-to-circular-economy>>

Department of Agriculture, Water and the Environment, '2018 National Waste Policy: Less Waste, More Resources' *Australian Government* (Web page, 2018) <<http://www.environment.gov.au/>>

Department of Agriculture, Water and the Environment, 'Australian Packaging Covenant', *Australian Government* (Web page, 28 April 2020) <<http://www.environment.gov.au/protection/waste-resource-recovery/plastics-and-packaging/package-covenant>>

Department of Agriculture, Water and the Environment, 'National Environment Protection (Used Packaging Materials) Measure 2011 Audit Methodology', *Australian Government* (Web page) <<https://www.environment.gov.au/system/files/resources/2a83e47d-9109-4615-aaf2-c267f427a89d/files/used-packaging-materials-nepm-audit-methodology.pdf>>

Department of the Environment and Energy, 'Product List and Notices 2013-14 Product List', *Australian Government* (Web page, 30 June 2013) <<http://www.environment.gov.au/>>

Department of the Environment and Energy, 'Product Notice - Packaging - 19/12/2011', *Australian Government* (Web page) <<http://www.environment.gov.au/>>

Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 Establishing a Framework for the Setting of Eco-design Requirements for Energy-Related Products (Text with EEA Relevance) 2009 (285)

Ellen MacArthur Foundation, 'News', *China-EU Agreement Paves Way for Global Adoption of Circular Economy* (online, 16 July 2018) <<https://www.ellenmacarthurfoundation.org/news/china-eu-agreement-paves-way-for-global-adoption-of-circular-economy>>

Ellen MacArthur Foundation, 'Circular Economy a New Economy Is Emerging' (online, June 2012) <<https://www.ellenmacarthurfoundation.org/news/circular-economy>>

Ellen MacArthur Foundation, 'Circular Economy Schools Of Thought' (Web page, July 2019) <<https://www.ellenmacarthurfoundation.org/circular-economy/concept/schools-of-thought>>

Ellen MacArthur Foundation, 'The Circular Economy in Detail' (Web page) <https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-detail?gclid=Cj0KCQiAwf39BRCCARIsALXWETy16qTAvZ7H9HImPiGa3OMPcMSH8R11BSmr_7d1VFZQIPc8gID20QEaAkDKEALw_wcB>

Ellen MacArthur Foundation, 'What Is a Circular Economy?' *What Is a Circular Economy? A Framework for an Economy that is Restorative and Regenerative by Design* (Web page) <<https://www.ellenmacarthurfoundation.org/circular-economy/concept>>

Environmental Protection Agency Tasmania, 'Overview', *Legislative Context - Resource Recovery & Waste* (Web page) <<https://epa.tas.gov.au/epa/resource-recovery-waste/legislative-context-resource-recovery-waste>>

Environment Protection Authority Victoria, 'Victorian Plastic Bag Ban', *Comply with the Plastic Bag Ban* (Online text, 4 May 2021) <<https://www.epa.vic.gov.au/for-business/how-to/comply-with-plastic-bag-ban>>

European Commission Environment, 'Our Oceans, Seas and Coasts', *Environment* (text, 10 May 2019) <https://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/index_en.htm>

European Union, 'Joint Statement of the 20th EU-China Summit', *EEAS - European External Action Service - European Commission* (Press Release, July 2018) <https://eeas.europa.eu/delegations/china/48424/joint-statement-20th-eu-china-summit_en>

Freshkills Park, 'It's All Downcycled From Here', (Web page, 5 February 2020) <<https://freshkillspark.org/blog/its-all-downcycled-from-here>>

Grand View Research, 'Plastic Packaging Market Growth and Trends', *Plastic Packaging Market Size Worth \$320.9 Billion by 2027* (Web page, March 2021) <<https://www.grandviewresearch.com/press-release/global-plastic-packaging-market>>

Greg Seaman, 'Plastics by the Numbers', *Eartheasy* (Webpage, 2 May 2012) <<https://learn.eartheasy.com/articles/plastics-by-the-numbers/>>

Hook, Paul and Heimlich, Joe. E, 'A History of Packaging', *Ohionline Ohio State University Extension* (Web page, 11 May 2017) <<https://ohionline.osu.edu/factsheet/cdfs-133>>

insidewaste, 'Australia One of Few Countries Responsible for High Waste Generation', *Inside Waste* (online, 15 July 2019) <<https://www.insidewaste.com.au/index.php/2019/07/15/australia-one-of-few-countries-responsible-for-high-waste-generation/>>

Jenny Elliss, 'The Rise and fall of Plastic', *Ecotourism Australia* (Web page, 17 July 2018) <<https://www.ecotourism.org.au/news/the-rise-and-fall-of-plastic/>>

Lasker, Phil. Jenya Goloubeva, Bill Birtles, 'Here's How Australia Is Planning to Deal with China's Ban on Foreign Waste', *ABC News* (Online text, 10 December 2017) <<http://www.abc.net.au/news/2017-12-10/china-ban-on-foreign-rubbish-leaves-recycling-industry-in-a-mess/9243184>>

Lasker, Phillip and Jenya Goloubeva, 'Recycling Industry Demands Federal Action as Mountains of Rubbish Build Up', *ABC News* (Online, 14 April 2019) <<https://www.abc.net.au/news/2019-04-14/recycling-industry-demands-federal-action-as--waste-piles-up/10993218>>

Macquarie Dictionary, 'Collaboration' (online) <https://www-macquariedictionary-com-au.ezp01.library.qut.edu.au/features/word/search/?search_word_type=Dictionary&word=collaboration>

Macquarie Dictionary, 'Holistic' (online) <https://www-macquariedictionary-com-au.ezp01.library.qut.edu.au/features/word/search/?search_word_type=Dictionary&word=holistic>

Macquarie Dictionary, 'Packaging' (online, 2020) <https://www-macquariedictionary-com-au.ezp01.library.qut.edu.au/features/word/search/?search_word_type=Dictionary&word=packaging>

Mirage, 'Woolworths and TerraCycle to Bring Revolutionary "Loop" Platform to Australia to Tackle Plastic', *Mirage News* (online, 29 October 2019) <<https://www.miragenews.com/woolworths-and-terracycle-to-bring-revolutionary-loop-platform-to-australia-to-tackle-plastic/>,
<https://www.miragenews.com/woolworths-and-terracycle-to-bring-revolutionary-loop-platform-to-australia-to-tackle-plastic>>

Molika Ashford, 'What Happens Inside a Landfill?', *LifeScience* (Web page) <<https://www.livescience.com/32786-what-happens-inside-a-landfill.html>>

Multi-Material Stewardship Western, 'History of EPR' (Web page) <<https://www.mmsk.ca/residents/history-epr/>>

National Environment Protection Council Service Corporation, 'Packaging Impacts Decision Regulation Impact Statement' (text, March 2014) <<https://www.environment.gov.au/system/files/resources/0d61a8da-4263-4844-928c-e4f9e07472ef/files/packaging-impacts-decision-ris.pdf>>

National Retail Association, '1.5 Billion Single Use Plastic Bags Eliminated since July', *National Retail Association* (Web page, 3 December 2018) <<https://www.nra.net.au/1-5-billion-single-use-plastic-bags-eliminated-since-july/>>

National Retail Association, 'Bag Bans across Australia', *Info for Australian Retailers* (Web page, 2021) <<https://bagban.com.au/>>

New South Wales Environmental Protection Agency, 'Packaging Waste', *Product Stewardship Schemes* (Web page, 20 November 2020) <<https://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/warr-strategy/product-stewardship-schemes>>

Parliament of Australia, 'History of The Commonwealth's Environmental Role - The Commonwealth's Role in Environmental Protection and Management', *History of The Commonwealth's Environmental Role* (Web page) <https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Completed_inquiries/1999-02/bio/report/c02>

Parliament of Australia, 'Source Reduction – Product Stewardship and Legislative and Regulatory Frameworks' *Chapter 7* (Web page) <https://www.aph.gov.au/parliamentary_business/committees/senate/environment_and_communications/marine_plastics/Report/c07>

Parliament of Australia, 'Waste Management and Recycling in Australia', *Chapter 2* (Web page) <https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/WasteandRecycling/Report/c02>

Parliament of New South Wales, 'The Roles and Responsibilities of Federal, State and Local Governments' (Web page) <<https://www.parliament.nsw.gov.au/about/Pages/The-Roles-and-Responsibilities-of-Federal-State-a.aspx>>

Queensland Government, 'Compliance and Enforcement', *Department of Environment and Science, Queensland* (Web page, 20 October 2009) <<https://environment.des.qld.gov.au/management/compliance-enforcement>>

Queensland Government, 'How the Ban Is Being Enforced', *Plastic Bag Ban* (Web page, 27 June 2019) <<https://www.qld.gov.au/environment/pollution/management/waste/recovery/reduction/plastic-bags/compliance>>

Queensland Government, 'Single-Use Plastic Products Ban', *Plastic Pollution Reduction* (Web page, 24 March 2021) <<https://www.qld.gov.au/environment/pollution/management/waste/recovery/reduction/plastic-pollution/single-use-plastic-products-ban>>

Richie, Mike, 'Is Australia's Product Stewardship Act Effective?', *Corporate Waste Solutions* (text, March 2017) <<https://www.fmmedia.com.au/sectors/australias-product-stewardship-effective/>>

SBS News Australia, 'Single-Use Plastics like Straws and Cutlery Are Now Banned in South Australia', *SBS News* (online, 3 January 2021) <<https://www.sbs.com.au/news/single-use-plastics-like-straws-and-cutlery-are-now-banned-in-south-australia>>

Science History Institute 'The History and Future of Plastics', *Science Matters: The Case of Plastics* (Web page, 18 July 2016) <<https://www.sciencehistory.org/the-history-and-future-of-plastics>>

Seventh Meeting of the Environmental Ministers, 'Agreed-Statement' (27 April 2018) <<https://www.environment.gov.au/system/files/pages/4f59b654-53aa-43df-b9d1-b21f9caa500c/files/mem7-agreed-statement.pdf>>

Schroeter, Miri, 'Two Decades of the Australian Packaging Covenant Explored', *Inside Waste* (Web page, 9 October 2019) <<https://www.insidewaste.com.au/index.php/2019/10/09/two-decades-of-the-australian-packaging-covenant-explored/>>

Sparkes, David, 'Australian Recycling Crisis to Deepen as Malaysia Sends Waste Back', *PM* (ABC Radio Darwin, 31 May 2019) <<https://www.abc.net.au/radio/programs/pm/australian-recycling-crisis-to-deepen-as-waste-sent-back/11168608>>

SUEZ Australia & New Zealand, 'Plastic Bags' (Web page) <<https://www.suez.com.au/en-au/sustainability-tips/recycling-tips/plastic-bags>>

The Aluminium Association, 'Recycling' (Web page)
<https://www.aluminum.org/industries/production/recycling>

The Guardian, 'Microplastic Particles Now Discoverable in Human Organs', *the Guardian* (online, 18 August 2020) <<http://www.theguardian.com/environment/2020/aug/17/microplastic-particles-discovered-in-human-organs>>.

Thomas Lindhqvist, 'Extended Producer Responsibility in Cleaner Production: Policy Principle to Promote Environmental Improvements of Product Systems' (The International Institute for Industrial Environmental Economics Lund University, 2000) <<https://lup.lub.lu.se/search/ws/files/4433708/1002025.pdf>>

United Nations Department of Economic and Social Affairs, *World Population Prospects 2019: Highlights* (No ST/ESA/SER.A/423, 17 June 2019)
<https://population.un.org/wpp/Publications/Files/WPP2019_Highlights.pdf>

United Nations, 'From Birth to Ban: A History of the Plastic Shopping Bag' (Web page, 25 April 2018)
<<https://www.unenvironment.org/news-and-stories/story/birth-ban-history-plastic-shopping-bag>>

Victor, Robert, 'How Technology Affects Modern Product Distribution', *Hollingsworth* (Web page, 20 June 2017) <<https://www.hollingsworthllc.com/technology-affects-modern-product-distribution/>>

Waste Management Review, 'APCO Conduct Brand Audit for 2025 Recycling Target', (Web page, 26 June 2018) <<https://wastemanagementreview.com.au/apco-conduct-brand-audit-2025-recycling-target/>>

Wendy Chapman, 'Demand Will Drive Soft Plastics Recycling', *Sustainability Matters* (Web page, 28 May 2020) <<http://sustainabilitymatters.net.au/content/waste/article/demand-will-drive-soft-plastics-recycling-1311372333>>

West, Dave and Boomerange Alliance, 'Submission to Senate Enquiry: The Treat of Marine Plastic Pollution in Australia' (2015)
<https://d3n8a8pro7vhmx.cloudfront.net/boomerangalliance/pages/158/attachments/original/1445317763/Environment_Communications_marine_plastic_sub77.pdf?1445317763>

World Economic Forum, 'Set up Global Reverse Networks', *Towards a Circular Economy* (Web page) <<https://reports.weforum.org/toward-the-circular-economy-accelerating-the-scale-up-across-global-supply-chains/set-up-global-reverse-networks/>>

WWF, '10 Worst Single-Use Plastics and Eco-Friendly Alternatives' (Web page, 1 July 2020) <<https://www.wwf.org.au/news/blogs/10-worst-single-use-plastics-and-eco-friendly-alternatives>>