
Biodegradability of plastics: Discussion paper

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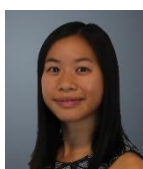
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Executive summary

The problem of plastic, and the purpose of this Discussion Paper

Plastics have become a core component of the functioning of modern society. They are perhaps most well known for their use in packaging, but they are also used in building materials, furniture, toys, medical devices and many other products.

The increased demand for and use of plastics has resulted in extensive plastic waste throughout the world, which has been described as one of the most pressing environmental issues of our time.¹ There are many facets to the problem of plastics, including that fossil fuels are typically used in the manufacture of these materials, the enormous amounts of plastic pollution existing globally, and the very low plastic recycling rate in Australia.²

Biodegradable plastics present a potential solution to some of the issues relating to plastics, although there are a number of challenges that mean that the scope and role of biodegradable plastics in an increasingly circular economy is not straight forward.

The purpose of this discussion paper is to describe what is meant by biodegradable plastics, and to consider issues arising from the current state of play in terms of knowledge, policy, law and expectations. This enables gaps and potential solutions to be identified and encourages consideration of whether 'biodegradability' is a useful concept in the pursuit of (and demand for) sustainability. Ultimately, if 'biodegradability' is a useful concept, consideration will need to be given to what role it could or should play from a practical, policy and regulatory perspective.

Issues with biodegradable plastics

The key issues associated with the use of the term 'biodegradable' in relation to plastics that are identified in this discussion paper include:

- 1 **Confusion in terminology.** Various terminology, such as 'bioplastics', 'bio-derived plastics' and 'biodegradable plastics' are similar and lack clarity. For example, 'bioplastics' is generally understood to include three different forms of plastic, which are not necessarily biodegradable (see **section 3.2(d)**). In addition, as explained in **section 3.2(c)**, various meanings have been ascribed to 'biodegradable plastics'. This has resulted in consumer confusion, posing a risk of greenwashing and reducing the legitimacy of the term 'biodegradability'. As a result, there are divergent views as to whether the term 'biodegradable' should be used at all in plastics marketing.
- 2 **Lack of clear policy.** Closely related to the confusion in terminology is the lack of clear policy (from all levels of Government) on the meaning and role of biodegradable plastics in the push towards circularity.

For example, given the waste hierarchy focuses on avoidance, reuse and recycling, there is a need to carefully identify the circumstances in which it is appropriate to design a product to be made of plastic, and when it is appropriate to use biodegradable polymers in the design of that plastic product. It is anticipated that biodegradable plastics may be appropriate in particular circumstances only.
- 3 **Problems with legislative regulation.** There are various issues with State/Territory and Commonwealth legislation, including:
 - (a) Inconsistent use of and inadequate definition of the term 'biodegradability'. For example, a review of current laws reveals the term is mostly used to describe certified compostable plastics, or is not defined or referred to at all.
 - (b) A lack of clarity as to how traditional laws, such as those seeking to protect the environment, will apply to biodegradable plastics. For example, when and for how long will a biodegradable plastic be considered waste or a form of pollution?

¹ Laura Parker, 'The world's plastic pollution crisis explained' *National Geographic* (Web Page, 7 June 2019) <<https://www.nationalgeographic.com/environment/article/plastic-pollution>>.

² In Australia in 2016-2017, less than 10% of plastics that were consumed were recycled: <https://www.energy.gov.au/households/reducing-waste>

- (c) A lack of specific regulation of claims relating to 'biodegradable' plastics, with experience to date suggesting that general consumer laws may be unable to offer protection that aligns with consumer expectations.

For example, in *ACCC v Woolworths* [2020] FCAFC 162, the Full Federal Court held that references to 'biodegradable' and 'compostable' were not misleading and deceptive as the representations were a present tense statement about the **inherent qualities** of a product (which were capable of breaking down in landfill and turned into compost); not what it will do in the future.

- (d) Insufficient enforcement powers and resources, particularly for co-regulatory models which seek to encourage voluntary product stewardship schemes.

4 **Problems with labelling.** For example:

- (a) The proliferation of 'green' marketing, including environmentally friendly logos, messages and words such as 'biodegradable,' gives rise to the risk of consumer confusion, 'greenwashing' and misleading or deceptive conduct.

One element of this has been acknowledged by the ACCC; that is, that there may be confusion as to what consumers understand trademarks to actually mean. For example, the logo licensed by the Australasian Bioplastics Association (**ABA**) for industrial compostable products only contains the word 'compostable', rather than 'industrial compostable' and it is possible that some consumers may not appreciate the relevance of the 'seedling logo' (which is used to convey industrial compostability). This can be contrasted with the licensed logo for home compostable products which states 'home compostable' and has an image of a home compost bin.

At the very least non-specific or generalised 'green' labelling hinders consumers' ability to make informed choices, and leads to the erosion of consumer trust and confidence. It may also be unlawful. This issue is exacerbated where 'technical' meanings of compostability or biodegradability do not correlate with the understanding of an ordinary consumer.

- (b) The difficulty consumers face in trying to understand and differentiate between the multitude of environmentally-evocative labels in use. There is a lack of 'holistic' assessment of overall environmental impact or sustainability.
- (c) Inconsistent or inaccurate labelling of biodegradable products means that it is difficult for both consumers and waste management facilities to distinguish different types of plastics to identify the appropriate waste disposal method.

5 **Limitations on waste management options.** There appears to be limited waste management options that are suitable for, available and willing to receive biodegradable plastics right now.

Given the prominence of 'leakage' (being waste that 'leaks' from the overall waste management system), there is a need to consider how imperfections of the current waste management system can be improved to ensure that once disposed of, biodegradable plastics (as for plastics of all types) enter and remain within the appropriate waste management system, at least until they can be reused or recycled.

6 **Unintended consequences.** In developing biodegradable plastics for use and considering their utility, unintended consequences must be avoided, such as the release of toxic contaminants through the biodegradation process and the inadvertent encouragement of 'leakage' through poor waste behaviours, such as littering.

Solutions to the problems with biodegradable plastics

This Discussion Paper identifies that the issues relating to biodegradable plastics and use of the term 'biodegradable' in plastics marketing are complex with no clear or simple solution. Instead, a multi-faceted approach is required to improve understanding and regulation of biodegradable plastics.

Such a multi-faceted approach is likely to include several of the following solutions:

- 1 **Information awareness campaigns for sustainability-related claims:** Information is key to addressing consumer confusion, not only about the meaning of terms but also as to the relationship (currently disjunct) between biodegradability and waste disposal. Campaigns would benefit from an agreed taxonomy and clear government policy, but do not depend on it.
- 2 **Quality assurance measures, such as standards, certifications, monitoring and enforcement:** Quality assurance builds confidence where it is robust, transparent, reliable and accountable.

In Australia, three standards are available that have partial operation with respect to biodegradable plastics: two Australian standards that address industrial and home compostability (AS 4736-2006 and AS 5810-2010 respectively) and an international standard (ISO 23517) that addresses biodegradable plastic materials used to produce mulch films for use in agriculture or horticulture. The ABA is responsible for certifying that products are compliant with these standards and has developed labels to communicate this certification.

However, more can and should be done to broaden the coverage of standards relevant to biodegradable plastics, and to clarify the role and expand the availability of certification. Reference could be made to the existing standards in Europe and the US and the certification process carried out by the ABA, TUV Austria and Din Certo in those jurisdictions. To the extent that quality assurance measures in Australia can align with those relevant globally, this should be supported.

New quality assurance measures, such as a 'biodegradability rating tool' and/ or a biodegradability database (see **section 6.1(c)** below), may be beneficial to pursue. A 'biodegradability rating tool' could convey the relative biodegradability of the plastic product, the source of the polymers used and where more information can be found. The biodegradability database may complement the hypothesised 'biodegradability rating tool' to provide an evidence-based approach to the classification (or certification) of biodegradable plastics. The database could be populated as scientific research advances and therefore assist in the classification of biodegradable plastics.



- 3 **Labelling systems, guidance and trademarks:** Accurate labelling will help reduce consumer confusion, reduce the risk of businesses making misleading statements, improve consumer choice and improve end of life management (if such information is included in the label). Improved labelling would be facilitated by, for example:
- further guidance from the ACCC and from industry bodies such as the Australian Packaging Covenant Organisation (**APCO**) (who has existing labelling guidance relating to compostable labels³) or the ABA; and/or
 - new and amended trademarks to legitimise labelling.

Voluntary labelling systems and trademarks used in Europe may be useful.

- 4 **Regulation by the law:** The law may be necessary to achieve some of the above solutions, such as use of trademarks and protections against misleading or deceptive conduct. Legal regulation can adopt a variety of models, from 'soft' (e.g. incentives) to 'hard' (e.g. 'command and control'), and operate at a variety of scales (local government, State, Commonwealth and international).

For example, legislation could specify minimum requirements for biodegradability claims or prohibit certain types of plastics (noting that steps to do so have been taken across Australia in respect of the phase out of oxo-degradable plastics).

Legislation as a solution may draw on both existing and new laws. For example, existing laws relating to consumer protection are capable of addressing biodegradability claims. To the extent that new laws are considered, the approach taken in other jurisdictions may be useful, such as California's bans on making generic claims about the biodegradability of plastic products, without providing information on the receiving environment required to achieve that biodegradation.

- 5 **Scientific research on the biodegradation of polymers and plastic products:** There have been some recent developments, including the EU's policy framework which critically analyses the positive and negative impacts of biodegradable (including compostable) plastics. However, scientific research in other areas has been called for to improve the understanding of biodegradation processes, including safe biodegradation in light of possible transfer to other (natural) environments, timeframes, the impact of additives and long-term effects on the surrounding environment.⁴

Table 5 establishes a link between the identified problems and proposed solutions. **Table 6** evaluates the benefits and challenges of the proposed solutions.

Stakeholder input

If Stakeholders have a view on the matters considered in the Discussion Paper, including the range of potential solutions identified and the recommendations made, they are welcome to share their views by emailing centreforbioplastics@uq.edu.au. To prompt such feedback and facilitate a broader discussion, a number of questions are posed:

- Is it appropriate to use the term 'biodegradable' in plastic marketing? Why or why not?
- Do you agree there is value in an agreed taxonomy for biodegradability related terms?
- Would industry and/or regulator guidance on product labelling be useful for industry?
- Do existing standards relating to biodegradable plastics need to be amended? If so, why?
- Do you consider the industry-led standards in Europe for biodegradability in soil, marine and fresh water provide a suitable model for adoption in Australia?
- Do you consider trademarks to be an effective means of conveying the sustainability credentials of a particular product? Is there scope for improvement? If so, how?
- Are there other 'problems' or 'solutions' beyond those identified in this discussion paper? If so, what?
- Do you have a view on what steps should be taken in the short (next 1-2 years), medium (2-5 years) and long (beyond 5 years) term? Who should take those steps and why?

³ Australian Packaging Covenant Organisation, *Considerations for Compostable Plastic Packaging* <https://documents.packagingcovenant.org.au/public-documents/Considerations%20for%20Compostable%20Packaging> p 13.

⁴ EU policy framework on biobased, biodegradable and compostable plastics, COM(2022) 682 final (November 30, 2022).

Chapter 1 – Objective

1 Objective

The objective of this discussion paper is to outline the key issues associated with the use of the term 'biodegradable' in relation to plastics and to identify a range of potential solutions that will assist Governments, industry and consumers to understand what the term means, when it could or should be used, and the mechanisms available for ensuring that a common understanding is adhered to.

By focussing on 'biodegradable' plastics, and avenues to improve understanding of this prominent (and environmentally evocative) term, this discussion paper also seeks to complement the work being undertaken in parallel by industry participants, policy makers, lawmakers and the UN. It will also serve to answer the key question: is 'biodegradability' a useful concept in the pursuit of (and demand for) sustainability?



Chapter 2 – Introduction

2 Introduction

“Academic and industry interest in biodegradable plastics...has exploded in recent years”,⁵ driven by a desire to find sustainable solutions to the growing problem of plastic waste and pollution.

The term “biodegradable” describes the ability of a particular product or compound to fully degrade into carbon dioxide (with methane in the absence of oxygen), water and biomass over time, driven by biological activity. As such, biodegradable plastics invoke “an ideal vision of matter lapsing back into nature without leaving a visible [or problematic] residue”.⁶

However, biodegradability depends on the environment (e.g. temperature, water, oxygen level, availability of enzymes), and the size and shape of the material, meaning that it can occur at varying rates and to varying extents.

As such, whilst the term ‘biodegradable’ describes a natural process of degradation, that process can occur across broad-ranging time scales, and can be artificially activated or accelerated through the addition of micro-organisms, the control of environmental conditions and/or through physical processing (e.g. by ‘breaking’ through impermeable layers, or increasing the surface area exposure by breaking a material into smaller fragments).

2.1 The problem and the need for a multi-faceted solution

The term ‘biodegradable’ is increasingly being used in product descriptions, particularly for plastics, presumably for its marketing (“green”) appeal.

Despite this trend, use of the term ‘biodegradable’ is largely unregulated in Australia - there is no industry accepted criteria or standard that needs to be met to classify a plastic as biodegradable.

There are genuine concerns that:

- a) the breadth of the term means that its usage is vague and liable to cause confusion; and
- b) ‘biodegradable’ is frequently misunderstood and/or misused by industry and consumers, particularly when used in relation to plastics.

Those concerns are amplified by potential misunderstanding or misuse of related terms, such as ‘degradable’, ‘bioplastics’ and ‘compostable’.

This is unsatisfactory from an environmental, legal and policy perspective, particularly given the focus on sustainability which continues to gain traction in Australia and around the world.

In this context, there are divergent views about the role that should be played by biodegradable plastics and whether the term ‘biodegradable’ should be used in plastics marketing at all.

Subject to these threshold matters, there is a need and desire to:

- a) improve the understanding of biodegradable plastics and relationship to source (bio-based or fossil-fuel based plastics);
- b) promote consumer choice across the supply chain;
- c) support the emergence of a market for biodegradable plastics in Australia, where appropriate; and
- d) reduce misunderstandings and eliminate false claims regarding the biodegradability of plastics.

⁵ Taofeeq Moshood et al, ‘Sustainability of biodegradable plastics: New problem or solution to solve the global plastic pollution?’ (2022) 5 *Current Research in Green and Sustainable Chemistry* 100273.

⁶ Koushik Ghosh and Brad Jones, ‘Roadmap to Biodegradable Plastics – Current State and Research Needs’ (2021) 9 *ACS Sustainable Chemistry & Engineering* 6170: 1-18, 1.

2.2 Structure

This discussion paper is structured as follows:

- a) **Parts 1-2** introduce the concept of 'biodegradability', and describes the problem, objective and structure of this discussion paper.
- b) **Part 3** provides contextual background on plastics, waste and sustainability, and explains the current meaning of key terms including 'bioplastics', 'compostability' and of course 'biodegradability'. **Part 3** also explores the merits and some of the challenges of 'biodegradable' plastics and identifies problems emerging from the discussion of these issues.
- c) **Part 4** summarises the current policy relevant to biodegradable plastics and identifies relevant (or potentially relevant) regulatory frameworks. The discussion identifies further problems associated with the regulation of biodegradable plastics and the gaps that remain.
- d) **Part 5** considers the regulation of biodegradable plastics in Europe and the United States, for comparative purposes.
- e) **Part 6** identifies and evaluates potential solutions, and makes recommendations as to what should be done, when and by whom.



Chapter 3 – Background

3 Background

3.1 Overview: plastics, pollution and the need for sustainability

Plastic is considered a ‘revolutionary material’⁷ that is produced and used en masse across a wide range of industries.⁸

The Macquarie Dictionary defines ‘plastic’ to mean:⁹

any of a group of synthetic or natural organic materials which may be shaped when soft and then hardened, including many types of resins, resinoids, polymers, cellulose derivatives, casein materials, and proteins.

It is important to recognise upfront that ‘plastics’ is a general term that is often used to refer to ‘polymers’ as well as manufactured ‘plastic products’. The distinction between these can be understood on the basis that one or more ‘polymers’ (also known as a ‘virgin polymers’) are the core ingredients of a manufactured plastic product, although such a product can have a number of other ingredients as well, such as additives, plasticisers or fillers.

The breadth of the term ‘plastics’ is matched by the breadth of the uses to which plastics are deployed. Indeed, plastics are a ubiquitous part of our everyday lives. They are perhaps most well known for their use in packaging, but they are also used in building materials, furniture, toys, medical devices and many other products.

When used for packaging purposes, plastic is durable, lightweight and provides protection from contaminants and the elements. In the context of perishable items, this helps to preserve the contents and increase their shelf life, without appreciably increasing the volume or mass of goods. This in turn helps to reduce wastage and enables lower transportation costs (relative to other forms of packaging such as cardboard), and thereby can help to reduce emissions, water consumption and biodiversity loss.¹⁰

However, the exponential demand for plastics over the last 40 years has led to enormous volumes of plastic waste in Australia,¹¹ and around the world.¹² Data drawn from Commonwealth department websites illustrates the scale of this problem. In particular, “more than 3.5 million tonnes of plastic were consumed in Australia in 2016-17, [but] less than 10% (293,000 tonnes) were recycled...”¹³

Unfortunately, not all plastic waste is contained by waste management systems. Leakage is unavoidable and this has led to vast amounts of plastic pollution, which is described as one of the most pressing environmental issues of our time.¹⁴ There is strong public awareness of this issue, reflected in the fact that “[p]lastic has been the most common item collected on Clean Up Australia day for 20 years”.¹⁵

⁷ Department of Agriculture, Water and the Environment, Australian Government, *National Plastics Plan 2021* (Publication, 2021) 4 <https://www.agriculture.gov.au/sites/default/files/documents/national-plastics-plan-2021.pdf>.

⁸ For example: agriculture, electrical, automatic, building & construction, household, leisure, sports, medical, mechanical, engineering, packaging.

⁹ *Macquarie Dictionary* (online at 2022) ‘plastic’ (def 10).

¹⁰ See: <https://www.sustainability-times.com/green-consumerism/we-need-plastics-what-we-dont-need-is-plastic-waste/>

¹¹ ‘2018–19 Australian Plastics Recycling Survey’ prepared by Envisage Works, 12 March 2020

<https://www.dceew.gov.au/sites/default/files/documents/australian-plastics-recycling-survey-report-2018-19.pdf>

¹² Roland Geyer, Jenna Jambeck and Kara Lavender, ‘Production, use, and fate of all plastics ever made’ (2017) 3(7) *Science Advances* 1700782: 1-5, 3.

¹³ Department of Climate Change, Energy, the Environment and Water, Australian Government, ‘Reducing Waste’, *Households* (Web Page) <https://www.energy.gov.au/households/reducing-waste>.

¹⁴ Laura Parker, ‘The world’s plastic pollution crisis explained’ *National Geographic* (Web Page, 7 June 2019) <<https://www.nationalgeographic.com/environment/article/plastic-pollution>>.

¹⁵ Department of Climate Change, Energy, the Environment and Water, Australian Government, ‘Reducing Waste’, *Households* (Web Page) <https://www.energy.gov.au/households/reducing-waste>.

One response to the plastics problem is to eliminate plastic – for example, by legally banning its production, use and/or disposal. This would certainly be effective at stemming the growing volume of plastic waste and pollution. However, it is easy to say, but nigh on impossible to do, because it is not a realistic option at the present time. Modern society *depends* on plastic, and readily available or economically viable alternatives are not available and, in some cases, do not yet exist. An example is personal protection face masks that became a vital aspect of society during the COVID-19 pandemic.

The development of alternatives to traditional plastics and making them readily available and economically viable, and at the same time not resulting in worse environmental impact, is an ongoing focus for research and development.

The good news, however, is that not all plastic products are the same: some are more sustainable than others. Even so, measuring the sustainability of a particular plastic product is not a straightforward exercise, given the range of factors involved. Those factors include the source of the material used to create the plastic product, with the vast majority of polymers in Australia being derived from traditional fossil-fuels (also known as petroleum- or fossil-based plastics).¹⁶ However, polymers can also be created from bio-sourced material, such as corn, sugarcane, or cellulose.

Another factor is the energy consumed in the process of manufacture and distribution, and whether that is supplied from renewable sources. And thirdly, the fate of plastics post use. Most commodity plastics are effectively non-degradable and accumulate in the environment, whether that be in well-managed environments like landfill, or open environmental systems, including the oceans. Some plastics are inherently biodegradable or degradable in industrial facilities such as composting or solid waste digestion.

Additional to the aforementioned considerations for plastic polymers (source material, energy footprint, and fate), it must be remembered that plastic products also have different functions, characteristics, and impacts, based on their components beyond the polymer matrix. Polyvinyl chloride (**PVC**) is a classic example where the addition of plasticisers transforms the physical properties of the inherently rigid PVC polymer, thereby creating flexible and durable products for applications including floorings and films. However, the ecotoxicity of some plasticisers such as phthalates has raised concerns over their impact to wildlife, human health, and the environment.¹⁷ On another note, the presence of additives and fillers can add complexity to the capacity to recycle using conventional plastic recycling facilities and increases the risk of contamination.

Some examples of the variable characteristics of plastic products are that:

- a) some plastics are relatively inert and can be re-used in their current form (once, twice, or more, but generally not indefinitely)¹⁸, whilst others are not suitable for re-use;¹⁹
- b) some plastics can be reprocessed and recycled,²⁰ while other plastics cannot be readily reprocessed and recycled;²¹ and
- c) some plastics contain hazardous or potentially hazardous chemicals, either in the base polymer(s) or in chemical additives.²²

¹⁶ Roland Geyer, Jenna Jambeck and Kara Lavender, 'Production, use, and fate of all plastics ever made' (2017) 3(7) *Science Advances* 1700782: 1-5, 3.

¹⁷ Sopheak Net et al, 'Occurrence, fate, behaviour and ecotoxicological state of phthalates in different environmental matrices' (2015) 49(7) *Environmental Science & Technology* 25730609: 4019-35. <https://pubs.acs.org/doi/10.1021/es505233b>.

¹⁸ See e.g. Supply chain totes and containers made from polyethylene.

¹⁹ See e.g. Some polyethylene and polypropylene can, when exposed to heat, for example in the microwave or dishwasher, leach unknown chemicals into food and drink. See L. Zanolli, 'Are plastic containers safe for our food' (2020) *The Guardian*, 18 February, <<https://www.theguardian.com/us-news/2020/feb/18/are-plastic-containers-safe-to-use-food-experts>>

²⁰ Including polyethylene terephthalate, polyethylene, polypropylene, and most other commodity plastics, although some polyethylene thin films and polystyrene foams can be problematic plastics that cannot be readily reprocessed and recycled include composite and multilayer plastics, plastic-coated wrapping paper, and contaminated mixed plastic wastes.

²¹ Including composite and multilayer plastics, plastic-coated wrapping paper, and contaminated mixed plastic wastes.

²² See e.g. plastics that contain toxic phthalates as plasticisers.

These differences highlight that *sustainable* production and use of plastics requires consideration to be given across the full lifecycle: from resourcing materials, processing and manufacture, to packaging, distribution and sale, consumption, reuse, recyclability, and disposal.

For example, something can be ‘good’ from a resourcing and manufacturing perspective (e.g., based on bio-derived material, produced using renewable power and recycled water), but ‘bad’ (or less ‘good’) from the perspective of the waste hierarchy (e.g. incapable of being reused, recycled, composted or digested) and environmental impact (e.g. leaving harmful substances or persistent microplastics if leaked to the environment). The reverse can also be true.

Similarly, something that is entirely ‘good’ in its resourcing, manufacture and disposal might nonetheless be ‘bad’ (or less ‘good’) if it encourages or enables poor behaviours to continue, such as the use of single use plastics.

With these issues in mind, it is important to recall the United Nations Sustainable Development Goals, in particular goal 12 which seeks to ensure sustainable consumption and production patterns, recognising that unsustainable patterns are the root cause of the ‘triple planetary crises’ of climate change, biodiversity loss and pollution.²³

Further, given that ‘sustainability’ reflects an expansive concept that captures environmental, social and economic considerations,²⁴ other matters may also be relevant, such as the impact of resourcing and manufacturing activities on cultural values, human rights and of course, economic viability.

The need for a lifecycle approach to improve the sustainability of plastic has been recognised by the United Nations Environment Assembly of the United Nations Environment Programme, which in March 2022 agreed that “an international legally binding instrument on plastic pollution..., based on a comprehensive approach that addresses the full lifecycle of plastics” is to be developed over the next few years.²⁵

There have also been considerable policy and statutory reforms across Australia that reflect the gathering momentum in relation to waste and sustainability. This is described further in **Part 4** of this discussion paper. In sum, however, there has been, and continues to be, an increased focus on matters such as resource efficiency, emissions reduction, waste minimisation and the pursuit of circular economies by Government, industry, investors and consumers.

This broader context demonstrates that change is firmly underway, although it will take some time to translate into meaningful reform. Within that context, this discussion paper is clearly just one piece of the puzzle.



²³ See United Nations Department of Economic and Social Affairs, Goal 12, <<https://sdgs.un.org/goals/goal12>>.

²⁴ United Nations Department of Economic and Social Affairs, *Sustainable Development Goals Report 2022* (7 July 2022) <<https://unstats.un.org/sdgs/report/2022/>>.

²⁵ *United Nations Environment Assembly of the United Nations Environment Programme*, UNEP RES 5/14, UNEP/EA.5/Res.14 (7 March 2022, adopted 2 March 2022).

3.2 Key terms

Before exploring the opportunities and issues associated with biodegradable plastics, it is necessary to explain a number of key terms.

a) Fossil-fuel based plastics

Historically, and today, fossil-fuel based polymers form the base ingredient of most plastic products.²⁶ The main fossil-fuel based polymers are:²⁷

- (i) polyethylene (PE), including high density polyethylene (HDPE), low density polyethylene (LDPE), and linear low-density polyethylene (LLDPE);²⁸
- (ii) polypropylene (PP);
- (iii) polystyrene (PS);
- (iv) polyethylene terephthalate (PET); and
- (v) polyvinyl chloride (PVC).²⁹

These traditional polymers are widely used in Australia, and many everyday consumer products and other types of industrial products are composed of fossil-fuel based polymers.

These polymers have an established classification system – the Plastics Identification Code, also known as the International Resin Identification Coding System (**Plastics Code**). The Plastics Code was launched in 1988 by the Society of the Plastics Industry in the United States (**US**) and was introduced to Australia in 1990.

The Plastics Code is a product stewardship program from the plastics industry. The numbering system identifies the resin composition of the plastic (i.e. the kind of polymer it is made from), and this is displayed inside a triangle shape created by three arrows. This shape is widely misunderstood as the ‘recycling symbol’.³⁰

Critically, when used as part of the Plastics Code, the number in the triangle identifies *what kind of plastic* the item is made from, *not* whether the product is recyclable or whether it can be recycled in Australia. The ACCC has noted that the resin identification system is a good example of how symbols can confuse consumers.³¹

²⁶ Roland Geyer, Jenna Jambeck and Kara Lavender, ‘Production, use, and fate of all plastics ever made’ (2017) 3(7) *Science Advances* 1700782: 1-5, 3.

²⁷ Stephen Burrows et al, ‘The message on the bottle: Rethinking plastic labelling to better encourage sustainable use’ (2022) 132 *Environmental Science and Policy* 109, 110 <<https://www.sciencedirect.com/science/article/pii/S1462901122000600#!>>.

²⁸ Chemistry Australia: <https://chemistryaustralia.org.au/Library/PageContentVersionAttachment/c5dd1bc7-0a5a-4ef0-b81b-e703664b3c9c/pic.pdf>








²⁹ Stephen Burrows et al, ‘The message on the bottle: Rethinking plastic labelling to better encourage sustainable use’ (2022) 132 *Environmental Science and Policy* 109, 110 <<https://www.sciencedirect.com/science/article/pii/S1462901122000600#!>>.

³⁰ See, eg, Vitali Vitaliev, ‘The biography of the famous logo [Summer of Love Recycling]’ (2017) 12(7-8) *Engineering and Technology* 51 <<https://ieeexplore.ieee.org/document/8392879>>.

³¹ Ibid.

The relevant code, examples of use, comments on recyclability in Australia and historical recovery rates are included in **Table 1** below.

Table 1: Polymer types, use, recovery and recyclability³²

Code	Name	Use	Recovery rate 2018-19	Recyclability in Australia
 1 PET	Polyethylene terephthalate (PET or PETE)	Consumer drink packaging, medicine bottles	21%	Packaging captured in container deposit schemes, existing recycling PET facilities. Good polymer for mechanical recycling pathways. An ideal polymer for depolymerisation.
 2 HDPE	High-density polyethylene (HDPE)	Durable containers: detergent, bleach, shampoo, motor oil, milk bottles, cereal box liners, retail bags	19.7%	Municipal waste collection via MRF facilitates. Considered a good polymer for mechanical recycling pathways. When mechanical is not possible, best suited for conversion technologies.
 3 PVC	Polyvinyl chloride (PVC)	Packaging: rigid bottles, blister packs Medical: bedding, shrink wrap, tubes, fluid bags Carpet backing, coated fabrics and flooring Construction: ducting, pipes	2%	Collection scheme for some medical plastics. Considered contamination in municipal plastics collections. Opportunities for greater collection in building and construction sector. Undesirable for conversion technologies. Best suited for purification technologies.
 4 LDPE	Low-density polyethylene (LDPE)	Bags, film wrap, sealants, wire cable covering	17.3%	Consumer packaging wrap collected by REDcycle in Australian supermarkets. Clean post-industrial film suitable for mechanical recycling. Also suitable for conversion technologies.
 5 PP	Polypropylene (PP)	Packaging containers, bottle caps, carpets, flexible packaging	8.9%	Low recycling rate in Australia. Suitable for either conversion or purification technologies.
 6 PS	Polystyrene (PS) and Expanded polystyrene (EPS)	Packaging peanuts, Styrofoam, protective foam, insulation, yoghurt pots	11.5%	Growing focus to reduce PS in packaging to meet recovery targets. EPS packaging collected at transfer stations. There is some recycling into the built environment. The majority of what is collected is currently exported. Excellent candidate for purification technologies. Also good for conversion and depolymerisation technologies.
 7 Other	A mixture of polymer types: ABS/SAN/ASA, PU, nylon, bioplastic and other aggregated or unknown polymer types	Multilayer barrier films, toothbrushes, some food containers, tyres, waste electrical and electronic equipment (WEEE), etc.	5%	Low recyclability, niche collection and recycling of different polymer types.

Recovery rate data source: O'Farrell 2019

³² CSIRO: <https://research.csiro.au/ending-plastic-waste/advanced-recycling/>

b) Bio-derived plastics

Bio-based or bio-derived plastics can be contrasted to fossil-fuel based plastics, because they are fully or partly comprised of polymers sourced from renewable resources such as plant or animal matter. Bio-derived plastics can be, but are not necessarily, biodegradable.

Bio-derived polymers are typically more expensive to produce and may, depending on the intended product, have inferior mechanical properties compared to fossil fuel-derived plastics, but may also result in less greenhouse gas emissions for materials that remain in circulation due to biogenic/sequestered CO₂.³³ Most though are typically used to manufacture products intended for short term (including single) use, such as dining utensils, bottles and packaging, and agricultural applications, such as mulch films.

Bio-derived plastics currently form a small fraction of the overall plastics market. For example, in 2020 the global production of biopolymers was ~2 million tonnes, which is <1% of the fossil-based polymer production.³⁴

c) Biodegradable plastics

The Macquarie Dictionary defines 'biodegradable' as "capable of being decomposed by the action of living organisms, especially of bacteria".³⁵ Other definitions drawn from the industry are more expansive. For example:³⁶

Biodegradable plastics are those that degrade into carbon dioxide (CO₂), methane (CH₄), and water (H₂O) through biological action in a defined environment and in a defined timescale.

In other contexts, a different meaning altogether is suggested – for example, that 'biodegradable' reflects where an item is made from plant-based materials.³⁷

The variation in these definitions reflects the fact that there is "no single understanding of or definition for 'biodegradable'",³⁸ and commentators have lamented that 'biodegradable' "could, and is, being used to refer to all manner of things, many of which aren't great for the environment".³⁹

This appears to have led the Australasian Bioplastics Association (**ABA**) to state that it "does not endorse labelling of a product or material as 'biodegradable' unless the performance of the material at end of life is defined", because the claim "...is meaningless unless it includes the conditions – when, where and how".⁴⁰

³³ Jesse Harrison et al, 'Biodegradability standards for carrier bags and plastic films in aquatic environments: a critical review' (2018) 5(5) 171792: 1-18, 2; Jim Phillip, 'Bioplastics science from a policy vantage' (2013) 30(6) *New Biotechnology* 636.

³⁴ There are various figures published. See Jan-Georg Rosenboom, Robert Langer and Giovanni Traverso, 'Bioplastics for a circular economy' (2022) 7 *Nat Rev Mater* 117 <https://doi.org/10.1038/s41578-021-00407-8>; 'Market update 2020: Bioplastics continue to become mainstream as the global bioplastics market is set to grow by 36 percent over the next 5 years', *European Bioplastics* (Web Page, 2 December 2020) <https://www.european-bioplastics.org/market-update-2020-bioplastics-continue-to-become-mainstream-as-the-global-bioplastics-market-is-set-to-grow-by-36-percent-over-the-next-5-years/>.

³⁵ Macquarie Dictionary, (online at 2022) 'biodegradable'.

³⁶ The SPI Bioplastics Council, *Bioplastics simplified: Attributes of biobased and biodegradable plastics* (Report, February 2016) 3 <https://bioplastics.org.au/wp-content/uploads/2016/05/Bioplastics-Simplified.pdf>; see also 'A straightforward explanation of biodegradable vs. compostable vs. oxo-degradable plastics', *Green Dot Bioplastics* (Blog Post) <<https://www.greendotbioplastics.com/biodegradable-vs-compostable-vs-oxo-degradable-plastics-a-straightforward-explanation/>>.

³⁷ See 'Biodegradable plastic will soon be banned in Australia', *UTS* (Forum Post, 9 March 2021) <<https://www.uts.edu.au/news/social-justice-sustainability/biodegradable-plastic-will-soon-be-banned-australia#:~:text=The%20federal%20government%20has%20launched,add%20up%20to%20big%20changes>>.

³⁸ ACCC, *Biodegradable, degradable and recyclable claims on plastic bags* (News for Business, 2010) 2 <<https://www.accc.gov.au/system/files/Biodegradable%2C%20degradable%20and%20recyclable%20claims%20on%20plastic%20bags.pdf>>.

³⁹ See 'Biodegradable plastic will soon be banned in Australia', *UTS* (Forum Post, 9 March 2021) <<https://www.uts.edu.au/news/social-justice-sustainability/biodegradable-plastic-will-soon-be-banned-australia#:~:text=The%20federal%20government%20has%20launched,add%20up%20to%20big%20changes>>.

⁴⁰ Rowan Williams, 'Bioplastics?' (Presentation, AORA Members Webinar, 27 August 2020) <https://bioplastics.org.au/wp-content/uploads/2020/09/ABA_AORA-Webinar-20200827_RWilliams.pdf>.

The importance of this information is illustrated by a study which considered the biodegradability of four types of carrier bags, labelled ‘degradable’ or ‘biodegradable’,⁴¹ in an open-air, soil and marine environment,⁴² and found that none of the types of carrier bags degraded in all three natural environments.

In this context, there is growing consensus that information is vital to support a biodegradability claim. However, exactly what information will be sufficient is not universally accepted, partly because of the complexity involved in defining the timescale and environment. For example, the definition of ‘biodegradable’ in French legislation acknowledges that these preconditions exist, but does not particularise what circumstances would satisfy the preconditions.⁴³

Relevantly, there are two Australian Standards relevant to compostable plastics (with compostability being a sub-set of biodegradability) (see **section 3.2(e)**), and the ABA has recently created a ‘soil biodegradability’ certification, which is discussed below in **section 4.2(d)**. Further standards and certifications exist in Europe and the US⁴⁴ that adopt their own meaning of ‘biodegradability’ relevant to the particular circumstances in which they apply. These are described further in **Part 4.3**.

For the purposes of this discussion paper, we confirm that:

- (i) the definition of ‘biodegradable plastics’ is plastics which can be fully converted into carbon dioxide (CO₂) (with methane (CH₄) in the absence of oxygen), water and biomass over time, facilitated by the action of micro-organisms; and
- (ii) we endorse the view that for ‘biodegradability’ to bear any correlation to sustainability, it must be coupled with information as to the environment in which biodegradation will occur, as well the requisite environmental factors and timing thresholds.

d) ‘Bioplastics’

‘Bioplastics’ are a “large family of plastics which are sourced from biomass at the beginning of their life (bio-based), metabolized [by] biomass at the end of their life (biodegradable), or both”.⁴⁵

This means that, despite the prefix ‘bio’ and the common perception that ‘bioplastic’ is synonymous with ‘biodegradable plastics’,⁴⁶ only a sub-set of bioplastics are biodegradable. Accordingly, the family of bioplastics is said to include:

- (i) bio-derived plastics that are biodegradable;
- (ii) bio-derived plastics that are non-biodegradable; and
- (iii) fossil-fuel based plastics that are biodegradable.

⁴¹ Imogen Napper and Richard Thompson, ‘Environmental Deterioration of Biodegradable, Oxo-biodegradable, Compostable, and Conventional Plastic Carrier Bags in the Sea, Soil, and Open-Air Over a 3 Year Period’ (2019) 53(9) *Environmental Science & Technology* (2019) 4775, 4781.

⁴² Ibid.

⁴³ *Vocabulaire des matériaux et de l’environnement (liste de termes, expressions et définitions adoptés)* 22 December 2016. Specifically, it is understood that the this legislation acknowledges that the biodegradability nature of a substance or material is assessed, in terms of the environment, according to the degree of decomposition, the time required for this decomposition and the effect of the elements obtained on the environment.

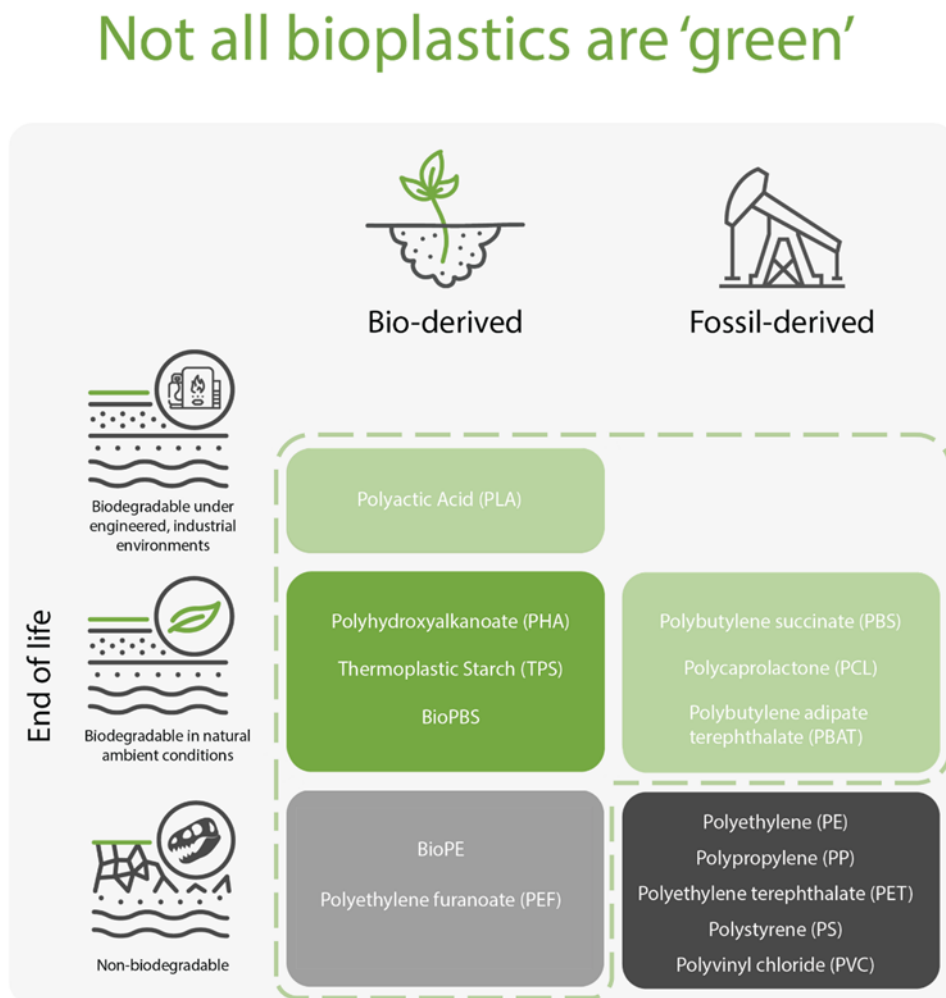
⁴⁴ See sections 5.1 and 5.2 below for further information.

⁴⁵ ‘A straightforward explanation of biodegradable vs. compostable vs. oxo-degradable plastics’, *Green Dot Bioplastics* (Blog Post) <<https://www.greendotbioplastics.com/biodegradable-vs-compostable-vs-oxo-degradable-plastics-a-straightforward-explanation/>>; see also Australasian Bioplastics Association, ‘Bioplastics’, *Understanding Bioplastics* (Web Page) <<https://bioplastics.org.au/bioplastics/>>

⁴⁶ Leela Dilkes-Hoffman et al, ‘Public Attitudes towards Bioplastics - Knowledge, Perception and End-Of-Life Management (2019) 151 *Resources, Conservation and Recycling* 104479.

Examples of each are illustrated in **Figure 1** below. In particular, the plastics cited in the green shaded rows are all biodegradable, with the dark grey highlighted box representing traditional non-biodegradable fossil-fuel based plastics.

Figure 1: Families of polymers



Source: Supplied by the University of Queensland (School of Chemical Engineering)

e) 'Compostable' plastic

A 'compostable' plastic is a plastic product made from polymer(s) which can biodegrade in a composting system, usually in either industrial (commercial) or home composting conditions.

As noted above, there are two Australian Standards that regulate industrial and home composting; AS 4736-2006 (industrial compostability) and AS 5810-2010 (home compostability). These standards prescribe a suite of criteria for compliance, including a minimum extent of compostability at certain temperatures and within a defined period of time.

Compliance with these Australian Standards⁴⁷ is linked to two logos, extracted in **Figure 2** below. The logos can only be used on license from the ABA where plastic packaging has been

⁴⁷ The Australian Bioplastics Association manages the certification and verification of materials in accordance with the two Australian standards: AS 4736-2006 and AS 5810-2010.

independently certified as meeting the respective performance standards set out in the Australian Standards.⁴⁸ As identified by the ABA, the seedling logo and home compostable logo communicate the authenticity and independent verification of claims of compliance to AS 4736-2006 and AS 5810-2010, respectively.

Figure 2: Compostable labelling



Where these logos are not used but a product is labelled or marketed as 'compostable', the product may or may not comply with AS 4736-2006 or AS 5810-2010.

Further detail on the criteria prescribed by the compostable Australian Standards is set out in **section 4.2(c)** below.

f) 'Oxo-degradable' plastics

An 'oxo-degradable', 'photodegradable', or 'oxo-fragmentable' plastic is a class of manufactured plastic product. Such products typically comprise of fossil-based non-biodegradable polymers (mostly PE and PP) to which additives such as metal stearates have been added to accelerate their oxidative breakdown.⁴⁹ Oxo-degradable plastics are designed for single use with the intention that they can break down rapidly following disposal.

However, oxidation to an extent sufficient to allow for microbial activity typically requires fairly extreme non-ambient treatment such as elevated UV light and/or elevated temperatures. In those conditions, if the plastic has been converted into low molecular weight products that are sufficiently oxidised, they may be consumed by microorganisms. Even under these conditions, a proportion of unoxidised microplastics is likely to remain, which could bioaccumulate.

Many in the industry consider that an oxo-degradable plastic is a separate category that does not overlap at all with biodegradability.

⁴⁸ The ABA provides that if the packaging / product satisfies the relevant standard, the applicant will be invited to license the use of the Seedling and/or Home Compostable logo from the ABA by entering into a licensing agreement and payment of the 12 month fee of \$500. See also: https://bioplastics.org.au/wp-content/uploads/2022/02/ABA_Application_form_24022022_editable.pdf

⁴⁹ Glossary, *Bioplastics Magazine* (January 2021) <http://www.bioplasticsmagazine.com/bioplasticsmagazine-wAssets/docs/Glossary.pdf>.

For example, one website describes how:⁵⁰

...oxo-degradables are a category unto themselves. They are neither a bioplastic nor a biodegradable plastic, but rather a conventional plastic mixed with an additive in order to imitate biodegradation. Oxo-degradable plastics quickly fragment into smaller and smaller pieces, called microplastics, but don't break down at the molecular or polymer level like biodegradable and compostable plastics. The resulting microplastics are left in the environment indefinitely until they eventually fully break down.

Similarly, the ABA has published a fact sheet on oxo-degradable plastics (and common synonyms) that confirms that:⁵¹

- (i) Oxo-degradable plastics are conventional non-biodegradable plastics (usually polyethylene (PE) or polypropylene (PP)), that have additives incorporated at low rates (2-3%) to cause the product to fragment or disintegrate in the presence of oxygen, under some conditions, such as in sunlight and/or under elevated temperatures.
- (ii) This disintegration is accelerated oxidation leading to fragmentation into smaller and smaller pieces which contributes to microplastic fragments which may in turn be lost to the surrounding environment.
- (iii) "Oxo-fragmentable materials do not biodegrade under commercial composting conditions as defined in accepted standard specifications such as AS 4736, EN 13432, ISO 18606, or ASTM D6400."⁵²

The environmental pitfalls of oxo-degradable plastics are widely recognised,⁵³ and as is explained further in **Part 4**, there is currently a nation-wide commitment to the phasing out of oxo-degradable plastics in Australia.

3.3 The case for biodegradable plastics, and issues

The benefit of biodegradable plastics is the potential to enable plastic things to become 'non-things'.⁵⁴ This is obviously a tantalising proposition in the context of plastic pollution, evoking a scenario where plastic that does end up in the environment can biodegrade and thereby shorten the lifespan of pollution. This is particularly compelling for the marine environment, where degradation of the growing mass of plastic waste is estimated to take from hundreds to thousands of years.⁵⁵

However, the case for biodegradable plastics is more complicated than this suggests. There are numerous technical issues associated with the manufacture of biodegradable plastics, including the availability of resources to create biodegradable plastics, and achieving the necessary properties for functional use whilst preserving the capacity to subsequently biodegrade.

We have also seen that there are issues associated with biodegradable plastics from a communication perspective, with a lack of common understanding raising questions about the integrity of 'green' labelling and the risks of consumer (and industry) misinformation or misunderstanding. Examples include a general lack of awareness of the difference between biodegradation in laboratory settings compared to

⁵⁰ 'A straightforward explanation of biodegradable vs. compostable vs. oxo-degradable plastics', *Green Dot Bioplastics* (Blog Post) <<https://www.greendotbioplastics.com/biodegradable-vs-compostable-vs-oxo-degradable-plastics-a-straightforward-explanation/>>.

⁵¹ 'Oxo-degradable, oxo-biodegradable, photo-degradable, photo-fragmentable, enzyme mediated or landfill biodegradable plastics', Australasian Bioplastics Association (Fact Sheet) <https://bioplastics.org.au/wp-content/uploads/2020/06/Oxo-degradable-fact-sheet-ABA-2.pdf>.

⁵² Australasian Bioplastics Association, 'Frequently Asked Questions' (Web Page) <https://bioplastics.org.au/resources/faq/#toggle-id-56>.

⁵³ Simon Hann et al, 'The impact of the use of "oxo-degradable" plastic on the environment' (Final Report for the European Commission Directorate-General for Environment, 7 August 2016) <https://data.europa.eu/doi/10.2779/992559>.

⁵⁴ Koushik Ghosh and Brad Jones, 'Roadmap to Biodegradable Plastics – Current State and Research Needs' (2021) 9 *ACS Sustainable Chemistry & Engineering* 6170: 1-18, 1.

⁵⁵ Alberto Di Bartolo, Giulia Infurna and Tzankova Dintcheva, 'A Review of Bioplastics and Their Adoption in the Circular Economy', (2021) 13(8) *Polymers* 1229: 1-26, 2.

the engineered or natural environment which the laboratory simulates, and the assumption that if a plastic is labelled as biodegradable in certain environments, then this suggests that one or other waste disposal option is suitable and available.

In addition, from a policy and practical perspective there are important questions about how biodegradable plastics:

- can and should be dealt with by existing waste management systems;
- align with the waste hierarchy; and
- are regulated in order to avoid unintended environmental consequences, such as the release of toxic contaminants through the process of biodegradation, or the inadvertent encouragement of poor waste behaviours (e.g. littering).

These matters are discussed briefly below.

(a) End-of-life waste management

Biodegradability has been described as an ‘end of life option’,⁵⁶ so it is easy to conflate the process of biodegradation with end-of-life waste management. For example, biodegradation can occur in a composting environment, and composting is understood in lay terms as a waste disposal option.

The ABA suggests that this is an “advantage provided by compostability labels... [as] they facilitate correct waste separation, collection and recovery”.⁵⁷ However, the contrary view is also evident in our review of the literature. For example, we understand that home composting environments may not reflect the laboratory defined conditions of AS 5810-2010 (Home Compostability), which may mean that certified plastic products take considerably longer to biodegrade than a consumer might expect or be able to manage in their home compost. In addition, whilst the ABA has a separate labelling system for soil biodegradability,⁵⁸ it is noted that being soil biodegradable does not mean that natural soil is a waste disposal option.⁵⁹

Another issue is that Rosenboom and others note that industrial “[c]omposters often reject biodegradable plastics... , as required decomposition times exceed typical composting process times of 6-8 weeks”.⁶⁰ Others have noted the “comparative dearth of ‘industrial composting’ facilities”.⁶¹ These comments appear to be directed at composters in Europe and the US, and it is unclear if the same can be said for industrial composting facilities in Australia.

A further concern is that biodegradable plastic products bear close similarity in appearance to ‘conventional plastic products’ (generally speaking, those made from fossil-based polymers that are not biodegradable), making it difficult for consumers to be able to easily differentiate between the types of plastics and make informed or correct decisions about their disposal.⁶²

This is problematic because researchers have shown “that even small quantities of PLA [a type of biodegradable plastic] will negatively affect the mechanical and thermal properties of recycled PET, which can cause technological and economic burdens”.⁶³ In other words, inclusion of biodegradable plastics in recyclable waste streams can taint the recyclability of conventional

⁵⁶ Mavstad, Maja Rujnic, ‘Biodegradable plastics’, *Plastic Waste and Recycling* (2020) at 5.2.

⁵⁷ ‘Frequently Asked Questions’, *Bioplastics* (Web Page) <https://bioplastics.org.au/resources/faq/>.

⁵⁸ Australasian Bioplastics Association, ‘The Soil Biodegradable Logo’, *Soil Biodegradable Verification Programme* (Web Page) <https://bioplastics.org.au/certification/soil-biodegradable-verification-programme/>.

⁵⁹ Layla Filicetto and Gadi Rothenberg, ‘Biodegradable Plastics: Standards, Policies, and Impacts’ (2021) 14(1) *ChemSusChem* 56 <https://doi.org/10.1002/cssc.202002044>.

⁶⁰ Jan-Georg Rosenboom, Robert Langer and Giovanni Traverso, ‘Bioplastics for a circular economy’ (2022) 7 *Nat Rev Mater* 117 <https://doi.org/10.1038/s41578-021-00407-8>.

⁶¹ *Ibid.*

⁶² Regulatory impact statement for draft Environment Protection Amendment (Banning Single-Use Plastic Items) Regulations 2022

⁶³ Alberto Di Bartolo, Giulia Infurna and Tzankova Dintcheva, ‘A Review of Bioplastics and Their Adoption in the Circular Economy’, (2021) 13(8) *Polymers* 1229: 1-26, 17.

plastics, as can many other contaminants such as minor percentages of the non-target polymer as well as fillers, additives, coatings etc.⁶⁴

Finally, we note that it has been said that “[b]iodegradable polymers should... be kept out of landfills as they can degrade anaerobically to CH₄, which has a [greenhouse gas] impact that is >20 times higher than that of CO₂”,⁶⁵ however this may not be a material concern for modern landfills which are designed to capture and harness landfill gas.⁶⁶

As the preceding paragraphs demonstrate, end of life waste management is a complex issue with opportunities and constraints varying significantly across geographic regions and in the context of different waste streams. However, there appears to be limited waste management options that are suitable for, available, and willing to receive biodegradable plastics right now. For example, recycling schemes (such as container deposit schemes) do not currently contemplate acceptance of biodegradable or compostable plastics.

Even so, the waste management industry cannot be expected to mature in a vacuum – it is inherently responsive to Governmental policy, regulation and market demand. As such, the lack of a suitable waste management system is not considered a reason to abandon efforts to support a market for biodegradable plastics. In addition, this waste management landscape is changing, with the emergence of technologies such as solid waste digestion for food waste management, and the management of biodegradable plastics may well be compatible with future waste management options.

Given the above, this discussion paper suggests that the environment for biodegradation must, for now at least, be distinguished from waste disposal options. Clearly conveying this distinction will need to be a priority of any information awareness campaign.



⁶⁴ See also Koushik Ghosh and Brad Jones, 'Roadmap to Biodegradable Plastics – Current State and Research Needs' (2021) 9 *ACS Sustainable Chemistry & Engineering* 6170: 1-18, 10.

⁶⁵ Jan-Georg Rosenboom, Robert Langer and Giovanni Traverso, 'Bioplastics for a circular economy' (2022) 7 *Nat Rev Mater* 117 <https://doi.org/10.1038/s41578-021-00407-8>.

⁶⁶ Noting also that biopolymers can be usefully converted to methane in industrial facilities such as solid waste digesters that are designed to capture this converted methane for use as energy.

(b) Integration with the waste hierarchy

The waste hierarchy is an important concept that is broadly supported and entrenched in policy and regulatory schemes across Australia. For example, APCO has described how the waste hierarchy requires consideration first be given to how to reduce packaging, then design for re-use, then for recycling, and then, where appropriate, for composting.⁶⁷

The waste hierarchy does not universally align with the emergence of a market for biodegradable plastics in Australia. For example, such a market could encourage consumer choice to be exercised in favour of a biodegradable product that has less potential to be reused or recycled compared to a non-biodegradable (or less biodegradable) product. This is reflected by the EU's policy framework on biobased, biodegradable and compostable plastic, which states that biodegradable plastics should only be used where consumption, reduction or reuse are not viable options and where the full removal, collection and recycling of plastic products is not feasible (amongst other limitations).⁶⁸

For present purposes, the authors consider the waste hierarchy should influence the circumstances in which the use of biodegradable plastics is considered appropriate.

The authors note that conversion of the biogenic/sequestered CO₂ produced from the biodegradation of these materials back to biomass and then reuse in bioplastics production is generally compatible with a full circular economy model.

In addition, the authors note that there is a growing body of research focussing on the recycling (mechanical and chemical) of bioplastics, again in compliance with a circular economy model.

(c) Ensuring that toxic and harmful effects on human health and the environment are avoided

Awareness of, and sensitivity to, the potential for toxic or harmful effects from the use of plastics in general is arguably higher than it has ever been, driven by greater access to information and the experience with materials such as tobacco and asbestos. We now see a precautionary approach being taken for emerging contaminants of concern (such as the group of chemicals known as PFAS), and significant attention has and is being directed to the growing problem of plastic pollution and microplastics.

In this context, it is important to recognise that there is potential for adverse environmental impacts to arise in relation to plastics in general where plastic waste pollutes the environment, and where toxic contaminants are mobilised through leaching or polymer breakdown. In relation to the latter, the process of degradation can 'release' toxic or harmful substances where these were added into the plastic formulation or, potentially in some cases, where they are formed in the process of polymer breakdown, either as an intermediate or finally degraded substance, even if only present in minute quantities in the original product.

The impact of additives, chemical mixtures and modifications on the end-of-life environmental impacts of a plastic item is a well-recognised information gap that is a focus of continuing research.

⁶⁷ APCO, *Considerations for Compostable Plastic Packaging* (2020) <<https://documents.packagingcovenant.org.au/public-documents/Considerations%20for%20Compostable%20Packaging>>.

⁶⁸ EU policy framework on biobased, biodegradable and compostable plastics, COM(2022) 682 final (November 30, 2022).

More generally, contamination and pollution issues can arise. For example:

- (i) Contamination may be caused by the transportation of biodegradable plastics off site before they are fully biodegraded.⁶⁹
- (ii) Similarly, even where a biodegradable plastic ends up in an environment in which it is capable of biodegrading, until that process is complete the presence of the item may constitute pollution and contamination.⁷⁰ This reinforces the importance of biodegradation environments not being equated to waste disposal options.
- (iii) As for all waste, there is a reality that some biodegradable plastic waste will ‘leak’ into the environment. That is, notwithstanding how a particular plastic product could or should be disposed of, some will invariably end up in the natural environment. Knowing that ‘leaked’ material will decompose rather than accumulate long term is comforting. But leakage is potentially exacerbated in the context of biodegradable plastic products, because of concerns there may be a misconception that biodegradability amounts to a tacit permission to litter. To use an obvious and well cited example, just because a plastic is legitimately labelled as ‘marine biodegradable’ does not mean a consumer should dispose of it in the marine environment.

According to one commentator, this means that biodegradable plastics “straddle... a thin boundary between minimizing the impact of accidental leakage and encouraging intentional leakage”.⁷¹

Clearly, the risk of consumers being more relaxed about discarding, and of increased littering of biodegradable plastics,⁷² is a matter that will need to be a focus point of any information awareness campaigns.

This issue is highlighted by a recent survey of 2518 members of the Australian general public, which found that “the majority of people (68%) think that littering still applies even if a plastic material is biodegradable”.⁷³ Viewed positively, this shows the majority of people understand the distinction between biodegradability and waste disposal (at least to some extent). However, it also suggests that there was still some confusion, since 23% were unsure while 9% thought that it may be an option, which is of concern.

Given the issues described above, we conclude this analysis of the case for biodegradable plastics by recognising that the role of biodegradable plastics is most promising in particular circumstances, where they offer a more sustainable solution to conventional plastics and do not displace an opportunity that is favoured by the waste hierarchy. Some such circumstances that have been identified in the literature include:

- (a) essential single-use items, where there are no non-plastic alternatives (e.g. medical gloves and other products used in a hospital environment);
- (b) food packaging, as biodegradable plastics are able to function equivalently to conventional plastics and facilitate the transport and bioprocessing of food waste;

⁶⁹ Markus Flurry and Ramani Narayan, ‘Biodegradable plastic as an integral part of the solution to plastic waste pollution of the environment’ (2021) 30 *Current Opinion in Green and Sustainable Chemistry* 100490.

⁷⁰ Ibid.

⁷¹ Koushik Ghosh and Brad Jones, ‘Roadmap to Biodegradable Plastics – Current State and Research Needs’ (2021) 9 *ACS Sustainable Chemistry & Engineering* 6170: 1-18, 2.

⁷² Markus Flurry and Ramani Narayan, ‘Biodegradable plastic as an integral part of the solution to plastic waste pollution of the environment’ (2021) 30 *Current Opinion in Green and Sustainable Chemistry* 100490: 4-5; Imogen Napper and Richard Thompson, ‘Environmental Deterioration of Biodegradable, Oxo-biodegradable, Compostable, and Conventional Plastic Carrier Bags in the Sea, Soil, and Open-Air Over a 3 Year Period’ (2019) 53(9) *Environmental Science & Technology* (2019) 4775, 4781.

⁷³ Leela Dilkes-Hoffman et al, ‘Public Attitudes towards Bioplastics - Knowledge, Perception and End-Of-Life Management’ (2019) 151 *Resources, Conservation and Recycling* 104479.

- (c) mulch films and other agricultural applications, where biodegradable plastics have a similar agronomic performance but do not require removal and disposal after use;⁷⁴
- (d) dolly ropes used in fishery, products used for tree protection, plant fixing clips or lawn trimmer threads;⁷⁵ and
- (e) other applications where marine and soil biodegradability is a benefit, such as for controlled release applications.

Further, even where the circumstances are appropriate, it is important to design for biodegradability through careful choice of polymers (by reference to factors such as source of materials, performance characteristics, costs and availability of waste collection and processing systems), avoidance of materials or additives that may thwart the process of biodegradation or contaminate the environment, and by informing consumers about appropriate waste disposal.⁷⁶



⁷⁴ Markus Flurry and Ramani Narayan, 'Biodegradable plastic as an integral part of the solution to plastic waste pollution of the environment' (2021) 30 *Current Opinion in Green and Sustainable Chemistry* 100490; Rosaria Ciriminna and Mario Pagliaro, 'Biodegradable and Compostable Plastics: A Critical Perspective on the Dawn of their Global Adoption' (2019) 9(1) *Chemistry open* 8, 11.

⁷⁵ Ibid.

⁷⁶ Drawing on APCO, *Sustainable Packaging Guidelines* (version 3, updated October 2020), available online < <https://apco.org.au/sustainable-packaging-guidelines>>, pgs 8 and 10.

3.4 Problems emerging from Part 3

The following problems are evident from the discussion in **Part 3**:

a) Confusion in terminology, including limited consumer information about the source of materials (bio- and fossil-derived)

Various terminologies, such as ‘bioplastics’, ‘bio-derived plastics’ and ‘biodegradable plastics’ are similar and lack clarity. For example, the only term seeking to convey the source of polymers used in plastic products is “bioplastics”, although this term is inherently unclear because it captures either (or both) biodegradable or bio-based polymers and plastic products. It can also be used to describe biomedical plastics. This means that the term “bioplastic” is inadequate to convey information about the source of materials (or indeed the biodegradable nature (or otherwise) of the plastic product).

b) Relationship between existing labels and waste disposal recommendations is not well understood

Currently, there is an absence of, or, at the least an insufficiency of, waste disposal instructions on labels for biodegradable plastic products. In addition, information on labels indicating the environment for biodegradability can be misconstrued as the environment for waste disposal.

Inconsistent or inaccurate labelling of products means that it is difficult for both consumers and waste management facilities to distinguish between biodegradable and non-biodegradable plastics, or between compostable and non-compostable plastics, and to identify the appropriate waste disposal method.

c) Current limitations on waste management options for biodegradable plastic waste

There appear to be limited waste management options that are suitable for, available and willing to receive biodegradable plastics right now. This may be overcome in time as biodegradable bioplastics may be supported by emerging technologies for management of organic wastes.

d) Encouraging a market for biodegradable plastics does not fully align with the waste hierarchy

There is a need to carefully identify the circumstances in which it is appropriate to design a product to be made of plastic, and if so, when it is appropriate to use biodegradable (such as compostable) polymers in the design of that plastic product.

This should have regard to, but not be solely driven by, the imperfections of the current waste management system which lead to leakage, which is likely to remain an issue moving forwards.

In addition, the circumstances where biodegradable plastics are appropriate may change over time, noting there is potential for biocycling of biodegradable plastics through emerging waste management technologies. For example, although container deposit schemes do not currently capture biodegradable plastics, it is foreseeable that an equivalent or similar scheme may one day accept biodegradable plastics.

e) Unintended consequences: the prospect of additional ‘leakage’ of biodegradable plastic waste into the environment

In developing biodegradable plastics for use and considering their utility, unintended consequences must be avoided. For example, concerns have been raised about a misconception that biodegradability amounts to a tacit permission to litter, which could increase the volume of ‘leaked’ plastic waste (notwithstanding that the environmental impact of that waste may be reduced). This will need to be a focus of any information awareness campaigns. Another example is the release of toxic contaminants through the biodegradation process, which is discussed further in **section 4.4(h)** below.

Chapter 4 – Current policy and legislative landscape

4 Current policy and legislative landscape

4.1 Plastics policies in Australia

The policy position of the Australian State and Territory Governments with respect to the utility and acceptability of terminology relevant to the 'biodegradability' of plastics is summarised in **Schedule 2**.

The primary observation is that the National Plastics Plan and relevant plastic policies at a State and Territory level do not explicitly endorse or oppose 'biodegradable' plastics.

However, a number of policies, including the National Plastics Plan, the NSW Plastics Action Plan⁷⁷ and South Australia's Waste Strategy 2020-20⁷⁸ each refer to (and endorse, to some extent) 'compostable' plastics. For instance, the "Plastics Mission" stated in the National Plastics Plan includes the:

phase out [of] non compostable plastic packaging products containing additive fragmentable technology that do not meet relevant compostable standards (AS 4736-2006, AS 5810-2010 and EN13432).

Similarly, a key action of the National Waste Policy Action Plan is to "deliver the industry-led target of 100% of all Australia's packaging being reusable, recyclable or compostable", a target that is reiterated in the National Plastics Plan and the waste policies of several States and Territories (including Tasmania, South Australia and Victoria).

On one view, this (and similar references in other policies) implies that 'biodegradable' plastics are only *good* where they are 'compostable'. In other words, that 'biodegradability' does not have anything meritorious to add because it is only acceptable where synonymous with 'compostability'.

We note that this position is generally supported by analysis of the regulation of plastics in **section 4.2** below.

An alternative view, however, is that 'compostability' is presently endorsed because there are Australian Standards that provide a standardised framework for determining whether or not something is 'compostable' in precisely defined circumstances. This leaves open an alternative implication: that if a comparable standardised framework was defined for other contexts for biodegradation (e.g. marine or soil), then the endorsement that is currently bestowed on 'compostable' plastics would be extended to apply to, for example, marine and soil biodegradable plastics, noting that "biodegradability" is a term that includes not just compostability but also the wider categories of marine- and soil-biodegradability (i.e. ambient environmental biodegradability).

QUESTIONS FOR STAKEHOLDERS:

1. Do you agree with either or both of these views?
2. Is there a further alternative view? Or an alternative way to frame these viewpoints?
3. Would your view be different if there were standardised criteria for determining 'biodegradability' in particular environmental mediums?
4. Would adherence to those criteria need to be verified/certified by a third party?

⁷⁷ Industry and Environment, NSW Department of Planning, 'New South Wales Plastics Action Plan' (Publication, June 2021) 5 https://www.dpie.nsw.gov.au/_data/assets/pdf_file/0007/357226/NSW-Plastics-Action-Plan-2021.pdf.

⁷⁸ Green Industries, Government of South Australia, 'South Australia's Waste Strategy 2020-2025' (Publication, 2020) 36 <<https://www.greenindustries.sa.gov.au/resources/sa-waste-strategy-2020-2025>>.

4.2 Regional initiatives and industry guidance

It is beyond the scope of this discussion paper to comprehensively consider all regional initiatives and industry guidance. However, there are four such matters that are important to acknowledge briefly as they have, or are likely to have, a material influence on domestic policy and regulatory frameworks.

a) ANZPAC

The first is the ANZPAC Plastics Pact (**ANZPAC**), which is a regional platform for organisations, Governments and supply chain stakeholders in Australia, New Zealand and the Pacific Islands region to show commitment to the transition towards a circular economy for plastic packaging.⁷⁹

Members of ANZPAC commit to reporting on their plastic packaging on an annual basis. Through reporting, ANZPAC intends to show its “progress towards targets and publish a public annual report, highlighting best practice and sharing valuable data and learning about plastics within the region and global community.”⁸⁰

One of the targets for ANZPAC is for 100% of plastic packaging to be reusable, recyclable or compostable by 2025. All members of ANZPAC participate in three focused workstreams, one of which is the “New Business Models & End-Markets” workstream that is working towards developing a specific list of value chain activities to make all plastic packaging reusable, recyclable or compostable across the ANZPAC region.⁸¹

b) UNEP Plastic Pollution Binding Agreement

The second is the plastic pollution binding instrument that the United Nations Environment Programme (**UNEP**) is currently developing, which is “to be based on a comprehensive approach that addresses the full life cycle of plastic”. In particular, the intergovernmental negotiating committee has been tasked with considering “how to promote sustainable production and consumption of plastics from product design to environmentally sound waste management through resource efficiency and circular economy approaches”.⁸² Negotiations are intended to complete by the end of 2024.

It is possible that this binding instrument will address biodegradable plastics and have a material bearing on Australia’s domestic policy and regulatory response.

c) Sustainable Packaging Guidelines

The third is the Sustainable Packaging Guidelines (**SP Guidelines**) published by industry body APCO. These are considered a ‘central part of the co-regulatory framework’ described in **section 4.3(b)** below,⁸³ and may be of broader utility given the sensible approach described for organics recycling, which the SP Guidelines identify as a ‘recovery pathway’ more favourable than energy recovery, but less so than reduction, reuse, and material recycling.

The SP Guidelines reference compostable packaging when reciting the national target for 100% of all Australia’s packaging to be reusable, recyclable or compostable by 2025 or earlier. According to the SP Guidelines, ‘compostable packaging’ is defined to mean certified compostable (i.e. verified compliance with the Australian Standards: see **section 4.3(c)**) AND where “successful post-consumer collection, (sorting), and composting is proven to work in practice and at scale”.⁸⁴

⁷⁹ ‘Frequently Asked Questions’, ANZPAC Plastics Pact (Web Page) <https://anzpacplasticspact.org.au/faqs/#general>.

⁸⁰ ‘Membership’, ANZPAC Plastics Pact (Web Page) <https://anzpacplasticspact.org.au/membership/#membership>.

⁸¹ ‘FY22 ANZPAC Workstreams’, ANZPAC Plastics Pact (Web Page) <<https://anzpacplasticspact.org.au/wp-content/uploads/2021/09/ANZPAC-FY22-Workstreams-Information-Pack-Sep21.pdf>>.

⁸² See UNEP, Intergovernmental negotiating committee (INC) on plastic pollution, <<https://www.unep.org/about-un-environment/inc-plastic-pollution>>.

⁸³ APCO, *Sustainable Packaging Guidelines* (version 3, updated October 2020), available online <<https://apco.org.au/sustainable-packaging-guidelines>>, pgs 3.

⁸⁴ *Ibid*, pg 34.

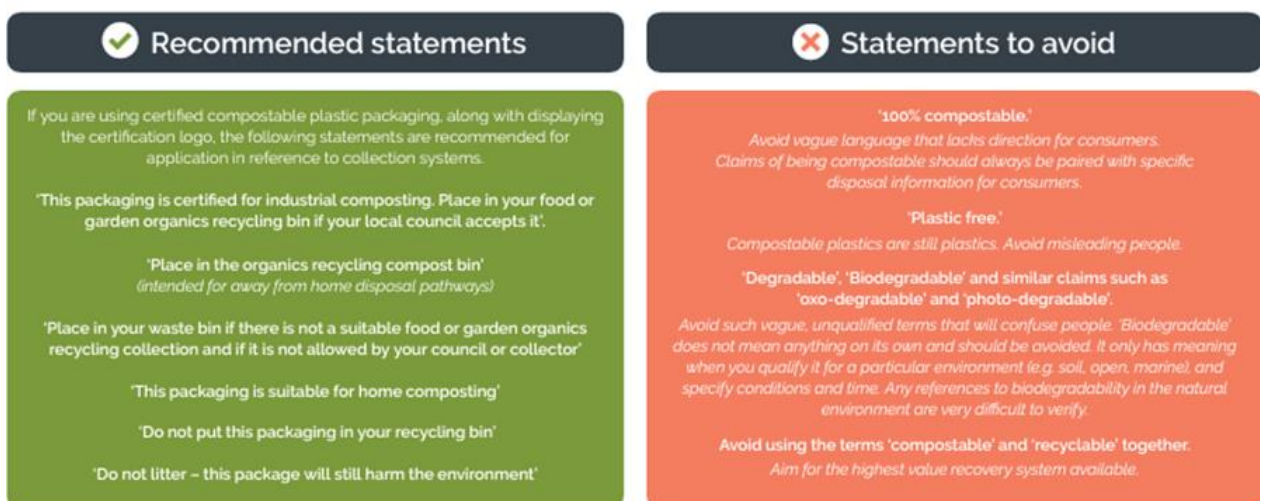
As a general observation, whilst biodegradability is not expressly endorsed by the SP Guidelines, the approach to compostable packaging seems capable of extending to other environments for biodegradability, if (and when) standards for those other environments become available.

As such, it is useful to acknowledge that the SP Guidelines describe compostability as an organics recycling ‘recovery pathway’ that may be appropriate depending on factors including the “type of product, consumer attitudes and behaviours..., availability of an existing... organics collection or composting system, functionality of alternative materials, costs” etc.⁸⁵ These considerations largely reflect the challenges discussed in **Part 3** of this discussion paper, notwithstanding that the SP Guidelines appear focussed on compostable packaging, as opposed to biodegradable plastics more generally.

d) APCO’s labelling guidance

The fourth is guidance issued by APCO setting out considerations businesses should follow when labelling compostable plastics.⁸⁶ **Figure 3** is an extract of that guidance and demonstrates a helpful, and user-friendly model that could potentially be developed further to address biodegradable plastic more generally.

Figure 3 – APCO labelling guidance⁸⁷



QUESTION FOR STAKEHOLDERS:

1. Are there any other regional initiatives or industry guidance that should be recognised?

⁸⁵ APCO, *Sustainable Packaging Guidelines* (version 3, updated October 2020), available online < <https://apco.org.au/sustainable-packaging-guidelines>>, pgs 3 and 8.

⁸⁶ APCO, *Considerations for Compostable Plastic Packaging* (2020) <<https://documents.packagingcovenant.org.au/public-documents/Considerations%20for%20Compostable%20Packaging>>.

⁸⁷ *Ibid*, slide 13.

4.3 Regulation of biodegradable plastics in Australia

'Biodegradable' plastics are not specifically regulated by legislation in Australia.

However, the concept is referred to at times, and captured by more general regulatory schemes relating to waste, environmental protection and consumer law.

In this **section 4.3**, we consider the range of contexts in which biodegradable plastics are or are potentially regulated, ranging from single use plastics legislation, product stewardship schemes, standards and certifications, to waste specific legislation and general legislation governing consumer law, intellectual property and environment protection.

a) Statutory references to “biodegradable” and “compostable” in single use plastic legislation

There are a number of near-attempts at defining biodegradable plastics in legislation across Australia, which are summarised in **Table 2** below and included in the more detailed summary of biodegradable-related terms in **Schedule 3**. These definitions generally derive from laws introduced to implement single-use plastics or plastic shopping bag bans in Australian States and Territories.

Notably, these definitions imply that law-makers view the interrelationship between key terms in varying (and arguably inaccurate) ways. Further, none of the definitions provide sufficient clarity on what is meant by 'biodegradable', because the term is mostly used to describe certified compostable plastics, or is not defined or referred to at all.

For example, in the context of the ban on plastic shopping bags in the Northern Territory and Tasmania, the term “biodegradable bag” is defined by reference to AS 4736-2006 (Industrial Compostability). Similarly, in Western Australia, paperboard food containers and bowls are excluded from the ban on single use plastics if they are “certified as biodegradable”, with 'certification' meaning compliance with AS 4736-2006 (Industrial Composting) or AS 5810-2010 (Home Composting).

These definitions imply that an item can only be characterised as “biodegradable” or “degradable” in the relevant legislation if it is compostable in accordance with one (or either) of the Australian Standards.

The relevant definitions used in Queensland provide a slightly different perspective. In particular, Queensland defines the term “degradable” to mean plastic that is:

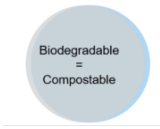

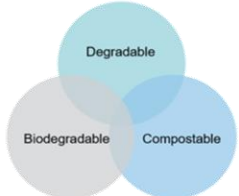
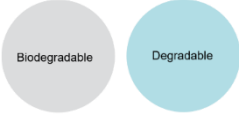
- (i) biodegradable, including material that is compostable under AS 4736-2006; or
- (ii) designed to degrade and break into fragments over time.

This definition recognises that the term 'biodegradable' is an umbrella term which captures, but is not limited to, certified industrially compostable materials. It also makes a distinction between plastics that are 'biodegradable' and those that are merely 'degradable', although the latter is not itself defined.

Finally, in Victoria and Western Australia, the definition of banned plastic bags/items includes plastics that are “biodegradable, degradable or compostable.” These terms are not defined in the respective legislation, however, the collective use of these terms to capture a category of plastics that are banned suggests that there is either ambiguity in or distinction between the meaning of each term, which necessitates a “catch-all” list of all three terms.

Table 2 below extracts key terms and definitions, and visually depicts what this means in terms of the relationship between terms, and whether it aligns with the author’s view.

Table 2: Definitions of “biodegradable”, “degradable”, “compostable” and relevant standards in legislation, illustrating the variation between jurisdictions

Jurisdiction	Term	Definition	Implication of the legislative definition	Author’s view
NT	biodegradable bag ⁸⁸	is a carry bag comprised of material of a type that: (a) has been assessed and tested in accordance with [AS 4736], as in force from time to time; and (b) can be designated, in accordance with the Standard, as compostable.		Deficient
TAS	biodegradable bag ⁸⁹	means a bag comprised of material of a type that has been assessed in accordance with [AS 4736-2006] and can, in accordance with [AS 4736]-2006, be designated as compostable.		Deficient
VIC	Refers to biodegradable, degradable and compostable . ⁹⁰	Not defined.		Ambiguous
WA	certified as biodegradable ⁹¹	an item is certified as biodegradable if: (a) a person accredited or body accredited in a manner approved by the CEO has issued a certificate verifying that the item complies with AS 4736-2006 or AS 5810-2010; and the certificate’s period of validity has not expired.		Deficient
	biodegradable plastic ⁹²	plastic that: (a) is able to be broken down by microorganisms into carbon dioxide, water, biomass and a mineral residue; and (b) does not contain an additive designed to accelerate fragmentation of the plastic;		Deficient

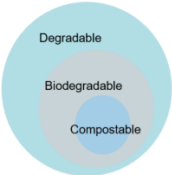
⁸⁸ Environment Protection (Beverage Containers and Plastic Bags) Act 2011 (NT) s 52; Environment Protection (Beverage Containers and Plastic Bags) Regulations 2011 (NT) reg 3.

⁸⁹ Plastic Shopping Bags Ban Act 2013 (TAS) s 3.

⁹⁰ See in Draft Environment Protection Amendment (Banning Single-Use Plastic Items) Regulations 2022 (Vic) reg 134B(1)(a) (definition of ‘banned single-use plastic items’); Environment Protection Regulations 2021 (Vic) reg 4 (definition of ‘banned plastic bag’).

⁹¹ Environmental Protection (Plastic Bags) Regulations 2018 (WA) cl 3A(4).

⁹² Environmental Protection (Plastic Bags) Regulations 2018 (WA) reg 3 (definition of ‘biodegradable plastic’)

Jurisdiction	Term	Definition	Implication of the legislative definition	Author's view
	degradable plastic ⁹³	(a) means plastic that contains an additive designed to accelerate fragmentation of the plastic into smaller pieces under certain conditions, including exposure to light, bacteria or heat; but (b) does not include biodegradable plastic.		Deficient
QLD	degradable ⁹⁴	for plastic, means plastic that is: (a) biodegradable, including material that is compostable under AS 4736-2006; or (b) designed to degrade and break into fragments over time.		Correct

b) Product stewardship through the Australian Packaging Covenant and the National Environment Protection (Used Packaging Materials) Measure 2011.

Product stewardship describes efforts to “encourage or require manufacturers, importers, distributors and other persons to take responsibility for products including, for example, through improved product design”.⁹⁵

Product stewardship regimes can take various forms. For example, the *Recycling and Waste Reduction Act 2020* (Cth) (**RWR Act**) contemplates that product stewardship can be voluntary, co-regulatory or mandatory.

An established and relevant product stewardship regime is the Australian Packaging Covenant (**Covenant**), which aims to reduce the environmental impacts of consumer packaging by optimising resource recovery through the supply chain, and preventing the impacts of fugitive packaging on the environment.⁹⁶

The Australian Government supports the Covenant through a co-regulatory approach to consumer packaging waste under the *National Environment Protection (Used Packaging Materials) Measure 2011* (**UPM NEPM**).

Even so, there has been some criticism about relying on voluntary and co-regulatory product stewardship schemes for delivering important policy goals. For example, conservation groups, such as the Boomerang Alliance, argue that packaging targets should be mandatory rather than supported by voluntary and co-regulatory product stewardship schemes.⁹⁷ A lack of compliance action taken under the UPM NEPM would seem to support this view.⁹⁸

Despite these concerns, APCO’s voluntary product stewardship scheme was recently accredited by the Australian Government under the RWR Act framework. This is intended to convey to “businesses and consumers that the arrangement has the Australian Government’s stamp of

⁹³ *Environmental Protection (Plastic Bags) Regulations 2018* (WA) reg 3 (definition of ‘degradable plastic’)

⁹⁴ *Waste Reduction and Recycling Act 2011* (Qld) s 99B(4).

⁹⁵ *Recycling and Waste Reduction Act 2020* (Cth) s 5.

⁹⁶ ‘The Australian Packaging Covenant’, *Australian Packaging Covenant Organisation* (Web Page) <<https://apco.org.au/the-australian-packaging-covenant>>.

⁹⁷ ‘What’s the Plan B for Packaging?’ *Boomerang Alliance* (May 2021), 1

<https://d3n8a8pro7vhmx.cloudfront.net/boomerangalliance/pages/4061/attachments/original/1621295180/apco-planB-20210518.pdf?1621295180>.

⁹⁸ See Gerry Nagtzaam and Steve Kourabas, ‘An Australian national plastics “plan”: one plan to rule them all?’ (2021) 36(2) *Australian Environment Review* 26.

approval”, which “provides confidence that the arrangement... will contribute to Australia’s recycling and waste reduction objectives”.⁹⁹

As such, large producers or brand owners with a gross annual income of more than \$5 million must elect to either:

- (iii) become a signatory to the Covenant, through membership of APCO; or
- (iv) be regulated by the requirements of the UPM NEPM, as implemented in the relevant State or Territory.

Under either option, these large producers or brand owners are subject to voluntary packaging targets and guidelines, and reporting obligations. Some brief overview comments for each of the Covenant and the UPM NEPM are provided below.

Notably, neither the Covenant nor the UPM NEPM expressly regulate biodegradable plastics.

Covenant

Businesses with an annual turnover of \$5 million or more that are involved in the supply chain of consumer packaging or are retailers that manufacture, import, sell by wholesale or offer its branded products to consumers can sign up to and comply with the Covenant.

Relevantly, the Covenant requires businesses to submit an action plan that establishes what it will do to contribute to the Covenant’s aims and how it will meet the obligations published by APCO, including the Guidelines. As noted above, the Guidelines contemplate biodegradability only in the context of certified compostability, by reference to verified compliance with the Australian Standards (described further below). Covenant, signatories must submit an annual report that assesses performance against the action plan commitments and complies with APCO’s reporting obligations.¹⁰⁰ APCO reviews these annual reports as part of its obligation to monitor compliance with the Covenant.

UPM NEPM

Section 9 of the UPM NEPM requires relevant businesses to:

- (a) *undertake or assure the systematic recovery of consumer packaging in which the brand owner’s products are sold; and*
- (b) *undertake or assure the re-use, recycling or energy recovery of consumer packaging in which the brand owner’s products are sold; and*
- (c) *demonstrate that all materials that have been recovered by them or on their behalf have been utilised through (in order of preference):*
 - (i) *re-use in the packaging of the brand owner’s own products (if applicable); or*
 - (ii) *use within Australia as a secondary resource; or*
 - (iii) *export as a secondary resource; and*
- (d) *demonstrate that reasonable steps have been taken to ensure that consumers are adequately advised as to how the packaging is to be recovered.*

⁹⁹ Department of Climate Change, Electricity, Energy, the Environment and Water, Commonwealth ‘Product Stewardship Accreditation’ *Product Stewardship in Australia* (Web Page) <<https://www.dcceew.gov.au/environment/protection/waste/product-stewardship/product-schemes/voluntary-product-stewardship>>.

¹⁰⁰ *Covenant*, The Australian Packaging Covenant Organisation (2022) s 10.

State and Territory legislation is created to give effect to the UPM NEPM.¹⁰¹ The requirements under this legislation differ in each State/Territory, however, in general there is an obligation to “collect and retain records of recovery data, draft and submit action plans that detail performance in respect of the use, recovery, re-use and recycling of materials, propose actions and performance indicators for achieving targets and obligations to review packaging design”.¹⁰² It is not clear how biodegradability fits within this framework, although as noted above, the Guidelines indicate that compostability is a ‘recovery pathway’ through an organics recycling process, suggesting that compostability is (and broader biodegradability could be) compatible with the UPM NEPM.

c) Standards

There are various standards that may be used to support and/or authenticate biodegradability and compostability claims.

Standards are an assurance tool that prescribe an agreed way of doing something or an agreed set of requirements that must be met in order to ‘comply’. In this way, standards effectively serve as a benchmarking tool.

Standards are often described as formal or informal. Formal standards are set by standard setting organisations such as Standards Australia (**AS**), the International Organization for Standardization (**ISO**), or ASTM International (formally known as American Society for Testing and Materials). Informal standards are usually developed by industry participants or bodies who are typically also involved in certification (see **section 4.3(d)** below).¹⁰³

Whether formal or informal, the starting position is that compliance with standards is voluntary – i.e. they are not ‘law’ – and therefore a form of self-regulation. However, compliance can and often does become a legal requirement by virtue of contractual obligations, or through adoption or incorporation in regulations, guidelines and the like.

Importantly, there are two types of standards:

- (i) **test criteria standards** – these standards establish the framework or criteria for the test material to pass using a certain test method (see below) in order to be certified; and
- (ii) **test method standards** – these standards establish the testing methodology and conditions.

There are three test criteria standards in Australia that are relevant to biodegradable plastic products, and each refers to one or more test method standards for particular criteria:

- (i) AS 4736-2006 (Industrial Compostability);
- (ii) AS 5810-2010 (Home Compostability); and
- (iii) ISO 23517 (Soil Biodegradability).

¹⁰¹ *Protection of the Environment Operations (Waste) Regulation 2014* (NSW); *Waste Management Policy (Used Packaging Materials) 212* (Vic); *Waste Management and Resource Recovery (Environment Protection – Used Packaging Materials) Code of Practice 2020* (ACT); *Environmental Protection (UPM NEPM-Used Packaging Materials) Regulations 2013* (WA); *Environmental Protection (Used Packaging Materials) Policy 2012* (SA); *Waste Reduction and Recycling Regulations 2011* (Qld); adopted as a State Policy under the *State Policies and Projects Act 1993* (Tas).

¹⁰² MP Consulting, *Review of the co-regulatory arrangement under the National Environment Protection (Used Packaging Materials) Measure 2011* (Final Report, February 2021).

¹⁰³ For example, Europe has an industry-led model for determining the biodegradability of plastics across a broad range of biodegradation environments.

An overview of each of these standards is provided in the text boxes below.

AS 4736-2006 (Industrial Compostability)

AS 4736-2006 specifies requirements and procedures to determine the compostability, or anaerobic biodegradation, of plastics by addressing biodegradability, disintegration during biological treatment, effect on the biological treatment process and effect on the quality of the resulting compost.

It is important to note that industrial compost facilities are very different to home composting systems: they operate at high temperatures that typically are not replicated in the home composting environment (50°C or higher). The criteria also dictates conditions that can only be replicated in a laboratory setting.

The criteria in AS 4736-2006 (Industrial Compostability) require:

- A. any organic constituents that are present at concentrations of more than 1% (by dry mass) shall demonstrate compostability separately. The sum of constituents that are less than 1% shall not exceed 5%;
- B. a minimum of 90% biodegradation of plastic materials measured by oxygen consumption or carbon dioxide evolution in powder form or small pieces (maximum particle size of 250 µm in diameter recommended) within 180 days in the aerobic composting environment tested according to ISO 14855 at a test temperature of 58°C +/- 2°C;
- C. if the intended disposal environment is anaerobic, a minimum of 50% more biogas, methane, production than theoretical value within 60 days in the anaerobic composting environment tested according to ISO 14853 at a test temperature of 35°C +/- 2°C;
- D. a minimum of 90% of plastic materials in sheet form with thickness as for the intended final use (10 cm x 10 cm for films and 5 cm x 5 cm for other products) should disintegrate into less than 2 mm pieces within 12 weeks tested according to ISO 16929 using the temperature profile as specified;
- E. no toxic effect of the resulting compost on plants and earthworms;
- F. hazardous substances such as heavy metals should not be present above the maximum allowed levels outlined in:
 - (i) plant growth test (ISO 11269-2)
 - (ii) earthworm test (ISO 11268-1)
 - (iii) nitrification inhibition test with soil microorganisms (ISO 15685).
- G. plastic materials should contain more than 50% organic materials.

AS 5810-2010 (Home Compostability)

The other Australian Standard is AS 5810-2010 and it provides the criteria for the assessment of the biodegradability of plastic materials in a laboratory defined 'home' composting environment that operates at a lower temperature (25°C +/- 5°C).

Despite the name suggesting it equates to a home compost environment, the similarity relates primarily to temperature, with AS 5810-2010 (Home Compostability) prescribing a lower temperature that is *theoretically* possible to achieve in a home compost. Importantly, however, actual home composts vary enormously, depending on factors including location, climate, drainage, how much waste is fed into the system, and whether it is actively maintained. Accordingly, a plastic that satisfies the criteria in AS 5810-2010 (Home Compostability) under laboratory conditions may not biodegrade at the same rate or to the same extent in a real home compost. This may not be well understood by consumers.

AS 5810-2010 (Home Compostability)

The criteria in AS 5810-2010 (Home Compostability) require:

- A. any organic constituents that are present at concentrations of more than 1% (by dry mass) shall demonstrate home compostability separately. The sum of constituents that are less than 1% shall not exceed 5%;
- B. a minimum of 90% biodegradation, measured by oxygen consumption or carbon dioxide evolution, of plastic material in powder form or small pieces (maximum particle size of 250 µm in diameter recommended) within 12 months in the aerobic home composting environment tested according to ISO 14855 at a test temperature of 25°C ± 5°C;
- C. a minimum of 90% of plastic materials in sheet form (2.5 cm x 2.5 cm for materials with thickness <5 mm and 1.5 cm x 1.5 cm materials with thickness >5 mm) should disintegrate into less than 2 mm pieces within 180 days tested according to ISO 20200 at a test temperature of 25°C ± 5°C;
- D. no toxic effect of the resulting compost on plants and earthworms;
- E. hazardous substances such as heavy metals should not be present above the maximum allowed levels; and
- F. plastic materials should contain more than 50% organic materials.

ISO 23517 (Soil Biodegradability)

ISO 23517 applies to “biodegradable plastic materials used to produce mulch films or biodegradable mulch films ready to be used for mulch applications in agriculture or horticulture”, and specifies test methods and evaluation criteria.¹⁰⁴

The criteria in ISO 23517 (Soil Biodegradability) require:

- A. any organic constituents that are present at concentrations of more than 1% (by dry mass) shall demonstrate soil biodegradability separately. The sum of constituents that are less than 1% shall not exceed 3%;
- B. a minimum of 90% biodegradation of plastic material measured by oxygen consumption or carbon dioxide evolution in either powder form (maximum particle size of 250 µm in diameter recommended) or sheet form (maximum size of 5 mm x 5 mm) within 2 years in the soil environment tested according to ISO 17556 at a test temperature between 20°C and 28°C;
- C. no toxic effect of the resulting soil on plants, earthworms and soil microorganisms; and
- D. hazardous substances such as heavy metals should not be present above the maximum allowed levels.

¹⁰⁴ International Organisation for Standardisation, 'Plastics – Soil biodegradable materials for mulch films for use in agriculture and horticulture' *Requirements and test methods regarding biodegradation, ecotoxicity and control of constituents* (ISO 23517, 2021) <<https://www.iso.org/standard/75894.html>>.

To illustrate the distinction between test criteria and test method standards, **Table 3** below outlines the test criteria standards and test method standards for industrial compostable plastics in Australia, Europe and the USA.

Table 3: Industrial compostable plastics – test criteria and test method standards

	Australia	Europe	USA
Test criteria standard →	AS 4736-2006	EN 13432:2000 / ISO 17088:2021	ASTM D6400-21
Criteria: Aerobic biodegradation Testing method →	ISO 14855-2:2018	ISO 14855-2:2018	ASTM D5338-15(2021)
Criteria: Anaerobic biodegradation Testing method →	ISO 14853:2017	ISO 14853:2017	Not specified
Criteria: Disintegration Testing method →	ISO 16929:2021	ISO 16929:2021	ISO 16929:2021
Criteria: Ecotoxicity Testing method →	EN 13432:2000 (Annex E)	EN 13432:2000 (Annex E)	ASTM E1676-12(2021)

d) Certifications

Independent validation or certification is a form of quality assurance. Validation or certification can be regulated by a public or private body that is recognised by industry and/or Government. They typically rely on standards; either 'test criteria standards' or 'test method standards' (as discussed in **section 4.3(c)** above).

A number of certifications relevant to biodegradable plastics already exist in Australia and overseas, to varying extents. For example, in Australia the ABA coordinates certification of compliance with the compostable Australian Standards, and ISO 23517 (Soil Biodegradability). Overseas, there are various certifications prepared by TUV Austria and Din Certo in Europe, which are outlined in **section 5.1(d)** below.

ABA's certification of compliance with standards is linked to various logos, being the Home Compostable logo and the Seedling logo (refer to **Figure 2** above) and the Soil Biodegradation logo in **Figure 4** below.

Each logo is intended to communicate that the plastic product satisfies compliance with the relevant standard and has been independently verified in order for the person to be licensed to use the logo. As noted by the ABA, the Soil Biodegradability logo communicates the authenticity and independent verification of the soil biodegradability claim and the product's compliance with the ISO standard.

Figure 4: Soil Biodegradable label



e) New wave of waste legislation

Relevantly, there is a new wave of waste related legislation that has been introduced across Australia. This includes the Commonwealth RWR Act, *Plastic Reduction and Circular Economy Act 2021* (NSW), *Plastic Reduction Act 2021* (ACT), *Waste Reduction and Recycling (Plastic Items) Amendment Act 2021* (QLD), *Single-use and Other Plastic Products (Waste Avoidance) Act 2020* (SA), the *Environmental Protection (Prohibited Plastics and Balloons) Regulations 2018* (WA) and the *Circular Economy (Waste Reduction and Recycling) Act 2021* (Vic).

At present, these laws are generally broad and with limited immediate regulatory impact, save for specific provisions that prohibit single use plastics, facilitate container deposit schemes or regulate thermal waste to energy. However, the laws set up a framework through which the regulatory framework can develop over time as plastic and waste policies and actions evolve.

For example, Victoria's *Circular Economy (Waste Reduction and Recycling) Act 2021* (Vic) requires 'prescribed entities' to comply with "any prescribed requirement for the sorting and separating of waste or recycling materials that applies to it", and provides for the creation of mandatory 'service standards' which could foreseeably address biodegradable plastics.¹⁰⁵ The service standards are currently undergoing a consultation process, and the first service standard is anticipated to be finalised in 2023, which will set out how councils and alpine resorts must provide waste and recycling services to households. While the detail that gives these provisions substantive effect has not yet been prescribed, the scope for future regulation is clear.

Another example is that under the framework created by the RWR Act, if the Australian Government considers that voluntary or co-regulatory arrangements are not sufficient, mandatory product stewardship requirements may be prescribed.¹⁰⁶ Mandatory rules may:

- (i) prohibit (either absolutely or subject to conditions), limit or restrict substances from being contained in the product;
- (ii) require the product to be labelled or marked in accordance with the rules; or
- (iii) specify requirements in relation to packaging the product.¹⁰⁷

It is unclear when these mandatory provisions will be activated and for what purpose.

¹⁰⁵ *Circular Economy (Waste Reduction and Recycling) Act 2021* (Vic), ss 62 and 63.

¹⁰⁶ *Recycling and Waste Reduction Act 2020* (Cth) ch 3 pt 5.

¹⁰⁷ *Recycling and Waste Reduction Act 2020* (Cth) s 92(3).

The RWR Act also enables the Minister for the Environment and Water to identify products and materials considered to be most in need of a product stewardship approach in the Minister's Priority List, including recommended actions and timeframes for action.

The Minister's Priority List for 2021-2022 includes "problematic and unnecessary single use plastics".¹⁰⁸ Specifically, the Minister has recommended that there be a nationally coordinated phase-out of packaging that is not certified compostable through elimination, redesign, replacement and innovation. This generally aligns with the 'Plastics Mission' stated in the National Plastics Plan (see **section 4.1** above) and was recommended to be completed by June 2022.¹⁰⁹

As at the time of finalising this paper, a nationally coordinated phase out of packaging that is not certified compostable has yet to occur. However, there have been various actions taken to contribute to the phase out of 'problematic and unnecessary single use plastics', including a prohibition on single use plastics (which may apply to single use biodegradable plastics), action to phase out oxo-degradable plastics, and APCO's 'Action Plan for Problematic and Unnecessary Single-Use Plastic Packaging', which encourages:¹¹⁰

- (i) elimination of packaging where possible;
- (ii) redesign for reduced volume and improved reusability;
- (iii) replacement with packaging that is reusable, recyclable or certified compostable (supported by use of the Australasian Recyclable Label to communicate correct disposal); and
- (iv) innovation opportunities.



¹⁰⁸ Department of Climate Change, Energy, the Environment and Water, Commonwealth, 'Minister's Priority List 2021-22' *Product Stewardship* (Web Page) <https://www.environment.gov.au/protection/waste/product-stewardship/ministers-priority-list/2021-22>.

¹⁰⁹ Ibid.

¹¹⁰ Australian Packaging Covenant Organisation, 'Action Plan for Problematic and Unnecessary Single Use Plastic Packaging' (Action Plan No 1, 1 December 2020) 11 < <https://documents.packagingcovenant.org.au/public-documents/Action%20Plan%20for%20Problematic%20and%20Unnecessary%20Single-Use%20Plastic%20Packaging>>. See also APCO's website, 'Government Update', *Australian Packaging Covenant Organisation* (Web Page, 30 June 2021) < <https://apco.org.au/news/20Y9e00000001YEAQ>>.

Case Study 1 and **Schedule 7** below provides some more detail on the phase out of single use plastics and oxo-degradable plastics, as at 1 May 2023.

Another area which has been a focus for a number of States and Territories is development of container deposit schemes. A number of such schemes operate across Australia, with Tasmania and Victoria due to launch their own schemes this later this year. Container deposit schemes enable consumers to deposit beverage containers at collection points in exchange for a partial refund. These schemes are examples of product stewardship arrangements and are regulated at a state-level. Currently, the eligibility criteria for these schemes do not accommodate biodegradable plastics, although it is foreseeable that a similar model for biodegradable plastics may be developed in future as an evolution of the existing schemes.

Case Study 1: Phase out of problematic and unnecessary plastics

The Commonwealth Government has committed to phasing out “problematic and unnecessary plastics” in its National Plastics Plan. This was followed by an Environment Minister’s Meeting¹¹¹ in 2021, which comprised the Commonwealth Minister for the Environment, and the environment minister from each Australian State and Territory.

In that meeting, the Environment Ministers identified eight ‘problematic and unnecessary’ plastic product types for industry to phase out nationally by 2025 (or sooner in some cases) under the National Waste Policy Action Plan. These products were identified to give greater certainty for industry.

Single use plastic bags and other products

Since the Environment Minister’s Meeting, all of the States and Territories have banned the supply of single use plastic bags, and almost all States and Territories have introduced legislation to ban the supply of single-use plastic products more generally (Tasmania and the Northern Territory have committed to a ban by 2025).

A summary of the scope of the single-use plastic bans is at **Schedule 7**, current as at 1 May 2023.

Phase out of oxo-degradable plastics

There has been a national movement to phase out oxo-degradable or ‘fragmentable’ plastics, with Environment Ministers agreeing to phase out “plastic products misleadingly termed as degradable”.¹¹² Progress made by State and Territory Governments to implement this commitment varies, as demonstrated in **Table 4** below.

It is notable that there is some inconsistency across the jurisdictions in terms of whether **all** items made of oxo-degradable plastic are prohibited from sale or supply, or only those that are single-use items. APCO have recognised this inconsistency, and recently proposed to “support state and territory governments on extending and aligning bans on problematic and unnecessary single-use plastics to additional materials”.¹¹³

Table 4: Regulation of oxo-degradable plastics

¹¹¹ Department of Climate Change, Energy, the Environment and Water, Commonwealth, ‘Environment Ministers Meeting 1’ (15 April 2021) <<https://www.awe.gov.au/sites/default/files/documents/emm-1-agreed-communicue.pdf>>.

¹¹² Department of Climate Change, Energy, the Environment and Water, Commonwealth, ‘Environment Ministers Meeting 1’ (15 April 2021) <<https://www.awe.gov.au/sites/default/files/documents/emm-1-agreed-communicue.pdf>>.

¹¹³ Australian Packaging Covenant Organisation, *Collective Impact Report*, (Report No 1, November 2021) 25 <https://documents.packagingcovenant.org.au/public-documents/APCO%20Collective%20Impact%20Report>.

Jurisdiction	Relevant regulation of oxo-degradable plastics
ACT	Since 1 July 2022, oxo-degradable plastics have been banned.
NSW	NSW Government will review whether a phase out of oxo-degradable plastics is appropriate in late 2024. Note that legislation contemplates that, when forming an opinion that a plastic item is unnecessary or problematic, the Minister may consider whether the plastic item contains additives that accelerate the breakdown of the item into particles. ¹¹⁴
NT	n/a
QLD	The Queensland Government has committed to preparing a draft 'priority statement' for oxo-degradable plastics with the effect of having the product stewardship principle applied.
SA	Since 1 March 2022, oxo-degradable plastics have been banned.
TAS	n/a
VIC	Since February 2023, <i>selected</i> single-use plastics made from oxo-degradable plastics have been banned.
WA	From 1 September 2023, oxo-degradable plastics have been banned.

f) Other relevant regulation

In addition to waste laws, product stewardship initiatives, standards and certifications, there are, of course, broader regulatory frameworks that are relevant when considering the manufacture, distribution, sale, use and disposal of biodegradable plastics. Those frameworks may relate to resource material rights, town planning, environmental impacts, health, consumer law, intellectual property and waste disposal.

Three of these frameworks are relevant to consider for present purposes.

(i) Consumer law

The first is the role of consumer law in regulating claims about the biodegradability of plastic. This is particularly important given that a key element of the 'problem' identified in **section 2.1** of this Discussion Paper is genuine concern about the misuse or misunderstanding of 'biodegradable' labelling on plastic products.

False and misleading claims about degradable items

Some State/Territory-based legislation includes specific consumer protections in relation to false or misleading claims related to degradability.

For instance, regulation 17B of the *Environmental Protection (Plastic Bags) Regulations 2018* (WA) provides that it is an offence to give information that the person knows is false or

¹¹⁴ *Plastic Reduction and Circular Economy Act 2021* (NSW) s 7(3)(b)(vii).

misleading about “the composition of a degradable plastic item”, being “plastic that contains an additive designed to accelerate fragmentation of the plastic into smaller pieces under certain conditions, including exposure to light, bacteria or heat; but does not include biodegradable plastic”.¹¹⁵ This offence carries a penalty of \$5,000.

Another example is in Queensland, where section 99GH of the *Waste Reduction and Recycling Act 2011* (Qld) provides that it is an offence to knowingly give false or misleading information to another person about whether or not a plastic item is compostable under AS 4736-2006 or AS 5810-2010.

A summary of consumer protections related to degradability embedded in plastics legislation across jurisdictions is at **schedule 5**.

False and misleading claims generally and ‘greenwashing’

More generally, companies must ensure that any claims about the ‘greenness’ of their products do not fall foul of the Australian Consumer Law (**ACL**).¹¹⁶ The prohibitions under the ACL against misleading and deceptive conduct apply to all representations made by companies about their goods (or services), including those made as part of advertising and product labelling.¹¹⁷

Environmental or sustainability claims are a powerful marketing tool often adopted by companies in an attempt to differentiate themselves and their products in the market. Advertising that focuses on the environmental aspect of a product is often referred to as ‘green’ labelling or ‘green’ marketing. The rise in ‘green’ marketing and consumer demand for environmentally sustainable products and practices, means that terms such as ‘green’, ‘eco’, ‘clean’, ‘nature’ and ‘bio’ are becoming increasingly attractive to companies (and consumers). Such claims are designed to, and are in fact, informing consumer purchasing decisions, with consumers often willing to pay more for sustainable or environmentally “friendly” products.¹¹⁸ However, it remains difficult for consumers to interpret these claims, and to balance the relative merits of claims on different products.

The Australian Competition and Consumer Commission (**ACCC**) has observed that there are “growing concerns that some businesses are falsely promoting environmental or green credentials to capitalise on these consumer preferences” for environmentally friendly and sustainable products.¹¹⁹

As recently acknowledged by Delia Rickard, deputy chair of the ACCC, when it comes to green claims, information asymmetry is a key problem:¹²⁰

It is difficult for consumers to verify the accuracy of a green claim as consumers are always going to have less information than the business making the claims.

Consumers often rely on trust marks, including certification trademarks, which provide products and services with increased legitimacy to their claims.

Information to verify claims, including the standards and criteria that lie behind trust marks, is often completely separate to, for example, the claim made on a product. It is often detailed

¹¹⁵ *Environmental Protection (Plastic Bags) Regulations 2018* (WA) reg 3.

¹¹⁶ *Competition and Consumer Act 2010* (Cth) Sch 2; (formerly the *Trade Practices Act 1974* (Cth)).

¹¹⁷ See, eg, *Competition and Consumer Act 2010* (Cth) ss 18, 29 and 33.

¹¹⁸ Delia Rickard, ‘SMH Sustainability Summit’ (Speech, The Sydney Morning Herald Sustainability Summit, 20 September 2022) <<https://www.accc.gov.au/speech/speech-to-smh-sustainability-summit>>.

¹¹⁹ Rod Sims, ‘ACCC’s enforcement and compliance policy update 2022-23’ (Speech, the Committee for Economic Development of Australia, 3 March 2022) <<https://www.accc.gov.au/speech/acccs-enforcement-and-compliance-policy-update-2022-23>>.

¹²⁰ Delia Rickard, ‘SMH Sustainability Summit’ (Speech, The Sydney Morning Herald Sustainability Summit, 20 September 2022) <<https://www.accc.gov.au/speech/speech-to-smh-sustainability-summit>>.

and complex. Often it requires research into other entities, standards and processes. Sometimes it is completely unavailable.

Many consumers are time poor, and only a very small portion of consumers will spend time researching an environmental claim prior to purchase. This is particularly the case where consumers are making everyday purchases at the supermarket or at a clothing retailer. Most consumers are not going to do the research required to verify claims when standing in aisle 12 at their local supermarket when choosing between two brands of detergent.

Clarifying or qualifying information on a website will generally not displace the overall impression that a consumer makes based on the advertising, slogans or trademarks used.

Consumers generally need to take at face value that claims made are truthful, and accurate. This gives rise to the greater likelihood of consumers being misled, and unfortunately can also be knowingly exploited.

Whether a 'green' labelling claim will amount to misleading and deceptive conduct depends on the circumstances of each case – in particular, the exact nature of the claim (representation) made and the product involved. Vague claims about a product being 'greener' or absolute claims about a product being '100% biodegradable' are problematic and more likely to raise consumer law issues. For example, in the decision of *ACCC v SeNevens International Ltd*, as discussed in **Case Study 3** below, the company SeNevens was found to have engaged in misleading or deceptive conduct by labelling its disposable nappy and nappy disposal bags (which contained polypropylene, polyethylene and polyethylene terephthalate) as 100% biodegradable.

However, the outcome in the SeNevens case can be contrasted with the decision in *ACCC v Woolworths (Woolworths)*, as discussed in **Case Study 2** below. While the Court's analysis of the nature of the representations made by Woolworths has not been challenged by legal commentators, the decision is, in part, unsatisfactory from a scientific and consumer protection perspective for two reasons.

First, the analysis of the Full Court suggests that products which do not in fact meet the standards of biodegradability or compostability may be capable of being marketed as such in Australia, provided the manufacturer only makes a present tense statement about the **inherent qualities** of a product, and not what it will do in the future. The precise language used by Woolworths was relevant to this finding – the Full Court observed that the suffix 'able' in the words 'biodegradable' and 'compostable' referred to the inherent qualities and capacity of the product, which was distinguished from a future matter.

This suggests that it may be acceptable for manufacturers to label a product as 'biodegradable' if it has the ability to biodegrade, regardless of the time it would take to biodegrade. With respect, such an approach may be liable to consumer error in that an absolute and unqualified claim that a product is 'biodegradable' is likely to create the impression in the consumer that the product is 'better' for the environment and will degrade within a reasonable amount of time.

Secondly, for representations as to future matters, it remains unclear what evidence a manufacturer requires to demonstrate that they had reasonable grounds for making such a representation.

Bearing these two matters in mind, it is relevant to observe that greenwashing and Environmental Social Governance (**ESG**) claims is now a priority for the ACCC. In March 2022, the Chair of the ACCC, Rod Sims, addressed the Committee for Economic Development of Australia (**CEDA**), and acknowledged that environmental claims in relation to consumer products was a concern and priority for the ACCC:

*'Greenwashing' is a concern for both consumers and businesses. Consumers are often unable to determine the veracity of a product's green credentials, reducing their confidence in the market. And businesses incurring the costs of genuine environmentally friendly manufacturing processes face unfair competition from those businesses making misleading green claims without incurring the same costs.'*¹²¹

More recently, in October 2022, the ACCC commenced two sweeps of the internet to identify misleading environmental and sustainability marketing claims and fake or misleading online business reviews.¹²² This trend demonstrates that greenwashing claims are a regulatory priority, and may also indicate that the ACCC (and potentially in time the courts) has increasing expectations about the standard of conduct that is considered acceptable.

It is not yet clear how this will influence market behaviour. It will possibly encourage conservatism; noting that APCO advises that "businesses should prioritise only referencing either 'certified compostable plastics' or 'conventional plastics' for maximum clarity across industry and consumers".¹²³

For those wishing to say more, however, it seems likely that avenues for 'high integrity' environmental labelling will become more prominent. One example is AS/NZS ISO 14021:2016 (Environmental labels and declarations—self-declared environmental claims (type II environmental labelling)), which is referred to in (indeed, required by) APCO's SP Guidelines.¹²⁴

Case Study 2 : ACCC v Woolworths Group Limited [2020] FCAFC 162

Key takeaway:

In this decision, the Full Federal Court found that Woolworth's disposable cutlery and crockery, which was labelled as "Biodegradable and Compostable", did not in fact need to be able to biodegrade or compost within a reasonable time. Labelling the products as "biodegradable and compostable" were representations as to existing or present facts regarding the capability of the cutlery and crockery to biodegrade or become compostable, and not a 'representation with respect to a future matter' under the ACL, as no future representations were made as to the time it would take for these processes to occur.

What is a representation about "future matters"?

Certain statements about the future may be misleading or deceptive, in breach of s 18 of the ACL. Section 4 of the ACL deals with representations with respect to "future matters".

Under s 4(1), a representation as to a future matter is taken to be misleading if the maker of the representation does not have reasonable grounds for making it. The test that applies is whether the relevant factual matter the subject of the representation is capable of being true or false at the time the representation is made.

¹²¹ Rod Sims, 'ACCC's enforcement and compliance policy update 2022-23' (Speech, the Committee for Economic Development of Australia, 3 March 2022) <<https://www.accc.gov.au/speech/acccs-enforcement-and-compliance-policy-update-2022-23>>.

¹²² Australian Competition & Consumer Commission, 'ACCC internet sweeps target 'greenwashing', fake online reviews' (Media Release 141/22, ACCC, 4 October 2022) <<https://www.accc.gov.au/media-release/accc-internet-sweeps-target-greenwashing-fake-online-reviews>>; Australian Competition & Consumer Commission, 'Businesses told to be prepared to back up their environmental claims' (Media Release 123/30, ACCC, 20 September 2022) <https://www.accc.gov.au/media-release/businesses-told-to-be-prepared-to-back-up-their-environmental-claims>.

¹²³ APCO (2020), *Considerations for Compostable Plastic Packaging*, p. 5

¹²⁴ Australian Packaging Covenant Organisation, *Sustainable Packaging Guidelines*, (Guidelines No 3, October 2021) [https://documents.packagingcovenant.org.au/public-documents/Sustainable%20Packaging%20Guidelines%20\(SPGs\)](https://documents.packagingcovenant.org.au/public-documents/Sustainable%20Packaging%20Guidelines%20(SPGs)).

Case Study 2 : *ACCC v Woolworths Group Limited* [2020] FCAFC 162

What happened in the Woolworths Case?

The labelling of Woolworths' Select Eco disposable crockery and cutlery (**Products**) contained the phrase "Biodegradable and Compostable" (**Representations**).

The ACCC contended that:

- (a) the Representations were as to "future matters" per s 4 of the ACL, and Woolworths did not have reasonable grounds for making those representations at the time they were made; or
- (b) alternatively, that the Representations were in any event false or misleading or deceptive, or likely to mislead or deceive in contravention of ss 18, 29 and 33 of the ACL, because the Products did not biodegrade or compost within a reasonable period of time when disposed of either using domestic composting or by ordinary disposal methods such as conventional Australian landfill.

In relation to the first contention, the Full Court held that a representation about the nature, quality, character or capability of a product is not a representation with respect to 'future matters':

"s 4 of the ACL does not operate on truthful statements about presently measurable and provable scientific characteristics or properties such as flammable, recyclable and biodegradable. Rather, s 4 is concerned with predictions, promises, forecasts and other like statements which are directed to circumstances or events which may or may not happen in the future but which cannot be proven to be true or false at the time when they are made":
Woolworths FCAFC at [120]–[121].

The Full Court held that references to "biodegradable and compostable" were representations about the **inherent qualities** of the product. As to the meaning of 'biodegradable' and 'compostable' the Court observed that the intuitive reaction of the ordinary consumer was relevant and cautioned against employing a detailed scientific interpretation of the words.

In relation to the second contention, the Full Court found that the packaging did not convey the representation that the Products would biodegrade or decompose "within a reasonable time", but represented the qualities of the Products themselves, which were "made of organic material, and were capable of breaking down in landfill, and capable of being turned into compost".

Case Study 3: ACCC v SeNevens International Ltd; Seneviratne (2008) TAD34/2008

Key takeaway:

Absolute claims about a product being “100% biodegradable” are likely to constitute misleading and deceptive conduct where the whole of the product is not capable of being broken down by the biological activity of living organisms.

What happened in the SeNevens Case?

In 2007, Perth-based SeNevens International Ltd (**SeNevens**) was marketing and selling its ‘Safeties Nature Nappy’ and ‘Nappy Bag’ (the **Products**) in all Australian States and the ACT. Claims were made through product packaging and other marketing material that the products were “100% biodegradable”.

The ACCC commenced proceedings in the Federal Court against SeNevens and Ms Charishma Seneviratne, the former director of SeNevens, alleging that:

- (a) SeNevens engaged in false, misleading and deceptive conduct relating to the marketing and promotion of the products as “100% biodegradable” in violation of section 52 of the *Trade Practices Act 1974* (Cth) (the **TP Act**) (now replaced by the ACL);
- (b) SeNevens’ conduct was in contravention of section 53(a) and (c) of the TP Act which prohibits false representations about a product’s composition, performance or benefits; and
- (c) Ms Seneviratne was knowingly concerned in, or party to, SeNevens’ false and misleading conduct.

Consent orders for SeNevens

In December 2008, the parties entered into consent orders with the Federal Court’s Justice Marshall declaring that the “100% biodegradable” claim was false and misleading because the products contained fossil-fuel based plastic polymers that are not capable of being chemically broken down by the biological activity of living organisms.¹²⁵

The consent orders imposed injunctions on SeNevens, restraining it for a period of five years from supplying or offering to supply disposal nappies and nappy bags in packaging which contains any representation that the product is biodegradable; and from representing by any means of promotion that the disposal nappies or nappy bags are biodegradable. Further, SeNevens was required to place a corrective notice on its website for a period of six months, notify each of its suppliers, retailers and distributors of the orders made, and participate in a compliance program.¹²⁶

Consent orders for the director

The consent orders also declared that Ms Seneviratne was knowingly concerned in and party to the contraventions of SeNevens through the making and approval of representations on behalf of SeNevens that the whole of the product was biodegradable (capable of being chemically broken down by the biological activity of living micro-organisms), when to her knowledge that was not the case.

The consent orders imposed an injunction restraining Ms Seneviratne for a period of five years of being knowingly concerned in or party to, any conduct by a corporation in connection with the supply or promotion of disposable nappies or nappy bags in Australia containing representations that those products are biodegradable unless, to the knowledge of Ms Seneviratne, the corporation has received written, independently tested, scientific evidence that the product is biodegradable.

- (ii) Intellectual property law (trademarks)

¹²⁵ Order of Justice Marshall in *ACCC v SeNevens International Ltd* (Federal Court, (P)TAD34/2008, 3 December 2008) [1].

¹²⁶ *Ibid* [3]-[4].



A trademark is a badge of origin. It is a proprietary right that allows the trademark owner (or authorised licensees) to use the mark in relation to certain goods and/or services. Trademarks can come in many shapes and forms – words, logos, numbers, pictures, letters and even colour marks – and enables companies to distinguish their goods (or services) from those of others.

From a consumer perspective, a trademark can convey a level of authenticity or legitimacy when used on a product, including when used in close connection with advertising claims made on the product. While a certification trademark (e.g. the Heart Foundation “tick” logo), can only be used on products (or services) that meet a certain standard or characteristic (as set out in the rules for that particular mark), the same is not true for ‘ordinary’ (or standard) trademarks, where the main determining factor¹²⁷ for the registrability of the mark is its distinctiveness.¹²⁸

In simple terms, distinctiveness is assessed by reference to whether the mark is capable of distinguishing the company’s (or person’s) goods or services from those of others. The question of distinctiveness involves consideration of multiple factors including the goods (or services) in question, whether the mark is descriptive of those goods (or services) and whether other traders would legitimately want to use the same or similar mark.¹²⁹ Further, a trademark which is (or is likely to be) deceptive, cause confusion or otherwise be contrary to another law (e.g. breach of the ACL) cannot be registered.¹³⁰

Despite this being a threshold issue for registration, in practice there may be consumer confusion about what trademarks used in the context of environmental labelling actually mean. For example, the ACCC has acknowledged that time poor consumers are unlikely to spend time corroborating the impression conveyed by a trademark on packaging with any explanatory information available about the trademark.¹³¹

As discussed in **section 4.3(c)** and **section 4.3(d)** above, compostable plastics that meet the industrial composting (AS 4736-2006) or home composting (AS 5810-2010) Australian standards, or that are certified to comply with ISO 23517 (Soil Biodegradability) can be endorsed with the following trademarks:

	Trademark	Logo licensed by ABA for certified materials
Industrial compostable	 <p>AU 1221837 IR 675032 (Registered)</p>	 <p>Compostable AS 4736 ABAX 9999</p>




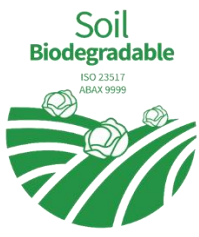
¹²⁷ *Trademarks Act 1995* (Cth) s 41.

¹²⁸ Note that there are a number of other factors relevant to the registrability of a trademark. This paper does not intend to explore all the grounds as it is beyond the scope of this discussion paper.

¹²⁹ *Ibid.*

¹³⁰ A trademark that is ‘contrary to law’ must be rejected from registration: *Trademarks Act 1995* (Cth) s 42. A trademark would be contrary to law if it is misleading, deceptive or likely to cause confusion in breach of the Australian Consumer Law.

¹³¹ See Delia Rickard, ‘SMH Sustainability Summit’ (Speech, The Sydney Morning Herald Sustainability Summit, 20 September 2022) <<https://www.accc.gov.au/speech/speech-to-smh-sustainability-summit>>.

	Trademark	Logo licensed by ABA for certified materials
Home compostable	 <p>Home Compostable[®]</p> <p>AU 1511872 (Registered)</p>  <p>Home Compostable[®]</p> <p>AS 5810 AU 2217591 (Under examination)</p>	 <p>Home Compostable[®]</p> <p>AS 5810 ABAX 9999</p>
Soil biodegradability	<i>Trademark yet to be registered</i>	 <p>Soil Biodegradable</p> <p>ISO 23517 ABAX 9999</p>

It is noted that the registered 'seedling logo' trademark (and the 'seedling logo' licensed by the ABA) does not contain the words 'Industrial Compostable' as part of the mark. Unlike the Home Compostable trademark / logo, the mark contains no reference to the fact that the material is only compostable in an industrial (commercial) composting environment. Further, it is possible that some consumers may not appreciate the relevance of the 'seedling' image and how it relates to industrial compostability.

Given these observations, there appears to be some room for improvement in respect of the seedling logo, so as to minimise the potential risk of consumer confusion or uncertainty. These are also matters that could potentially be addressed with other language on labelling and marketing materials.

(iii) Environmental law

The third general regulatory framework that warrants specific mention is obligations under environment protection laws. Such laws generally:

(A) create various offences, including for littering and where activities pollute or contaminate the environment; and

(B) regulate the transportation and disposal of waste.

These laws are therefore relevant to the extent that plastic waste is incorrectly disposed of, or otherwise 'leaks' from the waste management system into the environment (regardless of its biodegradability). Plastic pollution can arise at any scale, from microplastics through to individual or large volumes of plastic products.

Environmental laws also have a bearing on the thresholds/ tolerance for acceptability, if and to the extent that a biodegradable (or biodegraded) substance contains or releases residual contaminants. This is an important, and particularly challenging issue to navigate when formulating and implementing any standard.

For example, the Australian Standards relating to compostability require that any organic constituents that are present at concentrations of more than 1% (by dry mass) demonstrate compostability separately. There are understandable reasons for this – such as a pragmatic balancing of resources and risk. But viewed in isolation, this criterion leaves open the possibility that minor constituents do not biodegrade and therefore are persistent pollutants. In terms of toxicity, other criteria of the Australian Standards relating to compostability may provide some protection. For example, the product must have no toxic effect on the resulting compost on plants and earthworms.

This highlights that the integrity of standards as a means of measuring 'acceptable compostability' stems from a multi-criteria assessment, with no individual metric able to determine the matter alone. It also foreshadows some vulnerability to 'the impact of the 1%', being the impact of constituents that slip under the radar of some criteria.

4.4 Problems emerging from Part 4

The following problems are evident from the discussion in **Part 4**:

a) Unclear and inadequate distinction between the terms “biodegradable” and “compostable” in plastics policies

The National Plastics Plan and relevant plastics policies at a State and Territory level do not explicitly endorse or oppose 'biodegradable' plastics. In particular, although some policies refer to “compostable” plastics, all policies fall short of clearly recognising the relationship between the terms “biodegradable” and “compostable”.

b) Inconsistent use, adoption and endorsement of the terms “biodegradable” and “compostable” in plastics legislation

Legislation does not provide sufficient clarity on what is meant by 'biodegradable', because the term is mostly used to describe certified compostable plastics, or is not defined or referred to at all.

c) Inconsistent phasing out of oxo-degradable plastics across the Australian States and Territories

Whilst there has been progress across most jurisdictions to phase out oxo-degradable plastics (as explained in **Case Study 1**), there is some inconsistency in approach which makes navigating the bans challenging. APCO has recently indicated its support for alignment of the bans.

d) Limitations of voluntary product stewardship targets and schemes

General packaging and recycling targets remain largely voluntary through product stewardship initiatives

General packaging and recycling targets, including the National Packaging Targets 2025 for 70% of plastic packaging being recycled or composted, set a national direction for more plastic packaging to be “compostable”. However, some argue that these targets should be mandated

rather than supported by voluntary and co-regulatory product stewardship schemes.¹³² The new wave of waste specific legislation may enable this to happen. For example, the RWR Act now authorises the Commonwealth Government to include mandatory targets through provisions relating to product stewardship, although it is unclear when these mandatory provisions will be activated and for what purpose.

Lack of enforcement under the UPM NEPM

There have been no reported compliance actions, investigations or complaints from States and Territories under the UPM NEPM,¹³³ which indicates an absence of compliance and enforcement action by States and Territories. The implication of this is that companies that do not meet sustainable packaging guidelines or labelling (i.e. in relation to compostable plastics or certification) have not been penalised.¹³⁴ This suggests that voluntary and co-regulatory frameworks may be insufficient to achieve product stewardship objectives.

e) The challenge of balancing the relative merits of different green credentials

With the multitude of environmental product labels in use, it is difficult for consumers to differentiate between the labels and understand what they each represent. Furthermore, different labels measure different aspects of environmental impact without offering a 'holistic' assessment of the plastic product's overall environmental impact. For example, something that is 100% bio-based may take 1 million years to biodegrade. Is purchasing such an item a 'good'/'green' choice?

f) Limited regulation of 'biodegradability' related claims and risks of 'greenwashing'

The growing consumer demand for environmentally sustainable products has seen a proliferation of 'green' marketing. The attractiveness of environmentally friendly messages (such as green colours, a leaf or circular images) and words such as 'green', 'eco', 'biodegradable' or 'sustainable' gives rise to the risk of 'greenwashing'.

Greenwashing erodes consumer trust and confidence in the market, and is a priority for the ACCC and ASIC.¹³⁵ As observed by the ACCC, businesses will often use the terms 'compostable' or 'biodegradable' relying on specific scientific meanings or how the terms are defined under Australian or international standards. However, 'technical' meanings may not correlate with what an ordinary consumer might expect or understand. The ACCC has noted, for example, that consumers are unlikely to understand that use of the bare term 'compostable' means industrial composting, and suggests that claims should not only disclose the inherent capabilities of a product, but also the steps a consumer needs to take to ensure that these capabilities are fulfilled.¹³⁶

Recent case law suggests that the position under the ACL may not align with consumer expectations, giving rise to a potential risk of consumer confusion, particularly given that:

- (iv) there is increasing (and increasingly inconsistent) use of terms like 'biodegradable' and 'compostable' to describe plastic products,¹³⁷ presumably because such terms are attractive to consumers;
- (v) representations relating to 'biodegradability' are not specifically regulated; and

¹³² 'What's the Plan B for Packaging?' *Boomerang Alliance* (May 2021), 1 <https://d3n8a8pro7vnm.cloudfront.net/boomerangalliance/pages/4061/attachments/original/1621295180/apco-planB-20210518.pdf?1621295180>.

¹³³ MP Consulting, *Review of the co-regulatory arrangement under the National Environment Protection (Used Packaging Materials) Measure 2011* (Final Report, February 2021) 13.

¹³⁴ Gerry Nagtzaam and Steve Kourabas, 'An Australian national plastics "plan": one plan to rule them all?' (2021) 36(2) *Australian Environment Review* 26.

¹³⁵ Delia Rickard, 'SMH Sustainability Summit' (Speech, The Sydney Morning Herald Sustainability Summit, 20 September 2022) <<https://www.accc.gov.au/speech/speech-to-smh-sustainability-summit>>.

¹³⁶ *Ibid.*

¹³⁷ Vishal Goel et al, 'Biodegradable/Bio-plastics: Myths and Realities' (2021) 29 *Journal of Polymers and the Environment* 3079, 3080.

- (vi) the breadth of the term means its usage is vague – everything will eventually ‘biodegrade’ (even if it takes millions of years).

g) Limitations of ‘green’ trademarks and risks of ‘greenwashing’

‘Green’ trademarks are both a friend and foe to businesses and consumers. For businesses, the registration of a distinctive ‘green’ trademark can strengthen a brand’s identity. In addition, having a product independently certified to allow use of a certification mark can be valuable to businesses, given that certification trademarks provide legitimacy to a product’s green claims and are marks that consumers trust.

However, the heightened scrutiny around ‘green’ labelling means that business should tread carefully and be mindful of greenwashing when developing or using a ‘green’ trademark. Care must be taken to ensure that trademarks and symbols are not used in a way that could mislead consumers.

From the perspective of consumers, a proliferation of valid ‘green’ trademarks may hinder consumers’ ability to make informed choices and may lead to consumer confusion.¹³⁸ This risk is heightened by businesses creating their own trademarks, rather than seeking independent certification, and also by consumers not being aware of the difference between standard and certification trademarks, particularly for marks that use prefixes such as ‘bio’ or ‘compost’.

There appears to be some room for improvement in respect of the seedling logo, which relates to certification of compliance with AS 4736-2006 (Industrial Compostability), so as to minimise the potential risk of consumer confusion or uncertainty.

In addition, the ‘recycling symbol’, which is used in the resin identification system, may not be appropriate for inclusion in ‘green’ trademarks, given that the ACCC has recognised its scope to cause consumer confusion.

h) Impact of the “1%”: accounting for the impact of trace ingredients

Current certification schemes, such as European Standard EN 13432:2000 (Compostability) and Australian Standard AS 5810-2010 (Home Compostability), allow any organic constituent that is less than 1% of the product to be included without having to demonstrate its biodegradability. As such, an ingredient in a plastic product may constitute a very small part of the overall volume or mass, yet still have a significant impact on the sustainability credentials of the plastic product. For example, a biodegradable product will likely not biodegrade or biodegrade at a lower rate if it is coated by intact layers of non-biodegradable, water impermeable plastic, as it needs exposure to the environment in order to biodegrade.

Another example is that trace ingredients of a product may be toxic or environmentally harmful.

These factors are addressed to some extent by existing standards, and should be an important consideration for any new standard seeking to define other forms of acceptable biodegradability.

¹³⁸ Delia Rickard, ‘SMH Sustainability Summit’ (Speech, The Sydney Morning Herald Sustainability Summit, 20 September 2022) <<https://www.accc.gov.au/speech/speech-to-smh-sustainability-summit>>.

Chapter 5 – Regulation of biodegradable plastics in overseas jurisdictions

5 Regulation of biodegradable plastics in overseas jurisdictions

5.1 Regulations of biodegradable plastics in Europe

a) Background

The European Union (EU) and its member states have more extensive (quasi) regulation of biodegradable and compostable plastics than Australia. There are existing standards relating to home and industrial compostability, as well as for biodegradation in soil and freshwater, as summarised in **Schedule 1**.

In addition, the EU is taking active steps to develop further policy and regulations, such as critically analysing the positive and negative impacts of biodegradable (including compostable) plastics as well as investing in the development of biodegradability standards and labelling.

The approach in the EU is therefore a useful comparator, particularly given the experience to date suggests that Australia's approach generally follows regulation in Europe on compostability, as seen through the similarities between Australian Standard AS 4736-2006 and European Standard EN-13432.

b) Evolving EU Commission policy framework

In 2019, the EU Commission adopted the European Green Deal, which sets out the EU's framework for sustainable growth and addressing climate and environmental-related issues. The EU Commission's circular economy plan is one of the 'main building blocks' of the European Green Deal.

The European Green Deal and the EU Commission's circular economy plan require the EU Commission to develop a policy framework on biobased, biodegradable and compostable plastics.¹³⁹ Relevantly, this policy framework:

- (vii) calls for banning the use of generic claims on plastic products such as 'bioplastics' and 'biobased,' unless "they are underpinned by recognised excellent environmental performance...";¹⁴⁰
- (viii) comments on the role of biodegradable plastics in the waste hierarchy (see also **section 3.3(b)** above), stating that "the use of plastics that biodegrade in the open environment must be limited to materials for which full bio-degradability has proven to be below a specific and evidence-based timeframe to avoid environmental harm, and to specific applications where consumption reduction or reuse are not viable options and where the full removal, collection and recycling of plastic products is not feasible...Substitutions should not be considered as a solution for inappropriate waste management or littering";¹⁴¹
- (ix) recognises that where the use of biodegradable plastics is appropriate, consistent and science-based testing and certification standards for biodegradation of plastic in the open environment must be developed;
- (x) endorses the view that any labelling of plastics as 'biodegradable' must always specify the receiving open environment in which they will biodegrade (i.e. soil, water etc) and the required

¹³⁹ EU policy framework on biobased, biodegradable and compostable plastics, COM(2022) 682 final (November 30, 2022).

¹⁴⁰ *Ibid*, 3.1.

¹⁴¹ *Ibid* 4.1.

timeframe for their biodegradation, in terms of weeks, months or years. These claims should be based on existing standards or certification schemes;¹⁴²

- (xi) suggests that biodegradable claims, including in the form of labels, must not be made for litter-prone products;¹⁴³
- (xii) calls for further research on biodegradation processes, including safe biodegradation in light of possible transfer to other environments, timeframes, additives and long-term effects;¹⁴⁴ and
- (xiii) calls for international standardisation on biodegradable and industrially compostable plastics, which will help to achieve consistent standards at global level.¹⁴⁵

Recently, the EU Commission has proposed the Green Claims Directive that proposes a series of regulatory laws relating to substantiating and communicating environmental claims.¹⁴⁶ These requirements will also regulate apply to ‘comparable claims,’ whereby one trader seeks to compare their product with another. If passed, the directive will require third party verification of the substantiation and communication of these environmental claims. The Directive includes compliance monitoring measures and the ability to impose penalties.

c) EU biodegradability standards

In Europe, the European Committee for Standardisation (known as **CEN**) is formed by the national standardisation bodies of 33 countries. CEN is responsible for developing and endorsing various standards, including biodegradability and composability standards.

Similar to Australia, the biodegradability standards in Europe can also be categorised as either ‘test criteria standards’ or ‘test method standards’ (as discussed in **section 4.2(c)** above). The key test criteria standards relating to biodegradable plastics are:

- EN 13432:2000 – for home and industrial composting for packaging materials;
- EN 17033 – for soil biodegradability of mulch films used in agriculture and horticulture; and
- EN 14987:2006 – for freshwater biodegradability.



¹⁴² Ibid.

¹⁴³ Ibid.

¹⁴⁴ Ibid, 5.

¹⁴⁵ Ibid, 6.

¹⁴⁶ European Commission, *Directive of the European Parliament of the Council*, COM/2023/166 <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2023%3A0166%3AFIN> (*Green Claims Directive*).

In addition, the EU draws on ISO standards setting test criteria for biodegradability in soil (ISO 23517:2021) and industrial composting (ISO 17088).

Further standards on biodegradability may be developed in 2023 as part of the EU Commission's policy framework (discussed above), noting also that there is an EU Directive that requires:¹⁴⁷

- (i) member states to ensure that all packaging complies with specified essential requirements, including that biodegradable packaging is to “be of such a nature that it is capable of undergoing physical, chemical, thermal or biological decomposition such that most of the finished compost ultimately decomposes into carbon dioxide, biomass and water”; and
- (ii) the EU Commission to promote the preparation of European standards relating to, relevantly, biodegradable packaging.

In addition, there are indications that a biodegradability standard for the marine environment may be developed in the EU in the medium term as another EU Directive anticipates a review by 3 July 2027 (however, the review may occur sooner)¹⁴⁸ that will include an assessment of the scientific and technical progress concerning criteria or a standard for biodegradability in the marine environment applicable to single-use plastic products.¹⁴⁹

d) Biodegradability certification schemes

If the Green Claims Directive is passed, environmental claims will need to be verified by procedures established by member states. Article 11 of the Green Claims Directive outlines some of the verification requirements, which include being independent and being suitably qualified.

There are industry led voluntary biodegradability certification schemes in Europe, created by TUV Austria and Din Certo, which are the two most common certification bodies in Europe.¹⁵⁰ Some of these certifications draw on CEN and ISO standards which exist for biodegradability in home and industrial composting, soil and freshwater environments (refer to **Schedule 1**).

Other certifications, including in relation to marine biodegradability, reflect Din Certo or TUV Austria specified criteria, which are also certified by those same industry bodies.

e) EU plastic bans

The EU has implemented bans on single use and oxo-degradable plastics, as described below.

(i) *Single use plastics*

The EU has implemented a ban on the use of ‘single use plastic products’,¹⁵¹ where the definition of ‘plastic’¹⁵² excludes regenerated cellulose (which is manufactured from a bio-based polymer),¹⁵³ but otherwise applies to conventional plastics, bio-based plastics and biodegradable (including compostable) plastics (for example, polyhydroxyalkanoates (PHAs)).¹⁵⁴

¹⁴⁷ Directive 94/62/EC, Articles 9 and 10.

¹⁴⁸ For example, see <https://www.european-bioplastics.org/implementation-of-the-single-use-plastics-directive-or-how-to-create-a-legislative-hotchpotch/>

¹⁴⁹ EU Directive (EU 2019/904), Article 15.

¹⁵⁰ Note that **Schedule 1** provides a table outlining these biodegradability certifications.

¹⁵¹ ‘Single use plastic products’ is defined in EU Directive (EU 2019/904) (**SUPD**) as “a product that is made wholly or partly from plastic and that is not conceived, designed or placed on the market to accomplish, within its life span, multiple trips or rotations by being returned to a producer for refill or re-used for the same purpose for which it was conceived” [emphasis added].

¹⁵² Note that the SUPD defines “plastic” as “a material consisting of a polymer as defined in point 5 of Article 3 of Regulation (EC) No 1907/2006, to which additives or other substances may have been added, and which can function as a main structural component of final products, with the exception of natural polymers that have not been chemically modified”. Further guidance on this definition is included in part 2 of the Commission guidelines on single-use plastic products in accordance with Directive (EU) 2019/904.

¹⁵³ Part 2.1 of the Commission guidelines on single-use plastic products in accordance with Directive (EU) 2019/904.

¹⁵⁴ Commissions Guidance document and the Q&A section: https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_2709

Specifically in relation to plastic bags, some member states of the EU have introduced specific regulations that go beyond the regulations imposed by the EU. For example:

- Austria: there is a complete ban on non-biodegradable plastic bags;
- France: lightweight plastic bags (used for fresh produce, as an example) must be compostable and bio-sourced; and
- Italy: single use shopping bags with a thickness of less than 60 microns must be made from biodegradable plastic and be certified as compostable according to EN13432.

(ii) Oxo-degradable plastics

Oxo-degradable plastics have also been banned in the EU,¹⁵⁵ where oxo-degradable plastics are defined as “plastic materials that include additives which, through oxidation, lead to the fragmentation of the plastic material into micro-fragments or to chemical decomposition”.

f) Labelling of biodegradable plastics in the EU

Currently, specific regulation of the labelling of biodegradable plastics in the EU appears to be limited. However, targeted constraints have in the past been proposed,¹⁵⁶ including the Green Claims Directive, and may still evolve as part of reforms associated with the current policy framework.

Separately, the UK Government is considering mandatory labelling of packaging. The UK Government considers that “labelling should make clear appropriate information on how to dispose of products alongside whether they are biobased and/or biodegradable.”¹⁵⁷ In addition, ambiguous terms such as ‘bio-plastics’ should not be used.

More generally, it is noted that the broader suite of standards and certification schemes available in Europe relevant to biodegradability are linked to various trademarks, which are used in practice in product labels as a means of conveying quality assurance.

g) Regulating ‘green’ claims in the EU through consumer law

The EU Commission has recently announced that it is proposing to update the EU consumer rules to address greenwashing issues.¹⁵⁸ The amendments arise as part of the European Commission’s ‘Circular Economy Action Plan and New Consumer Agenda’. The proposed amendments will expand the list of prohibited unfair business practices to include making generic environmental claims, making an environmental claim about the entire product when it only concerns an aspect of the product and displaying a voluntary sustainable label which is not based on a third-party verification scheme or established by public authorities.¹⁵⁹ As mentioned above, the EU Commission is proposing the Green Claims Directive, which will establish the requirements to substantiate and communicate environmental claims.

¹⁵⁵ EU Directive (EU 2019/904), Article 5. The EU Commission’s guidance confirms this ban includes both biodegradable and non-biodegradable oxo-degradable plastic and it is not limited to single use plastic products – see Commission guidelines on single-use plastic products in accordance with Directive (EU) 2019/904, p 4.

¹⁵⁶ See EU Directive 94/62/EC, as amended by EU Directive 2015/720, Article 8a.

¹⁵⁷ HM Government, ‘Standards for Bio-based, Biodegradable, and Compostable Plastics: Government Response’ (Report) (April 2021) <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/976912/standards-biobased-biodegradable-compostable-plastics.pdf>

¹⁵⁸ Unfair Commercial Practices Directive (UCPD).

¹⁵⁹ European Commission, Press release 30 March 2022 *Circular Economy: Commission proposes new consumer rights and a ban on greenwashing* <https://ec.europa.eu/commission/presscorner/detail/en/ip_22_2098>.

In the UK, the Competition and Markets Authority (**CMA**) has recently published guidance that seeks to help business make accurate environmental claims, under the existing legal framework.¹⁶⁰ In particular, the CMA's guidance document and green claims code checklist, published in September 2021, is designed to help businesses understand and comply with their existing obligations under the UK consumer protection laws when making environmental claims. The guidance centres around 6 key principles and give examples of how to apply such principles when making environmental claims. The principles are:

- (i) claims must be truthful and accurate
- (ii) claims must be clear and unambiguous
- (iii) claims must not omit or hide important relevant information
- (iv) comparisons must be fair and meaningful
- (v) claims must consider the full life cycle of the product or services
- (vi) claims must be substantiated

5.2 Regulation of biodegradable plastics in the United States

The approach to biodegradable plastics in the United States also provides a useful comparator.

In particular, California has passed legislation that covers the use of the terms 'biodegradable' and 'compostable' on consumer packaging,¹⁶¹ and the term 'biodegradable' cannot be used on products unless it is accompanied by information on the receiving environment required to achieve that biodegradation.¹⁶² In addition, anyone who represents through labelling or advertising that a consumer product is not harmful or is beneficial to the environment must retain written documentation to support such claim.¹⁶³

The American Society of Methods and Materials have developed standards to address the biodegradability of plastics. These standards are used by some companies to support their biodegradability claims and are referenced in municipal and State regulations in America that govern the labelling of biodegradable plastics. Similar to Australian and European standards, the American standards can be categorised as 'test criteria standards' and 'test method standards'.

Relevant standards are listed in **Schedule 8** and include ASTM D6400-21 – test criteria for labelling of municipal or industrial compostability, as well as a number of test method standards (including ASTM D5338-15(2021), ASTM D5511–18, ASTM D5988–18 and ASTM D6691–17).

Schedule 8 provides a brief comparison of these American standards to the European and Australian standards discussed above.

¹⁶⁰ Competition & Markets Authority, *Making environmental claims on goods and services* (Guidance, 20 September 2021)

<<https://www.gov.uk/government/publications/green-claims-code-making-environmental-claims/environmental-claims-on-goods-and-services>>.

¹⁶¹ Peter John Kershaw, "Biodegradable Plastics & Marine Litter: Misconceptions, Concerns and Impacts on Marine Environments" (United Nations Environment Program, 2015).

¹⁶² Science Advice for Policy by European Academies, "Biodegradability of plastics in the open environment: Mapping review" (Berlin: SAPEA, 2021).

¹⁶³ *California Business and Professions Code* section 17580.

Chapter 6 – Potential solutions

6 Potential solutions

As has been seen, the issues associated with use of the term 'biodegradable' are multifaceted and complex, and arise in the context of a growing waste crisis and a general push towards sustainability, net zero and circular economies.

Accordingly, this discussion paper recognises that there is unlikely to be a simple or singular solution. Rather, any solution(s) will need to be directed at particular issues and will in most cases reflect a combination of potential solutions.

6.1 The range of potential solutions

Potential solutions range from scientific research through to regulatory reform, and the feasibility, impact and timeframe for implementation of solutions varies widely.

A range of potential solutions are introduced below.

a) Scientific research

The biodegradation of polymers and plastic products is a biological process that raises issues of concern to scientists from a range of disciplines. There are many gaps in the existing state of knowledge, some of which have been noted in this discussion paper.

Scientific research relating to biodegradable plastics is ongoing and will continue to be an important part of any 'solution' going forward.

b) Information awareness

There is a clear and compelling need for information awareness campaigns to be deployed as soon as possible in relation to sustainability-related plastic claims. Such campaigns can be employed in parallel with one or more of the other solutions proposed in this paper.

Such campaigns will need to do various things including clearly conveying:

- (vii) the meaning of sustainable plastics-related terms;
- (viii) the circumstances in which biodegradable plastic products are a sustainable option and should be favoured by consumers; and
- (ix) the information required to evaluate a biodegradable or other sustainability related claim.

These campaigns would benefit greatly from an agreed taxonomy, but do not depend on it. To have impact, information awareness campaigns will need to utilise various forms of media, including social media, and be accessible at the point of sale. The use of QR codes are desirable in this respect, as it allows consumers to make informed choices about sustainability-related plastics at the point of purchase.

A further key element of any information awareness campaign is conveying the disjunct between biodegradability and waste disposal, and providing clear guidance on suitable (or perhaps more directly, what are not suitable) waste management behaviours.

c) Quality assurance (e.g. standards and certification schemes)

As recognised earlier, for a biodegradability claim to be meaningful it must be coupled with:

- (i) an identified environment in which biodegradation will occur (at a minimum, natural or engineered, but preferably further defined by reference to, for example, marine, soil, freshwater etc); and

- (ii) a timeframe for biodegradation to a particular order of magnitude.

There are different ways to determine this information. For example, a manufacturer or industry body could invest in product specific testing to ascertain and document the biodegradability of a product. Retaining records of this testing would bear similarity to the obligation under US law to have documentary support for an environmentally beneficial claim.

A more common approach is to rely on standards and industry certification schemes. We have seen that standards can be used to 'benchmark' biodegradability in particular environments, and are currently available in Australia by reference to composting and soil environments. Additional standards may be needed in the future to address freshwater and marine biodegradability.

If additional standards were to be delivered for water and marine environments, or if an Australian Standard were developed for soil biodegradation, careful consideration would need to be given as to how to balance the need for clear and reliable criteria for compliance, with the need to preserve flexibility to enable the standard to evolve over time as the state of knowledge improves. In addition, as new standards are introduced internationally, such as standards for plastic biodegradation in solid waste digestion, there is a need to review the adoption of such standards within Australia.

The standards developed in Europe and the United States (which are discussed in **sections 5.1** and **5.2** above and summarised in **Schedule 1** below) can be used as a base when considering these issues.

We have seen that independent validation or certification is another form of quality assurance that is commonly coupled with standards. Certifications from the ABA in Australia, or that are available through TUV Austria and Din Certo in Europe, are outlined in **sections 4.2(d)** and **5.1(d)** above, and in **Schedule 1**.

Other matters relevant to quality assurance include the scope for independent review, and the need for monitoring and enforcement (raising questions of who could do this and how, and what the consequences of non-compliance should be?).

Beyond traditional standards and certification schemes, there may be scope for innovative approaches to quality assurance for biodegradable plastics, including:

- (i) a 'biodegradability rating tool' as a potential new format for an informal standard; this tool could convey the relative biodegradability of the plastic product, the source of the polymers used and where more information can be found; and / or
- (ii) the creation of a biodegradability database, which may complement the hypothesised 'biodegradability rating tool' to provide an evidence-based approach to the classification (or certification) of biodegradable plastics. The database could be populated as scientific research advances and therefore assist in the classification of biodegradable plastics.

d) Labelling systems, guidance and trademarks

Labels are a prime vehicle for communicating information about a product, subject to consumer protection laws and often involving the use of intellectual property (trademarks).

At the very least it is clear that further guidance for industry around labelling is warranted and would benefit businesses (and in turn, consumers). Accurate labelling will assist in:

- (i) reducing the risk of consumer confusion and risk to businesses in making potentially misleading statements to consumers;
- (ii) improving consumer choice; and
- (iii) improving end-of life management, when such information is included as part of the label.

We have seen that APCO has published helpful guidance for labelling compostable plastics (see **section 4.2(d)**) that could potentially be developed to address biodegradable plastic labelling more generally. It is noted that updated guidance from the ACCC would be beneficial. In the interim, guidance from the CMA in the UK may provide assistance for businesses seeking to avoid greenwashing.

Given that labels can and often do include trademarks as a simple visual cue, it is also relevant to note that there is scope for existing trademarks to be amended, or new trademarks to be developed, to improve consumer information. By way of example, a ‘biodegradable rating tool’ or similar could be coupled with a trademark used for labelling that summarises information for consumers about the relative performance of a biodegradable plastic product against the rating tool criteria. The more extensive suite of trademarks used in Europe may also provide a useful reference.

e) Regulation by the law

Some of the solutions identified above have, or can have, a nexus with the law. For example, through the regulation of trademarks or the protections against misleading and deceptive conduct provided by consumer law.

The law is obviously a powerful tool to regulate behaviour. In Australia, there are two major sources of law: the ‘common law’ drawn from the decisions made by judges in past cases, and legislation. In the context of biodegradable plastics, legislation is likely to be the primary source of regulation.

Legislation can adopt a wide variety of regulatory models, from ‘soft’ (e.g. incentives) to ‘hard’ (e.g. ‘command and control’). For example, legislation can mandate minimum requirements or obligations, or prohibit particular types of plastics or waste behaviours (as is the case for littering). It can also set targets and objectives and therefore accelerate a reform agenda, as is the case with the legislative support for the push towards circularity.

In the context of biodegradable plastics, legislation could theoretically be used to do a variety of things, including:

- (i) clarifying the meaning of key terms;
- (ii) specifying minimum requirements for biodegradability claims, such as that all such claims must be certified (see for example the approach taken in Queensland for regulating misrepresentation about compostability of plastics (see **section 4.3(f)(i)**), or that all claims must be accompanied by information on the receiving environment (as required by Californian legislation discussed in **section 5.2**);
- (iii) regulating bioplastic products blended and/or coated with non-biodegradable components, or products containing particularly “toxic” components; or
- (iv) expanding existing bans on single use and oxo-degradable plastics.

It is important to recognise that legislative reform may not be necessary for legislation to be part of the ‘solution’. For example, it is possible that existing consumer protection laws will activate in relation to biodegradable claims without the need for legislative amendment. This appears to be on the horizon, notwithstanding the recent Woolworths decision (refer to **Case Study 2**), given the ACCC has in the past published guidelines on the use of biodegradable, degradable and recyclable claims on plastic bags,¹⁶⁴ and has more recently emphasised that it is prioritising greenwashing (which could include claims relating to biodegradable plastics).¹⁶⁵

¹⁶⁴ ACCC, *Biodegradable, degradable and recyclable claims on plastic bags* (News for Business, 2010) 2 <<https://www.accc.gov.au/system/files/Biodegradable%2C%20degradable%20and%20recyclable%20claims%20on%20plastic%20bags.pdf>>.

¹⁶⁵ See, eg, Aysha de Krester and James Eyres, ‘ACCC says it’s ready to pursue greenwashers’, *Australian Financial Review* (online, 15 June 2022) <<https://www.afr.com/companies/financial-services/accc-says-it-s-ready-to-pursue-greenwashers-20220615-p5atv7>>.

6.2 Matching solutions to the identified problems

Table 5 below correlates the potential solutions to the problems identified in **Parts 3 and 4** of this discussion paper.

Feedback is sought from stakeholders on the range of potential solutions identified and the recommendations made.

Table 5: The key issues and solutions associated with the use of the term 'biodegradable' in relation to plastics

Problems	Solutions						
	SCIENTIFIC RESEARCH	INFORMATION AWARENESS / EDUCATION	STANDARDS	INDEPENDENT VALIDATION OR CERTIFICATION	MONITORING AND ENFORCEMENT	LABELLING GUIDANCE AND TRADEMARKS (E.G. RATING SYSTEM)	POLICY AND REGULATION
1 Confusion in terminology, including limited consumer information about the source of materials (bio and fossil-derived) (see point 3.4(a))		*Consumer education and greater guidance from industry and regulators ⁽¹⁾	*Expand or develop new standards ⁽⁹⁾	*Expand or develop new certification schemes ⁽⁹⁾		*New label or trademark, e.g. to explain source of materials ⁽⁹⁾	
2 Unclear and inadequate distinction between the terms “biodegradable” and “compostable” in plastics policies (see point 4.4(a))		*Consumer education ⁽¹⁾ and universal taxonomy ⁽³⁾					*Policies review ⁽⁴⁾
3 Inconsistent use, adoption and endorsement of the terms “biodegradable” and “compostable” in plastics legislation (see point 4.4(b))		*Universal taxonomy ⁽³⁾					*Regulatory reform ⁽¹³⁾
4 Encouraging a market for biodegradable or compostable plastics does not fully align with the waste hierarchy (see point 3.4(d)) <i>For example, permitting continued use of compostable single use plastics may not</i>	*Understanding when biodegradable plastics are appropriate; fit for purpose design ⁽²⁾	*Consumer education ⁽¹⁾	*Expand or develop new standards, e.g. to assess overall ‘greenness’ of products ⁽⁹⁾				*Dynamic policy and regulation; consider expanding single use plastic bans ⁽¹³⁾

Problems	Solutions						
	SCIENTIFIC RESEARCH	INFORMATION AWARENESS / EDUCATION	STANDARDS	INDEPENDENT VALIDATION OR CERTIFICATION	MONITORING AND ENFORCEMENT	LABELLING GUIDANCE AND TRADEMARKS (E.G. RATING SYSTEM)	POLICY AND REGULATION
<i>align with the waste hierarchy (i.e. encourages the best of a bad bunch)</i>							
5 Inconsistent phasing out of oxo-degradable plastics across the Australian States and Territories (see point 4.4(c))							*Consistent policy and legislative regulation ⁽¹³⁾
6 Limitations of voluntary product stewardship targets and schemes (see point 4.4(d))		*Consumer education ⁽¹⁾	*Expand or develop new standards ⁽⁹⁾		*Increased UPM NEPM compliance action ⁽⁷⁾		*Regulatory reform ^{(6), (13)}
7 Limited regulation of 'biodegradability' related claims and risks of 'greenwashing' (see point 4.4(f))	*Increase understanding of biodegradable plastics ⁽²⁾	*Consumer education ⁽¹⁾ and ACCC guidance ⁽¹¹⁾	*Expand or develop new standards ⁽⁹⁾	*Expand or develop new certification schemes ⁽⁹⁾	*ACCC enforcement ⁽¹⁰⁾	*New biodegradable label or trademark ⁽⁹⁾	*Legislative regulation ^{(10), (13)}
8 Limitations of 'green' trademarks and risks of 'greenwashing' (see point 4.4(g))		*Consumer education ⁽¹⁾ and ACCC guidance ⁽¹¹⁾			*Possible ACCC enforcement ⁽¹⁰⁾	*Amend compostable label and limit use of the 'recycling symbol' ⁽¹²⁾	
9 Relationship between existing labels and waste disposal recommendations is not well understood (see point 3.4(b))		*Consumer education ⁽¹⁾ ; universal taxonomy ⁽²¹⁾				*Labelling guidance ⁽⁵⁾ ; amend compostable label ⁽¹²⁾	
10 Current limitations on waste management options for biodegradable plastic waste (see point 3.4(c))	*Research into scalable waste management solutions ⁽²⁾	*Consumer education ⁽¹⁾ and ACCC guidance ⁽¹¹⁾				*Clear guidance from industry and regulators ⁽⁵⁾	*Consider reforms that could incentivise progress

Problems	Solutions						
	SCIENTIFIC RESEARCH	INFORMATION AWARENESS / EDUCATION	STANDARDS	INDEPENDENT VALIDATION OR CERTIFICATION	MONITORING AND ENFORCEMENT	LABELLING GUIDANCE AND TRADEMARKS (E.G. RATING SYSTEM)	POLICY AND REGULATION
11 The challenge of balancing the relative merits of different green credentials (see point 4.4(e))	*Understanding when biodegradable plastics are appropriate, and fit for purpose design ⁽²⁾	*Consumer education ⁽¹⁾ ; universal taxonomy ⁽²⁵⁾	*Expand or develop new standards, eg to assess overall 'greenness' of products ⁽⁹⁾	*Expand or develop new certification schemes ⁽⁹⁾		*Amend existing labels and trademarks to improve clarity ⁽¹²⁾	
12 Unintended consequences: the prospect of additional 'leakage' of biodegradable plastic waste into the environment (see point 3.4(e))		*Consumer education ⁽¹⁾			*ACCC enforcement ⁽¹⁰⁾		*Policy and legislative regulation
13 Impact of 'the 1%': accounting for the impact of trace ingredients (see point 4.4(h))	*Increase understanding of biodegradable plastics ⁽²⁾		*Consider new or amended standards ⁽⁹⁾	*Consider new or amended certification schemes ⁽⁹⁾	*Accountability for adverse impacts or outcomes		*Consider regulatory reform ⁽¹³⁾

* Recommended

Legend for Table 5 – Description of the recommended solutions:

- (1) Widespread consumer awareness campaign.
- (2) Scientific research to provide greater information about biodegradability of products (see **section 6.1(a)**). For example, such research could:
 - better understand the time it takes for different plastics to biodegrade;
 - build knowledge about the impact of trace ingredients (in terms of biodegradability and ongoing environmental effects);
 - develop scalable waste management services for biodegradable plastics; and/or
 - develop robust life cycle assessments (LCA) or other comparative assessment tools.

Increased knowledge will enable design of biodegradable plastics to be optimised, having regard to their intended functionality, use, options for waste disposal and environmental impact.
- (3) Development of a universal (or at least industry accepted) taxonomy (see **section 6.1(b)**).
- (4) Policy review in order to:
 - align to an agreed taxonomy (see **section 6.1(b)**); and/or
 - clarify position with respect to biodegradable plastics (see **section 4.1**).
- (5) Greater guidance for industry about accurate product labelling (could be provided by industry bodies such as APCO or ABA, or by regulators such as the ACCC).

- (6) Consider whether to make targets or voluntary schemes mandatory - for example, through:
- setting mandatory targets under the *Recycling and Waste Reduction Act 2020* (Cth) (see **section 4.3(b)**);
 - making compliance with AS 4736-2006 or AS 5810-2010 mandatory for particular products/ classes of product (see generally **section 4.3(c)**); or
 - making compliance with AS 4736-2006 or AS 5810-2010 the only basis for compostable claims to be lawfully made (see **section 4.4(f)**).
- (7) Compliance under the UPM NEPM to be a priority for States and Territories (see **section 4.3(b)**).
- (8) Consider amendment of AS 4736-2006 or AS 5810-2010 to plug gaps. For example:
- evaluation of the credibility of the 90% degraded in 12 months criteria;
 - alignment of the standard inoculum to real-life conditions (i.e. home compost quality); or
 - inclusion of additional criteria, e.g. to account for the impact of products with particular types of coating or ingredients.
- (9) Expand or develop new voluntary schemes, for example:
- develop new standards, such as for marine or freshwater biodegradability, or for measuring the source of materials (and resultant products);
 - expand certifications available beyond the compostability Australian Standards and the recently introduced 'soil biodegradable' programme (see **sections 4.2(c)** and **4.2(d)**), drawing on new standards or standards and certification schemes in the EU (see **sections 5.1(c)** and **5.1(d)**);
 - develop a holistic benchmarking tool, such as a 'biodegradability' rating tool, or an umbrella framework for assessing overall 'green' credentials of a product (see **sections 4.2(c)** and **6.1(c)**); and/or
 - new labels or trademarks, e.g. linked to a rating tool or new standards (see **sections 6.1(c)** and **6.1(d)**).
- (10) Reliance on existing consumer laws; ACCC enforcement (see **sections 4.3(f)(i)** and **6.1(e)**).
- (11) Consumer education about trademarks and greenwashing representations; guidance from ACCC and IP Australia about 'green' marks would assist (see **sections 4.3(f)(i)** and **6.1(e)**).
- (12) Amendment of existing trademarks to better reflect what they intend to represent. For example, as explained in **section 4.3(f)(ii)**:
- include the words 'industrially compostable' for the 'seedling logo' trademark;
 - reconsider the relevance of the 'seedling' image to industrial compostability; and/or
 - remove the 'recycling arrows' from the Resin Identification Codes.
- Note that the ACCC could consider addressing any potential risk of consumer confusion or uncertainty directly with the trademark owners or through educating IP Australia about the issue and encouraging it to raise appropriate objections during trademark examination.
- (13) Legislative reform – for example:
- to clarify the meaning of key terms;
 - to mandate the certification of 'compostable' or 'biodegradable' claims on products (see **section 6.1(e)**) (see for example the approach taken in Queensland for regulating misrepresentation about compostability of plastics (see **section 4.2(g)(i)**));
 - to regulate bioplastic products blended and/or coated with non-biodegradable components, or products containing particularly "toxic" components; or
 - to amend consumer laws, if considered necessary (noting the recent Woolworths decision; see **Case Study 2**); or
 - to expand existing bans on single use and oxo-degradable plastics (see **Case Study 1** and **Schedule 7** for the current status of single use plastic bans).

6.3 Evaluating the potential solutions

Table 6 below identifies the key benefits and challenges of various solutions identified in **section 6.1**.

Table 6 Key benefits and challenges

Measure	Timeframe for implementation			Benefits	Challenges
	Short	Medium	Long		
Scientific research				<ul style="list-style-type: none"> Necessary to underpin every other solution (see section 6.1(a)). 	<ul style="list-style-type: none"> Funding limitations. Scale of issues is immense (see section 3).
Information awareness / education				<ul style="list-style-type: none"> Encourage greater transparency and accountability, and equip consumers to make better informed decisions, together driving the market towards sustainability in a more deliberate and impactful way (see section 2.1). An agreed taxonomy would assist (see section 6.1(b)). 	<ul style="list-style-type: none"> The current state of knowledge is incomplete and/or inconsistent, meaning that, at least initially, stakeholders can be alerted to the issues but not provided with clear answers (see section 2.1). Resolving an agreed taxonomy is likely to be challenging given the divergence of opinion and that various stakeholders have commercial interests at stake (see section 4.2).
Standards				<ul style="list-style-type: none"> Standards are a familiar and trusted tool and are likely to be endorsed through legislation and/ or embraced by consumers and industry alike (see section 4.3(c)). Compliance with a standard is often conveyed through a trade mark licensed by a verification body (such as ABA's verification of compliance with the Australian Standards for compostability). Trade marks are visual cues that can be rapidly interpreted by consumers (see section 4.3(f)(ii)). An informal standard may be most beneficial as an 'interim' measure while a formal standard is being developed (see section 6.1(c)). 	<ul style="list-style-type: none"> The development of a standard takes considerable time and resources (see section 4.3(c)). A 'soft' solution – e.g. no direct 'legal force' (see section 4.3(c)). Compliance with standards usually requires detailed technical testing, which may be costly and time consuming and therefore may not: <ul style="list-style-type: none"> be a practicable option for some manufacturers of plastic products; or align with the rapid pace of change in the industry and the urgent need for improved sustainability outcomes (see section 6.1(c)). Where standards are used, there is a question as to whether they regulate individual components of a product, or only the final product. If individual components (eg polymers) are certified to comply with a standard, what bearing does this have on the final product? Unless formal standards are adopted through legislation, compliance is voluntary (see section 6.1(c)).
Validation or certification				<ul style="list-style-type: none"> Product testing is an assurance mechanism that would be most beneficial where formal or informal standards and legislation do not exist (see section 6.1(c)). Independent peer review undertaken by a suitable expert is another form of quality assurance that enhances the reliability of any claim (See section 4.3(d)). 	<ul style="list-style-type: none"> Validation and certification is an additional cost and takes time; it may not be practicable for many. The results of the product testing would need to be accurately and simply conveyed to consumers, which in the absence of 'familiar' visual cues may be challenging (see section 6.1(d)). Product testing may need to be coupled with broader information awareness campaigns so consumers were 'primed' to understand what the results actually mean (see section 4.3(f)(i)).

Measure	Timeframe for implementation			Benefits	Challenges
	Short	Medium	Long		
					<ul style="list-style-type: none"> Access may be improved by an entity offering independent peer review as a service. However, if the market does not volunteer this service then it may need to be encouraged through public funding. A service approach would also require benchmarking, which links back to the need for standards (as above) (see section 6.1(c)).
Monitoring and enforcement				<ul style="list-style-type: none"> Builds consumer confidence in the reliability of biodegradability claims and the importance of sustainable choices (see section 4.3(f)(i)). Motivates compliance (with consequences for non-compliance) (see section 6.1(c)). 	<ul style="list-style-type: none"> The value of ‘enforcement’ depends on there being a clear distinction between what is acceptable and what is not. This does not exist currently (see section 6.1(e)). Monitoring and enforcement would need to be driven by a particular entity and funding would likely be required (see section 6.1(c)). Resource intensive; may not efficiently drive desirable outcome(s).
Labelling guidance and trade marks (e.g. rating system)				<ul style="list-style-type: none"> Trade marks and labels are visual cues that can be rapidly interpreted by consumers (see section 6.1(d)). The use of certification trade marks can be controlled so that only products (or services) that comply with the standard/certification (and the licensing terms of use) can use the certification trade mark. This increases consumer confidence and avoids confusion (see section 4.3(f)(i)). 	<ul style="list-style-type: none"> A proliferation of legitimate ‘green’ marks carries a potential risk of consumer confusion (see section 4.3(f)(i)). Consumers may not understand the difference between standard and certification marks, such that they may assume that mark that uses the phrase ‘bio’ or ‘compost’ is meets a particular biodegradability or compostability standard (see point 4.4(a)). The outcome in the Woolworths decision suggests that the intervention of consumer law may not be an immediate solution (see section 4.3(f)(i)).
Regulation by the law				<ul style="list-style-type: none"> As the legislation impacts the whole of an industry, it is generally considered to be a fair and is an effective tool to change behaviour (see section 6.1(e)). Mandated requirements (as opposed to voluntary compliance with standards) will result in higher levels of compliance. Further, the availability and exercise of enforcement mechanisms within legislation will assist in motivating compliance with biodegradability requirements (see section 6.1(e)). 	<ul style="list-style-type: none"> Legislative reform takes considerable time to implement. Can be relatively inflexible which may not be appropriate given the rapid pace of industry development (see section 4.3(e)). The effectiveness of legislation will partially depend on consistency throughout Australia. Inconsistent legislation in States and Territories (as seen, for example, through the single use plastic bans) makes compliance difficult for businesses that operate in more than one jurisdiction. Federal legislation or a ‘national law’ implemented by each State and Territory would be the best mechanism to achieve consistency (see section 4.3(a) and section 4.3(e)).

QUESTIONS FOR STAKEHOLDERS:

1. Is it appropriate to use the term 'biodegradable' in plastic marketing? Why or why not?
2. Do you agree there is value in an agreed taxonomy for biodegradability related terms?
3. Would you support an information awareness campaign that advocated the case for biodegradable plastics in terms consistent with the issues discussed in this Discussion Paper?
4. Are there any reason(s) why information awareness campaigns should not be deployed?
5. Who would you expect or like to see driving any information awareness campaign?
6. Would industry and/or regulator guidance on product labelling be useful for industry?
7. Do existing standards relating to biodegradable plastics need to be amended? If so, why?
8. Do you consider the industry-led certification schemes in Europe (Din Certco or TUV) for biodegradability in soil, marine and fresh water provide a suitable model for adoption in Australia?
9. Do you see value in a 'biodegradable plastics rating tool' or similar being developed?
10. How important is independent validation or certification? What is the preferred model?
11. Is the market able to support a product stewardship scheme or co-regulatory framework for biodegradable plastics? If so, who should be involved?
12. Do you consider trademarks to be an effective means of conveying the sustainability credentials of a particular product? Is there scope for improvement? If so, how?
13. Are there other 'problems' or 'solutions' beyond those identified in this discussion paper? If so, what?
14. Do you have a view on what steps should be taken in the short (next 1-2 years), medium (2-5 years) and long (beyond 5 years) term? Who should take those steps and why?

Chapter 7 – Glossary










7 Glossary

Term	Definition
APCO	Australian Packaging Covenant Organisation
AS 4736-2006	Australian Standard AS 4736-2006: Biodegradable Plastic - Biodegradable Plastics Suitable for Composting and other Microbial Treatment
AS 5810-2010	Australian Standard AS 5810-2010: Biodegradable plastics suitable for home composting
Biodegradable	When used in relation to polymers or plastic products, has the meaning explained in section 3.2(c) .
Certified compostable	Means that claims of compliance with AS 4736-2006 or AS 5810-2010.
Conventional plastic	Plastic typically derived from fossil-based feedstock sources that is not considered to be biodegradable or compostable in any reasonable timeframe. This includes the common recyclable plastics of PET, HDPE and PP.
End-of-life	A term used to describe the expected disposal option for packaging when the customer/consumer has removed the product. Sometimes also used to describe the fate of a plastic product at the end of its in-use function.
Industrial composting	A broad term which includes all forms of large scale aerobic organic treatment characterised by high levels of control and that produces soil improver (compost, mulches, liquids) and/or biogas.
Plastic	A plastic is a synthetic, semi-synthetic or naturally occurring material comprised primarily of polymers, which have typically been modified with additives, that has the capacity to be moulded or shaped when softened such as by pressure and/or temperature, to be flexible or rigid.



**Schedule 1 –
European biodegradable certification standards**

European biodegradable certification standards

Environment	European test criteria standard	Test conditions (if different to referenced standard)	Biodegradability test threshold	Certification and logos
Industrial composting for packaging materials	EN 13432:2000 / ISO 17088		90% in 180 days	  
Home composting	EN 13432:2000	Ambient temperature (20°C – 30°C)	90% in 12 months	 
Biodegradable in soil	ISO 23517:2021 / EN 17033		90% in 2 years	 
Biodegradable in freshwater	EN 14987:2006	20°C and 25°C	90% in 56 days	
Biodegradable in marine water			90% in 6 months	

See S Hann, R Scholes et al, 'Relevance of Biodegradable and Compostable Consumer Plastic Products and Packaging in a Circular Economy' (March 2020), p 14; European Environment Agency, *Biodegradable and compostable plastics - challenges and opportunities* (August 2020).

**Schedule 2 –
Summary of Australia, State and Territory policy with respect to
biodegradable plastics**

Summary of Australia, State and Territory policy with respect to 'biodegradable' plastics

This table is current as at 1 May 2023.

Policy	Summary of position on “biodegradable” plastics	Overall position
National		
National Waste Policy Action Plan (NWPAP) 2019¹⁶⁶ and Annexure 2022¹⁶⁷	<ul style="list-style-type: none"> (page 1): The NWPAP identifies five circular economy principles for waste. The fifth principle is “Improve information to support innovation, guide investment and enable informed consumer decisions.” (page 10): To encourage design innovation, Action 2.9 is to “Deliver the industry-led target of 100% of all Australia’s packaging being reusable, recyclable or compostable.” This action is led by APCO, to be delivered by 2025. (page 5 updated in the Annexure 2022): To encourage sustainable design, Action 2.11 is to: “Develop Australian standards or adopt appropriate international standards that maximise the value of materials throughout the life of a product, to increase life cycle potential and avoid waste”. This action is led by the business sector, to be delivered by 2024. (page 16): To support waste industry transformation, Action 3.21 is to: “Deliver industry-led target of 70% of Australia’s plastic packaging being recycled or composted”. This action is led by APCO, to be delivered by 2025. <p>Note: In the actions to achieve the target of improving access by ensuring all communities have access to waste management and processing (see page 15), there is nothing about specifically increasing access to industrial composting facilities. There is only reference to developing “composting infrastructure” in an organic/food waste context (see Action 6.3).</p>	Possibly discouraging use of “biodegradable”
National Plastics Plan 2021¹⁶⁸	<ul style="list-style-type: none"> (page 3): The “Plastics Mission” includes the “Phase out non compostable plastic packaging products containing additive fragmentable technology that do not meet relevant compostable standards (AS 4736-2006, AS 5810-2010 and EN13432) (July 2022)”. (page 5): “The Australian Government will work with industry to fast-track phase outs of problematic plastic materials, including... non-certified compostable packaging” (page 5): One of the National Packaging Targets is that “100% of packaging being reusable, recyclable or compostable” by 2025. (page 7): Another National Packaging Target is “70% of plastic packaging being recycled or composted” by 2025. (page 8): “Combat Greenwashing: The Australian Government will refer companies making false or misleading labelling and environmental claims such as misrepresentation of recyclability to the ACCC for investigation” 	Possibly discouraging use of “biodegradable”

¹⁶⁶ Department of Climate Change, Energy, the Environment and Water, *National Waste Policy Action Plan 2019*, (Publication, 2019)

¹⁶⁷ Department of Climate Change, Energy, the Environment and Water, *National Waste Policy Action Plan – Annexure 2022*, (Publication, 2022) <https://www.dcceew.gov.au/sites/default/files/documents/national-waste-policy-action-plan-annexure-2022.pdf>.

¹⁶⁸ Department of Agriculture, Water and the Environment, *National Plastics Plan 2021*, (Publication, 2021) <https://www.dcceew.gov.au/environment/protection/waste/publications/national-plastics-plan>

Policy		Summary of position on “biodegradable” plastics	Overall position
		Note: the National Plastics Plan does not refer to the term “biodegradability”. The focus is on a shift to certified compostable plastics.	
States and Territories			
ACT	Waste Management Strategy 2011–25 ¹⁶⁹	No reference to compostable plastic or biodegradable plastics (except that biodegradable bags that “meet the Australian Standard” are an encouraged alternative to banned single use plastic bags).	Neutral
NSW	NSW Plastics Action Plan ¹⁷⁰	<p>NSW Plastics Action Plan (June 2021)</p> <ul style="list-style-type: none"> (page 5): In the discussion of which single-use plastics products should be phased out, the Plan states that: “In nominating these items, we have considered the availability of sustainable alternatives and the costs of transition for businesses and consumers. Compostable plastic alternatives may be available for some items, but these items only break down in industrial composting facilities. Given these items are highly littered and unlikely to be disposed of at the appropriate composting facilities, compostable plastic alternatives for those item will also be phased out.” This acknowledges the challenges of increasing the use of compostable plastics. <p>Cleaning up our act: Redirecting the future of plastic in NSW: Discussion Paper Consultation Report (June 2021)</p> <ul style="list-style-type: none"> No mention of biodegradable or compostable plastics. 	Possibly discouraging use of “biodegradable”
	NSW Waste and Sustainable Materials Strategy 2041 ¹⁷¹	<p>NSW Waste and Sustainable Materials Strategy 2041 (June 2021)</p> <ul style="list-style-type: none"> No mention of biodegradable or compostable plastics, but states the NSW Government’s goal to eliminate ‘problematic’ and single-use plastics by 2025, and triple the plastics recycling rate by 2030. 	Possibly discouraging use of “biodegradable” if it falls within the meaning of “problematic plastics”
NT	Northern Territory Circular Economy Strategy 2022-2027 ¹⁷²	No reference to compostable plastic or biodegradable plastics.	Neutral

¹⁶⁹ ACT Government Environment and Sustainable Development Directorate, *ACT Waste Management Strategy*, (The Canberra Plan, 2010) https://www.environment.act.gov.au/_data/assets/pdf_file/0007/576916/ACT-Waste-Strategy-Policy_access.pdf.

¹⁷⁰ Industry and Environment, NSW Department of Planning, *New South Wales Plastics Action Plan* (Publication, June 2021) 5 https://www.dpie.nsw.gov.au/_data/assets/pdf_file/0007/357226/NSW-Plastics-Action-Plan-2021.pdf.

¹⁷¹ NSW Department of Planning, Industry and Environment (2021), *New South Wales Waste and Sustainable Materials Strategy 2041* (Publication, June 2021) <https://www.dpie.nsw.gov.au/_data/assets/pdf_file/0006/385683/NSW-Waste-and-Sustainable-Materials-Strategy-2041.pdf>.

¹⁷² Northern Territory Department of Environment, Parks and Water Security, *Circular Economy Strategy 2022-2027* (Publication, 2022) https://depws.nt.gov.au/_data/assets/pdf_file/0020/1100882/nt-circular-economy-strategy-2022-2027.pdf.

Policy	Summary of position on “biodegradable” plastics	Overall position
QLD	<p>Proposed five-year roadmap for action on single-use plastic items¹⁷³</p> <ul style="list-style-type: none"> (page 1): Plan indicates support for identifying “sustainable replacement products” and possible future bans on “non-recyclable and non-compostable” products for some items in the future, without clarifying the meaning of these terms. 	Neutral
QLD	<p>Plastic Pollution Reduction Plan¹⁷⁴</p> <ul style="list-style-type: none"> (page 27): To meet Strategic Priority 2 to transition to a circular economy for waste, one of the long term action is to “Deliver ‘Challenging Plastics’ stakeholder events for EPS and polystyrene, soft plastics, and compostable, biodegradable plastics and bioplastics.” <p>Note: there is very little information online about these forums.</p>	Neutral
QLD	<p>Single-use Plastic Items Consultation Regulatory Impact Statement¹⁷⁵</p> <ul style="list-style-type: none"> (page 5): In the context of proposed single-use plastic ban, there is a statement that: “There will also be requirements placed on wholesale and manufacturer suppliers to ensure that there is clear labelling of alternative products in relation to the compostability of the item.” (page 14): The single use plastic ban is described as applying “to all plastic shopping bags less than 35 microns, including compostable and biodegradable shopping bags.” 	Neutral
SA	<p>South Australia’s Waste Strategy 2020-2025¹⁷⁶</p> <ul style="list-style-type: none"> (page 36): Two of the priority actions for plastics and packaging are to: <ul style="list-style-type: none"> “Support Australian Government target of 100% Australian packaging to be recyclable, compostable or reusable by 2025, to be delivered by the Australian Packaging Covenant Organisation.” “Progress the inclusion of polyethylene plastic barrier bags as a prohibited product under South Australia’s legislation on Single-Use and Other Plastic Products to encourage the adoption of barrier bags compliant with relevant standards, and that are suitable for composting.” 	Possibly discouraging use of “biodegradable”

¹⁷³ The State of Queensland Department of Environment and Science, *Proposed Five-year Roadmap for Action on Single-use Plastic Items* (Publication, 2022) <<https://www.dropbox.com/s/hq1kb9223t10nkt/Roadmap.pdf?dl=0>>.

¹⁷⁴ The State of Queensland Department of Environment and Science, *Tackling Plastic Waste: Queensland’s Plastic Pollution Reduction Plan* (Publication, 2022) https://www.Qld.gov.au/_data/assets/pdf_file/0022/113368/plastic-pollution-reduction-plan.pdf.

¹⁷⁵ The State of Queensland Department of Environment and Science, *Single-use Plastic Items Consultation Regulatory Impact Statement* (Publication, 2020) https://www.qld.gov.au/_data/assets/pdf_file/0013/120640/single-use-plastic-items-consultation-ris.pdf

¹⁷⁶ Green Industries, Government of South Australia, ‘South Australia’s Waste Strategy 2020-2025’ (Publication, 2020) 36 <<https://www.greenindustries.sa.gov.au/resources/sa-waste-strategy-2020-2025>>.

Policy	Summary of position on “biodegradable” plastics	Overall position	
SA	Turning the Tide 2021: The future of single-use plastic in South Australia ¹⁷⁷	<ul style="list-style-type: none"> (page 20): Identifies an issue with single-use takeaway cups because they contain bioplastics that cannot readily biodegrade in the natural environment; <ul style="list-style-type: none"> “About 90% of coffee cups are lined with polyethylene (PE) – a plastic made from fossil fuels – and 10% with polylactic acid (PLA), a bioplastic made from plant starches. However, neither PE nor PLA readily biodegrades in the natural environment. Bioplastics must be sent to a commercial compost facility, otherwise they pose similar environmental risks to traditional plastics, including the formation of microplastic. They could quickly create a new class of persistent pollutants in the marine environment. (page 22): Notes that France has banned single use plastic lids, including those made from bioplastics. (page 45): Summarises the global approach to single-use plastic products, including bioplastics. 	
TAS	Waste Action Plan (Draft) ¹⁷⁸	<p>No reference to compostable plastic or biodegradable plastics (except by reference to the National Target to ensure 100% of packaging is reusable, recyclable or compostable by 2025).</p>	Neutral
VIC	Recycling Victoria: A New Economy ¹⁷⁹	<ul style="list-style-type: none"> (page 18): The Victorian Government supports the APCO target of 100 per cent recyclable, reusable or compostable packaging by 2025. Oxo-degradable plastics will be banned as part of Victoria’s ban on single-use plastics, commencing February 2023. 	Possibly discouraging use of “biodegradable”
VIC	Regulatory impact statement for draft Environment Protection Amendment (Banning Single-Use Plastic Items) Regulations 2022	<ul style="list-style-type: none"> (page 4): In addition to conventional plastic items, single-use plastics made out of degradable and compostable materials (including bioplastics) are problematic. These items are also prone to becoming litter, breaking up in the environment and being ingested by birds and other marine animals. Their similar appearance to conventional single-use plastic items means individuals are generally not able to differentiate between these types of plastics in order to dispose of them correctly. This further contributes to the contamination of kerbside recycling and food organics and garden organics (FOGO) bins. (page 14): In addition to conventional single-use plastic items, there is a growing prevalence and use of single-use plastic items made from degradable or compostable materials – including bioplastics which are commonly made from plant-based materials such as corn starch. Bioplastics have similar characteristics to conventional plastics and can cause similar environmental issues; they are light, used only once – representing a poor use of resources – are often littered, and do not break down in land and marine environments. When littered, they create comparable environmental problems as conventional plastics. (page 17): Bioplastics cannot be recycled and are not always able to be composted - in home or commercial systems - and are not consistently accepted in food and garden organics (FOGO) collections. The similar appearance of non-compostable bioplastics to both compostable bioplastics and conventional plastics means it is challenging for individuals to make correct disposal decisions for these products, which creates: 	Possibly discouraging use of “biodegradable”

¹⁷⁷ Green Industries, Government of South Australia, ‘Turning the Tide 2021: The future of single-use plastic in South Australia’ (Publication, 2021) <https://www.greenindustries.sa.gov.au/GISA_SUPP%202021%20paper_WEB.pdf?downloadable=1>.

¹⁷⁸ Tasmanian Government Department of Primary Industries, Parks, Water and Environment, *Draft Waste Action Plan* (Publication, 2019) <<https://nre.tas.gov.au/Documents/Draft%20Waste%20Action%20Plan.pdf>> accessed on 8 December 2021>.

¹⁷⁹ The State of Victoria Department of Environment, Land, Water and Planning, *Recycling Victoria: A New Economy* (Publication, 2021) <https://www.vic.gov.au/sites/default/files/2020-02/Recycling%20Victoria%20A%20new%20economy.pdf>.

Policy	Summary of position on “biodegradable” plastics	Overall position
	<ul style="list-style-type: none"> ○ Problems for the recycling system: when placed in mixed recyclables bins, single-use bioplastics/ compostable plastics contaminate and reduce the value of other materials (including paper, cardboard and other plastics). For example, bioplastic containers resemble PET containers and cause recycled PET to appear cloudy, reducing its value. ○ Problems for commercial composting systems: single-use bioplastics/compostable plastics placed in the FOGO bin create problems for commercial composting systems and disrupt the sorting and processing undertaken by the composting industry, leading to additional costs of up to 60 per cent. Few Victorian composters are able to process bioplastics, and there is currently no appropriate life-cycle management of these items. This can contribute to contamination in FOGO bins and products going into landfill. The timeframes required for certified compostable plastics to break down exceed the processing timeframes of some organics processing facilities, meaning that fragmented compostable plastics are likely to appear in compost products. Markets for compost fragmented material of any kind (including compostable plastics) are extremely limited. ● (page 22): Banning the supply and sale of single-use plastic items prevents the use of commonly littered items in the first place, removing the need to change how people dispose of them, and reducing the need to manage them in the environment where they may already be causing harm. While it is recognised that non-plastic single-use items may still be littered, it is expected that many will be biodegradable in nature and thereby will have less of an impact on the environment over time. ● (page 23 addresses treatment of bioplastics and compostable plastics in Option 1 of the RIS) ● (page 36): Litter from alternative single-use items is expected to have fewer negative impacts, as many of these replacement items are made of natural materials, meaning they are both less visible in the environment and their presence will reduce over time through biodegradation. This suggests that there will be a direct benefit of reduced litter arising under the proposed ban (Option 1) compared with the base case, even where this benefit is partially offset by littering from alternative single-use items such as bamboo cutlery and paper straws. Of the 1,893 tonnes of single-use plastics which will be avoided from becoming litter, 1,769 tonnes is estimated to be replaced with single-use alternatives. 	
WA	<p data-bbox="230 932 448 983">Western Australia’s Plan for Plastics¹⁸⁰</p> <ul style="list-style-type: none"> ● (page 1): “Single-use plastics are not currently recycled by recycling and composting facilities, and most end up in landfill.” ● No other reference to compostable plastic or biodegradable plastics. <p data-bbox="501 991 1491 1018">Note: Focus of the plan is on reducing single-use plastics, not the overall management of plastics.</p>	Neutral

¹⁸⁰ Government of Western Australia Department of Water and Environmental Regulation, *Western Australia’s Plan for Plastics* (Publication, 2021) <https://www.wa.gov.au/system/files/2021-06/WA%27s%20Plan%20for%20Plastics.pdf>.

**Schedule 3 –
Summary of legislative definitions of biodegradable related terms**

Summary of legislative definitions of biodegradable-related terms

This table is current as at 1 May 2023.

State	Definition of “plastic”	Definition of “plastic item” / “plastic product”	Definition of “single-use”	Definition of “compostable”, “biodegradable” or “degradable”	Other relevant definitions	Are “biodegradable” or “compostable” plastic items included in the ban?
NSW Plastic Reduction and Circular Economy Act 2021	plastic means the following, but does not include material excluded by the regulations— (a) material made from or comprising organic polymers from plant extracts or fossil fuels, whether the material is processed, reprocessed, re-used, recycled or recovered, (b) material prescribed by the regulations.	plastic item means the following, but does not include an item excluded by the regulations— (a) an item, including packaging material, comprised, in whole or in part, of plastic, (b) an item prescribed by the regulations.	single-use , in relation to an item— (a) means an item designed or intended to be, or ordinarily, used only once for a particular purpose, whether or not the item is or can be— (i) re-used for the same or another purpose, or (ii) used for more than 1 purpose, or (iii) recycled, and (b) includes an item prescribed by the regulations, but does not include an item excluded by the regulations.	Nil.	Nil.	YES No carve outs for “biodegradable” or “compostable” plastic items.

State	Definition of “plastic”	Definition of “plastic item” / “plastic product”	Definition of “single-use”	Definition of “compostable”, “biodegradable” or “degradable”	Other relevant definitions	Are “biodegradable” or “compostable” plastic items included in the ban?
VIC <i>Environment Protection Regulations 2021</i>	Nil.	.Nil.	Reg 134B (1) subject to subregulation (2), a banned single-use plastic items means an item that: (a) is either wholly or partly comprised of plastic, whether or not that plastic is biodegradable, degradable or compostable. (b) is not reusable Note: sub-reg (2) lists items that are not banned single-use plastic items	Nil.	Integrated item means a plastic item that is, as the result of a machine automated process – (a) an integrated part of packaging material used to seal or contain food or beverages; or (b) included within or attached to packaging material used to seal or contain food or beverages, including pre-packaged portions of food or beverages; reusable means a plastic item that is manufactured – (a) to be used for the same purpose on multiple occasions; and (b) with a warranty (or other written representation from the manufacturer as to the length of time the item is designated to last) of at least one year. banned plastic bag means a bag: (a) with handles; (b) that comprises, wholly or partly, plastic, whether or not that plastic is biodegradable, degradable or compostable* and (c) that has a thickness of 35 micrometres or less at any part of the bag.	YES No carve outs for “biodegradable”, “degradable” or “compostable” plastic items. This is consistent with the scope of the plastic bag ban.

State	Definition of “plastic”	Definition of “plastic item” / “plastic product”	Definition of “single-use”	Definition of “compostable”, “biodegradable” or “degradable”	Other relevant definitions	Are “biodegradable” or “compostable” plastic items included in the ban?
SA <i>Single-use and Other Plastic Products (Waste Avoidance) Act 2020</i>	<i>plastic</i> means a material made from, or comprising, organic polymers, whether plant extracts or of fossil fuel origin;	<i>plastic product</i> means a product comprised, in whole or in part, of plastic;	<i>single-use</i> , in relation to a product, means a product designed or intended to be used once or for a limited number of times before being disposed of.	Nil.	<i>oxo-degradable plastic</i> means a material (however described) made of plastic which includes additives to accelerate the fragmentation of the material into smaller pieces, triggered by ultraviolet radiation or heat exposure, whether or not this is, or may be, followed by partial or complete breakdown of the material by microbial action;	YES No carve outs for “biodegradable” or “compostable” plastic items. Note: The South Australian Government’s “Replace the Waste” website says that “These [prohibited] single-use items can be replaced with reusable and plastic-free compostable alternatives.” ¹⁸¹ Note: The Replace the Waste FAQs also states that “The legislation includes both fossil-fuel derived plastic and compostable (bioplastic) plastic products (such as Polylactic Acid - PLA), but only for the prohibited plastic products listed in the legislation. Bioplastics are not a suitable alternative for single-use straws, cutlery and stirrers. While compostable plastic products can break down in industrial composting facilities, they can also cause pollution and harm to marine life in the same way as conventional, fossil-fuel plastic products if they enter the environment.” ¹⁸²

¹⁸¹ ‘Replace the Waste’, *Government of South Australia (Web Page)* <<https://www.replacethewaste.sa.gov.au/>>.

¹⁸² *Government of South Australia, ‘Replace the Waste’, Single-Use Plastic FAQs – Restricted and Prohibited Items (Web Page)* <<https://www.replacethewaste.sa.gov.au/single-use-plastic-faqs-restricted-and-prohibited-items>>.

State	Definition of “plastic”	Definition of “plastic item” / “plastic product”	Definition of “single-use”	Definition of “compostable”, “biodegradable” or “degradable”	Other relevant definitions	Are “biodegradable” or “compostable” plastic items included in the ban?
QLD <i>Waste Reduction and Recycling Act 2011</i>	n/a	<p>plastic item means an item made, in whole or part, of plastic (whether or not the plastic is compostable)</p> <p>A banned plastic shopping bag is a carry bag with handles—</p> <p>(a) made, in whole or part, of plastic (whether or not the plastic is degradable)</p>	<p>single-use plastic item means a plastic item, <u>other than a plastic item that is compostable</u>, designed to be used only once.</p>	<p>compostable, for a plastic item, means the plastic item is compostable under AS 4736 or AS 5810.</p> <p>degradable, for plastic, means plastic that is—</p> <p>(a) biodegradable, including material that is compostable under AS 4736; or</p> <p>(b) designed to degrade and break into fragments over time.</p> <p>AS 4736 means the Australian Standard for biodegradable plastics suitable for composting and other microbial treatment, as in force from time to time under that designation (regardless of the edition or year of publication of the standard).</p>	<p>99GF Stating conditions under which plastic items are compostable</p> <p>(1) This section applies if a person—</p> <p>(a) conducts a manufacturing, wholesale, distribution or import business or undertaking; and</p> <p>(b) in the course of conducting the business or undertaking, sells a plastic item that is compostable to another person.</p> <p>(2) The person must ensure the conditions under which the plastic item is compostable are clearly and legibly written—</p> <p>(a) on the packaging for the plastic item; or</p> <p>(b) in information or a document accompanying the plastic item.</p> <p>Maximum penalty—50 penalty units.</p> <p>(3) In this section—</p> <p>condition, under which a plastic item is compostable, includes—</p> <p>(a) whether the plastic item is suitable for industrial or home composting; and</p> <p>(b) whether the plastic item is compostable under AS</p>	<p>NO</p> <p>See carve out for “compostable” single use plastic items.</p>

State	Definition of “plastic”	Definition of “plastic item” / “plastic product”	Definition of “single-use”	Definition of “compostable”, “biodegradable” or “degradable”	Other relevant definitions	Are “biodegradable” or “compostable” plastic items included in the ban?
					<p>4736 or AS 5810.</p> <p>99GH Giving false or misleading information about whether or not plastic items are compostable</p> <p>A person must not give information, or a document containing information, that the person knows is false or misleading to another person about whether or not a plastic item is compostable.</p> <p>compostable, for a plastic item, means the plastic item is compostable under AS 4736 or AS 5810.</p> <p>condition under which a plastic item is compostable, includes—</p> <ul style="list-style-type: none"> (a) whether the plastic item is suitable for industrial or home composting; and (b) whether the plastic item is compostable under AS 4736 or AS 5810. 	

State	Definition of “plastic”	Definition of “plastic item” / “plastic product”	Definition of “single-use”	Definition of “compostable”, “biodegradable” or “degradable”	Other relevant definitions	Are “biodegradable” or “compostable” plastic items included in the ban?
WA <i>Environmental Protection (Prohibited Plastics and Balloons) Regulations 2018</i> ¹⁸³	<p>plastic</p> <p>(a) means a material consisting of a polymer, to which additives or other substances may have been added, which can function as a main structural component of final products; and</p> <p>(b) includes expanded plastic; but</p> <p>(c) does not include a material consisting of natural polymers that have not been chemically modified.</p>	<p>See definition of “disposable plastic item”, right.</p> <p>degradable plastic item means an item or product made wholly or partly from degradable plastic.</p>	<p>disposable plastic item means an item made wholly or partly out of plastic if—</p> <p>(a) the item is designed to be disposed of after a single use or several uses; or</p> <p>(b) the design and construction of the item is not sufficiently durable to enable the item to be kept and reused on an ongoing basis</p> <p>prescribed plastic item includes an item referred to in that subregulation [reg 3A(1)] that is</p> <p>(a) made wholly or partly from biodegradable plastic; or</p> <p>(b) made wholly or partly from plastic-laminated paper or plastic-laminated cardboard.</p> <p>prescribed plastic bag includes a bag referred to in that subregulation [reg 3B(1)] that is</p> <p>(a) made wholly or partly from biodegradable plastic; or</p> <p>(b) made wholly or partly from plastic-laminated paper or plastic-laminated cardboard.</p>	<p>biodegradable plastic means plastic that</p> <p>(a) is able to be broken down by microorganisms into carbon dioxide, water, biomass and a mineral residue; and</p> <p>(b) does not contain an additive designed to accelerate fragmentation of the plastic;</p> <p>degradable plastic (a) means plastic that contains an additive designed to accelerate fragmentation of the plastic into smaller pieces under certain conditions, including exposure to light, bacteria or heat; but</p> <p>(b) does not include biodegradable plastic.</p> <p>Note: AS 4736-2006 means Australian Standard 4736-2006 <i>Biodegradable plastics - Biodegradable plastics suitable for composting and other microbial treatment</i> published by Standards Australia, as in effect from time to time; AS 5810-2010 means Australian Standard 5810-2010 <i>Biodegradable plastics - Biodegradable plastics</i></p>	Nil.	<p>NO</p> <p>Reg 17 (applies from 1 September 2024): “A person must not, in the course of conducting a business or undertaking, supply a degradable plastic item.”</p> <p>Reg 3A(3)(c): The ban excludes “a food container, food tray or bowl that is made from paperboard and certified as biodegradable”.</p> <p>Reg 3A(4): “...an item is certified as biodegradable if</p> <p>(a) a person or body accredited in a manner approved by the CEO has issued a certificate verifying that the item complies with AS 4736-2006 or AS 5810-2010; and</p> <p>(b) the certificate’s period of validity has not expired.”</p>

¹⁸³ As amended by the Environmental Protection Regulations Amendment (Prohibited Plastics and Balloons) Regulations 2021 and Environmental Protection Regulations Amendment (Prohibited Plastics and Balloons) Regulations 2023

State	Definition of “plastic”	Definition of “plastic item” / “plastic product”	Definition of “single-use”	Definition of “compostable”, “biodegradable” or “degradable”	Other relevant definitions	Are “biodegradable” or “compostable” plastic items included in the ban?
				<p><i>suitable for home composting</i> published by Standards Australia, as in effect from time to time.</p>		
<p>TAS (Hobart) Single-Use Plastics By-Law 1 2019</p>	<p>plastic means a material that contains large molecular weight organic polymeric substances as an essential ingredient, but does not include plastic which is compostable;</p>	<p>n/a</p>	<p>single-use product means a product that is not conceived, designed or placed on the market to accomplish, within its life span, multiple use by being returned to the retailer for refill or re-used for the same purpose for which it was conceived.</p>	<p>compostable means, when treated in an industrial composting facility, the following requirements are met:</p> <ul style="list-style-type: none"> (a) 60% decomposition (aerobic) within 180 days; (b) 90% disintegration to less than 2mm in 84 days; and (c) is non-toxic; <p>Note: “non-toxic” is separately defined.</p>	<p>n/a</p>	<p>NO See carve out for “compostable” single use plastic products.</p>

State	Definition of “plastic”	Definition of “plastic item” / “plastic product”	Definition of “single-use”	Definition of “compostable”, “biodegradable” or “degradable”	Other relevant definitions	Are “biodegradable” or “compostable” plastic items included in the ban?
<p>TAS Plastic Shopping Bags Ban Act 2013</p>		<p>plastic shopping bag means a bag, with handles, that is –</p> <ul style="list-style-type: none"> (a) made, in whole or in part, of polyethylene with a thickness of less than 35 microns; or (b) a bag of a type prescribed by regulations to be a plastic shopping bag – but does not include – (c) a biodegradable bag; or (d) a plastic bag that is an integral part of the packaging in which goods are sealed before sale; or (e) a barrier bag; or (f) a bag of a type prescribed by regulations to not be a plastic shopping bag; 			<p>barrier bag means a bag used to carry unpackaged perishable food, including, but not limited to including, fruit, vegetables, meat and fish;</p> <p>biodegradable bag means a bag comprised of material of a type that has been assessed in accordance with the relevant standard and can, in accordance with the relevant standard, be designated as compostable;</p> <p>relevant standard means Australian Standard AS 4736-2006 Biodegradable plastics – Biodegradable plastics suitable for composting and other microbial treatment, as in force from time to time, published by Standards Australia, or, if another standard published by Standards Australia replaces that standard, that other standard;</p>	<p>NO</p> <p>See carve out for certified compostable plastic bags (described as “biodegradable bags” that are certified under AS 4736).</p>

State	Definition of “plastic”	Definition of “plastic item” / “plastic product”	Definition of “single-use”	Definition of “compostable”, “biodegradable” or “degradable”	Other relevant definitions	Are “biodegradable” or “compostable” plastic items included in the ban?
<p>ACT Plastic Reduction Act 2021;</p> <p>Plastic Reduction Regulation 2022</p>	<p>plastic means material comprising organic polymers from plant extracts or fossil fuels.</p>	<p>plastic product means a product made, in whole or in part, of plastic.</p> <p>prohibited plastic product—</p> <p>(a) means any of the following:</p> <p>(i) a single-use expanded polystyrene container for serving food or a beverage;</p> <p>(ii) a single-use plastic beverage stirrer;</p> <p>(iii) single-use plastic cutlery;</p> <p>(iv) a single-use plastic shopping bag;</p> <p>(v) any other single-use plastic product prescribed by regulation;</p> <p>(vi) a non-compostable degradable plastic product prescribed by regulation; but</p> <p>(b) does not include a single-use item mentioned in paragraph (a) (i) to (v) that is an integrated packaging item.</p> <p>Note: The regulations prescribe ‘a product made of oxo-degradable plastic’ for the purposes of the definition of ‘prohibited plastic product’ par (a)(vi)</p>	<p>single-use plastic product is a plastic product that is designed or intended to be used once only</p> <p>single-use plastic shopping bag—</p> <p>(a) means—</p> <p>(i) a bag that is made (in whole or in part) of polyethylene with a thickness of less than 35 microns; or</p> <p>(ii) a bag prescribed by regulation to be a single-use plastic shopping bag; but</p> <p>(b) does not include—</p> <p>(i) a barrier bag; or</p> <p>(ii) a compostable bag; or</p> <p>(iii) a bag prescribed by regulation not to be a single-use plastic shopping bag.</p>	<p>compostable, in relation to a plastic bag, means a plastic bag that is designated—</p> <p>(a) compostable in accordance with Australian Standard AS 4736-2006 (Biodegradable plastics suitable for composting and other microbial treatment) as in force from time to time; or</p> <p>(b) home compostable in accordance with Australian Standard AS 5810-2010 (Biodegradable plastics— Biodegradable plastics suitable for home composting) as in force from time to time.</p> <p>oxo-degradable plastic means a plastic that contains 1 or more additives to accelerate fragmentation.</p>	<p>Integrated packaging item –</p> <p>(a) means an item that is an integral part of the packaging in which goods, including pre-packaged portions of food or a beverage, are sealed before the goods are supplied; but</p> <p>(b) does not include an item prescribed by regulation.</p>	<p>YES</p> <p>Note: “a non-compostable degradable plastic product” may be prescribed by the regulations to be a prohibited plastic product, pursuant to section 7(1)(vi) of the Act.</p>

State	Definition of “plastic”	Definition of “plastic item” / “plastic product”	Definition of “single-use”	Definition of “compostable”, “biodegradable” or “degradable”	Other relevant definitions	Are “biodegradable” or “compostable” plastic items included in the ban?
NT <i>Environment Protection (Beverage Containers and Plastic Bags) Act 2011</i>	n/a	<p>Prohibited plastic bag (section 51)</p> <p>(1) A prohibited plastic bag is:</p> <p>(a) a carry bag:</p> <p>(i) the body of which comprises (in whole or part) polyethylene with a thickness of less than 35 microns; and</p> <p>(ii) that has handles; or</p> <p>(b) a bag of a kind prescribed by regulation.</p> <p>(2) However, each of the following is not a prohibited plastic bag:</p> <p>(a) a biodegradable bag;</p> <p>(b) a plastic bag that is, or forms an integral part of, the packaging in which goods are sealed prior to sale;</p> <p>(c) a bag of a kind prescribed by regulation.</p>	n/a	<p>Biodegradable bag (section 52)</p> <p>A biodegradable bag is a carry bag comprised of material of a type that:</p> <p>(a) has been assessed and tested in accordance with the Australian Standard prescribed by regulation, as in force from time to time; and</p> <p>(b) can be designated, in accordance with the Standard, as compostable.</p> <p>(s 55) alternative bag means any of the following:</p> <p>(a) a biodegradable bag;</p> <p>(b) a carry bag designed to be used on a regular basis over a period of 2 years;</p> <p>(c) a carry bag of a kind prescribed by regulation</p>	<p>Environment Protection (Beverage Containers and Plastic Bags) Regulations 2011:</p> <p>Reg 3: Australian Standard</p> <p>The Australian Standard for the definition biodegradable bag in section 52 of the Act is AS 4736–2006 (Biodegradable plastics –Biodegradable plastics suitable for composting and other microbial treatment).</p>	

**Schedule 4 –
Emerging waste and recycling laws**

Emerging waste and recycling laws

This table is current as at 1 May 2023.

Legislation		Summary of single-use plastic bans
National		
<i>Recycling and Waste Reduction Act 2020 (Cth)</i>		<p>Under the framework created by the <i>Recycling and Waste Reduction Act 2020 (Cth) (RWR Act)</i>, the Minister for the Environment may identify products and materials considered to be most in need of a product stewardship approach in the Minister's Priority List, including recommended actions and timeframes for action.</p> <p>The Minister's Priority List for 2022-2023 includes "problematic and unnecessary single use plastics".¹⁸⁴ Specifically, the Minister has recommended that there is a nationally coordinated industry phase-out in place for packaging that is not certified compostable (including oxo-degradable, landfill-degradable or other claimed degradable plastics) through elimination, redesign, replacement and innovation. This was to be completed by June 2022 and is marked in progress. This year there is also the obligation to develop product stewardship options (including disposal/collection and recycling) to help support these phase outs, examining the environmental and health impacts where products cannot be phased out. This is to be completed by December 2023.</p>
<i>National Environment Protection (Used Packaging Materials) Measure 2011</i>		<p>The Australian Government has adopted a co-regulatory approach to consumer packaging waste through the <i>National Environment Protection (Used Packaging Materials) Measure 2011 (UPM NPEM)</i>. Large producers or brand owners with a gross annual income of more than \$5 million can elect to either:</p> <ul style="list-style-type: none"> (a) become a signatory to the Australian Packaging Covenant (as members of APCO); or (b) be regulated by the jurisdictional environmental authority (e.g. EPA in NSW). <p>Under either option, these large producers or brand owners are subject to voluntary packaging targets and guidelines.</p>
States and Territories		
ACT	<i>Plastic Reduction Act 2021 (ACT)</i>	<p>Commencement of ban: 1 July 2021.</p> <p>Scope of ban: Plastic cutlery, drink stirrers, including PLA bioplastic versions of these items; and expanded polystyrene (EPS) takeaway food and beverage containers.</p> <p>PLA bioplastic is currently an acceptable replacement product for expanded polystyrene takeaway food and beverage containers.</p>
NSW	<i>Plastic Reduction and Circular Economy Act 2021 (NSW)</i>	<p>Commencement of ban: 1 November 2022.</p> <p>Scope of ban: lightweight plastic shopping bags, single-use plastic straws, stirrers and swizzle sticks, cutlery (including forks, spoons, knives, sporks, splayds, chopsticks, and food picks), cotton buds, bowls and plates, and expanded polystyrene (EPS) food service items.</p> <p>The ban applies even if these items are made from biodegradable, compostable, or bioplastics. This includes those made from Australian certified compostable plastic.</p>

¹⁸⁴ Department of Climate Change, Energy, the Environment and Water, Commonwealth, 'Minister's Priority List 2021-22' *Product Stewardship* (Web Page) <https://www.environment.gov.au/protection/waste/product-stewardship/ministers-priority-list/2021-22>.

Legislation		Summary of single-use plastic bans
	<i>Protection of the Environment Operations Act 1997</i>	Commencement of ban: 29 November 2000. Scope of ban: A person who releases 20 or more balloons at or about the same time is guilty of an offence if the balloons are inflated with a gas that causes them to rise in the air.
NT	n/a See: City of Darwin ban on single use plastics	<i>City of Darwin ban on single use plastics</i> Commencement of ban: 1 January 2019. Scope of ban: Council banned the use of single use plastic plates, plastic cups, plastic straws and plastic eating utensils from market stalls held on Council land. Council also endorsed a ban of single use plastic items (cups, straws, cutlery, and food containers) from all Council-run events. There is also a ban on any deliberate release of helium balloons.
QLD	<i>Waste Reduction and Recycling (Plastic Items) Amendment Act 2021 (QLD)</i>	Commencement of ban: 1 September 2021. Scope of ban: Plastic straws, stirrers, cutlery, plates, bowls, expanded polystyrene (EPS) cups and containers. Single-use plastic items certified industrially (AS 4736-2006) or home (AS 5810-2010) compostable to the Australian standards are exempt from the ban. ¹⁸⁵
SA	<i>Single-use and Other Plastic Products (Waste Avoidance) Act 2020 (SA)</i>	Commencement of ban: Stage 1 commenced 1 March 2021; Stage 2 commenced 1 March 2022; Stage 3 commences September 2023; Stage 4 commences September 2024; Stage 5 commences September 2025. Scope of bans: Stage 1 – Plastic straws, stirrers and cutlery, including PLA compostable version of these items. Stage 2 – Expanded polystyrene (EPS) cups, bowls, plates and containers, and all oxo-degradable products. Stage 3 – Plastic stemmed cotton buds, single-use plastic bowls and plates, plastic pizza savers. Stage 4 – Plastic produce bags, thick supermarket or boutique-style plastic bags, single-use plastic beverage containers (including coffee cups), other EPS consumer food and beverage containers, EPS trays used for foods, plastic confetti and plastic bread tags. Stage 5 – plastic fruit stickers, plastic soy sauce fish and pre-packaged and attached products.
TAS	n/a See: Hobart City Council Single-Use Plastics By-Law	<i>Hobart City Council Single-Use Plastics By-Law</i> Commencement of ban: 1 July 2021. Scope of ban: A retailer must not provide to a person any food packaging which is wholly or partly comprised of plastic, and a single-use product. Ban does not apply to food packaging certified by the Australasian Bioplastics Association or a similar organisation, as complying with the Australian Standard AS 4736-2006 (Industrial), European Standard EN13432, or United States of American standard D6400.
VIC	<i>Environment Protection Amendment (Banning Single-Use Plastic Items) Regulations 2022</i>	Commencement of ban: 1 February 2023 Scope of ban: single-use plastic drinking straws, cutlery, plates, drink stirrers and cotton bud sticks either wholly or partly made from conventional, biodegradable, degradable, and compostable plastics.

¹⁸⁵ *Waste Reduction and Recycling Act 2011* (Qld) s 99GB (definition of 'single-use plastic item').

Legislation		Summary of single-use plastic bans
WA	<i>Environmental Protection (Prohibited Plastics and Balloons) Regulations 2018 (WA)</i>	Commencement of ban: Stage 1 commenced 1 January 2022; Stage 2 commenced 1 February 2023. Scope of ban: Stage 1 – plates, bowls, cutlery, drink stirrers, drinking straws, thick plastic bags made wholly or partly of degradable, oxo-degradable, biodegradable or compostable plastic, expanded polystyrene (EPS) food containers, and release of a balloon inflated with a gas that causes the balloon to rise in the air. Stage 2 – expanded polystyrene packaging, degradable plastics, barrier/produce bags, expanded polystyrene cups, coffee cups and lids, lids for cups, bowls and takeaway food containers, cotton buds with plastic shafts, and microbeads..



**Schedule 5 –
Regulation of biodegradability claims**

Regulation of biodegradability claims

This table is current as at 1 May 2023.

Legislation		Regulation of representations about plastics
ACT	<i>Plastic Reduction Act 2021 (ACT)</i>	Section 11 provides that a person who supplies a prohibited plastic product commits an offence if the person intentionally or recklessly falsely represents that the product is not a prohibited plastic product.
NSW	<i>Plastic Reduction and Circular Economy Act 2021 (NSW)</i>	Section 50(1) provides that: “A person must not, while carrying on a business, provide, whether by act or omission, information in connection with the supply of the following that is false or misleading in a material particular... a prohibited plastic item.” There is no definition for “material particular”.
NT	<i>Environment Protection (Beverage Containers and Plastic Bags) Act 2011 (NT)</i>	Section 58 provides that a manufacturer or distributor of plastic bags who sells, supplies or otherwise provides prohibited plastic bags to another person commits an offence if that manufacturer / distributor represented to another person that the bags are not prohibited plastic bags.
QLD	<i>Waste Reduction and Recycling Act 2011 (QLD)</i>	Section 99GF(2) provides that “a person [who sells a plastic item that is “compostable” to another person] must ensure the conditions under which the plastic item is compostable are clearly and legibly written— (c) on the packaging for the plastic item; or (d) in information or a document accompanying the plastic item.” Section 99GH also provides that “A person must not give information, or a document containing information, that the person knows is false or misleading to another person about whether or not a plastic item is compostable.” compostable , for a plastic item, means the plastic item is compostable under AS 4736-2006 or AS 5810-2010. condition under which a plastic item is compostable, includes— (a) whether the plastic item is suitable for industrial or home composting; and (b) whether the plastic item is compostable under AS 4736-2006 or AS 5810-2010.

Legislation		Regulation of representations about plastics
SA	Single-use and Other Plastic Products (Waste Avoidance) Act 2020 (SA)	Section 12 (commencing on 1 March 2022) provides that: “A person who— (a) knows, or who ought reasonably to have known or suspected, that a product sold, supplied or distributed by the person to another person is comprised, in whole or in part, of oxo-degradable plastic; and (b) prior to, or in the course of, selling, supplying or distributing the product, represents to the other person that the product is not comprised, in whole or in part, of oxo-degradable plastic, is guilty of an offence.” The maximum penalty is \$30,000.
TAS	n/a	
VIC	Environment Protection Act 2017 (Vic) Environment Protection Regulations 2021 (Vic)	Clause 6.11A of Schedule 1 provides that the Regulations may prohibit the provision of false or misleading information relating to plastic products, plastic packaging or plastic bags. Regulation 134F of the <i>Environment Protection Regulations 2021</i> (Vic) provides that: <i>A person conducting a business or an undertaking must not, whether by act or omission, in the course of conducting the business or undertaking provide to any other person or any entity information that the person conducting the business or undertaking knows, or should reasonably know, is false or misleading about—</i> <i>(a) the composition of a banned single-use plastic item; or</i> <i>(b) whether or not an item is a banned single-use plastic item.</i> The penalty is 60 penalty units for a natural person; or 300 penalty units for a body corporate.
WA	Environmental Protection (Prohibited Plastics and Balloons) Regulations 2018	Clause 17B provides that “A person who supplies or manufactures degradable plastic items must not give any information that the person knows is false or misleading to another person about the composition of a degradable plastic item.” The penalty is a fine of \$5 000.

**Schedule 6 –
Key stakeholders**

Key stakeholders

There are a number of Government, regulatory and industry stakeholders who have an interest in biodegradable plastics. This includes those identified in the following table:

	Entities	Interest / role
Commonwealth Government	Department of Agriculture, Waste and the Environment (DAWE)	Responsible for “[e]nhancing Australia’s agriculture, environment, heritage and water resources through regulation and partnership”. ¹⁸⁶ Functions include waste and recycling. In particular, DAWE: ¹⁸⁷ <ul style="list-style-type: none"> regulates the export of waste from Australia and the export, import and transit of hazardous waste; has published a series of National Waste Policies and a National Waste Policy Action Plan; administers the Commonwealth Government’s investment in the Recycling Modernisation Fund (RMF); and is developing a digital ‘Waste Data Visualisation Platform’ (to be available in 2024).
	Department of Industry, Science, Energy and Resources (DISER)	Focussed on driving economic growth and job creation, including through circular economies for waste. ¹⁸⁸ Administers the Commonwealth Government’s funding of clean energy technologies including some waste to energy technologies, and supports innovative solutions to waste through Cooperative Research Centre Project Grants (which “[provide] funding for short-term research collaborations” ¹⁸⁹).
	Australian Competition and Consumer Commission (ACCC)	Australia’s competition regulator and national consumer law champion. ¹⁹⁰ In 2010, the ACCC published guidance on the use of biodegradable, degradable and recyclable claims on plastic bags. ¹⁹¹

¹⁸⁶ ‘About us’, *Department of Agriculture, Fisheries and Forestry, Australian Government* (Web Page) <<https://www.awe.gov.au/about>>.

¹⁸⁷ Ibid.

¹⁸⁸ ‘People’, *Department of Industry, Science and Resources, Australian Government* (Web Page) <https://www.industry.gov.au/people>.

¹⁸⁹ Australian Government, ‘Funding for short-term, industry-led research collaborations’, *Cooperative Research Centres Projects Grants* (Web Page, 10 October 2022) <<https://business.gov.au/grants-and-programs/cooperative-research-centres-projects-crpc-grants>>.

¹⁹⁰ See ACCC website: <https://www.accc.gov.au/>.

¹⁹¹ ACCC, *Biodegradable, degradable and recyclable claims on plastic bags* (News for Business, 2010) 2 <<https://www.accc.gov.au/system/files/Biodegradable%2C%20degradable%20and%20recyclable%20claims%20on%20plastic%20bags.pdf>>.

	Entities	Interest / role
	CSIRO	Constituted under the <i>Science and Industry Research Act 1949</i> (Cth). Purpose is “to solve Australia’s greatest challenges through innovative science and technology”. ¹⁹² Those challenges include resilient and valuable environments (enhancing sustainable use and resilience) and sustainable energy and resources (building resource security while lowering emissions). ¹⁹³ CSIRO is pursuing an ‘Ending Plastic Waste Mission’ that “is aiming for an 80 per cent reduction in plastic waste entering the Australian environment by 2030”. ¹⁹⁴ In August 2021, CSIRO announced that it is working “with industry and academia to investigate bioplastics that are able to degrade into carbon dioxide and water... [that] could be disposed of in industrial and home composts”. ¹⁹⁵
State and Territory Government	State departments (various)	Departments with functions relating to environment protection, planning, public health and human safety, resource efficiencies and economic development.
	Environment Protection Authority (EPA) (or equivalent)	The primary environmental regulator in each State and Territory generally has regulatory functions with respect to waste management obligations and the licensing of waste facilities. Also typically involved in policy development and implementation.
	Authorities administering the Commonwealth’s RMF in each State and Territory	The list of authorities is available online, ¹⁹⁶ and include: <ul style="list-style-type: none"> • Vic: DELWP • NSW: EPA • SA: Green Industries South Australia (GISA)
	Statutory authorities or corporations established by legislation	Statutory authorities or corporations established by legislation play various roles in administering different waste, recycling and sustainability initiatives, including; <ul style="list-style-type: none"> • Vic: Recycling Victoria and Sustainability Victoria • SA: Green Industries SA (formerly Zero Waste SA) • WA: Waste Authority WA
Municipal	Local Government Councils	Councils typically have waste management functions including the provision of waste collection services across their municipality.
Industry Associations	Australasian Bioplastics Association (ABA)	“[T]he peak industry body for manufacturers, converters and distributors of bioplastic products and materials throughout Australia and New Zealand.” ¹⁹⁷

¹⁹² CSIRO, ‘Partner with use to tackle Australia’s greatest challenges’, *About* (Web Page) <https://www.csiro.au/en/about/challenges-missions>.

¹⁹³ CSIRO, ‘Challenges’, *Missions* (Web Page) <https://www.csiro.au/en/about/challenges-missions/Challenges>.

¹⁹⁴ CSIRO, ‘Ending Plastic Waste’, (Web Page) <https://research.csiro.au/ending-plastic-waste/>.

¹⁹⁵ CSIRO, ‘Biodegradable Plastics’ *Ending Plastic Waste* (Web Page) <https://research.csiro.au/ending-plastic-waste/bioplastics/>.

¹⁹⁶ Department of Climate Change, Energy, the Environment and Water, Australian Government, *Investing in Australia’s waste and recycling infrastructure* (Web Page) <<https://www.dcceew.gov.au/environment/protection/waste/how-we-manage-waste/recycling-modernisation-fund>>.

¹⁹⁷ See also: <https://bioplastics.org.au/>.

	Entities	Interest / role
	Australian Organics Recycling Association Limited (AORA)	Established to create a leading industry organisation and an industry body for the organics recycling industry in Australia. ¹⁹⁸ AORA “works with stakeholders to facilitate the conditions through which surplus organic material can be sustainably and cost-effectively recycled; and to promote the beneficial use of compost, soil conditioners and mulches in primary industries”. ¹⁹⁹
	Australian Institute of Packaging (AIP)	“The Australian Institute of Packaging (AIP) is the peak professional body for packaging education and training in Australasia.” ²⁰⁰
	World Wide Fund for Nature (WWF-Australia)	WWF Australia has published its ‘No Plastic in Nature’ initiative, which “works across the life cycle of plastic to <ul style="list-style-type: none"> • reduce the amount of new plastic produced • increase the reuse of plastic already in circulation • eliminate leakage of plastic into nature”²⁰¹
	National Waste and Recycling Industry Council (NWRIC) (and State and Territory counterparts)	“NWRIC is composed of national waste and recycling companies and representatives from affiliated associations who together represent the interests of more than 450 small, medium, national and global businesses in Australia. The purpose of NWRIC is to maximise representation across the industry at a national, sector, state and territory level, building consensus on issues of concern and advocating for harmonisation of policies and regulations across local, state and national governments.” ²⁰²
	Waste Management and Resource Recovery Association Australia (WMRR)	“The Waste Management and Resource Recovery Association of Australia (WMRR) is the only national peak body for the \$15bn waste and resource recovery industry. Our membership covers the entire spectrum of the industry including landfill, recycling and resource recovery, energy from waste, e-waste, organics, construction and demolition, commercial and industrial, hazardous and biohazardous waste sectors.” ²⁰³ Priority advocacy areas include facilitating investment in resource recovery and remanufacturing capacity, improving coordination between State Government portfolios within and across State borders with responsibility for the sector, supporting the establishment of secondary and end markets for resource recovered materials and improving national waste and resource recovery data to enable the identification, recovery, classification, treatment, disposal and monitoring of waste.
	Centre for Organic Research and Education (CORE)	“CORE is a collaborative network supporting and promoting the beneficial reuse of recovered organic resources. CORE encourages and facilitates the highest sustainable reuse of recovered resources. In doing so it aims to minimise disposal of precious resources while maximising beneficial reuse... CORE is funded primarily by the additional business brought to members by CORE Programs and industry partnerships and collaborations.” ²⁰⁴
Other	APCO	“[A] not for profit organisation leading the development of a circular economy for packaging in Australia.” ²⁰⁵ Partners with industry and Government.

¹⁹⁸ AORA constitution: https://www.aora.org.au/sites/default/files/uploaded-content/website-content/aora-constitution-07-march-2019_0.pdf Constitution, Australian Organics Recycling Association Limited (2019) <https://www.aora.org.au/sites/default/files/uploaded-content/website-content/aora-constitution-07-march-2019_0.pdf>.

¹⁹⁹ ‘About AORA’, AORA (Web Page) <https://www.aora.org.au/about-aora>.

²⁰⁰ <http://aipack.com.au/who-are-we/>, ‘Who are we?’, Australian Institute of Packaging (Web Page) <<http://aipack.com.au/who-are-we/>>.

²⁰¹ WWF, ‘No plastic in nature’ (Web Page) https://wwf.panda.org/discover/our_focus/markets/no_plastic_in_nature_new/.

²⁰² ‘About’, National Waste and Recycling Industry Council (Web Page) <<https://www.nwrac.com.au/about-us/>>.

²⁰³ ‘About us’, Waste Management & Resource Recovery Association Australia (Web Page) https://www.wmrr.asn.au/Web/Web/About_WMRR/About_Us.aspx?hkey=fb41a42a-a6d6-45dc-8464-2a9ec73e23b8.

²⁰⁴ ‘About Core’, Centre for Organic Research and Education (Web Page) <<https://core.asn.au/about-core/>>.

²⁰⁵ ‘About APCO’, APCO (Web Page) <<https://apco.org.au/about-apco/>>.

Entities	Interest / role
	Working to ensure 100% of packaging is reusable, recyclable or compostable in the Australian resource recovery system, by 2025. Works across the life cycle from design, manufacture, transport, sale and recovery. ²⁰⁶
Product Stewardship Centre of Excellence	Operated by a consortium between the University of Technology Sydney's Institute for Sustainable Futures, the Australian Industry Group and Cox Inall Communications. Intended "to drive industry-led product stewardship action in Australia", by "supporting business to better manage the environmental impacts of their products, and help Australia to achieve its ambitious target to increase the resource recovery rate to 80 per cent by 2030". ²⁰⁷
Industry participants	Various including the National Waste, Recycling Industry Council.
Academia / research institutions	Various including Chemistry Australia.
Community and public interest groups	Various including Boomerang Alliance; Clean Up Australia.
Australian-New Zealand Chapter of the Society of Plastics Engineers	A "not-for-profit group which specialises in organising technical and networking events for professionals in the plastics industry." ²⁰⁸ Aims to promote the scientific and engineering knowledge about plastics by spreading knowledge, strengthening skills and promoting plastics.
Other stakeholders	Including: <ul style="list-style-type: none"> • resource providers and others in the supply chain; • technical consultants and professional service providers; • financiers; and • insurers.

²⁰⁶ 'About APCO' Youtube video, available at <https://apco.org.au/about-apco> PackagingCovenant, 'About APCO' (YouTube, 19 December 2019) <https://www.youtube.com/watch?v=3C-JnF7yVXg>.

²⁰⁷ Department of Climate Change, Electricity, Energy, the Environment and Water, Commonwealth 'Product Stewardship Centre of Excellence' *Waste Publications and Data* (Web Page) <https://www.dcceew.gov.au/environment/protection/waste/publications/product-stewardship-centre-of-excellence-factsheet>.

²⁰⁸ SPE, 'About the Society of Plastics Engineers', *Inspiring Plastics Professionals* (Web Page) <https://www.plastics.org.au/about/>.

**Schedule 7 –
Single use plastic legislation**

Single use plastic legislations

The table below summarises the existing and proposed bans in each jurisdiction (current as at 1 May 2023). By late 2024, the majority of single-use plastics listed below will be banned across Australia. Tasmania and Northern Territory are excluded from the table as their single-use plastics bans are limited to plastic bags.

Overview of single-use plastic bans						
Type of single-use plastic	NSW	Vic	Qld	SA	WA	ACT
Barrier/produce bags			1 September 2024	1 September 2024	1 March 2024	
Plastic stirrers						
Plastic straws ¹						
Cutlery ² (forks, spoons, knives, sporks, splayds, chopsticks, and food picks)						
Expanded polystyrene food service items ³						
Non-EPS bowls / plates ^{4,6}		5		1 September 2023		
Non-EPS cups (excluding coffee cups)				1 September 2024		
Coffee cups and lids				1 September 2024	1 March 2024	
Non-EPS lids for cups and bowls				1 September 2024	1 September 2024	
Non-EPS food containers ⁷			September 2025	1 September 2024		1 July 2023
Polystyrene packaging and cups			1 September 2023		1 September 2023	1 July 2023

Overview of single-use plastic bans						
Type of single-use plastic	NSW	Vic	Qld	SA	WA	ACT
Helium balloon release ⁸			1 September 2023			
Microbeads	⁹		1 September 2023		1 September 2023	1 July 2023
Cotton buds / cotton tips that incorporate single-use plastics			1 September 2023	1 September 2023	1 September 2023	
Oxo-degradable plastics		¹⁰	September 2024		1 September 2023	

Confirmed ban, effective now

Confirmed ban, scheduled to commence on the date specified

Proposed ban, indicated commencement date specified (where relevant)

1. Straws attached to shelf-ready, pre-packaged items are excluded in Queensland, WA, SA, NSW, ACT.
2. Queensland and NSW bans exclude cutlery that is attached to shelf-ready, pre-packaged items. The NSW ban also excludes serving utensils.
3. Each State includes specific exemptions.
4. The Queensland ban excludes serving platters and trays.
5. Based on the information currently available, it is unclear whether the Victorian ban will involve single use plastic bowls.
6. WA's ban excludes lids and cups that contain a hot drink or soup when it is supplied.
7. WA excludes food containers (made of plastic that is not EPS) with a lid.
8. The ban in NSW and ACT applies to the release of 20 or more balloons.
9. This ban is limited to plastic microbeads less than 5mm wide included in 'rinse-off personal care products'.
10. This ban only applies to certain single use plastics, being straws, cutler, plates, drink-stirrers, food and drink containers, and cotton bud sticks.

**Schedule 8 –
Overview of test criteria standards for biodegradability in
Australia, Europe and USA**

Overview of test criteria standards for biodegradability in Australia, Europe and USA

Environment	Australia	Europe	USA
Industrial composting	AS 4736-2006	EN 13432:2000 ISO 17088	ASTM D6400-21
Home composting	AS 5810-2010	EN 13432:2000 (modified conditions)	ASTM D6400-21 (modified conditions)
Biodegradable in soil	ISO 23517:2021	EN 17033:2018 (which only applies to mulch films) ISO 23517:2021	No standard
Biodegradable in freshwater	No standard	EN 14987:2006	No standard
Biodegradable in marine water	No standard	No standard	No standard

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