



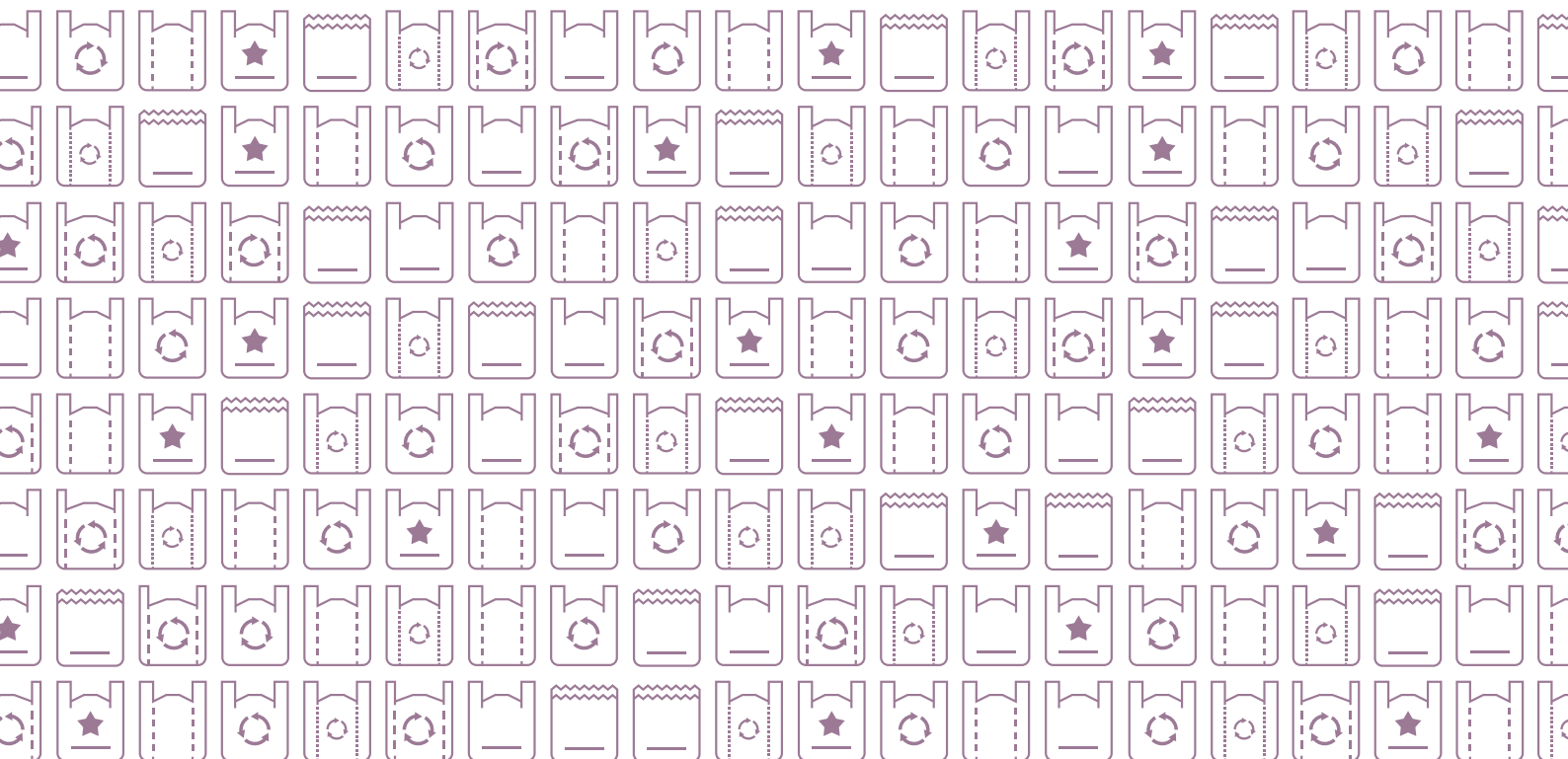
COMMISSIONER FOR SUSTAINABILITY
AND THE ENVIRONMENT



Australian
National
University

UNFANTASTIC PLASTIC – REVIEW OF THE ACT PLASTIC SHOPPING BAG BAN

August 2018



Acknowledgements

MAIN AUTHORS

Commissioner Professor Kate Auty and Kirilly Dickson
Office of the Commissioner for Sustainability and the Environment

KEY TECHNICAL ANALYSIS

Andrew Macintosh, ANU
Amelia Simpson, ANU
Teresa Neeman, ANU

CONTRIBUTIONS

Caroline Lambert, European Union
Jessica Shepherd, TCCS
Sanzida Akhter, TCCS
Michael Trushell, TCCS
Daniel Walters, EPSDD
Ian Walker, EPSDD
Trish Campbell, TCCS
Karen Jesson, Communities at work
Nicole and Ryan, Mooseheads
Manuel Xyrakis, Ainslie IGA
Greg Robertson and Luke Douma, Calvary Hospital
Bruce Edgerton, AECOM
Caitlin Roy, OCSE
Serena Farrelly, OCSE
SEE Change
Fiona, The Market Wanniassa
Alison Malmberg, Boomerang Bags Canberra
Elizabeth Kassell, RedGroup
Katrina Nelson, Energy Developments, EDL

Graphic design: CRE8IVE

Typesetting: Keep Creative

© Office of the Commissioner for Sustainability and the Environment 2018

ISBN 978-0-9873072-7-9

With the exception of the Commonwealth Coat of Arms and where otherwise noted, all material presented in this document is provided under a Creative Commons Attribution 3.0 Australia licence (<http://creativecommons.org/licenses/by/3.0/au/>). The details of the relevant licence conditions are available on the Creative Commons website (accessible using the links provided), as is the full legal code for the CC BY 3.0 AU licence (<http://creativecommons.org/licenses/by/3.0/au/legalcode>).

The document should be attributed as: Office of the Commissioner for Sustainability and the Environment (2018). Unfantastic Plastic - Review of the ACT Plastic Shopping Bag Ban.

Published by the Office of the Commissioner for Sustainability and the Environment, Canberra, 2018.

This document is available online at
www.environmentcommissioner.act.gov.au

For further information, contact:

Office of the Commissioner for Sustainability and the Environment
GPO Box 158, Canberra ACT 2601
Telephone: (02) 6207 2626
Facsimile: (02) 6207 2630
Email: envcomm@act.gov.au
Website: www.environmentcommissioner.act.gov.au

This report is printed on 100% recycled paper.

The ACT Government is committed to making its information, services, events and venues accessible to as many people as possible. If you have difficulty reading a standard printed document and would like to receive this publication in an alternative format – such as large print and audio – please call the Canberra Blind Society on (02) 6247 4580.

If English is not your first language and you require the translating and interpreting service, please call the Telephone Interpreter Service on 131 450. If you are deaf or hearing impaired and require assistance, please call the National Relay Service on 133 677.



CONTENTS

Foreword	4	3. Types of Plastic Bags	16
1. Introduction	6	<i>Case Study:</i> Biodegradable and compostable – what are the benefits?	20
Purpose of this Report	7	<i>Case Study:</i> Parliament of Youth 2018: which bag does our youth choose?	20
The Plastic Problem	7	<i>Case Study:</i> Boomerang Bags: A community driven circular economy for bags	21
The Effectiveness of the ACT Plastic Bag Ban	9	4. The ACT and Australian Response	22
Challenges for Further Reform	11	A Brief Overview of ACT Waste Policy	23
Framing the problem	11	The ACT Plastic Shopping Bags Ban Act 2010	23
Informing a solution	11	Plastic Bag Bans in Australia	23
2. Recommendations	12	Emerging Reform on Plastics at the Federal Level	25
Recommendation 1 – Mandatory Plastic Bag Disclosure Regime	14	<i>Expert Commentary:</i> The ACT's plastic bag ban: was it worth it and where to from here? <i>Bruce Edgerton</i>	26
Recommendation 2 – Minimum Plastic Bag Pricing	14	5. Environmental Impacts of Plastic Bags	28
Recommendation 3 – Improved Governance of Plastic Bag Regulation	15	The Fate of Plastic Bags in the ACT	30
Recommendation 4 – Research synergies for compostable plastic and a household organic collection scheme	15	<i>Case Study:</i> Redcycle	30
		Plastic Bags in Landfills	31
		Life Cycle Assessments of Plastic Bags and Substitutes	33
		A Circular Economy for Plastics	35
		<i>Expert Commentary:</i> From breaking bag habits to a circular plastic economy: the European Union's experience. <i>Caroline Lambert</i>	38

6. How Environmentally Effective has the ACT Plastic Bag Ban been? 40

Sourcing Data on Plastic Bag Consumption in the ACT	41
Changes in Plastic Bag Consumption	42
Changes in Plastic Bag Litter	47
Combining Plastic Bag Consumption and Litter Analysis	47

7. Costs and Challenges of the ACT Plastic Bag Ban 48

Retailer Compliance Costs	49
Household Shopping Costs	49
Government Compliance and Enforcement Costs	49
Continuity of Community Support	50

8. Options for Reform of the ACT Ban 52

Contextual Information	53
Support for change to improve environmental outcomes	53
Limited Information to Support Robust Policy	54
Jurisdictional Inconsistencies	54

9. Analysis of Reform Options 56

Option 1 – Keep the ban as it is (do nothing)	57
Environmental effectiveness	57
Impact on retailers	57
Impact on households	57
Cost to government	57

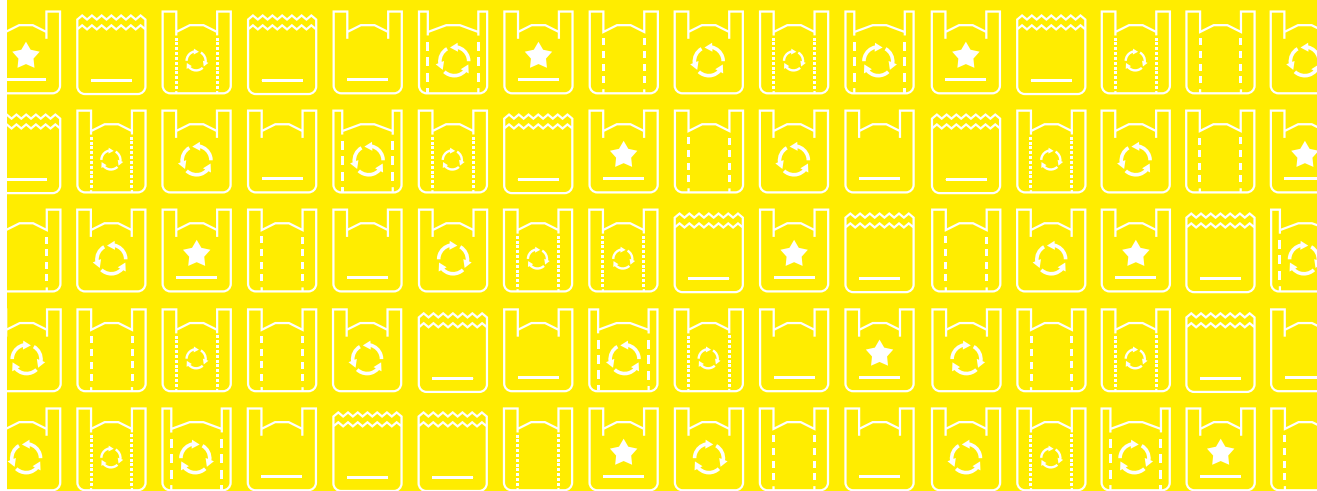
Option 2 – Increase the minimum thickness of plastic shopping bags	58
Environmental effectiveness	58
Impact on retailers	58
Impact on households	59
Cost to government	59

Option 3 – Require all plastic bags to be biodegradable and compostable	60
---	----

Case Study: Compostable packaging in Kassel, Germany	63
Environmental effectiveness	63
Impact on retailers	64
Impact on households	64
Cost to government	64

Option 4 – Ban Plastic Shopping Bags	65
Environmental effectiveness	65
Impact on retailers	65
Impact on households	65
Cost to government	65
Option 5 – Use prices to reduce consumption of plastic shopping bags	66
Environmental effectiveness	66
Case Study: Plastic Bag Fees and Levies –	
Experience elsewhere	67
Impact on retailers	68
Impact on households	68
Cost to government	68
Option 6 – Introduce a mandatory disclosure regime for the sale and distribution of plastic bags by retailers	69
Environmental effectiveness	69
Impact on retailers	69
Impact on households	70
Cost to government	70

Foreword





PROFESSOR KATE AUTY, COMMISSIONER FOR SUSTAINABILITY AND THE ENVIRONMENT, ACT

Waste is an affliction of every developed and developing country, every city, business, service provider, household and individual.

Clearly, plastic – including bags, straws, balloons, bottles and microplastics – is now polluting our oceans, killing marine species, impacting biodiversity, and generally degrading water quality. Some commentators are now postulating plastic as a ‘hazardous’ waste.

Plastic is the most enduring waste product of our daily consumer lifestyles. Virtually every piece of plastic ever made still exists in some shape or form. It is the very durability of plastic – originally celebrated as its virtue – that makes it an intransigent waste product of our consumerism. Our consumption patterns produce endless piles of packaging ‘rubbish’, even as we recycle and try to act responsibly.

Plastics make for portability and as a result consumption is more ‘convenient’ than at any time in the past. Plastics provide the ultimate ‘convenience’.

Documentaries like the Australian ‘War on Waste’ and social media campaigns, such as ‘Plastic Free July’ and those from Greenpeace, have telegraphed to all how ubiquitous plastic is in our lives, and how careless we have been of its impacts.

There is a broad acceptance of the problem and the ‘problem’ of plastics is complex. The challenge is to find solutions.

The Australian Capital Territory, the Northern Territory, and the South Australian governments all embraced plastic bag bans early, demonstrating the sort of leadership which we increasingly expect of sub-national governments on environmental issues.

Recently the Australian Senate recognised the extent of the plastic problem with its focus on marine pollution¹ and waste and recycling.² The 2018 Senate Inquiry recommended that the Meeting of Environment Ministers consider:

... phas[ing] out petroleum-based single-use plastics by 2023 (Recommendation 8.24).

It is in this environment that the ACT Minister Shane Rattenbury has called for this report.

We have commissioned expert commentary, analysed options, and surveyed Canberrans to test views and the appetite for change. Our findings include:

- Single-use plastic bags are not a large litter stream in the ACT.
- The 2011 ban has had a marked impact on our consumption of single-use plastic bags.
- But, every alternative has its own implications in respect of carbon emissions, energy, water use, and pollution.

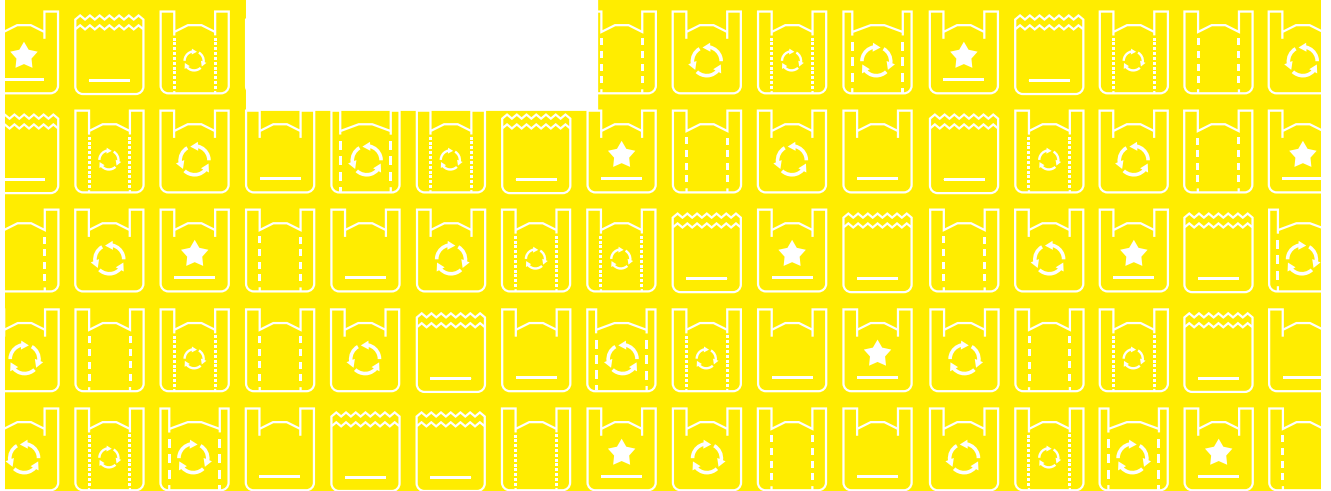
My recommendations reflect the complexity of the issues. There is no simple solution to our plastic addiction but we know we cannot continue to flood our world with such toxic waste.

¹ https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Marine_plastics/Report/c07 accessed 16 July 2018

² https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/WasteandRecycling/Report accessed 16 July 2018

1.

Introduction



Purpose of this Report

In December 2017 the ACT Minister for Climate Change and Sustainability Shane Rattenbury, asked the ACT Commissioner for Sustainability and the Environment to evaluate the operations of the *Plastic Shopping Bags Ban Act 2010* and assess whether any changes were necessary.

The terms of reference were established by the Minister and are addressed in this report.

This report represents a summary of the comprehensive technical analysis commissioned by the Commissioner for Sustainability and the Environment and undertaken by the Australian National University: *Regulating Plastic Shopping Bags in the Australian Capital Territory: Plastic Shopping Bags Ban Act 2010 Options Analysis*.¹

MINISTERIAL TERMS OF REFERENCE – DECEMBER 2017

By August 2018, the Office of the Commissioner for Sustainability and the Environment will:

- Investigate the efficacy of the existing *Plastic Shopping Bags Ban Act 2010*,
- Make recommendations as to how and whether improvements could be made to improve overall environmental outcomes, and
- Analyse options where possible through triple bottom line and cost-benefit analysis.

The Plastic Problem

While extremely useful, plastics can have adverse environmental impacts, from the way they are produced through to the end of their life.

Amongst other things, plastics are a major source of litter, cause damage to animals and birds through ingestion and entanglement, and can absorb and redistribute other pollutants in the environment.

Plastic bags are a form of single-use plastic, and like drinking straws, they have contributed to this world-wide problem and persist in the environment for hundreds of years.

As awareness increases of the ongoing damage of plastics, there has been real consideration of whether plastic should be listed as a hazardous substance.²

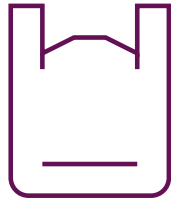
6
–
7

Virtually every plastic ever made still exists in some shape or form.

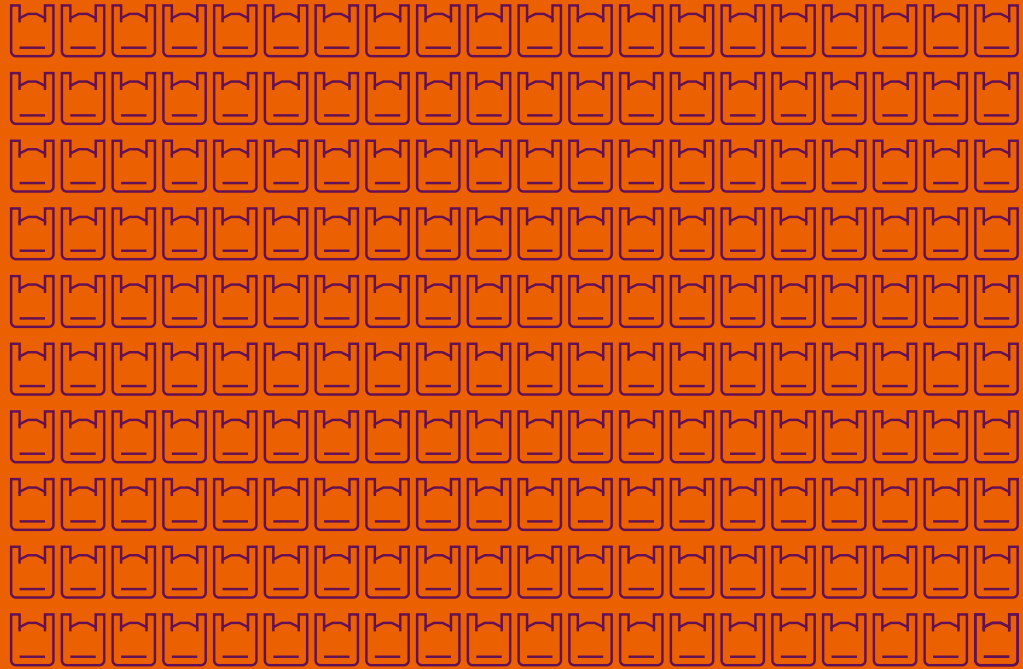


¹ A Macintosh, A Simpson and T Neeman (ANU), 2018: *Regulating Plastic Shopping Bags in the Australian Capital Territory: Plastic Shopping Bags Ban Act 2010 Options Analysis*.

² The Senate, 2016: *Toxic Tide: the threat of marine plastic pollution in Australia*



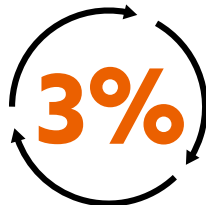
THE PLASTIC BAG PROBLEM



EACH AUSTRALIAN USES ABOUT **200** PLASTIC BAGS A YEAR.¹



The average plastic bag is used once, for about 20 minutes before being thrown away or recycled.²

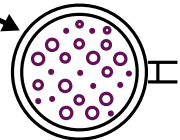


Only 3% of Australia's plastic bags are recycled.³ It takes 85 times more energy to recycle a plastic bag than make it.⁴

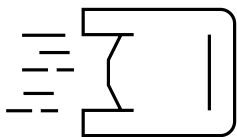
PLASTIC BAGS



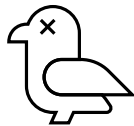
TAKE
1000+
YEARS



TO BREAK
DOWN INTO
MICROPLASTICS

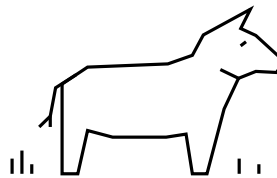


Plastic bags are light and can travel long distances on the wind, often settling in water ways.

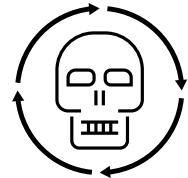


1,000,000

Littered plastic looks a lot like jelly fish in water, killing many animals after they eat them. More than a million sea birds and 100,000 animals are killed each year because of plastic bags.



On land, plastic bags can trap birds and kill animals. A farmer near Mudgee NSW found 8 plastic bags in a dead calves stomach.⁶



After an animal is killed by plastic bags, its body decomposes and the plastic is released back into the environment where it can kill other wildlife.

¹ Department of Environment and Conservation, WA kabc.wa.gov.au/library/file/Fact%20sheets/Plastic%20bag%20Fact%20sheet%20KAB.pdf accessed 5 March 2018

² factorydirectpromos.com/blog/whats-the-life-cycle-of-a-plastic-bag accessed 5 March 2018

³ Department of Environment and Conservation, WA kabc.wa.gov.au/library/file/Fact%20sheets/Plastic%20bag%20Fact%20sheet%20KAB.pdf accessed 5 March 2018

⁴ factorydirectpromos.com/blog/whats-the-life-cycle-of-a-plastic-bag accessed 5 March 2018

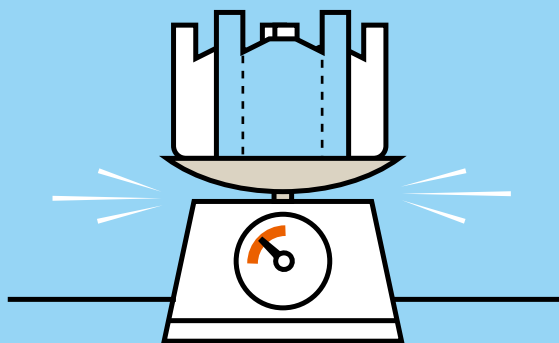
⁵ news.com.au/lifestyle/home/biodegradable-bags-arent-beter-than-regular-plastic-bags-senate-inquiry-report-finds/news-story/ accessed 5 March 2018

⁶ www.planetark.org accessed 5 March 2018

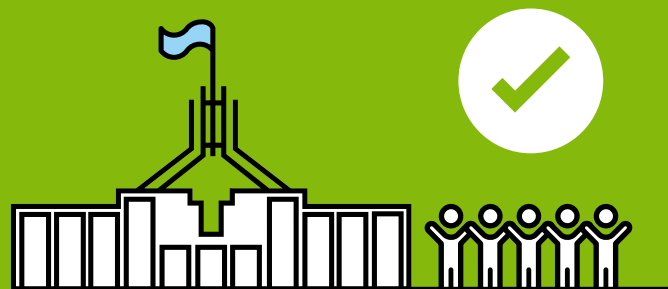
The Effectiveness of the ACT Plastic Bag Ban

The ACT plastic bag ban has been successful in reducing plastic bag consumption. This is discussed in detail in Chapter 6 of this report.

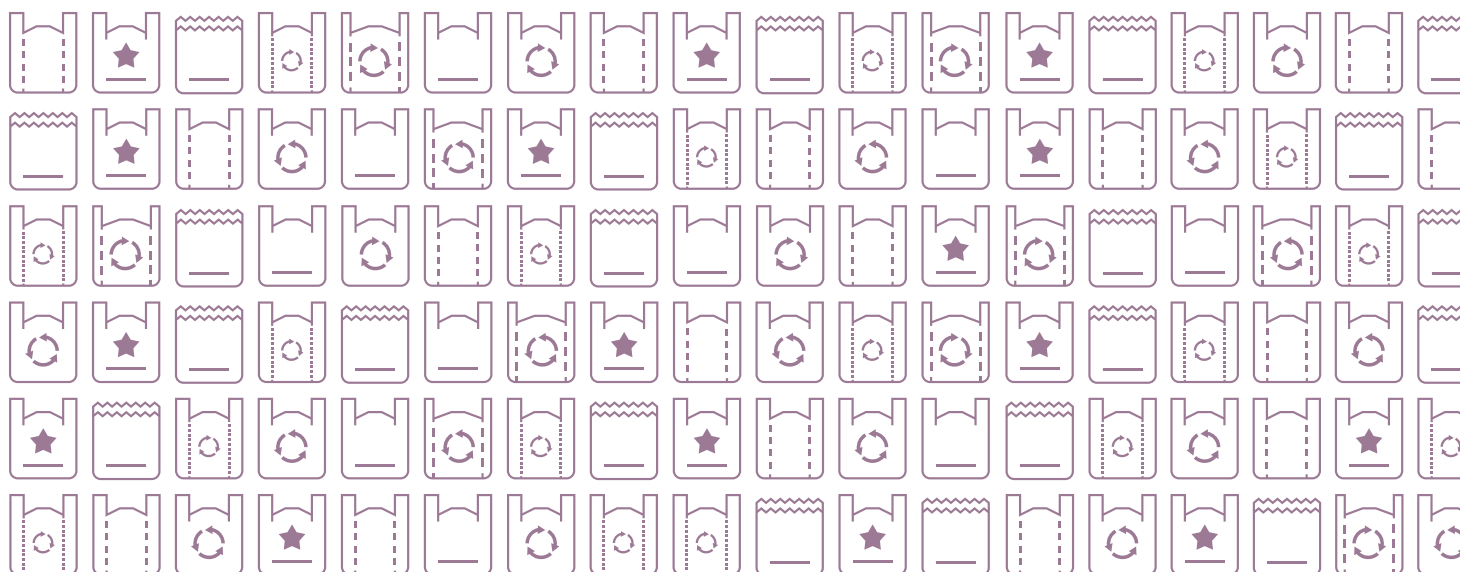
THE ACT PLASTIC BAG BAN HAS REDUCED OUR PLASTIC BAG USE:



BY **1132** TONNES
FROM 2011 – 2018



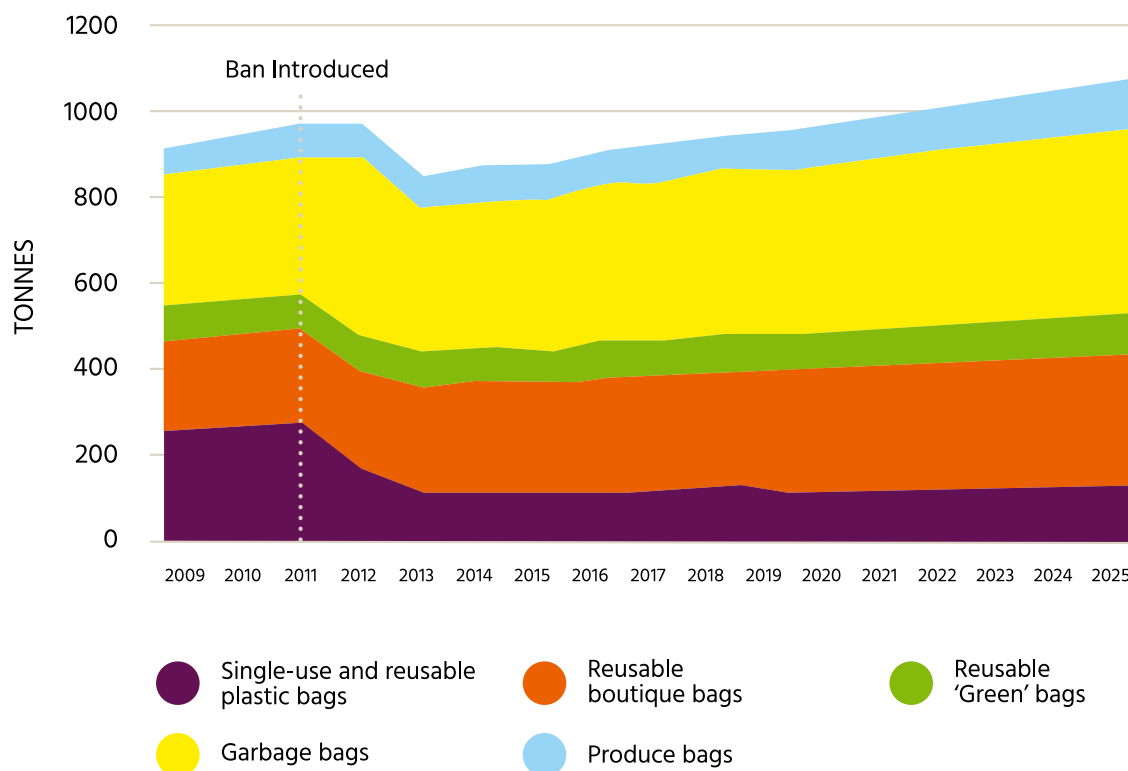
199 TONNES
IN 2017–18 ALONE
AROUND 55 MILLION PLASTIC BAGS



Cumulatively, plastic bag consumption over the period 2011–12 to 2017–18 was approximately 1,132 tonnes lower than it would have been if the ban was not introduced. The reduction in 2017–18 alone equates to approximately 199 tonnes of plastic bags consumed, the equivalent of around 55 million plastic bags.

As shown in Figure 1, while the ban has reduced plastic use in the Territory, as time passes consumption appears to be gradually returning to the levels seen prior to the ban's introduction. Consumption in 2017–18 was approximately 953 tonnes, compared to 973 tonnes in 2010–11. By the early 2020s, consumption is likely to pass pre-ban levels unless further policy measures are introduced.

FIGURE 1: ACT PLASTIC BAG BAN CONSUMPTION, TONNES, ESTIMATES 2008–09 TO 2017–18, THEN PROJECTIONS TO 2024–25



Source: Macintosh et al, ANU, 2018.

Challenges for Further Reform

There are two challenges associated with any proposed reforms to the plastic bag ban.

FRAMING THE PROBLEM

The first challenge is ambiguity about the nature of the environmental issues that the ban is designed to address. The primary purpose of the ACT bag ban appears to be to reduce the use of plastic bags.

There are several environmental reasons for trying to reduce plastic bag use, including:

- reducing production-related impacts,
- increasing community awareness about sustainability,
- reducing waste to landfill,
- reducing litter, and
- minimising plastic-related impacts on marine and terrestrial animals.

Greater clarity about the rationale behind the ban would facilitate improved analysis of its effectiveness and further consideration of alternative ways of addressing the specified environmental problems.

INFORMING A SOLUTION

The second challenge associated with reforming the plastic bag ban is the relative absence of information at a local and national level. There are material gaps and uncertainties in the information available on the ban and relevant environmental impacts. However, it is not clear what benefits we are seeking to prioritise by banning plastic bags.

Most significantly, there are limited data available on plastic bag consumption and trends. Surveys were used in this report to provide information on consumption in 2017–18. However, time series data on the consumption of different bag types are essential to inform analysis of the effectiveness of the ban. The generation and publication of this information would not only facilitate evidence-based policymaking but would also help non-government actors play a positive role in the governance of plastic bags.

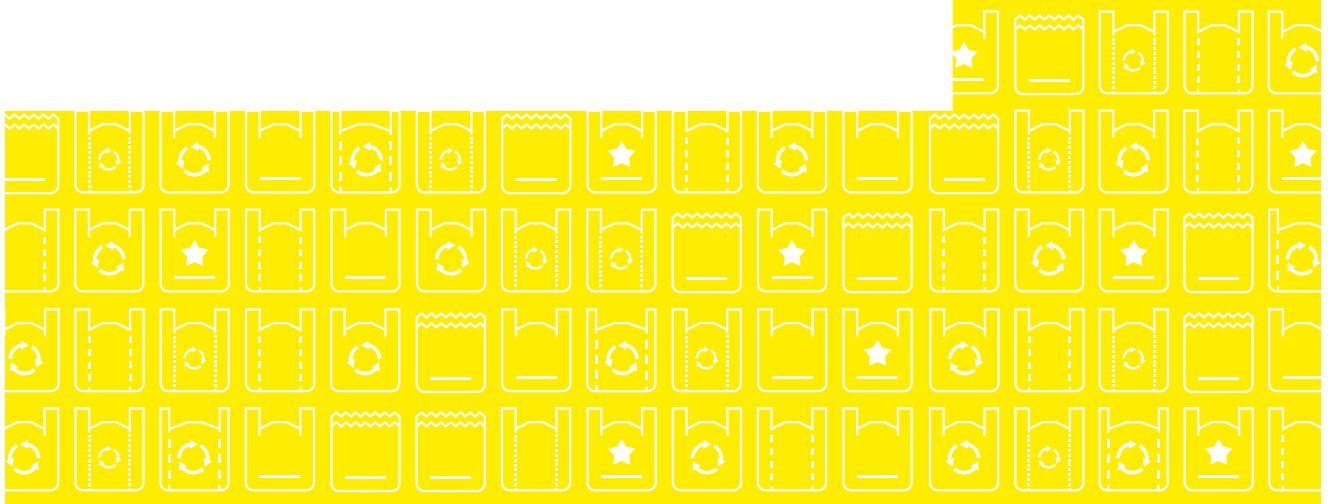
The barriers posed by the gaps in knowledge and information are not unique to the ACT. Several other studies have raised similar issues about the uncertainties associated with plastic bag consumption in Australia and plastic-related environmental impacts.³

10
–
11

³ Marsden Jacob Associates, *Plastic Bags Ban Options – Cost Benefit Analysis* (Victorian Government, 2016); B Hardesty et al., *Understanding Debris Sources and Transport from the Coastal Margin to the Ocean: Report to the Australian Packaging Covenant Organisation Ltd* (CSIRO, 2016).

2.

Recommendations



UNFANTASTIC PLASTIC 2018

RECOMMENDATIONS FOR THE ACT PLASTIC BAG BAN ACT

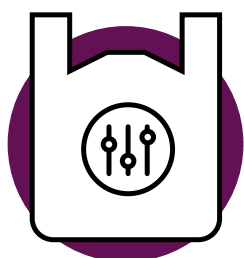


RECOMMENDATION 1 MANDATORY PLASTIC BAG DISCLOSURE REGIME

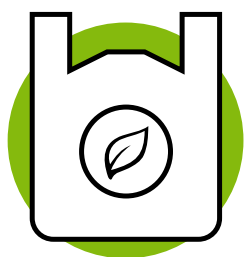


RECOMMENDATION 2 MINIMUM PLASTIC BAG PRICING

12
–
13



RECOMMENDATION 3 IMPROVED GOVERNANCE OF PLASTIC BAG REGULATION



RECOMMENDATION 4 RESEARCH SYNERGIES FOR COMPOSTABLE PLASTIC AND HOUSEHOLD ORGANIC COLLECTION

Recommendation 1 – Mandatory Plastic Bag Disclosure Regime

You can't manage what you can't measure.

Given the importance of information for effective design and implementation of policy, and the difficulties encountered in obtaining relevant data from retailers and bag distributors, it is recommended that a mandatory plastic bag disclosure regime be established in the ACT (Refer to Option 6, page 69).

This disclosure regime should require retailers who sell or distribute plastic bags in the Territory to report annually on bag sales and distribution, by bag type, size (volume) and mass. This data should be reported annually on a freely available public website. Prior to its establishment, further consultation should be undertaken with retailers to inform key design issues, particularly the scope of any exemptions and whether consumption data should be reported by retailer or in an aggregated form.

Recommendation 1: The ACT Government establish a mandatory plastic bag disclosure regime, which would require those retailers who sell or distribute plastic bags in the Territory to report annually on bag sales and distribution. Prior to its establishment, further consultation should be undertaken with ACT retailers to inform key design issues.

Recommendation 2 – Minimum Plastic Bag Pricing

Putting a price on unfantastic plastic.

The establishment of a mandatory disclosure regime is unlikely, on its own, to substantially reduce plastic bag consumption in the ACT. If there is a desire to significantly reduce plastic bag consumption, additional policy measures are likely to be necessary.

A mandatory minimum price (or levy) is the best available option currently to further reduce plastic bag consumption. A legislated minimum price would not be characterised as a tax, and therefore bring no constitutional complications (Refer to Option 5, page 66).

Ideally, the price would be based on bag mass, set at a relatively low level initially and introduced in stages starting with shopping bags. The minimum price would be designed to prompt behavioural change through a 'nudge' rather than by a material change in the economic incentives faced by consumers.¹

This approach would ensure there is a small but consistent incentive to reduce bag consumption across all types of plastic bags.

Provided the price was set at an appropriate level, the financial impacts on most retailers and households are likely to be small. Further, most retailers already charge for plastic bags, and many retailers and consumers anecdotally appear to believe the plastic bag ban requires plastic bags to be priced – which is currently not correct.

Government should consider applying this price to biodegradable and compostable plastic bags as well. This reflects that these bags do not address the impacts of

plastic pollution. This is consistent with the recent moves by Australian jurisdictions that are banning biodegradable and compostable bags similarly to single-use bags (refer to page 20).

Prior to the introduction of the mandatory minimum price, consultation should be undertaken with retailers on the scope and quantum of the price, particularly those that provide plastic bags for hygiene and safety reasons. Further consideration should also be given to how a mandatory minimum price might affect low income households and what measures could be put in place to mitigate impacts on vulnerable groups.

Recommendation 2: If there is a desire to further reduce plastic consumption, the ACT Government should introduce a mandatory minimum price on plastic bags and consider applying this equally to biodegradable and compostable bags.

The price should be based on bag mass and be designed to prompt behavioural change through a 'nudge' rather than by a material change in the economic incentives faced by consumers.

¹ R Thaler and C Sunstein, *Nudge: Improving Decisions about Health, Wealth and Happiness* (Yale University Press, 2008); N Rivers, S Shenstone-Harris and N Young (2017) 'Using nudges to reduce waste? The case of Toronto's plastic bag levy', *Journal of Environmental Management* 188, 153-162.

Recommendation 3 – Improved Governance of Plastic Bag Regulation

Clarity of roles affords focus in efforts.

Responsibilities for waste and litter related issues in the ACT Government are currently divided between Transport Canberra and City Services, the Environment, Planning and Sustainable Development Directorate, and Access Canberra. Transport Canberra and City Services is responsible for waste management and the administration and enforcement of the Litter Act 2004. The Environment, Planning and Sustainable Development Directorate is responsible for the oversight of the Plastic Shopping Bags Ban Act 2010, while responsibility for the enforcement of the ban rests with Access Canberra.

Despite this governance structure, there is a degree of uncertainty and ineffectiveness about the division of responsibilities related to the administration of the plastic

bag ban. To ensure the effective implementation of current and future plastic bag policy in the Territory, we recommend the ACT Government provide greater clarity about the division of responsibilities between relevant government agencies, particularly in relation to compliance and enforcement.

Recommendation 3: The ACT Government review and confirm the optimal division of responsibilities between government agencies for the regulation of plastic bags in the ACT.

Recommendation 4 – Research synergies for compostable plastic and a household organic collection scheme

Research is creating new knowledge.

This review has highlighted the endemic ‘confusion’ around the merits of biodegradable and compostable plastic bags.

Due to concerns about the inadequate environmental performance of biodegradable and compostable bags, Western Australia, Victoria² and Queensland have proposed to ban these bags.

Linking a mandatory compostable bag requirement to the proposed new food and garden organics (FOGO) collection and composting service would mitigate some of these associated environmental risks (Refer to Option 3, page 60). This is the subject of research now in South Australia.

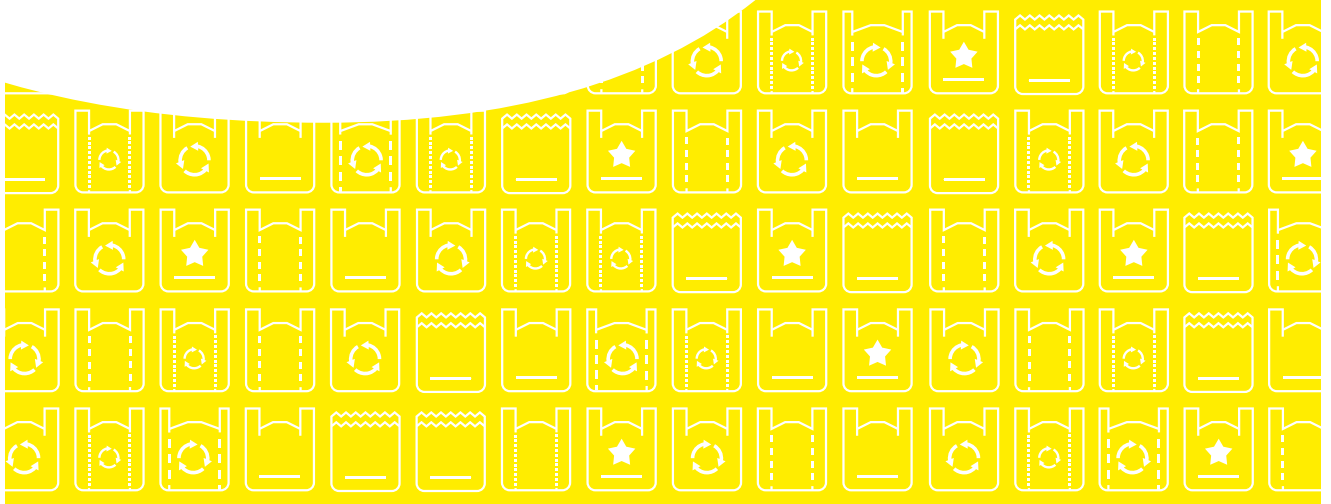
Recommendation 4: The ACT Government research synergies for introducing compostable plastic, primarily into packaging of organics, to supplement the proposed ACT household organic collection scheme.

14
–
15

² <https://www.insideretail.com.au/news/victoria-to-ban-plastic-bags-next-year-201806> accessed 29 June 2018

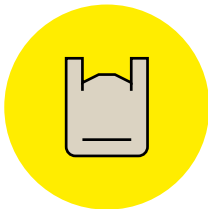
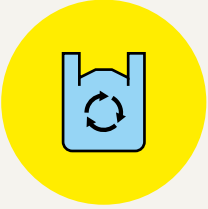
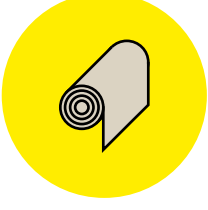

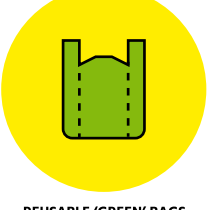
3.

Types of Plastic Bags





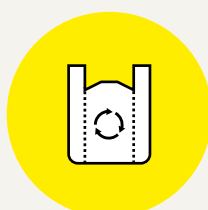
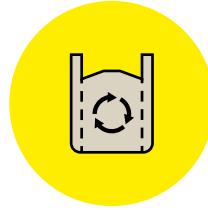
The main types of bags discussed in this report are described in Table 1. HDPE and LDPE stand for high density polyethylene and low density polyethylene respectively. In practice (and potentially confusingly) the thin bags are normally made with HDPE and thicker bags are made with LDPE.¹

TABLE 1: MAIN TYPES OF BAGS DISCUSSED IN THIS REPORT²

TERMINOLOGY USED IN THIS REPORT FOR TYPE OF BAG	DESCRIPTION	ICON
Single-use plastic bags	<p>Typically, grey or white singlet type plastic bags made of HDPE that are less than 35 microns (μm) in width and weigh between 5–8 grams.</p> <p>Grey fossil fuel-based single-use plastic bags are commonly distributed at supermarkets in jurisdictions without plastic bag bans (e.g. NSW).</p>	 <p>SINGLE-USE PLASTIC BAGS</p>
Reusable plastic bags	<p>Typically, white singlet type plastic bags made of HDPE that are equal to or greater than 35 microns in width.</p> <p>In the ACT, 35 microns plastic bags weighing around 14 grams are distributed at many smaller supermarkets, grocery stores, food markets and restaurants.</p> <p>These bags are often labelled as reusable but are frequently treated as single-use bags.</p>	 <p>REUSABLE PLASTIC BAGS</p>
Produce bags	<p>Also known as barrier bags, produce bags are made of either HDPE or LDPE, are typically sold in rolls and are commonly used to package and carry fresh produce, including fruit, vegetables and various types of meats.</p> <p>Produce bags typically weigh around 2.5 grams.</p> <p>In the ACT, produce bags are provided to shoppers without charge at most supermarkets, grocery stores and food markets.</p>	 <p>PRODUCE BAGS</p>
Reusable boutique bags	<p>Thicker bags (~40–60 microns) made of LDPE that typically weigh between 25–50 grams that are sold or distributed at supermarkets, department stores and other retailers.</p> <p>Branded reusable boutique plastic bags are sold at major supermarkets in the ACT for around 15 cents.</p> <p>Boutique plastic bags are also provided without charge at many department stores.</p>	 <p>REUSABLE BOUTIQUE BAGS</p>
Reusable 'green' bags	<p>Technically known as non-woven polypropylene bags, reusable polypropylene bags generally weigh around 70 grams (~100 grams with the plastic base) and are sold at supermarkets and other retail outlets for around \$1.</p> <p>They are known colloquially as 'green bags', even though they are now sold in a range of colours.</p>	 <p>REUSABLE 'GREEN' BAGS</p>

¹ <http://www.plasticshirtbag.com/difference-hdpe-ldpe.html> accessed 26 June 2018

² K O'Farrell, *LCA of Shopping Bag Alternatives: Report to Zero Waste South Australia* (Hyder Consulting Pty Ltd, 2009); and Macintosh et al, ANU, 2018

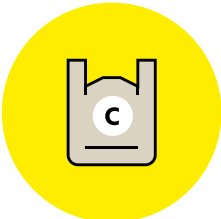
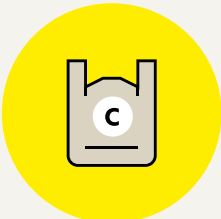
TERMINOLOGY USED IN THIS REPORT FOR TYPE OF BAG	DESCRIPTION	ICON
Garbage bags	Household garbage bags are made of either HDPE or LDPE and come in various sizes, from smaller 12–15 litre kitchen tidy bags, larger 35–50 litre bin liners through to 75–80 litre rubbish bags.	 GARBAGE BAGS
Paper bags	<p>Paper bags can be used for carrying grocery and other shopping items. They are often made (at least partly) of recycled pulp.</p> <p>Paper carry bags (15–20 litre 40–50 grams) are rarely offered by supermarkets in the ACT.</p> <p>Most paper bags available at grocery stores are smaller bags for specific items (e.g. alcohol, bread and mushrooms). Paper bags are more commonly offered in department, clothing and liquor stores.</p>	 PAPER BAGS
Calico bags	<p>Calico bags are made of cotton and are generally heavier than plastic bags (at around 80–90 grams).</p> <p>These are sold at various stores in the ACT.</p>	 CALICO BAGS
Jute bags	<p>Jute bags (or hessian) are made of jute fibre and are sold at various stores to carry shopping items.</p> <p>Jute bags are typically sold for \$3-\$4 at supermarkets.</p>	 JUTE BAGS

The term ‘degradable’ when used in the context of plastics is unhelpful as all plastics degrade through physical, chemical or organic processes.

The critical issues are the speed at which they degrade and what they degrade into. The five main types of

‘degradable’ plastic bags are described in Table 2. Some of these bags are produced using chemical additives. The implications of these bags are discussed further on page 60 of this report.

TABLE 2: DEGRADABLE PLASTIC BAGS – MAIN CLASSIFICATIONS³

BAG TYPE	DESCRIPTION
 <p>Biodegradable plastic bags</p> <p>COMPOSTABLE & BIODEGRADABLE PLASTIC BAGS</p>	<p>These are made of plastics typically produced from a combination of organic materials (e.g. starch and cellulose) and chemical additives that degrade into carbon dioxide, methane, biomass, water and mineral salts in a specified time because of the action of microorganisms.</p>
 <p>Compostable plastic bags</p> <p>COMPOSTABLE & BIODEGRADABLE PLASTIC BAGS</p>	<p>These are made of a type of biodegradable plastic that degrades under prescribed composting conditions at rates comparable with other compostable materials.</p> <p>Composting involves accelerated decomposition of materials through the action of microorganisms under aerobic (in the presence of oxygen) conditions.</p>
Oxo-biodegradable plastic bags	<p>These plastics include additives that cause accelerated oxidative degradation triggered by ultraviolet light and/or heat.</p>
Photodegradable plastic bags	<p>These plastics degrade when exposed to ultraviolet light.</p> <p>This process can be accelerated by the inclusion of additives in the plastic.</p>
Water-soluble plastic bags	<p>These plastics dissolve in water within a specific temperature range and then biodegrade.</p>

³ H Sawada (1998) ‘ISO standard activities in standardisation of biodegradability of plastics – development of test methods and definitions’, *Polymer Degradation and Stability* 59, 365-370; J Song et al. (2009) ‘Biodegradable and compostable alternatives to conventional plastics’, *Philosophical Transactions of the Royal Society B* 364, 2127–2139; K O’Farrell, *LCA of Shopping Bag Alternatives: Report to Zero Waste South Australia* (Hyder Consulting Pty Ltd, 2009); N Thomas et al., *Assessing the Environmental Impacts of Oxo-degradable Plastics Across their Life Cycle: Report for the UK Department for Environment, Food and Rural Affairs* (Loughborough University, 2010).

Case Study

BIODEGRADABLE AND COMPOSTABLE – WHAT ARE THE BENEFITS?

A 2016 Senate Inquiry into the threat of marine plastic pollution in Australia considered the merits of enforcing biodegradable and compostable bags to reduce plastic pollution.⁴

The Environment and Communications Committee observed that these types of plastic bags may significantly contribute to ongoing plastic pollution and create confusion in the public realm.

Dr Kathy Townsend, an academic marine biologist at the University of Queensland, Australia, commented in the inquiry:

'Unfortunately, degradable and biodegradable are interchangeable in the minds of the general public. They find that very confusing and often feel that they are doing the right thing, when in fact they are not.'

Several experts pointed to research that showed no difference between degradable, biodegradable and normal plastic bags in terms of their environmental impacts, unless they are disposed of in commercial composting units.

The inquiry noted that degradable and biodegradable bags can make microplastics available to animals much faster than would otherwise be the case.

A number of witnesses also expressed concern that degradable plastics do not encourage social change.

Doctor Lavers, a Research Scientist at the Institute for Marine and Antarctic Studies at University of Tasmania, stated that support for degradable plastic *'encourages the status quo and it encourages people to continue to treat plastic, which is a non-renewable resource, like a disposable item.'*

Reflecting these concerns, plastic bag ban regulations proposed in Western Australia, Queensland and Victoria include degradable, biodegradable, and compostable plastic bags less than 35 microns in their bans.

Please refer to page 60 for further related information on biodegradable and compostable bags.

Case Study

PARLIAMENT OF YOUTH 2018: WHICH BAG DOES OUR YOUTH CHOOSE?

Students from Kindergarten to Year 12 attended the 2018 Parliament of Youth on 4 June 2018.

The annual event, organised by SEE Change,⁵ called for students to present proposals on one initiative to make Canberra more sustainable.



At the Commissioner's booth, students were asked "Which bag do you choose and why?"

All students recognised the need to have a bag that was reusable.

They did not distinguish between single-use plastic bags, reusable plastic bags and degradable plastic bags. No students selected any of these, believing them all to be 'bad' options.

Interestingly, the most popular bag was the calico bag, followed by a bag made of recycled fabric from Boomerang Bags.

⁴ The Senate, 2016: *Toxic Tide: the threat of marine plastic pollution in Australia*

⁵ <http://www.see-change.org.au/> accessed 26 June 2018

BOOMERANG BAGS: A COMMUNITY DRIVEN CIRCULAR ECONOMY FOR BAGS

Boomerang Bags is an Australian community based initiative to provide a free, fun and sustainable alternative to plastic bags.⁶ The bags are made from donated recycled materials by local community members who volunteer their time to sew the bags.

These are then distributed for free amongst the community with the idea being that they are 'borrowed and reused.'



Boomerang Bags at The Market, Wanniasa. Source Kirilly Dickson

Since starting in NSW in 2013 Boomerang Bags has expanded globally and is starting to gain traction in the ACT. The Canberra Environment Centre ran the first local sewing workshop in April 2017. The Market Wanniasa and IGA Ainslie have recently started to stock Boomerang Bags, but more bags are needed.

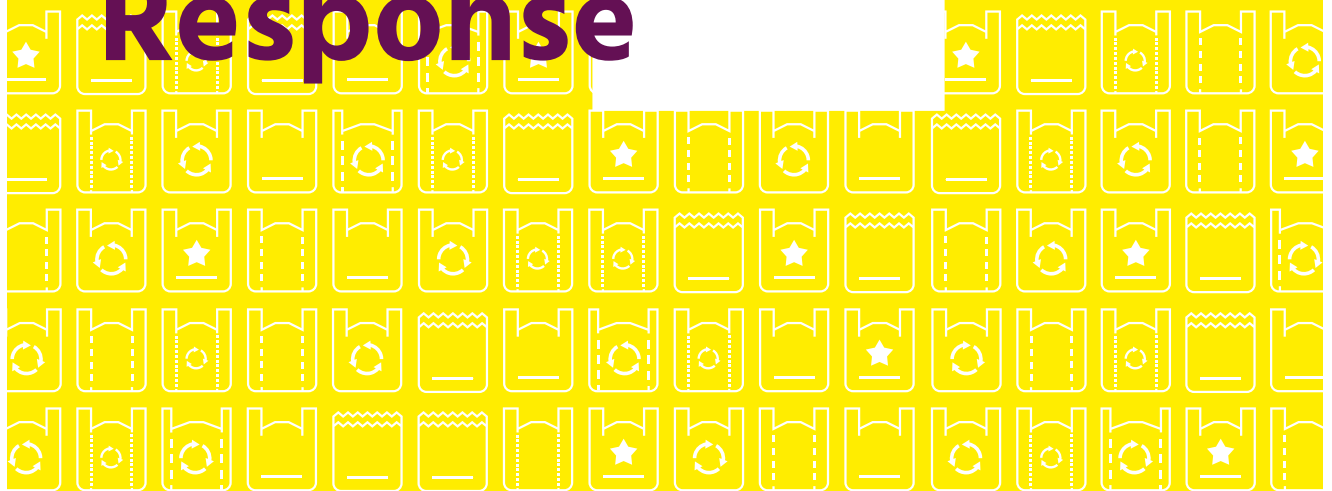
A group of volunteers meet about once a month at the Canberra Environment Centre. If you are interested in participating, email them at: boomerangbagscanberra@gmail.com

This concept reflects principles of the Circular Economy which is discussed further on page 35–37.

6 <http://up2us.org.au/wp-content/uploads/2017/09/Boomerang-bags-case-study.pdf> accessed 27 June 2018

4.

The ACT and Australian Response



A Brief Overview of ACT Waste Policy

The ACT Government produced its first Waste Management Strategy in 1996 after the community expressed a strong desire to achieve a waste free society.¹ This strategy established the ACT as the first government in the world to set the ambitious goal of achieving no waste to landfill.

An updated strategy, *ACT Waste Management Strategy – Towards a sustainable Canberra 2011–2025*, was released in 2011 and developed with extensive community consultation.² This strategy set a target of diverting 90 per cent of waste from landfill by 2025 and achieving a carbon neutral waste sector.

A *Roadmap*³ towards achieving the 2011–2025 strategy goals is currently under consideration and steps out four main recommendations:

1. Promoting better waste management behaviour
2. Diverting organics from landfill
3. Support and develop industry
4. Considering waste-to-energy options

Included in the Roadmap is a plan to divert about 40,000 tonnes of organic waste from landfill each year under a proposal to collect food scraps in kerbside bins.



ACT Kerbside Bins. Source Kirilly Dickson

The ACT Plastic Shopping Bags Ban Act 2010

The *Plastic Shopping Bags Ban Act 2010*⁴ came into effect in the ACT on 1 November 2011.

The primary purpose of this legislation has been to reduce the use of plastic bags and their impact on the environment.

The Act specifically bans the supply of single-use shopping bags made of polyethylene (referred to as plastic) with a thickness of less than 35 microns (a micron is 1,000th of a millimetre).

The Act does not ban:

- the supply of biodegradable and compostable shopping bags,
- produce bags used to separate fresh fruit, vegetables and meat products, or
- bags that are an integral part of a product's packaging.

The ACT plastic bag ban was reviewed in 2012 and 2014.⁵

Both of these reviews found that the ban has been successful in reducing the amount of plastic bag waste in the Territory.

Plastic Bag Bans in Australia

In Australia, four jurisdictions have imposed similar regulatory plastic bag bans: South Australia, ACT, Northern Territory and Tasmania.

South Australia was the first Australian jurisdiction to introduce a plastic bag ban in 2009, followed by the Northern Territory and ACT in 2011 and Tasmania in 2013.⁶

Plastic bag bans in Queensland and Western Australia came into effect from 1 July 2018. Victoria announced in October 2017 that it would also ban plastic bags and is currently undertaking consultation.

The only state not to commit to a ban is New South Wales. However there are several towns in New South Wales that have independently introduced plastic bag bans including Kangaroo Valley, Mogo, Oyster Bay and Huskisson. In fact, in 2012, Huskisson was the winner of Keep Australia Beautiful's Clean Beaches award.⁷

1 <https://www.tccs.act.gov.au/recycling-and-waste/about/waste-management-strategy> accessed on 31 Jan 2018

2 2011 ACT Government: *ACT Waste Management Strategy – Towards a sustainable Canberra 2011–2025*

3 ACT Government, 2018: *Waste Feasibility Study: Roadmap and Recommendations Discussion Paper May 2018*

4 <http://www.legislation.act.gov.au/a/2010-49/current/pdf/2010-49.pdf> accessed 8 May 2018

5 <https://www.environment.act.gov.au/waste/plastic-bag-ban/reviews-and-community-survey-results> accessed 27 June 2018

6 <https://www.theguardian.com/environment/2018/jan/30/single-use-plastic-bags-ban-under-scrutiny-as-shoppers-switch-and-ditch-reusables> accessed 2 Feb 2018

7 <http://knsbw.org.au/plastic-bag-free-towns-in-nsw/> accessed 2 July 2018

The Australian bans generally apply a minimum thickness of 35 microns. A recent variation on the existing bans is to extend the ban to include biodegradable and compostable bags. This reflects the observation that these types of bags are not currently effective in reducing pollution impacts.

TABLE 3: EXISTING STATE AND TERRITORY POLICIES ON LIGHTWEIGHT PLASTIC BAGS, AS AT JULY 2018*

STATE	LEGISLATION	BAN START DATE	SCOPE OF REGULATORY BAN
South Australia	<i>Plastic Shopping Bag (Waste Avoidance) Act 2008</i>	4 May 2009	<p>s 3: ‘plastic shopping bag’ defined as any carry bag, with handles, ‘the body of which comprises (in whole or in part) polyethylene with a thickness of less than 35 microns’ or as prescribed in regulations.</p> <p>Specifically excludes biodegradable bags and any ‘plastic bag that constitutes, or forms an integral part of, the packaging in which goods are sealed prior to sale’.</p>
Northern Territory	<i>Environment Protection (Beverage Containers and Plastic Bags) Act 2011</i>	1 September 2011	<p>s 51: defines a ‘prohibited plastic bag’ as any carry bag, with handles, ‘the body of which comprises (in whole or in part) polyethylene with a thickness of less than 35 microns’ or as prescribed in regulations.</p> <p>Specifically excludes biodegradable bags and any ‘plastic bag that is, or forms an integral part of, the packaging in which goods are sealed prior to sale’.</p>
ACT	<i>Plastic Shopping Bags Ban Act 2010</i>	1 November 2011	<p>s 6: ‘plastic shopping bag’ defined as ‘a bag that is made (in whole or in part) of polyethylene with a thickness of less than 35 microns’, or as prescribed in regulations.</p> <p>Specifically excludes biodegradable bags, integrated packaging and produce bags.</p>
Tasmania	<i>Plastic Shopping Bags Ban Act 2013</i>	1 November 2013	<p>s 3: ‘plastic shopping bag’ defined as a bag ‘made, in whole or in part, of polyethylene with a thickness of less than 35 microns’, or as prescribed in regulations.</p> <p>Specifically excludes biodegradable bags, integrated packaging and produce bags.</p>
Queensland	<i>Waste Reduction and Recycling Act 2011</i>	1 July 2018	<p>s 99B: defines ‘banned plastic shopping bag’ as ‘a carry bag with handles ... made, in whole or in part, of plastic (whether or not the plastic is degradable) that has a thickness of less than ... 35 microns’, or as otherwise defined in regulations.</p> <p>Specifically excludes produce bags and integrated packaging.</p>
Western Australia	<i>Environment Protection Act 1986</i>	1 July 2018	<p>The ban will be implemented through regulations made under the <i>Environment Protection Act</i>. At the time of writing, the regulations had not been released. However, information published by the Department of Water and Environmental Regulation indicates it will apply to all plastic bags with handles that are ≤ 35 microns, including degradable, biodegradable and compostable plastic bags.</p>

Source: Cited statutes and WA Department of Water and Environmental Regulation, *Frequently Asked Questions: Western Australia’s Ban on Lightweight Plastic Bags* (Western Australian Government, 2018).

Emerging Reform on Plastics at the Federal Level

The Senate Standing Committee on Environment and Communications Inquiry into waste and recycling, delivered its report “*Never waste a crisis: the waste and recycling industry in Australia*”⁸ in June 2018.

The Inquiry was established in August 2017 following the exposé by Four Corners, “Trashed”, where the emerging waste and recycling crisis was examined. The impetus of this investigation was later augmented by China’s import ban on Australian recyclables, where one of the significant issues is ‘contamination’ of the waste stream at source.

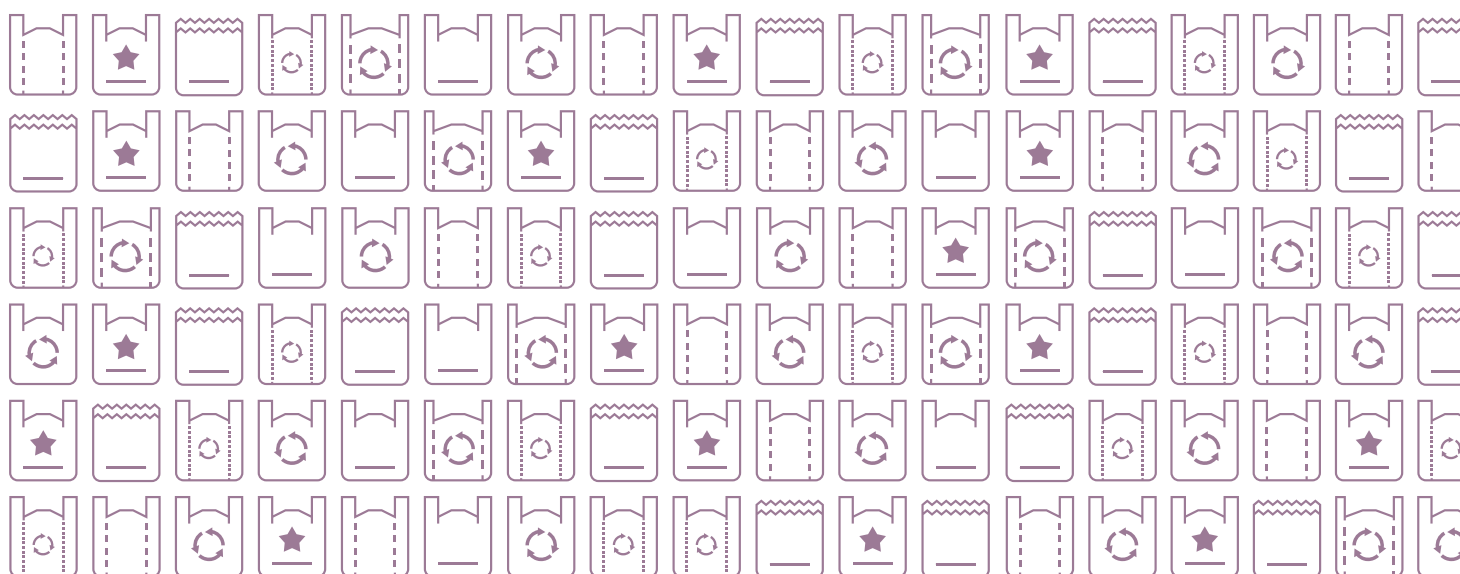
The Senate Committee report has called for an Environmental Ministers commitment to a phase-out of single-use plastics – plastic bags, takeaway containers, plastic-lined coffee cups and chip packets – by 2023.

If accepted by government, this plastic ban will overlay and expand on the existing state legislation that currently focuses only on plastic bags.

25

–

25



8 The Senate, 2018: *Never waste a crisis: the waste and recycling industry in Australia*



The ACT's plastic bag ban: was it worth it and where to from here?

Bruce Edgerton, Principal Waste Management Consultant, AECOM; formerly ACT Government. B.Eng (Chemical). MBA.

WAS IT WORTH IT – LITTER REDUCTION AND BEHAVIOURAL CHANGE?

Plastic bags represent less than 1 per cent of the waste going to landfill. Hence, banning them makes no discernible impact on waste generation or the need for new landfills.⁹

From a policy perspective, plastic bag bans have two main benefits. One of these is **litter reduction**.

Plastic bags make up a relatively small amount of the litter stream in Australia.¹⁰ However, they can have more impact on our drains and water ways than other forms of litter. Grey, single-use plastic bags also have a disproportionate impact on sea turtles due to their unique ability to float through the ocean looking remarkably like a jelly fish.¹¹

Plastic litter over the last 50 years has washed into the ocean and led to garbage patches forming in the ocean gyres. These plastics are breaking down into microplastics, which provide a pathway for various compounds of concern, such as heavy metals, to enter the food chain. However, the Australian plastic bag bans will make no material difference to the growth rate of the plastic garbage patches nor to the problem of microplastics.¹²

Does this make the ACT's plastic bag ban pointless? Not at all.

The ban has placed a relatively **modest burden on shoppers**. Polling suggested shoppers support the bans, so much so that Woolworths and Coles have decided to extend the model nationally, including to the two most populous Australian states, neither of which currently have a plastic bag ban.

The ban can play a role in **educating consumers** about the problems of a "disposable" "single-use society" and help them engage in behaviour changes that could make a difference.

As with climate change policy, Australia needs to act if it is to have a credible voice in global efforts to address global problems. Australia can and should demonstrate policy interventions to address plastic pollution to waterways and single-use products that are difficult to recycle. The plastic bag bans are a small step in this direction, initially undertaken by states and territories in the absence of national leadership.

Continuing the analogy with climate change, the problem of plastic waste polluting our oceans is a global one. Australians wishing to make a difference need to act locally as part of a wider international approach.

State and territory plastic bag bans must not lead individuals and households to feel the plastic pollution problem is solved and nothing more needs to be done. Otherwise they are actually detrimental to global progress towards sustainability.

WHERE TO FROM HERE?

Levies and mandatory charges

A number of jurisdictions in the UK and Europe as well as San Francisco in the USA have introduced either a **levy or a mandatory minimum charge** for businesses providing shopping bags to customers.

International experience shows that this **price signal** is very effective in reducing plastic bag consumption.

A levy has the additional benefit of raising funds that can be used to address the wider issue of other plastic entering the waterways.

Arguably, an ACT specific plastic bag levy would create a significant regulatory burden for local businesses and would be expensive for the Territory to administer relative to the amount of money it would raise. This would not be the case were the Commonwealth to apply a national bag levy to the small number of plastic bag manufacturers or importers.

In the absence of a national levy, the ACT could introduce a mandatory minimum fee for the distribution of shopping bags. This could also be applied to department store bags. Such a fee would further reduce the consumption of plastic bags and reinforce the educational benefits, consistently **rewarding people** who bring their own shopping bags.

Biodegradable bags and the organics bin

Several voices in the plastic bag debate have argued that conventional plastic (polyethylene) bags be replaced with biodegradable bags. This would be poor policy.

9 Mass balance estimate based on the ACT using 80 million bags/year before the ban, weighing 18g each and the ACT landfilling 220-300,000 tonnes of waste a year.

10 <http://kab.org.au/litter-research/national-litter-index/> accessed 15 May 2018

11 Schuyler *et al.* Mistaken identity? *Visual similarities of marine debris to natural prey items of sea turtles*. BMC Ecology 2014, 14:14 <http://www.biomedcentral.com/1472-6785/14/14> accessed 15 May 2018

12 Based on Australia's population, GDP or waste generation as a proportion of global population, GDP or waste generation.

Biodegradable bags are not only more expensive, but using current technologies and agricultural feedstocks, they have a greater environmental burden than conventional bags.

Biodegradable bags do not break down rapidly enough to spare turtles, and they do still break down to microplastics in the oceans.

Biodegradable plastics also degrade faster in landfill than their synthetic counterparts – creating more greenhouse gas emissions.

To have a benefit, biodegradable bags need to be composted, rather than sent to landfill. Commercial composting facilities would struggle to identify biodegradable bags amongst the other plastic contamination.

There may be an application where biodegradable bags could make a positive difference however – in relation to produce bags.

Produce bags are the bags provided for your unpackaged fruit and veggies. Due to their health and convenience benefits, no Australian jurisdiction is banning these bags.

In May 2018 the ACT Government released a discussion paper outlining a “roadmap” for new waste services and infrastructure.¹³ This paper recommends the Government include household food and organic waste collection services.

If biodegradable produce bags were mandated, the community would have a free source of bin liners readily available for their kitchen scraps. Householders could pick up their spoilt fruit and vegetables directly from the fridge, still in the produce bag, and place it in the organics bin without causing contamination. This could greatly increase community participation to food-waste capture and composting rates.

For biodegradable produce bags to be effective they would need to be coloured and labelled in a unique manner to support public education and to enable the downstream composting facility to easily identify which soft plastic needs to be removed and which can safely remain.

IS THERE A ROLE FOR WASTE TO ENERGY?

Single-use plastic bags, and their common reusable plastic bag replacement, are made from polyethylene (so called “soft plastic”) and there are currently no significant¹⁴ recycling markets in Australia for soft plastics. These soft plastics represent over 5 per cent of the waste going to landfill and this category of waste is increasing.¹⁵ Soft plastics could be collected for use in local or international waste to energy facilities or cement kilns.

Soft plastic could also be catalytically cracked¹⁶ and refined into transport and aviation fuels. From an environmental life cycle perspective and from the perspective of techno-economic market analysis this is a sustainable option.

However, as recent proposals for a small plastics-to-fuel plant in the ACT demonstrated – sections of the community are not on-board with waste to energy and the benefits do not seem to be widely understood.¹⁷

This leaves product stewardship as an effective policy intervention.

PRODUCT STEWARDSHIP

Product stewardship is where companies involved in producing, distributing or selling products work to ensure that those products are appropriately managed throughout their life cycle – typically by finding and funding sustainable pathways back into the **circular economy**, diverted away from landfill.

An effective product stewardship scheme for all soft plastic would ensure the companies that make and use film plastics take responsibility for developing sustainable markets for this waste. A packaging product stewardship program could require companies producing waste that turns up in our litter stream (as measured by national litter audits) to contribute proportionally to litter clean-up activities and education campaigns.

Research shows State and Territory product stewardship schemes can be inefficient and impose an unnecessarily high regulatory burden especially when compared to national schemes. So, with regards to plastic bags and other packaging the ACT is best to focus on achieving national action on packaging while supporting the existing voluntary programs (such as Redcycle) through purchasing and facilitating greater retailer participation.

CONCLUSION

The ACT plastic bag ban has achieved a number of local benefits.

It has helped progress the national movement to phase out single-use plastic bags even though its overall impact is modest.

A more comprehensive approach is needed to address the issues of plastic pollution and achieve a **circular economy** across Australia and globally.

The ACT has a role to play in this transition and the Territory can continue to show real leadership pioneering initiatives that demonstrate pathways towards a sustainable economy.

13 ACT Government, 2018: *Waste Feasibility Study: Roadmap and Recommendations Discussion Paper May 2018*

14 There are some companies using soft plastics to make products like public benches and bollards e.g. the REDcycle initiative. However, these markets are much smaller than the quantity of soft plastic being produced.

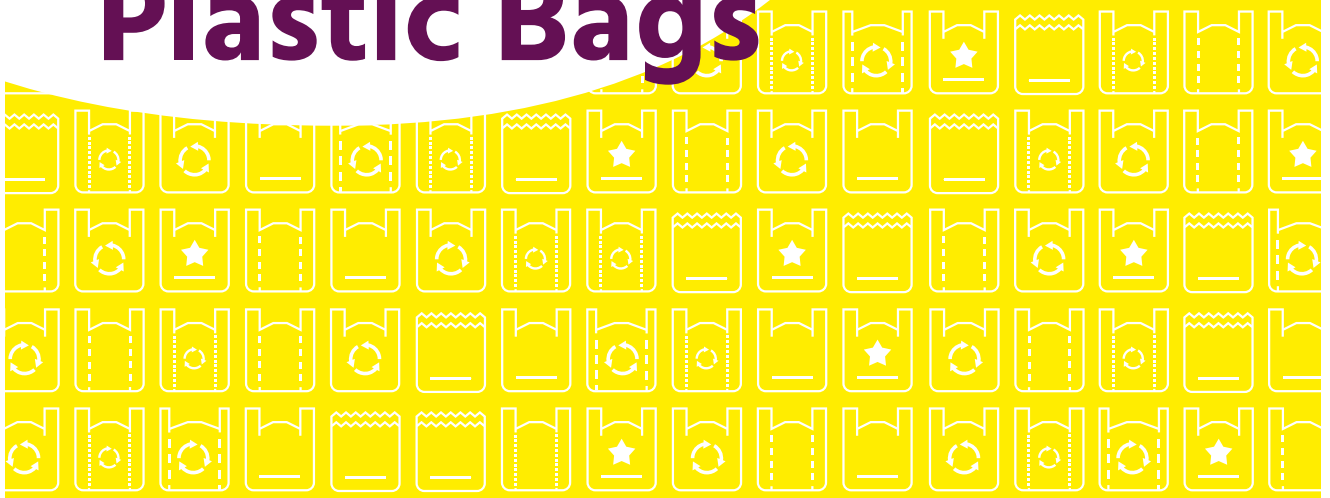
15 <https://www.tccs.act.gov.au/recycling-and-waste/about/reports-audits>

16 Catalytic cracking is widely used in petroleum refineries to convert the heavy oils and tars into shorter chain products such as petrol, diesel, aviation gas and lighter fractions such methane, ethane, LPG and naphtha.

17 <https://www.canberratimes.com.au/national/act/proposed-act-plastic-to-fuel-plant-to-be-investigated-by-expert-health-panel-20170111-gtphay.html> accessed 15 May 2018

5.

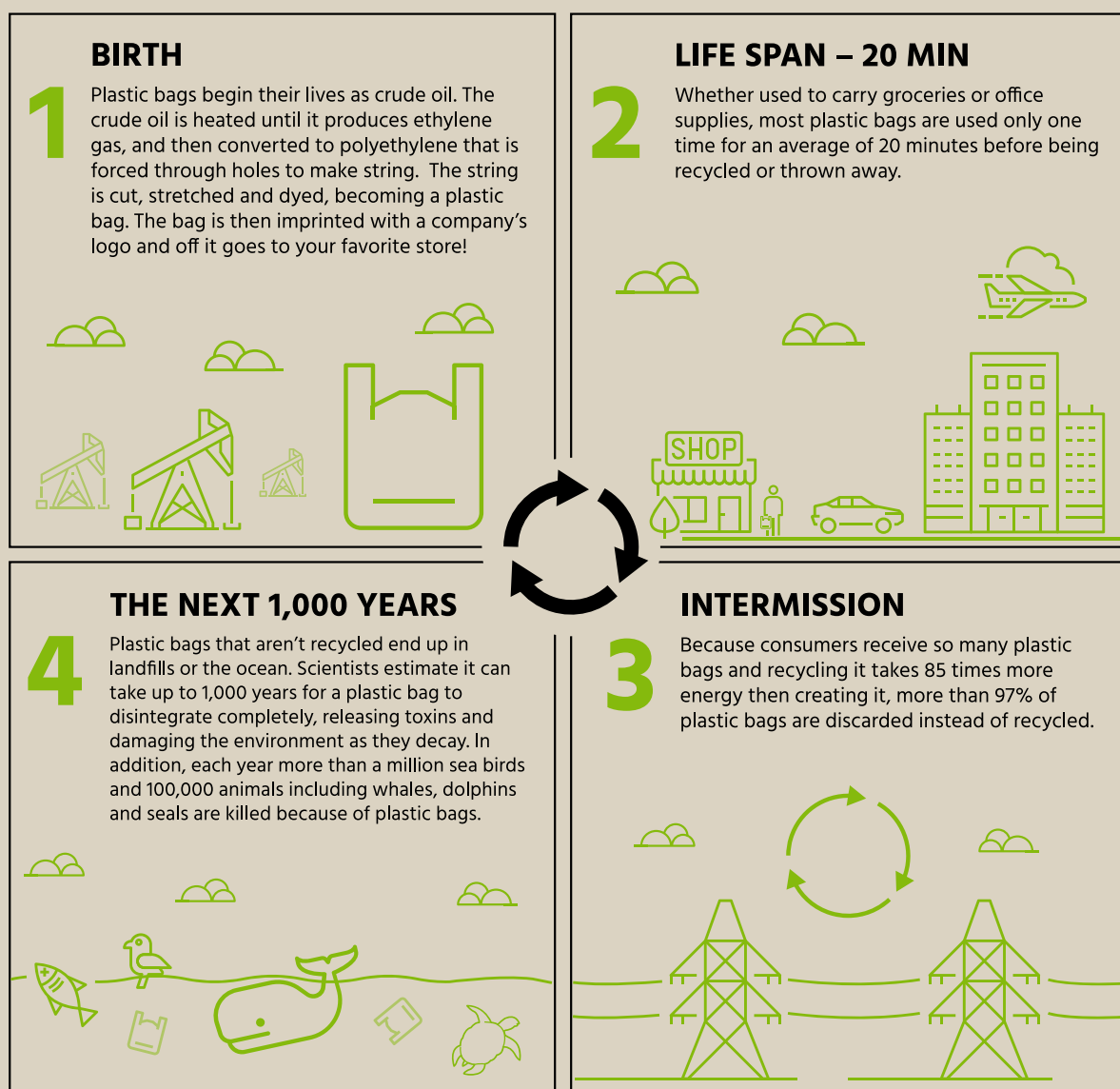
Environmental Impacts of Plastic Bags



Arguably, the most significant environmental issues associated with plastic shopping bags relate to their management during the end-of-life phase of the product.

THE LIFE CYCLE OF A PLASTIC BAG

**5 TRILLION BAGS ARE PRODUCED EACH YEAR.
HERE'S A QUICK LOOK AT THE LIFE OF ONE OF THOSE BAGS.**



Life Cycle of a plastic bag, source: factorydirectpromos.com/other/infographics/life-cycle-of-a-plastic-bag

The Fate of Plastic Bags in the ACT

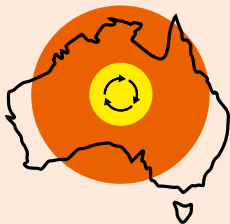
In the ACT, most plastic shopping bags are disposed of in the Mugga Lane Landfill. This is mainly due to the relative lack of recycling opportunities. Soft plastics cannot be recycled at the ACT's resource management centres. There are several soft plastic recycling drop off points at various locations in the ACT (refer to the case study below).

Case Study

REDCYCLE



REDCycle, run by RED Group, allows people to return soft plastic packaging used for produce, frozen food, confectionary packets and shopping bags that are then sent to recycling partners. Specially marked bins have been placed at over 20 Coles and Woolworths supermarkets in the ACT.



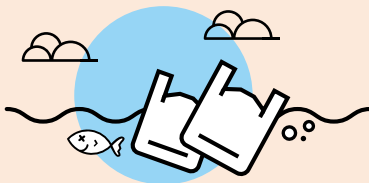
**3 MILLION
PIECES**

OF SOFT PLASTIC HAVE BEEN
RECOVERED AND RECYCLED
WEEKLY BY RED GROUP



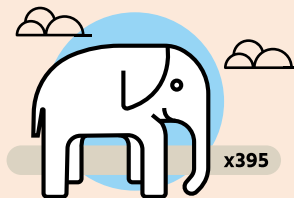
**380 MILLION
PIECES**

OF SOFT PLASTIC HAVE BEEN
RECOVERED AND RECYCLED
SINCE 2011



**THAT'S OVER
1580 TONNES**

OF SOFT PLASTIC THAT WILL
NEVER END UP IN LANDFILL,
ON OUR BEACHES OR IN
OUR WATERWAYS



**THAT'S EQUIVALENT TO
395 ELEPHANTS**
(WEIGHING 4 TONNES EACH)

The material collected is then turned into products like outdoor furniture by Replas. Replas (recycled soft plastic) products have been used at various locations across the ACT.

Sources:

act.gov.au/recycling/a-z_waste_and_recycling_guide/p-q#Plasticbags accessed 10 May 2018

redcycle.net.au/resources accessed 10 May 2018

replas.com.au/products accessed 10 May 2018



*Parking Bollards made from recycled plastic at Molonglo Valley.
Source Kirilly Dickson*



*Board walk pathway made from recycled plastic at Lake Burley Griffin.
Source Kirilly Dickson*

Plastic Bags in Landfills

The environmental impacts associated with the disposal of plastic bags in landfills depend on the nature of the plastic bags and the design and management of the landfill.

Biodegradable plastic bags that decompose in landfills under anaerobic conditions will produce methane, a relatively short-lived but potent greenhouse gas. Importantly, the extent to which the production of methane from biodegradable plastic bags contributes to climate change will depend on whether the relevant landfill captures and combusts the gas.

In contrast, conventional fossil fuel-based plastic bags do not contain organic materials, are not biodegradable in their natural form, and do not release methane as they breakdown.¹

In addition to the release of methane, the disposal of plastic bags to landfill can contribute to the release of toxins to the environment through leachate.²

The risks are limited at well-designed and managed landfills, where:

- the base is lined to prevent contamination through leachate,
- drainage systems are maintained to move water off the landfill, and
- landfill cells are capped.

In the case of the ACT, the Mugga Lane Landfill is lined and capped, has a well-maintained drainage system that drains leachate into three leachate dams, and is subject to regulatory oversight by the ACT Environment Protection Authority.³ Figure 2 illustrates how the Mugga Lane landfill captures methane generated by decomposing organic matter and combusts that methane in the onsite power station.

30
–
31

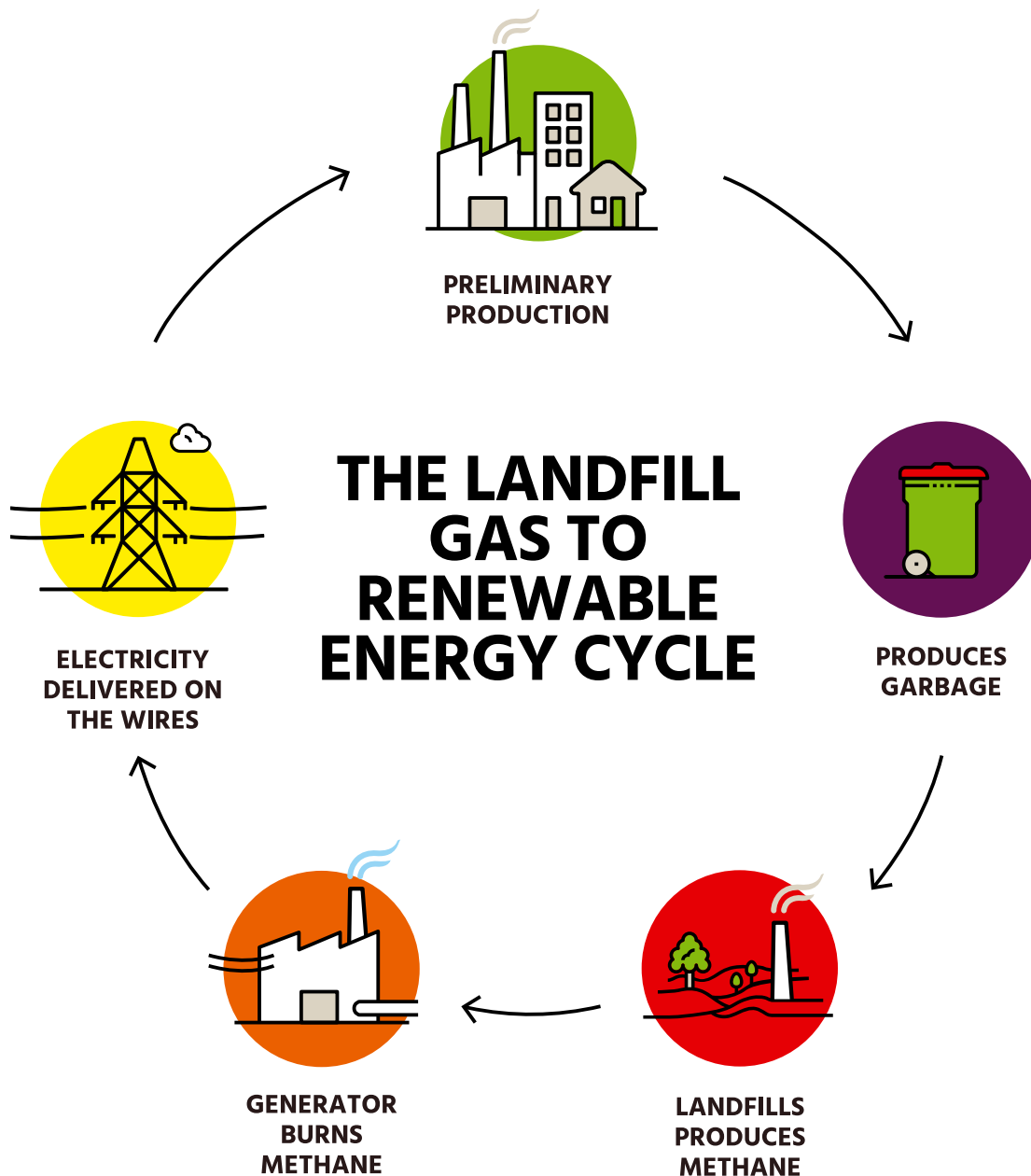
¹ AA Shah et al. (2008) 'Biological degradation of plastics: A comprehensive review', *Biotechnology Advances* 26, 246-265; Y Zheng et al. (2008)

'A Review of Plastic Waste Biodegradation', *Critical Reviews in Biotechnology* 25(4), 243-250.

² Leachate is water that has drained through the landfill

³ *Environmental Authorisation under the Environment Protection Act 1997: Authorisation No. 0375* (ACT Government, 2017).

FIGURE 2: LANDFILL GAS TO RENEWABLE ENERGY CYCLE



In the last 12 months to 30 June 2018, the Mugga Lane landfill gas power station generated enough electricity to abate and avoid more than 100,000 tonnes of carbon dioxide equivalent, power 5,600 homes or remove 33,000 cars off the road per year.

Some ACT waste is also transported to the Woodlawn Bioreactor in New South Wales. Like the Mugga Lane Landfill, Woodlawn is a well-designed and managed landfill that uses biogas to generate electricity and has facilities to limit leachate risks.⁴



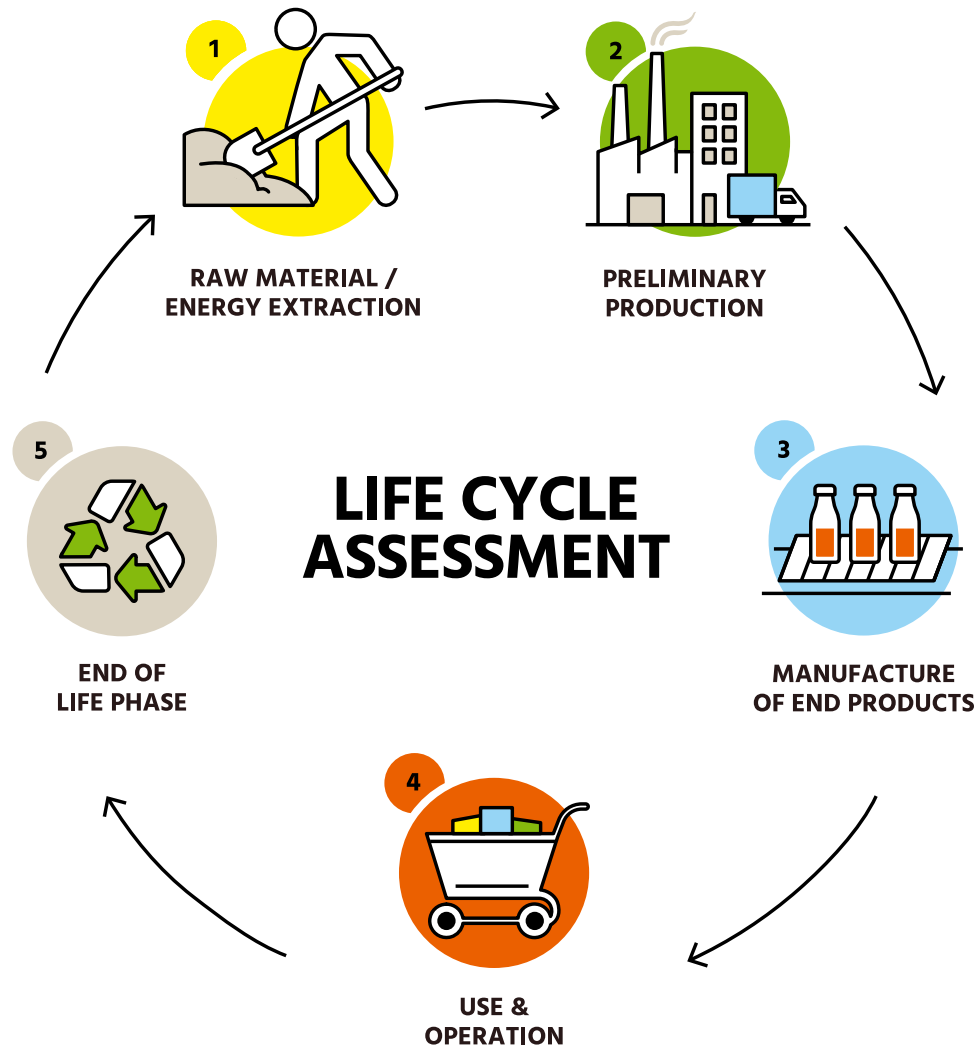
Landfill gas fuelled power generation units at the Mugga Lane Resource Management Centre. Source Energy Developments

⁴ <https://www.veolia.com/anz/papakura/our-services/our-facilities/landfills/woodlawn-bioreactor-facility> accessed 27 June 2018

Life Cycle Assessments of Plastic Bags and Substitutes

Life cycle assessments (LCA) are often used to compare the net environmental impacts of different types of plastic bags and plastic bag substitutes. LCA is an internationally accepted method of evaluating the resources used through, and environmental impacts associated with, the lifecycle of a product or process. The life cycle phases are shown in Figure 3.

FIGURE 3: THE PHASES OF LIFE CYCLE ASSESSMENTS



LCAs that examine plastic bags and their substitutes have tended to show that reusable plastic bags have superior environmental performance to single-use plastic bags and even other more ‘natural’ alternatives, like paper and calico, provided they are repeatedly used.⁵

Table 4 illustrates this by showing the comparative impacts of various bag options.

While useful, the results of LCAs need to be interpreted with caution because of their sensitivity to assumptions and data inputs.

For example:

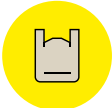



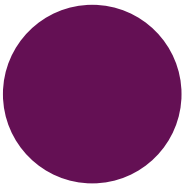




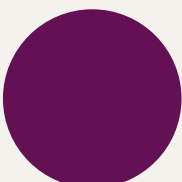




















- Most reusable bags are assumed to be reused 104 times prior to replacement in LCA studies.
- Production of plastic bags is generally assumed to be using fossil fuel electricity sources rather than renewables in LCA studies.
- Most LCAs on shopping bags typically do not account for the capture and combustion of methane at landfill sites.

Whatever type of bag is used, the key to reducing the impacts is to reuse it as many times as possible.⁶

⁵ See, for example, ExcelPlas Australia, *The Impacts of Degradable Plastic Bags in Australia* (Nolan-ITU & RMIT, 2003); C Chaffee and B Yaros, *Life Cycle Assessment for Three Types of Grocery Bags – Recyclable Plastic; Compostable, Biodegradable Plastic; and Recycled, Recyclable Paper* (Boustead Consulting & Associates, 2007); K O’Farrell, *LCA of Shopping Bag Alternatives: Report to Zero Waste South Australia* (Hyder Consulting Pty Ltd, 2009); K Verghese, *Environmental Impacts of Shopping Bags: Report for Woolworths Ltd* (Sustainable Packaging Alliance Ltd, 2009)

⁶ UK Government Environment Agency, 2011: *A Life Cycle Assessment of supermarket carrier Bags: a review of bags available in 2006*

TABLE 4: COMPARING LCA IMPACTS OF VARIOUS BAG OPTIONS⁷

	No. of shopping trips	Carbon dioxide equivalents (CO ₂ -e)	Energy use (MJ)	Water use (L)	Litter marine impacts (G. yrs) [^]
 Plastic Bags ~35 microns	1				
 Reusable boutique bags	3				
 Reusable 'green' bags	104				
 Compostable & biodegradable plastic bags	1				
 Paper bags	1				
 Reusable calico bags	104				

[^] G. yrs = number of years prior to breakdown of material before it is no longer an entanglement risk to larger marine organisms.

⁷ K O'Farrell, *LCA of Shopping Bag Alternatives: Report to Zero Waste South Australia* (Hyder Consulting Pty Ltd, 2009)

A Circular Economy for Plastics

The idea of a circular model is – once it's out of the ground it keeps circulating.

James Moody, entrepreneur.

Gaining momentum internationally, the industry is focussed on transitioning the plastic sector to a circular economy that ensures the optimal end-of-life options are catered for in product manufacturing.

The traditional linear economic system of 'take, make, use and dispose' is wasteful and needs more resources to be used to provide new services and products. Driven by renewable energy, a circular economy builds on the 'reduce, reuse, recycle' framework by trying to keep material resources in use for as long as possible.

So why is this relevant to plastic bags?

The more we can reuse plastic bags, the lower their impact will be on the environment and our economy.

The Ellen Macarthur Foundation has built on this concept in its report *The New Plastics Economy*.⁸

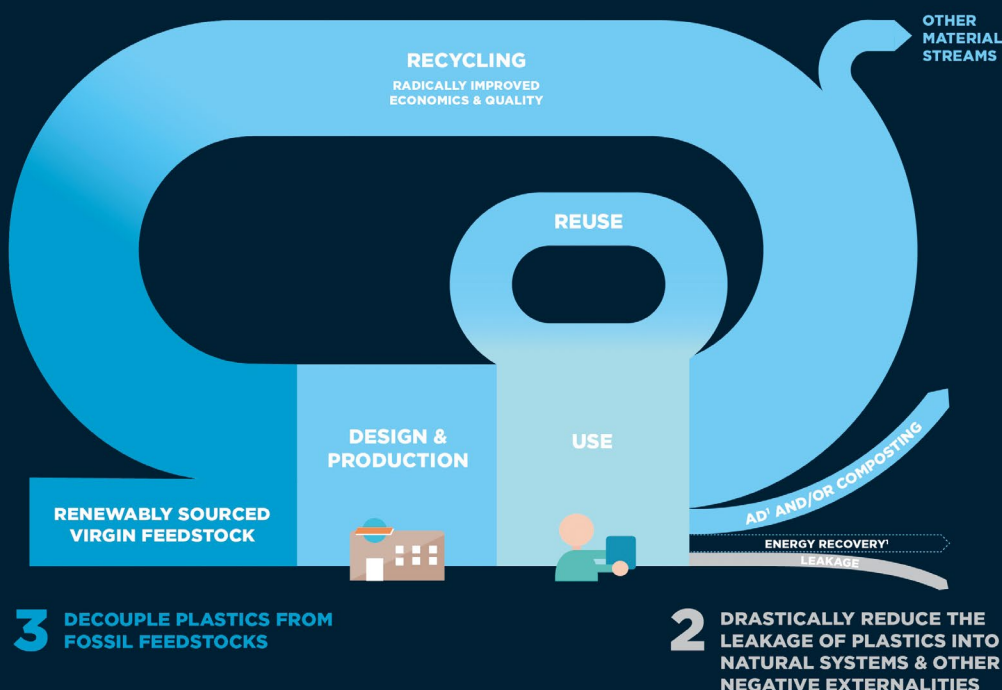
The Senate Standing Committee on Environment and Communications Inquiry into waste and recycling recent report⁹ included as its first recommendations that:

'...the Australian Government prioritise the establishment of a circular economy in which materials are used, collected, recovered, and re-used, including within Australia'.

The recent recommendations included in the ACT's Waste Feasibility Discussion paper¹⁰ are designed to facilitate the market transition towards a circular economy through a range of tools including regulation, price signals and product stewardship.

THE NEW PLASTICS ECONOMY

1 CREATE AN EFFECTIVE AFTER-USE PLASTICS ECONOMY



WORLD ECONOMIC FORUM, ELLEN MACARTHUR FOUNDATION, MCKINSEY & COMPANY, A NEW PLASTICS ECONOMY: RETHINKING THE FUTURE OF PLASTICS (2016) ELLENMACARTHURFOUNDATION.ORG/PUBLICATIONS

¹ Anaerobic digestion

² The role of, and boundary conditions for, energy recovery in the New Plastics Economy needs to be further investigated.

Source: Project Mainstream analysis



34

-

35

Source: Ellen Macarthur Foundation

⁸ https://www.ellenmacarthurfoundation.org/assets/downloads/EllenMacArthurFoundation_TheNewPlasticsEconomy_Pages.pdf accessed 20 Feb 2018

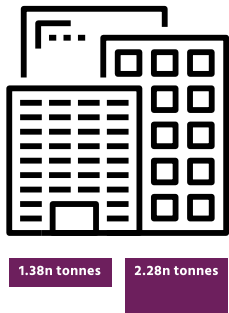
⁹ The Senate, 2018: *Never waste a crisis: the waste and recycling industry in Australia*

¹⁰ ACT Government, 2018: *Waste Feasibility Study: Roadmap and Recommendations Discussion Paper May 2018*

THE CIRCULAR ECONOMY

Linear business models mean **INCREASED CONSUMPTION, LEADING TO MORE WASTE.**

WASTE PROJECTIONS 2012 — 2025

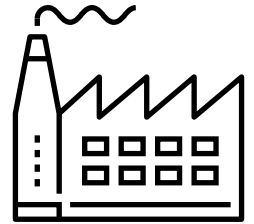


**Municipal
Waste**

+69%

**Industrial
Waste**

+85%



9.28n tonnes 176n tonnes

ONLY

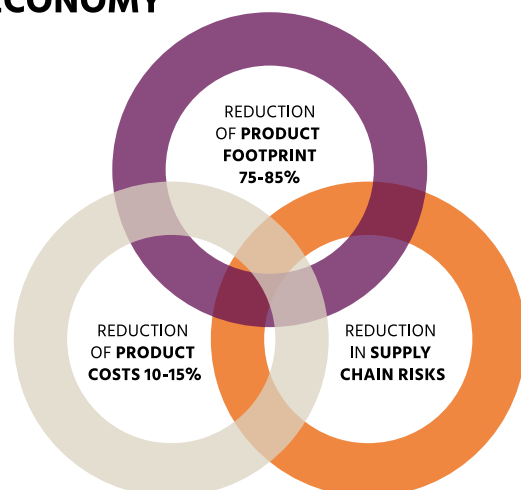
**10%
MUNICIPAL
WASTE
RECYCLED**



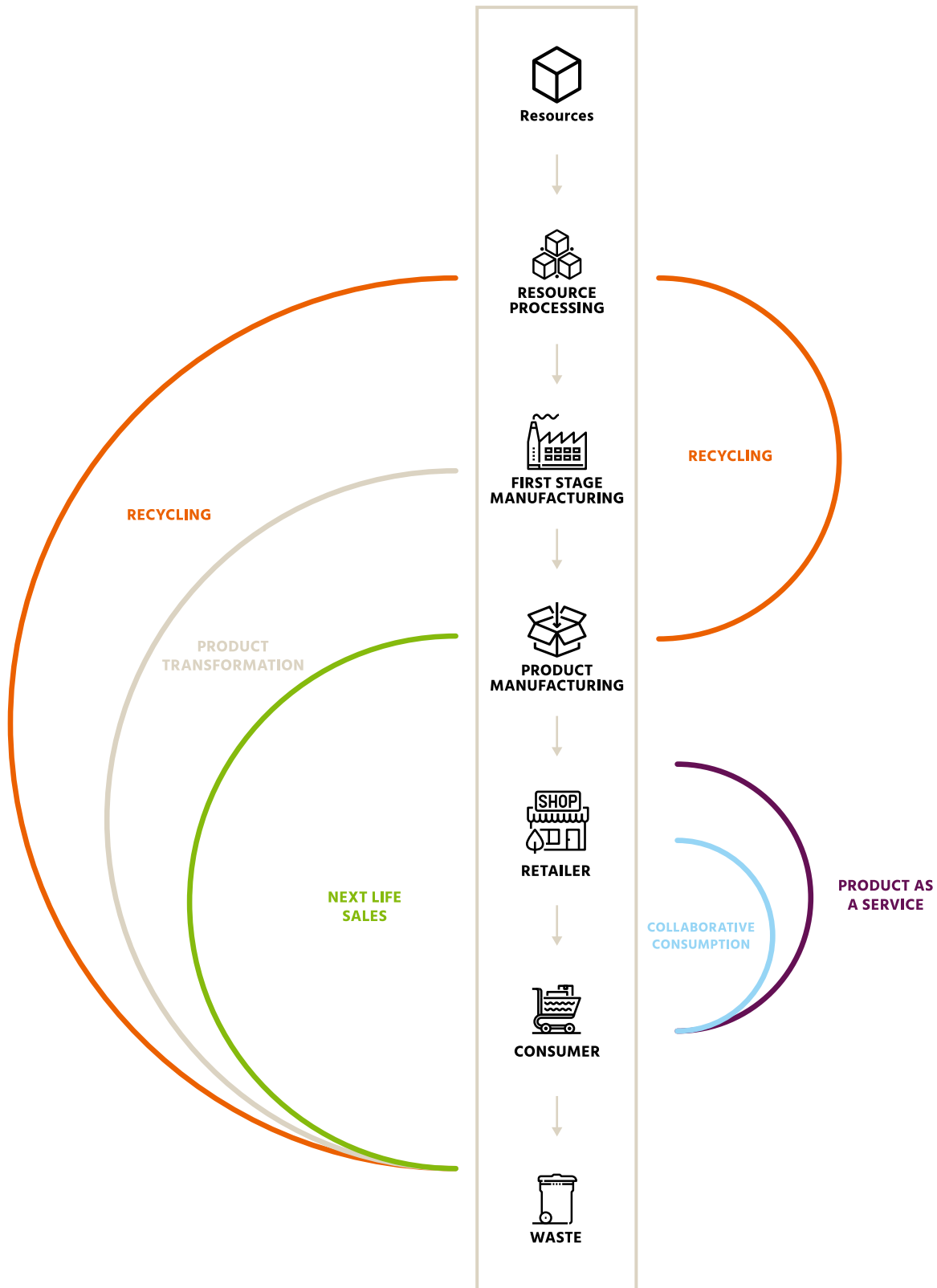
**7%
INDUSTRIAL
WASTE
RECYCLED**

CHANGING TO A CIRCULAR ECONOMY

AN OVERALL
POTENTIAL
SAVING OF
US \$2 TRILLION
BY **2030**



A circular economy keeps resources
in use for as long as possible.





From breaking bag habits to a circular plastic economy: the European Union's experience.

Caroline Lambert, Former Climate and Environment Counsellor, Delegation of the European Union to Australia

Plastic waste is choking our oceans, killing wildlife, having a devastating effect on marine life and threatening our own health. Plastics are reaching our lungs and dinner tables, with microplastics in the air we breathe, in our drinking water and in our food having an unknown impact on our health.

Early 2010s EU research showed that more than 8 billion plastic bags ended up as litter in Europe every year, causing enormous environmental damage well beyond national borders, throughout the continent as well as through large debris accumulation in European seas. Plastic bag consumption figures also varied greatly between Member States, with an estimated 4 bags per capita per year in Denmark and Finland and 466 bags in Poland, Portugal and Slovakia.¹¹ Confronted with a growing pan-European environmental problem, European institutions decided to tackle the "bag habit" at EU-level through a specific amendment to the EU general packaging regulation.¹²

The new rules agreed in 2015¹³ require EU Member States to drastically cut light-weight plastic bag consumption which was at around 100 billion bags per year in 2010, i.e. around 200 bags per European. The commonly agreed objectives are to reduce consumption to no more than 90 bags per person a year by 2019; to no more than 40 bags per person per year by the end of 2025 and to ensure that, by the end of 2018, no lightweight plastic bag is provided free of charge. The legislation covers all plastic carrier bags below thickness of 50 microns although EU Member States can exempt very lightweight bags (less than 15 microns) used for wrapping of food (e.g. fruit, vegetables, fish).

Member States can choose the measures they find most appropriate, including charges and levies, national reduction targets or a ban provided those bans are non-discriminatory and non-protectionist.

Some Member States have already achieved impressive results in curbing plastic bag use. In Ireland, since the introduction of a levy, the consumption of single-use plastic bags has fallen from 328 per person per year to just 18 – a reduction of nearly 95 %. Germany and Austria have formed agreements with the retail sector. France and Italy have banned all but biodegradable and compostable plastic bags.

Curbing the use of plastic bags is only one element in the move towards reducing the leakage of plastics to the environment. The European Commission, as part of its Action Plan on the Circular Economy and after a long consultation with the plastic industry and its users, has just unveiled a new **Plastics Strategy**¹⁴ to transform the way plastics and plastics products are designed, produced, used and recycled. The gist of the strategy is to find win-win solutions to the environmental and economic waste represented by the plastics economy today.

Every year, Europeans generate 25 million tonnes of plastic waste, but less than 30% is collected for recycling, 60% of which is sent abroad. According to estimates, only 5% of the value of plastic packaging material remains in the economy, the rest is lost after a very short first-use. The annual bill is over AU\$ 100 billion. Europe cannot afford this. In the EU one more tonne of recycled plastics a year would be equivalent to one million cars off the road a year in terms of reduced greenhouse gas emissions.

¹¹ <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52013SC0444> accessed 1 March 2018

¹² http://ec.europa.eu/environment/waste/packaging/index_en.htm accessed 1 March 2018

¹³ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32015L0720> accessed 1 March 2018

¹⁴ https://ec.europa.eu/commission/publications/documents-strategy-plastics-circular-economy_en and political communication <http://ec.europa.eu/environment/circular-economy/pdf/plastics-strategy.pdf> accessed 1 March 2018

EU PLASTICS STRATEGY



European
Commission

The strategy's main elements are:

- **100% plastic packaging re-use or cycling by 2030.** Plastic packaging is 60 per cent of all of Europe's plastics waste, so by acting here we tackle the biggest problem first. The target implies that some types of plastic will no longer be on the EU market by 2030 because there is hardly an economic case for recycling all the plastics we have today.
- **50% recycling rate for all plastics by 2030.** To generate sufficient economies of scale, as a first step, the European industry is encouraged to respond to a recycled content pledging campaign by June 2018. The European Commission will also look at how to remove the barriers slowing the uptake of recycled plastics, from packaging to cars. We are notably looking at setting up a trustworthy system to verify recycled content, quality standards for recycled plastics and harmonised EU definition and labels for biodegradable and compostable plastic.
- **Single-use plastic restrictions.** A proposal to restrict single-use plastic in the EU will be tabled in May 2018. Single-use plastics constitute 50% of litter found on EU beaches.
- **Bans on intentionally added microplastics and on oxo-plastics.** New proposals to ban intentionally added microplastics in cosmetics, detergents and paints as well as oxo-plastics

which degrade into microplastics will be tabled in the next months. Work to find solutions to intentionally released microplastics, in textiles and other products like tyres is also launched.

- **More EU research, development and innovation funding.** The European Commission has announced an additional 100 million Euro in plastics innovation, on top of more than 250 million already invested so far. These funds are accessible to Australian researchers working in teams with European researchers.

The EU will be working hard to get international partners on board. Global plastics consumption per capita is growing quickly, most notably in Asia.¹⁵

2018 Action

In 2018, the Commission will launch a dedicated project to reduce plastic waste and marine litter in East and South-East Asia. Of the many other actions we will carry out internationally, using aid to support improved waste prevention and management and working towards international standards on sorted plastic waste and recycled plastics are perhaps most important. Going forward, there are also of course significant prospects for developing an innovative circular plastics industry worldwide.¹⁶ The EU already has the world's highest rate of plastic recycling. It is well placed to lead new developments.

¹⁵ Per capita plastic consumption has reached around 100 kg per year in Western Europe and North America; in Asia it is currently above 20 kg per year, a figure expected to grow rapidly.

¹⁶ More than 85 % of the exported EU plastic waste is currently shipped to China, a situation that will soon change following China's decision to ban the import of certain types of plastic waste, thus opening new opportunities for EU recyclers.



6.

**How Environmentally
Effective has the
ACT Plastic Bag Ban
been?**

The environmental effectiveness of the ACT plastic bag ban was assessed for this review based on two measures:

- a. changes in plastic bag consumption, and
- b. changes in plastic bag litter in the ACT litter stream.

The ability to analyse these issues is hindered by the relative absence of publicly available data on plastic bag consumption.

Sourcing Data on Plastic Bag Consumption in the ACT

For this review, the major supermarkets and a sample of smaller supermarkets and grocery stores were asked to provide data on plastic bag distribution and sales in the ACT. Data was provided by some smaller supermarkets and grocers, but no data was provided by the larger supermarkets. Similar challenges were encountered in the previous ACT Government reviews.

Due to the incomplete nature of the data provided, two further surveys were undertaken to provide an estimate of plastic bag consumption in 2017–18:

- A household survey, and
- A retailer survey.

HOUSEHOLD SURVEY

The first survey (household survey) was undertaken on shoppers across the ACT on a weekday and a weekend day. The survey asked shoppers questions about their use of the four plastic bag types:



produce bags,



reusable boutique bags,



reusable 'green' bags (including cooler tote bags), and



household plastic garbage bags.






RETAILER SURVEY

The second survey (retailer survey) involved asking smaller retailers about their weekly plastic bag sales. This survey was focused on estimating how many of these stores were providing plastic bags that were borderline compliant (i.e. equal to or close to the minimum 35 microns in thickness). This included smaller supermarkets, Asian grocers, fruit and vegetable stores, butchers and chicken stores, fishmongers and other retailers. Responses were provided by 43 retailers.

In 2017–18 about 9.5 million plastic bags used in the ACT are borderline compliant in terms of the minimum thickness, noting that this includes biodegradable bags as well. The results are shown in Table 5.

40
–
41

TABLE 5: ESTIMATED ANNUAL CONSUMPTION OF SELECTED PLASTIC BAG TYPES IN THE AUSTRALIAN CAPITAL TERRITORY, 2017–18¹

	 Plastic Bags ~35 microns	 Reusable boutique bags	 Single-use produce bags	 Reusable 'green' bags	 Household garbage bags
Average household consumption (bags)	56	57	214	5	178
Total consumption (million bags)	9.5	9.6	36.2	0.9	30.1
Total consumption (tonnes)	126.9	269.9	90.5	88.9	376.8

Source: ANU estimates derived from household and retailer surveys, using Australian Bureau of Statistics (ABS) household and population data. ABS, *Census of Population and Housing* (ABS, 2018); ABS, *Australian Demographic Statistics, 3101.0* (Australian Government, 2018).

These plastic bag consumption estimates align with the national data contained in the 2016–2017 Australian Plastics Recycling Survey.²

Changes in Plastic Bag Consumption

Our analysis of the impact of the ban on the consumption of plastic bags covered five plastic bag types over the period 2008–09 to 2016–17:

- single-use and reusable plastic bags (conventional and biodegradable),
- reusable boutique plastic bags,
- reusable 'green' bags,
- garbage bags, and
- produce bags.

Two scenarios were developed for our analysis:

- **Scenario 1 (without the ban):** projected consumption of plastic bags in the ACT assuming the ban was not in place.
- **Scenario 2 (with the ban):** estimated actual consumption in the ACT.







The main assumptions adopted in each scenario are described in Table 6.

The results are shown in Figures 4 and 5.

¹ Macintosh et al, ANU, 2018

² K O'Farrell, 2016–17 *Australian Plastics Recycling Survey* (Envisage Works, 2018).

TABLE 6: CHANGES IN PLASTIC BAG CONSUMPTION, MAIN ASSUMPTIONS

Bag type	Mass (grams)	Assumptions	
		Scenario 1 (without the ban)	Scenario 2 (with the ban)
  Single-use and reusable plastic bags	Single-use (~15 microns) = 5.4 Reusable (35 microns) = 14.2	Estimate for 2010–11 (51 million) derived from 2014 ACT review. Assumed growth rate over entire period of approximately 3.8%, derived from national data on single-use plastic bag consumption.	2010–11 estimate same as scenario 1. For 2011–12, consumption assumed the same as scenario 1 until 1 November, with estimate for remainder of the financial year composed of reusable conventional 35 microns plastic bags, ¹ single-use biodegradable plastic bags ¹ and 34,000 illegally distributed conventional single-use plastic bags. ² 2017–18 estimate derived from our retailer plastic bag survey. Growth in legal consumption over period 2011–12 to 2016–17 of approximately 1.8% in line with weighted final ACT household consumption. ³ Illegal bag consumption over same period grows at 1.7% in line with ACT population growth.
 Reusable boutique plastic bags	28.0	Estimates for 2008–09 to 2010–11 same as Scenario 2. From 2011–12 onward, consumption grows at 1.7% in line with ACT population growth.	2017–18 estimate derived from our household survey. Growth in consumption over period 2011–12 to 2016–17 of approximately 1.8% in line with weighted final ACT household consumption. Growth prior to ban of 2.0% in line with ACT population growth.
 Reusable 'green' bags	99.1 (including plastic base)	Estimates for 2008–09 to 2010–11 same as Scenario 2. From 2011–12 onward, consumption grows at 1.7% in line with ACT population growth.	2017–18 estimate derived from our household survey. Growth of approximately 2.2% from date of introduction of ban (ACT population growth plus 0.5%). Assumed 15% spike in consumption in 2011–12. ⁴
 Garbage bags	12.5	Estimates for 2008–09 to 2010–11 same as Scenario 2. From 2011–12 onward, consumption grows at 1.7% in line with ACT population growth.	2017–18 estimate derived from our household survey. Growth of approximately 2.2% from date of introduction of ban (ACT population growth plus 0.7%). Assumed 31% spike in consumption in 2011–12. ⁴
 Produce bags	2.5	2017–18 estimate derived from our survey. Growth of 4.3% over period in line with final ACT household food consumption.	Same as scenario 1.

Source: ABS, *Australian National Accounts: State Accounts, 5220.0* (Australian Government, 2017); ABS, *Australian Demographic Statistics, 3101.0* (Australian Government, 2018); Directorate of Environment and Sustainable Development, *Review of the Plastic Shopping Bags Ban* (ACT Government, 2014); Directorate of Environment and Sustainable Development, *Interim Review of the Plastic Shopping Bags Ban* (ACT Government, 2012); K O'Farrell, 2016–17 *Australian Plastics Recycling Survey* (Envisage Works, 2018); Hyder Consulting Pty Ltd, *Plastic Retail Carry Bag Use* (Environment Protection and Heritage Council, 2008).

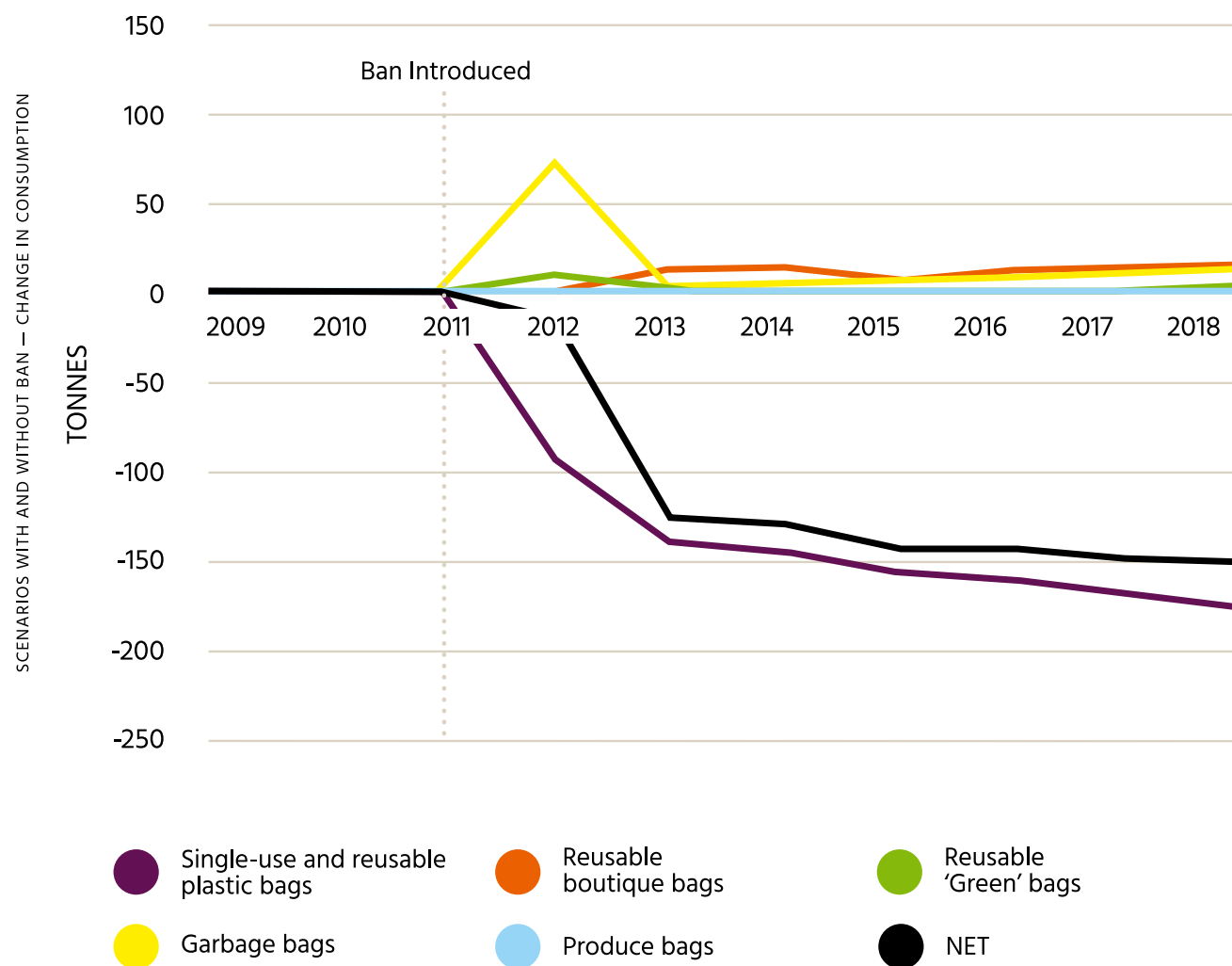
¹ Reusable plastic bags and single-use biodegradable plastic bags have been distributed at many smaller supermarket chains, grocery stores, food markets and restaurants in the ACT since the introduction of the ban. Data from retailers suggest, in 2017–18, around 90% of plastic bags were conventional 35 microns bags and 10% were biodegradable.

² Assumes non-compliance rate of approximately 0.1%.

³ Consumption confined to food, clothing and footwear, and alcohol and tobacco (chain volume measures), with weightings of 0.76, 0.21 and 0.03 respectively.

⁴ Based on the 2014 review observation there was a short-term increase in consumption of 'green' bags following November 2011, which had subsided by 2013.

FIGURE 4: ESTIMATED IMPACT OF ACT PLASTIC BAG BAN ON CONSUMPTION OF PLASTIC BAGS (NET DIFFERENCE BETWEEN SCENARIOS 1 AND 2), TONNES, 2008–09 TO 2017–18



Source: Macintosh et al, ANU, 2018

The results suggest the ACT plastic bag ban has led to significant reduction in net plastic bag consumption across the five bag types (refer to Figure 4).

In 2017–18, consumption of single-use and reusable plastic bags was estimated to be 232 tonnes lower than it would have been if the ban was not introduced.

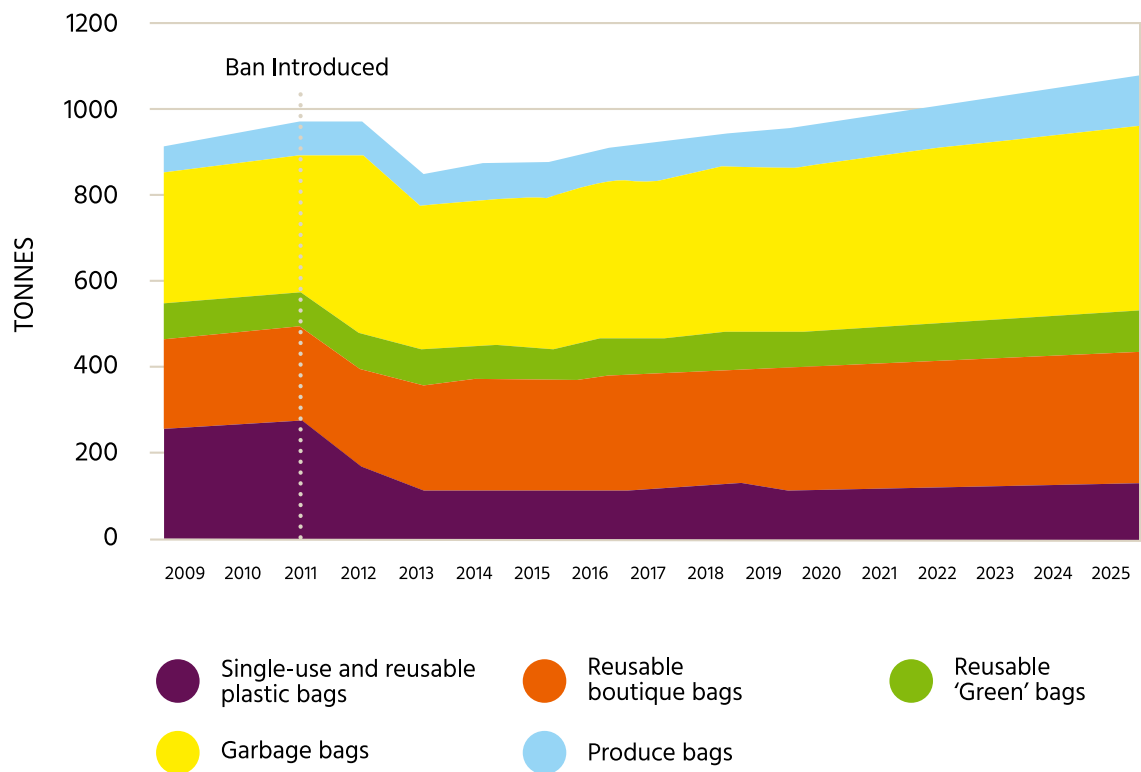
The estimated net reduction in plastic bag consumption across all five bag types (scenario 2 consumption relative to scenario 1) in 2017–18 was 199 tonnes.

Overall, total consumption (tonnes) of single-use and reusable plastic, reusable boutique, reusable 'green', garbage bags and produce bags in the ACT is estimated to be less than the levels prior to the introduction of the ban (Figure 5).

Consumption in 2017–18 was approximately 953 tonnes, compared to 973 tonnes in 2010–11.

However, as time passes, increasing population levels and household consumption are projected to be driving plastic bag consumption back to the levels seen prior to the introduction of the ban (refer to Figure 5).

FIGURE 5: ACT PLASTIC BAG BAN CONSUMPTION, TONNES, ESTIMATES 2008–09 TO 2017–18, THEN PROJECTIONS TO 2024–25



Source: Macintosh et al, ANU, 2018

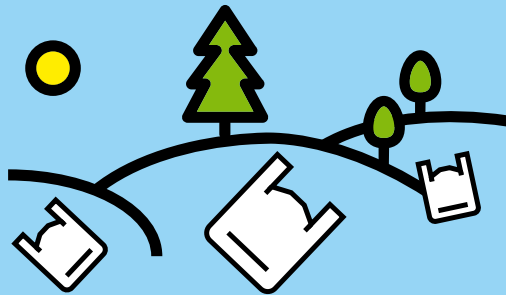
Due to data limitations, the results should be interpreted with caution.

There is a particular need for additional information on household garbage bag, single-use and reusable bag consumption.³ Improved time series data on consumption patterns are also necessary if there is a desire to analyse the impacts of policy interventions over time.

44
–
45

3 Macintosh et al, ANU, 2018

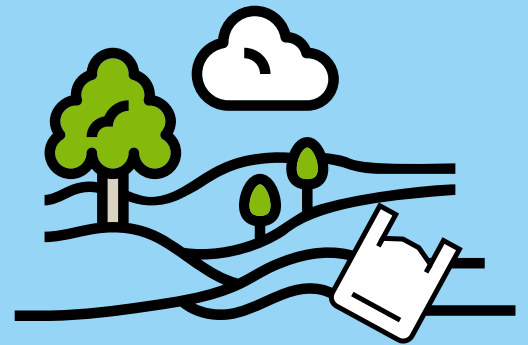
ACT PLASTIC BAG LITTER COUNT RESULTS



2009—2011

0.17

bags per 1000 m²



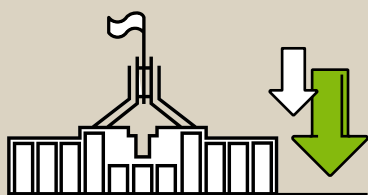
2013—2017

0.06

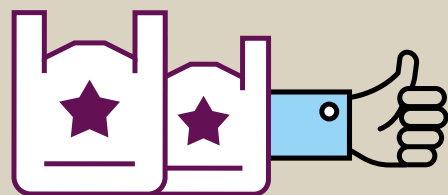
bags per 1000 m²

Reduction of 60%

IN LIGHTWEIGHT PLASTIC BAG LITTER SINCE THE
INTRODUCTION OF THE BAN IN THE ACT



ACT REMAINS THE
LOWEST
STATE/NUMBER OF PLASTIC
BAGS COUNTED PER 1000 m²



BOUTIQUE PLASTIC BAG LITTER
COUNTS HAVE REMAINED
RELATIVELY STABLE
FROM 2009—2017

Changes in Plastic Bag Litter

Ideally, an analysis of the impact of the plastic bag ban on litter would involve a comparison between two scenarios:

- projected plastic shopping bag litter in the ACT under the assumption the plastic bag ban was never introduced, and
- estimated actual plastic shopping bag litter in the ACT.

The best available data on the ACT litter stream over time is from the Keep Australia Beautiful National Litter Index.⁴

Keep Australia Beautiful kindly provided their data to assist with this analysis.

However, it is unclear how representative the National Litter Index data are of the ACT litter stream to inform a comparative scenario analysis.

The best alternative is to report trends in the National Litter Index data.

For these purposes, data on the two main National Litter Index plastic bag categories ('Bags – supermarket type light weight carry bags' and 'Bags – heavier glossy typically branded carry bags') were extracted and normalised (litter items per 1000 square metres).

The results are summarised in the adjacent graphic.

Combining Plastic Bag Consumption and Litter Analysis

At a superficial level, the trends in plastic bag consumption and litter in the ACT align well, namely, both demonstrate:

“a marked fall in single-use plastic bag consumption accompanied by a comparatively small increase in reusable boutique bag consumption. However, it is unclear to what extent the decline in the number of plastic bags counted in National Litter Index surveys is attributable to the plastic bag ban.”⁵

However, the number of plastic bags counted in the litter surveys both before and after the introduction of the ban is small. It is also unclear how representative the results of the National Litter Index surveys are of the actual ACT litter streams.

Further, there are several factors, other than the plastic bag ban, that may account for the change in the prevalence of plastic bags in the litter stream.

For example, observed falls in litter could be a product of greater resources being devoted to reducing littering and increasing its collection and removal. This could take the form of increased government litter collection services, increased voluntary litter collection, public education campaigns and/or the installation of litter traps in waterways.⁶

Changes in social attitudes related to levels of income and education may also have been a factor.⁷

Without further information, it is difficult to reach definitive conclusions on the impact of the ACT plastic bag ban on plastic bag litter.

All that can be said at this stage, is that the trends in litter survey data are consistent with the hypothesis that the ban has reduced plastic bag litter.

⁴ McGregor/Tan Research, 2018: *Keep Australia Beautiful National Litter Index*

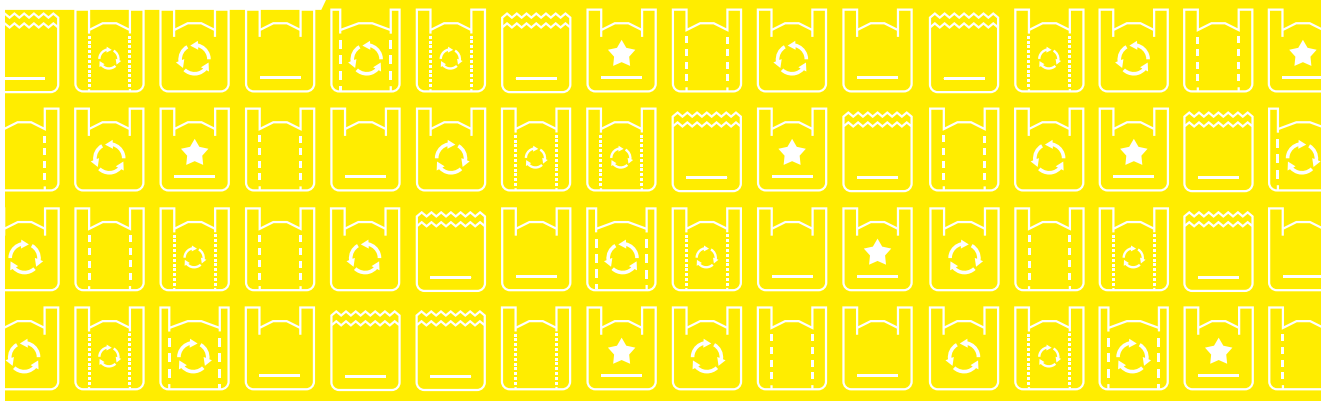
⁵ Macintosh et al, ANU, 2018

⁶ K Willis et al. (in press) 'How successful are waste abatement campaigns and government policies at reducing plastic waste into the marine environment?', *Marine Policy*, doi.org/10.1016/j.marpol.2017.11.037. The study found that, while litter bans are correlated with lower litter in coastal areas, other policy measures aimed at the prevention of litter and its removal are often more effective and that the best outcomes arise from a combination of approaches.

⁷ Hardesty et al., *Understanding Debris Sources and Transport from the Coastal Margin to the Ocean: Report to the Australian Packaging Covenant Organisation Ltd* (CSIRO, 2016). The study established a correlation between socio-economic status and litter densities. This may be a factor in the ACT due to the relatively high socio-economic status of the population.

7.

Costs and Challenges of the ACT Plastic Bag Ban



The introduction of any regulatory measure is likely to give rise to costs and challenges. In the case of the ACT plastic bag ban, the main costs and challenges fall into four categories:

- retailer compliance costs,
- increased household shopping costs,
- government compliance and enforcement costs, and
- continuity of community support for bans.

Retailer Compliance Costs

Retailer compliance costs refers to any net reduction in profit derived by retailers in the ACT because of the plastic bag ban.

Limited information was able to be gathered on compliance costs from retailers and the industry.

Although there is no mandatory requirement for retailers to charge for plastic bags, most retailers have done so since 2011 to reflect government policy.

Prior to the introduction of the ban, most ACT retailers did not charge for single-use HDPE bags. Those bags cost retailers in the order of 0.75–1 cent per bag. This meant that retailers either absorbed the costs of the bags (by reducing profits) or recovered the costs by imposing higher prices on other products.

Since the introduction of the ban, a significant proportion of retailers now charge for plastic bags as shown in the table below:

TABLE 7: TYPICAL COSTS AND CHARGES FOR DIFFERENT BAGS

BAG TYPE	TYPICAL CHARGE ¹	WHOLESALE COST ²
 Reusable plastic bags	10 cents (or free)	4 cents
 Biodegradable plastic bags	5 cents (or free)	2 cents
 Reusable boutique bags	15 cents	6–12 cents
 Reusable 'green' bags	\$1	70–80 cents

Given these wholesale and retail prices, the increases in retailer profits that are attributable to the plastic bag ban are likely to be small.

1 All prices are GST inclusive.
2 All prices are GST inclusive. The amounts paid by individual retailers will depend on the quantities order and market power.
3 Macintosh et al, ANU, 2018

Household Shopping Costs

The plastic bag ban has increased household shopping costs by substituting free single-use plastic bags to costed reusable bags for those shoppers who did not bring their own bags prior to the ban.

However, increases in household shopping costs have been relatively small, because of the low price of reusable bags and the capacity for shoppers to manage their own bag consumption.

Based on the two scenarios, with and without the plastic bag ban in place, the increase in household shopping costs in 2017–18 was approximately \$696,000, or around \$4.20 per household per annum.³

The analysis suggests most of this increase (84%) is attributable to an increase in expenditure on reusable plastic bags and garbage bags (rather than reusable boutique and ‘green’ bags).

Government Compliance and Enforcement Costs

Compliance and enforcement services associated with the ACT plastic bag ban were originally provided by the ACT Government Office of Regulatory Services.

Responsibilities for waste and litter related issues in the ACT Government are currently divided between Transport Canberra and City Services, the Environment, Planning and Sustainable Development Directorate, and Access Canberra. Transport Canberra and City Services is responsible for waste management and the administration and enforcement of the Litter Act 2004. The Environment, Planning and Sustainable Development Directorate is responsible for the oversight of the Plastic Shopping Bags Ban Act 2010, while responsibility for the enforcement of the ban rests with Access Canberra.

Despite this governance structure, there is a degree of uncertainty and ineffectiveness about the division of responsibilities related to the administration of the plastic bag ban.

Due to the ambiguity in responsibility within Government, it was not possible to evaluate the compliance and enforcement cost impacts associated with the implementation of the ban.

Continuity of Community Support

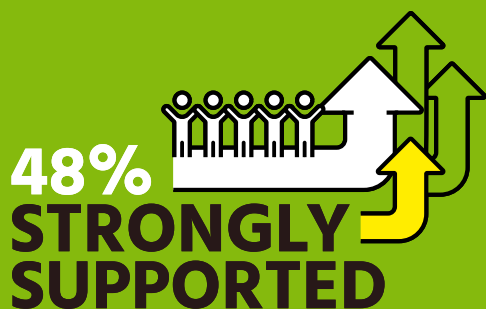
The ACT plastic bag ban has enjoyed high levels of public support since it was introduced in 2011.

Three surveys have been undertaken on the levels of public support, in 2012, 2014 and now in 2018.

For the purposes of this review, ReachTel were commissioned to undertake a phone survey of ACT residents. The survey was conducted in March 2018 and 1,058 respondents were surveyed. Results are shown in various graphics following.

2018 COMMUNITY VIEWS ON THE ACT PLASTIC BAG BAN

68% OF RESPONDENTS SAID THEY
SUPPORT THE BAN



27% OF RESPONDENTS SAID THEY
OPPOSE THE BAN



5% WERE UNSURE ABOUT THE BAN

**THE RESULTS SUGGEST THE LEVEL
OF PUBLIC SUPPORT FOR THE BAN HAS
INCREASED OVER TIME, FROM 58% IN 2012,
TO 65% IN 2014, AND NOW 68% IN 2018.**

Interestingly, support for the ACT plastic bag ban was highest amongst older voters and lowest amongst those aged 18–34 years.⁴

The reasons for the high level of community support for the plastic bag ban are likely to relate to how shoppers have responded to the ban, and their perceptions of its positive environmental impacts, as shown in the graphic below.

2018 COMMUNITY VIEWS ON THE ACT PLASTIC BAG BAN



69%
BELIEVE THE BAN HAS HAD A
POSITIVE IMPACT ON THE ENVIRONMENT

⁴ Macintosh et al, ANU, 2018



8.

Options for Reform of the ACT Ban

Six options have been considered for what to do with the ACT plastic bag ban:

1. keep the ban as it is (do nothing),
2. increase the minimum allowable thickness of plastic shopping bags,
3. require all plastic bags to be biodegradable and compostable,
4. ban all plastic shopping bags,
5. use prices to reduce consumption of plastic shopping bags, and
6. introduce a mandatory disclosure regime for the sale and distribution of plastic bags by retailers.

It was assumed for this review that the primary objective of the plastic bag ban is to reduce plastic bag consumption and/or the associated detrimental environmental impacts.

Contextual Information

There are three main contextual factors that are relevant to the analysis of options:

- the level of community support for changes to the ban to improve environmental outcomes,
- information availability and uncertainties, and
- the potential for policy changes to exacerbate jurisdictional inconsistencies in the regulation of plastic bags.

SUPPORT FOR CHANGE TO IMPROVE ENVIRONMENTAL OUTCOMES

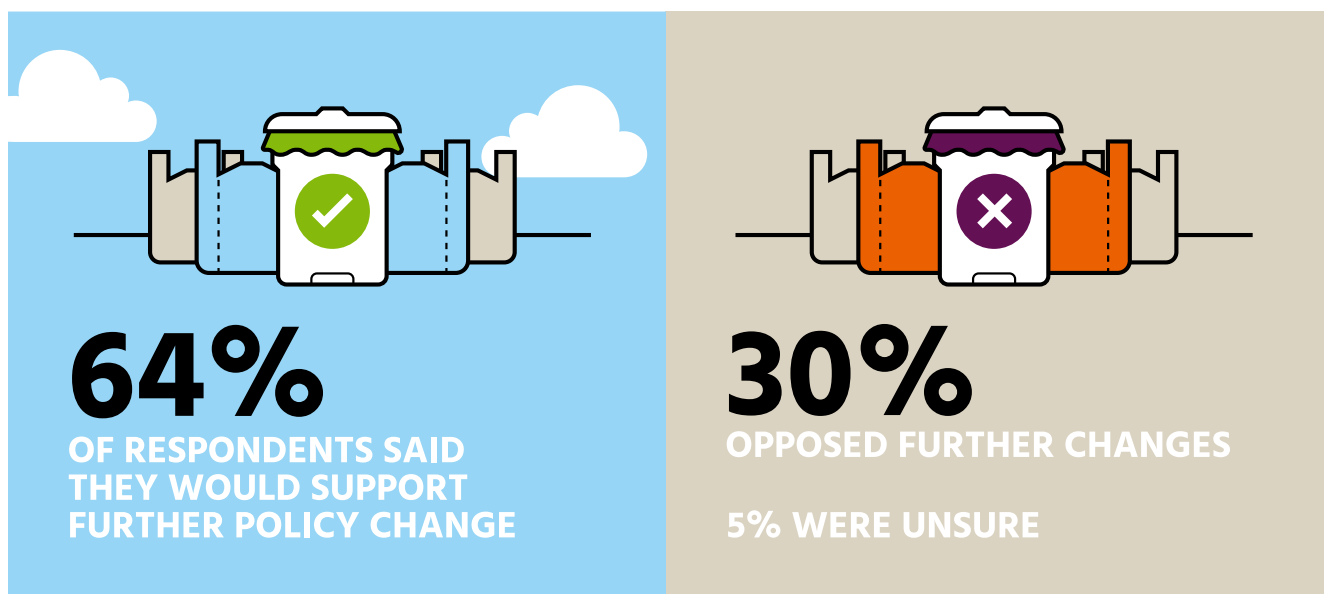
To inform the analysis of options, respondents to the ReachTel phone survey were asked whether they would support or oppose changes to the ACT plastic bag ban.

Sixty-four per cent of respondents said they would support further policy change, thirty per cent opposed further changes and five per cent were unsure (refer to graphic below).

While there was broad support amongst respondents for further policy changes to improve environmental outcomes, the stated willingness to pay for these improvements was relatively low (refer to graphic overpage).

52
–
53

2018 COMMUNITY VIEWS ON THE ACT PLASTIC BAG BAN



2018 COMMUNITY VIEWS ON THE ACT PLASTIC BAG BAN

How much would you be willing to pay per week to help further reduce plastic bag use and the associated environmental impacts?



46%

SAID THEY WERE NOT WILLING TO PAY ANYTHING



23%

SAID THEY WERE WILLING TO PAY LESS THAN 50c



17%

SAID THEY WERE WILLING TO PAY BETWEEN 50c AND \$1



14%

SAID THEY WERE WILLING TO PAY MORE THAN \$1

In response to questioning about how much they would be willing to pay per week to help further reduce plastic bag use and the associated environmental impacts, 86% of respondents said less than \$1: almost half (46%) said they were not willing to pay anything, 23% said they were willing to pay less than 50c and 17% said they were willing to pay between 50c and \$1.

To further investigate community opinions on potential changes to the ban, respondents were asked which of four broad reform options they would prefer:

- require all plastic bags to be biodegradable and compostable,
- increase the minimum thickness requirement for plastic shopping bags,
- impose a price or levy on plastic bags and use the money to recycle plastics, or
- ban all plastic bags.

Of these options, requiring all plastic bags to be biodegradable and compostable was by far the most popular (62%), followed by banning all plastic bags (15%) (refer to adjacent graphic). This reflects the confusion in the community about the perceived merits of biodegradable and compostable bags versus their real performance (refer to the case study on page 20).

Imposing a levy and increasing the minimum thickness requirements were the least popular (13% and 11% respectively).

LIMITED INFORMATION TO SUPPORT ROBUST POLICY

The ability to make informed policy decisions on the regulation of plastic bags is currently impeded by the relative absence of robust information on key issues and uncertainties surrounding environmental impacts, such as:

- There are gaps in the available information on current plastic bag consumption and almost no time series data on consumption trends.
- There are uncertainties about the fate of plastic bags during their end of life phase, including in relation to their representation in the ACT litter stream and the extent to which bags littered in the ACT pose a threat to marine (and potentially also terrestrial) organisms.
- There are scientific uncertainties about the threats posed by plastic bags in the environment, particularly when reduced to microplastic size.

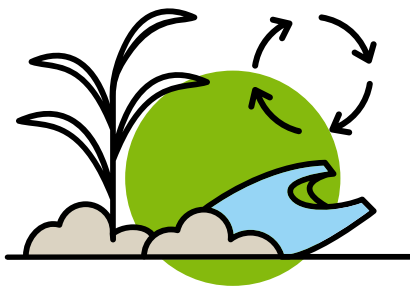
The extent of the information gaps suggests consideration should be given to the acquisition of additional information to help inform future policy making.

JURISDICTIONAL INCONSISTENCIES

As noted in Chapter 4, there has been variability in plastic bag regulation in Australia since 2009. This can cause complications for, and confusion amongst, retailers.

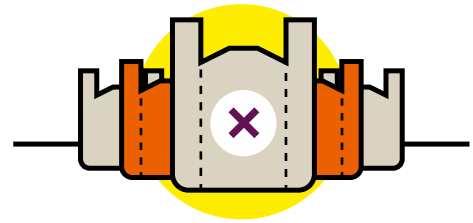
The ACT Government needs to consider this in progressing any future changes. Understanding the potential compliance costs to business will help address this matter.

WHICH OF THE FOLLOWING CHANGES DO YOU SUPPORT THE MOST?



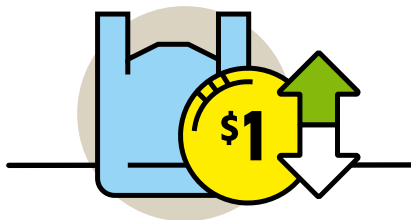
62%

REQUIRE ALL PLASTIC BAGS
TO BE BIODEGRADABLE AND
COMPOSTABLE



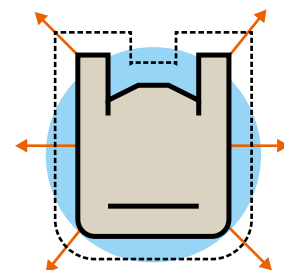
15%

BAN ALL PLASTIC BAGS



13%


IMPOSE A LEVY AND USE
THE MONEY TO RECYCLE
AND REDUCE LITTER



10%

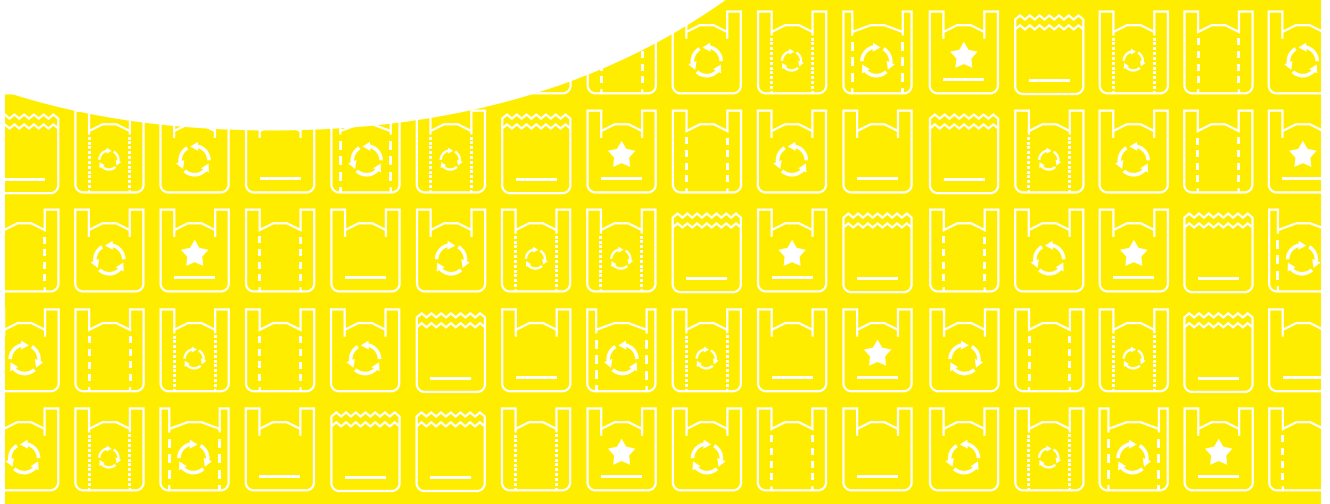
INCREASE THE
MINIMUM THICKNESS

Source: ReachTel, *ACT Plastic Bag Survey* (March, 2018).



9.

Analysis of Reform Options



This chapter presents the key findings from the technical analysis undertaken by the Australian National University: *Regulating Plastic Shopping Bags in the Australian Capital Territory: Plastic Shopping Bag Ban Act 2010 Options Analysis*.¹

Option 1 – Keep the ban as it is (do nothing)

Keeping the plastic ban bag as it is will provide ongoing benefits relative to whether the plastic bag ban was never introduced. It will also minimise costs to government and reduce any potential adverse impacts on ACT retailers and consumers with further changes.

However, in the absence of additional policy measures the consumption of plastic bags in the ACT is likely to grow and exceed the rates seen prior to the introduction of the ban. Conservative projections suggest that, due to increasing population levels and household consumption, this is likely to occur in the early to mid-2020s (refer to Figure 5).

ENVIRONMENTAL EFFECTIVENESS

The environmental impacts will remain unchanged.

There will be ongoing environmental benefits relative to the situation where the bag ban was never introduced, yet plastic bag consumption is likely to continue to rise because of consumption and population growth.

IMPACT ON RETAILERS

The costs to retailers will remain unchanged.

IMPACT ON HOUSEHOLDS

The costs to consumers will remain unchanged.

COST TO GOVERNMENT

The costs to government will remain unchanged.

56

–

57

¹ A Macintosh, A Simpson and T Neeman (ANU), 2018: *Regulating Plastic Shopping Bags in the Australian Capital Territory: Plastic Shopping Bag Ban Act 2010 Options Analysis*

Option 2 – Increase the minimum thickness of plastic shopping bags

Retailer responses to the specifics of the ACT plastic bag ban have differed.

The major supermarket chains have elected to phase out plastic bags and now offer a combination of reusable boutique and ‘green’ bags, and to a lesser extent jute bags.

The reusable boutique bags offered by the major supermarkets are significantly thicker than the regulated minimum of 35 microns, with most falling in the range 47–55 microns and with a mass of between 23–33 grams.

Many smaller supermarkets, grocery stores and other retailers in the ACT offer plastic bags (sometimes in combination with ‘green’, jute and other bag types).

Some of the plastic bags offered by these retailers are single-use biodegradable bags but most are reusable, greater than 35 microns, plastic bags. The reusable plastic bags are not as large or durable as the reusable boutique or ‘green’ bags sold by the major supermarkets, and there is the potential they may not be reused as many times as these other bag types.

Increasing the mandated minimum thickness requirement for conventional (fossil fuel-based) plastic bags (to say between 45–55 microns) could potentially increase the average life of the plastic shopping bags offered by smaller supermarkets and other retailers and thereby reduce plastic consumption.²

Only recently, one of the local supermarket chains (Supabarn) voluntarily took this step, phasing out 35 microns plastic bags in preference for 55 microns boutique bags.

ENVIRONMENTAL EFFECTIVENESS

Increasing the minimum thickness requirement may result in a small reduction of plastic consumption.

There is uncertainty about the extent to which behaviours regarding the use of 35 microns plastic bags differ from those involving greater than 45 microns plastic bags. Increasing the mandated minimum thickness requirement might simply result in the substitution to thicker bags, without changing the number of bags consumed or littered.

Industry sources suggest there is approximately 6:1 ‘substitution rate’ between single-use and reusable plastic bags and boutique bags when single-use plastic bags are banned or otherwise removed from distribution.

In the ACT, the available data suggest the ‘substitution rate’ was similar to the industry estimate, at 5:1.

Given the current plastic bag ban in the ACT, the rate of substitution in the ACT would likely be higher if the minimum thickness requirement was increased.

Assuming a 5:1 rate of substitution, and the average substituted bag has a mass of 28 grams, raising the thickness requirement would reduce plastic consumption by 69 tonnes per year in 2018–19, rising to 77 tonnes in 2024–25.³

This equates to a 7 per cent reduction in the consumption of plastic from shopping bags, garbage bags and produce bags over this period. The substitution rate would have to be ≤2:1 in order for there to be no net reduction.

The effectiveness (and acceptability) of the measure could also be enhanced by having exemptions for particular product types or retailers; for example, butchers, fishmongers, poisons and takeaway restaurants.

The impact in plastic bag consumption on litter and other environmental impacts is not known with absolute certainty.

However, given the small number of plastic bags in the ACT litter stream, the scope for further reductions in plastic litter appear to be small.

IMPACT ON RETAILERS

Increasing the minimum thickness requirement is likely to have minimal impacts on retailers.

Thicker plastic bags will cost retailers more to purchase, with the difference being in the order of 5–6 cents per bag depending on the bag type and purchasing power of the retailers. However, in most cases, retailers will be able to pass these costs on to consumers in the form of higher retail plastic bag prices.

For some retailers, the policy change could result in small increases in profit. For example, retailers that do not currently charge for plastic bags are likely to profit from the change, provided they are able to charge for bags. Other retailers may suffer small losses, primarily because of the decline in bag sales. Overall, these losses are likely to outweigh gains, but only marginally.⁴

² For these purposes, it is assumed the minimum thickness requirements applies only to conventional (fossil fuel-based) plastic bags, meaning biodegradable bags of less than 35 µm could still be offered.

³ This assumes substituted bag consumption increases by 1.8% in line with weighted average household consumption growth after 2018–2019. For simplicity, we have also assumed there is no substitution to non-plastic bag types (e.g. calico, jute or paper) or to <35 µm biodegradable bags.

⁴ Macintosh et al, ANU, 2018

IMPACT ON HOUSEHOLDS

The average financial impact on households of increasing the minimum thickness requirement of plastic bags is likely to be positive (i.e. a reduction in household bag expenditure) but small.

Average households are likely to save approximately \$1 per annum in 2018–19 relative to the situation if the bag ban was not changed.⁵

While the average household impact is likely to be small, there is a risk increasing the minimum thickness requirement could increase shopping costs for financially vulnerable households. Several studies have found low socio-economic status households are less responsive to increases in plastic bag costs than higher socio-economic status households.⁶ Targeted information and social marketing campaigns may assist in alleviating impacts on these vulnerable groups. This has the potential to cost government even if aligned with other waste education programs.

COST TO GOVERNMENT

Increasing the minimum thickness requirement of plastic bags is likely to have minimal fiscal implications for the ACT Government.

Similar to the case with the introduction of the ban in 2011, government resources would be needed for a retailer and community consultation and education process prior to the change.

This consultation process would need to settle the scope of any exemptions with retailers (e.g. for fishmongers, restaurants and retailers selling poisonous materials).

Further resources may be necessary for any targeted campaign aimed at mitigating impacts on low income households.

After the transitional phase, there is likely to be a need for compliance and enforcement resources to ensure retailers understand and adhere to the new requirements.

As with the current ban, once the changes are embedded, there is unlikely to be a need for significant resources to be devoted to compliance and enforcement on an ongoing basis.

58
–
59

⁵ Macintosh et al, ANU, 2018

⁶ J Dikgang, A Leiman and M Visser (2012) 'Analysis of the plastic-bag levy in South Africa', *Resources, Conservation and Recycling* 66, 59-65; N Rivers, S Shenstone-Harris and N Young (2017) 'Using nudges to reduce waste? The case of Toronto's plastic bag levy', *Journal of Environmental Management* 188, 153-162.

Option 3 – Require all plastic bags to be biodegradable and compostable

Biodegradation is a degradation process catalysed by microorganisms in which materials are metabolised to carbon dioxide, methane, biomass, water and mineral salts.⁷

Concern about the persistence of plastics in the environment has promoted considerable research and, more recently, commercialisation of a number of different types of biodegradable plastics, including biodegradable plastic bags.

As detailed in Chapter 3, biodegradable plastics are generally made of a combination of organic materials such as starch and cellulose and chemical additives. To be classified as biodegradable, the plastic must be capable of degrading because of the action of naturally occurring microorganisms within a prescribed time under specified conditions.

Compostable plastics are a type of biodegradable plastic that degrades under prescribed composting conditions.

Composting involves the accelerated decomposition of materials through the action of microorganisms under controlled aerobic (in the presence of oxygen) conditions.⁸

To be classified as compostable, the aerobic decomposition must be capable of occurring under commercial or household composting conditions at rates comparable with other compostable materials.⁹

It is important to keep in mind that biodegradable and compostable bags have been observed by experts to perform poorly in application, as discussed previously on page 20.

Fact Box

AUSTRALIAN STANDARDS FOR A BIODEGRADABLE BAG

In Australia, there are two standards that apply to plastics labelled as compostable:

- Australian Standard AS 4736–2006¹⁰ (Biodegradable plastics -Biodegradable plastics suitable for composting and other microbial treatment); and
- Australian Standard AS 5810–2010¹¹ (Biodegradable plastics suitable for home composting).

AS 4736–2006 covers biodegradable plastics suitable for composting in municipal and industrial composters.

As its title suggests, AS 5810–2010 covers biodegradable plastics suitable for composting in home or domestic composters.

To meet the definition of biodegradable under the *Plastic Shopping Bags Ban Regulation 2011* (ACT), bags must satisfy the requirements of AS 4736–2006. These requirements include:

- at least 90 per cent of the plastic must biodegrade within 180 days in municipal and industrial composting conditions;
- at least 90 per cent of the plastic materials must degrade into less than 2 millimetre pieces within 12 weeks in municipal and industrial composting conditions;
- the resulting compost must not have toxic effects on plants or earthworms; and
- the plastic materials must contain more than 50 per cent organic materials.

Biodegradable bags meeting the requirements prescribed under AS 4736–2006 are exempt from the ban on <35 microns plastic bags.

7 H Sawada (1998) 'ISO standard activities in standardisation of biodegradability of plastics – development of test methods and definitions', *Polymer Degradation and Stability* 59, 365-370; S Grima et al. (2000) 'Aerobic Biodegradation of Polymers in Solid-State Conditions: A Review of Environmental and Physicochemical Parameter Settings in Laboratory Simulations', *Journal of Polymers and the Environment* 8(4), 183-195; S Lampman, *Characterization and Failure Analysis of Plastics* (ASM International, 2003).

8 Macintosh et al, ANU, 2018

9 J Song et al. (2009) 'Biodegradable and compostable alternatives to conventional plastics', *Philosophical Transactions of the Royal Society B* 364, 2127–2139; K O'Farrell, *LCA of Shopping Bag Alternatives: Report to Zero Waste South Australia* (Hyder Consulting Pty Ltd, 2009).

10 <https://www.saiglobal.com/pdftemp/previews/osh/as/as4000/4700/4736-2006.pdf> accessed 3 July 2018

11 <https://www.standards.org.au/standards-catalogue/sa-snz/manufacturing/ev-017/as--5810-2010> accessed 3 July 2018

At present, only a small proportion of plastic bags used in the ACT are biodegradable (approximately 10 per cent of plastic bags, or 830,000 bags in 2017–18).

One option for reform of the plastic bag ban is to require all plastics bags, including those of greater than 35 microns, to be compostable, either in accordance with AS 4736–2006 or AS 5810–2010. It is important to note that this contradicts the recent moves by other states and territories that are including biodegradable and compostable bags in their bans due to their poor environmental performance (refer to page 20).

For this analysis, it is assumed that such a change would require compliance with AS 4736–2006 only and that it would not be coupled with a thickness requirement (i.e. bags could be of any thickness provided they are compostable).¹²

The ACT Government’s recently completed Waste Feasibility Study recommends a municipal composting facility to process food and garden organics (FOGO) supported by household kerbside collection.¹³

It estimated this FOGO bin service and composting facility could divert over 40,000 tonnes of waste from landfill.

Amending the plastic bag ban to require all plastics bags to be biodegradable and compostable could be linked to the introduction of this new FOGO service. A similar approach could be adopted in the ACT as to Kassel, Germany (refer to case study on page 63). There is research currently underway in South Australia to trial this approach.¹⁴ This concept is shown in the graphic over page.

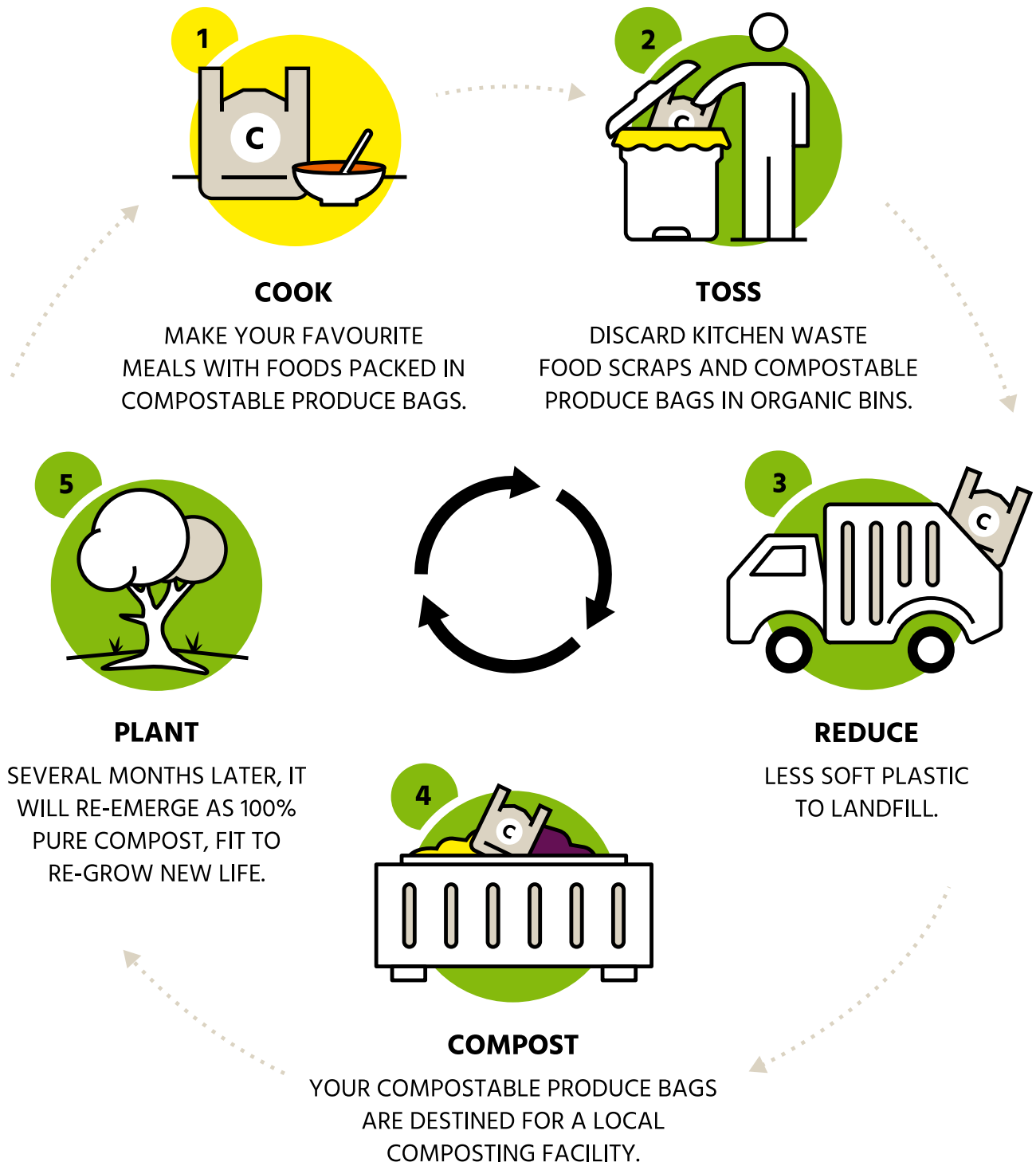
61
–
61

¹² Requiring compliance with AS 5810-2010 could have greater adverse financial impacts on retailers and householders because of the relative cost of AS 5810-2010-compliant bags.

¹³ ACT NoWaste, *Overview: A Roadmap to Improved Resource Recovery – Waste Feasibility Study* (ACT Government, 2018).

¹⁴ <http://www.abc.net.au/news/2018-06-28/compostable-bags-a-real-alternative-to-single-use-plastic-bag/9915000> accessed 2 July 2018

INCORPORATING COMPOSTABLE PRODUCE BAGS WITH HOUSEHOLD ORGANIC SERVICES



COMPOSTABLE PACKAGING IN KASSEL, GERMANY

A pilot project involving the introduction of compostable packaging, its collection through a household food and garden organics, or FOGO, collection service and subsequent composting at a commercial composting facility was successfully undertaken in Kassel, Germany, in 2001–2002.¹⁵

The trial found most of the compostable packaging was either disposed of in household composters or in designated FOGO bins, and there was no increase in the misplacement of conventional plastics in the FOGO waste stream.¹⁶

A further issue with biodegradable plastics is that, when they degrade under anaerobic conditions (e.g. in landfills), they produce methane, a potent greenhouse gas.

Another issue associated with biodegradable plastics is that their rate of degradation is dependent on environmental conditions, particularly temperature, exposure to ultra-violet radiation, moisture, salinity, mechanical weathering and microbial activity.¹⁹

The influence that these and other variables have on the degradation process makes it difficult to predict the rate of biodegradation in natural conditions. Compostable plastics degrade rapidly in suitable composting facilities and tend to degrade faster than other plastics in the ‘general environment’.²⁰ However, the degradation process still takes time and depends on the specific environmental conditions.²¹ Due to this, biodegradable and even compostable plastics can still have material litter impacts. Where they persist, they may also cause animal mortality and morbidity, including in marine environments.²²

When littered, biodegradable or compostable bags are unlikely to encounter the optimal environmental conditions required for degradation and will persist in the environment.

Moreover, if the requirement prompted people to actually purchase more biodegradable and compostable bags as they believe they are sustainable; it could add to consumption and litter problems.

Given these concerns about the poor environmental performance of biodegradable and compostable bags, several jurisdictions have included biodegradable bags within the scope of bans on lightweight plastic bags. For example, Western Australia, Victoria²³ and Queensland have proposed to include biodegradable and compostable bags within the scope of their plastic bag bans.

However, linking a mandatory compostable bag requirement to the proposed new FOGO collection and composting service would mitigate some of these associated environmental risks. This is the focus of current trials in South Australia.

ENVIRONMENTAL EFFECTIVENESS

Requiring that all plastics bags be biodegradable and compostable is unlikely to materially reduce, and may even increase, the environmental impacts associated with the consumption of plastic bags in the ACT.

Several issues have been raised about the environmental benefits of biodegradable and compostable plastic bags (refer to page 20). Life Cycle Assessments (LCAs) suggest their direct causal impacts on the environment are not dissimilar, and are at times worse, than those associated with conventional plastic bags.¹⁷

Studies have found single-use compostable and oxo-biodegradable plastic carry bags had climate change and water impacts that were roughly equal to or greater than those associated with conventional single-use plastic bags.¹⁸

The reasons for the ‘negative’ LCA outcomes on many environmental measures stem largely from the nature of the feedstock. The reliance on biological material as a primary input to plastic production means the LCA impacts include those associated with growing and manufacturing the feedstock (biomass). In many instances, this can result in attributed water use and greenhouse gas emissions being higher than with conventional plastics.

15 J Reske, ‘Market Introduction of Compostable Packaging’, in E Chiellini and R Solaro (eds), *Biodegradable Polymers and Plastics* (Springer, 2003).

16 Reske, *ibid*.

17 M Yates and C Barlow (2013) ‘Life cycle assessments of biodegradable, commercial biopolymers – a critical review’, *Resources, Conservation and Recycling* 78, 54–66; T Hottle, M Bilec and A Landis (2017) ‘Biopolymer production and end of life comparisons using life cycle assessment’, *Resources, Conservation and Recycling* 122, 295–306.

18 K O’Farrell, *LCA of Shopping Bag Alternatives: Report to Zero Waste South Australia* (Hyder Consulting Pty Ltd, 2009); K Verghese, *Environmental Impacts of Shopping Bags: Report for Woolworths Ltd* (Sustainable Packaging Alliance Ltd, 2009).

19 P Sangwan and K Dean, *Degradable Plastics Packaging Materials: Assessment and Implication for the Australian Environment* (CSIRO, 2011); S Mehdi Emadian, T Onay and B Demirel, (2017) ‘Biodegradation of bioplastics in natural environments’, *Waste Management* 59, 526–536.

20 T O’Brine and R Thompson (2010) ‘Degradation of plastic carrier bags in the marine environment’, *Marine Pollution Bulletin* 60, 2279–2283; E Gomez and F Michel (2013) ‘Biodegradability of conventional and bio-based plastics and natural fibre composites during composting, anaerobic digestion and long-term soil incubation’, *Polymer Degradation and Stability* 98(12), 2583–2591.

21 Mehdi Emadian, Onay and Demirel, 2017.

22 J Song et al. (2009) ‘Biodegradable and compostable alternatives to conventional plastics’, *Philosophical Transactions of the Royal Society B* 364, 2127–2139; Muller et al. (2012) ‘Experimental degradation of polymer shopping bags (standard and degradable plastic, and biodegradable) in the gastrointestinal fluids of sea turtles’, *Science of the Total Environment* 416, 464–467; A Nauendorf et al. (2016) ‘Microbial colonization and degradation of polyethylene and biodegradable plastic bags in temperate fine-grained organic-rich marine sediments’, *Marine Pollution Bulletin* 103, 168–178.

23 <https://www.insideretail.com.au/news/victoria-to-ban-plastic-bags-next-year-201806> accessed 29 June 2018

An education campaign will help to ensure the majority of compostable bags were included in FOGO bins, and reduce the amount of waste going to landfill, minimise litter issues and potentially reduce methane emissions from landfill.

However, the attributional environmental impacts would largely remain, particularly those associated with the production of the bags and their feedstocks. Further, the greenhouse gas benefits associated with the diversion of compostable bags from landfill are likely to be limited because both Mugga Lane and Woodlawn capture landfill gas and use it to generate electricity.

IMPACT ON RETAILERS

Because of the low cost of compostable plastic bags and potential to pass additional costs on to consumers, any positive or negative impacts are likely to be negligible across the retail sector as a whole.²⁴

The wholesale costs of compostable (AS 4736–2006 compliant) plastic bags are generally in the order of 20–30% higher than equivalent conventional plastic bags.

The most significant financial impacts on retailers are likely to arise through increased costs of single-use bags (if retailers choose not to charge for them) and produce bags, which retailers traditionally do not charge for.

IMPACT ON HOUSEHOLDS

Notwithstanding the likelihood of retailers passing additional bag costs on to consumers, the financial impacts on households of a mandatory compostable bag requirement are likely to be small.

Analysis shows that the estimated net increase in household bag expenditure in 2018–19 was approximately \$9 per annum (18 cents per week), growing to \$11 in 2024–25 (21 cents per week).²⁵

Again, while this estimate is subject to considerable uncertainty, it illustrates the likely magnitude of any adverse household financial impacts.

As indicated previously, any measure that increases the costs of plastic bags to consumers could disproportionately affect low income households. Targeted information and social marketing campaigns may assist in alleviating impacts on financially vulnerable groups.

COST TO GOVERNMENT

The net fiscal impacts to Government of requiring all plastic bags to be compostable are likely to be relatively small.

The cost implications of this option for the ACT Government are likely to arise through four main channels:

- negotiations with retailers over the scope and timing of the ban,
- general community marketing and education,
- targeted marketing and education to alleviate potential impacts on low income households, and
- ongoing compliance and enforcement costs.

Ultimately, the costs to government will depend largely on the extent of negotiations and the marketing and education that are considered necessary to implement the changes. The extent to which the change is linked to the proposed FOGO collection and composting service will also materially affect government costs and the scope of required community education and marketing.

One of the challenges associated with imposing a mandatory compostable bag requirement is that it is likely to decrease the profits of retailers who distribute bags without charging for them.

Retailers like butchers, fishmongers, and fruit and vegetable stores who distribute plastic carry and produce bags for free, will face increased costs but may not be able to pass these costs on to consumers. These types of retailers may oppose the change, which could prolong government negotiations and consultation, and potentially necessitate greater resources for retailer and community marketing and education.

²⁴ Macintosh et al, ANU, 2018

²⁵ Macintosh et al, ANU, 2018

Option 4 – Ban Plastic Shopping Bags

Broad-based bans on plastic bags have been introduced in several jurisdictions, including the city of Bangalore in India, the Indian state of Karnataka, and Kenya.²⁶ Where these types of bans have been imposed, this has generally been in response to acute problems with plastic bag litter.

Anecdotal reports suggest the success of these types of bans has been variable, largely depending on the enforcement capacity of governments.²⁷ There are also reports of adverse economic and social side-effects of the complete bans, including obstructions to business activity and the development of black markets for plastic bags.²⁸

The imposition of a complete ban on plastic bags in the ACT is likely to result in:

- a reduction in plastic bag consumption, the extent of which would depend on the scope of the ban, the penalties for non-compliance and the strictness with which the ban is enforced,
- an increase in consumption of substitute jute, calico, paper and other similar bags,
- a small change (likely increase) in retailer profits,
- a minor increase in household shopping costs due to the need to purchase substitute bags, and
- a small increase in the budget impact to government due to the regulatory effort required to introduce and enforce the ban.

It is assumed the ban would be limited to shopping bags. This would mean it would not cover garbage bags or produce bags. The inclusion of garbage and produce bags within the scope of the ban could give rise to human health risks associated with food hygiene and waste management.

ENVIRONMENTAL EFFECTIVENESS

A ban on plastic shopping bags in the ACT would reduce the consumption of the six main bag types (single-use plastic, reusable plastic, reusable boutique, 'green', garbage and produce) by 50% (approximately 487 tonnes) in 2018–19.

The avoided plastic consumption would grow to almost 541 tonnes per annum in 2024–25.

As with option 2, increasing the minimum thickness requirement, the reduction in plastic bag consumption should lead to less plastic in the general environment. However, given the small number of plastic bags in the known ACT litter stream, the scope for further improvements in plastic litter control appear to be small.

The ban would increase consumption of substitutes like jute, calico and paper. LCAs suggest this shift could have adverse environmental impacts, for example, by increasing greenhouse gas emissions and increasing water use.

IMPACT ON RETAILERS

Impacts on retailer profits are likely to be relatively small across the sector.

It will depend on which substitutes consumers choose to purchase, the prices charged for the substitutes and the extent of reuse of the substitute bags. For example, if consumers shift from reusable boutique plastic bags to calico, retailers will have a modest increase in profits due to higher retail margins on the different bags.

IMPACT ON HOUSEHOLDS

Analysis suggests that average impacts on households are likely to be small.

As with retail impacts, the financial impacts on households will depend on how consumers respond to the ban and the prices charged for the substitutes.

Analysis indicates a potential increase of \$1 per week to households.²⁹

Again, there is the potential that the cost increases may be most pronounced in low income households, who may be less responsive to price signals. Targeted information campaigns should be considered as a way of alleviating potential adverse impacts on financially vulnerable households.

COST TO GOVERNMENT

The net fiscal impacts to Government of banning all plastic bags are likely to be relatively small.

The fiscal impacts of this option for the ACT Government are similar to those identified above in relation to options 2 and 3. The government will incur costs associated with negotiations with retailers, general and targeted community marketing and education, and compliance and enforcement. While these costs are likely to be relatively small in the context of the ACT Government budget, their size will depend on the extent of these efforts and how they are undertaken.

The risk of opposition from retailers and the broader community may necessitate a broader community consultation, marketing and education campaign than would be needed in relation to the other options.

26 Gazette Notice No. 2334, *The Kenya Gazette*, Vol. 119(31), 14 March 2017 (Republic of Kenya, 2017); Bruhat Bangalore Mahanagara Palike, No.Comm/PR/774/2016-17, Ban of Plastics & Penalty Impose in Bruhat Bangalore Mahanagara Palike (Office of the Commissioner, Bruhat Bangalore Mahanagara Palike, 4 May 2016); *Karnataka Forest, Ecology and Environment Secretariat Notification*, No. FEE 17 EPC 2012, Bangalore, 11 March 2016 (Karnataka State Pollution Control Board, 2017); S Moudgal, 'Total plastic ban in Karnataka', *The Times of India*, 14 March 2016; D Xanthos and T Walker (2017) 'International policies to reduce plastic marine pollution from single-use plastics (plastic bags and microbeads): A review', *Marine Pollution Bulletin* 118(1-2), 17-26.

27 J Watts, 'Eight months on, is the world's most drastic plastic bag ban working', *The Guardian*, 25 April 2018; 'Plastic shopping bags slowly making a return', *Business Daily*, 4 February 2018.

28 Ibid.

29 Macintosh et al, ANU, 2018

Option 5 – Use prices to reduce consumption of plastic shopping bags

Levies and taxes have been imposed on plastic bags as a way of helping to reduce consumption in several countries, including Botswana, Canada (Toronto), China, Denmark, Germany, Ireland, Israel, Malaysia (Penang and Selangor), South Africa, Uganda, the United Kingdom (England, Scotland and Wales), and the United States (New York City, Chicago and Washington DC).³⁰

In most cases, the levies or taxes have been imposed on retailers at the point of sale, who pass the cost on to consumers.³¹ There are also instances where the revenues raised through the imposition of the levies have been hypothecated for particular purposes. For example, in Washington DC, the funds raised have been used to assist in the clean-up of the Anacostia River.³² In Ireland, the funds raised through the levy are remitted to an environment fund, where they are used to support a range of environment measures, including waste reduction and management.³³

In addition to levies and taxes, another way of reducing plastic bag consumption using prices is to impose a mandatory minimum price for plastic bags. Mandatory minimum prices have several advantages over taxes and levies. Most particularly, there is greater certainty over the minimum price effect and there are lower compliance costs for retailers as there is no revenue to collect and transfer to government. On the other hand, because mandatory minimum prices generate no revenue, there is no new revenue source that can be used to manage the negative environmental impacts of plastics.

If price mechanisms were chosen as the preferred means of influencing plastic bag consumption, planning should take account of constitutional constraints upon the permissible form of any new measure.

The ACT is constitutionally prohibited from levying taxes in the form of ‘excise’ duties, as these are an exclusive preserve of the Commonwealth.³⁴ An excise duty is a tax upon a commodity that is imposed at some point in the distribution chain prior to consumption.³⁵ With this in mind, if the ACT resolved to impose a levy on plastic shopping bags it would need to be framed—as a matter of legislative drafting—as an impost attaching at the point of consumption (or sale) rather than at any earlier point in the distribution of bags (e.g. wholesale supply).

A legislated minimum price would bring no constitutional complications. Such a measure would raise no public revenue and therefore could not be characterised as a tax (excise or otherwise).

ENVIRONMENTAL EFFECTIVENESS

Imposing a mandatory levy on plastic bags in the ACT could further reduce plastic bag consumption and the associated environmental impacts. The revenues raised could also be used to support other environmental initiatives, including improved flexible plastic recycling services.

The effectiveness of any levy will depend on its design, most particularly the bags it is imposed on and the rate(s) at which it is set. The importance of design is evident in the literature on the effectiveness of other plastic bag levies. Some have had limited success in reducing bag consumption and litter, while others appear to have been highly effective.

30 D Xanthos and T Walker (2017) ‘International policies to reduce plastic marine pollution from single-use plastics (plastic bags and microbeads): A review’, *Marine Pollution Bulletin* 118(1-2), 17-26; F Convery, S McDonnell and S Ferreira (2007) ‘The most popular tax in Europe? Lessons from the Irish plastic bags levy’, *Environmental and Resource Economics* 38, 1-11; J Dikgang, A Leiman and M Visser (2012) ‘Analysis of the plastic-bag levy in South Africa’, *Resources, Conservation and Recycling* 66, 59-65; N Rivers, S Shenstone-Harris and N Young (2017) ‘Using nudges to reduce waste? The case of Toronto’s plastic bag levy’, *Journal of Environmental Management* 188, 153-162.

31 There are instances of the levies or taxes being imposed on bag suppliers.

32 Xanthos and Walker, 2017

33 O Laiyemo, *Spending Review 2017: Environment Fund* (Irish Government Economic & Evaluation Service, 2017).

34 Commonwealth Constitution, s 90; *Capital Duplicators Pty Ltd v Australian Capital Territory (No 1)* (1992) 177 CLR 248.

35 *Dickenson’s Arcade Pty Ltd v Tasmania* (1974) 130 CLR 177.

Case Study

PLASTIC BAG FEES AND LEVIES – EXPERIENCE ELSEWHERE

The South African levy of 46 rand cents per 24 litre bags initially resulted in significant reductions in bag consumption but these impacts have diminished over time because of falls in the relative price of bags and declining responsiveness of consumers to price signals.³⁶ In Toronto, the imposition of a 5 cents levy led to only modest increases in the propensity of people to reuse bags (3.4%), with the response being more pronounced amongst high socio-economic households.³⁷

In Ireland and Portugal, for example, the imposition of levies at different levels (initially 15 Euro cents in Ireland and 10 Euro cents in Portugal) resulted in marked reductions in plastic bag consumption.³⁸ In Ireland's case, the levy also resulted in a significant reduction in the number of plastic bags in the litter stream.³⁹ In Portugal, the positive impacts of the observed 74% reduction in single-use plastic bag use were partially offset by a 12% increase in plastic garbage bag consumption.⁴⁰

The variability in effectiveness of the levies imposed is primarily attributable to design issues. It is also important to emphasise that there are weaknesses in the literature as many of the studies have been based on simple before and after comparisons.⁴¹

In the ACT, one option is to impose a plastic levy (or mandatory minimum price) at the point of sale or distribution on a broad range of shopping and garbage bags, at a rate set based on the mass of the bag.




For example, the levy could be imposed at 2 cents per gram of plastic, regardless of the plastic type. Assuming the levy was fully passed on to consumers, this would increase bag prices by roughly the amount outlined in Table 8. To prevent leakage (the substitution of unleveled for leveled bags), the levy would also need to apply to any other types of plastic bags that are sold or distributed in the Territory.

One of the attractions of a levy (or mandatory minimum price) like this is that it could capture all bag types and provide a consistent incentive across bag types for reducing plastic consumption. However, there is insufficient information available on the price elasticities of the different bag types to derive reliable approximations of the likely impact of the levy.

For illustrative purposes, making assumptions about price elasticities of demand and consumer responses, the introduction of the 2 cents per gram levy would result in a 340 tonne reduction in plastic consumption across the six bag types in 2018–2019.⁴²

This estimate should be seen as illustrative only because of the lack of data on which to base estimates of own-price elasticities of demand. Further, the estimate does not account for substitution between plastic bag types. Prior to imposing a levy, further analysis should be undertaken on likely consumer responses.

TABLE 8: APPROXIMATE INCREASES IN PLASTIC BAG PRICES WITH 2 CENTS PER GRAM PLASTIC BAG LEVY

TYPE	MASS	CURRENT RETAIL PRICE	LEVY (DOLLARS)
 Biodegradable plastic bags	5.4	Free to 5 c	0.11
 Reusable plastic bags	14.2	Free to 10 c	0.28
 Reusable boutique bags	28.0	15c	0.56
 Reusable 'green' bags	99.1	100c	1.98
 Garbage bags	12.5	9c–13c	0.25
 Produce bags	2.5	Free	0.05

Source: Macintosh et al, ANU, 2018.

36 Dikgang, Leiman and Visser, 2012.

37 Rivers, Shenstone-Harris and Young, 2017.

38 Convery, McDonnell and Ferreira, 2017; M Anastasio and J Nix, *Plastic Bag Levy in Ireland* (Institute for European Environmental Policy, 2016); Laiyemo, 2017; G Martinho, N Balaia and A Pires (2017) 'The Portuguese plastic carrier bag tax: The effects on consumers' behaviour', *Waste Management* 61, 3-12.

39 Anastasio and Nix, *ibid*; National Litter Monitoring Statistics (Ireland), http://www.litter.ie/system_survey_results/index.shtml (1 June 2016).

40 Martinho, Balaia and Pires, 2017.

41 Rivers, Shenstone-Harris and Young, 2017.

42 Macintosh et al, ANU, 2018

IMPACT ON RETAILERS

Impacts on retailer profits are likely to be relatively small across the sector.

Given the inability to reliably predict the consumer response to a levy, it is also not possible to robustly estimate the likely impacts of the levy on retailer profits.

In any case, the direct impacts are likely to be relatively small because bag sales contribute a very small amount to retailer turnover and profits.

Transaction costs associated with the collection of the levy or tax and the transfer of the funds to the government need to also be considered. In most cases, these transaction costs are likely to have the most material impact on retailers, particularly small shops and grocers. The use of a mandatory minimum price for plastic bags would avoid these retailer-level transaction costs, while still using price signals to alter consumer behaviour.

IMPACT ON HOUSEHOLDS

Imposing a levy (or mandatory minimum price) on plastic bags could have adverse financial impacts on average household budgets. For example, the imposition of the 2 cents per gram levy increases average annual household expenditure on bags by \$63 in 2018–19 (\$1.20 per week), rising to \$75 in 2024–25 (\$1.44 per week). While this estimate is illustrative only, it demonstrates how material the average household cost increases could be with a 2 cents per gram levy.

If the ACT Government decides to impose a levy (or mandatory minimum price), consideration should be given to how best to mitigate impacts on low income households. These households have lower capacities to absorb price increases and there is evidence to suggest they may be the least responsive to price signals.

COST TO GOVERNMENT

Imposing a plastic bag levy would give rise to costs for the ACT Government similar to those associated with options 2, 3 and 4. However, unlike those other options, it would generate revenue, which could be used to offset the implementation costs and potentially allocated to relevant environmental activities.

As noted above, without additional information, it is not possible to reliably predict what the impact of a levy might be on bag consumption levels and associated revenue from a levy. However, for illustrative purposes, it is estimated that a 2 cents per gram levy could generate \$12.5 million in revenue in 2018–19, rising to \$16.4 million in 2024–25.

While a levy has the benefit of generating government revenue, it may also face strong community opposition. As shown on page 55, a plastic bag levy was the least popular of the options for reform identified by respondents in the ReachTel phone survey. Retailers may also oppose the imposition of a levy because of the transaction costs associated with its collection and transfer to government. The potential for opposition may increase the implementation costs faced by the government if it decided to pursue this option.

Using a mandatory minimum price rather than a levy or tax is likely to reduce retailer opposition, thereby smoothing the path for implementation. However, a mandatory minimum price would still increase costs for consumers and would not generate revenue for government.

Option 6 – Introduce a mandatory disclosure regime for the sale and distribution of plastic bags by retailers

Mandatory disclosure regimes are used in environmental and natural resource management as a way of ensuring there is an information base to support evidence-based policymaking. Disclosure regimes also facilitate collaborative governance arrangements, whereby producers, consumers, third parties and governments work together to find solutions to environmental and other problems.

Examples of mandatory environmental disclosure regimes in Australia include the National Pollution Inventory (NPI) and the National Greenhouse and Energy Reporting System (NGERS). The NPI is a collaborative federal, state and territory regime that provides free information on emissions of 93 pollutants and the source and location of the emissions. NGERS is an Australian Government initiative that collects and reports on energy use and greenhouse gas emissions from energy, industrial and waste facilities that emit more than 25,000 tonnes of carbon dioxide equivalent per year.

While strictly not a mandatory disclosure regime, during the Millennium Drought the ACT Government publicised average household water consumption levels as a way of increasing awareness of water restrictions and changing water consumption behaviour. This type of approach could equally be used for plastic bags but would require the mandatory extraction of data from retailers or bag suppliers.

A mandatory disclosure regime for plastic bag consumption in the ACT would require retailers who sell or distribute plastic bags to report annually (or on another designated time period) on bag sales and distribution, by bag type, size (volume) and mass. This data could be collated by the ACT Government and reported on a freely available public website. The data could be reported by retailer or in aggregate.

The reporting of plastic bag sales by retailers would better enable collaborative governance arrangements. The ability of retailers, consumers, third parties and governments to find solutions collaboratively is contingent on all parties having information on the nature and magnitude of a given problem. Reporting only aggregate information would undermine these efforts, shielding underperformers from public scrutiny.

Some retailers are likely to oppose the disclosure of their sales and distribution data of plastic bags on the grounds the information is commercial-in-confidence. Similar arguments have been raised in relation to other mandatory disclosure regimes. Before a mandatory disclosure regime is introduced, further information should be obtained on the materiality of the commercial risks associated with the disclosure of retail-level plastic bag data. While likely to be less effective, the reporting of aggregated Territory-wide or electoral division data on plastic bag sales and distribution would still provide information for government and the broader community.

ENVIRONMENTAL EFFECTIVENESS

It is not possible to accurately predict whether, and to what extent, a mandatory disclosure regime might reduce plastic bag consumption in the ACT and the associated environmental impacts.

The outcomes would depend on several unknown variables, including the scheme's design, third party engagement and the responsiveness of retailers and consumers.

IMPACT ON RETAILERS

A mandatory disclosure regime is likely to have minimal financial impacts on retailers.

All retailers already maintain records on plastic bag purchases and sales. This information is maintained for the management of inventories. Retailers are also required to keep these data for tax purposes. Consequently, there should not be additional cost associated with the collation and storage of the information.

The main additional costs relate to the reporting of plastic bag consumption data to the ACT Government. Larger retailers are unlikely to encounter difficulties in absorbing these transaction costs. However, for smaller retailers, who have few staff and limited spare capacity, the reporting costs could be material.

68

–

69

Reporting costs could be minimised through the design of an online reporting portal for registered retailers. Exemptions could also be provided for small retailers to alleviate concerns about their capacity to absorb or pass on transaction costs. Surveys could be used as an alternative way of tracking bag consumption patterns at exempt retailers.

IMPACT ON HOUSEHOLDS

A mandatory disclosure regime is likely to have no impact on household shopping costs.

Retailers may pass transaction costs on to consumers by increasing the cost of plastic bags or other products. However, the impact on retail prices should be small. The ability of retailers to pass on costs is also likely to be constrained by competitive market forces (i.e. retailers may be reluctant to raise prices for fear of losing market share).

COST TO GOVERNMENT

The establishment of a mandatory plastic bag disclosure and reporting regime would involve additional costs to government.

These include costs associated with:

- the establishment and maintenance of the (preferably online) reporting portal,
- the establishment and maintenance of the online public database,
- negotiations with retailers,
- general and targeted community marketing and education, and
- compliance and enforcement.







Commissioner for Sustainability and the Environment

P: GPO Box 158 Canberra, ACT 2601

T: (02) 6207 2626

E: envcomm@act.gov.au

environmentcommissioner.act.gov.au

