



# Plastic Bags Issues & Alternatives Information Document February 2004





## Forward

The information contained in this document is reproduced in part from relevant information presented in the following two reports list below.

Both reports are available online from the Department of Environment and Heritage website - [www.deh.gov.au/industry/waste/plastic-bags/index](http://www.deh.gov.au/industry/waste/plastic-bags/index).

### **PLASTIC SHOPPING BAGS IN AUSTRALIA**

National Plastic Bags Working Group

Report to the National Packaging Covenant Council

6 DECEMBER 2002

### **PLASTIC SHOPPING BAGS – ANALYSIS OF LEVIES AND ENVIRONMENTAL IMPACTS FINAL REPORT**

Prepared in association with

RMIT Centre for Design and

Eunomia Research and Consulting Ltd

DECEMBER 2002



## Background

### Department of Environment & Heritage

The Department of the Environment and Heritage recognises that plastic bag litter is a serious environmental concern, and is currently working with state and territory governments, industry, and the community to undertake a package of actions to reduce the impact of plastic bags on the Australian environment. These actions include:

- Setting the aspirational goal of reducing plastic bag litter by 75% by the end of 2004;
- Developing and implementing a strong National Retailers Code of Practice for the Management of Plastic Retail Carry Bags by April 2003, which will set ambitious targets for recycling and reducing plastic bag use;
- Developing legislative options, including a possible plastic bag levy or ban on plastic bags;
- Developing a coordinated national customer and retailer awareness program; and
- Committing \$60,000 to undertake a comprehensive study on the full impact on the introduction of degradable plastic bags into Australia.

### Plastic Bags Working Group

At a meeting of the Environment Protection and Heritage Council on 11 October 2002, Ministers agreed to pursue a number of actions relating to the adverse impacts of plastic bags on the Australian environment. Ministers requested specific proposals from the National Packaging Covenant Council for consideration at their meeting in December 2002. Ministers also resolved to create a working party of officials, industry and community representatives—the Plastic Bags Working Group—to identify options for consideration by the National Packaging Covenant Council.

The Working Group's terms of reference were to:

- Identify options for eliminating the environmental impact of non-degradable plastic shopping bags to achieve better environmental outcomes; and
- Take into account the development and intent of the National Packaging Covenant in its deliberations.

The Working Group was tasked to:

- Investigate the broad range of issues surrounding plastic bag use in Australia;
- Undertake the role of an expert advisory group to the Covenant Council, providing it with ideas and options for consideration and comment and, as appropriate, to forward to Ministers; and
- Feed into and take value from an analysis being prepared by Environment Australia on the impacts of overseas plastic bag levies.

In parallel to this work, Environment Australia commissioned a consultant, Nolan-ITU Pty Ltd, to undertake research on the Analysis of Levies and Environmental Impacts.



## Introduction

The plastic bag is an established part of Australian shopping – with goods from groceries and take away food to clothing and hardware being carried from retail outlets in plastic bags. Approximately 6.9 billion plastic bags are used by Australian consumers every year.

Recent public concern and debate has developed over plastic bag usage and disposal. This debate has been largely triggered by the highly publicised outcomes of a plastic bag levy which has been recently introduced in Ireland, with dramatic reductions in plastic bag use reported. These results are tempered, however, by differing results from other countries with similar schemes.

The major plastic bag types used in Australia are the 'singlet' bag, made of high density polyethylene (HDPE) and the 'boutique' style bag, made of low density polyethylene. Some HDPE bags are also used in a 'wave top' shape, with a reinforced handle.

The HDPE singlet bag is generally used in supermarkets, fresh produce, take-away food and other non-branded applications. The LDPE boutique and HDPE wave top bags are generally branded and used to carry higher value goods such as clothing.

Industry data indicates that 6.9 billion, or over 36 850 tonnes, of plastic shopping bags were used in Australia in 2001, with 6 billion of these being HDPE bags and 900 million LDPE bags.





## **BASIC FACTS**

### **Plastic Bags – What are the real issues?**

The following four main areas of concern were identified in the course of the Working Group's investigations:

1. Plastic bag littering, and associated indiscriminate waste disposal and consumer behaviour;
2. Resource consumption issues, including reduction, reuse, and recycling;
3. Plastic degradability issues relating to littering and resource use;
4. Social issues, including triple bottom line concerns, community education and awareness, and consumer perceptions.

### **Where do plastic bags end up?**

The nature of many goods purchased and carried in plastic bags effects the end destination of both the product and the bag. Three major destinations have been identified:

- Home;
- Away from home – outdoor; and
- Away from home – commercial and industrial.

Outdoor use locations would include take-away food, picnics and camping, building sites etc. Indoor locations include businesses, offices, shows and exhibitions and other commercial areas. Supermarket shopping bags are likely to go to a home, and many take-away food bags may go to an outdoor or street location.

The destination of bags strongly effects the disposal destination, including the recycling and reuse of the bags and littering potential. Purchase points such as fast food outlets which have a high percentage of 'away from home – outdoor' destinations are considered to have higher likely impacts in litter, and these sectors may therefore be the focus of different policy and actions than other sectors.

## **How many plastic bags are used in Australia?**

The Nolan-ITU report notes that approximately 6.9 billion new plastic bags are used by consumers each year, or just under one bag per person per day. This equates to roughly 2% (or over 36 850 tonnes) of total plastics produced in Australia each year. Around 6 billion of these are HDPE bags and 900 million are LDPE bags. 53% are obtained from supermarkets, with the remaining 47% from other retailers.



## THE KEY ISSUES IN DETAIL

### Littering

Data collected by Clean Up Australia and Keep Australia Beautiful suggests that plastic bags comprise around 2% of the litter collected at clean up sites<sup>7</sup>. Although this is indeed a small proportion, by their nature plastic bags are a very visible component of the litter stream, and their material persistence means that the number of bags in the environment will increase over time.

### Resource Consumption

Nolan-ITU estimates that 6.9 billion bags (HDPE and LDPE) or 36 850 tonnes of plastic polymer, are consumed in Australia each year. This is equivalent to just 2.5% of the total plastics consumed in Australia per year by weight. HDPE and LDPE are manufactured from ethylene (a by-product of gas or oil refining), a non-renewable resource.

As noted in the Nolan-ITU report, the energy consumed in the manufacturing process of one HDPE singlet bag plus the energy content of the bag (the embodied energy) is equivalent to:

- Fuel consumed by driving a car 1 km is equivalent to 8.7 bags;
- Fuel consumed by driving a 28 tonne articulated truck 1 km is equivalent to 64.6 bags (i.e. travelling from Melbourne to Sydney would be roughly equivalent to 57 300 bags).

In comparison, it is estimated that the making of a plastic bag uses up to 40% less energy, produces up to 80% less solid waste, 72% less atmospheric emissions and 90% less waterborne waste, than a paper bag.

Because plastic bags are lighter than paper bags there is also considerably less fuel used in distributing the plastic bags, which means less greenhouse gas emissions.

### Social Issues

Plastic bags are popular with consumers and retailers because they are a functional, lightweight, strong, cheap, and hygienic way of transporting food and goods. However, despite this popularity, there appears to be widespread public concern that plastic bags are 'bad'. In a recent media talk-back session with the Commonwealth Minister for the Environment and Heritage, callers expressed their concerns on a range of issues including suggestions for alternatives and the kinds of alternatives they were currently using, concern that those with vested interests would dominate the decision-making process, and suggestions for other types of plastic packaging that should be considered.

The high visibility of HDPE plastic bags (usually white or pale coloured), and the extent to which their use has pervaded society, is seen by some members of the

community as a symbol of the 'wasteful society'. However, given that alternatives are readily available (depending on personal choice), and that a recycling collection system has been in place for several years (albeit a system that relies on consumer action), it is interesting that the majority of consumers continue to use the equivalent of one new plastic bag per day whilst complaining that 'someone' should do something about the issue.

This is supported by data collected by Clean Up Australia from newpoll surveys conducted during their 2001 *Bag Yourself a Better Environment Campaign*: although 92% of those surveyed indicated that the effects of plastic bags on wildlife was a major concern (75% for landfill and 86% on rubbish), the majority of respondents indicated that they **weren't** likely to use an alternative (72%), reuse a bag (63%), or recycle a bag (64%).

## Degradable Plastic Bags

A recent Environment Australia report produced by Nolan-ITU discusses the range of developments and environmental impacts that need to be considered when applying degradable technologies to a given situation.

*Environment Australia: Bio-degradable Plastics Development and Environmental Impacts* (Nolan-ITU, October 2002) contains valuable references for determining the best way to manage the plastic bag problem, and some of this information has been used in this report.

There is no one degradable plastic, but rather a range of plastics which have been designed to breakdown in different ways. Degradability, as a term, encompasses bio-degradability as well as bio-additive technologies and the differences between the two processes are important in order to determine appropriate application and likely success of introduction in solving a specific problem.

The different classes of degrading mechanisms are summarised as:

- Hydrocarbon based polymers that rely on pro-degradant additives;
- Pure starch type polymers; and
- Starch hydrocarbon polymer mixes.

Fifteen different polymer types have been identified so far. Degradable materials have been in existence for a number of years with mixed results in the market place. These have been applied to a range of plastic product groups, and plastic bags have been made from various degradable materials overseas for several years. In Australia, degradable plastic bags are quite new and have not yet seen broad application, use or evaluation.



# **ATTACHMENT 1**

## **MECHANISMS TO REDUCE PLASTIC BAG USE**

OPTIONS	PROS	CONS
Ban on plastic shopping bags	<p><u>Environmental</u> Major reduction in plastic bag litter. Decreased use of non-renewable resources</p> <p><u>Economic</u> Alternate industries prospering. Waste management costs down.</p> <p><u>Social</u> Increased awareness may flow to disposal of other items</p>	<p><u>Environmental</u> Impacts of alternatives could be significantly more harmful than plastic bags. No incentive to reduce other litter.</p> <p><u>Economic</u> Increased purchases of bin liners – impact on consumers. Impact on plastic bag manufacturers and employees. Also import/export concerns. Recyclers – no input to processors.</p> <p><u>Social</u> Lose amenity of plastic bags – carry of wet products. No choice to make – no environmental commitment of householders.</p>
Mandated take-back of plastic bags	<p><u>Environmental</u> Possible reduction in plastic bag litter.</p> <p><u>Economic</u> Recycling process will have substantial supply – could result in increase in markets for recovered material.</p> <p><u>Social</u> Take back of plastic bags may encourage further environmentally responsible behaviour. Community participation. Increased awareness may flow to disposal of other items.</p>	<p><u>Environmental</u> May lead to shift to equally or more harmful alternatives. Does not encourage reduction in use or less littering – relies on proactive consumers. No incentive to reduce other litter. Consumers may need to acquire plastic bags to dispose of nappies, dog poo, etc.</p> <p><u>Economic</u> Retailers will need to set aside retail space normally rented to brand owners. Costs of recovery may outweigh savings. Increased costs passed on to shoppers. Impact on plastic bag manufacturers and employees. Need to develop markets for returned bags.</p> <p><u>Social</u> Will not change littering behaviour</p>

OPTIONS	PROS	CONS
Commonwealth mandated and administered levy	<p><u>Environmental</u> Funds could be made available for environmental benefit. Will decrease plastic bag use (how much?).</p> <p><u>Economic</u> May reduce cost of litter clean up. Will lead to a nationally consistent approach.</p> <p><u>Social</u> Litter abated – visual amenity. Politically simple – clear government leadership.</p>	<p><u>Environmental</u> Impacts of alternatives.</p> <p><u>Economic</u> Administrative cost for government and retailers. Adverse impact on bag manufacturers. Issues relating to how funds raised are expended.</p> <p><u>Social</u> Cost to consumers, particularly families – plastic bag levy or cost of alternatives. May be seen as another grab for money by governments.</p>
Nationally mandated levy jointly administered by the states and the commonwealth.	<p><u>Environmental</u> Funds could be made available for environmental benefit. Will decrease plastic bag use (how much?).</p> <p><u>Economic</u> May reduce costs of litter clean up.</p> <p><u>Social</u> Initial litter abatement – visual amenity. States and Commonwealth seen to be working together to address issues of environmental importance.</p>	<p><u>Environmental</u> Impacts of alternatives.</p> <p><u>Economic</u> Costs increase for householders, retailers and government.</p> <p><u>Social</u> Will not necessarily be implemented consistently in all jurisdictions – confusion and equity issues.</p>
State based levies implemented collectively by the states.	<p><u>Environmental</u> May reduce littering of plastic bags. Funds could be made available for environmental benefit.</p> <p><u>Economic</u> Jurisdictions would have control of funds – may provide opportunities for flexibility.</p> <p><u>Social</u> Initial litter abatement – visual amenity.</p>	<p><u>Environmental</u> Impact of alternatives.</p> <p><u>Economic</u> Costs increase for householders, retailers and government.</p> <p><u>Social</u> Will not necessarily be implemented consistently in all jurisdictions – confusion and equity issues.</p>

OPTIONS	PROS	CONS
<p>State based levies implemented individually by the states</p> <p>Retailer administered levies implemented by some covenant-style mechanism, funds passed to government administered fund.</p>	<p><u>Environmental</u> May reduce littering of plastic bags. Funds could be made available for environmental benefit.</p> <p><u>Economic</u> Jurisdictions would have control of funds.</p> <p><u>Social</u> Initial litter abatement – visual amenity. May be flexible and easier to implement than an approach requiring national agreement.</p> <p><u>Environmental</u> Possible reduction in plastic bags. An increased use of alternatives. Funds available to benefit environment.</p> <p><u>Economic</u> Increase in funds. Lower administrative costs.</p> <p><u>Social</u> Retailers seen to be environmentally responsible May be embraced by local communities.</p>	<p><u>Environmental</u> Impact of alternatives</p> <p><u>Economic</u> Costs increase for householders, retailers and government.</p> <p><u>Social</u> Will not necessarily be implemented consistently in all jurisdictions.</p> <p><u>Environmental</u> Impact of alternatives</p> <p><u>Economic</u> Costs increase for householders, retailers/small business and government.</p> <p><u>Social</u> Will not necessarily be implemented consistently in all jurisdictions. Lose ability to direct funds to projects of state or national importance.</p>
<p>Retailer administered and retained compulsory charge with minimum charge set via state based legislation.</p>	<p><u>Environmental</u> Will decrease plastic bag use.</p> <p><u>Economic</u> No free riders Retailers decide use of revenue raised (industry led measures).</p> <p><u>Social</u> Constitutionally safe (absence of revenue raising function means unable to be characterised as a duty of excise). May be embraced by retailers.</p>	<p><u>Environmental</u> Impact of alternatives.</p> <p><u>Economic</u> Costs increase for householders, retailers/small business and government.</p> <p><u>Social</u> Will not necessarily be implemented consistently in all jurisdictions. Lose ability to direct funds to projects of state or national importance.</p>

OPTIONS	PROS	CONS
Retailer administered levies (or charges) on a purely voluntary basis.	<p><u>Environmental</u> May reduce plastic bag litter</p> <p><u>Economic</u> Beneficial to retailers</p> <p><u>Social</u> Retailers seen to be environmentally responsible May be embraced by local communities Constitutionally safe.</p>	<p><u>Environmental</u> Most likely will not influence littering behaviour.</p> <p><u>Economic</u> Increased cost to retailers/small business for administration and accountability. Likely to increase costs to householders. It is likely that some retailers will not participate and will be in a position to undercut their competitors.</p> <p><u>Social</u> Not consistent across retailers and jurisdictions. Lose ability to direct funds to projects of state or national importance.</p>
Mandated performance targets/reporting with sanctions	<p><u>Environmental</u> Reduction in plastic bag use – may abate litter.</p> <p><u>Economic</u> Needed data would be provided. Costs of regulation avoided.</p> <p><u>Social</u></p>	<p><u>Environmental</u> Targets may be on wrong aspects and cause other environmental impacts.</p> <p><u>Economic</u> Increased costs to retailers/small business. Checking industry performance may be difficult.</p> <p><u>Social</u> If unsuccessful could adversely impact on other recycling systems. May be subject to some scepticism if targets are not ambitious.</p>

OPTIONS	PROS	CONS
Strengthened Code of Practice	<p><u>Environmental</u> Possible reduction in plastic bag use.</p> <p><u>Economic</u> Retailers/small business could undertake actions within their capabilities. Could incorporate rigorous targets and measures which are publicly reported</p> <p><u>Social</u> Awareness of litter issue continually reinforced</p>	<p><u>Environmental</u> Little litter abatement.</p> <p><u>Economic</u> Would increase costs to retailers/small businesses. Checking industry performance may be difficult. Free riders may gain a competitive advantage.</p> <p><u>Social</u> May be subject to considerable scepticism due to lack of progress with existing code. Retailers may not be fully committed.</p>
Compulsory offer of alternatives to shoppers	<p><u>Environmental</u> Would influence appropriate shopping bag use.</p> <p><u>Economic</u> Retailers would possibly sell more alternate bags.</p> <p><u>Social</u> Consumers provided with an opportunity to act responsibly.</p>	<p><u>Environmental</u> Alternatives could impact adversely on environment.</p> <p><u>Economic</u> May cost consumers more.</p> <p><u>Social</u> Consumers made to feel irresponsible.</p>
Compulsory messages on bags (eg, this product may kill a turtle)	<p><u>Environmental</u> Will decrease plastic bag use. May address litter issue. Will increase exposure to environmental issues. Source of litter may be identifiable if all had printing.</p> <p><u>Economic</u></p> <p><u>Social</u> May make identification of litter sources easier and therefore local litter prevention activities more robust.</p>	<p><u>Environmental</u> Could create overexposure and dilute message. Printing on bags may make them difficult to recycle.</p> <p><u>Economic</u> Cost of printing.</p> <p><u>Social</u> Hectoring – non-partnership. So many messages for consumers that they tune out.</p>



# **ATTACHMENT 2**

## **ALTERNATIVE CARRY SYSTEMS**

## PAPER/CARDBOARD

TYPE	DESCRIPTION	ATTRIBUTES	ORIGIN	ADVANTAGES	DISADVANTAGES
Cardboard	Box available at check outs (provided by store from deliveries)	Recyclable Reusable Degradable	In store	<b>Environmental</b> Made from recycled materials  <b>Economic</b> Cheap (free)	<b>Environmental</b> Not recyclable through Kerbside Recycling Less material being recycled through in-store collection  <b>Economic</b> Checkout design Boxes could be in short supply due to changes in transport systems  <b>Social</b> Heavy to carry/lift
Cardboard	'Catchy': box in trolley	Recyclable Reusable Degradable	Aust. Patent	<b>Environmental</b> Made from recycled materials	<b>Environmental</b> Not recyclable through Kerbside Recycling Less material being recycled through in-store collection  <b>Economic</b> Cost of licensing from patent Checkout design  <b>Social</b> Heavy to carry/lift
Sugar cane	Low-grade paper made from 'bagasse' (cane trash)	Recyclable Renewable Degradable	Australia	<b>Environmental</b> Renewable resource Waste reuse  <b>Economic</b> Develop Aust markets Looking at developing a bio-plastic (several years away)	<b>Economic</b> Currently not economic ally viable to produce paper in Australia

TYPE	DESCRIPTION	ATTRIBUTES	ORIGIN	ADVANTAGES	DISADVANTAGES
Paper	Generic paper sack	Recyclable Renewable Degradable	Australia	<p><b>Environmental</b> Made from recycled materials Fibres can be recycled up to 6-8 times Can be reused up to 6 times for dry goods Renewable resource from pine plantations &amp; managed forests Collected through Kerbside Recycling</p> <p><b>Economic</b> Around 90% of paper sacks manufactured in Aust. with Aust. fibre</p> <p><b>Social</b> Good size to volume ratio</p>	<p><b>Environmental</b> Large amounts of paper entering the waste stream Uses more water in production than plastic Uses more energy in production than plastic (Winnipeg study) Unsuitable for wet goods (unless plasticised) Permeable</p> <p><b>Economic</b> Cost approx. 10-12 cents each wholesale Checkout design</p>

## NATURAL FIBRE BAGS

TYPE	DESCRIPTION	ATTRIBUTES	ORIGIN	ADVANTAGES	DISADVANTAGES
Cotton/Calico/ Canvas	Generic soft fabric bag with variety of handle types	Reusable Renewable Degradable	95% of Aust cotton exported to Indonesia for manufacturing	<p><b>Environmental</b> Multi-use bag for life Renewable resource Light, flexible, washable</p> <p><b>Economic</b> Support/develop Aust markets</p> <p><b>Social</b> 'Green' image</p>	<p><b>Environmental</b> Crop production costs (water) GM issues High pesticides, herbicide needs Washing uses resources Less plastic recyclate</p> <p><b>Economic</b> Products imported Cost around \$2 each Checkout design</p> <p><b>Social</b> Current Coles &amp; Woolies bags are imported (China) – outworker issues</p>
Cotton/Calico/ Canvas	'Trolley Bag" currently calico but other options possible (hemp), polyprop handles, elastic top	Reusable Renewable Degradable?	Germany	<p><b>Environmental</b> Multi-use bag for life Can be made from recycled materials</p> <p><b>Economic</b> Develop Aust markets (hemp etc)</p>	<p><b>Environmental</b> Less plastic recyclate</p> <p><b>Economic</b> Cost approx. A\$8-9 each wholesale. Currently selling in Hobart @ \$12 each Currently imported Checkout design</p>

TYPE	DESCRIPTION	ATTRIBUTES	ORIGIN	ADVANTAGES	DISADVANTAGES
Jute	Generic woven fibre bag with variety of handle types	Reusable Renewable Degradable	India, Bangladesh	<p><b>Environmental</b> Multi-use bag for life Renewable resource</p> <p><b>Economic</b> Support 3<sup>rd</sup> World industry Reportedly comparable to plastic bag production costs (in Asia)</p> <p><b>Social</b> 'Green' image</p>	<p><b>Environmental</b> Less plastic recyclate Crop production costs?</p> <p><b>Economic</b> Checkout design</p> <p><b>Social</b> Imported product – outworker issues</p>
Hemp	Generic soft fabric bag with variety of handle types	Reusable Renewable Degradable	Central Asia (origin) China (imports) Commercial production licensed in Australia	<p><b>Environmental</b> Multi-use bag for life Renewable resource Dryland crop possible No pesticides, fungicides, herbicides needed</p> <p><b>Economic</b> Support/develop Aust markets</p> <p><b>Social</b> 'Green' image</p>	<p><b>Environmental</b> Less plastic recyclate May leach nitrogen into waterways Crop production costs?</p> <p><b>Economic</b> Hemp fabric is currently imported More expensive to purchase than cotton? Checkout design</p>
String	See Jute, Sisal	Reusable Renewable Degradable		<p><b>Social</b> Multi-use bag for life Renewable resource Cottage industry creation Good size to expansion ratio</p>	<p><b>Environmental</b> Less plastic recyclate</p> <p><b>Economic</b> Checkout design</p> <p><b>Social</b> Difficult to carry large items</p>

TYPE	DESCRIPTION	ATTRIBUTES	ORIGIN	ADVANTAGES	DISADVANTAGES
Sisal	Coarse woven bag or string bag	Reusable Renewable Degradable	Mexico, Central America	<p><b>Environmental</b> Multi-use bag for life Renewable resource</p> <p><b>Economic</b> Support 3<sup>rd</sup> World industry</p> <p><b>Social</b> 'Green' image</p>	<p><b>Environmental</b> Less plastic recyclate Crop production costs?</p> <p><b>Economic</b> Checkout design</p> <p><b>Social</b> Imported product – outworker issues</p>
Cane (rattan) basket	Generic woven basket with cane handles	Reusable Degradable (eventually) Renewable	Thailand, China, Malaysia, India Indonesia & other SE Asian countries. Crops being grown in Northern Aust.	<p><b>Environmental</b> Multi-use bag for life Carbon sequestration similar to conifers (3,700- 4,000 lbs/hectare) Waste chipped for mulch Renewable resource</p> <p><b>Economic</b> Support/develop Aust markets</p> <p><b>Social</b> Rigid &amp; sturdy vessel 'Green' image</p>	<p><b>Environmental</b> Less plastic recyclate High water use (crop)</p> <p><b>Economic</b> Product imported Not currently used for basketmaking in Australia</p> <p><b>Social</b> Heavy to carry/lift</p>
Palm Pandanus Banana leaf	Generic woven basket	Reusable Degradable (eventually) Renewable	Samoa, Indonesia, India & other Asian & Pacific countries	<p><b>Environmental</b> Multi-use bag for life Made from waste products Renewable resource</p> <p><b>Economic</b> Support/develop Aust markets</p> <p><b>Social</b> 'Green' image</p>	<p><b>Environmental</b> Less plastic recyclate</p> <p><b>Economic</b> Product imported Checkout design</p> <p><b>Social</b> Outworker issues</p>

## PLASTICS – Non degradable

TYPE	DESCRIPTION	ATTRIBUTES	ORIGIN	ADVANTAGES	DISADVANTAGES
Polypropylene	'Smartbox': box in trolley	Reusable Possibly recyclable	UK	<b>Environmental</b> Multi-use bag for life Potentially recyclable  <b>Economic</b> Develop Aust. Markets	<b>Environmental</b> Manufactured from non-renewable resources No current Australian markets for PP  <b>Economic</b> Cost? Imported Checkout design  <b>Social</b> Heavy to lift
Polypropylene	"Greenbag": non woven plastic with plastic handles	Reusable Possibly recyclable	Asia/UK	<b>Environmental</b> Multi-use bag for life	<b>Environmental</b> Manufactured from non-renewable resources No current Aust.markets for PP  <b>Economic</b> Cost €1.00 retail each Imported  <b>Social</b> Outworker issues?
Low Density Polyethylene	ALDI bag with flexi-loop handles	Reusable	Australia	<b>Environmental</b> Multi-use bag for life Contains recycled content reclaimed from industrial waste  <b>Economic</b> Manufactured in Australia	<b>Environmental</b> Recyclable, but not collected through Kerbside Recycling  <b>Economic</b> Cost 15 cents retail each

## PLASTICS – degradable

TYPE	DESCRIPTION	ATTRIBUTES	ORIGIN	ADVANTAGES	DISADVANTAGES
Polyethylene	"BioBag": DCP (prodegradant) additive. TDPA. Compostable bags and Landfill bags	Bioerodable: light, heat, attrition/stress Recyclable	Canada (EPI)	<p><b>Environmental</b> Does not affect bacteria, fungi, earthworms Can use for binliners Coverts to water &amp; CO<sub>2</sub> Degrades in landfill in 2-3 years Degrades in the open in yrs 2 months Degrades in compost in 2-4 months Degrades in water (with wave action)</p> <p><b>Social</b> Good customer take-up – seen as benefiting the environment</p>	<p><b>Environmental</b> Requires environmental degrading first before bags bioerode Need more info on degrading in water Does not degrade in turtle digestive tracts as well as starch-based bags No Australian Standards</p> <p><b>Economic</b> Cost 2.5-3 cents/bag</p> <p><b>Social</b> Perceived environmental benefits could result in inappropriate use</p>
Starch polymer	"Mater-Bi": Starch-based polymer (corn, wheat, potato)	Biodegradable/compostable	Italy (Novamount)	<p><b>Environmental</b> No polymer or toxic residue, breaks down into cellulose Renewable resource Water soluble Can use for binliners Compostable Degrades in landfill 3-6 weeks (no testing been done) Degrades in the open (mulch film) 3-4 weeks Degrades in compost 3 weeks Degrades in water 6-months, 30 weeks</p>	<p><b>Environmental</b> Degrades in turtle digestive tracts better than other plastics No landfill testing done No Australian Standards</p> <p><b>Economic</b> Cost 9-10 cents/bag Some bags still imported from Italy Starch products imported from Italy</p> <p><b>Social</b> Perceived environmental benefits could result in inappropriate use</p>

TYPE	DESCRIPTION	ATTRIBUTES	ORIGIN	ADVANTAGES	DISADVANTAGES
Starch polymer				<p><b>Economic</b> Starch polymer Manufactured in Newcastle (PCC Plastics) &amp; Brisbane (Jonmar Plastics) at the moment Support/develop Australian markets</p> <p><b>Social</b> Good customer take-up – seen as benefiting the environment</p>	
Modified PET	“Biomax”: hydro/biodegradable polyester resin	Biodegradable/compostable	USA (DuPont)	<p><b>Environmental</b> Degrades in compost 180 days</p> <p><b>Social</b> Currently pilot with McDonalds Good customer take-up – seen as benefiting the environment</p>	<p><b>Environmental</b> Residues? Need more testing info No Australian Standards</p> <p><b>Economic</b> Cost 8 cents/bag Imported product</p>
Starch polymer	Starch-based polymer (corn)	Biodegradable/compostable	Australia	<p><b>Environmental</b> Degrades in landfill under 6 months Higher density so sinks in water</p> <p><b>Economic</b> Support/develop Australian markets</p> <p><b>Social</b> Good customer take-up – seen as benefiting the environment</p>	<p><b>Environmental</b> Need more testing info No Australian Standards</p> <p><b>Economic</b> Cost 6-7 cents/bag</p>

DCP: Degradable & Compostable Polymer additive

TDPA: Totally Degradable Plastic Additive technology from EPI (Environmental Plastic Incorporated, Canada)

PET: Polyethylene terephthalate

## OTHER

TYPE	DESCRIPTION	ATTRIBUTES	ORIGIN	ADVANTAGES	DISADVANTAGES
Granny trolley	Fabric/plastic case on wheels with handle	Reusable		<p><b>Environmental</b> Multi-use bag for life Large capacity</p> <p><b>Social</b> Rigid &amp; sturdy vessel Easy to carry heavy items Easy for pedestrian shoppers</p>	<p><b>Environmental</b> Mix of materials – hard to recycle</p> <p><b>Economic</b> Expensive compared with alternatives</p> <p><b>Social</b> Image problem Difficult to load into vehicles</p>
Backpack	Generic backpack style bag made from variety of fabrics	Reusable		<p><b>Environmental</b> Multi-use bag for life Large capacity</p> <p><b>Economic</b> Probably already purchased for other uses</p> <p><b>Social</b> Easy to carry heavy items Easy for pedestrian shoppers</p>	<p><b>Environmental</b> Mix of materials – hard to recycle</p> <p><b>Economic</b> Expensive compared with alternatives</p>