



DEPARTMENT OF
ENVIRONMENT & HERITAGE

**Plastic Retail Carry Bag Use
2002 – 2005 Consumption**

2005 MID YEAR REPORT

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TABLE OF CONTENTS

1	BACKGROUND	1
1.1	Bag Use in Australia	1
1.2	EPHC Objectives	2
1.3	Project Scope	2
2	DOMESTIC PRODUCTION AND IMPORT OF BAGS	3
2.1	Domestic Production	3
2.2	Bag Imports	3
2.3	Combined Trends in HDPE Local Bag Production and Import	5
3	RETAILER USE	7
3.1	Retail Sector HDPE Carry Bag Consumption	7
3.2	Supermarkets	7
3.3	Other Retail Sectors	8
4	CONCLUSIONS	9
5	REFERENCES	10
6	REPORT LIMITATIONS	11

APPENDICES

Appendix A: Plastic Bag Consumption Calculations

Appendix B: Sensitivity Analysis on Estimations

1 BACKGROUND

1.1 Bag Use in Australia

The plastic carry bag is an established part of Australian shopping. Carry bags are typically made from High Density Polyethylene (HDPE) plastic and are lightweight and strong, with a carrying capacity of over 1 000 times the weight of the bag. The weight of HDPE bags varies between 2 and 8 grams, with an average supermarket bag weighing 5-7 grams.

Most plastic carry bags are imported into Australia. In 2002, the import of bags was estimated to account for two thirds of total consumption.

In 2002 an estimate of annual HDPE bag consumption of 6.01 billion bags was developed. This estimate was based on information from both bag manufacturers and importers, and from key retailers. Table 1.1 outlines the estimated 2002 total carry bag use by retail sector.

Table 1.1: Estimated 2002 HDPE Bag Consumption

Retail Sector	No. of bags (billions)
Supermarkets	3.68
Other Food & Liquor	0.93
General Merchandise & Apparel	0.59
Fast Food, Convenience & Service Station	0.35
Other Retail	0.46
Total	6.01

These estimates were made and reported at the end of 2002. More recently available data incorporates more accurate import information which has resulted in a minor decrease in the 2002 bag consumption estimate presented above.

There is no government or industry program to measure or record plastic carry bag use in Australia. The Australian Customs Service collects data on bag imports based on weight of bags rather than bag units.

1.2 EPHC Objectives

In 2003, the Environment Protection and Heritage Council (EPHC) challenged Australian retailers to establish a National Code of Practice for the Management of Plastic Bags which included a range of targets relating to the reduction and recycling of retail carry bags. These targets included a 25% reduction in the number of HDPE bags issued by end of 2004 against the base of December 2002 and a 50% reduction by the end of 2005. In response to this challenge, the Australian Retailers' Association (ARA) developed a Code of Practice for the Management of Plastic Bags (ARA; 2003). This included a commitment to the EPHC targets. The ARA Code focuses on HDPE carry bags. (It was estimated in 2002 that HDPE bags account for over 85% of total carry bags by number.)

The ARA submitted a report to the EPHC on the progress of activity (including progress against the target of 25% bag reduction by the end of 2004). A further report in early 2005 reported progress to end of 2004 (ARA; 2005). The ARA has submitted a further report to the EPHC on the progress of activity in September 2005.

1.3 Project Scope

In August 2005 the Department of Environment and Heritage (DEH) engaged Nolan-ITU to undertake a study to report on bag usage over the period January to June 2005. The aim of the study is to identify the level of bag use across all retail sectors and to compare this to data presented in December 2002.

With thousands of retailers and many companies operating of numerous sites across Australia, it is not possible to conduct a comprehensive survey of bag use at a retail level. The methodology utilised in the study is therefore focussed primarily on data obtained at a bag manufacturers' and import level. Where possible, supporting data has also been obtained from retailers across many retail sectors.

2 DOMESTIC PRODUCTION AND IMPORT OF BAGS

2.1 Domestic Production

Australian manufacturing of retail carry bags is limited to a small number of producers. The largest manufacturers of HDPE bags in Australia are Detmark and Andrew Kohn. Both companies manufacture a range of HDPE and LDPE bags for all retail sectors. Based on information from the leading manufacturers, the total Australian production of HDPE carry bags over the six months from January to June 2005 is estimated at 0.72 billion bags. A summary of HDPE carry bag production in the period 2002 – 2005 is provided in Table 2.1.

Table 2.1: Summary of HDPE Carry Bag Production 2002 – 2005

Year	No. of bags (billions)
2002	1.98
2003	1.75
2004	1.58
Jan-June 2005	0.72

2.2 Bag Imports

The majority of the lightweight HDPE bags used in Australia are imported. The Australian Customs Service (ACS) records data on the import of all goods into Australia. Goods are classified under a series of product description codes, see Table 2.2. These codes have six levels of description in order to more accurately identify the import of specific product categories. The reference code 3923.21.00.25 is used to categorise the import of polyethylene shopping bags (excluding low-density polyethylene) not designed for permanent use. Most HDPE lightweight carry bags imported into Australia are classified under this description code.

It is also likely that some other bags are imported into Australia and classified under the code for HDPE shopping bags. Primarily this will include HDPE bags used for wrapping fruit and vegetables (produce bags). While some of these bags may be classified under a different code (3923.21.00.28), a survey of bag importers has shown that some classify produce bags under the same code as carry bags (3923.21.00.25). Therefore the quantity of bags recorded under the relevant codes for shopping bags will be inflated due to the inclusion of some other retail packaging.

Table 2.2: ACS Plastic Bags Codes and Descriptions

ACS Reference	Description
3923.21.00.24	Shopping Bags – LDPE
3923.21.00.25	Shopping Bags – HDPE
3923.21.00.26	Shopping Bags – other plastics
3923.21.00.27	Other Sacks – LDPE
3923.21.00.28	Other Sacks – HDPE
3923.21.00.29	Other Sacks – other plastics
3923.29.00.30	Other Sacks & Bags (excluding PE)

The data recorded by ACS is by weight rather than units. Therefore the data provided is in terms of total tonnes of shopping bags imported for HDPE and LDPE plastic. The weight of bags varies based on bag size and wall thickness. HDPE bags vary in weight between small, very light-weight bags (as used for example in “\$2” shops) through to bags used in department stores for large items. The vast majority of bags are of a medium weight of between 5 and 7 grams. These are widely used in supermarkets and many other retail sectors.

In converting the ACS data from tonnes to bag units, an average weight of 5.5 grams/bag has been used for HDPE bags. This figure was confirmed by industry sources.

To allow for bags other than carry bags being classified in the shopping bag category (e.g. produce bags) the total weight of HDPE bags imported and recorded under the relevant code has been reduced by 25%. This reduction is based on information from retailers of the likely usage of produce bags and an estimate of the percentage of these that will be included with shopping bags under the ACS code 3923.21.00.25. The reduction is consistent with the method used to generate the 2002 figures.

As a result, the number of HDPE retail carry bags imported into Australia from January to June 2005 was 1.43 billion bags. It is acknowledged that the accuracy of this estimate is closely linked to the assumed bag weights of imported bags and the level of non-retail carry bag material included in the ACS categories. A sensitivity analysis has been carried out on the estimates of the quantity of non-retail carry bags in the ACS categories. Sensitivity results are provided in Appendix B.

Most importantly, the ACS data is recorded on a month by month basis each year. This enables a direct comparison with bag imports from previous years. A comparison of tonnes imported under the code 3923.21.00.25 (HDPE shopping bags) showed a decline in bag imports over the two years from 2002 to 2004. This trend has continued into the first half of 2005.

Table 2.3: Summary of Imported HDPE Bags – 2002 to mid-June 2005

Year	No. of bags (billions)
2002	3.97
2003	3.49
2004	3.16
Jan-June 2005	1.43

Although the focus of this report is on HDPE retail carry bags, data was also obtained on LDPE retail carry bags. The Australian Customs data shows a sharp drop in LDPE bag imports in the first half of 2005. The scale of this import reduction is 68 % over 2002 levels based on a projected full year outcome for 2005. In discussions with local manufacturers of LDPE bags it was apparent that this reduction in imports was not the result of a shift to local production but rather a reflection of a decline in use. This could reflect a decline in sales in some general merchandise and fashion retail sectors combined with a switch to HDPE bags and reduced consumer use in these sectors.

2.3 Combined Trends in HDPE Local Bag Production and Import

The Australian market for lightweight HDPE retail carry bags is a combination of imported and locally produced bags. As outlined in Section 2.1, the total estimated sales of locally produced HDPE bags from January to June 2005 was 0.72 billion bags. This compares to estimated sales of locally manufactured bags in 2002 of 1.98 billion bags. This translates to a projected decline between 2002 and 2005 of 27.7%. There is a view amongst some manufacturers that market share for Australian produced bags have declined recently with some shift in higher weight bags to the import market.

As outlined in Section 2.2, the total estimated sales of imported HDPE bags from January to June 2004 was 1.43 units. This compares to estimated sales of imported HDPE bags in 2002 of 3.97 billion units.

Following analysis of the data obtained from local and import sources, HDPE plastic carry bag consumption has been estimated for the whole of 2005. For the first six months from January to June the estimated bag consumption was 2.15 billion bags (0.72 billion locally produced and 1.43 billion imported). By extrapolating this to a full year figure for 2005, total consumption of local and imported bags is 4.30 billion bags or 23 644 tonnes.

An alternative method of projection has been undertaken taking account of the seasonal variation in bag use, as observed over the period 2002-2004. During this period bag consumption was above average in the months November and January, and below average in April, May and December. In order to project a likely outcome for the remainder of 2005, Nolan ITU has separately assessed first half and second half year consumption for 2004 and, based on this split, a projected full year figure for 2005 has been estimated. Table 2.4 shows the data for 2002 to 2004 plus the progressive and projected 2005 data. It shows bag consumption continuing to fall significantly into 2005. It is likely that a figure in the range 25 - 30% will be achieved by end of 2005.

Table 2.4: Summary of HDPE Carry Bag Consumption

Description	2002	2003	2004	Jan-Jun 2005	Double 1st half year	Projected 2005 (seasonal)
Imported HDPE carry bags (tonnes)	21 813	19 210	17 358	7 881	15 762	16 283
Locally produced HDPE carry bags (tonnes)	10 907	9 605	8 679	3 941	7 881	8 142
Total HDPE carry bags (tonnes)	32 720	28 815	26 038	11 822	23 644	24 425
Total HDPE carry bags (billions)	5.95	5.24	4.73	2.15	4.30	4.44
% decrease from 2002:	-	11.9%	20.4%	N/A	27.7%	25.4%

The combined estimated saving in the use of HDPE retail carry bags over the three-year period is 3.58 billion bags, from 2002 baseline consumption.

2003: Difference over 2002 = 5.95 – 5.24 = 0.71

2004: Difference over 2002 = 5.95 – 4.73 = 1.22

2005: Difference over 2002 = 5.95 – 4.30 = 1.65

Total saving over three years: 3.58 billion bags

Table 2.5 provides an estimate of the change in the rate of HDPE carry bag use per capita and per household based on total bag consumption and population and household numbers.

Table 2.5: Changes in Average Use of HDPE Carry Bags (Number of Bags)

Year	Per Capita Use	Household Use
2002	303	792
2004	235	614
Jan-June 2005	105	250
Full year 2005 (estimated)	211	551

3 RETAILER USE

3.1 Retail Sector HDPE Carry Bag Consumption

Table 3.1 provides estimates of HDPE carry bag consumption on a retail sector basis. These estimates have been derived based upon the views of bag manufacturers and importers, and are indicative only. There is currently no direct measurement of plastic bag consumption across all sectors on a sector-by-sector basis. The values for 2005 have been estimated based upon 2002 sector consumption figures, and percentage changes in sector consumption values provided by industry. As such the 2005 HDPE carry bag consumption value, and the overall percentage change in consumption, are both slightly different from the values stated in Table 2.4.

Table 3.1: Estimated 2002 & 2005 HDPE Carry Bag Consumption by Sector

Retail Sector	2002 Bag Consumption (billions)	Est. 2005 Bag Consumption (billions)	Change (%)
Supermarkets	3.64	2.44	-33.0%
Other Food & Liquor	0.92	0.71	-23.0%
General Merchandise & Apparel	0.58	0.49	-16.0%
Fast Food, Conven. & Serv. Station	0.35	0.30	-15.0%
Other Retail	0.46	0.37	-20.0%
Total	5.95	4.30	-27.7%

3.2 Supermarkets

There is currently no government or industry body collecting data on retail carry bag use. Therefore it is not possible to accurately measure use across the vast retail sector. The ARA developed a Code for the Management of Plastic Bags in response to the EPHC challenge to industry. The ARA Code requires signatories who are Group One retailers (supermarkets) to provide audited data on bag usage to the ARA. This enables the ARA to report on progress in bag usage reduction for these retailers on a six-monthly basis. The ARA issued reports on the Code in February 2004, mid-2004 and in March 2005. In September 2005 it produced its report on 2005 first half year progress in meeting the Code target of a 50% reduction in bag usage by December 2005.

In this latest report, the ARA has indicated that bag usage in major supermarkets has declined over the past two and a half years. The stated decline is a reduction in the annualised rate of HDPE bags issued at 30 June 2005 of 33.8%. This figure does not take account of some supermarket chains that were unable to provide audited data due to their structure, or where stores are managed independently and data is not reported consistently across the group.

Similarly the 33.8% annualised reduction does not reflect activity in Group Two retailers (all retailers using lightweight HDPE retail carry bags other than supermarkets), where the code does not require audited data be provided and most signatories have not reported on bag usage. The previous ARA reports on activity have covered most Group One retailers but not Group Two retailers.

3.3 Other Retail Sectors

From discussions with bag manufacturers and retailers, the key findings are:

- While plastic carry bag usage is down, actual reductions in use have occurred for only some retailers, with others stable or experiencing an increase;
- Many companies had experienced a change in market share which impacted on their bag usage;
- Some companies had introduced a charge for bags resulting in substantial reduction in bag usage (typically over 80%);
- Some companies have switched from plastic carry bags to paper bags despite increased cost; and
- Some had seen a steady decline in bag usage based on increased consumer awareness and change staff practices.

Several retailers and bag suppliers observed that the ability to significantly reduce bag usage is more easily achieved in some retail areas than others. For example video rental outlets, bookshops, newsagents, pharmacies and music shops have a higher degree of one or two item transactions where a bag can more practically be avoided. Conversely, department stores and food outlets have more items per transaction and therefore less ability to eliminate a bag from a transaction. Reductions in these stores can come from more efficient use of bags or consumers supplying their own bag. The survey found the use of reusable bags was stated to be lower in other retail sectors than in supermarkets.

Bag manufacturers and importers reported that some of their retail customers have achieved a reduction of 50% or more in bag usage while others had experienced no bag reduction. The inability of many retailers to report on bag usage, combined with the low level of signatories by Group Two ARA members to the plastic bag code, indicates many retailers are not actively pursuing bag reduction at the level that the major supermarkets have.

As non-supermarket retail outlets account for an estimated 43% of HDPE bag use, the efforts of all retail sectors will be crucial to achieving a further significant reduction in bag use.

4 CONCLUSIONS

- There is clear evidence from bag import data and Australian bag manufacturers that there has been a reduction in bag usage in Australia between 2002 and 2004, which has continued into 2005.
- It is estimated the reduction in lightweight **HDPE bags** from 2002 to the end of 2005 will be 27.7% or 1.65 billion bags per year.
- The reduction in the supermarket sector is estimated to be higher than other retail sectors reflecting a higher level of activity by companies and community organisations in these stores. It is estimated that the 2002-2005 reduction in the supermarket sector is 33% or higher if adjusted for store growth.
- The reduction across the rest of the retail industry is estimated to be lower, although there will be individual exceptions. (For example where retailers have introduced a charge for bags and the observed reduction has been much greater, typically over 80%).
- The reduction in **LDPE shopping bags** has been more significant in 2005, with imports dropping an estimated 68.5% from 2002 imports.
- Industry observations are that the reductions in bag use over the past two years are the result of increased consumer awareness, better staff training and the more widespread availability and use of heavier duty reusable carry bags.



5 REFERENCES

- Australian Customs Service, 2005. Importation Data – HDPE and LDPE Retail Carry Bags, ACS, January 2005.
- Australian Retailers Association, 2003. Code of Practice for the Management of Plastic Bags, ARA, October 2003.
- National Plastic Bags Working Group, 2002. Plastic Shopping Bags in Australia – Report to the National Packaging Covenant Council, December 2002.
- Nolan-ITU/RMIT Centre for Design, 2002. Plastic Shopping Bags – Analysis of Levies and Environmental Impacts, December 2002.
- Australian Retailers Association, 2005. Code of Practice for the Management of Plastic Bags- 2004 End of Year Report, ARA, March 2005.



6 REPORT LIMITATIONS

This report has been prepared in accordance with an agreement between Department of the Environment and Heritage and Nolan-ITU.

The services performed by Nolan-ITU have been conducted in a manner consistent with the level of quality and skill generally exercised by members of its profession and consulting practices.

This report is solely for the use of Department of the Environment and Heritage and any reliance of this report by third parties shall be at such party's sole risk and may not contain sufficient information for purposes of other parties or for other uses. This report shall only be presented in full and may not be used to support any other objectives than those set out in the report, except where written approval with comments are provided by Nolan-ITU.



Appendix A

Plastic Bag Consumption Calculations

HDPE Plastic Bag Usage

Table A1 presents detailed calculations of HDPE plastic bag consumption from 2002 to 2005. It is estimated that 25% of the HDPE plastic bags imported in 2002 were actually non-carry bag types, such as produce bags used for fruit and vegetables, and this amount (7 271 tonnes) has been subtracted from the total quantity of HDPE bag imports. In addition, it was estimated by industry that local production was 50% of imports during 2002, recent information from industry suggests that this ratio was largely unchanged for 2003, 2004 and into 2005.

Table A1: Summary of HDPE Plastic Bag Consumption

Description	2002	2003	2004	2005 (Est.)
Imported HDPE bags (tonnes):	29 084	26 481	24 629	23 033
Non-carry bags (tonnes):	7 271	7 271	7 271	7 271
Imported HDPE bags less non-carry bags (tonnes):	21 813	19 210	17 358	15 762
Imported HDPE bags less non-carry bags (billions):	3.97	3.49	3.16	2.87
Number of locally produced HDPE bags (billions):	1.98	1.75	1.58	1.43
Total HDPE bags, including local production (tonnes):	32 720	28 815	26 037	23 644
Total HDPE bags, including local production (billions):	5.95	5.24	4.73	4.30
% decrease from 2002:	-	11.9%	20.4%	27.7%



Appendix B

Sensitivity Analysis on Estimations

Introduction

This sensitivity analysis is used to determine the sensitivity of the methodology employed in this study to changes in the principle estimated parameters (variables). If a small change in a variable results in relatively large changes in the outcome, then the outcomes are said to be highly dependent on that variable.

This may suggest either that:

- the estimated variables should be determined very accurately; or
- the methodology should be redesigned to reduce the sensitivity.

In this study it is not possible to verify the accuracy of the baseline variable values provided by industry, nor the possible variability of the values, without significantly increasing the scope of this study. Similarly the methodology employed in the study is believed to be the best available, without again greatly increasing the scope of the project.

As such, the objective of the sensitivity analysis undertaken below is merely to illustrate the general degree of dependence of the calculation outcome to the industry provided estimated variables. It is clear from the calculations below that this dependence is high.

It is not the purpose of the sensitivity analysis, nor is it currently possible, to provide a probability range on the plastic bag consumption estimations.

Impact of Non-Carry Bag Imports Estimation Variation

The majority of the lightweight HDPE bags used in Australia are imported. Data on these imports is provided by the Australian Customs Service (ACS). Goods are classified under a series of product description codes by the ACS. However these codes are not always exactly specific to a particular product, as is the case for HDPE and LDPE shopping bags. Thus it is highly likely that some non-carry bags are imported into Australia and classified under the same ACS codes as retail carry bags.

To adjust for this inflation the total weight of HDPE bags imported and recorded under the relevant ACS code has been reduced by 25%. This is based upon discussions with bag importers, an estimate of the likely usage of produce bags, and an estimate of the percentage of these that will be included with shopping bags under the ACS codes. However, some uncertainty does exist as to the accuracy of this important estimation and so an analysis of the impact of varying this estimation by $\pm 20\%$ (or 20% to 30% of imports, from a baseline of 25%) is provided in Table B1 below.

Table B1: Sensitivity Analysis of Non-Carry Bags Estimation

Estimation Variation	2002 Total	2004 HDPE	2005 HDPE	% Decrease 2002 to 2005
20% (-20%)	5.95	5.00	4.70	21.0%
25% (baseline)	5.95	4.73	4.30	27.7%
30% (+20%)	5.95	4.47	3.90	34.5%

Impact of Local Production / Imports Ratio Estimation Variation

Another major estimation used to establish local HDPE retail carry bag numbers, and thus overall plastic retail carry bag use, is the ratio of imports of carry bags to the local production of carry bags.

Local bag manufacturers advised in 2002 that the estimated ratio of local product to imports of plastic bags was approximately 1:2. Further discussions during early 2005 indicated that this ratio was largely unchanged for 2003, 2004 and 2005, and so this value has been used to establish local production from 2002 to 2005. However, as no manufacturing company records data for all sales uncertainty does exist as to the accuracy of this important estimation and so an analysis of the impact of varying this estimation by $\pm 20\%$ (or 40% to 60% of imports, from a baseline of 50%) is provided in Table B2 below.

Table B2: Sensitivity Analysis of Local Production to Imports Ratio Estimation

Estimation Variation	2002 Total	2004 HDPE	2005 HDPE	% Decrease 2002 to 2005
40% (-20%)	5.95	4.42	4.01	32.6%
50% (baseline)	5.95	4.73	4.30	27.7%
60% (+20%)	5.95	5.05	4.59	22.9%