



# Welsh Assembly Government, Single Use Bag Study

## Final



Llywodraeth Cynulliad Cymru  
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## Executive summary

Approximately 480 million single use plastic carrier bags were issued in Wales in 2008. Whilst this is expected to fall further as a result of a voluntary agreement between major UK retailers and the government, it is anticipated that around 320 million bags will continue to be handed out each year unless further action is taken.

Jane Davidson, Minister for the Environment, Sustainability and Housing in the Welsh Assembly Government has announced that she would like to put an end to single use carrier bags. Reasons for so doing include concern over the inherent waste of resource entailed in a single use bag, problems with litter, particularly in the South Wales Valleys, and the need to change public behaviour if society is to move to a truly sustainable path.



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There is some public support for such action. Indeed, a proposed ban on issuing of free plastic carrier bags came top in a BBC Wales audience poll on a list of ideas for new legislation proposed by members of the public. It is also notable that governments in many countries across the world are implementing legislation to limit the use of free plastic bags or ban them altogether.

This report reviews various reasons put forward for and against taking further action to control single use carrier bags. Arguments put forward in support of further action include:

- Encouraging a change in public attitude to resource use, moving away from the 'throwaway' society to a more sustainable model that reflects the objectives of the One Wales: One Planet Sustainable Development Scheme<sup>1</sup>
- Improving waste management by focusing on reduction in waste generation and re-use rather than options further down the waste hierarchy (including recycling), in line with the draft Welsh Waste Strategy 2009-2050: Towards Zero Waste<sup>2</sup>
- The environmental benefits of long-life carrier bags compared to single use carrier bags
- The desire to reduce the visual blight of littering
- The desire to reduce other impacts of plastic in the environment

<sup>1</sup> <http://wales.gov.uk/consultations/closedconsultations/sustainable/onewalesoneplanet/?lang=en>

<sup>2</sup> <http://wales.gov.uk/consultations/environmentandcountryside/wastestrategy/?lang=en>

- Problems for recycling of plastic bags, for example associated with the mix of plastics present, including degradable materials which could alter the structural properties of recycled plastic
- Public pressure for action against plastic bags
- The simple fact that alternatives are readily available

Arguments put forward opposing further action include:

- Plastic bags generate only a small share of the overall burden of human activity on the environment
- There is potential for reduced plastic bag use to have negative impacts on the environment
- So-called single use bags can be and are re-used
- Single-use bags are recyclable (though see the comments above, relating to possible problems with plastic bag recycling)
- Plastic bags have a high calorific value, useful when waste is sent for incineration
- Alternatives such as cotton or canvas bags may be less hygienic
- Labour conditions have been criticised at some overseas factories where textile bags are manufactured
- A reduction in the demand for single use bags would cause job losses at some UK bag manufacturers and distributors
- Shoplifting is made easier when large numbers of people carry their own bags

There is merit in some of the arguments raised against limiting the use of these bags. For example, it is true that they represent only a small amount of the overall waste stream and that a significant number of nominally single use bags are used more than once and for a variety of purposes. However, it is concluded that a number of the objections to further action are overstated. It was also found that several arguments can be addressed by appropriate design of legislation or by organisations applying corporate social responsibility. For example, several LCA (life cycle assessment) studies have shown that a switch to paper bags would be worse for the environment than continued use of plastic. This can be addressed by applying new legislation equally to both types of bag. Concern over conditions in factories making alternative bag types can be addressed by sourcing bags from accredited manufacturers (e.g. those meeting the Fairtrade standards), which can be reinforced through the development and use of sustainable procurement policies by companies and public bodies.

On balance it is concluded here that there is a good logic and evidence for progressing with action to reduce bag use beyond the ambition level set by the existing voluntary agreement in the UK.

The study has also reviewed measures applied both in the UK and internationally. These include the outright banning of plastic carrier bags, voluntary reduction schemes (as already exists in the UK), public awareness raising through the promotion of long-life bags and charging for bags. It is concluded that the Irish legislation, introducing a €0.15 charge per plastic bag (raised after 5 years to €0.22) offers a particularly attractive model. The law has reduced the use of single use

plastic bags by over 90% and has been extremely effective in reducing littering in Ireland. Prior to the ban, plastic bags represented a very visible 5% of Irish litter, whilst they now contribute less than 0.3% to the problem. Whilst there appears to have been a small increase in shoplifting after the levy was introduced, survey data show that associated costs are small compared to the savings to retailers from the need to purchase fewer bags and related storage costs. The Irish public has also been extremely supportive of the policy, helped by the fact that money raised goes to a fund for environmental improvement.

A number of UK retailers including Ikea and Marks and Spencer have already introduced a charge for bags. Significant reductions in demand of between 80% and 95% have resulted. The wider application of charging would be expected to reinforce these reductions by improving consumer awareness. Retailers in a growing number of UK towns have agreed to ban plastic bags. The fact that retailers are prepared to ban plastic bags or charge for them in the absence of legislation demonstrates the strength of feeling on the issue and their belief that some of the problems identified above are overstated.

A number of recommendations are made for the design of a national charging scheme. These are strongly influenced by the Irish legislation, recognising its success to date:

- Undertake an extensive country-wide awareness campaign, using a variety of communication channels to ensure the system and its objectives are understood.
- Undertake early consultation with stakeholders, particularly retailers. The Irish example should be followed, in that ‘this is going to happen but now is your opportunity to shape how the scheme is managed’.
- Retail staff may need some training to respond to customer queries or complaints.
- Regional support networks should be established for both customers and retailers.
- Bag specifications should be the same as those defined in the Irish legislation, though extended to include bags made from paper.
- Initial charge to be set around 10 to 15 pence per bag.
- The charge is to be passed on to customers, and shown on till receipts.
- Enforcement to rest with local authorities, but consideration to be given to how to make this as efficient as possible to ensure that as little as possible is spent on policing the charge
- Encouragement for money raised to be used for projects focussed on sustainability in Wales, reflecting social, environmental and economic need.

Reducing the use of single use carrier bags does not solve the problems facing the environment on its own. It is however, an important step in the right direction, particularly through its likely effects on littering, attitudes to littering and the message that it provides about the need to adopt more sustainable lifestyles.

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**WRAP Retail Sector**, for providing statistical information in relation to the voluntary agreement with the major British retailers.

## Note on Internet References

All internet references given in this report were accessed in April and May 2009.

## List of Abbreviations

APME	Association of Plastics Manufacturers in Europe
BRC	British Retail Consortium
BVPI	Best Value Performance Indicator
CBC	Carrier Bag Consortium
CNEA	Clean Neighbourhoods and Environment Act
CO <sub>2</sub>	Carbon dioxide
CoSLA	Confederation of Scottish Local Authorities
Defra	Department for Environment, Food and Rural Affairs
EO	Executive Officer
EPA	(US) Environmental Protection Agency
EU	European Union
FTE	Full Time Equivalent
HDPE	High Density Polyethylene
INCPEN	The Industry Council for Packaging and the Environment
ISO	International Standards Organisation
kWh	kiloWatt hour
LA	Local Authority
LCA	Life Cycle Analysis
LCO	Legislative Competence order
LDPE	Low Density Polyethylene
LEQ	Local Environmental Quality
MCS	Marine Conservation Society
MSP	Member of the Scottish Parliament
NO <sub>x</sub>	Nitrogen oxides (NO and NO <sub>2</sub> , but not N <sub>2</sub> O)
PE	Polyeth(yl)ene
SEO	Senior Executive Officer
SME	Small and Medium Enterprise
SUB	Single Use Bag
TOS	Throw Out Shopping Bag
ULS	Use Less Stuff
USEPA	US Environmental Protection Agency
VA	Voluntary Agreement
VAT	Value Added Tax
WAG	Welsh Assembly Government
WRAP	Waste Resources Action Programme
WTP	Willingness To Pay

# 1 Introduction

## 1.1 Regulatory context

Jane Davidson, Welsh Minister for the Environment, Sustainability and Housing, announced in February 2009 that she has requested Welsh Assembly Government (WAG) officials to develop legislation to reduce the number of single use carrier bags. The Minister said:

*“I have always stated that I do not support the use of one-trip plastic bags.*

*“They are not usually bio-degradable and represent a waste of resources. Customers have come to expect free plastic bags at checkouts, but the tide appears to be turning as shoppers look for more environmentally-friendly options.*

*“I have asked my department to develop legislation to end the use of single use carrier bags. Currently there is a voluntary agreement where certain retailers have agreed to reduce the number of single use carrier bags by 50% by May this year – this is a good target.*

*“But this does not cover all retailers and still leaves 50% using one trip plastic bags. I recognise we need to give the retail sector a chance to demonstrate what they can do voluntarily, but I am willing to use all the powers at our disposal.*

*“An estimated 490 million plastic bags are used in Wales each year. It takes between 450 and 1,000 years for these bags to degrade.”*

In response, the WAG commissioned this study from AEA and their Associates in March 2009 to investigate and assess the range of environmental, business and consumer impacts related to the proposal to end the use of single use bags (SUBs). A variety of options have been considered including a ban, charge or voluntary approaches.

It is noted that action to further reduce the use of SUBs would be in line with various other legislation, including:

- The EU Waste Framework Directive and the Packaging and Packaging Waste Directive and subsequent regulations, both of which stress the importance of waste minimisation



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- LCO (Legislative Competence Order) on Environmental Protection and Waste Management, which also refers to waste minimisation
- Various measures focused on the reduction of litter:
  - Clean Neighbourhoods and Environment Act (CNEA) 2005
  - Code of Practice on Litter and Refuse and Associated Guidance 2007
  - Monitoring via the LEQ (Local Environmental Quality) Cleanliness Index informing the Best Value Performance Indicator (BVPI) as a driver

## **1.2 Background Information on Bags**

### **1.2.1 Definition of a Single Use bag**

There is no definitive definition of a Single Use Bag (SUB) or Throw Out Shopping Bag (TOS) as they are sometimes referred to. For the purposes of this report SUBs include plastic, paper and biodegradable polymer based carrier bags. All of these types of bag have environmental impacts although it is plastic bags that tend to be singled out as the main problem (no doubt partly because they are the main type of bag used). All of these bag types are generally given away free and have a very limited intended lifespan.

### **1.2.2 Different types of SUB**

Most outlets currently provide free lightweight bags<sup>3</sup> made from conventional polyethene (polyethylene) plastic or bags made from degradable plastic (some outlets do make a charge<sup>4</sup>). Most major supermarket retailers also offer heavyweight reusable bags known as ‘bags for life’, for which they charge a small sum. Some shops also provide paper bags free of charge. The main types of carrier bags are described below; Table 1 summarises their key features.

### **1.2.3 Disposable High-Density Polyethene (HDPE) Bags**

These plastic bags offer a thin, lightweight, high strength, waterproof and reliable means of transporting shopping. Research and development by the industry has reduced the average weight of such a bag by 60% compared with 20 years ago, while retaining the same strength and durability. Such bags are currently found in supermarkets and other food retail outlets.

### **1.2.4 Disposable Low-Density Polyethene (LDPE) Bags**

These bags are currently given away free by many UK retailers (e.g. clothing shops). Like their HDPE counterparts, they are made from a by-product of the oil industry.

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<sup>3</sup> Throughout this report, the term ‘lightweight’ plastic carrier is used to describe ‘disposable’ plastic carrier bags available at the checkout as opposed to reusable bags such as ‘bags for life’. Bags will vary in size depending upon products purchased. We understand, and have taken into account, the fact that lightweight plastic carrier bags are often reused for a second purpose.

<sup>4</sup> For example, Lidl and B&Q (see Appendix 2).

### 1.2.5 Reusable Low-Density Polyethene (LDPE) Bags

These are heavier gauge plastic carrier bags, often called ‘bags for life’. Retailers charge for these (typically around 10p). The intention is that the customer uses them repeatedly and then returns them to the store for recycling when they are worn out, receiving a free replacement. Such bags are offered in many UK supermarkets.

### 1.2.6 Paper Bags

The paper bags issued by shops range from very simple ones for small items (e.g. from newsagents and greengrocers) to larger ones (e.g. issued by fashion and shoe retailers). Some paper bags have plastic handles or plastic coatings. Under the terms of the Irish definition of plastic carrier bags (i.e. a bag with a plastic content), bags with a plastic content would be subject to the Irish levy.

### 1.2.7 Polypropylene Bags

Polypropylene<sup>5</sup> has many uses for producing rigid and flexible containers, as well as furniture. Like LDPE and HDPE it is derived from oil resources. Non-woven polypropylene bags are available at shops such as Marks and Spencer in the UK, where they retail at more than £1. They are strong and durable and, like ‘bags for life’, are intended to be used many times.

Woven polypropylene bags are available at J Sainsbury in the UK as well as in the Republic of Ireland at Tesco and Dunnes stores. Woven bags are produced by stretching the polypropylene in production to form “fibres” resulting in a stronger bag.

### 1.2.8 Degradable Bags

Bags that can be broken down by chemical or biological processes are described as degradable. Intuitively, degradable bags are expected to be environmentally friendly and a number of retailers are actively pursuing this option. Thus, there is often some surprise when reports suggest that degradable bags are not such an ‘environmentally friendly’ option. Waste management protocols emphasise the need to prevent, reduce, reuse, recycle and then recover energy. Encouraging disposal via degradation runs counter to this approach.

It can also be difficult to agree whether a particular type of bag is degradable or not – over what time period, for example, would degradability be assessed? This could become significant if biodegradable bags were to be exempt from a charge.

There are two main kinds of degradable bags<sup>6</sup>.

- **Biodegradable** bags are made from natural starch sources such as maize and synthetic polyesters that degrade through the enzymatic action of micro-organisms (bacteria, fungi and algae), essentially rotting down like vegetable

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<sup>5</sup> Correct chemical name is polypropene.

<sup>6</sup> Biodegradable bags can be properly classified by how they decompose (either by microbes or through heat, ultraviolet light and water) and by the material they are made from (e.g. natural starch sources such as maize or wheat, or synthetic polymers from oil). Blended materials are also available, e.g. starch with HDPE or polyester [RMIT].

matter. However, starch-based biodegradable carrier bags are not available in significant numbers in the UK at the present time though this could change if there was sufficient demand. A subgroup of this classification would be compostable bags that are required to meet certain standards (EN13432:2000, OK Compost or OK Compost Home) relative to the rate at which they degrade and the absence of toxic residues that would affect the quality of any compost produced.

- **Bioerodable** bags are made from synthetic plastics (oil-based) with trace degradation initiators (HDPE with an approximately 3% content of metals such as manganese and iron<sup>7</sup>) and, as such, would be covered by a plastic bags levy. They bioerode primarily by oxidation and erosion of the plastic through the action of light and heat until very small particles of plastic remain (these often degrade biologically). It is reported that, in an anaerobic environment, the degradation process is halted for some types of bioerodable bags<sup>8, 9</sup>.

A number of concerns have been raised regarding degradable bags:

- **Recycling.** Conventional polyethene plastic bags (HDPE and LDPE) can be recycled into new products such as other bags and solid items such as 'plastic' wood (known as plaswood). It will be difficult to keep the different kinds of bag apart (HDPE and LDPE bags for recycling and bioerodable bags for composting), especially if both are available in the same community. Inevitably, bioerodable bags will get into this plastic bag waste stream and thus contaminate the recyclate. If the resulting recycled item contains a certain percentage derived from bioerodable bags, it will have inherently lower functional properties (i.e. it will start to degrade when in contact with water, ultraviolet light, etc.). This could have serious implications if the recycled plastic is used for pipes for water, gas supply or as fencing posts or seats. Some types of bioerodable bags<sup>10</sup> are reported not to damage the overall value of the reclaimed material as the initiator for degradation is destroyed during reprocessing.
- **Shelf-life and storage.** Bioerodable bags may start to decompose early if exposed to high temperatures, light or moisture. This compromises their carrying ability, though vacuum packaging is reported to prevent this.
- **A solution to littering problems?** This claim is felt to send the wrong message to the consumer, i.e. it is acceptable to discard these bags because they will eventually rot down. The argument is that consumers should be informed of the need to reuse bags to reduce litter and resource consumption<sup>11</sup>. In addition, the Marine Conservation Society (MCS) reports that any littered bioerodable bags based on HDPE will still cause problems to wildlife as they will break down into smaller pieces that can be ingested

<sup>7</sup>Also copper, nickel, cobalt and cerium as well as photoactive compounds such as ferrocene.

<sup>8</sup> The Impacts of Degradable Plastic Bags in Australia. Final report to the Department of the Environment and Heritage prepared by ExcelPlas Australia, Centre for Design at the Royal Melbourne Institute of Technology (RMIT) and Nolan-ITU, September 2003..

[www.deh.gov.au/industry/waste/degradables/impact/index.html](http://www.deh.gov.au/industry/waste/degradables/impact/index.html)

<sup>9</sup> Briefing Note on Degradable Plastics. Symphony Plastic Technologies plc.

<sup>10</sup> Oxo-biodegradable plastic bags produced by Symphony Plastic Technologies plc.

<sup>11</sup> Royal Melbourne Institute of Technology. <http://www.rmit.com/browse;ID=pikmpj6w9j7j>

[MCS 2005]. This is questioned by Symphony Plastic Technologies, which suggests that degradation to carbon dioxide, water and humus is likely and that, should an animal ingest these smaller pieces, the degradation process will actually continue in its gut.

- **Provision of appropriate conditions for planned benign degradation.** Bioerodable bags are designed to decompose through the action of sunlight, water, stress and, ultimately, the enzymatic action of microbes in an aerobic environment. Where degradable bags are simply disposed of alongside other 'household waste' and then landfilled the necessary conditions to allow degradation may well be absent and thus the environmental 'benefits' lost.

Manufacturers of degradable polymers have signed a voluntary agreement with the European Commission to use environmentally friendly polymers in packaging that "will effectively guarantee a biodegradability standard for products such as plastic bags, cups and plant pots, enabling them to be turned into compost and soil improvers." The agreement includes a certification and labelling scheme to help consumers and manufacturers identify products made from degradable polymers.

### 1.2.9 Key Features of Carrier Bags

Table 1 summarises some of the key features of the various types of carrier bags available, including their costs and relative sizes compared with conventional lightweight plastic carrier bags. Much of the data shown is sourced directly from the Scottish Executive Report undertaken in 2005<sup>12</sup>, though a review of information on various websites suggests that it is still broadly valid.

**Table 1. Key features of carrier bags**

Bag type	Features	Cost to retailer per bag	Average weight per thousand bags (kg)*	Relative bag storage volume**	Recyclability
Lightweight plastic carrier	Light, strong, durable, effective when wet	0.75p	8.4	1	Yes – but not all stores have facilities
Lightweight recycled plastic carrier	Light, strong, durable, effective when wet	1.5p ***	8.4	1	Yes – but not all stores have facilities

<sup>12</sup> Proposed Plastic Bag Levy - Extended Impact Assessment (AEA Technology, 2005).  
<http://www.scotland.gov.uk/Publications/2005/08/1993102> ,  
<http://www.scotland.gov.uk/Publications/2005/08/1993154>,  
<http://www.scotland.gov.uk/Publications/2005/08/1993259>.

Bag type	Features	Cost to retailer per bag	Average weight per thousand bags (kg)*	Relative bag storage volume**	Recyclability
Lightweight carrier made from cornstarch****	Light, strong, effective when wet		9.2	1.1	Compostable
'Bag for life'	Light, strong, durable, effective when wet	6.1p	47	4	Yes – system of replacement actively encouraged
Fully degradable plastic bag	Light, strong, durable, effective when wet	0.6 to 0.8 p	6.5	1	Degradable under the right conditions. Problematic if contaminate conventional plastic recycling.
Paper, without handles §	Convenient	5p	51	8	Yes – kerbside collections available
Paper, with handles §	More appealing to customers e.g. for shoes and clothes	22p	124	10	Yes – kerbside collections available but can be more problematic due to mixed materials
Non-woven polypropylene	Durable, strong, effective when wet	33p	139	20	Not at present
Woven polypropylene	Durable, strong, effective when wet	43p	226	20	Not at present

**Notes**

\* Data provided by CBC and Symphony Plastic Technologies plc. based on average price of an average bag.

\*\* The relative volume of bags (to a conventional lightweight bag) is important for transportation and storage units required compared with plastic carrier bags.

\*\*\* Data on price for recycled bags from [www.packaging2u.co.uk](http://www.packaging2u.co.uk)

\*\*\*\* Data for cornstarch bags taken from <http://www.materbi.com/>.

§ The average weight of all paper bags available is 99g (arithmetic mean of 51, 81 and 166g).

## **1.3 Arguments for and against further action on SUBs**

The report investigates numerous arguments for and against action to further control the use of SUBs. At this point in the report the arguments are simply listed and no judgements are made as to their validity, or on the balance of advantages and disadvantages of SUBs.

### **1.3.1 Arguments supporting further action**

Arguments supporting further action include:

- Encouraging a change in attitude to resource use, moving away from the 'throwaway' society to a more sustainable model
- Improving waste management by focusing on reduction in waste generation and re-use rather than options further down the waste hierarchy (including recycling)
- The environmental benefits of long-life bags compared to single use bags
- The desire to reduce the visual blight of littering and associated social impacts
- The desire to reduce other impacts of plastic in the environment, including possible effects on infrastructure such as blocking drainage
- Problems for recycling of plastic bags, for example associated with the mix of plastics present, including degradable materials which could alter the structural properties of recycled plastic
- Public pressure for action against plastic bags
- The simple fact that alternatives are readily available

### **1.3.2 Arguments against further action**

Arguments opposing further action include:

- Plastic bags generate only a small share of the overall burden of human activities on the environment and are efficiently produced
- Plastic bags are made from a by-product of oil refining and hence make use of resources that would otherwise be thrown away
- There is potential for actions taken to reduce plastic bag use to have negative consequences on the environment
- So-called single use bags can be and are re-used
- Single-use bags are recyclable (though see the comments above, relating to possible problems with plastic bag recycling)
- Plastic bags have a high calorific value, useful when municipal solid waste is sent for incineration
- Alternatives such as cotton or canvas bags may be less hygienic
- Labour conditions at some overseas factories manufacturing textile bags have been criticised
- A reduction in demand for single use bags would cause job losses at some UK bag manufacturers and distributors
- Shoplifting is made easier when large numbers of people carry their own bags

## 1.4 Key developments considered in this report

This report builds on previous analysis carried out for the Scottish Executive at the time that they were considering implementation of a levy on single use plastic bags (AEAT, 2005).

Since 2005 there has been significant further work and interest in this area. In particular, the following reports / articles have been issued since the Scottish assessment was completed:

- Further review of the Irish Plastax (e.g. Convery et al, 2007)
- Actions taken by a large number of countries to reduce or ban the use of plastic bags, such as the voluntary agreement by major UK retailers aimed at reducing bag use by 50%
- Publication of new LCA research (e.g. Boustead 2007) on the merits of bags made of different materials.

The findings of the report to the Scottish Executive are therefore re-evaluated in this report, with specific consideration given to the form of a possible levy in Wales.

Further work is currently underway by other bodies that could not be incorporated in this report, perhaps most importantly:

- Consumer attitude and behaviour survey for WRAP
- Life Cycle Analysis for the Environment Agency
- Evaluation of progress with the Irish Levy for the Irish Government

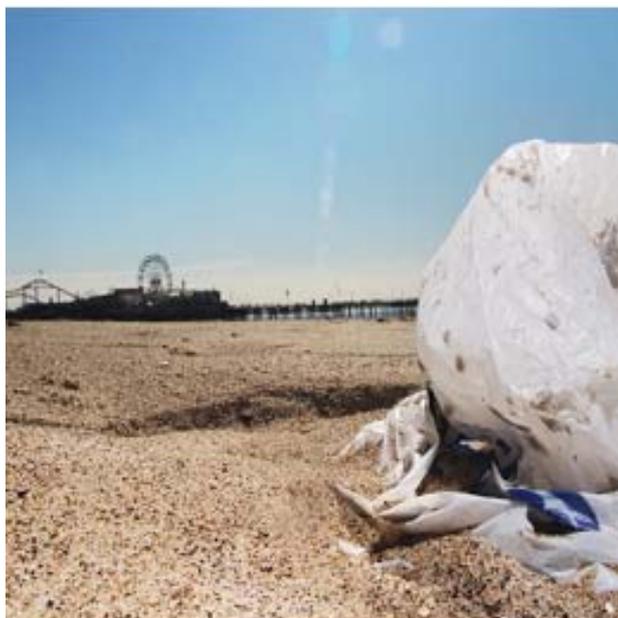
## 2 Impacts of carrier bags

This chapter describes the scale of bag usage in Wales and reviews possible impacts through littering, resource consumption and environmental burden posed by different types of bag.

### 2.1 Plastic bag usage

This section places the debate around plastic bags into context. The scale of the use of plastic bags is not in question:

- Across the UK 9.9 billion were issued in 2008. This was a 26% reduction from the 13.4 billion handed out in 2006<sup>13</sup>. This significant reduction has been achieved partly through the voluntary agreement with the major UK retailers and partly through local and other initiatives.
- Despite this fall in consumption it is estimated that approximately 480 million bags were issued in Wales in 2008<sup>14</sup>. This equates to about 200 bags for each adult in 2008.



From 'Dominant Wave Theory', © Andy Hughes MA RCA 2007

The use of plastic bags has become so extensive because they are convenient for retailers and customers alike. For consumers, they are a hygienic, odourless bag that is strong<sup>15</sup> and waterproof and may often be re-used either for shopping or for alternative uses such as to contain domestic and pet waste, line bins, carrying lunch and physical education kits and containing soiled nappies. For retailers, they have been generally considered a cheap<sup>16</sup> form of packaging that can be transported in large numbers at relatively little cost. This appears to have led to a cavalier attitude to bag use particularly for home deliveries, with two supermarkets found in 2007 to be putting as few as two or three items in a typical bag<sup>17</sup>. However, some companies, for example, Aldi, have taken a different view, regarding the provision of free bags as an unnecessary expense to the company and to shoppers willing to bring their own bags. A number of other retailers have also recently started charging for bags.

<sup>13</sup> [http://www.wrap.org.uk/wrap\\_corporate/news/retailers\\_exceed.html](http://www.wrap.org.uk/wrap_corporate/news/retailers_exceed.html)

<sup>14</sup> Similarly, scaling back the earlier UK total of 13.4 billion bags to Wales gives an estimate of 660 million bags for 2006.

<sup>15</sup> The Carrier Bag Consortium in 2001 estimated that no other shopping container can carry 2,500 times its own weight and remain water resistant

<sup>16</sup> According to a Simpac Ltd study for the Carrier Bag Consortium in 2005, plastic bags cost less than 0.01p to produce

<sup>17</sup> [http://www.thisismoney.co.uk/consumer/caring/article.html?in\\_article\\_id=423963&in\\_page\\_id=511](http://www.thisismoney.co.uk/consumer/caring/article.html?in_article_id=423963&in_page_id=511)

Despite being used for shopping for only a few minutes, the single use plastic bag is likely to persist for hundreds of years unless recycled or incinerated as part of the managed waste stream. Even so-called degradable plastic bags take a significant amount of time to break down and hence pose a significant litter risk<sup>18</sup>.

## 2.2 Bags and attitudes

The Waste and Resources Action Programme (WRAP) was established as a not-for-profit company in 2000, backed by government funding from England, Scotland, Wales and Northern Ireland. WRAP helps individuals, businesses and local authorities to reduce waste and recycle more, making better use of resources and helping to tackle climate change. WRAP work in seven key areas (Construction, Retail, Manufacturing, Organics, Business Growth, Behavioural Change, and Local Authority Support). Their work focuses on market development and support to drive forward recycling and materials resource efficiency within these sectors, as well as wider communications and awareness activities. In recent years WRAP has been integral in working with these sectors to promote change, raise awareness and undertake research in order to have positive impacts encouraging management of waste in accordance with the waste hierarchy.

WRAP has stated that *'single use carrier bags are one of the most potent symbols of our throwaway society'*. Encouraging customers to make a small change in their shopping habits here may lead them to extend their thinking to other areas.<sup>19</sup>

Some commentators believe that plastic bags are symbolic and their removal from the shops, bins and landfills of the UK could serve as one of many necessary catalysts required for the country to address the issue of climate change and sustainable living more generally given that it requires very widespread behavioural change<sup>20</sup>. The need for behavioural change is highlighted a number of times in the *One Wales One Planet Strategy*<sup>21</sup>. Most SUBs will go straight to the last step in the waste hierarchy, i.e. landfill. A survey undertaken by the Somerfield Group suggested that 68% of Londoners claimed to 'recycle' their plastic bags<sup>22</sup>. In practice this is more likely to be a single 're-use' (e.g. as a home bin liner) prior to it going to landfill.

Andrew Irving Associates<sup>23</sup> undertook a research study on behalf of WRAP in 2005. The aim was to: 'understand consumer behaviour and attitudes towards free carrier bags and re-usable bags / bag for life for supermarket shopping'.

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<sup>18</sup> Data presented at <http://www.materbi.com/ing/html/prodotto/cosematerbi/biodegradabilita.html> shows that even cornstarch bags take several weeks to degrade under composting conditions.

<sup>19</sup> [http://www.wrap.org.uk/retail/news\\_events/news/move\\_by\\_tesco\\_to.html](http://www.wrap.org.uk/retail/news_events/news/move_by_tesco_to.html)

<sup>20</sup> London Assembly Environment Committee, December 2007, *Bag to Basics: Why and how free shopping bags should be removed from London's shops*.

<sup>21</sup> Consultation on the *One Wales One Planet Strategy*:  
<http://wales.gov.uk/docs/desh/consultation/081119oneplaneten.pdf>

<sup>22</sup> Somerfield Press Release, 8 February 2007: "Bad Bag Habits – 40,000 tonnes of plastic wasted in carrier bags each year". Available at: <http://www.somerfieldgroup.co.uk/index.asp?sid=201&pressID=1156>

<sup>23</sup> Andrew Irving Associates, 2005 "Carrier bags usage and attitudes". WRAP

The survey used both qualitative and quantitative methods, the former based on discussion with 11 focus groups and the latter, interviews with 1,048 individuals. The following summarises the results:

- 80% put 'everything' into free carriers at their main shop
- Participants claimed, no such thing as 'single use' – with 75% reusing all their bags at home
- Shoppers expect bags at checkouts
- 50% had some dislikes with vest carriers – most were quality / function related, whilst 11% had environmental concerns.
- 37% claimed to regularly use alternatives to vest carriers.

The notion of 75% of participants re-using all of their bags at home is extremely hard to believe, not least because it is inevitable that some bags will split on first use or become contaminated through spills.

The survey obtained the following results when considering the take-up of stronger bags (often called 'bags for life') sold at the checkout:

- 85% were aware of bags for life
- 40% had purchased them
- 26% said that they had re-used bags
- 13% said that they re-use all or most of the time

Two thirds of those that purchased stronger bags stated that they bought them because they were stronger, 8% purchased them to specifically reuse them for shopping and just 6% justified the purchase on environmental grounds.

A number of 'prompted' questions were undertaken to assess the awareness of 'bags for life'<sup>24</sup>:

- 61% had seen or heard of bags for life
- 39% had not seen or heard of them
- half of those who did not buy bags for life, do not know the term
- whilst 25% of those that did buy bags for life, did not know the term
- 33% who had purchased bags for life understood the free replacement policy and 12% had replaced them

In 2005 it was therefore evident that free carrier bags were embedded in consumer behaviour with customers 'expecting' free carrier bags, many customers liking strong bags and that the environment was a low priority for them.

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<sup>24</sup> The study considered 'bags for life' generally, though with some focus on those sold at supermarket checkouts.

In contrast in February 2009 the Daily Mail<sup>25</sup> reported that:

- Four in five shoppers want stores to end the give-away of 13 billion free 'plastic poison' bags at the tills
- 83% of shoppers surveyed believe supermarkets and others should stop giving away the free bags
- 82% said the introduction of a charge of 10p-15p on the throwaway bags would encourage a switch to green reusable bags for life.
- 92% expressed environmental concern, up from 83% the year before
- SUBs are used for an average of 20 minutes before being discarded, taking 1,000 years to rot away in landfills

These findings indicate that within the last four years consumer behaviour has changed dramatically, with many shoppers no longer expecting free carrier bags and that they have a greater level of concern for the environment. Hence it can be concluded that many would be more receptive to legislative changes controlling the use of bags. Recognising the shift in attitude and that carrier bags have been debated widely in the press and as a result of the voluntary initiatives in place with leading retailers, WRAP are currently undertaking further attitudinal studies. The results of these will be made available in late May 2009. It could be said that comparison of the results of the two surveys carried out for WRAP may well provide a better view of attitudinal shift than comparison of the WRAP and Daily Mail surveys, assuming greater consistency in the questions asked and the way that the surveys are conducted.

## 2.3 Bags and the environment

Plastic bags have a wide range of impacts once released into the environment. This is particularly the case for aquatic systems, where they are not only more difficult and expensive to clean up but have been known to block drainage systems and harm aquatic organisms. Litter related effects are considered in Section 2.4 whilst direct effects on wildlife are discussed in Section 2.5.

Although lightweight plastic carrier bags attract a great deal of attention, paper bags and other alternatives can be equally damaging to the environment. Paper bags are heavier and bulkier than plastic and therefore impose a greater transport burden<sup>26</sup>. Significant burdens are also generated during the manufacture of paper and processing it into bags. These effects are considered through a review of the results of available life cycle analyses in Section 2.6.

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<sup>25</sup> Sean Poulter, Daily Mail Press release 19 February 2009, "Four in five shoppers support a ban on plastic bags". Available at: <http://www.dailymail.co.uk/news/article-1149332/Four-shoppers-support-ban-plastic-bags.html>

<sup>26</sup> Scottish Executive, 2005:Proposed Plastic Bag Levy – Extended Impact Assessment: Volume 1: Main Report.

## 2.4 Littering

Plastics are resistant to biodegradation and are only broken down subject to weathering<sup>27</sup>. As a result the number of plastic bags in the environment is in effect cumulative. They have gone from being 'rare' in the marine environment in the early 1990s, to being "almost everywhere" from Spitzbergen 78 degrees north to the Falklands 51degrees south<sup>28</sup>. Due to their lightweight nature, plastic bags are easily transported by both wind and water<sup>29</sup>.

In addition to bags that are simply discarded by littering, many enter the environment having been put into the waste management system by escaping from litterbins, waste disposal sites or refuse collection vehicles or as a result of scavenging by animals. This could be a particular problem in Wales as the country has a greater mean wind speed than much of the rest of the UK<sup>30</sup>.

Many parties (particularly those lobbying support for SUBs) choose to play down the littering impact of plastic bags. Here we consider various research reports that indicate the extent of the problem. For example, the Beachwatch 2008 survey showed that with 46.5 items per kilometre of coastline, plastic bags are fourteenth in the list of most commonly found items of litter on UK beaches, increasing from a position of fifteenth in 2007<sup>31</sup>. They also estimate that the annual cost of clearing plastic bags from beaches in the UK is £290,000<sup>32</sup>. This is pro-rated from an estimate for cleaning UK beaches of litter of £14.5 million provided by the Environment Agency, in line with information on the fraction of litter that is composed of plastic bags (2%). However, given the small percentage of litter made up of plastic bags it seems unlikely that their elimination would change the frequency of beach cleaning, unless action on bags led to a much greater change in attitude to littering.

Bags not only cause a problem in aquatic environments (see Section 2.5), but are also highly prevalent and visual on land. Their widespread prevalence in both urban and rural settings suggests carelessness towards the environment and disregard for its cleanliness. Keep Wales Tidy believes that *'it is this high visibility and their ubiquitousness that earns the plastic bag its high level of disapproval in the eye of*

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<sup>27</sup> Marine Conservation Society, 2005. Submission from the Marine Conservation Society: Environmental Levy on Plastic Bags (Scotland) Bill. Ross-on-Wye: Marine Conservation Society.

<sup>28</sup> Barnes D, 2003, quoted in Roach J, 2003. Are Plastic Grocery Bags Sacking the Environment? National Geographic News.

[http://news.nationalgeographic.com/news/2003/09/0902\\_030902\\_plasticbags.html](http://news.nationalgeographic.com/news/2003/09/0902_030902_plasticbags.html), accessed 20 February 2006

<sup>29</sup> National Plastic Bags Working Group, 2002. Plastic Shopping Bags in Australia. Adelaide: Environment Protection and Heritage Council.

<sup>30</sup> Department of Trade and Industry, 2006. Wind speed Database. London.

<sup>31</sup> Marine Conservation Society, 2008. Plastic Bags.

<http://www.mcsuk.org/mcs2/downloads/beachwatch/Methods%20&%20Results%20BW08.pdf>  
[http://www.adoptabeach.org.uk/pages/page.php?cust\\_id=10](http://www.adoptabeach.org.uk/pages/page.php?cust_id=10)

<sup>32</sup> Marine Conservation Society, 2005. Submission from the Marine Conservation Society: Environmental Levy on Plastic Bags (Scotland) Bill. Ross-on-Wye: Marine Conservation Society.  
[http://www.adoptabeach.org.uk/pages/page.php?cust\\_id=51](http://www.adoptabeach.org.uk/pages/page.php?cust_id=51)

*the Welsh public*<sup>33</sup>. Two thirds of people responding to a Keep Wales Tidy survey described them as a ‘*major problem*’<sup>34</sup>.

Keep Wales Tidy’s report further compounds the associated problems of SUBs in Wales to its topography and weather systems, but also goes further in that it links the SUB issue to the socio demographics of an area, testifying that:

*“As a result of topography and high rainfall, Wales is blessed with a particularly high density of rivers. However, this means that Wales has a disproportionately high amount of tree-hanging plastic bag litter compared to other countries in the UK. Many of these rivers, particularly in the South Wales valleys, run directly through the centre of densely populated communities, and plastic bag litter will therefore be a highly visible component of litter. These valleys communities are also largely the poorest communities in Wales: In a very real sense, plastic bag litter has an inordinately visually polluting effect on Wales’ poorest communities”.*

The proportion of plastic bags in litter has often been quoted as less than 1%. The source of this figure is a study by EnCams (Environmental Campaigns, the English equivalent of Keep Wales Tidy, and renamed ‘Keep Britain Tidy’ from 1<sup>st</sup> June 2009). Its relevance has, however, been questioned by Keep Wales Tidy. The submissions to the Scottish Parliament that quoted research to back up their assumptions of the proportion of plastic bags in litter can be traced back to the EnCams report<sup>35</sup>. Indeed, DEFRA uses the same report to quantify plastic bag litter in the UK generally as being in the range 0.1-1%<sup>36</sup> even though the report examined sites only in England. According to Keep Wales Tidy, the report, funded by the packaging industry, suffers from the following flaws:

- It includes 'chewing gum stains' as litter. Chewing gum stains are not classed as litter in any country in the UK, because such a classification would require local authorities to remove it.
- More than 61% of 'litter' in the study should therefore not be classified as such.
- Under the heading 'Methodology', the report states "*The INCPEN survey would comprise 30 sample sites*"<sup>37</sup> – a sample too low to be statistically representative of littering throughout England.
- Keep Wales Tidy notes that it uses a methodology that only examines litter on adopted land, principally streets<sup>38</sup>:  
*“These surveys do not usually take account of items caught in hedges or trees, nor is there a rigorous programme of riverside, submarine, or*

<sup>33</sup> Keep Wales Tidy, *Papur datgan sbwriel bagiau plastig /Plastic Bag Litter Position Paper*. July 2006, [http://www.keepwalestidy.org/welsh/images/plasticbags\(w\).pdf](http://www.keepwalestidy.org/welsh/images/plasticbags(w).pdf)

<sup>34</sup> Keep Wales Tidy, 2006. Unpublished data from 2006 Local Environmental Quality Survey. Caerdydd: Keep Wales Tidy, cited in Keep Wales Tidy 2006, *Plastic Bag Litter Position Paper*.

<sup>35</sup> Keep Wales Tidy, *Papur datgan sbwriel bagiau plastig/Plastic bag litter position paper*, July 2006, [http://www.keepwalestidy.org/welsh/images/plasticbags\(w\).pdf](http://www.keepwalestidy.org/welsh/images/plasticbags(w).pdf)

<sup>36</sup> DEFRA, *Local environmental quality: plastic bags*, <http://www.defra.gov.uk/environment/localenv/litter/plasticbags/index.htm>

<sup>37</sup> Incpen, *Plastic carrier bag tax – ‘the facts’*. Available at <http://www.incpen.org/pages/userdata/incp/PCBFS.pdf>

<sup>38</sup> Keep Wales Tidy, *Papur datgan sbwriel bagiau plastig/Plastic bag litter position paper*, July 2006, [http://www.keepwalestidy.org/welsh/images/plasticbags\(w\).pdf](http://www.keepwalestidy.org/welsh/images/plasticbags(w).pdf)

*offshore litter analysis. Plastic bags form a disproportionately large fraction of litter caught in vegetation”.*

- Since cigarette ends comprise a large proportion of litter in most cases, all other forms of litter will look insignificant in comparison. Keep Wales Tidy believes that this ‘skewing’ effect of cigarette ends:  
“... has been used in the information produced by all other categories of litter producing industries as a pretext for inaction”.

The Welsh Assembly Government requested Keep Wales Tidy to analyse a litter segmentation study they had commissioned. Their analysis indicated that plastic bags account for 2.7% of litter in Wales by weight (this would be higher taking in to account other SUBs). In addition to this they estimated, as a proportionate cost of the £37 million pounds annual cost of street cleaning in Wales, dealing with plastic bag litter costs local authorities £1 million pounds annually.

## **2.5 Direct effects of bags on wildlife**

Whilst it is not disputed that bags have some impact on wildlife, there is an active debate about the scale of effects. The International Coastal Clean-up Reports stated that 2.2% of all animals found dead during the 2004 survey had been entangled in plastic bags<sup>39</sup>. The Keep Wales Tidy Report provides various examples from around the world of incidents reported whereby plastic bag litter has caused harm to marine animals<sup>40</sup>. In contrast, an article in the Times<sup>41</sup> states that some scientists and environmentalists believe the claims on plastic bags are exaggerated, in particular an oft-repeated assertion that bags kill 100,000 marine mammals and seabirds each year. Other plastics and fishing debris were cited as major factors.

## **2.6 Life cycle analysis: review of previous studies**

Life cycle analysis (LCA) is a methodology for assessing the material and energy burdens of different products over their full life cycle, from extraction of raw materials to final disposal. LCA methods have developed significantly in the last 20 years. Early work frequently generated accusations of bias in favour of the views of study sponsors with particular problems arising via the way that the boundaries defining the system under investigation were set. However, significant international effort has gone into the refinement of LCA methods and the development of LCA tools and the method now provides useful input to decision making.

The focus on material and energy burdens in LCA leaves aside a number of potentially important types of impact for the present case, including:

- Littering
- Social impacts of bag manufacture overseas
- Employment in Wales

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<sup>39</sup> International Coastal Clean-up, 2005. The International Coastal Clean up 2005 Report. Ocean Conservancy.

<sup>40</sup> Keep Wales Tidy 2006, *Plastic Bag Litter Position Paper*.

<sup>41</sup> Times 8 March 2008, *Series of blunders turned the plastic bag into global villain*.

### 2.6.1 Complexities in life cycle assessment of carrier bags

There is potential when performing LCA of different options for carrying shopping to make a number of different assumptions, each of which will have some influence on the final outcome of the analysis. In the present case these assumptions include:

- Type of material
  - Type of plastic
    - Oil based
    - Vegetable based
    - Biodegradable
    - Etc.
  - Paper
    - Virgin
    - Recycled (whole or part)
  - Textiles, including natural and other fabrics, and some recycled content
  - Etc.
- Use
  - Number of uses
  - Extent to which the capacity of bags is fully used
  - Type of re-use
    - As shopping bags
    - For waste, possibly displacing use of new bin bags
    - Etc.
- Disposal
  - Recycling
  - Incineration with recovery of heat and electricity displacing alternative fuel use
  - Use of waste bags in cement kilns, blast furnaces, etc. displacing use of other fuels
  - Landfill with gas recovery, displacing use of alternative fuels
  - Etc.
- Other
  - Country of origin of raw materials, final material production, bag manufacture
  - Transport distances
  - Etc.

In some of these areas it is possible that a further series of assumptions may be necessary. Taking the disposal of bags to municipal waste incineration, as an example:

- What is the efficiency of energy conversion?
- Is it assumed that both heat and energy are recovered?
- What fuels are assumed to be displaced by the generation of useful heat and electricity? Options range from clean technologies such as wind, in which case waste combustion performs poorly in the LCA, to dirty technologies such as old coal-fired plant, in which case potentially significant benefits could accrue to the incineration of plastics in modern facilities.

It is clearly important therefore that the scenarios modelled reflect the situation on the ground as closely as possible. This is not always straightforward to do. In the present case, for example, there are uncertainties regarding bag use (e.g. how many times a bag is used and what it is used for after the initial shopping trip) and the structure of waste management across Wales (e.g. how will bags be distributed across recycling, landfill and incineration in the coming years?).

The approach selected here has been to review existing studies rather than undertake new LCA modelling, in order to see how different assumptions influence the outcomes of analysis.

### 2.6.2 Relevant studies

A number of studies have performed LCA in relation to the environmental impacts of different types of shopping bag, notable examples include:

- Ecobilan, 2004. Évaluation des Impacts Environnementaux des Sacs de Caisse Carrefour: analyse du cycle de vie de sacs de caisse en plastique, papier et matériau biodégradable. Report prepared for Carrefour. ECOBILAN PwC, Paris, France.
- Franklin Associates, 1990. Resource and Environmental Profile Analysis of Polyethylene and Unbleached Paper Grocery Sacks. Franklin Associates Ltd, Kansas, USA.
- Fenton, R., 1991 The Winnipeg Packaging Project: Comparison of Grocery Bags. Department of Economics, University of Winnipeg, Manitoba, Canada.
- Nolan-ITU, 2002, Plastic Shopping bags - Analysis of Levies and Environmental Impacts. Report for the Department of the Environment and Heritage. Nolan-ITU Pty Ltd, Victoria, Australia.
- Boustead Consulting, 2007, Life Cycle Assessment for Three Types of Grocery Bags - Recyclable Plastic; Compostable, Biodegradable Plastic; and Recycled, Recyclable Paper  
[http://www.americanchemistry.com/s\\_plastics/doc.asp?CID=1106&DID=7212](http://www.americanchemistry.com/s_plastics/doc.asp?CID=1106&DID=7212)
- Billerud, 2009, Executive summary for Billerud Carbon Footprint – overview documentation.
- Novamont (undated), Life cycle analysis of bags in Mater-bi® (cornstarch)

Prominent reviews of these and other LCAs include:

- EuroCommerce, 2004. The Use of LCAs on Plastic Bags in an IPP Context. EuroCommerce a.i.b.s., Brussels, Belgium.
- FRIDGE. Socio-economic Impact Assessment of the Proposed Plastic Bag Regulations. Report for the National Economic Development and Labour Council. Bentley West Management Consultants, Johannesburg, South Africa.
- ULS, 2008. Review of life cycle data relating to disposable, compostable, biodegradable and reusable grocery bags.

### 2.6.3 Findings of the carrier bag LCAs

#### Carrefour LCA

The Carrefour LCA showed that the production of base materials (chiefly plastic and paper) tends to give rise to the greatest environmental impacts<sup>42</sup> for all types of bag. Bag manufacture has significant effects (at least within the context of the lifecycle) on emissions of air pollutants. In contrast, the use of bags has very little impact on pollutant emissions. At the end of the lifecycle, disposal has a number of significant impacts on littering, generation of solid waste and greenhouse gas emissions. All these impacts can be reduced by not using a bag and through reusing bags. Carrefour found particular benefit from the use of bags that were robust enough to withstand several trips, rather than bags that could at best be expected to last one or two trips.

It is to be noted that the LCA methods take only limited account of the persistence of bags in the environment, typically being concerned only with degradation rates of paper and plastic in landfill. As a general comment, however, it is clear that:

- Plastic bags have the potential to persist for far longer in the environment than paper or degradable plastics.
- Both paper and degradable bags can take months to degrade in the environment. Data suggesting that they degrade on shorter timescales typically relates to the use of composting facilities where conditions for degradation are optimised.
- All lightweight plastic bags have a greater potential than the heavier paper bags to be carried long distances by the wind.

The Carrefour study compared the following bag types:

- HDPE (high density polyethylene) bag typical of lightweight plastic carrier bags
- LDPE (low density polyethylene) bag typical of a 'bag for life'.
- Paper bag

Results showing the performance of bags relative to HDPE are shown in **Table 2**. The study concludes that reusable plastic bags are better than paper or HDPE 'single-use' bags for all of the environmental indicators that were considered except littering risk if reusable plastic bags are used four times or more. The analysis took into account the fact that free, lightweight plastic carrier bags are often reused once at home.

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<sup>42</sup> Environmental impact assessed in terms of energy use (non-renewable), water use, air pollution greenhouse gases, nitrogen oxides, sulphur dioxide, photochemical ozone creation potential (smog), water pollution (eutrophication), solid waste and possibility of littering.

**Table 2. Relative performance of different types of carrier bag against environmental indicators<sup>43</sup>**

Indicator of environmental impact	HDPE bag (lightw't)	Reusable LDPE bag (used 2x)	Reusable LDPE bag (used 4x)	Reusable LDPE bag (used 20x)	Paper bag (single use)
Consumption of non-renewable primary energy	1.0	1.4	0.7	0.1	1.1
Consumption of water	1.0	1.3	0.6	0.1	4.0
Climate change (emission of greenhouse gases)	1.0	1.3	0.6	0.1	3.3
Acid rain (atmospheric acidification)	1.0	1.5	0.7	0.1	1.9
Air quality (ground level ozone formation)	1.0	0.7	0.3	0.1	1.3
Eutrophication* of water bodies	1.0	1.4	0.7	0.1	14.0
Solid waste production	1.0	1.4	0.7	0.1	2.7
Risk of litter	1.0	0.4	0.4	0.4	0.2

**Note:** \* Eutrophication here refers to the emission to water of nitrate and phosphate pollutants that stimulate excess growth of some aquatic life such as algae, to the detriment of other ecosystem components.

The results show that paper bags perform worse in all indicators except 'risk of litter'. Reusable bags perform best, provided that they are reused at least four times. In general, the Carrefour study draws the same conclusions on the comparison of paper and plastic bags as the Franklin report, although the differences are less extreme for the base case than the North American study. It found that, compared with lightweight plastic bags, paper bags:

- Consume about the same amount of energy
- Create about the same amount of photochemical oxidants
- Consume three times the amount of water
- Create 90% more greenhouse gas emissions

<sup>43</sup> Source: Table 18 of the Carrefour study. It is assumed that bags are disposed of to landfill at the end of their service life. For each indicator, results are normalised to the lightweight HDPE bag. . The lower the number, the better the environmental performance.

- Create 80% more nitrogen oxide (NO<sub>x</sub>)/sulphur dioxide emissions
- Generate twelve times the level of eutrophication (nitrate and phosphate pollution to water)
- Create 80% more solid waste

### **Franklin report**

In the American Franklin report [ARA], paper bags are also shown to be the least environmentally preferable option. This was due to the greater amount of resources (materials and fuels for transport from greater weight per bag) estimated for their production. Compared with lightweight plastic bags, paper bags:

- Use six times as much raw material.
- Use three times the energy for manufacture.
- Are six times heavier for the same volume.
- Use ten times the storage/warehousing volume.
- Require seven times the amount of transport and associated emissions.

### **AEAT study for the Scottish Government**

The analysis by AEAT (2005) for the Scottish Government took the work for Carrefour as its starting point, rather than conducting a totally new LCA (see Appendix 2 for further details). It considered the following scenarios:

- Scenario 0: Baseline, business as usual
- Scenario 1A: Tax all plastic carrier bags used by all businesses
- Scenario 1B: As 1A but excluding SMEs (Small and Medium Enterprises) and charity shops
- Scenario 2A: Tax all plastic and paper carrier bags used by all businesses
- Scenario 2B: As 2A but excluding SMEs and charity shops

The Carrefour data were adapted by AEAT to account for differences in:

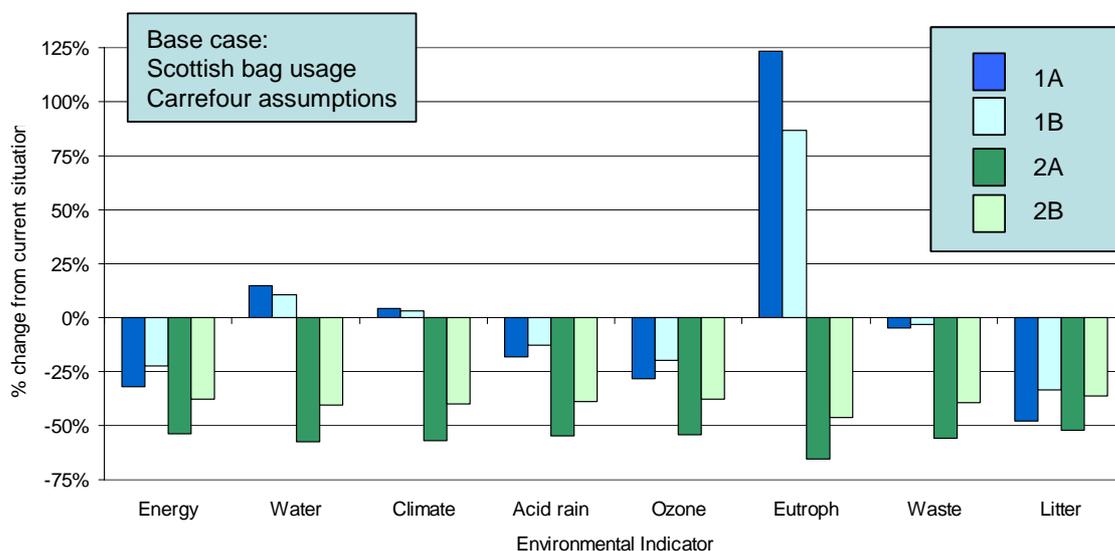
- Bag weight
- Volume of shopping bags
- Assumptions on changes in demand for bin liners
- Assumptions on fate of bags in the waste stream

The analysis first considered the effects of each scenario on the number of bags of different types that would be in use. It was forecast that Scenario 1 (taxing LDPE bags only) would increase demand very substantially for paper carrier bags and to some extent for bags for life and bin liners also (Table 3). Under scenario 2 (tax both HDPE and paper bags), consumption of both HDPE and paper bags fell, whilst use of LDPE bags for life increased. There was no difference in consumption of bin liners between scenarios 1 and 2.

**Table 3. Estimated carrier bag consumption now ('business as usual') and for the four scenarios considered in the Scottish Executive study<sup>44</sup>**

	Change in the number of bags used under each scenario relative to Scenario 0				
	0	1A	1B	2A	2B
Plastic carrier bag (HDPE, lightweight)	0%	-90%	-63%	-90%	-63%
Plastic reusable bag (LDPE, heavyweight)	0%	188%	138%	263%	188%
Paper bag (single use)	0%	446%	313%	-90%	-64%
<b>Total bags used</b>	0%	-62%	-43%	-86%	-61%
Bin liners <sup>45</sup>	0%	76%	53%	76%	53%

Figure 1 shows how the different scenarios performed relative to business as usual for Scenario 0 (baseline). An increased score shows increased environmental impact and a negative score shows reduced environmental impact. Benefits were most significant for Scenario 2 when both paper and plastic bags were included in the proposed levy. When paper bags were excluded (Scenarios 1A and 1B) impacts regarding water use, greenhouse gas emissions and eutrophication of water bodies worsened relative to the baseline. .

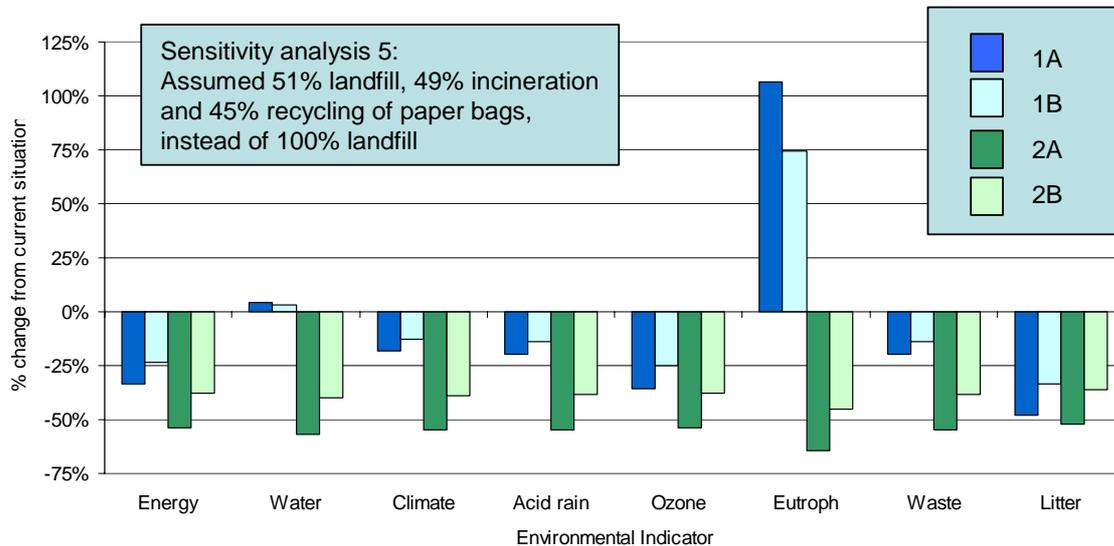


**Figure 1. Base case showing the relative change in each environmental indicator for the four levy scenarios compared with business as usual (scenario 0).**

<sup>44</sup> Numbers calculated as described in Section 4.3.

<sup>45</sup> It would be appropriate to monitor sales of bin liners before and after any further action on SUBs, perhaps drawing on a sample of large and small retailers.

Various sensitivity analyses were run. Of these possibly the most relevant to the Welsh case assumed that waste management follows French practice with 51% of material sent to landfill and 49% incinerated. For paper bags, it is assumed that 45% would be recycled. The baseline in contrast considered all waste going to landfill – a reasonable assumption at the time when 88% of Scottish waste was sent to landfill, but given recent developments (e.g. the Welsh Waste Strategy) not one that is particularly useful for projective analysis.



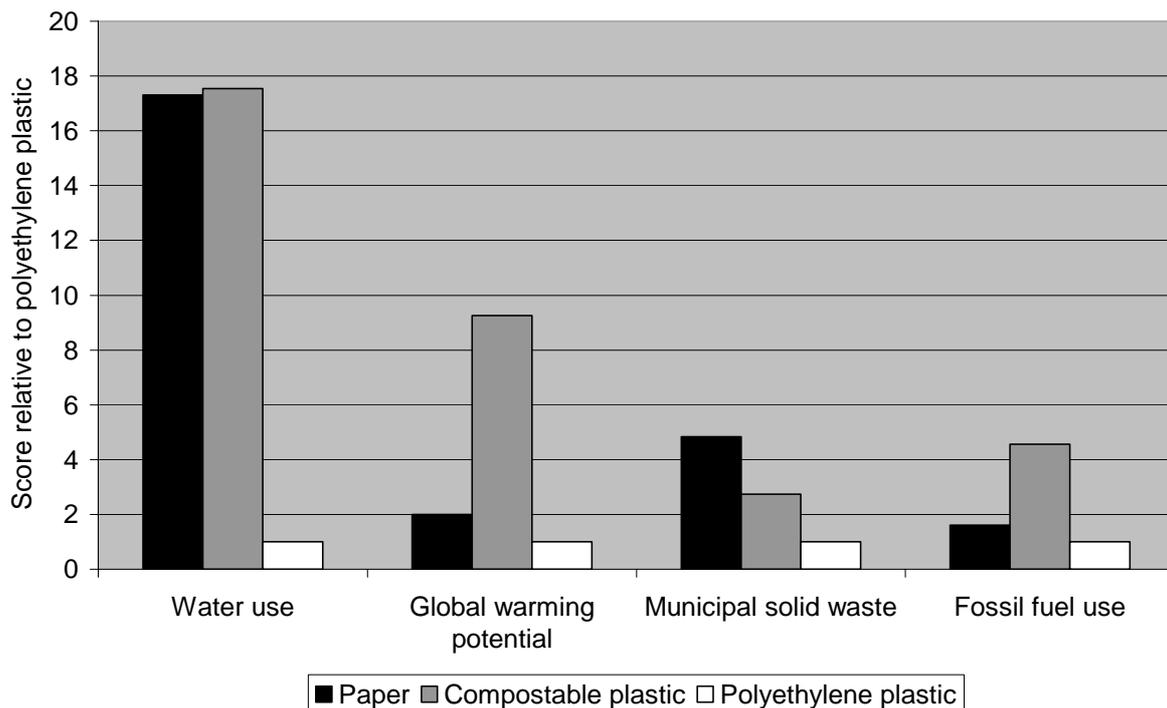
**Figure 2. Sensitivity analysis assuming that waste disposal in Scotland is split across incineration, landfill and recycling in the same proportions as in France\*.**

The alternative position on end-of-life waste management led to a uniform improvement in the performance of scenarios 1A and 1B across all indicators, though it had almost no effect on scenarios 2A and 2B. The climate change indicator switches from worsening under scenarios 1A and 1B in the base case to a slight improvement.

### Boustead Consulting study

More recently, a study by Boustead Consulting (2007) for the Progressive Bag Alliance (an industry lobby group in the USA) compared paper bags with compostable and polyethylene plastic bags, all nominally single use. Results are summarised in Figure 3, taking the sensitivity case where paper bags provide the equivalent service (in terms of the volume of shopping carried) to 1.5 plastic bags. In all cases the polyethylene plastic bags perform better than either paper or compostable plastic.

The boundary of the study that restricts it to only three types of single use bag make the results of limited interest so far as this report is concerned, given the lack of consideration of re-usable bags. However, the results agree with the findings of the earlier work regarding the relative merits of paper and plastic bags.



**Figure 3. Relative performance of different types of single use bag. Data source: Boustead Consulting 2007.**

### Billerud analysis

The Billerud analysis was carried out for a Swedish paper manufacturer. It is restricted to assessment of greenhouse gas emissions, and so far as paper is concerned, to paper manufacturing by Billerud itself. In the second half of the paper the carbon footprint of bags and sacks made from Billerud’s paper is compared with those for plastic equivalents (30g polyethene bag and an 86.5g woven polypropylene sack). Results show that the impacts of the paper products are forecast to be lower than those of the plastic bags (Figure 4 and Figure 5).

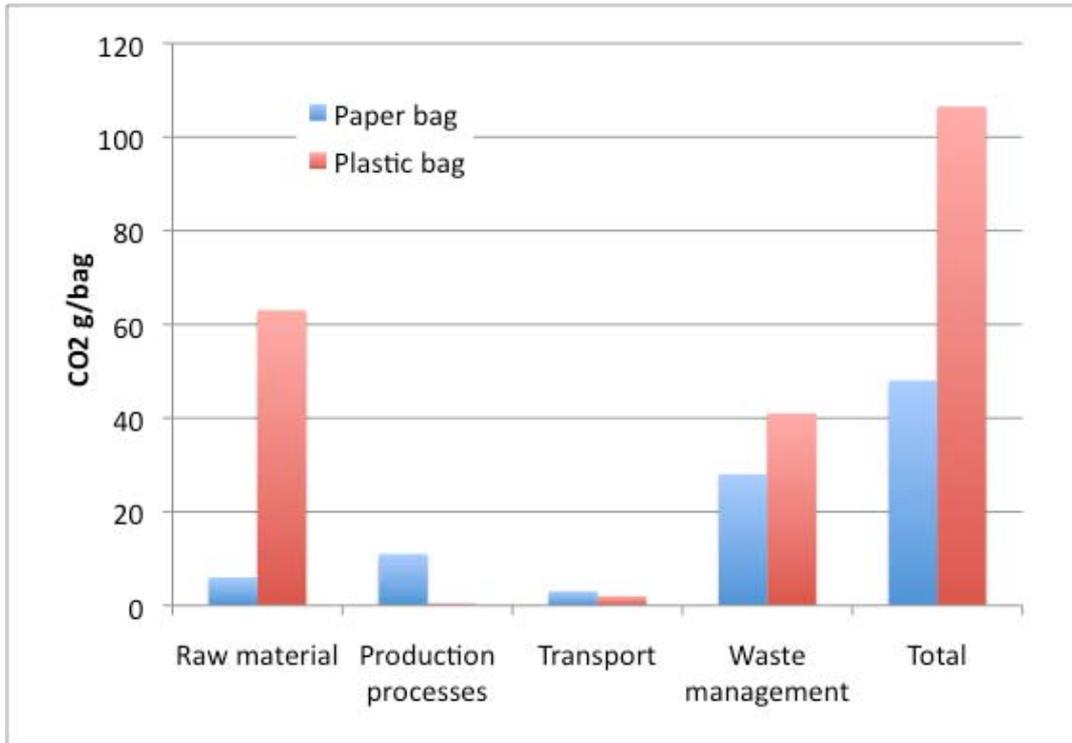


Figure 4. Relative performance of paper and plastic bags. Data source: Billerud, 2009.

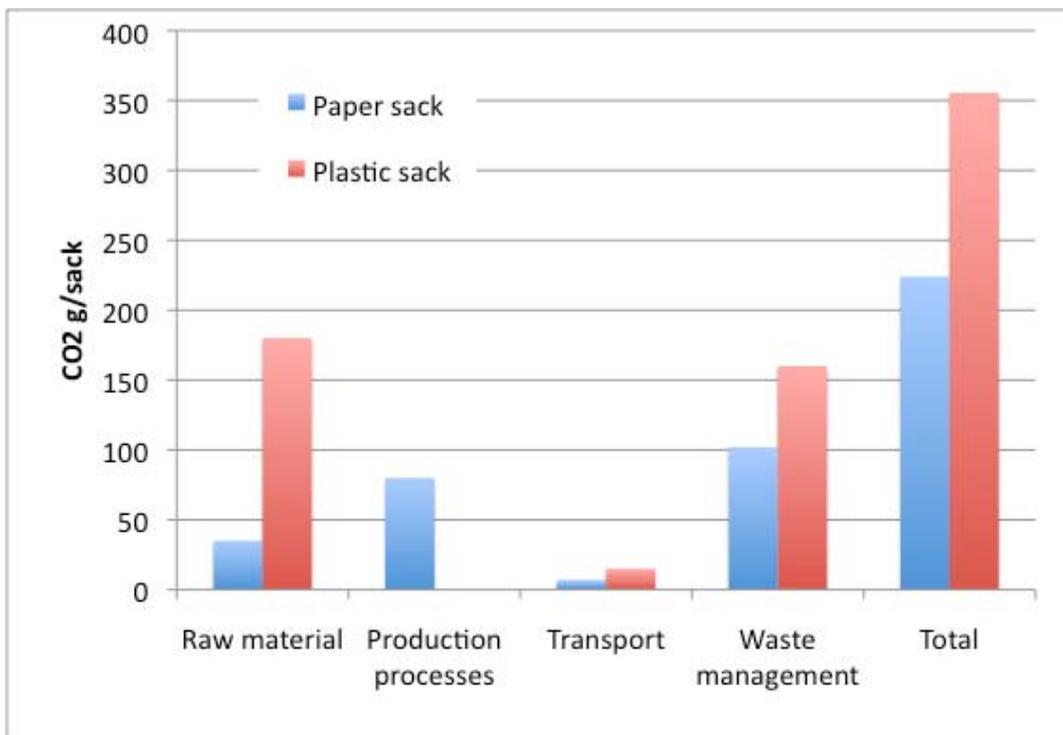


Figure 5. Relative performance of paper and plastic sacks. Data source: Billerud, 2009.

Several issues with the Billerud analysis are identified here, in part relating to the relevance of Swedish data to UK paper use and in part to some of the choices made in the analysis:

- The comparison is made on a bag versus bag basis, without appearing to consider the service offered by the different bags. Whilst a 30g plastic bag may be the norm in Sweden, it is not in the UK, where a lightweight bag would weigh under 10g. A 30g plastic bag is much closer to a 'bag for life'. Accounting for the potential to use the plastic bag (or the sack, in the second comparison) a number of times beyond the uses to which a paper bag or sack would be used seems likely to change the results to favour use of plastic.
- Assumptions on the CO<sub>2</sub> impact of energy sources are made in such a way as to minimise the carbon footprint of paper manufacture (it is unclear how this feeds through into the comparison of paper and plastic). So, the carbon loading of electricity used to manufacture paper is taken as the average for Vattenfall (the utility company concerned) of 6g CO<sub>2</sub>/kWh, a figure presumably based largely on power generation by nuclear and hydro plant. Energy recovery at the end of the lifecycle, however, is assumed to displace emissions by a factor of 380g CO<sub>2</sub>/kWh, this figure being the emission factor for power generation from natural gas, which the authors consider to be the marginal technology. The net effect is that energy brought in for manufacture is 'costed' at a lower rate than energy produced by combustion at the end of the life cycle. Whilst this may be applicable to the case where paper is produced by certain Swedish manufacturers, it would not apply when paper is made elsewhere and the carbon impacts of average power generation are higher. In the UK, for example, it would be logical to use the same emission factor for both manufacture of paper and energy recovery at the end of the lifecycle.
- On the other hand, the assumed recovery rate for landfill gas of 45% is significantly lower than may be anticipated for a modern UK landfill equipped with gas recovery (UK LCA work in this field such as ERM, 2006<sup>46</sup>, tends to take figures in the region of 60%). This assumption would therefore bias against paper and in favour of plastic.
- An assumption made by Billerud is that the volume of timber that they buy contributes to an economic market for timber, which in turn contributes to stimulate sustainable and efficient forest management in Sweden. One effect of this is that the volume of standing timber in Sweden has increased significantly over recent decades. Based on this argument, Billerud calculate a large sequestration benefit from paper manufacture. However, it is not clear how this has been factored into their analysis, if at all.

For the purposes of the present study the first issue is probably most problematic: Comparison on a per bag basis does not account for differences in the potential to re-use the different types of bag.

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<sup>46</sup> ERM (2006) Carbon balances and energy impacts of the management of UK wastes. Defra R&D project WRT 237. December 2006.

**Novamont study**

The Italian company Novamont market a cornstarch alternative to plastic called Mater-Bi, and provide details of an LCA comparison of their bags with paper and plastic alternatives<sup>47</sup>. The specific comparison made concerned bags for the collection of organic waste, rather than shopping bags, as specified in Table 4. Analysis is reported as having been performed independently and in accordance with ISO 14040.

**Table 4. Specification of bags considered in the Novamont LCA.**

	<b>Bags made of Mater-Bi®</b>	<b>Paper bags</b>	<b>Bags made of Polyethylene</b>
Material	Z-class Mater-Bi®	Kraft paper	HDPE
Country of origin	PCL:USAmaze: FranceMater-Bi®: Italy	Paper: Sweden Bag: Switzerland	Granules:Malaysia Bag: Malaysia
Disposal	Composting	Composting	Incineration
Dimensions (mm)	(220+220)x440	(240+105)x510	(180+360)x600
Weight (g)	9.15	59.6	7.04

Results are summarised in Table 5. Specific conclusions drawn by the authors are:

- Paper bags consume much more energy than the corresponding bags made of Mater-Bi® and of PE (polyethylene), because of the greater weight.
- Bags made of Mater-Bi® make a significant contribution to reducing the greenhouse effect, because of their natural constituents.
- Bags made of Mater-Bi® have a better environmental impact than paper bags, and are comparable with bags made of polyethylene incinerated alone after separation from the waste. However, complete separation of the plastic bag from the organic waste is not possible, as a significant quantity of non-separable organic material remains to be burned with the plastic. Accounting for this, the environmental impact of bags made of Mater-Bi® is better than that for bags made of polyethylene.

<sup>47</sup> [http://www.materbi.com/ing/html/prodotto/cosematerbi/lca\\_edp.html#](http://www.materbi.com/ing/html/prodotto/cosematerbi/lca_edp.html#)

**Table 5. Comparison of Mater-bi bags and bags made of polyethene and paper.**

Environmental impact category	Bag made of Mater-Bi® compared with:		
	bag made of PE	paper bag	bag made of PE, including incineration of the organic residue
Energy	++	0	+
Greenhouse effect	+	+	++
Acidification	+	0	++
Nutrication	++	0	+
Ozone formation	++	+	++
Toxicity in air	+	++	++
Toxicity in water	++	0	+
Salification	-	--	++
Waste produced	++	--	-

**Legend:** (++) = much better (+) = better (0) = comparable (-) = worse (--) = much worse

Numeric results are not provided on the Novamont website and it has not therefore been possible to carry out a sensitivity analysis to test alternative assumptions in some areas. As Novamont considered bags used specifically in the first instance for containing waste rather than shopping, they do not account for the potential of bags to be used on a number of occasions. This seems likely to improve the rating of bags made from polyethene.

At the time of writing a further LCA study was underway for the Environment Agency for England and Wales, though details are as yet unavailable.

#### **2.6.4 Screening assessment carried out for this study**

A screening assessment has been carried out under the present study using the SimaPro 7 software tool allied with the Ecolnvent 2.0 and other databases such as BUWAL250. These are regarded as state of the art by European LCA practitioners. It is stressed that a full ISO (International Standards Organisation) -compliant LCA has not been carried out here – we have simply assessed the quantities of different materials (LDPE for long life plastic bags, HDPE for lightweight, nominally “one trip” plastic bags and Kraft paper for paper bags) required to provide a common level of service (carrying 1000 litres of shopping) and integrated results from past LCAs contained in Ecolnvent, limited to the production phase. A qualitative assessment of the impacts linked to the other potentially significant life cycle stages, transport and waste management is also provided below.

Data on bag volumes, weight and storage volume were taken from Table A1.1, section 1.3 of Appendix 1. The data given there may be questioned, for example, the extent to which each type of bag may be used to its full volume, or the weight of

material used. Some limited sensitivity analysis has been carried out to assess the effect of these factors on conclusions drawn.

The data for HDPE are averaged across 10 companies, producing 1.3 Mtonne HDPE using APME (Association of Plastics Manufacturers in Europe) data. For LDPE data again originated from APME, this time averaged across 22 companies producing 2.8 Mtonne in total. In both cases the BUWAL 250<sup>48</sup> analysis has been adopted for the screening assessment, this being an assessment of packaging materials undertaken for Switzerland. Data for paper were taken from various sources provided with the SimaPro 7 software, including Ecoinvent 2 and BUWAL250, referring to 'sack paper' or 'unbleached Kraft paper'. Some of the information used to derive the life cycle burdens is somewhat dated now, particularly in view of recent changes in environmental regulation. The data contain assessment of the burdens of wastes only in relation to process waste, rather than product (bag) end-of-life, though impact of different bag types on municipal waste generation can be assessed using information from Table A1.1.

As discussed above, there are a significant number of assumptions that are required for an LCA of carrier bags. These include how many times a bag is used, the volume of shopping carried in an average bag (as opposed to the carrying capacity of bags), the location of production facilities which will affect the energy sources used and the importance of certain impact categories such as water consumption, the fate of bags in the waste system and so on. These assumptions need to be tested through sensitivity analysis to understand the robustness of any conclusions reached using LCA.

The question of the number of times a bag is used is particularly important; used twice a bag clearly has only half the impact per use compared to a bag used once. It is a particular issue for lightweight plastic bags. A common form of re-use for these bags is to line domestic waste bins. However, this form of re-use may decline in the coming years through changes in the way that domestic waste is collected, with separate collection of food waste and dry recyclables in individual containers provided by local authorities.

The comparison of HDPE single use and LDPE bags for life made through this screening assessment is broadly consistent with the earlier AEAT analysis. Results show that for most of the LCA indicators selected a long-life plastic bag would need to be used three times more than a lightweight plastic bag. We are careful here to say that long-life bags need to be used so many times more than lightweight bags in recognition of the fact that many lightweight bags, though by no means all, are used more than once. The exception was water consumption for which a bag for life would need to be used six times to gain a net benefit. Though not included within the BUWAL250 dataset used in this screening analysis, comparison of information from Table A1.1 suggests the heavier bag would need to be used between four and six times more than lightweight plastic bags to perform similarly with respect to transport and municipal waste management burdens.

Paper bags perform worst in relation to the category of water consumption, reflecting the earlier results from Boustead Consulting and others. It is necessary to ask how

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<sup>48</sup> <http://www.pre.nl/download/manuals/DatabaseManualBUWAL250.pdf>

important this impact category is. Many parts of the world suffer water shortages and any additional water demand is problematic. However, the problem is not universal: for example in Scandinavia, where water is plentiful and water consumption at paper mills is not a problem. Indeed, such facilities may distort the analysis through having little or no need to apply water conservation measures, whilst plant in more water stressed areas may well appear to operate more efficiently with respect to water use.

With respect to generation of municipal solid waste (not considered in the LCA datasets used), information on the weight of different bags shown in Table A1.1 indicates that paper will perform about six times worse than HDPE bags, in line with the results given by Boustead Consulting. It will also have a greater transport demand through the distribution of bags.

Comparison of global warming potential and energy use between lightweight HDPE bags and paper bags gives variable results, reflecting differences in assumptions on the energy sources used particularly for paper manufacture. In some situations a significant part of the energy demand for paper manufacture will be derived from renewable sources such as hydro or from waste wood. In the latter case CO<sub>2</sub> emissions from combustion may be considered as part of the natural carbon cycle and so would not be counted as part of the overall contribution of the process to climate change. Results do not appear as clear-cut as implied by the results of the Franklin, Carrefour and Boustead studies. Assuming one use per bag, some of the case study material suggests paper could perform better and some suggests plastic. It is possible that factoring in waste management options for the bags (as opposed to simply reporting the quantity of material sent for disposal) could change the balance more in favour of plastic as a result of its higher energy content.

## 2.7 Extrapolation of the AEAT study to Wales

The analysis carried out by AEAT for the Scottish Executive has here been extrapolated to the Welsh situation. Key assumptions concern the effect of a reduction in plastic bag use on the consumption of other bags (see Table 3). The scenarios considered are as follows:

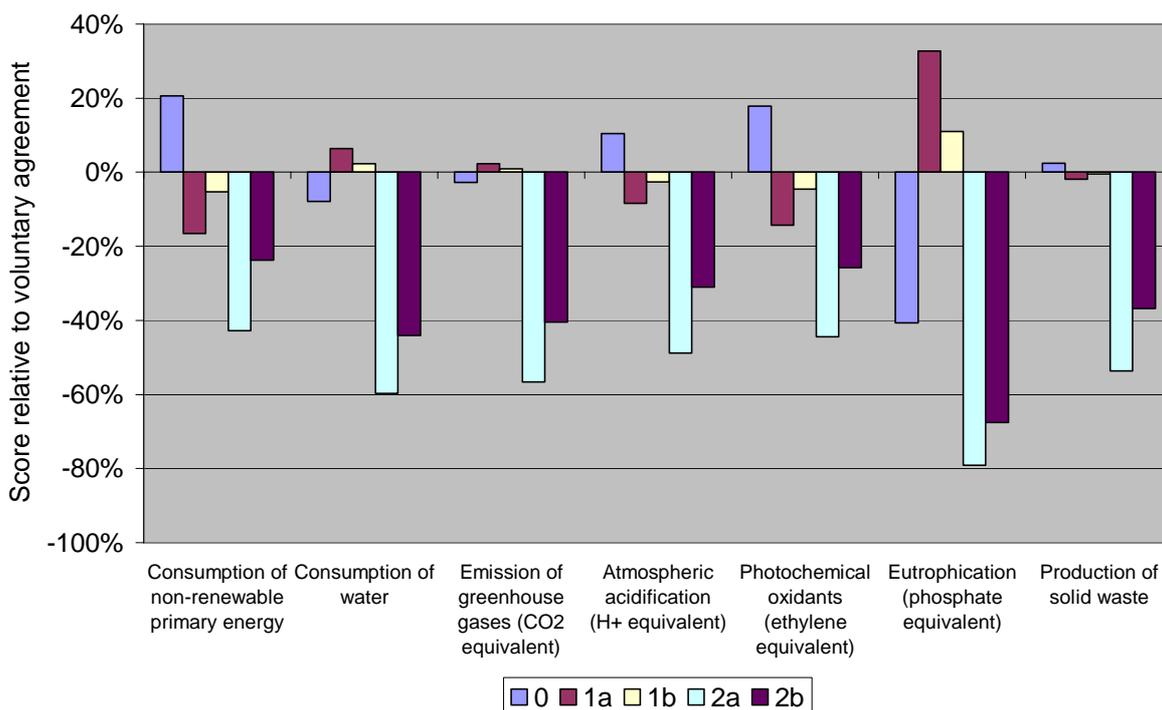
- VA: Baseline assuming full implementation of the voluntary agreement with retailers
- Scenario 0: Baseline without the voluntary agreement
- Scenario 1A: Apply a charge for all plastic carrier bags used by all businesses
- Scenario 1B: As 1A but excluding SMEs and charity shops
- Scenario 2A: Apply a charge for all plastic and paper carrier bags used by all businesses
- Scenario 2B: As 2A but excluding SMEs and charity shops

Initial results are shown in Figure 6, referenced to full implementation of the voluntary agreement<sup>49</sup>, assuming a 50% reduction in the use of lightweight plastic carrier bags. Results imply that for some impact categories (water consumption, global warming and eutrophication) there is a negative impact of the voluntary

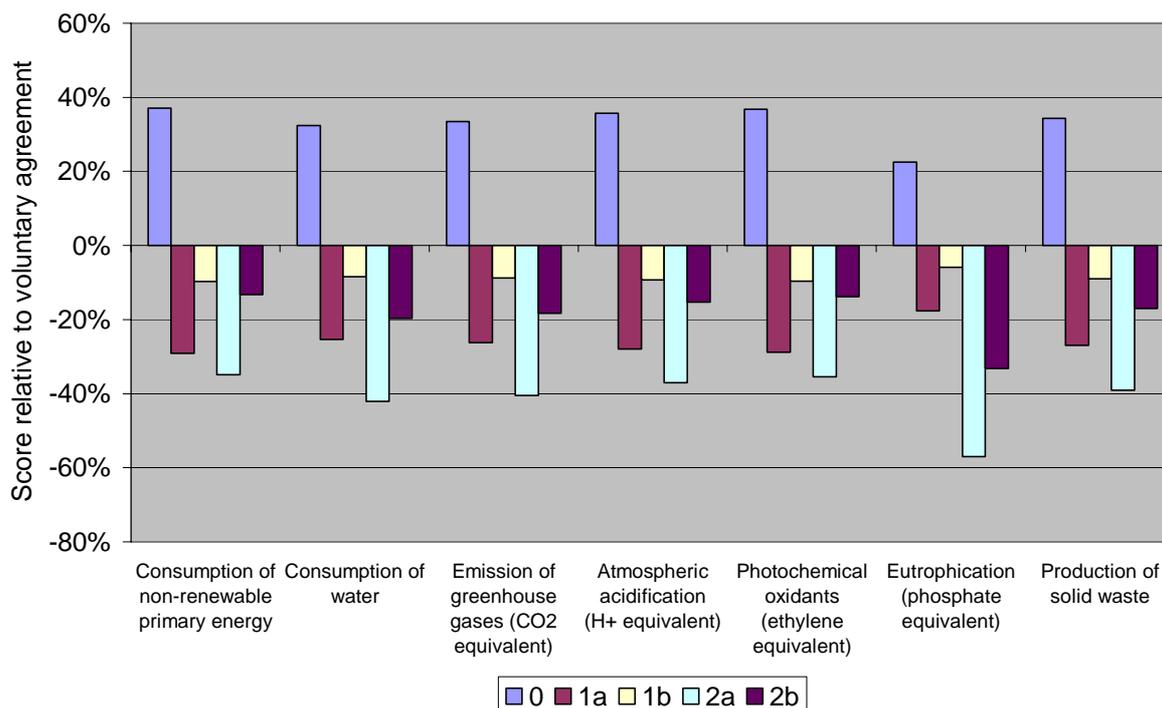
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<sup>49</sup> The AEAT study referenced results to their Scenario 0, prior to the implementation of the Voluntary Agreement. Here, however, we are interested in the impact that new legislation would have to the current

agreement as a result of switching from lightweight plastic bags to paper rather than to heavyweight plastic bags, according to the assumptions used in the earlier work. However, as noted in Section 6.2, there does not appear to be a significant shift from plastic to paper amongst retailers under the voluntary agreement. In view of this, the results shown in Figure 7 assume that there is further increased use of plastic bags for life under scenarios VA, 1a and 1b and no increase in paper bag use under these scenarios. In this case there is a benefit in moving from the scenario 0 baseline to the voluntary agreement across all indicators. The true position is likely to be between the extremes shown in Figure 6 and Figure 7. The figures demonstrate that there is benefit to be gained from going beyond the current voluntary agreement.



**Figure 6. Performance of each scenario relative to the voluntary agreement for various LCA indicators assuming significant increases in paper bag use.**



**Figure 7. Performance of each scenario relative to the voluntary agreement for various LCA indicators assuming no increase in paper bag use for scenarios VA, 1a and 1b.**

## 2.8 Conclusions from the LCAs

A general concern arising from the review of bag LCAs is that many have been commissioned by particular bag manufacturers. It is possible that this could introduce bias to the results, for example, through comparison of state of the art manufacturing of one type of bag with outdated production of another.

Most LCAs that specifically compare paper and plastic bags (Franklin, Carrefour/AEAT, Boustead Consulting and Novamont) are consistent in showing that paper bags perform worse than plastic against most burden categories. On this basis, a proposal for a charge that left scope for an increase in paper bag use would appear to have potential for significant adverse consequences. Indeed, WRAP’s response to the Scottish Environmental Levy Bill [WRAP 2004a] stated a levy that substituted plastic bags with free paper bags would be a step in the wrong direction.

A review of additional LCA data, particularly from Ecoinvent and BUWAL250, suggests that the differences between paper and plastic may not be as large for some impact categories, notably global warming and fossil fuel use, as suggested by these comparative analyses. Significant variation in the environmental performance of paper manufacture was observed between different assessments, reflecting factors such as the availability of water and renewable sources of energy (water and wood/biomass). However, whilst there seems scope to question the extent of differences previously reported between the choice of paper or plastic, no firm rationale has been identified for preferring “average” paper manufacture to plastic. On this basis the concern that there could be adverse environmental consequences

of a charge that applied only to lightweight plastic bags and not to paper carriers appears to remain valid.

Some challenge to this view is provided by the results of the Billerud study, which concludes that paper bags have a lower impact on global warming (the only impact category assessed in the study) than plastic bags. However, it is concluded here that there are three problems with this view in the context of the present study:

- Results are from a single paper manufacturer in Sweden and may not be typical of paper used for bags in the UK more generally
- Results appear to be based on the assumption that bags of each type are only used once (or the same number of times)
- The plastic bag considered was much heavier than is typical of lightweight bags in the UK, closer to a so-called 'bag for life'

Studies comparing single use bags with heavyweight bags available from supermarkets tend to show that the heavier bags outperform the lighter ones if used about four times more. Factoring bin liner usage into the analysis, as in the work done by AEAT for the Scottish Executive, did not have a significant negative impact on the overall results. The extent to which lightweight plastic bags may continue to substitute for bin liners is questioned here in the light of changing systems for municipal waste collection by local authorities, particularly in relation to the separate collection of food wastes. This may lead to increased use of cornstarch bags, but not bags made from HDPE and other non-bio plastics.

The AEAT study also demonstrated that exempting some businesses (SMEs and charity shops) would have a small negative impact on the results, which was of course to be expected.

Overall, therefore, it is concluded from the LCAs that have been reviewed that long-life bags outperform single use bags and that plastic outperforms paper. No comparison with other bags (e.g. those made from cotton or canvas) has been made as these have not been included in the LCAs reviewed.

A further question concerns whether recycled or biodegradable bags offer advantage over HDPE plastic bags or long-life bags. It is concluded that they do not for the following reasons:

1. Lightweight bags of any material are equally as likely to cause problems through littering.
2. Degradable bags can take a substantial amount of time to degrade, in the order of months or years. They therefore have the potential to persist as litter in the environment. Rapid degradation is only ensured when they are sent to composting plant that operate at optimised conditions.
3. Once degradable bags start to fragment they become more difficult to collect and fragments may be more easily ingested by animals.
4. The LCA by Boustead Consulting raised questions about the broader lifecycle impacts of biodegradable bags.

5. A mixture of non-degradable and degradable bags in the waste stream would be problematic for attempts to recycle bags.
6. Recycling is lower in the waste hierarchy than waste reduction.

This does not rule out the use of degradable bags in some applications, for example the use of cornstarch bags to line bins in areas where food wastes are collected separately for composting (indeed, these may be provided by local authorities for this purpose). The use of HDPE bags for this purpose would be problematic, as they are not compostable.

## 3 Action in the UK and other countries to control bag use

This section starts by reviewing the current situation in the UK generally and then Ireland and Scotland, the two countries for which bag charges have been implemented or considered that are likely to be of most relevance to the situation in Wales. This is followed by a review of activities in other parts of the world.

### 3.1 UK

#### 3.1.1 UK action

In the last three years two voluntary objectives have been agreed between UK government and major retailers:

- to reduce the environmental impact of carrier bags by 25% by the end of 2008, based on a 2006 baseline (achieved).
- to reduce the number of bags given out by 50% by the end of May 2009, based on a 2006 baseline

Signatories to this shared objective with central UK government, devolved administration governments and WRAP, agreed:

- to work jointly with government and WRAP to monitor the environmental impact of carrier bags and to agree a baseline figure from which to measure reduction
- to work with the above parties to reduce the overall environmental impact by 25% by the end of 2008
- to review experiences by the end of 2008 in order to determine what would be required in order to make a further reduction by 2010<sup>50</sup>

This was achieved via the following routes:

- by reducing the environmental impact of each individual carrier bag
- by encouraging customers to significantly reduce the number of carrier bags they use
- by enabling the recycling of more carrier bags where appropriate.

WRAP reported in February 2009 that since 2006, retailers have delivered a 40% reduction in the environmental impact of carrier bags, as measured by the reduction in the amount of virgin plastic used. Retailers have achieved this by reducing the number of carrier bags issued by 26%, increasing recycled content and reducing carrier bag weight<sup>51</sup>.

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<sup>50</sup> WRAP, Carrier Bags. Available at: [http://www.wrap.org.uk/retail/carrier\\_bags/index.html](http://www.wrap.org.uk/retail/carrier_bags/index.html)

<sup>51</sup> WRAP press release 26 February 2009, "Retailers exceed carrier bag reduction target". Available at: [http://www.wrap.org.uk/wrap\\_corporate/news/retailers\\_exceed.html](http://www.wrap.org.uk/wrap_corporate/news/retailers_exceed.html)

In April 2009, the UK Government in partnership with the British Retail Consortium and WRAP launched an advertising campaign in support of the commitments retailers are making. The campaign named 'Get a bag habit' follows research undertaken for WRAP by YouGov that found that '*on average we use more than 160 new carrier bags each every single year, at least 400 a year for the average household*'<sup>52</sup>. The aim of the campaign was to get customers to remember to reuse their bags<sup>53</sup>.

The WAG launched their own communications campaign in April 2009, promoting the message 'remember, give your bag a second chance'. Support is given to both retailers and members of the public<sup>54</sup>. A free reusable bag is being offered to the first 1000 Welsh households that register<sup>55</sup>.

### 3.1.2 Local action

In addition a number of towns have independently acted to reduce or eliminate the use of bags (see Appendix 5). Overall, 10 towns in the UK have become plastic bag free and 136 towns / areas are in the planning stages. In Wales, one town, Hay-On-Wye is currently plastic bag free, with 14 others in the planning stage or undertaking awareness campaigns.

Hay-On-Wye became carrier bag free on the 1<sup>st</sup> December 2007 with the support of Powys Council, the Chamber of Commerce, Hay Festival and the majority of the town's shopkeepers. In addition, the CO-OP donated a fair-trade cotton carrier to every household in the town.

A similar campaign is underway in Chepstow, Monmouthshire<sup>56</sup>. In early 2009 an "I Support Plastic Bag Free Chepstow" window sticker was produced with the help of a grant from Rural Community Action. A growing number of local retailers (30 are listed on the website) have joined the initiative, displaying the window sticker and pledging to reduce their use of plastic carrier bags.

The Porthcawl Action Group in conjunction with Bridgend County Council visited all the resort's shops and state that 94% of the traders of the town have shown keen support to a campaign to go plastic bag free. The town's participating shops will carry a campaign certificate and display a highly visible and colourful 'Bagman Sticker' in their shop window<sup>57</sup>.

The fact that a significant number of towns have decided to act in this way demonstrates the strength of feeling on the issue and the willingness of the public to change their behaviour. In addition the National Federation of Women's Institutes focus groups have come out in favour of charges, concluding that that a charge as

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<sup>52</sup> Defra Press release 07 April 2009, "Government Minister urges people to get a habit: a bag habit". Available at: <http://www.defra.gov.uk/news/2009/090407a.htm>

<sup>53</sup> For further information see <http://campaigns.direct.gov.uk/getabaghabit/>.

<sup>54</sup> For further information visit: <http://wales.gov.uk/walescarbonfootprint.com>

<sup>55</sup> <http://wales.gov.uk/news/topic/environment/2009/090518carrierbagcampaign/?lang=en>

<sup>56</sup> <http://www.transitionchepstow.org.uk/InitiativeDetails.aspx?id=5>

<sup>57</sup> Sustainable Wales Press release, Aug 4th, 2008, "Porthcawl takes step forward in bid to become plastic bag free". Available at: <http://www.sustainablewales.org/blog/?p=149>

high as 10p is the most effective way to encourage people to change to alternatives such as reusable 'bags for life'<sup>58</sup>.

Decreasing plastic bag use appears to be supported by the Welsh public. This was demonstrated when members of the public, suggested banning plastic bags. This won an audience vote in a BBC contest to nominate new laws for Wales<sup>59</sup>.

### 3.1.3 Action by retailers

A number of stores have acted independently, introducing charges for bags or trialling charges. IKEA was the first UK leading retailer to introduce a fee per bag in June 2006 in an attempt to phase out single use bags. This has led to a reduction in consumption by 95%. Revenues have gone to community and environmental projects.

Marks and Spencer followed suit introducing a 5p charge on bags for food shopping across the whole of the UK in May 2008, following a successful trial in 50 stores in Northern Ireland and South West England. The introduction of the 5p charge per polythene bag has led to an 80% cut in the number of bags handed out<sup>60</sup>.

The leading supermarkets (Marks and Spencer, Sainsbury, Co-op and Checkers) in Jersey and Guernsey agreed to introduce bag charges of 5p from May 2008. This voluntary action by retailers is commendable and illustrates the growing consensus for a charge on bags, with the concerns on loss of trade, or shoplifting being shown to be negligible.

In August 2008, the National Trust introduced a 5p fee per bag and encouraged the use of other reusable cotton bags at all their shops and sites, resulting in a 95% fall in usage.

Netto, Lidl and Aldi all charge for carrier bags, with other companies currently considering changes and undertaking various trials, Debenhams, Bodyshop, Whole Foods Market, Help the Aged and Oxfam, for example. Help the Aged are banning plastic bags in all 365 stores and Oxfam plan to undertake a similar phased approach in their 790 shops. Debenhams are looking at several proposals, including offering reusable cotton bags and charging for bags (5p). They propose to undertake trials in a few of their stores to gauge customer reaction. Lisa Williams, head of investor relations at Debenhams, said removing free bags was more difficult when dealing with fashion rather than products like food. However she also stated: 'We all realise we have to do something. We are really committed to reducing our impact on the environment.'<sup>61</sup>

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<sup>58</sup> Sean Poulter, 6 March 2008.:

[http://www.thisismoney.co.uk/consumer/caring/article.html?in\\_article\\_id=432199&in\\_page\\_id=511](http://www.thisismoney.co.uk/consumer/caring/article.html?in_article_id=432199&in_page_id=511)  
<sup>59</sup> Marine Conservation Society press release, 6th November 2008, " Welcomes Recommendation For Wales To Introduce A Plastic Bag". Available at:  
[http://www.mcsuk.org/newsevents/press\\_view/249](http://www.mcsuk.org/newsevents/press_view/249)

<sup>60</sup> BBC News online, 17 May 2008, "Plastic Bag Policy – A Diversion". Available at:  
<http://news.bbc.co.uk/1/hi/uk/7405861.stm>

<sup>61</sup> Sean Poulter, 6 March 2008.:

[http://www.thisismoney.co.uk/consumer/caring/article.html?in\\_article\\_id=432199&in\\_page\\_id=511](http://www.thisismoney.co.uk/consumer/caring/article.html?in_article_id=432199&in_page_id=511)

**Table 6. Summary of charging results per store**

Store	Fee per bag	Results	Other comments
IKEA	10p	95% fall in consumption	10p charge applies to SUBs – long life bags are also available
M&S	5p	80% fall in consumption	Results published after a trial, now national
Safeway	5p	Unknown	Jersey & Guernsey Stores only
CO-OP			
Checkers			
M&S			
National Trust	5p	95% fall in consumption	
Lidl	5p	Unknown	

Many of the leading supermarket chains, although signed up to WRAP’s voluntary agreement and promoting the use of less bags and alternative bags, are still poor when it comes to deliveries from orders placed online. A survey undertaken by ‘This is Money’ in February 2008 assessed wasteful use of bags by placing test orders for 30 products. Sainsbury’s and Ocado fared worst, delivering 10 bags, containing on average three items per bag.

### 3.2 Ireland

The Irish Government introduced a levy on plastic bags (HDPE and degradable plastic) in spring 2002 at a fee of 15 euro cents. Ireland has robust legislation in place to tackle littering. However the levy, targeting consumption, had the two-fold benefit of addressing the durability and visibility of plastics bags as compared to other littered items and sending a strong signal to consumers to change their behaviour to adopt more sustainable modes<sup>62</sup>. Plastic bags were heavily visible in the Irish landscape, ruining the natural beauty of both coast and countryside. Research by McDonnell and Convery estimated that since the levy was introduced there has been a reduction in the consumption of plastic bags in excess of 90% and an associated gain in the form of reduced littering and negative landscape effects<sup>63</sup>.

In assessing the method of applying the taxation, The Irish Government rejected a recommendation to have upstream taxes imposed on producers and importers as their objective was to change consumer behaviour.

<sup>62</sup> Convery *et al*, 2006. The most popular tax in Europe? Lessons from the Irish plastic bag levy. *Environ Resource Econ*, 2007, 38: 1-11.

<sup>63</sup> McDonnell S and Convery F, 2008. *The Irish plastic bag levy – A review of its performance 5 years on*, Draft paper awaiting publication.

In the last few years, Ireland has seen an increase in receipts for the levy and thus an increase in the use of plastic bags). This led to the Irish Government increasing the levy from 15 to 22 euro cents per bag at point of sale in July 2007. Irish Environment Minister Dick Roche said the "Plastax" had dramatically cut the estimated 1.2 billion free plastic bags that had been given out by shops annually and that "Surveys indicated that up to 90% of shoppers used long-life bags in 2003, compared with 36% in 1999." On the introduction of the tax the number of plastic bags issued per capita fell from 328 to 21 per capita per year almost overnight. However, by 2006 usage had increased to 31 bags per head, causing the government to revise the charge and by 2008 usage had fallen back to 27 bags per capita.<sup>64</sup> There was a reduction in littering observed for both the introduction and the subsequent (2007) change to the levy (Table 7).

**Table 7. Littering and the Irish charge on plastic bags**

Time	Plastic bags as % of litter in Ireland
Prior to the levy	5%
December 2002	0.32%
August 2003	0.25%
August 2004	0.22%
August 2005	0.22%
August 2006	0.52%
August 2007, following increase in the levy	0.29%

### 3.2.1 Administration

The Irish system appears to have been relatively simple to administer with negligible costs for the retailers as a result of an existing online levying system. It simply involved adding another reporting line to the current system of the Inland Revenue's database, which consisted of a comprehensive list of existing retailers. The scheme operates as follows: Every quarter retailers send a direct debit slip to the Collector-General in Limerick (e.g. as per the VAT system where quarterly returns are made). The Revenue Commissioners are responsible for collecting revenues and were provided with initial set-up costs of €1.2 million, earmarked for new computer systems and increased resources to administer the levy.

They also receive €300,000 per year for ongoing costs<sup>65</sup>. Payment is by electronic debiting of the retailer's bank account. An online system for this, the Revenue Online System (ROS), was in place prior to the introduction of the levy. In addition to this, advertising costs associated with a publicity and awareness campaign were €358,000<sup>66</sup>.

<sup>64</sup> BBC News Press release 22/02/07: [http://news.bbc.co.uk/1/hi/northern\\_ireland/6383557.stm](http://news.bbc.co.uk/1/hi/northern_ireland/6383557.stm)

<sup>65</sup> Convery *et al*, 2006. The most popular tax in Europe? Lessons from the Irish plastic bag levy. *Environ Resource Econ*, 2007, 38: 1-11.

<sup>66</sup> McDonnell S and Convery F, 2008. *The Irish plastic bag levy – A review of its performance 5 years on*, Draft paper awaiting publication.

**Table 8. Year on Year Revenue Returns from the Plastic Bag Levy July 2002- June 2007**

Full Year	Revenue Returns €million	% Increase Year on Year
July 2002 -June 2003	14	-
July 2003 -June 2004	13	-4.51%
July 2004 -June 2005	16	23.79%
July 2005 -June 2006	18	10.47%
July 2006 -June 2007	20	14.86%

Source: McDonnell S and Convery F, 2008. *The Irish plastic bag levy – A review of its performance 5 years on*, Draft paper awaiting publication

The returns for 2003 suggest consumption of bags to be running at only 6% of the level before the levy. There has been an increase, yet year on year consumption is still about 91% below levels immediately before the levy introduction<sup>67</sup>. The slight increase in bag usage may be attributed to a variety of factors, such as:

- Lapse in peoples attitudes and the effects of the levy have worn off
- Increase in sales activities

However, no specific research has been undertaken to qualify this.

The revenues from the levy are ring-fenced into an environment fund and then administered by the Department of the Environment, Heritage and Local Government. The funds have been used to support waste recycling and litter initiatives. Waste recycling infrastructure, ongoing running costs and dedicated staff to enforce legislation (e.g. to tackle illegal dumping) has been introduced. It is important to note that this ‘ring fencing’ of money has not been applied for other policies possibly due to the difficult nature of overcoming Treasury rules, however the continued high level support of Ministers for the plastic bag levy ensured that the scheme was implemented. The fact that the funds went back in to supporting environmental projects and would act as motivator for consumers to change their habits was a contributing factor to the Ministers agreeing this approach.

### 3.2.2 Enforcement

Local Authorities have responsibility for monitoring and enforcing. This appears to have proved easy, which Convery et al attribute to the public ‘buying in’ to the scheme and reporting rogue retail outlets<sup>68</sup>.

<sup>67</sup> McDonnell (2003) quoted in McDonnell S and Convery F, 2008. *The Irish plastic bag levy – A review of its performance 5 years DC comment: on*, Draft paper awaiting publication

<sup>68</sup> Convery et al, 2006. The most popular tax in Europe? Lessons from the Irish plastic bag levy. *Environ Resource Econ*, 2007, 38: 1-11.

Local authorities are central to the enforcement of the levy on the ground. The following actions are undertaken by local authorities in ensuring compliance by retailers with the requirements of the levy regulations:

- visiting retail outlets and talking to retailers
- carrying out initial spot checks
- monitoring implementation
- ensuring that the levy is passed on in full to customers
- ensuring that exemptions are not being abused
- checking tills to confirm that customers are being charged the 15 cent levy for plastic bags where applicable
- taking appropriate action where it has been established that the levy has not been charged to customers – e.g. issuing letter informing retailer of obligations under the regulations and follow up where necessary
- following up on any complaints from the public

### **Enforcement Powers available to local authorities under the Waste Management Act, 1996**

Section 14 of the Waste Management Act, 1996 sets out the powers of authorised persons under the Act.

Section 14 (1) states that an “authorised person may [ ] at all reasonable times [ ] enter any premises and bring thereon such other persons (including members of the Garda Síochána) or equipment as he or she may consider necessary for the purpose”.

Section 14(3) requires that an authorised person is furnished with a certificate of appointment for the purposes of the Act and shall produce that certificate if requested.

Section 14(4) allows the authorised person to, inter alia, carry out inspections, require the provision of information and require the provision of records and documents as may be necessary for the exercise of power under the Act.

Section 14(6) makes it an offence to impede or mislead an authorised officer in the performance of his or her functions under the section.

Section 72 of the Waste Management Act, 1996 (as inserted by Section 9 of the Waste Management (Amendment Act), 2001) provides the basic power to make regulations to impose the plastic bag levy. In accordance with subsection (9) of that section, it is an offence for any person to fail to comply with a provision of those regulations.

In turn, in accordance with Section 10 of the Waste Management Act 1996, (as amended by section 22 of the Protection of the Environment Act 2003) a person guilty of an offence under the Act is liable on summary conviction to a fine not exceeding. € 3,000 or to imprisonment for up to 12 months, or both or, on conviction on indictment, to a maximum fine of €15 million, or to imprisonment for up to 10 years, or both. The Act also provides for a system of daily fines where an offence continues to be committed after conviction i.e. up to €1,000 per day for a summary conviction, or up to €130,000 for conviction on indictment.

Section 11 of the Act gives local authorities powers to take summary proceedings.

### 3.2.3 Stakeholder Engagement

Convery et al showed that interaction with stakeholders (retailers, importers and various trade groups) was extensive and continuous<sup>69</sup>. As soon as it was set down in the coalition government's programme for office, the political will from the then Environment Minister, Noel Dempsey TD, meant that debates around whether a levy should or should not be imposed turned to how such a levy would be implemented<sup>70</sup>.

The main concern of retailers was that they would inadvertently get the blame for the charge from customers. The Government therefore undertook a strong marketing and communication campaign to convey the main reasons why they were introducing a levy.

Stakeholders also expressed concern with regard to hygiene implications for certain food products. This case was accepted and exemptions passed for smaller bags used as barriers to prevent cross-contamination. For example, bags used to contain:

- fresh meat, fish or poultry (whether packaged or otherwise);
- loose fruit and vegetables, nuts, confectionery, dairy products and hot or cold cooked food that are not otherwise packaged and ice, provided they do not exceed 225mm in width (exclusive of any gussets), by 345mm in depth (inclusive of any gussets), by 450mm in length, (inclusive of any handles).

The final concern was that of shoplifting, retailers believing it may increase as a result of shoppers not having standard bags or actually removing shopping trolleys. Anecdotal evidence provided by the Department of Environment, Heritage and Local Government indicates there was an initial slight increase but not of significant detriment to retailers and this has since gone back to pre-levy rates and has fallen further<sup>71</sup>.

A survey of retailers conducted a year after the levy's introduction found that they felt the effects of the levy on them were generally positive or neutral<sup>72</sup>. Key results are shown in Table 9. The additional costs of implementation and book-keeping were seen as modest and generally less than the savings that retailers were enjoying from buying fewer lightweight plastic carrier bags. Similarly, the costs linked to shoplifting and trolley thefts were reported as being low compared to the savings made.

In Ireland, the implementation of a trouble-free system that requires limited changes is key to gaining acceptance from retailers.

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<sup>69</sup> Convery *et al*, 2006. The most popular tax in Europe? Lessons from the Irish plastic bag levy. *Environ Resource Econ*, 2007, 38: 1-11.

<sup>70</sup> London Assembly Environment Committee, *Bag to basics: Why and how free shopping bags should be removed from London's shops*, December 2007, <http://www.london.gov.uk/assembly/reports/environment/bag-to-basics.pdf>

<sup>71</sup> Scottish Executive, 2005: *Proposed Plastic Bag Levy - Extended Impact Assessment*. Volume 1: Main Report.

<sup>72</sup> Convery *et al*, 2006. The most popular tax in Europe? Lessons from the Irish plastic bag levy. *Environ Resource Econ*, 2007, 38: 1-11.

**Table 9. Survey of retailers in Ireland in the year after the levy was introduced. Source Convery et al.**

Category	(A) Super-market multiple	(B) Super-market multiple	(C) Symbol Group	(D) Symbol Group	(E) Independent	(F) Dept/ clothes	(G) Dept/ clothes
No. of outlets	80	<20	200+	400	5	4	11
Bag expenditure before levy	€2,196,000	€500,000+	€1,270,000	€900,000	€82,000	€154,000	-
Bag storage costs before levy	€12,000	-	-	-	-	-	0
Annual implementation costs for levy	€100,000	€15,000 then €8,000/year	0	-	-	€60,000	0
Shoplifting and trolley theft attributable to levy	€65,000	Rose initially then fell	-	-	Rose initially then fell	0	0
Bag use reduction post levy	95%	90-95%	99%	89%	89%	96%	-
Overall impact (-3 to +3)	0	+3	0	+2	(+2, +3)	-1	(-1, 0)
Demand increase for permanent bags	75%	Small	-	-	Very large	-	400%
Sales turnover	€1,400M	-	-	€750M	€36M	€206M	-

### 3.2.4 Other Impacts

The main motivating factor was to reduce the consumption of bags, to get consumers to value their bags and hence reduce the impact on the environment in terms of litter. It was noted above (Table 7) that there was a major reduction in littering by bags after the levy was introduced.

Litter surveys were also undertaken by the consortium of Irish Business Against Litter (IBAL) and An Taisce (the National Trust of Ireland). Their surveys followed a different monitoring methodology to the Litter Monitoring Body and concentrated on assessing the number of areas clear of plastic bags. This visible assessment from January 2002 until spring 2009 showed a continual improvement in the environment with some seasonal variations.

Not all the changes in consumer behaviour triggered by the levy in Ireland have been positive. The London Assembly notes the number of plastic swing bin liners sold in Ireland's branches of Tesco rose by 77%<sup>73</sup> and the number of paper bags used in Ireland has also increased. Both items have a negative impact on the environment and both represent an unintended consequence that has yet to be tackled by the Republic.

The 'bin liner' question is analysed further by Friends of the Earth Scotland<sup>74</sup>: The extent to which consumers increased purchases of kitchen tidy bags where they previously used plastic bags has been estimated as a 77%<sup>75</sup> increase in sales of plastic kitchen tidy bags. The 90% reduction in plastic check-out bags in Ireland equates to a reduction of one billion plastic bags and a 77% increase in kitchen tidy bags equates to an increase of 70 million of these bags. The net effect is an overall reduction in plastic bag use of 930 million bags, with apparently insignificant levels of substitution by paper bags.

Fehily et al quoted by Convery et al<sup>76</sup> analysed the impact of the levy on the plastic bag industry. They estimated that in 1999, 79% of the plastic bags consumed were imported. The remaining 21% was produced by four plastic manufacturing firms operating in the Republic. Since then, one firm has gone out of business causing the loss of 26 jobs, but it is uncertain whether this would have happened even in the absence of the levy.

### 3.3 Scotland

Following the successful implementation of the Irish levy, a bill to introduce a levy on plastic bags in Scotland was debated in 2005. The Scottish Executive undertook extensive research and produced various reports prior to tabling the Bill, which was then subject to extensive challenges by the Scottish retail sector, in particular those with links to carrier bags.

#### 3.3.1 Parliamentary consideration

The Environment and Rural Development Committee considered the Bill at Stage One. Evidence was taken in late 2005, with the Committee recommending to Parliament that both Mike Pringle MSP and the Scottish Executive be given the opportunity to clarify their respective views on what they proposed to do about some specific issues highlighted by the Committee. The Committee requested further information, as they were sympathetic to the aims of the bill, but found it difficult to judge whether the proposed levy was an appropriate way forward.

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<sup>73</sup> Bag to Basics - Why and how free shopping bags should be removed from London's shops. GLA Environment committee, December 2007.

<http://www.london.gov.uk/assembly/reports/environment/bag-to-basics.rtf>

<sup>74</sup> Friends of the Earth Scotland, *Evidence to the Environment Committee on Environmental Levy on Plastic Bags (Scotland) Bill*,

[http://www.foe-scotland.org.uk/publications/plastic\\_bag\\_bill\\_evidence.pdf](http://www.foe-scotland.org.uk/publications/plastic_bag_bill_evidence.pdf)

<sup>75</sup> Evidence to Scottish Parliament, Environment and Rural Development committee Hearings 2005

<sup>76</sup> Convery *et al*, 2006. The most popular tax in Europe? Lessons from the Irish plastic bag levy. *Environ Resource Econ*, 2007, 38: 1-11.

Further written evidence was forthcoming and further oral evidence was taken in September 2006. While remaining supportive of the stated aims of the Bill, the Committee could not agree to the proposals as stated in the Bill:

*“...the Committee urges the Executive to include ambitious measures to address plastic bag use in its waste prevention strategy. The Committee is not persuaded that the levy as currently proposed in this Bill is an effective means to achieve these objectives. The Committee, therefore, recommends that the Parliament does not agree to the general principles of the Bill”.*

The committee rejected the bill because they felt it was impossible to be certain about the likely environmental impact. They felt a number of unintended consequences could arise from the levy as proposed, e.g. the potential transition to paper bags and the suspected negative effects this would have on the environment.

Two key recommendations of the Committee to the Parliament were:

- (1) That any scheme needs to be integrated within a package of measures. The Welsh Assembly Government has already made progress with respect to this with the launch of the communications campaign and work with retailers, but this needs to be continued and driven forward in conjunction with legislation.
- (2) That the levy has most potential as part of a waste strategy.

### **3.3.2 Outline of the proposed Scottish Levy**

The Environmental Levy on Plastic Bags (Scotland) Bill aimed to reduce the number of plastic bags in circulation, to reuse them wherever possible and to recycle them after use. The policy intention behind the Bill was not to eradicate plastic bags or to promote any particular alternatives, and plastic bags would still have been available for those customers who wished to pay the levy for them. The Bill had three key objectives:

- protecting the environment both by the reduction in the number of plastic bags and by investing the money raised by the levy in local environmental projects
- assisting local authorities towards meeting their Scottish National Waste Plan targets by encouraging the reduction and reuse of plastic bags that are in circulation
- raising awareness of environmental issues such as recycling and litter

### **3.3.3 Provisions of the Bill**

#### **Levy & definition of a bag**

Sections 1 of the Bill set the proposed levy at ten pence per bag. Section 2 defined what types of bag would be included in the scheme, as below:

- (1) For the purposes of this Act, a “plastic bag” means a bag made wholly or in part of plastic.

- (2) The following bags are exempt from the levy-
- (a) small bags used to contain any unpackaged food for human or animal consumption
  - (b) bags used for packaging any goods and sealed before the goods are offered for retail sale or supply
  - (c) bags sold in the ordinary course of trade for use by the customer away from the premises at which they are sold
  - (d) bags provided to the customer for the transmission of goods to the supplier
  - (e) bags designed for re-use which are sold to the customer at a cost of at least 5 times the amount of the levy
  - (f) bags designed to be used for the disposal of waste
  - (g) bags used to contain goods sold on board a ship, aircraft, train or bus used for carrying passengers

(3) a “small bag” means one which, when measured flat with any gussets opened, is not larger than 300mm by 300mm.

- (4) The Scottish Ministers may by order—
- (a) remove any category of bag from the list of exempt bags in subsection (2)
  - (b) reduce the dimensions referred to in subsection (3); or
  - (c) alter the multiplier in subsection (2)(e) but not to less than 3

### **Registration of suppliers**

The Scottish proposal was to charge the customer for bags in order to have a positive effect on consumer behaviour. This therefore applied a level of responsibility on the retailer or ‘supplier’. It would have required any person who provides a non-exempt plastic bag to a customer in the course of business (a “supplier”) to charge the customer the levy. They were then to ensure that the amount charged was itemised on any invoice or receipt issued to the customer. Retailers could charge a fee higher than that recommended by the Executive.

The Executive planned to put a requirement on Suppliers to register with them under this Act with the local authority for any area where bags are to be provided. They suggested the following information was to be provided:

- the name and address of the business
- the name (if different from the name of the business) of the persons with a controlling interest in the business
- the address (if different from or additional to the address of the business) of any premises

They also proposed the right to amend and or extend these requirements.

## Returns and Methods of Payment

The bill proposed the following requirements:

- A supplier must submit a return to the local authority stating the number of non-exempt plastic bags provided to customers within the local authority's area in the period covered by the return
- The supplier must submit returns at such dates and intervals, not less than monthly, and in such form as may be determined by the local authority
- Where a supplier provides non-exempt plastic bags to customers at two or more premises or locations within the local authority's area, a separate return must be made for each of them unless the local authority and the supplier otherwise agree
- The supplier must pay to the local authority the amount of levy collected, payment being made at such dates and intervals, not less than monthly, and in such a way as may be determined by the local authority
- The Scottish Ministers may by regulations make further provision as to the returns to be made and the times and methods of payment

## Record keeping

- A supplier must keep full and accurate records of the number of non-exempt bags provided to customers, and the amounts of levy received, at any premises or location during each period covered by a return
- The supplier must retain the records kept under this section, together with all other documents containing particulars on which the records are based, for a period of at least 5 years from the date of the return made under section 5

They also proposed the right to amend and or extend these requirements.

## Functions of Local Authorities

The Executive proposed the following regulations for Local Authorities with respect of collecting the levy:

- Each local authority must collect from each supplier within its area the amount of levy collected by that supplier.
- The local authority must provide any person who in its opinion may be or become a supplier with information about—
  - the registration requirements under the Act
  - including requirements relating to the correction and updating of the register
  - the frequency with which, and dates when, returns and payments are to be made
  - the form of the returns, and any supporting documentation, required
  - methods of payment

They also proposed the right to amend and or extend these requirements.

## **Local Authorities ability to spend the levy**

It was proposed that a local authority must spend the money raised from the levy, after deduction of reasonable collection costs, on environmental projects meeting criteria set out in guidance issued by the Scottish Ministers.

## **Reporting Duties on Local Authorities**

The following requirements would have been mandatory:

- A local authority must publish annually a report on its performance under this Act
- The report must include an account of the amounts raised and spent under the Act in the period covered by the report
- The local authority must submit a copy of the report to the Scottish Ministers

The Local Authorities would have had to notify the Executive in writing of the persons it had nominated as being 'authorised' under the regulations of this bill.

## **Offices, penalties and suggested amounts**

### **Offence of not charging levy**

It was suggested that a supplier who fails to charge a levy in accordance with the above would be guilty of an offence.

The accused could defend themselves if able to prove that an employee or agent had taken all reasonable precautions and exercised due diligence to avoid the fine.

If found guilty of an offence the supplier would be liable on summary conviction to:

- a fine not exceeding level 3 on the standard scale; and
- a penalty of £100 for each occasion when a customer who was required to be charged the levy was not so charged<sup>77</sup>.

Anybody found to obstruct the LA Officers would also be found guilty of an offence. Similarly, they proposed to take action on corporate bodies failing to ensure the bill was applied.

### **Civil penalties**

The following Civil Penalties were proposed:

(1) A local authority may by notice impose a penalty on any person who, being liable to do so:

- (a) fails to register as required by or under section 4;
- (b) fails to submit a return as required by or under section 5;

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<sup>77</sup> We note that this level of fine is towards the top end of fines for littering in the UK. It is significantly less than other fines that can be imposed on shopkeepers, for example for selling tobacco or alcohol to children.

- (c) fails or delays to pay the amount of levy collected to the local authority as required by or under section 5;
  - (d) fails to keep records as required by or under section 6; or
  - (e) fails to comply with any requirement lawfully made by an authorised officer.
- (2) The notice must contain details about—
- (a) the reason for imposing the penalty;
  - (b) how the penalty is calculated;
  - (c) when and how payment is to be made;
  - (d) rights of appeal; and
  - (e) the steps which may be taken to recover payment.
- (3) The penalty is £100 for each infringement.
- (4) The penalty becomes due for payment to the local authority four weeks after the date of the notice.
- (5) The local authority may at any time withdraw a notice by serving a notice of withdrawal, with the effect that the penalty is no longer due.
- (6) A penalty may not be imposed on a person under subsection (1) if the person has been convicted of an offence under this Act in respect of the conduct in question.

### **Estimated amounts**

#### **In enforcing the levy, it was proposed Local Authorities could:**

- (1) A local authority may serve a notice on a person stating the estimated amount due by that person in respect of the levy for a period if, in its opinion, the person—
- (a) was liable to submit a return for that period under section 5 but has failed to do so within the time required by the local authority; or
  - (b) has submitted a return which understates the amount due.
- (2) The period covered by the notice may not include any period more than 5 years before the date of service of the notice unless the person has been convicted of fraud in relation to the levy.
- (3) The notice must contain details about—
- (a) the reason for serving the notice;
  - (b) how the estimated amount is calculated;
  - (c) when and how payment is to be made;
  - (d) rights of appeal; and
  - (e) the steps which may be taken to recover payment.
- (4) The estimated amount becomes due for payment to the local authority four weeks after the date of the notice.
- (5) The local authority may at any time withdraw a notice by serving a notice of withdrawal, with the effect that the estimated amount is no longer due.

### **Appeals against penalties and estimated amounts**

The Bill suggested that a person served with notice may appeal to the sheriff by summary application, whose decision would be final.

### **3.4 Other countries**

Information on the situation in other countries is summarised in Appendix 3. The following conclusions are drawn:

1. There is a widespread view that carrier bag usage should be controlled
2. Plastic carrier bags cause a diverse range of problems in different countries of the world. In some the main concern is littering, in others, waste minimisation, wildlife protection and flood protection.
3. The approaches taken to deal with the issue vary from country to country. In some countries bans are in place, others like the UK have settled for voluntary agreements and in others still a charging system is in place. A further option is to set a minimum thickness for bags.

## 4 Possible approaches for Wales

The British Retail Consortium and its supermarket members have reduced the number of single use bags used in Wales by 49% by spring 2009 under the Voluntary Agreement , This falls just short of the Voluntary Agreement 's reduction target for spring 2009 of 50% which, we estimate, would mean that 320 million bags would still be provided each year<sup>78</sup>. This equates to roughly 130 bags per adult in Wales, a rate of consumption of the bags that is around 5 times higher than that currently achieved in Ireland. It is natural to ask why one would consider it appropriate to reduce annual consumption by



From 'Dominant Wave Theory' © Andy Hughes MA RCA 2007

320 million bags but be content with allowing 320 million bags to still enter the system. On this basis it is appropriate to consider options for further action.

### 4.1 Options for further action

The following are considered:

- Voluntary approaches from retailers
- Voluntary approaches from shoppers
- Banning the use of specific types of bag
- Requiring bags to have lower impacts during manufacture and transport
- Charging for specific types of bag to drive consumer behaviour

### 4.2 Voluntary approaches from retailers

As already noted, a variety of voluntary approaches have already been introduced by UK retailers:

- Introduction of 'bags for life'
- Provision of carrier bag waste collections in store
- Adoption of the voluntary agreement aimed at reducing bag consumption by 50% across the major UK retailers

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<sup>78</sup> The number of bags issued in 2008 was approximately 480 million. However, this includes the first phase of the Voluntary Agreement. The figure of 330 million bags per year is based on a 50% cut (i.e. full implementation of the Voluntary Agreement) from a 2006 baseline.

- Introduction of a charge (already applied at various stores including B&Q, Marks and Spencer, Ikea) for carrier bags
- Banning plastic carrier bags (e.g. at towns such as Hay-on-Wye and Modbury)
- Promoting the use of more sustainable alternatives

All of these measures can be considered a step in the right direction. The action taken under the existing voluntary agreement provides a useful first step in encouraging shoppers to act more sustainably. Further action can, if necessary, build on this with shoppers already made aware of the problem and the options that are open to them.

The success of the schemes at, for example, Ikea in generating over 90% bag consumption is particularly striking, as it is not a shop that people tend to visit on a regular basis. One would expect, therefore, that people entering their stores would be less well prepared (e.g. by taking in their own bags) than people doing a weekly supermarket shop. These cases certainly highlight the potential of charging for further reducing bag use. They also highlight the positive attitude of the public – stores are not likely to introduce something that would deter customers.

A major problem for those who wish to adopt more sustainable alternatives to plastic bags is simply remembering to put them in the car after a shopping trip, or to take them from the car into the store. One respondent to the USEPA's Greenversations blog commented that<sup>79</sup>:

*"I have purchased about a dozen of the reusable bags at my local grocer. When I mentioned to them my trouble is remembering to bring them into the store each time they gave me a sticker. It is a removable cling sticker you put on the glass of your car window. When you exit the driver side door each time you are reminded to bring in your bags. This is a great reminder to Go Green. Thank you to Publix supermarkets for providing the reminder sticker and reusable bags at a dollar each."*

### 4.3 Voluntary approaches from shoppers

There is already some voluntary action by shoppers to reduce bag use through the purchase of reusable bags, the re-use of single use bags and the generally positive response to the retailers' voluntary agreement. This could be further enhanced by a publicity campaign via TV, radio, web and press, or through the supply of the cling stickers reminding people to take their reusable bags with them mentioned at the end of the previous section. UK government already promotes bag re-use on its website<sup>80</sup> as part of the "Get a bag habit" campaign and similarly, the Welsh Assembly Government promote re-use through their communication campaign 'remember, give your bag a second chance'.

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<sup>79</sup> Greenversations (2008) The official blog of the US Environmental Protection Agency  
<http://blog.epa.gov/blog/2008/07/21/qotw-paperplasticreusablebags/#comment-5215>

<sup>80</sup> <http://campaigns.direct.gov.uk/getabaghabit/>

However, it is questionable whether some of these approaches would bring about the long term change in behaviour that is desired amongst those with little interest in sustainability. Reinforcement of these messages through use of a charge would, as shown by experience in various UK stores, in Ireland and in other countries, have a much deeper impact.

#### **4.4 Banning the use of specific types of bag**

Some countries have simply banned the use of plastic bags. This is a logical response where plastic bags are a very clear cause of, for example, the blocking of sewerage systems as has been the case in some parts of India. The question arises of how shops and shoppers would react to the banning of a specific type of bag, a possibility being that they adopt others that have little or no benefit to the type of bag that has been banned (as we consider would be the case if plastic bags were replaced by ones made from paper).

Another option would be to ban single use carrier bags altogether. However, this could require shoppers to buy heavyweight alternatives that they do not need (already having a supply at home) at significant expense, and may act as a deterrent to passing trade or opportunistic purchases.

#### **4.5 Reducing impacts during manufacture and transport**

This approach is already factored into the UK's voluntary agreement through its objectives for:

- Increasing the collection of used bags for recycling at store
- Increasing the recycled material content of the bags
- Making bags lighter where possible and therefore using less material

A reduction in the weight of bags may have two unwanted side effects – weakening bags and hence limiting their potential for re-use, and making it easier for them to be blown away, adding to the problem of littering.

The Danish Government has also acted to reduce impacts through a tax on the weight of packaging materials.

The problem again arises of potential for action on plastic bags to promote other types that have greater impacts. As already noted, paper bags can have considerably larger environmental impacts during manufacture than their plastic counterparts. The greater weight and volume of paper bags also raises additional burdens during transport. These effects clearly need to be accounted for in the development of any new regulation. So far as other alternatives are concerned, a problem highlighted by the Carrier Bag Consortium concerns labour standards in some factories manufacturing bags made from cotton and other textiles. Their website includes an article published in the Scottish Sunday Express in 2008 entitled "*Are you carrying a sweatshop bag when you go to the supermarket: We expose the filthy conditions where our eco-bags are made using child labour*". However, there

are already mechanisms in place, such as the Fairtrade scheme, that buyers can use to be confident that goods are produced ethically and sustainably sourced.

## **4.6 Charging for specific types of bag**

The final option considered is charging for bags. The success of this approach is evident from information from Ireland and several UK retailers. Like any option, however, there is potential for unwanted side effects if the overall package behind implementation of a charge is not well constructed. Welsh Ministers can introduce a charge on single use carrier bags under section 77 of, and Schedule 6, to the Climate Change Act 2008. This also means that Welsh Ministers do not have the power to say where any money raised from a charge should go, although WAG are currently looking at legislative options to address this matter. A number of questions would need to be addressed in the development of a charging system under these arrangements, including:

- At what point would the charge be imposed? It could be charged when retailers purchase bags (as in Denmark) or when shoppers request one. The first option can be rejected for the purposes of this report as it is quite possible that retailers would absorb costs or pass them on to shoppers via increased prices for goods – either way it would not achieve the required change in behaviour.
- How would the money raised from a charge be used? Positive response to the Irish Plastax is attributed in part to the fact that the money raised is ring-fenced for environmental improvement.
- How would a charge be policed?

## **4.7 Conclusion**

If it is accepted that voluntary agreements will not bring about the desired level of change, further action will be needed. Short of banning bags altogether the most effective approach, as shown by the Irish experience and those of a number of UK retailers, would be the implementation of a charge paid by the customer each time a new bag was requested. A possible design for a charging system is discussed in the next Chapter.

## 5 Design for a charging system

From the information presented to this point, the most effective option for reducing consumption of plastic carrier bags short of banning their distribution altogether would be to introduce a charging scheme similar to that adopted in Ireland. This option is considered in more detail in this Chapter with specific reference to the situation in Wales. The following issues are considered:



From 'Dominant Wave Theory' © Andy Hughes MA RCA 2007

- Specification of the bags to which a charge would apply
- Level of charge
- Retailers required to collect the charge
- Options for policing the charge
- Options for allocating the charge

Extensive reference is made to the Irish system for two reasons:

- It has been shown to work well and achieved defined goals at a very low cost
- Consistency, for example with respect to what constitutes a chargeable bag, will assist public understanding. We do not, however, recommend complete consistency, for example, considering that a lower level of charge is appropriate than is currently applied in Ireland and that carrier bags made of paper should be included in the charging scheme.

### 5.1 Specification of chargeable bags

It is important to be clear as to which bags are included in the scheme. The Irish legislation provides the following definition<sup>81</sup>:

A 'plastic bag' is defined in section 9(1)(a) of the Waste Management (Amendment) Act 2001 as a bag "made wholly or in part of plastic". This includes any bag with a plastic laminate in either a gloss or a matt finish. Furthermore, the levy applies to bags with plastic handles.

Exclusions cover:

- Shopping bags designed for re-use which are sold for 70 cents or more,
- Bags used to contain fresh meat, fish or poultry (whether packaged or otherwise), loose fruit and vegetables, nuts, confectionary, dairy products and hot or cold cooked food that are not otherwise packaged and ice provided

<sup>81</sup> Abridged from <http://www.environ.ie/en/Environment/Waste/PlasticBags/FAQs/>

they do not exceed 225mm in width (exclusive of any gussets), by 345mm in depth (inclusive of any gussets), by 450mm in length, (inclusive of any handles). If other products are placed in these bags, then the retailer must pass on the charge to the customer.

- Plastic bags used to contain goods or products sold on board an aircraft or ship, and in an area of a port or airport to which intending passengers are denied access unless in possession of a valid ticket or boarding card, are also excluded from the levy.

Bio-degradable bags are not excluded from the charge. Bio-degradable bags are included under the Irish legislation because they contribute to litter and take some considerable time (months extending to years) to degrade in the natural world (see end of Section 2.5). Degradation in landfill may take a considerably longer time.

It is recommended here that the same definition is applied (including degradable bags), but extended to include paper bags so as not to encourage their use in preference to charged-for plastic bags. The reason for this recommendation is that available LCAs demonstrate paper bags to have significant environmental burdens.

## 5.2 Retailers required to collect the charge

The current UK voluntary agreement on reducing bag use only applies to the major retailers. Establishing the use of re-usable bags for these stores will doubtless have knock-on benefits with smaller shops also as people will become used to taking bags with them for shopping.

Several arguments can be put forward for excluding some types of shop from a charging scheme. In assessment of a possible levy for Scotland, for example, there was concern that SMEs and charity shops could be adversely affected, so analysis was carried out in relation to their inclusion and exclusion. Key results, comparing these two positions were as follows:

- Including all shops, it was forecast that the number of lightweight bags issued would fall by 90%, compared to 63% when SMEs and charity shops were exempt
- Environmental benefits were, naturally smaller when small shops were exempted, by around 30%
- Costs to consumers increased by about 40% when small shops were included, from £2.50 to £3.47 per person per year
- Administration costs increased more significantly, doubling when small shops were included, though this assumed a much higher level of enforcement, etc. would be needed than appears to be the case in Ireland.

However, such exclusions do not apply under the Irish legislation, and as such there is no evidence of them causing problems. On this basis we recommend that the charge be applied to all retailers, to maximise the reduction in the number of bags issued and to reinforce the change in behaviour.

### 5.3 Level of charge

The Irish Department of the Environment, Heritage and Local Government commissioned a study in 1999 to assess attitudes to the environment. As part of this a survey of maximum willingness to pay (WTP) for a plastic bag was undertaken<sup>82</sup>. Results are given in Table 10. It is not clear from the original report how or whether questions linked WTP for bags with environmental improvement.

**Table 10. Maximum WTP for a plastic bag from a sample of 1,003 Irish adults aged 18 or over. Source: Drury Research, 2000<sup>82</sup>.**

Amount <sup>a</sup>	% willing to pay
Nothing	40
€0.013 to 0.025	27
€0.038 to 0.063	25
More than €0.076	8

**Note:** a) amounts in the original survey were in Irish pennies, here converted to Euro.

The Irish government set the Plastax initially at €0.15, double the highest WTP specifically considered in the study. This was necessary to be confident that the tax would change behaviour. Five years after its introduction in 2002 the levy was increased to €0.22 as some increase in bag use had started to materialise.

UK retailers that charge for bags have settled for 5p/bag. This has achieved a reduction in bag numbers of between 80 and 95%, a striking success rate particularly considering the nature of some of these stores and the fact that charging is not more widespread at the moment. Combining this with the Irish experience suggests that an initial charge be set between 5 and 15 pence. To emphasise the deterrent intended by the charge it should perhaps be set in the 10 to 15p bracket. Following the current Irish system a charge in the region of 20p/bag may seem appropriate. However, this reduces the leeway at a later date for increasing the charge to ensure the continued success of the scheme.

### 5.4 Policing the charge

Local authorities play an important role in the Irish system in providing the necessary monitoring and checks to ensure that the legislation is being properly implemented. That said, public support has almost eliminated the need for time-consuming policing of the application of the charge by officials from local authorities, with members of the public taking responsibility to report retailers who are not charging for bags to the responsible authorities. Notification that authorities are aware of non-compliance has typically been sufficient for retailers to comply with the law.

<sup>82</sup> Drury research (2000) Attitudes and Actions: A national survey on the environment  
<http://www.environ.ie/en/Publications/Environment/Waste/LitterPollution/FileDownload,1497,en.pdf>

## 5.5 Allocation options

The Irish legislation places a great deal of emphasis on using money raised for environmental protection. The scheme would seem most likely to gain and maintain public support, which is clearly vital to its success, if the money raised were seen to go to worthy causes<sup>83</sup>.

It is therefore suggested that a similar use of funds be applied in Wales, i.e. it would be sensible to encourage funds to be applied in supporting environment / sustainability projects.

## 5.6 Summary of recommendations

From the above discussion we draw the following recommendations for implementation of a bag charge:

- Undertake an extensive country-wide awareness campaign, using a variety of communication channels to ensure the ‘opportunities to see’ are extensive. This should be aimed at both raising awareness and to ensure the public are aware that the money raised is going to environmental projects
- Undertake early consultation with stakeholders, particularly retailers. The Irish example should be followed, in that ‘this is going to happen but now is your opportunity to shape how the scheme is managed’
- Additional support should be provided to assist retailers and in particular their staff, to prevent some of the derogatory comments reported in by Irish retail assistants. Training or ‘staff resource packs’ should be issued to assist them in responding to customer queries or complaints.
- Regional support networks should be established for both customers and retailers
- Bag specifications should be the same as those defined in the Irish legislation, though extended to include bags made from paper
- Initial charge to be set around 10 to 15 pence per bag
- The charge is to be passed onto customers, and shown on till receipts
- Enforcement to rest with local authorities, but consideration to be given to how to make this as efficient as possible to ensure that as little revenue as possible is spent on policing and administration of the charge.
- Encouragement for money raised to be used for projects focussed on sustainability in Wales, reflecting social, environmental and economic need.

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<sup>83</sup> See also <http://www.ipsos-mori.com/content/polls-08/consumers-oppose-nanny-state-on-plastic-bags.ashx>

## 6 Effects of a charge on carrier bags in Wales

### 6.1 Data on bag usage

To understand plastic bag consumption in Wales various parties were contacted including the British Retail Consortium (BRC), the Carrier Bag Consortium (CBC) and WRAP. Neither consortium responded directly to requests for information; though the BRC did refer the enquiry to the Retail Team at the Waste Resources Action Programme (WRAP).

The Retail Project Manager responded, though specific data is not available for Wales. WRAP provided estimated figures based on the population of Wales and this methodology has been used for other reports.

Unfortunately, specific data is also not yet available on different types of bags consumed in Wales; WRAP is seeking to obtain this information via the 2009 Voluntary Agreement. In addition, WRAP is seeking to verify the number of carrier bags used in Wales by procuring retail sales data, which will allow them to estimate national carrier bag usage based on retail sales. Unfortunately due to time constraints these data cannot inform this report.

Under the 2008 Voluntary Carrier Bag Commitment, data shows that the retailers committed to this agreement distributed 9.9 billion carrier bags in 2008 on a UK wide basis. This figure includes bags for life and reusable bags, as well as traditional 'vest-style' bags. The number of bags issued in Wales each year can be approximated by multiplying this total for the UK by the fraction of the UK population that lives in Wales (4.9%), giving an estimate of 480 million.

In 2006, approximately 660 million bags<sup>84</sup> were used in Wales. The estimated fall of 27% to 480 million indicates that the voluntary agreement and customer attitudes are having a positive effect, albeit not yet as dramatic as the Irish Plastax which recorded a fall in bags issued of more than 90%, though it is anticipated that further reductions will soon be reported.

This data does not accurately reflect the total consumptions of single use bags in Wales during 2008. The number is likely to be considerably higher, as the source is only from major retailers signed up to the voluntary agreement thus neglecting usage from other retailers using plastic bags or other types of SUB. The actual numbers from these alternative retailers or consumption of other types of bags, however, bearing in mind the large number of SMEs in Wales, it is likely that considerable numbers of paper and 'thin vest type' bags are distributed annually.

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<sup>84</sup> Personal communication with Nikki Sully, Project Manager Retail Team, WRAP

## 6.2 Effects on number of bags used

Effects of a charge on bag use have been extrapolated from the earlier report for the Scottish Executive by AEAT assuming replication of the 90% reduction rate observed in Ireland. Results are shown in Table 11 for a number of scenarios:

- Scenario 0: Baseline, business as usual, prior to the voluntary agreement with major retailers
- Scenario VA: 50% reduction in plastic carrier bag use through the Voluntary Agreement with the major retailers
- Scenario 1a: Charge for all plastic carrier bags used by all businesses
- Scenario 1b: As 1A but excluding SMEs and charity shops
- Scenario 2a: Charge for all plastic and paper carrier bags used by all businesses
- Scenario 2b: As 2A but excluding SMEs and charity shops

**Table 11. Estimated number of bags of different types used annually in Wales under various scenarios for a charge system**

	Number of bags used annually (millions)					
	0	VA	1a	1b	2a	2b
Plastic carrier bag (HDPE, lightweight)	660	330	66	244	66	244
Plastic reusable carrier bag (LDPE, heavyweight)	7	14	20	16	25	20
Paper carrier bag	33	115	181	137	3	12
<b>Total carrier bags used</b>	700	459	267	398	95	276
Bin liners	100	143	177	154	177	154

The baseline adopted here is the use of 660 million plastic bags per year rather than the 490 million estimated for 2008 to show the position before the voluntary agreement with major retailers. This seems more appropriate as the starting point for quantifying a 90% reduction in lightweight plastic bags use resulting from the introduction of bag charging.

The estimated increase in paper bag use is probably pessimistic. Few retailers under the voluntary agreement appear to be offering free paper bags as an alternative, most opting to supply paid-for heavyweight plastic bags.

## 6.3 Effects on litter and the wider environment

Following from the Irish experience it is to be expected that the decrease in plastic bags as a litter nuisance would roughly follow the decrease in the number of bags

issued. Information presented by the Irish government showed the presence of bags to fall from 5% of litter to around 0.3%<sup>85</sup>. There would inevitably be some lag reflecting the persistence of bags in the environment, though it is anticipated that, as in Ireland, the presence of bags as litter would fall rapidly and decreases would certainly be noticeable within a year.

## 6.4 Life Cycle Assessment

The results of the AEAT study for the Scottish Government, based on the Carrefour analysis, have been extrapolated to the Welsh situation, drawing particularly on the estimates of bag use from Table 11. Outputs were shown above, in Section 2.7, where it was concluded that there would be benefits in going beyond the voluntary agreement, particularly if a charge were applied to both paper and plastic bags and to all retailers.

## 6.5 Impacts on Consumers and Business

The proposed charge on single use bags will affect the economy as well as the environment. Our conclusions on the business and industry effects of the proposed levy are based on:

- Contact with industry
- Examination of raw data
- Evidence from previous studies on similar measures worldwide

### 6.5.1 SMEs in Wales

Table 12 below shows that there were 188,810 SMEs in Wales in 2006, accounting for 99% of all enterprises<sup>86</sup>. SMEs accounted for 59% of all employment, and 45% of turnover in Wales.

**Table 12. Overall business structure in Wales (2006)**

	<b>Number of enterprises</b>	<b>Employees</b>	<b>Turnover (£M)</b>
Total	190,420	986,355	79,422
SMEs	188,810	581,255	35,812
% SMEs	99%	59%	45%

The largest number of SMEs (43,980 enterprises or 23%), were in the distribution, hotels, restaurants and transport sectors. This was followed by the construction sector (39,260 enterprises or 21%), and the financial and business services sector (37,435 enterprises or 20%). The sector that would be most widely affected by further action on SUBs is clearly the retail sector, for which there are just over

<sup>85</sup> <http://www.environ.ie/en/Environment/Waste/PlasticBags/>

<sup>86</sup> <http://www.statswales.wales.gov.uk/TableViewer/tableView.aspx?ReportId=1688>

14,000 units in Wales according to ONS<sup>87</sup> (noting that this figure does not only cover SMEs, but also see footnote).

Effects would be likely for three kinds of SME:

- Those manufacturing shopping carriers
- Those distributing bags
- Small shop-keepers

The effects on those manufacturing shopping carrier bags are likely to be mixed. Those manufacturing lightweight plastic or paper bags (assuming a charge were to apply to both) would clearly be likely to lose out. However, those manufacturing long-life alternatives (bags, crates, etc.) would gain. Further information would be required on the sector to make a judgement as to how the two would balance.

Bag distributors would also be likely to see a drop in trade. However, this seems likely to be insignificant given the relatively small volumes of plastic SUBs being moved around relative to other goods.

The effect on small shopkeepers is likely to be mixed. On the one hand they would save money through reduced bag purchase and storage costs, on the other they would need to spend time making returns showing bags sold and may experience some increase in shoplifting. Evidence on these issues is mixed. A report from the Irish Grocers Association and Irish Trade Journal “Shelf Life” claimed losses of €34million in the first year of operation (as quoted by CBC<sup>88</sup>). However, more recently, the paper by Convery et al implies that shoplifting following the introduction of the tax in Ireland was a minor issue and more than balanced by the reduced costs of bag purchase and storage – detailed information on costs, etc. from the Convery paper was provided above in Table 9<sup>89</sup>.

## 6.5.2 Impact on the SUB industry in Wales

Once again external parties such as the CBC were contacted to identify the number of bag manufacturers in Wales, however no data were supplied. Hence a number of online searches were undertaken of business directories, including Yell, Kelly, and Applegate.

The geographical distribution of these businesses shown in Table 13 indicates a wide distribution in Wales. Both importers and/or distributors of carrier bags, as well as manufacturers, will be affected by a ban or levy. In the Republic of Ireland, one manufacturer closed after the Plastax was introduced.

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<sup>87</sup> Office for National Statistics, 2008, UK Business: Activity, Size and Location – 2008. The study for the Scottish Executive found just over twice the number of properties classified as shops according to the all-Scotland Valuation Roll from April 2005 as identified by the ONS 2008 data for “VAT or PAYE based enterprises”. This suggests that the figure of 14,000 retail units in Wales may be significantly lower than is really the case.

<sup>88</sup> <http://www.carrierbagtax.com/downloads/sound%20bites%20update%20Jan%202008.doc>

<sup>89</sup> Convery *et al*, 2006. The most popular tax in Europe? Lessons from the Irish plastic bag levy. *Environ Resource Econ*, 2007, 38: 1-11.

**Table 13. Plastics and plastic bag manufacturers, importers and distributors in Wales by postcode**

Postcode district	Total Plastic & Packaging associated	Bags (mainly plastic )
LL (Llandudno)	43	3
SY (Shrewsbury)	30	3
LD (Llandrindod Wells)	3	0
SA (Swansea)	29	6
CF (Cardiff)	67	6
NP (Newport)	52	5
<b>Wales</b>	<b>244</b>	<b>23</b>

Of the 23 companies identified that are associated with bags, nine offer alternatives to plastic bags, including paper, cornstarch, biodegradable, cotton, woven and bags for life. Eight provide wider packaging services, e.g. jiffy bags, tape, cardboard boxes. The size of these companies varies, from 1 to 100 employees.

Smaller enterprises are considered more likely to suffer greater impacts from a charge as it is anticipated that they have less capacity to adapt. Discussion with industry suggests most of the bin liners produced in the UK are manufactured in England. It is considered unlikely that production could be switched to Wales to compensate for some of the lost bag production. There are, however, Welsh businesses dealing with bags for life and re-usable crates. As already noted, these would stand to benefit from increased trade following the introduction of a charging scheme. There are thus likely to be winners and losers, though it is not possible to assess the balance between the two without further information from the industry.

Considering the situation in Scotland, the earlier AEAT study for the Scottish Executive provided the following information:

*Industry estimates that anywhere from 300 to 700 direct jobs could be lost in Scotland alone as a result of a levy being imposed on lightweight plastic carrier bags [CBC]. This estimate is made up of:*

- *Some 400 jobs at BPI's Greenock plant.*
- *Some 100 or so jobs at Simpac's plant in Glasgow.*
- *Jobs at other smaller manufacturers and importers that would either have to:*
  - *close;*
  - *move operations to elsewhere in the UK (as in Simpac's case to Hull) or abroad;*
  - *diversify where possible into other plastic film products.*

*Another important company that would be affected by a levy is Smith Anderson in Fife<sup>90</sup>, which manufactures large volumes of paper bags from both virgin and recycled sources. There would also be knock-on effects elsewhere in an industry that employs around 2,500 people in the manufacture, import and distribution of carrier bags and around 12,000 in the wider plastic films sector in the UK.*

This analysis did not account for the additional jobs created through the manufacture, import and distribution of the alternatives to lightweight plastic bags that would be required. It also does not account for the fact that money not spent on lightweight plastic bags can be spent on other things that will also generate employment. This is of course of little comfort to those who may be made redundant as a result of a reduced demand for SUBs as jobs may be created elsewhere. However, assistance could be provided by extending the possibilities for allocation of revenues from a charge on bags from environment alone (as in Ireland) to sustainability more generally which includes social and economic concerns as well as environmental ones.

### **6.5.3 Impact on Consumers**

It is considered unlikely that there would be any significant adverse effect on consumers. Whilst it is true that some will pay more through the need to buy bags at least occasionally, others could benefit through retailers passing on cost savings through not having to buy or store large quantities of bags. The use of revenues for good causes in Wales would also benefit consumers.

It may be argued that charging for bags could have a negative effect on trade, by putting people off impulse purchases when they do not have a bag. This seems unlikely given the levels likely to be proposed for the charge per bag. Put another way, if someone would not purchase something because a bag would increase the price by 10 or 15p, they probably do not really want the item anyway.

Concerns have also been raised about effects on low income groups. However, provided that there is a supply of low-cost or free long-life alternatives this does not seem to be a problem. The AEAT study for the Scottish Executive estimated costs per consumer of between £3 and £11 per year, adjusted for inflation<sup>91</sup>. If applied to Wales, even with varying assumptions, it is assumed that the costs will be similar and will remain quite small. This could not be calculated exactly for Wales due to the lack of data obtainable in regard to current bag use etc.

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<sup>90</sup> [www.smithanderson.com](http://www.smithanderson.com)

<sup>91</sup> Equation used to calculate these figures can be found in Proposed Plastic Bag Levy –Extended Impact Assessment Report, Volume I, Final, Scottish Executive 2005, p33, and is a combination of: bag levy; hidden cost of bag; heavy duty bag purchase; additional bin liners; plus additional VAT.

## **6.6 Administration costs**

### **6.6.1 A system for Wales**

It is assumed that costs could be incurred to the public sector for the following:

- Developing the regulations and implementation mechanism and a central administration team
- Education for retailers and members of the public through a publicity campaign
- Setting up systems
- Enforcement by local authorities
- Legal assistance

To achieve annual running costs at a similar level as reported for Ireland requires a small central administration team and a limited requirement for enforcement (limited to the extent that it can be covered under existing activities) and little or no need for legal action. The Irish experience, the apparent popularity of further action on SUBs and UK experience in relation to the ban on smoking in public places both indicate that it is not unreasonable to expect that there would be a high level of compliance.

Under current powers available to Welsh Ministers, the option would be to permit retailers to keep the charge and use it as they see fit. Some would no doubt opt to retain the charge whilst others may donate the money to good causes (as a number of retailers already do). This would clearly be the cheapest system, but may not be popular due to the possible perception of retailers benefiting at the expense of their customers.

Further work is required to develop a detailed understanding of administration and other costs.

## 7 Conclusions and Recommendations

### 7.1 Arguments supporting further action

#### **Changing attitudes to resource use.**

Sustainable development requires a major change in personal behaviour. It is for example estimated that greenhouse gas emissions by countries like Wales will need to be reduced by 80% by 2050 if the global climate is to be stabilised. Some of this improvement can be achieved through improved energy efficiency in industry and transport and by improvements to the building stock. However, changes in behaviour are also needed to bring about the necessary level of change and to do so at least cost. The single use carrier bag is a potent symbol of what is frequently termed ‘the throwaway society’ and one where the public have shown a strong willingness to adapt to alternatives. Continued and extensive use of these bags seems to run counter to Wales’ commitment to promote sustainable development<sup>92</sup>.



From 'Dominant Wave Theory' © Andy Hughes MA RCA 2007

The introduction of the Irish Plastax levy has been so popular that Convery et al<sup>93</sup> remark that “*it would be politically damaging to remove it*”. This suggests that action to further reduce the use of plastic bags in Wales would be a good candidate for measures to change attitudes to more sustainable lifestyles. As such, the benefits of introducing a charge could, if combined with effort to disseminate other environmental information, go well beyond the immediate impacts of carrier bag use.

**Improving waste management.** The waste hierarchy of ‘reduce, re-use, recycle’ is frequently referred to in the literature in relation to plastic bags. There is, however, a tendency to present all three options as equal, when of course they are not, with reduction preferred to reuse, and both preferred to recycling. It can be argued that a strict application of the hierarchy is not always justified, that it may vary from product to product. However, the literature review carried out for this report has found no research to say that it does not apply to disposable carrier bags.

The voluntary agreement under which major UK retailers have committed to a 50% reduction in bag provision is clearly well aligned with the reduction of waste.

<sup>92</sup>

<http://new.wales.gov.uk/topics/sustainabledevelopment/?jsessionid=rjynJvQSrnCLqVjF86lXxpf4sSbrsKpGGfVp6YrOFTm9F2TK5Y1!1116311810?lang=en&ts=1>

<sup>93</sup> Convery, F., McDonnell, S. and Ferreira, S. (2007) The most popular tax in Europe? Lessons from the Irish plastic bags levy. *Environmental and Resource Economics*, **38**, 1-11.

However, it is logical to ask why one should stop at 50% when action elsewhere (e.g. the Irish government's levy and some of the charging initiatives brought in independently by some UK retailers) has reduced consumption by 90%.

**Long-life bags offer environmental benefits over single use bags.** The Carrier Bag Consortium in the UK and the Plastic Bag Alliance in the USA have used the result of LCA analysis to show that conventional lightweight plastic bags made from polyethylene are better against a number of environmental impacts than paper bags or degradable bags. On this basis they state that further action on plastic bag consumption is not warranted as it would lead to the wider use of alternatives that have greater environmental impact. However, this comparison between different types of single-use bag does not reflect the range of alternatives which also includes boxes, crates, baskets, and various types of long-life bag. The latter have been found to perform well in other analysis, such as that carried out by AEAT for the Scottish Government.

**Reducing the visual blight of littering.** There are differing views on the contribution of plastic bags to littering. Analysis of litter generally reports that plastic bags contribute less than 1%, with the remainder being cigarette butts, fast food packaging, etc.

The Welsh Assembly Government requested Keep Wales Tidy to analyse a litter segmentation study they had commissioned. Their analysis indicated that plastic bags comprise 2.7% of litter in Wales by weight<sup>94</sup> (this would be higher taking in to account other single use bags). In addition they estimated the cost of dealing with plastic bag litter costs local authorities in Wales £1 million pounds annually.

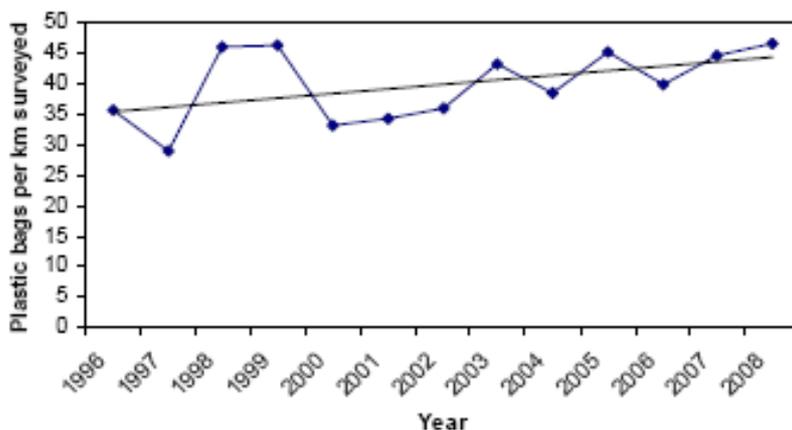
Keep Wales Tidy's identifies further problems for single use bags as a result of Wales' topography and weather systems:

*“As a result of topography and high rainfall, Wales is blessed with a particularly high density of rivers. However, this means that Wales has a disproportionately high amount of tree-hanging plastic bag litter compared to other countries in the UK. Many of these rivers, particularly in the south Wales valleys, run directly through the centre of densely populated communities, and plastic bag litter will therefore be a highly visible component of litter. These valleys communities are also largely the poorest communities in Wales: in a very real sense, plastic bag litter has an inordinately visually polluting effect on Wales' poorest communities”.*

There appears also to be an upward trend in the presence of bags around the UK coastline (Figure 8). The effect of the voluntary agreement on reducing the number of bags provided at major retailers is as yet unknown.

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<sup>94</sup> Keep Wales Tidy, Papur datgan sbwriel bagiau plastig/Plastic bag litter position paper, July 2006, [http://www.keepwalestidy.org/welsh/images/plasticbags\(w\).pdf](http://www.keepwalestidy.org/welsh/images/plasticbags(w).pdf)



**Figure 8. Trend in plastic bags as litter around the UK coastline. Source: Marine Conservation Society:**

<http://www.mcsuk.org/mcs2/downloads/beachwatch/Methods&Results20BW08.pdf>

In addition to their presence around rivers and coasts, bags are easily carried on the wind and may be carried by it over considerable distances, becoming snared in trees and other inaccessible places where they may remain for a considerable time. Their contribution to litter in otherwise litter-free environments may thus be disproportionate to their overall contribution to the mass of litter collected in surveys.

**Reducing the impacts of plastic in the environment.** The Marine Conservation Society in the UK identifies plastic as a significant problem for marine life including whales, turtles, birds and filter feeders<sup>95</sup>. The role of plastic bags may be small relative to some other sources of plastic (e.g. discarded fishing net and plastic bottles) but it does nonetheless contribute to the problem.

**Degradable plastic bags are not a solution to many of the problems of plastic bag use.** Some retailers have adopted degradable plastic bags to avoid problems linked to the extreme persistence of plastics. However, adoption of such bags can have unforeseen impacts. First, conditions within landfill may not be conducive to degradation. Even newspaper has been found to persist in landfill for decades. Second, degradable bags in the environment will eventually fragment, making it more difficult to collect the litter, with the result that the problem may persist longer than if a non-degradable bag were used. Animals will also find it easier to consume these fragments than intact bags.

**Alternatives are readily available**, including plastic ‘bags for life’, paper bags, cardboard and plastic boxes and bags made from canvas and other textiles. As an added benefit, prominent designers have created bags for sale by charities (such as the Lulu Guinness shopping bag sold to raise funds for the Royal Marsden Cancer Hospital).

<sup>95</sup> Long Term Impacts of Plastic Bags in the Marine Environment, Marine Conservation Society, Ross-on-Wye, UK.  
[http://www.mcsuk.org/downloads/policy/coastal\\_polln/MCS\\_Long\\_Term\\_Impacts\\_of\\_Plastic\\_Bags\\_In\\_the\\_Marine\\_Environment\\_\(Aug\\_2004\).doc](http://www.mcsuk.org/downloads/policy/coastal_polln/MCS_Long_Term_Impacts_of_Plastic_Bags_In_the_Marine_Environment_(Aug_2004).doc)

## 7.2 Arguments against further action

A concerted campaign against a charge on plastic carrier bags has been mounted by the Carrier Bag Consortium who describe themselves as “*a group of major UK carrier bag suppliers who have uniquely joined together to fight the possibility of a carrier bag tax being imposed in the UK*”. The group’s website provides a comprehensive listing of objections to the adoption of a tax or other levy on the use of single use bags<sup>96</sup>. The principal arguments of this group are that a carrier bag tax would be of no benefit to the environment and would be detrimental to businesses.

**Plastic bags generate only a limited environmental burden** in terms of contribution to climate change, total waste generation, etc. Statistics show that the total amount of household waste accounted for by single use bags is small, less than 1%. On this basis it can be argued that there are more important issues to be addressed by environmental regulation. On the other hand, this can be said to ignore other impacts of plastic bag use such as littering and the symbolic nature of disposable bags for the throwaway society.

**The potential for actions taken to have negative consequences.** As illustration, life cycle analysis (see section 2.5) suggests that the use of paper bags may be worse for the environment than the use of plastic. Hence, action that displaces bags made of plastic in favour of those made of paper may be counter-productive. An alternative way of addressing this problem would be to charge for both plastic and paper bags, as is done in Denmark. If this were done the consumption of both plastic and paper bags could fall.

**Re-usability of bags.** Bags can of course be used more than once, either for further shopping trips or for other purposes such as containing household waste provided that they have not split at first use or become unusable for other reasons. Those bags that are used to contain waste will displace some manufacture of bin bags.

**Recyclability.** Bags can be recycled to generate further plastic materials, e.g. recycling bins and street furniture. Whilst successful recycling schemes are in place in some areas there are some notable barriers to recycling. Prime amongst these is probably the potential for contamination of recyclate with food wastes, glues, or bags made from other plastics such as biodegradable materials. The American chemistry website in promoting re-use and recycling, lists a number of contamination issues that people should be aware of when putting bags into a recycling system<sup>97</sup>. It is questionable whether most people would be conscious of these factors and hence whether the material collected is of the required quality. Shonfield (2008) reports that recycling to a high quality (replacing virgin polymer) brings the highest benefits for plastics generally, but that when contamination rates rise, other waste management

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<sup>96</sup> <http://www.carrierbagtax.com/>

<sup>97</sup> [http://www.americanchemistry.com/s\\_plastics/doc.asp?SID=6&DID=7940&CID=&VID=178&RTID=0&CIDQS=&Taxonomy=&specialSearch=](http://www.americanchemistry.com/s_plastics/doc.asp?SID=6&DID=7940&CID=&VID=178&RTID=0&CIDQS=&Taxonomy=&specialSearch=)

options may be preferable<sup>98</sup>. Specific details of this conclusion in relation to polyethylene are not provided.

So far as the provision of in-store recycling collection points is concerned (now legislated for in large stores in California) there is a major problem that also affects the re-use of bags – the simple requirement for people to remember to bring their bags back to the store. Even some of the most motivated individuals find this problematic<sup>99</sup>.

**The high calorific value of bags increases the energy content of household wastes**, which can be beneficial when sending bags for incineration, though there are currently limited facilities for this in Wales.

**Alternatives such as canvas bags may be less hygienic.** We have not identified studies that demonstrate a clear health risk from these alternatives. The Carrier Bag Consortium provides some anecdotal evidence on its website relating to the conditions in textile-bag factories in Asia, but no information is given as to how this translates to impacts on UK consumers. There is also the potential for bags to become contaminated by the foodstuffs that they are used to carry over time. Again, there is no real evidence that this causes problems. Textile bags can of course be put through the washing machine.

**Labour conditions.** The manufacture of canvas or other textile bags overseas may involve child labour or other adverse labour conditions. However, whilst conditions in some factories may not be acceptable, conditions in others no doubt are. For large orders buyers can exert significant pressure for improvement of working conditions among suppliers – no UK supermarket would wish to have their name associated with child labour. Also, whilst there are from time to time exceptions, concern for the welfare of people in developing countries is not well served by setting barriers to the purchase of their products.

**Job losses at UK bag manufacturers.** It is clearly reasonable to point out that there would be job losses at existing manufacturers of lightweight plastic bags. However, it is also reasonable to state that manufacturers of other containers for shopping (reusable bags, crates, etc.) would need additional staff to cope with increased demand. Where high quality bags are manufactured, it is possible that a significant number of jobs could be created.

**Shoplifting is made easier when large numbers of people carry their own bags.** Evidence on this point from the Irish experience is mixed, with some reports claiming major losses and others negligible losses that are more than balanced by the reduction in the costs of buying and storing bags.

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<sup>98</sup> Shonfield, P. 2008. LCA of Management Options for Mixed Waste Plastics. Report for WRAP. [http://www.wrap.org.uk/downloads/LCA\\_of\\_Management\\_Options\\_for\\_Mixed\\_Waste\\_Plastics.10972bc2.5497.pdf](http://www.wrap.org.uk/downloads/LCA_of_Management_Options_for_Mixed_Waste_Plastics.10972bc2.5497.pdf)

<sup>99</sup> See responses at <http://blog.epa.gov/blog/2008/07/21/qotw-paperplasticreusablebags/>

### 7.3 Balancing the arguments for and against further action on plastic bags

The preceding sections show that a large number of arguments have been made to promote and oppose further action on SUBs, and plastic bags in particular.

We note a lack of balance in the website run by the main group in the UK that opposes further intervention to reduce lightweight bag use, the Carrier Bag Consortium. To illustrate, under the headline ‘Top US Green Group Says Bag Taxes Don’t Work’ a link is provided to a report by ULS from June 2007<sup>100</sup>. One of the conclusions in the ULS report is that “*Legislation designed to reduce environmental impacts and litter by outlawing grocery bags based on the material from which they are produced will not deliver the intended results.*” This appears to support the principal message of CBC. However, the statement needs to be seen against the remit of the ULS report which was focused specifically on an ordinance of March 2007 by the Board of Supervisors of the City of San Francisco effectively banning the use of plastic grocery bags at supermarkets and large pharmacies with the objective of stopping environmental degradation and reducing litter. The legislation favoured the adoption of reusable bags and bags made from paper or compostable plastic. ULS highlight problems associated with paper and compostable bags in coming to the above conclusion. However, they add a further conclusion as follows:

*“The conclusion to be drawn about how to reduce the environmental impacts and litter associated with grocery bags is very much in line with both longstanding EPA guidelines and the ULS Report philosophy: the issue is not paper or plastic, but rather finding ways to reduce, reuse, and recycle both of them – in that order. By putting more items in fewer bags, avoiding double bagging, switching to durable tote bags, and reusing and recycling disposable bags, significant reductions in material and non-renewable energy consumption, pollution, solid waste, greenhouse gas emissions, and litter, will occur.”*

Another example concerns a headline on the CBC website that reads “*latest evidence from Norway slams plastic bag tax myths*”. This is problematic as the context for the Norwegian work<sup>101</sup> is a system where bags are charged for routinely at around €0.10/bag and long-life LDPE bags are the norm, rather than SUBs.

We find that several of the arguments made against imposing a charge of some kind are based on assumptions of the precise form of the legislation. It is not, however, inevitable that these assumptions would be correct. For example the assumption that a reduction in plastic bag use would increase consumption of paper bags that appear to have a worse environmental performance presumes that legislation would focus purely on plastic SUBs. This objection is simply overcome by applying a charge to both types of bag.

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<sup>100</sup> <http://use-less-stuff.com/Paper-and-Plastic-Grocery-Bag-LCA-Summary.pdf>

<sup>101</sup> [http://www.carrierbagtax.com/downloads/Carrier\\_bags\\_Norwegian\\_report\\_summary.doc](http://www.carrierbagtax.com/downloads/Carrier_bags_Norwegian_report_summary.doc)

We also find the views on recyclability of lightweight plastic bags problematic, for several reasons, not least the position of recycling in the waste hierarchy relative to reduction in demand which avoids the generation of waste altogether.

On the other hand, there appear a number of substantive reasons for taking further action, particularly:

- The need to change attitudes to sustainable lifestyles, especially promotion of reduction in waste generation
- The apparent willingness of the general public for further action on plastic bags
- The role of plastic bags as litter in Wales
- The environmental performance of long-life alternatives to SUBs.

## **Appendices**

Appendix 1 Life cycle analysis of carrier bags

Appendix 2 National policies on plastic bags

Appendix 3 List of UK towns taking action on plastic bags

## Appendix 1

### Supplementary information on Life Cycle

#### Analysis of Carrier Bags

This appendix provides further information on the Carrefour study and its application by AEAT in analysis for the Scottish Executive, as this latter work is the most relevant of the studies available to date to the Welsh situation. A number of North American studies were identified but rejected for use in that work because:

- Carrier bag consumption patterns in the USA and Canada may differ considerably from those in Europe due to differences in shopping behaviour (e.g. greater use of car transport).
- The studies lack a range of environmental indicators, focusing primarily on energy consumption.
- The studies are over 14 years old and lack the sophistication in modelling and data processing that has been developed recently in LCA techniques.
- Since the publication of the North American studies, there have been major improvements in manufacturing and action by industry to reduce pollutant emissions.

The Australian study (Nolan-ITU 2002) was not used because:

- It lacked a range of environmental indicators, focusing primarily on material consumption, energy consumption and litter.
- It lacked the data required for assessment of environmental impacts based on the scenarios outlined in this report.

The Carrefour study (Ecobilan 2004) was favoured because:

- It is European and hence likely to be more relevant to Wales than Australian or US studies.
- It considers a suitable variety of bag options.
- It considers a broad range of environmental indicators, though there are some significant gaps in the data covered and indicators used.
- It provides sufficient information for each option and lifecycle stage to enable a summary assessment to be put together for the sensitivity analysis in this report.
- It is based on carrier bag consumption data which we considered reflected consumption patterns in Scotland better than the other studies.

However, its use in Scotland was subject to a number of caveats:

- The source of bags is specific to the Carrefour chain and is thus not the same as it would be in Scotland.

- The electricity mix assumed is different to that of Scotland, particularly for cases such as reusable bags, where production is confined to France. In these cases, the prime source of electricity assumed in the Carrefour LCA is nuclear.
- The main sources of data appear to be from analysis carried out during the 1990s. Given the pace of change in environmental regulation since then, it is possible that there has been a substantial reduction in some types of emissions and that there will be further action in the next few years. For example, the release of volatile organic compounds (VOCs) has fallen as a result of the Solvents Directive and emissions from fossil-based power stations are falling as a result of the revision to the Large Combustion Plant Directive. Major changes in vehicle technologies will have very little impact because the Carrefour study shows that transport of bags has a low level of impact compared with the manufacture of bags. With respect to water pollution, there are also changes (e.g. as a result of the Urban Waste Water Treatment Directive), which may be expected to influence results for eutrophication significantly.
- There are differences in the typical size of bag assumed for Carrefour and that used in Scotland. Results can be adjusted to account for this quite easily, however, as they will scale reasonably directly against the weight of the bags.
- The rationale for some aspects of the Carrefour analysis is unclear and possibly questionable. For example, it appears that greenhouse gas emissions of bags at the end-of-life are treated similarly irrespective of the nature of the raw material inputs. Emissions of carbon dioxide (CO<sub>2</sub>) from the decomposition of paper, for example, can be considered part of the carbon cycle and hence do not add to the total CO<sub>2</sub> load in the atmosphere. However, emissions of CO<sub>2</sub> from plastic bags are additional to the existing CO<sub>2</sub> load because they originate from fossil carbon, previously unavailable to the atmosphere.

Table A1.1 gives details of the five scenarios investigated for the Scottish study.

If a levy was introduced in Scotland and did not include paper bags, it was anticipated that there would be an increased take-up of paper bags as well as 'bags for life'. The estimate of the take-up of alternative carrier bag options was based on 'assumed percentage reductions' as used in the Australian [DEH] and South African [FRIDGE] studies. The assessment of consumer behaviour for the Scottish Executive study was based on the following assumptions:

- A levy would be charged at £0.10 per bag on lightweight plastic or paper carrier bags. This would lead to a 90% reduction in demand for each type of carrier bag, based on the experience in the Republic of Ireland.
- Under scenarios 1A and 1B (in which paper bags would not be subject to the levy), it was assumed that of consumers not purchasing a lightweight plastic carrier bag:
  - 30% would not require any type of carrier bag ('no bag');

- 45% would switch to heavyweight plastic carrier bags (or similar);
- 25% would switch to paper carrier bags<sup>102</sup>.

**Table A1.1 Scenarios investigated**

<b>Scenario</b>	<b>Summary</b>	<b>Description</b>
<b>0</b>	Current situation	Business as usual, prior to the Voluntary Agreement with major UK retailers
<b>1A</b>	As in the proposed Scottish Bill	Based on the introduction of a levy on all lightweight plastic carrier bags including degradable plastic bags, but NOT paper bags. It includes all distribution points: shops, petrol stations, charity shops, on-street promotional give-aways, etc.
<b>1B</b>	As in the proposed Bill, but excluding small-to-medium enterprises (SMEs), charities and promotions	Recognises the logistical problems of collecting a levy from all retail outlets. It assesses the extent of the environmental gain for the anticipated large-scale additional effort. The idea is to focus on the larger companies that use the greatest amount of bags and have the resources to enable them to comply more readily with a levy.
<b>2A</b>	As in the proposed Bill + paper bags	Based on applying the levy to all lightweight carrier bags including plastic, degradable plastic and paper. Includes all distribution points: shops, petrol stations, charity shops, on-street promotional give-aways, etc. Recognises that the levy is aiming to achieve behavioural change and encourage the use of re-usable bags and not simply a switch to, for example, paper bags.
<b>2B</b>	As in the proposed Bill + paper bags but excluding SMEs, charities and promotions	This scenario is the same as scenario 2A, but excludes SMEs, charities and promotions. Like scenario 1B, it looks at the extent of the environmental benefits without the logistical problems of trying to police and enforce the levy across the board.

<sup>102</sup> It was assumed that 30% of the total reduction in the use of lightweight plastic and paper carrier bags is transferred to 'no bag', as adopted for a 15 cent levy in the Australian report [DEH]. The remaining 70% reduction was assumed to be split between paper carrier bags and heavyweight plastic carrier bags. Using information from the UK Expenditure and Food Survey 2002/03 [ONS], expenditure likely to require a carrier bag was calculated and then split according to (a) those retail categories (e.g. footwear, clothing, etc.) thought most likely to accommodate a switch to paper carrier bags (as seen in the Republic of Ireland) and (b) those retail categories (e.g. food, beverages, etc.) most likely to accommodate a switch to heavyweight plastic carrier bags. On this basis, 36% of total household expenditure is sourced from (a) and 64% from (b) It was therefore assumed that 25% would be transferred to paper carrier bags (i.e. 36% × 70% = 25%) and 45% is transferred to heavyweight plastic carrier bags (i.e. 64% × 70% = 45%).

- Under scenarios 2A and 2B (which included paper bags in the levy base), it was assumed that of consumers not purchasing a lightweight plastic bag:
  - 42.5% of consumers would not require any type of carrier bag;
  - 57.5% of consumers would switch to heavyweight carrier bags (or similar)<sup>103</sup>.
- Under scenarios 2A and 2B, the estimated reduction in paper bags was assumed to result in a 70% switch to heavyweight carrier bags (or similar).
- It was assumed that a typical heavyweight carrier bag is used 20 times before replacement<sup>104</sup>. Therefore, the 45% of consumers who choose to switch to a heavyweight carrier bag will purchase five such bags in place of 100 lightweight carrier bags. This gives a 1/20th ratio for calculating the numbers of heavyweight carrier bags used under the levy scenarios.
- Spending at SMEs was assumed to account for 30% of total household expenditure<sup>105</sup> - a factor applied to scenarios 1B and 2B.
- Bin liner consumption was included to account for the displacement effect of people switching to or using additional purpose-made bin liners instead of carrier bags in the event of a levy. In the absence of Scottish or UK data, Irish data were used and scaled for Scotland along population ratios. An Australian study [DEH] reported a 77% increase bin liner consumption in the Republic of Ireland, from around 91 million to 161 million, following the introduction of the Plastax. The Scottish Executive study assumed the same level of increase<sup>106</sup>.
- Black refuse sacks and disposable nappy sacks were not factored into the analysis as information on the relevant sales volumes was not available. In addition, there were no statistics available for bags made of polypropylene in Scotland. Although retailers felt that a levy would instigate an increase in sales of kitchen swing bin liners, they did not feel that it would alter their sales of black refuse sacks to any great extent [Nolan-ITU Pty Ltd, personal communication].

Based on these estimates, it was predicted that:

- Under scenarios 1A and 2B, there would be a drop in lightweight plastic carrier bag usage of 697 million/year.
- This decrease would not be so profound if SMEs were excluded (scenarios 1B and 2B) when it would be 488 million/year.

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<sup>103</sup> It was assumed that, of those consumers who transferred to paper bags under Scenarios 1A and 1B, half now transfer to heavyweight plastic bags and half transfer to 'no bag'. This assumption was made because no other suitable evidence was available. Thus, the total proportion of the reduction in lightweight carrier bags now transferred to heavyweight bags is equal to 57.5% (i.e. 45% + (50% × 25%)).

<sup>104</sup> Taken from the Carrefour study [Carrefour].

<sup>105</sup> This is based on share of turnover in SIC(92)52, i.e. the retail trade with less than 250 employees, as determined by the Institute of Retail Studies, University of Stirling. Hence, in scenarios 1B and 2B, the levy was assumed to apply to 70% of the retail base in scenarios 1A and 2A. By adjusting the retail base in this fashion, it was assumed that a £1 expenditure equals a £1 turnover and that the number of bags issued per £ expenditure at a SME equals the number of bags issued per £ expenditure at a non-SME. This was a crude assumption, but necessary without any data available.

<sup>106</sup> Scaled for population [CSO.ie2005, Stats Scot]

- If paper bags were not included in the levy, there would be annual increases of 174 million paper bags under scenario 1A and 122 million bags under Scenario 1B.
- 'Bags for life' would only increase by 11–21 million/year due to them being reused 20 times.
- Bin liner consumption would increase by 90 million/year if SMEs were included in the levy (scenarios 1A and 2A), or 63 million/year if not (scenarios 1B and 2B).

Results on bag use were then combined with information from the Carrefour LCA. A number of factors relevant for sensitivity analysis were identified, in order that the assessment better reflected Scottish conditions:

- Sensitivity analysis 1: Assume paper bags weigh 99g instead of 52g.
- Sensitivity analysis 2: Assume on average that paper and plastic bags are used to carry the same volume of shopping.
- Sensitivity analysis 3: Assume lightweight plastic bags weigh 8g instead of 6g.
- Sensitivity analysis 4: Combined effects of sensitivity analyses 2 and 3.
- Sensitivity analysis 5: Assume the same split across recycling, incineration and landfill as in France.

The main results of the sensitivity analyses were:

- Repeating the analysis using a higher bag weight or 'effective' volume of paper bags led to a significant worsening in the performance of scenarios 1A and 1B for all categories except for 'risk of litter'. The categories of solid waste generation and acid rain, for which a small benefit was originally recorded under the base LCA (Carrefour, 100% of end-of-life bags landfilled), became a disbenefit (to a lesser extent for acid rain). The effect on solid waste generation is driven by the greater weight of paper bags compared with plastic bags (this feeds directly through to waste generation at the end of the lifecycle) and by the waste produced during paper production.
- Such effects were counteracted to a large degree by the assumption that lightweight plastic bags in Scotland are 8g compared to 6g in France.
- The assumptions on alternative waste management strategies (sensitivity analysis 5) had little effect on the results.
- The results for scenarios 1A and 1B were affected significantly by the sensitivities explored. This was as a result of encouraging people to switch from plastic bags to paper. Whereas, the results for scenarios 2A and 2B, where paper bags were also subject to the levy, showed little change. In all cases studied and for all environmental indicators, scenarios 2A and 2B improved on the business as usual case by between 30% and 70%. The most restrictive scenario (2A, where all outlets including SMEs and charities are subject to the levy) showed a uniform improvement over scenario 2B of around 16% relative to business as usual.

The main conclusions from the LCA for the Scottish levy were:

- The biggest environmental improvement was seen in scenarios 2A and 2B where paper bags were included in the levy. These occur for all environmental indicators
- In scenarios where paper bags were excluded, the environmental benefits of reduced plastic bag usage were negated for some indicators by the impacts of increased paper bag usage. This is because a paper bag has a more adverse impact than a plastic bag for most of the environmental issues considered. Areas where paper bags score particularly badly include water consumption, atmospheric acidification (which can have effects on human health, sensitive ecosystems, forest decline and acidification of lakes) and eutrophication of water bodies (which can lead to growth of algae and depletion of oxygen).
- Heavyweight, reusable plastic bags (the so-called 'bags for life') are more sustainable than all types of lightweight plastic carrier bags if used four times or more. They give the greatest environmental benefits over the full lifecycle.
- Paper bags are anywhere between six to ten times heavier than lightweight plastic carrier bags and, as such, require more transport and its associated costs. They would also take up more room in a landfill if they were not recycled.
- The analysis demonstrated that SMEs and paper bags should be included to maximise the potential environmental benefit of the levy. The inclusion of paper bags in the levy made a greater contribution to maximising environmental benefits than inclusion of SMEs.

## Appendix 2

### National Policies on Plastic Bags

The UK, Ireland and Scotland are covered in the main text; this appendix provides supplementary information on some other countries. Particular attention is given to Australia, with further information on other countries provided in a series of tables. Data have been gathered from the ACR+ 2008 update<sup>107</sup> and other sources.

#### A2.1 Australia

The Australian Government is determined to take a stance on plastic bags and reduce consumption. However despite it being debated widely since 2002, no nation-wide system has been approved. The government has opted for what it calls collaborative federalism, where it seeks to obtain a joint decision with the six states and two self-governing territories about the issue<sup>108</sup>.

Ministers from state met in April 2008, but the overwhelming position of the states and territories is away from a ban on the plastic shopping bags.

Victoria proposed a trial 10 cent per bag levy to see whether this would reduce public use of the micro-thin high-density polyethylene (HDPE) bags and South Australia proposed a ban.

##### A2.1.1 Victorian Government and the Australian National Retailers Association (ANRA)

In 2008 the Victorian Government and the Australian National Retailers Association (ANRA) agreed to work together to trial the application of a charge on single-use plastic bags in supermarkets<sup>109</sup>.

The trial was for a four week period, involving seventeen stores in three trial areas; Fountain Gate, Wangaretta and Warrnambool. The Steering committee engaged an independent consultant, KPMG to analyse the outcomes of the trial<sup>110</sup>.

It was evident the trial was well supported by the Government and Retailers alike, with dedicated Trial Manager appointed to co-ordinate the scheme. The scheme was also supported by:

- a public website and inquiry service, created by Sustainability Victoria;
- a public telephone inquiry line, provided by DSE;

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<sup>107</sup> Strange, K and Strange M (2008) Plastic bags – policies and practices to reduce consumption: Assessing the application of policies to lightweight single use polyethylene plastic bags, 2008 update. Reported prepared for ACR+ and IGBE by Residua Limited.

<sup>108</sup> Oh My News, Australia backs away from plastic shopping bag ban 29/07/08  
[http://english.ohmynews.com/ArticleView/article\\_view.asp?menu=A11100&no=383265&rel\\_no=1&back\\_url=](http://english.ohmynews.com/ArticleView/article_view.asp?menu=A11100&no=383265&rel_no=1&back_url=)

<sup>109</sup> Steering Committee, 2008. Trial of a charge on plastic bags to the Victorian Minister for Environment and The Australian National Retailers Association.

<sup>110</sup> KPMG, 2008. Trial of a Government and industry charge on plastic bags

- an extensive media and advertising campaign managed by DSE;
- free reusable bags for people with special needs, funded by the Victorian Government and distributed with the assistance of Victorian Foodbank Relief and the Department of Human Services;
- accounting oversight, provided by Chartered Accountants, Lumina;
- legal support for the authorisation of the trial by the Australian Competition and Consumer Commission, funded by Coles and Woolworths;
- instore signage and advertising of the trial, provided by each retailer; and
- the seventeen stores and their employees who participated in applying the charge during the four week trial period.

The headline results of the trial were very positive, with an immediate sustained reduction in plastic bag use throughout the 4 week trial period. On average a 79% reduction was achieved across the three areas.

The appointment of an independent consultant at the commencement of the trial appears to have been extremely beneficial in that useful qualitative and quantitative data has been produced, that will inform future direction.

The KPMG report demonstrates strong community support for the trial, with 86% of consumers supporting initiatives to reduce plastic bags and 60% were happy to participate in the trial, based on the perception that they were 'helping a good cause'. In contrast, 13% of customers expressed concern at the cost of plastic bags resulting from the trial levy.

Despite the positive reports direct from consumers surveyed, the report also acknowledged that retail workers on occasions were affected detrimentally from customers complaining or overloading bags, hence the behaviour of consumers may be different dependant on whom they are talking to. The four week trial was not sufficiently long enough to assess whether consumer behaviour would be sustained over a longer timeframe.

Despite an overwhelmingly majority of customers supporting the trial, a number were still concerned as to what happened to the monies raised, hence any levy based scheme should endeavour to make clear to customers from the outset how the revenue will be utilised to benefit the local environment.

The trial imposed a 10 cent charge on bags and this appears to have been a sufficient value to make them consider the value they place on a bag, with 87% of respondents saying they would continue to use reusable bags and only 10% stating they would continue to pay, this would reduce by 45% should the fee be raised to 25 cents. A hard core of approximately 17% of customers would remain who would continue to use plastic bags even under a 25 cent charge.

Customers highlighted some concern over the need to purchase bin liners if a charge is applied to plastic bags, with 57% claiming that they would purchase more bin liners as a result of the charge; however this should also be addressed in scheme communication and marketing material and wider recycling messages to assist customers in managing their waste more sustainably and helping them to realise that bin liners are avoidable.

### **Impacts on retailers and staff**

The KPMG report identifies efficiency gains from the reduction in the volume of bags, but changes in idle rates are unknown. An increase in idle rates has the potential to financially impact the retailers and potentially increase consumer costs. 68% of staff stated that the “checking out” process took longer as a result of the trial as compared to only 14% of customers. Staff claimed it took longer to pack the reusable bags than plastic bags already at the cash desk.

61 % of Supermarket employees raised occupational health and safety concerns in relation to the weight of bags, i.e. customers were placing more items in one bag than previously when they could indiscriminately take free carrier bags. Similarly they raised hygiene concerns as to the condition of the bags brought by customers to reuse. Hence it is recommended that marketing and communication material in support of any bag initiative should include information on hygiene issues and the carrying and lifting capacity of reusable bags.

The communication and marketing campaign prior to the trial had a positive direct impact in preparing customers for the trial with 95% of customers aware of the trial before arriving at the supermarket and aware of the charge. Customers cited the newspaper and TV advertisements when recalling where they had heard about the trial.

### **Outcome**

The trial was deemed successful, but the steering committee acknowledged that good results can be achieved utilising a voluntary approach rather than the imposition of a regulatory mechanism, if all stakeholders support the agreed scheme, in particular Government and retailers. It was recognised that this study had its limitations in terms of limited geographical area, not all retailers participated, potential for customers to shop elsewhere, the affects of the media are not fully known as it was covered in advance people may have changed their habits in preparation

#### **A2.1.2 South Australian Parliament**

On June 18 2008, the South Australian Minister for Environment & Conservation, Gail Gago, introduced legislation seeking to ban light-weight plastic shopping bags. The South Australia Parliament has opted to take their own action and is introducing a ban on lightweight carrier bags from 4<sup>th</sup> May 2009.

The ban is planned to come into full effect from 4 May 2009. After that date, it is proposed that single-use, light-weight polyethylene bags cannot be given away or sold by retailer for carrying goods. Retailers will be able to charge for alternative bags that they supply.

#### **Which bags are proposed to be banned?**

Light-weight plastic bags made of polyethylene polymer with a thickness of less than 35 microns (a micron is 1000th of a millimetre). These bags are generally used by supermarkets and take-away food outlets.

**Which bags will not be banned?**

- Paper bags and compostable bags that meet the Australian Standard
- Barrier bags - the type dispensed from a roll to hold items such as loose fruit and vegetables
- Heavier style retail bags (boutique bags)
- Multiple use bags such as 'Green Bags'
- Bin liners for purchase.

The scheme has been widely publicised, with a dedicated website (<http://byobags.com.au/About.mvc/>) developed to assist customers and retailers alike. The South Australian Parliament have engaged early with retailers and provided clear communication as to key dates.

Minister for Environment and Conservation Gail Gago said:

*“I will be writing to about 12,500 retailers across the State advising that after the legislation passes the transition to the ban starts on 1 January 2009, with the ban coming into full effect on Monday 4 May 2009.*

*“The decision follows ongoing consultation with a taskforce involving retailer and union representatives and will maximise the ban’s outcomes by being fully introduced when stores aren’t as busy with holidays, sales and New Year staff arrangements.*

*“This taskforce has also focussed on addressing potential health and safety implications for shop assistants that were identified in a Government funded co-operative report overseen by the SDA”.<sup>111</sup>*

A phone survey undertaken in late 2008 for Zero Waste SA indicated that:

- eight out of ten shoppers have already started to change their habits, and have been taking their own bags for grocery shopping. Most of these people have been bringing their own bags for more than a year.
- Awareness of the phase-out of checkout style plastic shopping bags is high, with 95 per cent of respondents knowing about the phase-out and more than 90 per cent stating their support for the ban.
- shoppers said they forgot to take their own bags for grocery shopping almost a quarter of the time - and most people don’t take reusable bags when buying takeaway food.
- While most shoppers take their own bags grocery shopping, they still end up with checkout style plastic shopping bags on at least one in four occasions.
- The survey revealed that 55 per cent of respondents said they received at least some checkout plastic bags on their last shopping trip to the supermarket.”<sup>112</sup>

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<sup>111</sup> Government of South Australia, Staged approach for South Australia's historic plastic bag ban, 18/06/08: <http://www.ministers.sa.gov.au/news.php?id=3280>

<sup>112</sup> Government of South Australia, news release, 30/12/08: <http://www.ministers.sa.gov.au/news.php?id=4176>

### **A2.1.3 Voluntary Schemes in Australia**

Over the past five years in Australia, there have been some tremendous success stories in reducing the environmental impact of plastic bags. Bunnings Home Improvement stores reduced their usage of plastic bags by over 99% by introducing a charity charge of 10 cents per plastic bag. IKEA took the same approach – like Bunnings they gave the bag charge to charity. As a result, they have now banned the usage of single-use HDPE plastic bags in their stores<sup>113</sup>.

The ALDI supermarket chain has more than 150 supermarkets Australia-wide and they also charge for plastic bags. This saves them passing on the cost of ‘free’ plastic bags to consumers in the form of increased grocery prices. As a result, their customers save money by bringing their reusable bags when they shop<sup>114</sup>.

## **A2.2 Action in other countries**

The following tables list actions taken in the following parts of the world:

Table A2.1: Europe

Table A2.2: Africa and the Middle East

Table A2.3: North and South America

Table A2.4: Asia and Australasia

Costs are given in local currency.

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<sup>113</sup> <http://www.areyouready.com.au/>

<sup>114</sup> <http://www.areyouready.com.au/>

**Table A2.1 Summary of European actions to control bag use**

<b>Country/region</b>	<b>Main concern</b>	<b>Approach</b>	<b>Comments</b>
Austria	Waste minimisation	Publicity campaign regarding 'clever shopping'	Occasional distribution of free reusable textile bags. No specific focus on plastic bags, but planning a campaign on 'Clever shopping'.
Belgium	Waste minimisation (for packaging generally, not just bags)	Instead of a tax on all packaging materials, the government has decided to tax selected types of packaging including Plastic bags (carrier bags) €3/kg. In June 2007, the Belgium government started phasing in a tax on single-use plastic bags to change retailers' habits. It is a new ecotax for retailers, the cost of which will be passed onto consumers.  Tax payable by retailers who pass on cost to consumers.	Response to the voluntary agreement by supermarkets includes not providing bags at all (Aldi, Lidl, Colruyt), giving reward points for reusing bags (Delhaize) charging for bags (Ikea, Delhaize) and promoting reusable bags and crates. Focus on plastic bags.
Bosnia Herzegovina	Litter	Promotional campaign	Campaign in 2003 considered a success, repeated in 2004. Focus on plastic bags.
Czech Republic	Waste minimisation, recycling	Czech Ecolabelling Agency preparing criteria for biodegradable shopping bags. Some stores charge for bags, others give them away.	Plastic bags - €0.035-€0.2. Paper bags - €0.35

Country/region	Main concern	Approach	Comments
Denmark	Waste minimisation	Packaging tax	Paper bags DKK10/kg Plastic bags - DKK22/kg Tax paid by retailers, not shoppers, therefore not obvious to customers. It encourages retailers to promote alternatives.
Finland	Waste minimisation	Levy on supermarkets for number of bags used. Supermarkets charge for bags	All Finnish shopping bags are charged at a range of: €0.15 - €0.5 / bag.  A plastic bag eco-tax was examined by 3 Finnish Ministries, but did not deem the measure beneficial to society as the current fees and methods for household waste management minimise the problem.
France	Waste Minimisation & to change the behaviour of the public	A ban on the supply of free non-biodegradable lightweight bags. This may conflict with the terms of the EU Directive on packaging and packaging wastes. France must submit a <i>decret d'application</i> to the European Commission.	Heavy reusable bags being promoted – no costs. The French approach has caused much internal debate, with many arguing the benefits of bio-bags, stating that reuse should be promoted above biodegradable. However, strong support from agricultural sector to bio bags as they believe an opportunity to diversify

Country/region	Main concern	Approach	Comments
Germany	Waste & Litter (prior to 1991)	Plastic bags are viewed as sales packaging and so are regulated by the German Packaging Waste Ordinance. Plastic bags are not banned and there is no mandatory charge, deposit or tax on it in Germany.	€0.05 to €0.20, depending on bag application, relates to plastic bags.
Hungary		Voluntary, no agreements – most stores expect customers to have their own bags	Medium sized sturdy plastic bags available at 25 cents
Iceland	Waste Minimisation	Levy on lightweight plastic carrier bags,	IKR 15 (€20) per lightweight plastic carrier bag. The levy is used for many projects, mostly to support environment related projects.
Italy		No law, but supermarkets charge per bag	5 cents per plastic bag. Generally high street shops giveaway plastic bags and supermarkets charge. Italy has passed a law providing for non-biodegradable plastic bags to be banned from 2010. The 2007 Finance Act also includes provision for a tax on plastic carrier bags.
Luxembourg	Waste prevention	Voluntary agreements with retail sector to reduce number of lightweight plastic bags	Around 750 tonnes pa of one-way disposable bags are consumed in Luxembourg. Since the signing of the first accord (January 2004), some 600,000 eco-sacs have been sold. The signatories to the agreement expect to see a 38% increase in the use

Country/region	Main concern	Approach	Comments
			of reusable bags. Primarily targeting the reduction of lightweight plastic bags.
Malta		Plastic carrier bags taxes were introduced under three categories: 1. biodegradable where no eco-contribution is paid 2. degradable where an eco-contribution of 6 Malta cents per bag is paid 3. plastic bags where an eco-contribution of 7 Malta cents per bag is paid	Focus to reduce plastic carrier bags, with the higher fee.
The Netherlands	Waste Prevention	No regulations, but supermarkets apply a fee	(€0.20) / thick plastic carrier bag
Switzerland	No real problem considered	Switzerland requires supermarkets to charge.	CHF0.15 to 0.20 per plastic bag, but smaller bags are free to consumers.

**Table A2.2 Summary of African and Middle Eastern actions to control bag use**

<b>Country/ region</b>	<b>Main concern</b>	<b>Approach</b>	<b>Comments</b>
Bangladesh	Litter & environmental implications	March 2002 polythene bags banned as they were blocking drainage systems & had been a major culprit during 1988 & 1998 floods that submerged two-thirds of the country. These problems are caused by a lack of infrastructure to dispose of plastic bags properly.	Bangladesh was using 9 million bags a day and littered 85% of those. In March of 2002, a ban was established on the manufacture or use of plastic bags. Anyone caught with a plastic bag is faced with a \$2,000 fine.  This has brought plastic bag usage and litter to a complete halt
Botswana	Litter & environmental implications	Ban on free, lightweight bags issued	No set fee per bag, targeting plastic bags
Eritrea	Ban	Banned plastic bags in 2005	
Kenya	Environmental implications	120% excise duty on plastics & a standard agreed for the minimum thickness of plastic bags	Targeting plastic bags.
Kingdom of Jordan	Environmental Implications	Government agreed to undertake awareness raising campaigns to reduce plastic consumption, following movements from the Environment Society	Targeting plastic bags
Niger	Waste Prevention	The government of Niger has adopted a less strict approach and buys used plastic bags for 25 CFA francs, (about US\$0.03) per kg. The bags are then used to repair crumbling roads, or are compressed using new ceramic mould technology and transformed into bricks.	Targeting plastic bags

Country/ region	Main concern	Approach	Comments
Republic of South Africa	Litter	Compulsory Levy on plastic bags and enforce a minimum 24-micron weight per bag (including imports)	3c per bag (R2.13/kg).  A proportion of the revenues collected through the levy are used to establish the Buyisa-e-Bag Section 21 Company. This is a joint venture between Government, labour and the private sector. However, there are concerns that the money is not being ring-fenced. Targeting lightweight plastic bags.
Rwanda	Litter	Imposed a ban on plastics less than 100 microns thick in conjunction with awareness campaigns	Heavily enforced. Targeting lightweight plastic bags.
Somalia		Banned plastic bags in 2005	
Tanzania	Litter and environmental implication	Imposed a ban on thin plastics	Targeting lightweight plastic bags.

**Table A2.3 Summary of actions in the Americas to control bag use**

Country/ region	Main concern	Approach	Comments
San Francisco	Litter	Voluntary agreement with supermarket operators to promote recycling and reuse. Contributing to an educational fund.	A levy was debated and research undertaken, the recommended levy per bag suggested at US\$0.17 per plastic or paper bag – however a voluntary agreement was made with supermarket operators
California	Waste prevention		Campaigns, specifically to engage recycling and engage and reward school children targeting plastic bags.
Rhode Island	Litter	Awareness raising campaign	Campaign, not directly aimed at reduction or recycling but predominantly to reduce the effects of wind blown plastic bags.

<b>Country/ region</b>	<b>Main concern</b>	<b>Approach</b>	<b>Comments</b>
Canada - Ontario	Waste prevention	Voluntary campaigns to reduce consumption	Voluntary programme to encourage retailers and consumers to reduce plastic bag usage. The province aims to cut bag usage in half by 2012 – currently Ontarians use seven million plastic bags every day
Canada – Tofino	Waste prevention	Voluntary ban on plastic bags	Targeting plastic bags
Canada - Huntingdon	Waste prevention	Byelaw to make the town plastic bag free	As part of a wider waste reduction campaign, no retail outlet can distribute plastic bags, no advertiser can deliver fliers in plastic bags, and residents are not even supposed to line their garbage bins with green plastic bags
Brazil	Waste prevention	Voluntary Agreement	In Brazil more than twenty cities are said (Symphony, 2007) to have issued a direction that the city authorities and all their suppliers use only oxy-biodegradable plastic for their packaging, bags, and refuse sacks.

**Table A2.4 Summary of actions in Asia and Australasia to control bag use**

Country/ region	Main concern	Approach	Comments
Australia	Littering & Waste Prevention	Voluntary agreement with retailers association with targets.	In 3 ½ years lightweight plastic bag use dropped by more than 1 billion or 33.8% in 2005. The Retailer Association pushed for the voluntary agreement believing that a ban or levy would be costly and detrimental to their industry. A levy of 25 cents was suggested to target plastic bags.
Coles Bay – Tasmania (other towns are following suit)	Littering & Waste Prevention	Town ban on the use of plastic bags	AUS\$0.25 for bags made of recyclable paper. AUS\$2.50 for calico bags
Australia – South Australian Parliament		Ban on lightweight carrier bags from 4 <sup>th</sup> May 2009.	Single-use, lightweight polyethylene bags cannot be given away or sold by retailer for carrying goods. Retailers will be able to charge for alternative bags that they supply
Australia – State of Victoria	Littering & Waste Prevention	Amended its Environment Protection Act 1970 to enable the Victorian Government to require retailers who choose to supply plastic bags to charge a minimum fee to consumers receiving those bags	In 2008 the Victorian Government and the Australian National Retailers Association (ANRA) agreed a 4 week trial. The trial imposed a 10 cent charge on bags and this appears to have been a sufficient value to make them consider the value they place on a bag. On average a 79% reduction was achieved across the three areas. Targeting plastic bags.
Bangladesh	Littering	Ban on lightweight plastic carrier bags	Targeting lightweight plastic bags.

Country/ region	Main concern	Approach	Comments
China	Waste prevention & associated environmental implications	Ban on free plastic bags at shops & supermarkets.	Customers to be charged for any used. Will come into effect on 1 <sup>st</sup> June 2008. Bags will also be banned from all public transportation including buses, trains, planes & from airports and scenic locations. Shops have been instructed to mark the price of the plastic bags clearly and not fold them into the cost of other items.
Hong Kong	Waste prevention & associated environmental implications	Shoppers will pay a levy of 50 Hong Kong cents (approximately 3p) on every plastic bag taken home from supermarkets, convenience shops and cosmetics shops by 2009 following approval of the new Product Eco-responsibility Bill.	It will be phased in with the first phase affecting supermarkets and larger chain stores expected to be in place by the beginning of 2009. In conjunction with other environmental awareness campaigns.
India	Waste prevention	'Recycled Plastics Manufacture and Usage Rules, 1999' under the Environment (Protection) Act, 1986 on September 2, 1999.	The salient features of the Rules are: 1. No carry bags having less than 20-micron (20-m equivalent to 0.2 mm) thickness, can be manufactured, stored, sold and/or used 2. Carry bags made from recycled plastic would have to be coloured, specially marked and should not be used for carrying foodstuff 3. The recycling procedure should strictly follow the Bureau of Indian Standards specifications 4. Carry bags manufactured from virgin

Country/ region	Main concern	Approach	Comments
			granules should either be transparent or white. Targeting Plastic bags.
India – West Bengal	Environmental Protection	The West Bengal Pollution Control Board (WBPCB, imposed a blanket ban on the manufacture, sale and use of plastic carry bags with effect from 15 <sup>th</sup> September 2001 in certain ecologically sensitive areas of the state.	Targeting Plastic carrier bags
India - Himachal Pradesh  (Mumbai, western Indian state of Maharashtra, Sikkim, Goa, Kerala and Karnatak states have followed suit)	Litter causing flooding & death of cows	Based on legislation passed by the national parliament, this state has banned all bags	The legislation includes the banning of the production, storage, use, sale and distribution of polythene bags. Penalties for those manufacturers and stores who do not comply with the ban are severe - they include up to seven years in jail or a fine of up to 100,000 Rupees.
Kerala	Environmental Protection	Banned the production, storing, consumption, distribution and transportation of plastic bottles, carry bags and cups below 50 microns.	Those who violate the concerned rule will have to pay a fine of Rs. 1 lakh, and imprisonment up to five years or both as per the Environment (Protection) Rules. Targeting plastic bags.
Japan	Waste Prevention	Ban on plastic bags, with levy set by retailers and Containers and Packaging law requires retailers to report to the government their efforts to reduce the use of plastic bags	Levy ranges from 5 to 10 yen/bag (plastic or paper).
Malaysia		No national schemes or bans	Reusable bags widely available

<b>Country/ region</b>	<b>Main concern</b>	<b>Approach</b>	<b>Comments</b>
New Zealand	Waste prevention	Educational Awareness Campaigns	Targeting plastic bags  In 2007 a study for the New Zealand Retailers Association found 8 out of 10 New Zealanders used free plastic shopping bags per week.
Pakistan	Waste prevention	Ban on the sale or use of plastic bags less than 30 microns thick. Currently drafting a law which would allow the production of plastic bags made of biodegradable materials only	Outlawed the sale or use of plastic bags less than 30 microns thick. The ban carries a penalty of three months in jail and/or a fine of US\$825, and is being aggressively enforced
Taiwan	Waste prevention	Current laws in Taiwan stipulate that plastic bags offered to customers must not be less than 0.06 mm thick and must not be given to consumers for free.	New plastic bags cost NT\$1 a piece.

## Appendix 3

### List of UK Towns taking action on plastic bags

This appendix provides a listing of towns in Wales, England and Scotland that either have a ban on plastic bags in place or are considering a ban on the use of plastic bags (in the planning stages).

**Table A3.1 Towns in Wales with a plastic bag ban in place or considering a ban**

Plastic Bag Free		In the Planning Stages	
County/City area	Town/area	County/City area	Town/area
Powys	Hay-on-Wye	Bridgend	Porthcawl
Monmouthshire	Chepstow	Carmarthenshire	Newcastle Emlyn
		Denbighshire	Llangollen
		Monmouthshire	Abergavenny
		Newport	Newport
		Pembrokeshire	Fishguard, Haverfordwest, Llandysilio, Milford Haven, Tenby
		Powys	Newtown, Llanidloes
		Rhondda Cynon Taff	Penygraig & Williamstown
		Vale of Glamorgan	Cowbridge

**Table A3.2 Towns in Scotland with a plastic bag ban in place or considering a ban**

Plastic Bag Free		In the Planning Stages	
County/City area	Town/area	County/City area	Town/area
Aberdeenshire	Banchory	Argyll	Oban
Scottish Borders	Selkirk	Argyll & Bute	Dunoon, Taynuilt
		Dundee	Dundee
		East Dunbartonshire	Kirkintilloch
		East Lothian	Haddington, North Berwick
		Edinburgh	Leith
		Falkirk	Falkirk
		Fife	Kinghorn & Burntisland, St Andrews
		Highland	Ullapool
		Kinross-shire	
		Peeblesshire	
		The Isle of Arran	
		The Isle of Mull	

**Table A3.3 Towns in England with a plastic bag ban in place or considering a ban**

Plastic Bag Free		In the Planning Stages	
County/City area	Town/area	County/City area	Town/area
Devon	Modbury	Bath & NE Somerset	Bath
Cambridgeshire	Girton	Berkshire	Reading
Hampshire	Overton	Brighton & Hove	Brighton
London	Kew	Bristol	Gloucester Road, Knowle West
Norfolk	Aylsham	Buckinghamshire	Buckingham, Chesham, High Wycombe
West Sussex	Henfield	Cheshire	Wilmslow (Chapel Lane)
West Yorkshire	Hebden Bridge	Cornwall	Camborne, Helston, Millbrook, Pensilva, St Germans, Saltash
Wiltshire	Tisbury	Co. Durham	Durham, Seaham
		Derbyshire	New Mills
		Devon	Bideford, Bovey Tracy, Chagford, Crediton, Exeter, Kingsbridge, Tavistock, Teignmouth, Torrington, Totnes
		Dorset	Christchurch, Dorchester, Isle of Portland & Weymouth, Lyme Regis, Wimborne Minster
		East Sussex	Eastbourne, Forest Row
		East Yorkshire	Pocklington
		Essex	Maldon
		Gloucestershire	Stroud, Fairford
		Hampshire	Alresford, Bishop's Waltham, Chandler's Ford, Emsworth, <u>Romsey</u>
		Herefordshire	Hereford
		Hertfordshire	Royston
		Isle of Wight	Ventnor

Plastic Bag Free		In the Planning Stages	
County/City area	Town/area	County/City area	Town/area
		Kent	Deal, Maidstone, Sidcup
		Leicester City	Leicester
		Lincolnshire	The Deepings, Sleaford
		London	East Dulwich, Highbury Barn. Islington, Kensington and Chelsea, Newington Green. Islington, Richmond upon Thames
		Manchester	Chorlton-cum-Hardy
		North Yorkshire	Harrogate, Knaresborough, Whitby
		Northamptonshire	Northampton
		Nottingham	Eastwood
		Nottinghamshire	Hockerton, Netherfield
		Oxfordshire	Faringdon, Thame, Wantage, Milton, Shipton & Ascott under Wychwood
		Peterborough	Peterborough
		Rutland	Uppingham
		Shropshire	Newport
		Somerset	Glastonbury, Ilminster, Wellington, Winscombe
		South Yorkshire	Penistone, Stocksbridge & Deepcar
		Staffordshire	Newcastle-under-Lyme, Stoke-on-Trent
		Suffolk	Ipswich, Newmarket
		Surrey	Farnham, Godalming, Guildford
		Sussex	Kemptown
		Tyne and Wear	Whitley Bay
		Warwickshire	Kenilworth, Warwick
		West Midlands	Coventry
		West Sussex	Arundel, Amberley

<b>Plastic Bag Free</b>		<b>In the Planning Stages</b>	
<b>County/City area</b>	<b>Town/area</b>	<b>County/City area</b>	<b>Town/area</b>
		West Midlands	Walsall
		West Yorkshire	Huddersfield
		Wiltshire	Melksham, Salisbury
		Wirral	Wirral
		Worcestershire	Evesham, Malvern, Upton Upon Severn
		York	York
		Yorkshire	Bradford, Kirklees
		The island of Guernsey	



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