

# Delivering rightweighted bottles



Photograph: Cordelia Robinson Photography

Working with beer, cider and spirits brand owners and their supply chain, the project has delivered significant benefits through the rightweighting of glass bottles. Benefits have included reduced costs, improved filling line productivity, demonstrable responsiveness to retailer environmental requirements and renewal of market image. Large reductions in glass entering the waste stream and associated carbon emission savings have also been achieved.

WRAP helps individuals, businesses and local authorities to reduce waste and recycle more, making better use of resources and helping to tackle climate change.

**Written by:** Gordon K M Watts, Project Manager, GTS Environmental



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**Front cover photography:** the new Consortium bottle running on the Frederic Robinson filling line.

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# Executive Summary

*“Bottle Rightweighting – a process of packaging design and production to optimise packaging weight, whilst taking into account the requirements of all stakeholders in the supply chain, including manufacturers, brand owners, fillers, retailers, consumers and the environment”.*

Glassrite Beer Cider and Spirits, a WRAP funded project delivered by GTS Environmental, ran from January 2007 to March 2008. The project supported the supply chain for the beer, cider and spirits sectors in rightweighting the bottles they used. The project successfully met and surpassed its target to remove 20,000 tonnes per year from the UK waste stream, and supported the development of a culture in which rightweighting is a central consideration in bottle re-design.

## The Drive for Packaging Reduction

There is considerable drive in the UK to reduce the amount of packaging consumed across all sectors. This is embodied in the EU Packaging Waste Directive, and at a more local level, the Government Waste Strategy, the activities of WRAP and Envirowise and initiatives such as the Courtauld Commitment. Drivers include reduced raw material consumption, a reduction in waste to landfill and associated carbon emission savings.

However, beyond the environmental arguments, there is a strong business case for packaging reduction due to the cost savings, process efficiencies, and marketing possibilities it offers to the supply chain. This can be achieved either through engineering out unnecessary elements of packaging, or as is the case here, rightweighting one element of the total packaging solution.

## Glassrite Beer, Cider and Spirits Activities

The project has worked extensively with stakeholders in the beer, cider and spirits sectors, and in particular brand owner-fillers and the UK glass manufacturers, to highlight the benefits of rightweighting, and identify rightweighting opportunities within brand portfolios.

The project has supported brand owners in the development of these opportunities and in addressing barriers which could slow or prevent initiatives reaching market. Key barriers addressed through the project have been bottle fitness for purpose during filling, transit and consumption, and also critically, marketing image and consumer perceptions of rightweighted bottles.

Through representation at seminars, conferences and stakeholder meetings, along with project newsletters and press releases, significant profile has been given to the rightweighting agenda, and some of the early achievements under the project. These activities have helped to raise awareness of these achievements and the benefits and possibilities of rightweighting.

## Project Achievements

Through its activities, the project has identified and supported more than 15 rightweighting initiatives, delivering glass savings from the UK waste stream of ~32kt per annum, against the project target of 20kt. An associated carbon emissions saving of some 22,000 tonnes of CO<sub>2</sub> has been achieved.

Savings by sector category are summarised below:

Sector	Achieved Tonnage Saving / tonnes	Number of Contributing Initiatives
Lager	10,600	4
Ale	11,600	9
Cider	9,600	3
Spirits	500	1
Total	32,300	17

Participants have variously undertaken such initiatives in the name of reducing glass and PRN liability costs, improving process and line efficiencies, meeting retailer requirements for packaging reduction and shelf ready

packaging, reducing their environmental impacts, and refreshing and enhancing marketing image. These initiatives demonstrate that significant rightweighting can either take place without noticeably changing bottle appearance or indeed, be used to enhance a brand's marketing appeal.

The relatively low number of initiatives and tonnage achievement in the spirits sector is strongly associated with a high barrier to weight reduction which is closely linked to the premium brand image in this sector, perceived consumer expectations, and the needs of a largely export market. In addition, due to the low run numbers on many of the premium brands, residual mould costs for existing designs can represent a significant cost barrier. However, through project activities there is evidence of increasing sector interest in and debate around the issue of rightweighting, and previous work in the sector to lightweight highstreet name blended brands should not be overlooked.

## Additional Research Undertaken

Beyond achievement of delivery of tonnage savings, the project has delivered a number of pieces of research including:

- the impact of rightweighting on the light protection offered by glass – showing that protection against lightstrike is not significantly compromised by rightweighting.
- the future of forming technology – this study has highlighted that technological possibilities exist for further lightweighting of containers, beyond current technologies, but suggests that the development and use of such technologies is strongly interlinked with societal demands, and the operational needs of the glass manufacturers; and
- a spirits brand consumer perception study - this work demonstrated that strong consumer appeal can be maintained in a rightweighted spirit bottle.

## Recommendations

In order to maintain the momentum created during the project and encourage replication of its achievements, significant advocacy work should take place going forward. This could include further events, ongoing one-to-one contact with brand owners and retailers, and the development of case studies, and trade press articles highlighting the achievements under the project.

Recognising the particular spirits sector premium image / premiumisation<sup>1</sup> issues identified through the project, it is recommended that an audit of spirits bottle weights be conducted to better understand where the opportunities lie in this sector, and critically, an extended spirits consumer perception study to advise the thinking of marketers in the spirits sector.

## Acknowledgements

The achievements of this project have relied heavily on the commitment, energy and enthusiasm of a wide network of participants. Particular thanks go to:

- the brand owners, for their commitment to the rightweighting ethos, and willingness to share their achievements with the wider sector;
- the UK glass manufacturers, who provided much of the technical 'know how' and design capabilities underpinning the project;
- the Project Steering Group, for their enthusiasm and guidance in support of the project and its aims;
- the Proposal Approval Group, for their very considerable efforts in support of the project funding mechanism proposal, and the wider project support from the sector associations they represent; and
- WRAP, for their support and enthusiasm during the project, and for the funding which made this project possible.

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<sup>1</sup> Premiumisation relates to the development of upmarket profiles for brands. Currently in the spirits sector, a premium image is often associated with bottle designs with a high bottle weight.

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## 1.0 Introduction

***“Bottle Rightweighting – a process of packaging design and production to optimise packaging weight, whilst taking into account the requirements of all stakeholders in the supply chain, including manufacturers, brand owners, fillers, retailers, consumers and the environment”.***

This report summarises the outcome of ‘GlassRite Beer, Cider and Spirits’, a 15 month WRAP project to stimulate and support rightweighting initiatives in these sectors.

This section gives an overview of previous lightweighting initiatives which led to the current Glassrite projects, and continues to consider the related subject of glass recycling. Brief consideration is then given to the technological developments which have allowed the production of increasingly lightweight containers, and this technical capability is set in the context of the principle of ‘rightweighting’. The section concludes by laying out the aims, objectives and target for GlassRite Beer, Cider and Spirits.

Subsequent sections in this report consider:

- the nature of the UK beer, cider and spirits sectors and markets, the potential rightweighting opportunity, barriers which might prevent this potential being realised, and ways in which they might be addressed;
- the project management approach, methodology, and participants;
- achievements under the project, detailing specific rightweighting initiatives undertaken during the project, their achievements and overall performance against the project target;
- a summary of a number of pieces of supporting research undertaken through the project to advance the rightweighting agenda; and
- a summary of the project achievements and recommendations for future work.

### 1.1 Project Origin

‘GlassRite Beer, Cider and Spirits’ is one of a suite of three projects under the ‘GlassRite’ banner, the other projects addressing the wine, food, soft drinks and RTD<sup>2</sup> sectors. These projects do not stand in isolation, and are set in the context of a wider and longer term process and series of projects, all supporting the lightweighting ethos. The following section briefly describes the activities which led to the GlassRite suite of projects.

#### 1.1.1 ContainerLite Project

One of WRAP’s key objectives is to drive initiatives to reduce waste bound for landfill, including post consumer glass containers.

Consistent with this objective, in 2004 WRAP issued an invitation to tender, seeking ideas for projects that could make significant reductions in the waste arisings from households. Faraday Packaging Partnership (FPP), British Glass (BG) and Glass Technology Services Ltd (GTS) recognised that the brand owners, retailers, packer-fillers and glass manufacturers already engaged in a then ongoing joint FPP, BG & GTS project, would form the ideal supply chain to address this WRAP objective. This project was known as ContainerLite<sup>3</sup> and was the initial proof of principle to demonstrate that lightweighting of glass container was both commercially and technically possible.

The ContainerLite project ran from March 2005 to March 2006. This project worked with the collective supply chain to demonstrate the ability to reduce container weights in all major glass container categories whilst not adversely affecting market share. The project demonstrated that between 10% and 20% could typically be removed from the average container weight to align with the best in class, and in certain categories, a new best in class could be targeted. ContainerLite addressed products in the beer, spirits, soft drinks and food market categories, with some significant successes. The most notable of these was the Coors Brewers Ltd.’ Grolsch beer

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<sup>2</sup> RTD is the acronym for ‘Ready to Drink’ beverages, also variously referred to as FABs (Flavoured Alcoholic Beverages) and Alcopops’.

<sup>3</sup> ContainerLite: [http://www.wrap.org.uk/retail/case\\_studies\\_research/case\\_study\\_.html](http://www.wrap.org.uk/retail/case_studies_research/case_study_.html)

bottle which significantly changed design and reduced weight by approximately 14% whilst maintaining market share, and yielding significant operational benefits. Another success was the first sub-300g 70cl tall round spirits bottle. In total these activities yielded a glass saving of over 8,000 tonnes for the ContainerLite project.

Perception studies carried out at Leeds University, suggested that weight differences between existing containers for nominally identical end uses were founded in brand perceptions of market needs, or glass manufacturing legacy effects, rather than technical necessity or consumer desires. It was believed that this work supplemented by further perception work and identification of 'best and/or lightest in class' for a range of categories could lead to significant reductions in typical glass container weights sold through UK retail. Through production and category data held by BGMC, the British Glass Manufacturers' (trade) Confederation, GTS estimated that should 'best in class'<sup>4</sup> philosophy be taken up across the board, this could result in a reduction in excess of 100,000 tonnes of glass entering the household waste stream.

### 1.1.2 GlassRite Projects

ContainerLite was a considerable success as a demonstrator project and WRAP was keen to build on its achievements. As a result, a further call for tenders was issued, addressing the wine, food, soft drinks, beer, cider and spirits categories. This tender led to the inception of the GlassRite suite of projects:

- GlassRite Wine – managed by the British Glass Manufacturers Confederation;
- GlassRite Food, Soft drinks and Ready-to-Drinks (RTDs) – managed by Faraday Packaging Partnership; and
- GlassRite Beer, Cider and Spirits – the subject of this report - managed by GTS Environmental (part of GTS Ltd.).

The start dates for the three projects differed, with the wine and food, soft drinks and RTDs projects starting in August 2006, and the beer, cider and spirits projected starting later in January 2007. All projects culminated in March 2008.

### 1.1.3 Courtauld Commitment

In addition, and complimentary to the above projects, a further significant driver for lightweighting is WRAP's Courtauld Commitment<sup>5</sup>. Signed in 2005 by many major UK retailers and subsequently by a number of large brand owners, the aim of the Courtauld Commitment is for the signatories to support WRAP in achieving the following objectives:

- to design out packaging waste growth by 2008;
- to deliver absolute reductions in packaging waste by 2010; and
- to identify ways to tackle the problem of food waste.

As a result of the Courtauld Commitment and other unilateral packaging targets, major retailers and brand owners have a considerable interest in reducing and lightweighting their packaging. As much of their packaging originates from their upstream suppliers, signatories have a considerable interest in reduction and lightweighting of packaging from this source; glass bottles and jars are one form of such packaging. In the case of retailers, this market factor is particularly relevant for own-label brands where the retailer has a large degree of control over the product and its packaging.

A similar but discrete factor driving the re-design of glass containers is a trend for retailers to drive for 'shelf ready packaging', which requires minimal staff intervention to display it on shelf. Whilst not directly associated with lightweighting, the design implications of this need inevitably interact with, and can positively coincide with lightweighting efforts.

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<sup>4</sup> Best in class is the lightness packaging format that is fit for purpose for a product, [http://www.wrap.org.uk/retail/tools\\_for\\_change/uk\\_best\\_in\\_class/index.html](http://www.wrap.org.uk/retail/tools_for_change/uk_best_in_class/index.html)

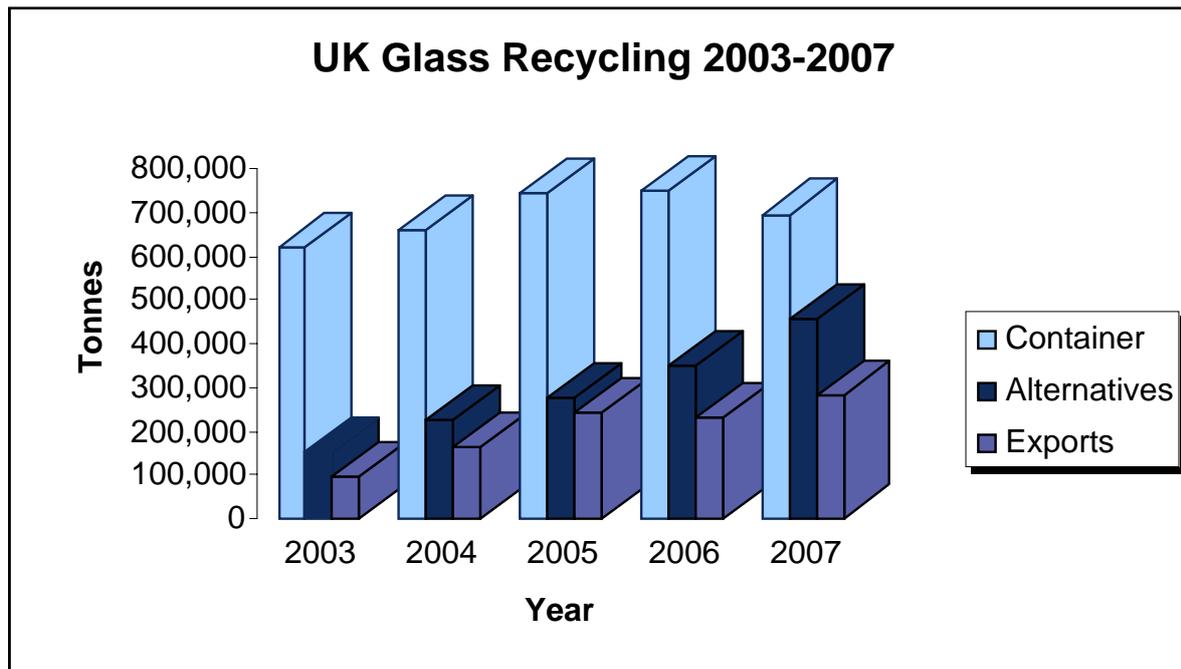
<sup>5</sup> Courtauld Commitment, [http://www.wrap.org.uk/retail/courtauld\\_commitment/index.html](http://www.wrap.org.uk/retail/courtauld_commitment/index.html)

## 1.2 Glass Recycling

The Glassrite Beer, Cider and Sprints project does not directly address the issue of glass recycling, however, lightweighting and recycling do interact, and therefore an outline understanding of glass recycling and the interactions with lightweighting is useful.

Glass container recycling in the UK has been established for over 30 years. Operated through an extensive network of bottle banks, it provides good quality cullet for the glass container re-melt industry. In recent years capacity has been aided through the development of local authority kerbside collection schemes, which have sought to contribute to the overall glass container re-melt recycling rates in the UK (Figure 1)<sup>6</sup>.

**Figure 1** UK Glass Recycling Trends 2003-2007.



The Packaging Waste Regulations which came into effect in 1997 have sought to drive up recycling rates of all packaging materials through the Packaging Recovery Note system (PRN) and Packaging Export Recovery Note (PERN). The UK has been set a national target of 60% for glass recycling in 2008, with business targets of 73.5%<sup>7</sup>. At the current time approximately 2,700,000 tonnes of container glass is consumed in the UK each year, and yet only about 700,000 tonnes is recycled back into UK glass furnaces for the manufacture of glass bottles and jars; such remelting has significant environmental raw material and CO<sub>2</sub> reduction benefits. There are also economic benefits associated with reduced furnace energy requirements when melting cullet as opposed to raw materials. A further 600,000 tonnes of glass is recovered for alternative uses such as aggregates or exported for re-melting overseas.

A residual of approximately 1.4 million tonnes of container glass per annum is not currently recovered from the waste stream. One means of tackling this issue is to improve recycling rates. A second approach is reduction of waste at source, and it is in this context that glass lightweighting plays an important role by reducing the weight of glass waste entering the waste stream for a given number of containers. However, paradoxically, given an approximate 50% overall recycling rate, it should be noted that through lightweighting, reductions in the weight of un-recovered glass sent to landfill (50%) will at the same time reduce the weight of cullet available for re-melt, and therefore the benefits associated with this.

<sup>6</sup> Source Data: British Glass Manufacturers Confederation

<sup>7</sup> DEFRA, *Packaging and Packaging Waste, UK Implementation of the Packaging Directive*. [www.defra.gov.uk/environment/waste/topics/packaging/faq.htm](http://www.defra.gov.uk/environment/waste/topics/packaging/faq.htm)

The UK also suffers an imbalance between the colour mix of glass recovered from the waste stream, and that ideally required to support UK container manufacture. This imbalance is brought about through large exports of clear (flint) spirits bottles and a net import of green wine (and also beer) bottles, resulting in excess green glass in the UK waste stream beyond that which can currently be re-processed and consumed in UK container manufacture, the most beneficial re-use. Development of alternative non colour critical markets for glass container cullet is one method of addressing the colour imbalance in the UK and supported through various WRAP initiatives has shown a strong increase over the last 5 years (Figure 1), with glass aggregates being the dominant alternative use. Along with alternative markets, export of excess green cullet for re-melt overseas has shown a steady, if slower, net increase over the last five years.

This colour imbalance issue is of limited relevance in the beer, cider and spirits sectors, as relatively small volumes of products in these categories are imported 'in glass' to the UK. However, this issue is of considerably greater relevance in the wine sector and has been extensively addressed and reported under the GlassRite Wine project.

### 1.3 Background to Glass Lightweighting Technology and the Rightweighting Principle

Glass has been melted, crafted and fashioned for many thousands of years and the reduction of container weights across time is closely linked with the introduction of new forming technologies. Initially hand produced by skilled craftsman, production became mechanised around the turn of the 20<sup>th</sup> Century allowing considerably larger volumes of glass containers to be manufactured, associated with moves toward higher production speeds and also improved uniformity of product.

Automated production began in earnest with the advent of the Owens rotary suction fed machine in 1912, which through several refinements survived until 1982 when the last machine was taken out of production.

This slow demise overlapped with the introduction in 1927 of the Hartford Empire IS Machine, which marked the start of current glass forming technologies. The 'in line' IS (Individual Section) design together with the then revolutionary gob feeder system has through developments over the years led to current IS machines which are the dominant technology used for glass container production.

Control of container shape and weight has also been aided by advances in the control of raw materials, glass melting and homogeneity, forehearth temperature control and feeder design. The current generation of IS machines include many innovations which have contributed to successive improvements in production speeds, container quality and importantly, lightweighting of designs. These developments include:

- the introduction of air cooling and much later, 'vertiflow' cooling;
- the introduction of the NNPB process (Narrow Neck Press and Blow) for bottles, which has partially replaced the 'blow and blow' process. This process allows lighter bottles to be produced due to improved and more even glass distribution; and
- electronically timed and servo-driven machines which provide improved machine control which is essential for the production of lightweight containers possessing finer manufacturing tolerances.

Beyond machine engineering, the introduction of computer aided design (CAD) and computer aided manufacture (CAM) also supports the ability to design and manufacture lightweighted bottle and jars, through enhanced design capabilities and machine control.

Other non-technical factors have also affected bottle weights. In the UK over the last few decades there has been a continuing trend away from returnable containers to single trip containers. This trend is particularly relevant in respect of beer and similar bottles. Returnable bottles needed to be heavier weight in order to be fit for purpose to survive several trips through the supply chain. The environmental and business pros and cons of single trip versus returnable bottles are still open for debate. However, suffice to say that the observable trend to single trip containers has led to a reduction in average container weights, although some legacy effects remain, wherein design features associated with returnable bottles have been retained in single trip bottles; this latter fact offers an opportunity to explore redesign with a view to reducing bottle weight.

The above discussion has largely addressed the technical capability to produce lightweight containers. A separate piece of research undertaken through GlassRite Beer, Cider and Spirits investigates this subject in greater depth

and considers future technological possibilities (see section 5.2). However, the ethos of the GlassRite projects is not to move toward the lightest technically possible container at all costs, but rather to consider what is appropriate for a specific product and application. The project ethos recognises that containers need to be fit for purpose along a number of dimensions including:

- aesthetic acceptability to consumers;
- the ability of brands to retain brand distinctiveness;
- technical Fitness for purpose during:
  - Transport from the glass manufacturer,
  - Filling and packing
  - Transfer to the retailer, for example by road and sea
  - Retailer display;
  - Consumer consumption; and
- financial viability for the supply chain, recognising the embedded costs of existing moulds, filling lines, labellers etceteras and also the capital and revenue costs associated with any required changes.

Possible supply chain costs associated with lightweighting along the above dimensions must naturally be balanced against, the benefits which might be accrued from lightweighting which include reduced costs, improved filling line productivity, demonstrable responsiveness to retailer requirements, maintenance and possibly renewal of market image, external environmental image, and alignment with company sustainability agendas. Unsurprisingly, such costs and benefits associated with lightweighting cannot be generalised and will vary from initiative to initiative, and with timing of implementation.

In consequence, initiatives under the Glassrite projects have sought to produce containers 'right' for the market and business contexts in which they are set, and do not strive for the lightest technically possible container, unless viable along the dimensions identified above.

The environmental benefits from lightweighting are concerned with waste reduction and carbon emission reductions; the former is discussed in section 1.2. Carbon emission reductions per bottle can be realised:

- during bottle manufacture – glass melting and container manufacture is an energy intensive process, typically taking 2.5 -3 MWh to melt a tonne of glass. Reducing bottle weight means that more bottles can be produced per tonne of glass melted, and thereby energy consumption and carbon emissions per bottle reduced; and
- during bottle transport (empty and full):
  - less glass is being moved and therefore the fuel required to move a given load is reduced.
  - more lightweighted bottles can often be fitted on a pallet compared to 'standard' bottles. This can further reduce carbon emissions per bottle.

## 1.4 Glassrite Beer, Cider and Spirits Project Aims and Objectives

The following aims and objectives were established for the project:

- to promote a comprehensive lightweighting programme for beer, cider and spirits bottles within both the UK and where appropriate third party countries of origin, to deliver reductions in the tonnage of glass in the UK waste stream;
- to engage the beer, cider and spirits sector supply chain (retailers, brands, glass manufacturers, packer/fillers, relevant associations and research bodies etc) in initiatives to reduce the amount of glass packaging entering the waste stream from these categories. This will be achieved through developing and delivering an effective consortium of appropriate stakeholders to identify significant challenges and barriers to lightweighting, and undertake research, provide technical advice and run pilots and trials to overcome these barriers;
- to help generate a lightweighting 'culture' wherein lightweighting is an early consideration in any bottle re-design / re-branding exercise; and
- monitor progress toward project targets and disseminate findings.

The purpose of the work was thus reducing the weight of glass used for packaging beer, cider and spirits per unit of product sold in the UK.

The project was a collaborative venture encompassing all stages in the domestic UK Beer, Cider and Spirits supply chain. Participation in the Project was intended to provide benefits for all elements of this supply chain including: increased business and networking opportunities, positive publicity, reduction in packaging recovery obligations, potential for reduced costs and access to specialist technical services. For the retail sector specifically, achievements under the project contribute toward that sector meeting its obligations under the Courtauld Commitment.

## 1.5 Project Targets

Beyond the qualitative objectives described above, the project held quantitative glass waste reduction targets:

- to initiate at least 20,000 tonnes/annum of glass waste reduction during the 'Project Period';
- to identify the split between off and on trade<sup>8</sup> savings and associated carbon emission reductions; and
- through the activities of the project to stimulate an additional 10,000 tonnes / annum saving from wider take-up of packaging reduction, rightweighting, during the 12 months following completion of the project (the 'Roll-out Period').

Lightweighting initiatives counting toward the 20,000 tonnes per annum target comprise those entering retail during the Project Period, (1<sup>st</sup> January 2007 to 31<sup>st</sup> March 2008), and/or projects agreed with WRAP which were initiated during the Project Period, but came to market after 31<sup>st</sup> March 2008.

The 'Rollout Period' runs from 1<sup>st</sup> April 2008 to 31<sup>st</sup> March 2009. Initiatives counting toward this 10,000 tonnes per annum target comprise those entering retail during this period, other than agreed initiatives counted under the 'Project Period'.

In either case, tonnage savings are based on the forward annualised sales from the point of introduction of a new lightweighted bottle in retail.

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<sup>8</sup> 'Off trade' sales are those to the public through supermarkets, off-licenses and similar. Conversely, 'On trade' sales are sales to the public through pubs, clubs and restaurants and other bars.

## 2.0 Market Overview

### 2.1 General Overview of the Beer, Cider and Spirits Sectors

The Beer, Cider and Spirits sectors unsurprisingly represent a wide range of market characteristics, and cannot be treated as a single entity. However some key features are shared between these sectors:

- **Dominance of branded products.** Relative to food and wine sectors in which generic unbranded and retailer own label products are common, the glass bottled beer, cider and spirits sectors are dominated by branded products, many of which are household names. Such brands / brand owners characteristically tightly control the brand image of the bottles they use, this representing a key component of their brand image and 'unique selling proposition' (USP). As such, when considering lightweighting in these sectors, brand owners hold central importance. Notwithstanding the dominance of branded bottles, it should be noted that generic stock bottles are used for smaller brands and retailer own label products, particularly in the ale and spirits sectors, although the volumes involved are modest;
- **Brand owner-packer fillers.** The majority of the major brands in the beer, cider and spirits sectors own and operate their own filling lines. This is notably different to the food and wine sectors, and naturally offers brands a high level of control over filling operations. This effectively contracts the supply chain by one stage and thereby facilitates the lightweighting process. However, again many smaller brands and supermarket own brands do often use contract filling facilities, and therefore this stage of the process cannot be neglected; and
- **Domestic production and consumption.** The vast majority of beer and cider is produced and bottled in the UK for UK consumption, with relatively little international trade. However, breaking this general pattern it is noted that:
  - the UK imports significant volumes of Magners 'in bottle' from the Republic of Ireland;
  - beers such as Becks, Heineken and Millers Genuine Draft are imported to the UK 'in bottle'; and
  - a high proportion of UK produced spirits are destined for export markets, and this factor significantly impacts on packaging design requirements.

Recognising the above shared features, the following sections further briefly describe the characteristics of each of the individual sectors.

### 2.1.1 The Beer Sector

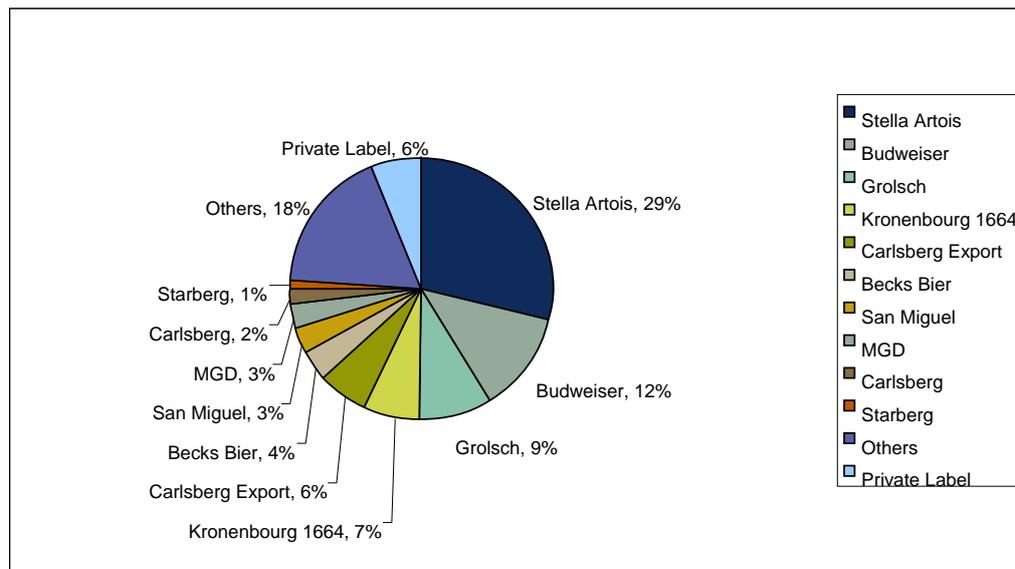
In itself the beer sector is split into two broad categories, the lager subsector and the ales and stouts subsector.

#### Lager

The lager subsector dominates the beer sector in both terms of volume and sales value, comprising approximately 90% of glass consumed in the beer sector overall with a significant proportion of lager sold 'in bottle' through pubs and clubs.

Previous work by Leeds University Business School<sup>9</sup> identified the top bottled lager brands by volume as follows:

**Figure 2** Top Bottled Lager Brands by Volume 2005 (Off Trade), Source: ACNielsen ScanTrack



Total volumes are heavily dominated by a handful of brands, with 330ml being the best selling package size with 49% market share, followed by 300ml at 17% and 250ml at 15%; the remaining key formats are 275ml and 660ml. More recent data for 2007 shows a similar pattern, with the top 5 sales represented by Stella Artois, Carling, Foster's, Carlsberg and Budweiser<sup>10</sup>, although this data does not differentiate between bottles and cans. Importantly, amongst these top brands, a number are held and controlled by large parent companies. For example, Inbev Ltd. owns the Stella Artois and Becks labels, and Carlsberg naturally owns the Carlsberg suite but also Kronenbourg (following a recent change of ownership).

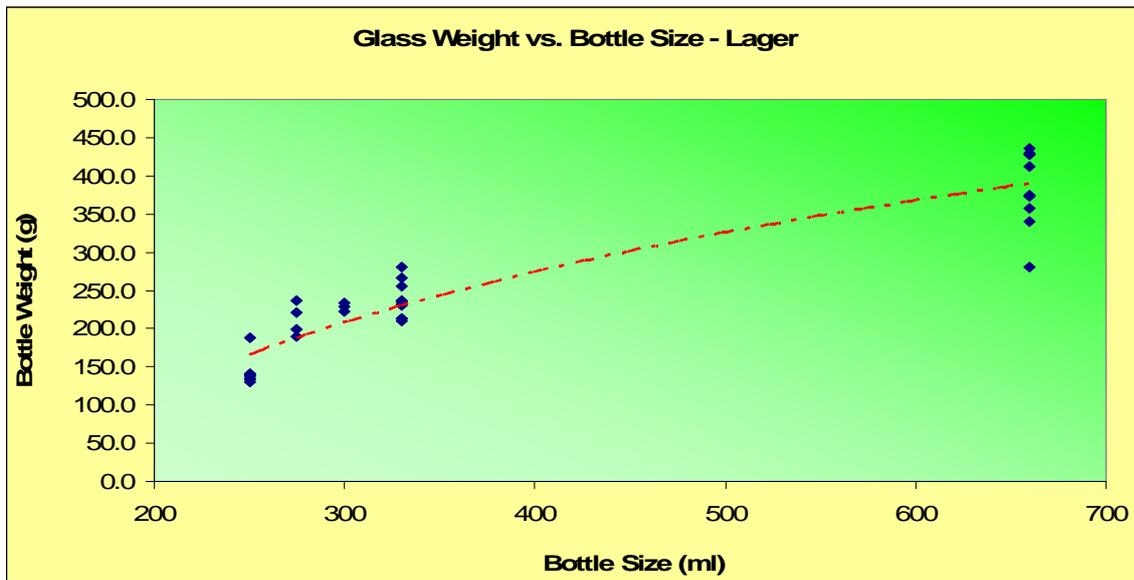
Through a process of ongoing evolution, bottles in the lager sector are already relatively light in comparison to their counterparts in the ale sector. However, opportunities for significant savings remain and due to the high unit sales of these products, cumulative financial and environmental benefits can be considerable even when unit weight reduction is relatively modest.

<sup>9</sup> Work by Leeds University Business School under the WRAP 'Container Lite' project

<sup>10</sup> Off-licence News: 16 November 2007

Bottle weights within the lager sector show a spread for each of the bottle sizes as exemplified below:

**Figure 3 – Distribution of Lager Bottle Weights by Bottle Size (2004)<sup>11</sup>**



Opportunities clearly exist to move bottles lying toward the top end of the distribution toward or beyond current best in class; for example the 660ml format shows an approximate 60% weight difference across the shown spread. Previous work<sup>12</sup> has suggested that lightweighting by 10% of the top 10 off sale lagers could yield glass savings of some 16,000 tonnes.

### Ale and Stout

Dissimilar to the lager sector, the ale sector is heavily dominated by off-trade sales with little bottled ale sold in the on trade.

Dominant brands in this sector include brewers such as:

- Fullers;
- Greene King;
- Hall and Woodhouse;
- Marstons;
- Newcastle Brown Ale (Scottish and Newcastle)
- Refresh Drinks (including Wychwood);
- Shepherd Neame; and
- Wells and Young.

Such brewers are small compared to the lager brewers with typical sales of only 10-20 million units per annum per brand. Nonetheless, branded bottles remain prevalent. Most of the brands named above hold a suite of beer labels, often present in the high street as apparently discrete brands. For example, Refresh Drinks owns Wychwood and Brakspear labels, and Wells and Young, control the Wells, Youngs', Cobra and Red stripe labels in the UK.

The sector also strongly features many small and medium enterprises (SME's) and micro breweries producing local and specialist products; in part these small companies serve a strong 'ale enthusiast' community, and the majority of such products are bottled in generic 'catalogue' ale bottles produced by the glass manufacturers.

<sup>11</sup> James Ross Consulting Ltd. 2004 for WRAP (WRAP Project: INN0011-004)

<sup>12</sup> Work by Leeds University Business School under the WRAP 'Container Lite' project

Similarly, retailer own label ale brands often use such generic bottles. Indications are that overall the ale sector is losing market to lager, but with growth in the bottled specialist and premium segment of this sector<sup>13</sup>.

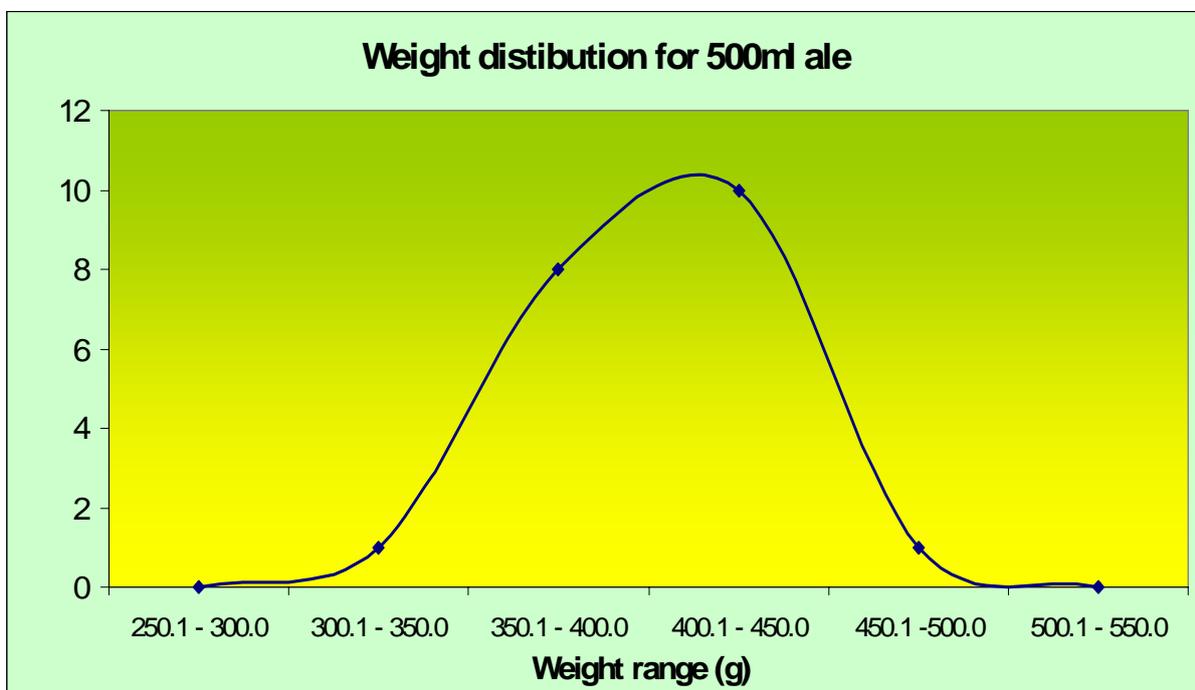
The subsector is heavily dominated by use of 500ml bottles with lesser use of pint (568ml) and 330ml formats. Relative to lager, the ale subsector still features a considerable number of 'heavier style' designs. This is attributed to the dual factors of:

- Relative to lager, the ale / stout sector has retained a more 'traditional' image which is often associated with such designs; and
- Whilst the majority of ale and stout sales are now in single trip bottles, there appears to be a design legacy associated with the former use of returnable bottles.

In consequence, in a corollary to the lager scenario, whilst ale stout unit sales are much lower, due to the greater possible weight savings available per unit, the potential for significant net weight savings and associated benefits remains. Additionally, the opportunity for weight savings for the cumulative cross brand use of generic ale bottles is also significant, running to 1,000s of tonnes.

The distribution of 500ml ale bottle weights is exemplified below:

**Figure 4** – Distribution of 500ml Ale Bottle Weights (2004)<sup>14</sup>



Similar to lager, a significant spread in weights can be seen, showing an approximate 50% difference across the range. Previous work (James Ross Consulting, 2004) indicates that a 10% weight reduction across the range of 500ml ale bottles would yield a saving of some 3,000 tonnes, whereas a move by all to the then best in class (339g) would yield some 5,000 tonnes. Indeed results from the current project, reported later in this report, suggest that this estimate was conservative.

### 2.1.2 The Cider Sector

The cider sector is similar to the lager sector in that it has significant bottled sales in both the on and off trades. However, relative to lager there are fewer major players in the market:

<sup>13</sup> 07.11.16, 'Consumers flock to bottled ale', *Off Licence News*

<sup>14</sup> James Ross Consulting Ltd. 2004 for WRAP (WRAP Project: INN0011-004)

- C&C plc – Magners ('Bulmers Irish Cider') in Ireland;
- Constellation Europe Ltd – Gaymers, Blackthorn and Diamond White; and
- Scottish and Newcastle (owning HP Bulmer Ltd) – Bulmers Original<sup>15</sup>, Scrumpy Jack, Strongbow, Strongbow SIRRUS, Woodpecker

The sector also contains a second wave of smaller but significant players such as Merrydown Plc (Merrydown suite), H. Weston & Sons (Weston's Cider), Aston Manor, Aspall, and similar.

In 2006-7 following a relatively static period the cider sector underwent very rapid growth with the introduction of 'over ice' brands such as Magners and Bulmers Original, in what is sometimes called 'the Magners effect'. This high growth period, stimulated the cider sector overall leading to the introduction of new products such as perrys (pear ciders) and growth in / new SME players in the cider market.

Little detailed information is available on the bottled cider market shares or bottle weight distribution, however, in the context of lager, ale and cider, cider ranks second behind lager in the amount of glass consumed at approximately 150,000 tonnes. The pint (568ml) format is prevalent for two of the market leaders, Bulmers and Magners Original, but other formats such as 330, 750 and 1000ml are also present in the market.

### 2.1.3 The Spirits Sector

The spirits sector is currently dominated by two main categories, whisky and white spirits (gin and vodka) but it is understood that rum is currently a significant growth area<sup>16</sup>. The sector is dominated by a number of parent-holding companies which own and control many of the high street spirit brands. These include groups such as:

- Bacardi Martini – including Bacardi, Martini, Bombay Sapphire, Dewars whisky;
- Beam Global – including Teachers whisky, Jim Beam, Laphroaig and Courvoisier;
- Diageo – including Bells whisky, Gordons gin, Smirnoff, Bushmills;
- Edrington Group – including Famous Grouse, The Macallan, Highland Park;
- Halewood International – including Red Square vodka ;
- Pernod Ricard – including Chivas Brothers, Beefeater gin, 100 Pipers, Jameson, Glenlivet; and
- Whyte and Mackay – including W&M, Vladivar, Jura, Dalmore.

Beyond these groups many other large spirits producers exist in the market such as Wm Grants, Glenmorangie and G&J Greenall. Retailer own label spirits brands represent only a small proportion of total spirits volume.

The dominant bottle size in this sector is 70cl, and previous work<sup>17</sup> by spirits category suggests the following top 5 off trade sales:

**Table 1** Off trade spirits sales by category

Rank	Whisky	Gin	White Rum	Vodka	Dark Spirit – Rum & Brandy
1	Bells	Gordon's	Bacardi	Smirnoff	Courvoisier
2	Famous Grouse	Bombay Sapphire	Other	Vladivar	Others
3	Grants	Others		Glens	
4	Teachers			Others	
5	Others				

<sup>15</sup> It should be noted that there is no connection between HP Bulmers owned 'Bulmers Original Cider' and C&C owned 'Bulmers Irish Cider'

<sup>16</sup> 04.12.07, 'Rum sales up', DAILY STAR

<sup>17</sup> Work by Leeds University Business School under the WRAP 'Container Lite' project

This earlier work suggests off-trade glass consumption of approximately 40,000 tonnes, and based on a weight reduction of 10% across the board, a potential saving in this sector of some 3,000-4,000 tonnes. In such a diverse sector, with a wide range of bottle styles, bottle weight distributions are neither readily available nor particularly helpful in reliably determining weight saving opportunities.

It should be noted that in total the UK spirits sector is estimated to consume approximately 200,000 tonnes of glass, but that a very high proportion of this is for the export market, with the Far East representing a key market, and Brazil, Russia, India and China representing strong emerging markets. This factor is highly relevant when considering bottle lightweighting. The important export market's preference is for weighty bottles, and in order to avoid the need for different bottles to serve different markets, there is a tendency to use heavy bottles across all markets, including the UK.

Compared to beer and cider sectors, the spirits sector is characterised as a premium product, and currently premiumisation of packaging in this sector tends to be associated with a heavier bottle. Additionally, the bottle cost relative to the total product value is significantly less than for beer and cider products, possibly providing less incentive for rightweighting as a cost saving initiative. However, through activities in this project there is evidence of increasing sector interest in and debate around the issue of rightweighting, and previous work in the sector to lightweight highstreet name blended brands should not be overlooked.

For the above reasons rightweighting in the spirits sector represents a particular challenge.

## 2.2 Summary of Glass Consumption and the Potential Rightweighting Opportunity

The following table, based on figures collated through the course of the project and the previous sections summarises estimated glass consumption in the beer, cider and spirits sectors, along with an indication of the maximum potential glass saving available through lightweighting. It should be noted that the indicative saving is based on previous studies, and has no direct connection with the current project or achievements thereunder:

**Table 2** Summary of Glass Consumption and Potential Glass Saving (Sources including: James Ross Consulting, DHL, BBPA, British Glass, GVA, SWA, AC Nielsen)

	Estimated Glass Consumption / kilotonnes	Estimated UK Glass Saving Potential / tonnes
Lager	600-700	16,000
Ale / Stout	60	3,000-5,000
Spirits & Liqueurs	200	3000-4000
	Note: >90% export	Maximum
Cider (& Perry)	150	Unknown
<b>Total</b>	<i>~1000</i>	<i>22,000-25,000</i>

## 2.3 Potential Barriers to Lightweighting and Possible Solutions

Significant business and environmental benefits are associated with lightweighting bottles. These include:

- reduced material and process costs in the supply chain;
- improved filling line productivity;
- demonstrable responsiveness to retailer requirements for shelf ready packaging and packaging weight reductions;
- the opportunity to renew market image and create environmental CSR opportunities; and
- alignment with business sustainability policies and objectives.

However, these must be balanced against potential barriers to lightweighting. Certain barriers are common across the beer, cider and spirits sectors, whereas some are specific to specific sectors. These are discussed below.

Some barriers were known at the outset of the project, whereas others have become apparent through the course of the discussions with project partners during the course of the project.

### *2.3.1 Common Cross-sector Barriers*

#### **Commercial Justification and Risk**

Most lightweighting initiatives incur some degree of capital expenditure, and all require revenue spend in terms of management, design and trialling time.

Capital costs might include:

- **Write off of Moulds and/or Purchase of New Moulds:** Glass bottles are manufactured using mould sets comprising 'blank' and 'finishing' moulds. These moulds gradually wear and have a natural life measured in the number of bottles they are used to produce. Moulds for one bottle design cannot generally be re-engineered to a new bottle design. As such, if a bottle is re-designed before the natural mould life is reached, residual mould life may need to be financially absorbed. For this reason, design changes will often be timed to coincide with the natural end of a mould set's life. Similarly, depending on the nature of the commercial arrangement between the brand owner and the glass manufacturer, some cost is likely to be associated with the supply of new mould sets;
- **Filling Line Change Parts:** Filling lines contain many components, known as 'change parts', which are specific to particular bottle dimensions. Lightweighting of a bottle may result in dimensional changes which could require the purchase of new filling line change parts (such as star wheels, labellers and bottle packers). It should however be noted that significant lightweighting can often be achieved within the dimensional constraints of existing change parts. Additionally, dimensional rationalisation of bottle ranges often associated with lightweighting can also reduce the number of change parts or line changes required, thereby reducing change part stock and line down time; and
- **Label Cutter Guides and Plates:** Bottle redesign due to lightweighting may also often require the purchase of new hardware associated with the re-design of labels.

In conclusion, the benefits associated with lightweighting must be balanced against these capital and revenue costs in the context of payback period and also the risk associated with moving to a new bottle design in terms of line and market performance. Clearly such cost benefit analyses are specific to individual initiatives, however, given the number of rightweighting containers now successfully entering the market, there is strong empirical evidence that carefully planned rightweighting initiatives yield significant net benefit to the brands involved, both financially and environmentally.

#### **Customer and Brand Perception**

There is always risk of poor market acceptance associated with any product re-design. In the context of bottle lightweighting there is sometimes the fear that products in lighter weight bottle designs will be perceived by consumers as being cheaper / of poorer quality. It is in part from this perspective that the term 'rightweighting' rather than 'lightweighting' emerges. That is, weight is not removed at all costs to achieve the technically lightest possible bottle, but rather a bottle with a weight appropriate to the needs of the brand, market and supply chain, the 'rightweight', is developed.

It is often thought that lighter weight bottles will be shorter than their heavier counterparts, and as a result have poorer 'shelf presence'. However, actual examples from this project indicate that very often lighter bottles can be the same height or taller (see section 4.).

In addition, during bottle rightweighting, consumer perception studies can be used to 'test the market' and provide empirical evidence to advise the design process, rather than relying solely on accepted marketing considerations and views. Indeed, under this project market surveys and studies have informed a number of rightweighting initiatives, such as that undertaken by Hall and Woodhouse.

Additionally, previous work suggests that consumers are unable to detect 'in hand' significant reductions in bottle weight. In the ContainerLite project consumer perception work suggested that consumers are usually unable to detect a 10% weight reduction, but more likely a 30% weight reduction<sup>18</sup>.

### Bottle Technical Performance

Glass bottles typically have to survive a number of process stages in their life:

- transport from glass manufacturer to filling line;
- the filling process;
- transport to final market and on to the consumer; and
- consumption and disposal.

Bottles must technically perform well at all these stages, with low failure rates. Beyond impact on yield, excessive bottle failure can result in significant line down time, and potentially consumer injury. It is sometimes assumed that lighter weight bottles will suffer higher rates of failure than their heavier counterparts as they often have thinner walls. However, lighter bottles are often formed using a different technology, 'Narrow Neck Press and Blow' (NNPB), which gives improved process control and a more even glass distribution than heavier bottles made using 'Blow and Blow' technology, without detriment to fitness for purpose. This is exemplified by the first sub-300g spirits bottle produced under the ContainerLite project. This bottle shows excellent and even glass distribution, and an associated strong technical performance<sup>19</sup>.

The trialling of a few hundred new bottles at the glass sample stage before full production is a good way to spot and iron out technical problems before a design is finalised. Such trialling might include:

- **Fitness for Purpose Testing of the bottle itself.** New bottles are invariably tested to ensure fitness for purpose. This may take the form of glass manufacturers' in house tests, and independent third party tests are also often commissioned by brand owners. In the beer / cider sector, a fitness for purpose performance standard dealing with carbonated beverages is applicable; based on empirical performance data, the British Glass 'Tec 7' standard considers, 'Strength and performance standards for the manufacture and use of carbonated beverage'. This considers the requirements for different 'in-use' internal bottle pressures, and can thus accommodate bottle conditioned beers;
- **Filling Line Testing.** Such tests assess how well a lightweighted bottle will handle and fill on the filling line. Additionally, test equipment is now coming to market which allows testing of the line itself, identifying areas of excessive impact or force which might cause bottle failure, thereby allowing for engineering improvements to the line itself; and
- **Transit Testing.** Examines how well a bottle stands up to the transport stages it will experience in the supply chain, possibly involving road and sea transport. Various test houses can simulate the conditions a bottle might experience in its supply chain (for example vibration / humidity), and evaluate how the bottle would perform during and after such transit. Such testing is generally of whole pallets or bottle packs.

### 2.3.2 Sector Specific Barriers

In addition to the general barriers identified above, certain barriers are more relevant to specific sectors, and indeed additional barriers may exist. These are briefly outlined below.

#### Lager

- **Bottle height** - Discussions with representatives within the lager sector suggests that marketers in this sector are particularly sensitive to the perceived shelf presence associated with bottle height, wherein a tall bottle is regarded as more favourable, and brands do not wish to appear shorter than competitor products.

<sup>18</sup> Container Lite - Light-weight Glass Containers – The Route to Effective Waste Minimisation, Final Report, WRAP, March 2006.

<sup>19</sup> Case Study: Lightweight spirits bottles: a business case for change. ([http://www.wrap.org.uk/downloads/14325-08\\_Spirits\\_LoRes.978ac656.pdf](http://www.wrap.org.uk/downloads/14325-08_Spirits_LoRes.978ac656.pdf))

This concern is set in the context that lightweight UK bottles may appear small in comparison to competitor bottles and un-lightweighted imports. However, significant lightweighting can still take place without significant change in bottle height. Previous work on the Grolsch bottle clearly exemplifies this, as does the Miller Genuine draft development described later in this report. Both these examples embody the principle that lightweighting can be achieved, whilst continuing to meet other supply chain requirements, in these cases brand market image.

**Figure 5** The Grolsch bottle was lightweighted without losing significant bottle height.



#### Ale

- **Residual Mould Life** - Due to relatively modest number of bottles required by ale producers, glass moulds of a particular design have a relatively long life. The need to write off residual mould life if bottle design is changed prior to the end of natural mould life, can sometimes present a financial barrier to lightweighting in this sector. However, this barrier must be balanced against the potential benefits which might be accrued from lightweighting; and
- **Lightstruck Beer / 'Skunking'** – hop compounds in ale can react with daylight to produce an unpleasant 'skunky' aroma, associated with the compound MBT<sup>20</sup>. Glass in bottles offers a level of protection from the damaging light wavelengths, with amber glass providing the greatest protection. It might be perceived that thinning of the bottle walls associated with lightweighting might raise concerns amongst brewers over a possible increased propensity to lightstrike and taint their beer. This has however proved less of a concern amongst brewers than was anticipated at the project outset, and a number of lightweighted ale bottles are now entering market without apparent issue. A research study has been conducted under the auspices of this project to experimentally examine how the transmission of the damaging wavelengths changes as glass is thinned. A summary of this work is given in section 5.1 to this report and the full report separately published.

#### Cider

There are no identified sector specific barriers to lightweighting in the cider sector.

#### Spirits

- **Premiumisation** - As identified in section 2.1.3, spirits hold a position as a premium product, with premium glass bottles traditionally being heavyweight. This relationship between premium and heavyweight is

<sup>20</sup> MBT is the acronym for '3-methylbut-2-ene-1-thiol'

understood to be particularly strong in some of the key export markets for spirits. Additionally, the relatively long consumption life of these products and thus packaging visibility is understood to strengthen this effect. This marketing perception represents a particular challenge for lightweighting in the premium spirits sector. At the current time there is little independent objective consumer research available to inform debate in this issue. However, under this project a limited consumer perception study of spirit bottles has been performed by the Centre for Experimental Consumer Psychology at Bangor University. This study was undertaken to examine this issue in the context of lightweighting of a particular spirits brand. A fuller description of this work is given in section 5.3.

- **Residual Mould Life** – Similar to the ale sector the run numbers for many spirits brands and in particular premium brands are relatively modest, and as such, glass moulds of a particular design have a relatively long life. The need to write off residual mould life if bottle design is changed prior to the end of natural mould life, can present a significant financial barrier to lightweighting in this sector.

## 3.0 Project Structure

### 3.1 Project Management Team

To deliver the objectives of the project, a project management team comprising WRAP and GTS representatives was established. This team was responsible for the day to day operation of the project, identification and development of trial opportunities, operation of the funding mechanism, the detailed organisation and support of trials and the collection of initiative data. More specifically:

- **WRAP – the project instigators and funders.** WRAP had the responsibility to monitor progress of the project toward its objectives, where relevant to support GTS Environmental in the identification and development of trial opportunities, to publicise the project and its early achievements, and to ensure monies allocated under the project were used cost effectively for the specified purpose; and
- **GTS Environmental (part of GTS Ltd.) – the project managers and delivery partners for WRAP.** GTS Environmental held key responsibility for delivery of the projects objectives and targets and was the focal point of all project activity<sup>21</sup>. Additionally, Glassrite Beer, Cider and Spirits forms one of a suite of 3 projects, the other projects addressing wine, and food, RTDs and soft drinks sectors. In order to ensure possible synergies between the different projects were exploited, GTS Environmental also provided overview project management across the suite of three projects.

### 3.2 Project Steering Group

To ensure that the project was aligned to meet the needs of the beer, cider and spirits supply chains and that it remained on course to meet its objectives and targets, the project was advised by a steering group drawn from the industry. The steering group's terms of reference were:

- to ensure that the proposed methodology would realise the agreed project objectives;
- to provide those directly involved in the project with guidance on project business issues;
- to ensure the project's scope aligned with the requirements of the beer, cider and spirits supply chain;
- to address any risk that could have had major implications for the project;
- to review and monitor project progress; and
- to publicise and participate in the dissemination of the project's progress and final outcome.

In order that the steering group best represented the needs of the project and the beer, cider and spirits supply chain, it was formulated to reflect the sector structure as follows, with individuals representing their element of the supply chain:

**Table 3** Project Steering Group Composition

Name: <i>(PAG member)</i>	Organisation type:	Organisation (+ Role)
Richard Ireland	Lager Brand Owner	Coors Brewers Ltd. (Chair)
Gordon Watts	Project Management	GTS Environmental (Project Manager)
Nick Kirk	Project Management	GTS Environmental (Glassrite suite coordinator)
Richard Edgar	Project Management	GTS Environmental (Project Support)
<b><i>Claire Hingston</i></b>	Project Management	WRAP (Project Manager)

<sup>21</sup> GTS Environmental held key responsibility for the promotion of the project and its aims, identification and development of lightweighting opportunities and initiatives under the project, the capture of initiative data (including where possible publicity materials), bringing forward trial proposals to WRAP and driving the funding mechanism, and reporting project progress and achievements to WRAP and the project steering group (see below). GTS Environmental ensured that in all its dealing with project partners it displayed impartiality and safeguarded commercially sensitive information to which it became party.

<b><i>Nicola Jenkin</i></b>	Project Management	WRAP (Glassrite suite coordinator)
Joe Kelly	Spirits Brand Owner	Whyte and Mackay
Nigel Kirkwood	Lager Brand Owner	Anheuser Busch
Toby Heaseman	Ale Brand Owner	Hall and Woodhouse
Matt Synnott	Cider Brand Owner	C&C Group – Bulmers Irish Cider (‘Magners’ in UK)
Mark Lee	Retailer	Morrisons
David Braithwaite	Glass manufacturer	Ardagh Glass
<b><i>Andy Tighe</i></b>	Trade Association – Beer	BBPA – British Beer and Pub Association
<b><i>Morag Garden</i></b>	Trade Association - Whisky	SWA – Scotch Whisky Association
<b><i>Graham Bateman</i></b>	Trade Association – Gin and Vodka	GVA – Gin and Vodka Association

Those individuals highlighted in ***Bold Italic*** comprised the Proposal Approval Group (PAG), which played a very important and critical role in approving funding for rightweighting initiatives under the project, as described in section 3.4.

The steering group met 5 times to share and discuss project progress and to agree necessary project actions. One of the activities of the steering group was to establish a ‘memorandum of understanding’ and confidentiality agreements which could be used under the project with project partners. In outline, whilst holding no legal standing the memorandum of understanding established that partners would:

- Agreed to make their involvement in the project public;
- Affirm the Project principle to reduce the environmental impact of beer, cider and spirit packaging in the UK, consistent with the Courtauld Commitment;
- Review product lines and operations and identify any project trial opportunities;
- Discuss opportunities and, if practicable progress those opportunities to product trial status;
- Provide appropriate data to develop a baseline and monitor trial progress against agreed targets. This information will typically relate to: container weights and sales volumes, the product of which equates to the weight of packaging material in circulation;
- Develop and agree a trial plan describing the anticipated programme of work;
- Provide updates of trial progress; and
- Support the subsequent dissemination of the trial outcomes.

### 3.3 Project Methodology

The project set out to initiate and support a number of lightweighting trials, addressing barriers to lightweighting such as those described in section 2.3 above, with the aim of replication in the wider sectors, and development of a wider consciousness of the possibilities for and opportunities offered by bottle lightweighting.

Prior to the commencement of the project proper, GTS Environmental undertook considerable work to establish relationships with key brand owners, with a view to identifying lightweighting opportunities for inclusion under the project. However, it became apparent that whilst the general expression of interest in the project and its aims was high, only one or two companies were at that time in a position to give reasonably firm trial commitments to the project. This reflects the fact that such decisions within brand owner companies are very significant and must reflect business needs and risks. Reflecting this status the project was divided into 3 main phases of activity as described below; these phases were overlaid with 5 quarterly project milestones for internal progress reporting to WRAP:

- **Part A** – Two project elements ran concurrently from January to March 2007:
  - **Part A1** – Included the development and commencement of project and trial work with those brand owners already able to commit to the project, including work with companies such as Hall and Woodhouse, SAB Miller, Scottish and Newcastle and Inbev. This phase of the project

also included work associated formation of a project steering group and associated structures and the first PSG meeting, and also a cross sector 'beer bottle specification review' activity as further described in section 5.4;

- **Part A2** – Comprised further work and relationship development with existing contacts not yet fully committed to the project, and also identification and development of relationships with new contacts. This work was undertaken with a view to developing trial commitment and rightweighting proposals under the project. This activity centred around meetings and discussions with brand owners, to discuss the project, the benefits of lightweighting, possible opportunities within brand owner portfolios, and barriers which needed to be addressed. Discussions were also held directly with the glass manufacturers to identify possible lightweighting opportunities for further investigation by GTS Environmental; and

■ **Part B** – running from April 2007 to March 2008. This phase of the project focussed on the further development and commencement of project work with brand owners committed under part A2 of the project.

The above structure reflects the broad change in project activities which took place over its duration, however, in actuality there was significant overlap between the different project phases. This was inevitable when working with companies faced with many and often conflicting businesses pressures, and meant that new partners and trial opportunities and activities were still being identified well into part B of the project. In addition, due to changing company circumstances, some trial prospects which showed promise in the early phases of the project, did not ultimately take place. The project provided a level of support to some trial initiatives. Funding was used to support identified activities to overcome barriers to lightweighting, and were allocated according to the funding mechanism described in section 3.4.

In addition to meetings and discussions with individual brand owners, the project was promoted through attendance at key conferences and sector meetings including such as the SIBA annual conference, London International Wine and Spirits Fair, the International Brewing convention, and SWA Operational directors meeting. Such activities were important in helping to raise awareness of early achievements and forward possibilities, and to develop a wider lightweighting 'culture' wherein lightweighting is an early consideration in any bottle re-design exercise. Associated with these wider advocacy activities, GTS Environmental identified a number of lightweighting initiatives taking place within the sector which were not directly supported by the project, and where possible data relating to these developments was captured under the project.

The net result of these activities was more than 15 lightweighting initiatives within the beer, cider and spirits sectors during the course of the project, as reported in section 5.

In addition to trial activities, a number of areas of research took place under the project to address issues of wider relevance to the lightweighting agenda. These are outlined below and are more fully discussed in section 5:

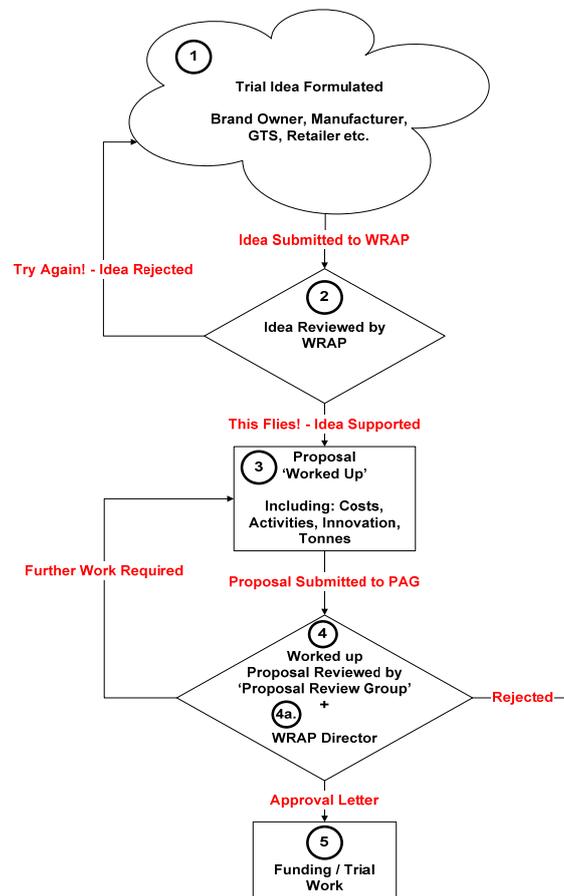
- A review of beer bottle specifications and norms – a cross beer sector working group to examine opportunities for multi-lateral agreement on a beer bottle specification conducive to lightweighting;
- The future of glass forming technology in relation to lightweighting - a desktop study undertaken by GTS;
- The impact of lightweighting on the protection offered by glass against lightstrike in beer - a desktop and experimental study undertaken by GTS; and
- Consumer perception research for a lightweight whisky bottle – consumer research undertaken at Bangor University 'Centre for Experimental Consumer Psychology' in relation to a specific lightweighting initiative in the spirits sector.

### 3.4 Project Funding Mechanism

As previously indicated, the project offered a level of support to some trial initiatives, to support identified activities to overcome barriers to lightweighting. In all cases this funding took the form of a contribution to, rather than full funding of costs.

Support was allocated to initiatives on a rigorous basis as described below. The following flowchart summarises the funding mechanism. A brief explanation of each numbered stage follows the figure.

**Figure 6** Funding Review and Approval Mechanism



**Stage 1** – Trial / research ideas for possible support were discussed between the relevant prospective project partners, and submitted to WRAP as an idea proposal. This stage of the proposal took the form of a relatively brief, idea proposal form.

**Stage 2** – The idea submission was reviewed by WRAP and either accepted, or referred back to the originator(s), for further work.

**Stage 3** – Proposals successful at the 'idea' stage were more fully drawn up as a full proposal including more detailed description of the proposed initiative.

**Stage 4** - This proposal was submitted to the 'Proposal Approval Group' (PAG) for review. The PAG comprised representatives from the 'British Beer and Pub Association', 'Scotch Whisky Association' and 'Gin and Vodka Association', organisations with no direct vested commercial interest in the success or otherwise of proposed initiatives. The PAG assessed proposals using a standard scoring matrix provided by WRAP. GTS Environmental compiled the PAG's responses and these were submitted to WRAP for final review.

**Stage 4a.** – The proposal and PAG assessment were reviewed for approval by WRAP.

**Stage 5** – Successful proposals and approval allowed for a trial or piece of research to start.

In total 10 proposals were successful in receiving support.

### 3.5 Project Partners & Interested Organisations

Through the course of the project GTS Environmental and WRAP were in dialogue and worked with a wide range of partners. These discussions were mainly focused on brand owners, but also included other partners such as:

- Trade associations such as BBPA, SIBA, SWA, GVA – a key and very supportive stakeholder group;
- Glass manufacturers – all major UK container manufacturers have been involved in the project, and represent another key stakeholder group;
- Glass stockholders;
- Retailers, such as Morrisons and The Co-operative Group;
- Technical Research organisations, such as Brewing Research International (BRI) and Bangor University 'Centre for Experimental Consumer Psychology'; and
- Other relevant 'interest' groups such as CAMRA and the 'Cider Industry Council'.

Appendix 1 gives a list of most of the organisations worked with during the project.

Approach to and discussion and / or development of rightweighting opportunities and initiatives with partners, in particular brand owners, was dependent on a number of factors including:

- **The market status of brands:** Section 2. identifies the key players in the beer, cider and spirits markets covered by this project. Such players represented a key group to be approached by GTS Environmental for development of dialogue;
- **The ability of brands to rightweight within project timescales:** a range of factors effectively prevented some brands from participating in the project including,
  - major and disruptive company rationalisations,
  - recent launch of new non-lightweight bottles (effectively delaying further re-designs for a significant period),
  - residual mould lives for existing designs, and
  - the nature of the decision making process in some larger organisations, requiring several levels of authority and policy /strategy decisions; and
- **The willingness of brands to rightweight within project timescales:** a factor dictated by the current thinking and mindset of individual organisations. Some organisations already recognised the benefits of rightweighting and a showed a willingness to discuss possibilities under the project. Other organisations, despite often extended dialogue were not ready to commit to rightweighting at the current time, although in some, but not all cases, extended dialogue did result in rightweighting work taking place.

A significant number of rightweighting initiatives have taken place during the project, however, as would be expected, and for a combination of the reasons given above, this was not possible for all. Where trials within the project timescale were not possible, GTS Environmental and WRAP aimed to 'prime' brands for future rightweighting initiatives, when conditions were more favourable.

## 4.0 Achievements under Glassrite Beer, Cider and Spirits

The Glassrite Beer, Cider and Spirits project has through its course strongly promoted the ethos and benefits of bottle right weighting across all the sectors. During the project a considerable number of successful lightweighting initiatives have taken place. These initiatives have addressed a range of barriers, and there is circumstantial evidence of growing rightweighting momentum within the sectors, and particularly within the beer and cider sectors. The spirits sector is currently less active due to the markets in which it operates and in particular, the premium market image in this sector. However, there is also evidence of growing debate in the spirits sector regarding rightweighting.

Rightweighting initiatives have either taken place with the direct (but not necessarily monetary) support of the project or have reported their achievements in association with the project, and the wider rightweighting ethos it has promoted. This section reports, the outcome of such initiatives.

The introduction of new rightweighted containers to market is almost without exception inseparable from the marketing of the brands concerned, and thereby to some extent, the success of those brands in market. For this reason such rightweighting initiatives are very often of considerable commercial and competitive sensitivity, and the brands concerned do not normally wish their endeavours to become public prior to the launch of the new container in market. For this reason, in this report it is not possible to report the detail of all the initiatives concerned, but rather, the data for such trials is presented in an anonymised form to protect the confidentiality of the companies concerned.

This report is the 'Part A' main report to the Glassrite Beer, Cider and Spirits project, and contains publicly available or suitably anonymised information. Public and non-public initiatives are presented in sections 4.1 and 4.2 respectively.

A 'Part B' report has been provided to WRAP for their internal use only, which contains information on all rightweighting initiatives under the project.

In the following tables, a 'CO<sub>2</sub> saved / tonnes per annum' figure is given. This considers savings in glass furnace emissions only, and is based on a WRAP figure of 0.685 tCO<sub>2</sub> saving / tonne glass saved, assuming a nominal 50% recycled glass content. Transport CO<sub>2</sub> savings are not included as these are much more specific to individual supply chains, the assessment of which lies beyond the scope of this project.

A percentage split between on- and off-trade is also given. Where possible this is an actual figure for the brand concerned, however, where such a figure is not available, the following WRAP sourced generic values are used, and such use stated:

**Table 4** Indicative on/off trade split by sector

Product sector	On-trade	Off-trade	Source
Wine	56%	44%	Mintel 2007
Whisky	20%	80%	Scotch Whisky Association
Gin & Vodka	57%	43%	Gin & Vodka Association
Beer (ale & lager)	57.4%	42.6%	British Beer & Pub Association
Cider	37.6%	62.4%	Mintel 2006

### 4.1 Summary of Rightweighting Initiatives

The following section provides summary data for trials in a tabular form. Trials are arranged in alphabetic order of the lead partner / brand owner, with one initiative per page.

#### 4.1.1 Bud Ice

<b>Project Name:</b>	Lightweighting of Bud Ice		
<b>Product(s):</b>	Bud Ice	<b>Sector:</b>	Beer / Lager
<b>Lead Company:</b>	Anheuser Busch		
<b>Project partners:</b>	Ardagh Glass Ltd.		
<b>Date in retail:</b>	Quarter 1 2008.		
<b>Bottle size(s):</b>	330 ml being re-sized to 300ml		
<b>Percentage weight reduction:</b>	8%		
<b>Original weight:</b>	218g	<b>New weight:</b>	200g
<b>Glass saved from waste stream / tonnes per annum:</b>	297	<b>On/off trade split (%):</b>	~5% / 95%
<b>CO<sub>2</sub> Saved / tonnes per annum:</b>	204	<b>Future glass saving opportunity (use of same bottle for other brands) / tonnes per annum:</b>	NA
<b>Description:</b>			
<p>The original Bud Ice bottle (shown) featured body embossing to give an ice effect on the bottle. Following considerable marketing discussion, the brand has been re-launched in a non-embossed bottle, with brand distinctiveness being retained through labelling. Whilst the bottle is reducing in volume from 330ml to 300ml, the weight saving is more strongly associated with the removal of the ice embossing (as exemplified by the current 330ml Budweiser bottle which is also 200g).</p> <p><b>Old bottle</b></p>			
			

## 4.1.2 Carlsberg

<b>Project Name:</b>	Lightweighting of <ul style="list-style-type: none"> <li>the Carlsberg Export bottle</li> <li>several bottles in the Carlsberg range</li> </ul>		
<b>Product(s):</b>	Carlsberg Export, Carlsberg, Carlsberg Elephant, Carlsberg Special Brew, Holsten Pils, Holsten Export, and Tuborg	<b>Sector:</b>	Beer / Lager
<b>Lead Company:</b>	Carlsberg UK Ltd.		
<b>Project partners:</b>	Ardagh Glass Ltd. Mead, SCA, Sidal and Kister – Wrap around / pack re-development Krones – Filling / trial support Darleys – label re-design PIRA – transport (transit) stability Technolink – reprographic support to accommodate re-design Maxicrown (Japan Crown Cork)		
<b>Date in retail:</b>	March 2008		
<b>Bottle size(s):</b>	275ml		
<b>Percentage weight reduction:</b>	16.7%		
<b>Original weight:</b>	210g	<b>New weight:</b>	175g
<b>Glass saved from waste stream / tonnes per annum:</b>	8,435	<b>On/off trade split (%):</b>	18% / 82%
<b>CO<sub>2</sub> Saved / tonnes per annum:</b>	~5,778	<b>Future glass saving opportunity (use of same bottle for other brands) / tonnes per annum:</b>	339
<b>Description:</b>			
<p>Carlsberg UK has reduced glass weight by ~16% across its UK portfolio. The project was designed to deliver a substantial reduction in the amount of glass used in the production of Carlsberg UK's bottle range. In addition this initiative delivers processing efficiencies and environmental benefits across the UK business.</p> <p>The initiative comprised two main elements, lightweighting of the Carlsberg Export bottle and of several other bottles in the Carlsberg brand range. The move to a more consolidated bottle range offers Carlsberg UK significant process efficiencies.</p> <p>The Carlsberg Export development included a size consolidation to 275ml only, eliminating the 300ml bottle. (275 &amp; 300ml → 275 ml). This rationalisation yields additional process efficiencies to Carlsberg. Lightweighting was of the 275 ml bottle. The redesign comprised a move to a shorter neck, with vertical embossing, removing the need for a body label, associated label packaging waste and production line complexity.</p> <p>The second initiative again moved to a shorter necked non-embossed straight walled bottle, with neck embossing on some brands.</p> <p>It is understood the resulting 275ml bottles represent BIC by some ~23g (based on DHL data).</p> <p>Initiative activities through the project include:</p> <ul style="list-style-type: none"> <li>Re-design of artwork (cutter guides and plates) for the new profile bottles</li> <li>Bottle design, modelling, production, and filling trials</li> <li>Product performance testing specifically looking at stability within the supply chain.</li> </ul>			

**Before and After Bottles in the Carlsberg Range – in all cases new bottle on right**



### 4.1.3 C&C Magners

<b>Project Name:</b>	Rite-weighting Magners N/R Pint bottle		
<b>Product(s):</b>	Magners Original Irish Cider	<b>Sector:</b>	Cider
<b>Lead Company:</b>	C&C Group plc		
<b>Project partners:</b>	Ardagh Glass, Quinn Glass, Owens Illinois (manufacturers) GTS (consultancy and product performance testing) Smurfit Kappa / Anecto Ltd. to support supply chain ('transit') testing		
<b>Date in retail:</b>	March 2008		
<b>Bottle size(s):</b>	1 pint (568ml)		
<b>Percentage weight reduction:</b>	In excess of 10%		
<b>Original weight:</b>	---	<b>New weight:</b>	---
<b>Glass saved from waste stream / tonnes per annum:</b>	8,320	<b>On/off trade split (%):</b>	~80% / 20%
<b>CO<sub>2</sub> Saved / tonnes per annum:</b>	5,699	<b>Future glass saving opportunity (use of same bottle for other brands) / tonnes per annum:</b>	NA C & C Group are considering further lightweighting in the Magners range

#### Description:

The Magners brand formed part of the resurgence of the cider category. Associated with this market growth the C&C Group invested in a number of new filling lines at their Clonmel production site, configured to run the pint bottle.

Magners committed to a lightweighting initiative under the project, which benefited from the triple headed project input of Ardagh Glass, Quinn Glass and Owens Illinois as well as consultancy and testing support from GTS. C & C recognised the significant cost savings possible from such a move. However a financial constraint on the project was that due to the recent investment in the filling line, the lightweighted bottle would be required to run with the change parts for the existing bottle. In addition, limitation and management of brand image risk was also a factor, placing constraints on the bottle redesign.

Following several design iterations, and C&C's marketing review, a revised design was agreed, retaining the original bottle height, and with a marginal reduction in bottle diameter, within filling line tolerances.

A key barrier addressed through the initiative was ensuring fitness for purpose through the filling line and transport through the wider supply chain – 'transit testing'; as an Irish based brand, the supply chain includes shipping by both road and sea. This element of work required a critical assessment of the Magners supply chain, and testing, supported by Smurfit Kappa and Anecto Ltd. This testing included the development of tests suitable to meet C&C's needs.

The work under this project also acted as a primer for further significant lightweighting of the Magners bottle range.

#### Old Bottle



#### 4.1.4 Cobra Beer

<b>Project Name:</b>	Lightweighting of Cobra 660ml Bottle		
<b>Product(s):</b>	Cobra Beer	<b>Sector:</b>	Beer / Lager
<b>Lead Company:</b>	Wells and Young		
<b>Project partners:</b>	Ardagh Glass		
<b>Date in retail:</b>	April 2007		
<b>Bottle size(s):</b>	660ml		
<b>Percentage weight reduction:</b>	21%		
<b>Original weight:</b>	469g	<b>New weight:</b>	370g
<b>Glass saved from waste stream / tonnes per annum:</b>	693	<b>On/off trade split (%):</b>	57.4% / 42.6% Generic Value
<b>CO<sub>2</sub> Saved / tonnes per annum:</b>	475	<b>Future glass saving opportunity (use of same bottle for other brands) / tonnes per annum:</b>	NA
<b>Description:</b>			
<p>In 2005, Wells &amp; Young's lightweighted their 330ml Cobra bottle, yielding glass savings of more than 200 tonnes.</p> <p>This achievement was replicated for the brand's 660ml Cobra bottle with the introduction of a 21% lighter bottle in April 2007. With only marginal changes in bottle height and diameter, the revised bottle retained the heavy and characteristic embossing of the original, thereby protecting the brand's image.</p>			
<b>New bottle on Right</b>			
			

#### 4.1.5 Consortium Bottle

<b>Project Name:</b>	Consortium bottle redesign		
<b>Product(s):</b>	'Consortium bottle', common bottle used by Frederic Robinson Ltd. (including Double Hop), Black Sheep Brewery (including Riggwelter), Broughton Ales (including Black Douglas).  In total used for 25 different ales.	<b>Sector:</b>	Beer / Ale-Stout (and Lager)
<b>Lead Company:</b>	Frederic Robinson Ltd. (and filler)		
<b>Project partners:</b>	Ardagh Glass Ltd. Black Sheep Brewery Broughton Ales Brewery.		
<b>Date in retail:</b>	November 2007		
<b>Bottle size(s):</b>	500ml		
<b>Percentage weight reduction:</b>	24%		
<b>Original weight:</b>	391g	<b>New weight:</b>	296g
<b>Glass saved from waste stream / tonnes per annum:</b>	545	<b>On/off trade split (%):</b>	0% / 100%
<b>CO<sub>2</sub> Saved / tonnes per annum:</b>	373	<b>Future glass saving opportunity (use of same bottle for other brands) / tonnes per annum:</b>	34 tonnes. Extended use of the bottle for a further Robinson's brand
<b>Description:</b>			
<p>The Consortium bottle has for a number of years been shared by the 3 named breweries, and is filled by Frederic Robinson Ltd.. The rightweighting initiative required agreement of a design mutually acceptable to the three brand stakeholders, through a number of design and management meetings.</p> <p>Trial activities included acrylic model and pilot mould sample production and filling trials necessary to prove bottle functionality on the line.</p> <p>The taller slimmer bottle increases bottles per pallet, reduces storage space and offers a retailing benefit (more bottles per shelf), whilst retaining the characteristic embossed hop bine motif.</p> <p>The new bottle represents current sector best in class for a 500ml ale bottle by a nominal 3g.</p> <p><b>New bottle on left.</b></p>			
			

#### 4.1.6 Hall and Woodhouse – Badger Ales

<b>Project Name:</b>	New H&W Lightweight Ale Bottle		
<b>Product(s):</b>	All Badger brand ales including:  Badger First Gold, Tanglefoot, Golden Champion, Golden Glory, England's Gold etceteras	<b>Sector:</b>	Beer / Ale
<b>Lead Company:</b>	Hall and Woodhouse		
<b>Project partners:</b>	O-I 'Butcher and Gunderson' and 'Ideation' design and market research support		
<b>Date in retail:</b>	April 2008		
<b>Bottle size(s):</b>	500ml		
<b>Percentage weight reduction:</b>	27%		
<b>Original weight:</b>	409g	<b>New weight:</b>	300g
<b>Glass saved from waste stream / tonnes per annum:</b>	1,635	<b>On/off trade split (%):</b>	~ 0% / 100%
<b>CO<sub>2</sub> Saved / tonnes per annum:</b>	1,120	<b>Future glass saving opportunity (use of same bottle for other brands) / tonnes per annum:</b>	NA
<b>Description:</b>			
<p>In autumn 2006, H&amp;W committed to lightweighting the bottle used across their brand range due to the glass cost savings that could be achieved and the opportunity to refresh the brand image of their long standing bottle. Following a significant design and market research phase, which comprised in depth focus groups and a wider less deep survey, a new and significantly different bottle design was nominally agreed. In addition to brand image, the design process also had to consider pack stability through the H&amp;W filling line.</p> <p>The new taller slimmer design features an asymmetric label panel which requires bottle alignment for labelling. At this stage in the initiative, two glass designs were on the table. One design relied on a physical spotting bar to orientate the bottle for labelling, with the other lighter design relying on optical spotting for bottle alignment; the optical spotting approach required additional capital spend on the filling line. After due consideration the H&amp;W family board committed to the optical spotting approach, recognising the additional net benefits available from opting for the lighter bottle.</p> <p>The new bottle is significantly taller and slimmer than its predecessor, allowing more bottles per pallet and per shelf offering transport CO<sub>2</sub> benefits in addition to those accrued in glassmaking.</p>			
<b>New bottle on Right</b>			
			

#### 4.1.7 Marston's

<b>Project Name:</b>	Marston's Lightweight Bottle		
<b>Product(s):</b>	All Marston's brand 500ml NRB, including Pedigree, Old Empire & Burton Bitter.	<b>Sector:</b>	Beer / Ale
<b>Lead Company:</b>	Marstons plc		
<b>Project partners:</b>	O-I		
<b>Date in retail:</b>	November 2007		
<b>Bottle size(s):</b>	500ml		
<b>Percentage weight reduction:</b>	22%		
<b>Original weight:</b>	---	<b>New weight:</b>	---
<b>Glass saved from waste stream / tonnes per annum:</b>	1018	<b>On/off trade split (%):</b>	57.4% / 42.6% Generic Value
<b>CO<sub>2</sub> Saved / tonnes per annum:</b>	697	<b>Future glass saving opportunity (use of same bottle for other brands) / tonnes per annum:</b>	NA
<b>Description:</b>			
<p>During 2007 Marston's with their bottle supply contract up for re-negotiation, took the opportunity to review their bottle design with manufacturer O-I. This move was made as a cost control measure and to align with the company CSR policy.</p> <p>In November 2007, Marston's introduced the new rightweighted bottle for their Marston's Branded 500ml NRB portfolio. The new taller slimmer bottle reflects evident trends in the ale sector, and allowed a reduction in bottle diameter to meet retailer requirements for shelf ready packaging and the requirement to fit 2 x 8 bottle packs on the smallest depth of shelf.</p> <p>The redesign also allowed the enhancement of the shoulder embossed Marston's logo, and the incorporation of changing Government information requirements in the revised labelling.</p>			
<b>New bottle on Right</b>			
			
<p>Marston's plc is considering adopting a similar approach for other brands in the company portfolio (e.g. Banks's, Jennings &amp; Ringwood).</p>			

#### 4.1.8 Refresh Drinks – Wychwood

<b>Project Name:</b>	Wychwood 500ml nrb, lightweighting		
<b>Product(s):</b>	All Wychwood 500ml; including Hobgoblin, Fiddlers Elbow, Circlemaster, Black Wych	<b>Sector:</b>	Beer / Ale
<b>Lead Company:</b>	Refresh UK plc		
<b>Project partners:</b>	Ardagh Glass – manufacturer Marston's – filler GTS – fitness for purpose testing		
<b>Date in retail:</b>	Expected August 2008		
<b>Bottle size(s):</b>	500ml		
<b>Percentage weight reduction:</b>	10-14%		
<b>Original weight:</b>	385g	<b>New weight:</b>	alternative proposals 345g and 333g (1/2 way point 339g)
<b>Glass saved from waste stream / tonnes per annum:</b>	608 to 790 (Average 699)	<b>On/off trade split (%):</b>	0% / 100%
<b>CO<sub>2</sub> Saved / tonnes per annum:</b>	417 to 541 (Average 479)	<b>Future glass saving opportunity (use of same bottle for other brands) / tonnes per annum:</b>	NA
<b>Description:</b>			
<p>In the name of reducing glass cost, PRN liability and carbon footprint, Refresh decided to reduce the weight of the bottles they use.</p> <p>After due consideration of their 3 main bottle types it has been decided to progress first on the highest use bottle, used across the Wychwood portfolio.</p> <p>An initial barrier to the initiative was the possible need to redesign the secondary packaging if the bottle significantly changed diameter and height. However, it was decided to lightweight the Wychwood bottle, nominally within its dimensional envelope, to minimise the risk of packing issues.</p> <p>Trials in the early part of the year using acrylic mock-ups of the proposed designs will be used to assess how the new bottle would run down the contract filling line, (Marston's), in respect of line speed or breakages. Additionally, the trials will assess how the new design packs into current secondary packaging. In both cases the trials will be used to enable bottle design modifications prior to glass production and/or to cost any required plant modifications.</p>			
<b>Old Bottle</b>			
			

#### 4.1.9 Scottish and Newcastle – Newcastle Brown Ale

<b>Project Name:</b>	Newcastle Brown Ale move to lightweight single trip bottle										
<b>Product(s):</b>	Newcastle Brown Ale (NBA)	<b>Sector:</b>	Beer / Ale								
<b>Lead Company:</b>	Scottish & Newcastle UK Ltd										
<b>Project partners:</b>	Quinn Glass, S&N UK – Tadcaster (filler)										
<b>Date in retail:</b>	November 2007										
<b>Bottle size(s):</b>	550 ml										
<b>Percentage weight reduction:</b>	26% This includes a shift from a returnable bottle, largely used as a single trip bottle, to a 100% single trip design, used solely in that mode.										
<b>Original weight:</b>	---	<b>New weight:</b>	---								
<b>Glass saved from waste stream / tonnes per annum:</b>	4,180  (this is the additional glass weight which would have been consumed, if the original returnable bottle had been retained for a 100% single trip supply chain)	<b>On/off trade split (%):</b>	57% / 43%								
<b>CO<sub>2</sub> Saved / tonnes per annum:</b>	2,863	<b>Future glass saving opportunity (use of same bottle for other brands) / tonnes per annum:</b>	NA								
<b>Description:</b>											
<p>In early 2007 S&amp;N decided to close their NBA filling line, on the basis that a high proportion of the product, being supplied in returnable grade bottles, was in fact being consumed in a single trip mode, and that this was negatively impacting on cost and operational efficiencies.</p> <p>S&amp;N concluded it was no longer necessary or economically viable to supply Newcastle Brown Ale in returnable bottles, and additionally, use of 100% single trip glass bottles was now environmentally superior to transport, cleaning and refill of returnable bottles.</p> <p>The decision to close the line was accompanied by a move to a single trip bottle fit for that purpose, rather than an effectively over engineered returnable design.</p> <p>In addition to operational efficiencies, the move resulted in reduced glass costs and PRN liability.</p> <p>Whilst marginally shorter, the new bottle retains the look, feel and embossing of the original bottle, thereby maintaining brand identity.</p>											
<table style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;"><b>Old</b></td> <td style="width: 25%;"><b>New</b></td> <td style="width: 25%;"><b>Old</b></td> <td style="width: 25%;"><b>New</b></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </table>				<b>Old</b>	<b>New</b>	<b>Old</b>	<b>New</b>				
<b>Old</b>	<b>New</b>	<b>Old</b>	<b>New</b>								
											

#### 4.1.10 Scottish and Newcastle – Strongbow / Strongbow SIRRUS

<b>Project Name:</b>	Rightweighting of Strongbow / SIRRUS Bottle		
<b>Product(s):</b>	Strongbow / Strongbow SIRRUS	<b>Sector:</b>	Cider
<b>Lead Company:</b>	Scottish & Newcastle UK Ltd		
<b>Project partners:</b>	Quinn Glass – Glass manufacturer HP Bulmers – Hereford - Producer. Thomas Hardy – Kendal - Filler		
<b>Date in retail:</b>	November 2007		
<b>Bottle size(s):</b>	275 ml		
<b>Percentage weight reduction:</b>	14%		
<b>Original weight:</b>	---	<b>New weight:</b>	---
<b>Glass saved from waste stream / tonnes per annum:</b>	627	<b>On/off trade split (%):</b>	7% / 93%
<b>CO<sub>2</sub> Saved / tonnes per annum:</b>	430	<b>Future glass saving opportunity (use of same bottle for other brands) / tonnes per annum:</b>	NA
<b>Description:</b>			
<p>In November 2007 Scottish and Newcastle launched a new lightweight bottle for their Strongbow and Strongbow SIRRUS brands. The bottle reduced the weight of the bottle by 14% whilst retaining its strength and brand image. The initiative was primarily introduced to reduce glass costs and PRN liability.</p>			
<b>New Bottle</b>			
			

#### 4.1.11 SAB Miller – Miller Genuine Draft

<b>Project Name:</b>	Weight reduction Miller Genuine Draft		
<b>Product(s):</b>	Miller Genuine Draft (MGD)	<b>Sector:</b>	Beer / Lager
<b>Lead Company:</b>	SABMiller – Miller Brewing Company USA		
<b>Project partners:</b>	Saint Gobain - manufacturer – (not UK) Bierre Peroni Padova, Italy – Brewer		
<b>Date in retail:</b>	November 2007		
<b>Bottle size(s):</b>	330ml		
<b>Percentage weight reduction:</b>	8%		
<b>Original weight:</b>	218g	<b>New weight:</b>	200g
<b>Glass saved from waste stream / tonnes per annum:</b>	1,152	<b>On/off trade split (%):</b>	34% / 66%
<b>CO<sub>2</sub> Saved / tonnes per annum:</b>	789	<b>Future glass saving opportunity (use of same bottle for other brands) / tonnes per annum:</b>	NA
<b>Description:</b>			
<p>Through a bottling review exercise SAB assessed bottling options for the MGD brand, including possible changes of bottle volume and / or lightweighting.</p> <p>Through this process it was decided to retain and rightweight the 330ml bottle. During discussions the bottle filler requested the new bottle to be increased in weight, in order to maximise filling line efficiencies, without the need for change parts.</p> <p>However, recognising the wider benefits of lightweighting, SAB Miller opted for a lighter bottle and committed to capital spend for change-parts to accommodate the reduced dimensions of the lightweighted 330ml bottle and maintain line efficiencies.</p> <p>The new bottle retains height, and retains and enhances the bottles embossing, with a new heel embossed band. The marginally narrower bottle also requires less secondary packaging.</p>			
<b>Old bottle</b>	<b>New bottle</b>	<b>Old Bottle</b>	<b>New Bottle</b>
			

#### 4.1.12 Thatchers Cider

<b>Project Name:</b>	Lightweighting of Thatchers Cider Bottle		
<b>Product(s):</b>	Thatchers Cider, including Katy	<b>Sector:</b>	Cider
<b>Lead Company:</b>	Thatchers Cider Company Ltd		
<b>Project partners:</b>	Ardagh Glass		
<b>Date in retail:</b>	Spring 2008		
<b>Bottle size(s):</b>	500ml		
<b>Percentage weight reduction:</b>	21%		
<b>Original weight:</b>	460g	<b>New weight:</b>	365g
<b>Glass saved from waste stream / tonnes per annum:</b>	646	<b>On/off trade split (%):</b>	37.6% / 62.4% Generic Value
<b>CO<sub>2</sub> Saved / tonnes per annum:</b>	443	<b>Future glass saving opportunity (use of same bottle for other brands) / tonnes per annum:</b>	NA
<p><b>Description:</b>            The bottle used for Thatchers range of ciders has been lightweighted, with an associated label re-design retaining the brand character.</p> <p>The bottle has been redesigned to offer stronger shelf presence, whilst reducing packaging requirements.</p>			
<b>Old Bottle</b>		<b>New Bottle</b>	
			

#### 4.1.13 Wells and Young

<b>Project Name:</b>	Consolidation and lightweighting of Wells & Young's Ale bottles		
<b>Product(s):</b>	18 beers will share the new bottle including - <b>Wells</b> Bombardier, Eagle and Banana Bread, and <b>Youngs</b> Bitter, Waggle Dance and Double Chocolate Stout	<b>Sector:</b>	Beer / Ale-Stout
<b>Lead Company:</b>	Wells & Young's Ltd.		
<b>Project partners:</b>	Ardagh Glass Ltd. GTS Ltd.		
<b>Date in retail:</b>	March 2008		
<b>Bottle size(s):</b>	568 ml Wells and 500ml Youngs → 500ml share bottle		
<b>Percentage weight reduction:</b>	23%		
<b>Original weight:</b>	432g (Wells), 437g (Youngs)	<b>New weight:</b>	335g Shared
<b>Glass saved from waste stream / tonnes per annum:</b>	949	<b>On/off trade split (%):</b>	0.5% / 99.5%
<b>CO<sub>2</sub> Saved / tonnes per annum:</b>	650	<b>Future glass saving opportunity (use of same bottle for other brands) / tonnes per annum:</b>	NA
<b>Description:</b>			
<p>During 2007 made the decision to consolidate and lightweight their two brand ranges (and sizes) in existing heavyweight bottles into a single 500ml lightweight container. The initiative was undertaken as it offered significant process and environmental benefits with brand differentiation retained through labelling.</p> <p>Through a bottle design and development agency, a bottle, and labelling which met the needs of the two brands was proposed. Following production of sample glass bottles, the new bottle underwent filling trials and fitness for purpose testing, before launch in retail in Spring 2008.</p>			
<p><b>Old Wells Bottle on Left, Old Youngs Bottle on Right, New Shared Bottle in middle.</b></p>		<p><b>Youngs Brands in the New Bottle</b></p>	
			

## 4.2 Summary of Rightweighting Initiatives not yet Publicly Announced

The following table provides an overview for rightweighting initiatives which cannot currently be publicised due to commercial confidentiality requirements:

**Table 5** Summary of Initiatives, not yet publicly announced

<b>Product Sector</b>	<b>Glass saving / tpa</b>	<b>% weight reduction</b>	<b>Date in market</b>
Beer / Ale - multiple bottles	1724	22-25%	June to August 08
Beer / Ale	747	21%	July to August 08
Spirits	514	21% - 28%	June 08

### 4.3 Performance Against Project Targets

The project had a target to realise glass savings of 20,000 tonnes per annum during the project period. As is evidenced from the preceding sections (4.1 and 4.2) very significant rightweighting has taken place or been set in motion during the project period, which meets and exceeds this target. These achievements are summarised in the following table. Initiatives reaching market within the project period (nominally Jan07-March08), are classed as 'delivered tonnes', whereas initiatives which have received project support, but are not due to come to market until after March 2008, are termed 'in-delivery' tonnes:

**Table 6** Summary of Project Achievements (Italics indicate generic on- / off-trade split used as given in table 4, where brand specific splits cannot be given).

Delivered tonnes				
Product	On-trade	Off-trade	Total	Delivery Date
Bud Ice	15	282	297	Q1 2008
Carslberg suite	1,518	7,170	8,435	March 2008
C&C Magners 1 pint	6,656	1,664	8,320	April 2008
Cobra 660ml	<i>397</i>	<i>295</i>	693	April 2007
Consortium Bottle	0	545	545	November 2007
Badger Ales – H&W	0	1,635	1,635	April 2008
Marstons suite	<i>584</i>	<i>434</i>	1,018	November 2007
Newcastle Brown Ale	2,383	1,797	4,180	November 2007
Strongbow / Sirrus	44	583	627	November 2007
MGD – SAB Miller	392	760	1,152	November 2007
Thatchers Cider	<i>243</i>	<i>403</i>	646	Spring 2008
Wells and Young suite	4.8	944	949	March 2008
<b>Sub-total: Delivered tonnes</b>			<b>28,581</b>	
In-delivery tonnes				
Product	On-trade	Off-trade	Total	Proposed delivery date
Refresh - Wychwood	0	~699	~699	August 2008
Beer / Ale - multiple bottles	<i>990</i>	<i>734</i>	1724	June to August 08
Beer / Ale	0	747	747	July to August 08
Spirits	<i>103</i>	<i>411</i>	514	June 08
<b>Sub-total: In-delivery tonnes</b>			<b>3,684</b>	
<b>Total tonnes saved</b>			<b>32,265</b>	
<b>Project Target</b>			<b>20,000</b>	

The above achievements demonstrate a high level of rightweighting activity within the beer and cider sectors, suggesting growing sector momentum, and the development of a culture in which rightweighting is a key consideration in any bottle re-design initiative; this trend reflects the multi-fold benefits available to businesses from rightweighting. The notable exception to the above trend is the spirits sectors in which only one initiative can be reported.

Despite very considerable efforts throughout the project, the spirits sector remains the least engaged of all sectors considered. This apparent reticence to consider rightweighting is strongly associated with the premium brand image prevalent in the spirits sector combined with the fact that much UK-based spirits production is destined for overseas markets where it is believed that culturally, quality is strongly equated with weight. In order to address these issues, it is believed that further in depth consumer perception works may be required to better understand how consumers really do regard and place value on such products. Additionally, residual mould life for existing bottle designs also represents a significant cost barrier to lightweighting in this sector.

However, it must be recognised that discussions with spirits brand owners have been far from fruitless. There is growing interest in, and recognition of the benefits of rightweighting, and tentative ideas mooted regarding rightweighting initiatives in the medium term.

The following table considers the above achievements by subsector and in the context of glass use and savings potential given in section 2.2:

**Table 7** Summary achievements by subsector

Sector	Achieved Tonnage Saving / tonnes	Number of Contributing Initiatives	Estimated saving potential / tonnes	Estimated total glass consumption / ktonnes	Saving as Percent of total Glass consumption
Lager	10,600	4	16,000	600-700	2%
Ale	11,600	9	3,000-5,000	60	19.3%
Cider	9,600	3	Unknown	150	6.4%
Spirits	500	1	3,000-4,000	200	0.25%
Total	32,300	17	23,500	1,060	3.3%

Based on the above table, and recognising the imprecise nature of the 'total use' and 'saving potential' estimates, involved, the following observations are made:

- **Lager** – the savings achieved approach the estimated potential, but represent a small percentage of the overall market. A projected forward 3,000 tonnes saving by a brand in this sector, would increase savings toward the estimated potential. It is also noted that the major contributor to the lager saving made percentage weight savings significantly greater than the 10% used in the estimate. The fact that the savings represent a low percentage of the overall market consumption, probably reflects the fact that lager bottles are in general already relatively light, making improvement potential more modest;
- **Ale** – savings in the ale sector far outstrip the estimated potential, and reflect the high level of activity in this subsector and engagement of many of the major players, combined with high percentage savings in bottle weight;
- **Cider** - the more than 6% saving in this sector against total glass consumption is a significant achievement, and reflects in two of the contributing initiatives, a shift away from very heavy bottles; and
- **Spirits** – the very low percentage saving and number of initiatives in this sector reflect the identified premiumisation barrier, and associated with this, the key importance of the export market in influencing bottle designs.

Viewed across all categories it is clear that the project has far outstripped the potential identified in earlier studies. Participants have variously undertaken such initiatives in the name of reducing glass and PRN liability costs, improving process and line efficiencies, meeting retailer requirements for packaging reduction and shelf ready packaging, reducing their environmental impacts, and notably, refreshing and enhancing marketing image. The examples shown demonstrate that rightweighting can take place without noticeably changing bottle appearance (for example, Cobra Beer), or indeed can be used to enhance a brands marketing appeal with a new look (for example, Hall and Woodhouse's Badger Ales bottle).

Other rightweighting initiatives are in plan or progress, which it is not currently possible to report in these sections, 4.1 or 4.2 above, but which clearly add to the general rightweighting momentum and associated benefits. There is also a growing indication of the introduction of lightweight generic ale and cider bottles to market, and the uptake of these bottles by brands without their own bespoke designs.

However, it should be recognised that in each of the categories key players can be identified which were not involved in initiatives during the project period. In this context, it is believed that further significant potential for rightweighting and its associated benefits remains.

## 5.0 Project Research

A number of areas of research have been conducted under the project in support of the project objectives:

- **The Impact of Bottle Lightweighting on the Protection Offered by Glass from Lightstrike in Beer** – a desktop and experimental study conducted by GTS;
- **The Future of Glass Forming Technology in Relation to the Manufacture of Lightweight Containers** - a desktop study conducted by GTS;
- **Consumer Perception Research at Bangor University 'Centre for Experimental Consumer Psychology'** – this research was conducted in relation to a specific spirits sector initiative, to support the business and marketing decision making process; and
- **Cross Lager Brand Bottle Redesign Exercise** – a sector lead initiative to investigate options for cross sector bottle design standards.

With the exception of the last exercise, these pieces of individual research are reported in full separately from this report, and where relevant published. However, the following sections provide a brief summary for each of these pieces of work. In relation to the consumer perception study, it has been necessary to anonymise the brand concerned for commercial confidentiality reasons.

## 5.1 The impact of bottle lightweighting on the protection offered by glass from lightstrike in beer

### 5.1.1 Introduction

Since the late 19<sup>th</sup> Century the impact of light on the flavour of beer has been studied and documented. It is known that light at wavelengths between 350 and 520 nanometres causes a reaction in sulphur-containing amino acids from hops, to produce a compound known as 3-methyl-2-butene-1-thiol or 'MBT'. This effect is known as 'lightstrike'. MBT gives beer a flavour that is considered undesirable by brewers and consumers and which is often associated with a skunk like aroma, giving the effect its other common name, 'skunking'. Each of the many different hops used in the brewing industry have their own characteristics in this regard, with a varying propensity to suffer lightstrike.

Traditionally brewers have relied on amber bottles of a certain thickness (approximately 3.5mm) to filter out the harmful wavelengths of light and protect their product. However brand owners are now using both flint and green bottles as part of the marketing for certain beers. Additionally, more recently rightweighting initiatives have resulted in thinner bottles for all glass colours.

The aim of the study was to assess whether or not moving to lightweighted bottle designs with thinner walls, critically affects the protection from light afforded to the beer by the bottle.

### 5.1.2 Methods

A desktop study was conducted to confirm the relevant wavelengths of concern, and to understand previous work in the area.

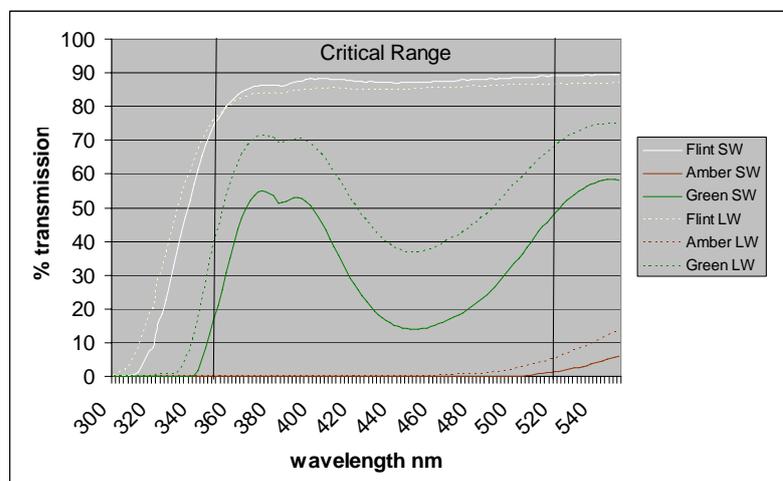
A key element of this study was a laboratory based experimental phase. Due to the very variable nature of different beers in relation to lightstrike, the study did not measure the formation of MBT in beer as this result could not be generalised across all beers. Rather, the transmission characteristics of different colours and thicknesses of glass were assessed, to identify how protection of the beer against the critical wavelengths would change with thickness and colour.

Beer bottles representing lightweight and non-lightweight (traditional) designs of different colours were sectioned to produce samples for spectrographic analysis. The light transmission through these samples was tested at traditional and lightweighted wall thicknesses, and additionally at a further reduced thickness. Transmission curves were produced for wavelengths 300 and 550 nm.

### 5.1.3 Findings

The following graph summarises the key study findings.

**Figure 7** Transmission Curves for Glass of Varying Thickness and Colour



In this graph low transmission values are good, indicating less light of the damaging wavelengths makes it through the glass wall, and reaches the beer.

The well established order of amber, green and flint is evident, in terms of the general level of light protection afforded by the different colour glasses.

The most significant findings of the study are that:

- Relative to green and amber glass, flint glass offers poor light protection, but within experimental error, this level of protection is not further degraded by lightweighting;
- Green glass offers an intermediate level of protection, the level of which varies approximately linearly with glass thickness; and
- Amber glass offers excellent light protection against lightstrike, and this protection does not notably suffer on lightweighting.

#### *5.1.4 Conclusions*

The results obtained indicate that there is very little difference in the lightstrike protection offered by flint and amber bottles as a result of lightweighting; amber glass continues to provide excellent protection in lightweighted containers, and as such brand owners can lightweight without risk of product damage.

For green glass 15% to 20% less protection is offered by the lightweighted bottle. The use of specially formulated glass compositions or light protective coatings would be needed to improve the protection offered.

The full report can be downloaded at [www.wrap.org.uk/retail](http://www.wrap.org.uk/retail)

## 5.2 The Future of Glass Forming Technology in Relation to the Manufacture of Lightweight Containers

### 5.2.1 Introduction

The introduction and use of rightweighted containers is critically dependent upon the glass forming technologies available for their manufacture. For many years, 'blow-blow' technology was the dominant glass bottle forming process, however, more recently the 'narrow neck press and blow' (NNPB) has become the dominant technology for the production of lightweight bottles. Superior dimensional control and consistency available from NNPB allows lighter bottles to be produced without compromising fitness for purpose or market appeal.

However, the current NNPB process inevitably has limitations on the minimum bottle weight which can be achieved, this also being critically dependent on bottle design and volume.

Nonetheless, interest exists within the beer, cider and spirits sectors to move to bottle weights beyond current NNPB technologies.

The aim of this study was to review where the future of glass forming technology lies in respect of the production of lightweight containers. The study reviews incremental improvements from the current state of play, through to more significant step changes in technology. In addition to the technological possibilities, consideration is also given to cultural and market drivers which impact on the development and uptake of new technologies.

### 5.2.2 Methods

The central element of the study was around discussions with key players and stakeholders in the sector. A wide range of bodies were consulted, key amongst which were:

- Manufacturers of IS machines and related equipment;
- Glass manufacturers; and
- Glass / material research bodies and universities.

In addition to these key groups, other stakeholders such as glass trade associations, technology service providers and glass consultancies were consulted as appropriate.

Provision of advanced forming technologies is naturally a commercial activity and this influenced the willingness and ability of certain bodies to openly discuss development within their organisations. In consequence, contributions to the project ranged from in depth discussion of possible new technologies, to provision of more limited organisational statements.

The discussions outlined above were complimented by a focussed review of aspects of the very considerable literature available on the subject.

### 5.2.3 Findings

The study gained good insight into the future possibilities in relation to glass lightweighting. Areas of possible technological development were categorised into 4 areas:

- **Process control improvements** - focussing on enhanced control of current technologies;
- **Enabling down stream technologies** - handling and inspection techniques capable of accommodating ultra-lightweight containers;
- **Strength improvement** – considering coatings / treatments to strengthen glass in order to compensate for glass thinning from lightweighting; and
- **Forming technologies** – more significant seed changes in the mechanics of forming, the most prominent candidate technology appearing to be single stage forming using a porous plunger.

The study found that development and uptake of the above technological possibilities must be seen in the context of cultural, market and manufacturing drivers. These fall into two categories:

- **Societal demand** – the demand for lightweight bottles. In the UK such drive is relatively high through initiatives such as the Glassrite projects, WRAP's Courtauld Commitment, and the growing profile of environmental issues amongst consumers. This is not so in all regions, or indeed in much of Europe (where returnable bottles remain much more prevalent). There is significant evidence that manufacturers will not 'push' further development of lightweighting technologies without such demand being present; and
- **Manufacturing considerations** – unsurprisingly for the majority of manufacturers, key operational drivers are to increase speed, productivity and energy efficiency; such drivers are not with odds with lightweighting *per se*. However, there is also evidence of some moves to 'deskill' the manufacturing process with increasing automation and 'process toughening / simplification' to allow this. This seems to an extent to be associated with moves to offshore manufacture in order to minimise energy and labour costs. Such technological drivers are not conducive to the development and uptake of lightweighting technologies, which necessarily work within finer tolerances.

#### 5.2.4 Conclusions

There exist a number of technological possibilities for further lightweighting of glass containers. These range from incremental improvements in current technologies, through to capital intensive step changes in forming technique. However, the development and uptake of such possibilities is strongly linked with societal demands, and the operational needs of manufacturers themselves. Future possibilities should also be seen in the context that the control of new technologies is increasingly focussed in a small number of organisations, and that these are responding to the needs of increasingly global rather than local glass markets.

The full report can be downloaded at [www.wrap.org.uk/retail](http://www.wrap.org.uk/retail)

## 5.3 Consumer perception Research at Bangor University 'Centre for Experimental Consumer Psychology'

**Note** – for commercial confidentiality reasons it has been necessary to anonymise the brand involved in this study, and discussion is limited to the reasons for, approach to and outline findings of the study.

### 5.3.1 Introduction

It has earlier been identified, that brand premiumisation is a key issue in the spirits sector in respect of lightweighting, with bottle weight and size often equated with quality.

During the course of the project, a rightweighting initiative with a major brand in the spirits sector encountered this issue, with the brand marketers expressing concern that the proposed rightweighted design would be less well regarded by consumers than the original bottle, and in comparison to competitor products. The proposed rightweighted design reflected the general design of the original bottle but was slightly shorter.

To address the above concern and barrier to rightweighting the Bangor University, 'Centre for Experimental Consumer Psychology' (CECP) was engaged to conduct consumer research for the proposed new design compared to the brands competitors.

### 5.3.2 Methods

A dressed acrylic model of the proposed 70cl rightweight design was provided to for use in visual (only) consumer perception testing. The sample was presented to consumers along with 5 competitor brands, and the participants asked to rank the bottles on the following criteria:

- Guess the price of each bottle. Minimum £10; max £16 pounds;
- Rate the quality of the product using a scale of 0 to 200;
- Rate the bottle's appearance (attractive – unattractive) excluding the label using a scale of 1 to 5; and
- Rate the bottle's label (attractive – unattractive) using a scale of 1 to 5

During the study 100 consumers were surveyed. Average results and spread were determined for each of the study metrics.

### 5.3.3 Findings

#### Bottle Price

The bottle price was ranked 2<sup>nd</sup> highest of the 6 bottles.

#### Product Quality

The product was ranked fourth in terms of quality, but with only fine margins between second, third and fourth positions, which suggested that these three products were on a par. Notably the lightweight mockup scored significantly higher than the original bottle.

#### Bottle Attractiveness Excluding the Label

The bottle's appearance was rated highly, in second place, slightly ahead of 3<sup>rd</sup> place and significantly ahead of the remaining products. Again the lightweight mockup scored significantly higher than the original bottle.

#### Bottle Label

The label was ranked sixth on a par with 5<sup>th</sup> place and slightly behind the remaining competitor products which showed one clear leader.

### *5.3.4 Conclusions*

This study indicates that the rightweighted design was well perceived, and that the bottle shape contributed to this. The marginally weakest element of the package appeared to be the label. Such objective consumer based research is clearly of considerable value to the marketers of the brand concerned.

## 5.4 Cross-lager Brand Bottle Redesign Exercise

### 5.4.1 Introduction

In September 2006, before project inception, a 'beer round table' was held in London, considering amongst other things the lightweighting agenda. One outcome of this event was the formation of a 'brewer's packaging managers group' under the auspices of the Glassite Beer, Cider and Spirits project, in association with the British Beer and Pub Association (BBPA).

The introduction of this group was championed by Coors Brewers Ltd, key players in the Containerlite project with the Grolsch initiative. Coors Brewers Ltd remained keen to further lightweight their bottles but felt limited by current lager bottle design 'standards' which currently prevail in the sector. It was for this reason that the 'brewer's packaging managers group' was formed to consider these issues.

At the initial meeting of the group (December 2006), two key areas for consideration were identified:

- Mainstream lager brand marketing currently strongly favours tall bottles, or bottles with a height no less than competitor brands, to give strong 'shelf presence'. This is prevalent across brands, and is not conducive to bottle lightweighting. The need to address this marketing norm was highlighted as key if maximum lager bottle lightweighting potential was to be achieved within the sector; and
- A forward view of next generation glass manufacturing and forming technology, which may allow further step changes in bottle weight.

### 5.4.2 Methods

The group met twice, and the chosen way forward was identified as a paper exercise to create a cross-lager brand alternate 'vision of the future'. That is, what a rightweighted set of lager bottles could look like, including reduction of bottle height. The reason for this approach was that it was felt that cross-brand multilateral action was necessary in order that individual brands did not feel exposed to excessive brand risk by taking unilateral action to reduce bottle height. A tentative medium term objective of this initiative was to work toward a 'brewer's Courtauld Commitment'.

Under this group, GTS Environmental drew up a preliminary outline plan for this exercise. At the second group meeting, a draft boundary condition style re-design brief was developed, and it was intended that a glass manufacturer be engaged under the project to conduct the re-design exercise.

### 5.4.3 Findings

At this juncture the BBPA presented the proposed activity to the BBPA senior executives 'Brewers Group' for their input. This group felt that unfortunately at the current time the proposed initiative was related to too competitive an issue, especially in the face of beer imported 'in bottle' not being subject to any such UK agreement on design criteria. In line with this view, the group decided that further work on such an initiative would not be practical at the current time. However, the group were supportive of both the idea of a generic 500ml ale bottle being developed and also of individual brewers working with GTS and WRAP on branded bottle lightweighting opportunities.

### 5.4.4 Conclusions

Following subsequent discussions between BBPA, GTS and Coors Brewers Ltd, and in line with the sector position, it was agreed the initiative would not be further progressed under the Glassite Beer, Cider and Spirits Project.

The second planned area of discussion of the group, 'next generation glass manufacturing and forming technology', was addressed as a piece of project desktop research as described in under section 5.2 above.

Additionally, in line with the views of the BBPA senior executives 'Brewers Group', an initiative to produce a lightweight 500ml generic ale bottle is in progress under the project, in association with the BBPA, Society of Independent Brewers Association (SIBA) and a glass manufacturer.

## 6.0 Summary

Through the course of GlassRite Beer, Cider and Spirits project, the project team has worked extensively with stakeholders in these sectors, and in particular brand owner-fillers and the UK glass manufacturers. Through this work, the benefits of rightweighting have been highlighted and rightweighting opportunities within brand portfolios identified. The project has supported brand owners in the development of these opportunities and in addressing barriers which could slow or prevent initiatives reaching market. Key barriers addressed through the project have been bottle fitness for purpose during filling, transit and consumption, and also marketing image and consumer perceptions of rightweighted bottles.

Additionally, other rightweighting activities were identified in the sector and where possible championed through the project, to help further develop a culture in which the possibilities and benefits of rightweighting are realised, and rightweighting is a central consideration in any bottle re-design exercise. Indeed, through representation at seminars, conferences and stakeholder meetings, along with project newsletters and press releases, significant profile has been given to the rightweighting agenda, and some of the early achievements under the project.

Through its activities, the project has identified and supported more than 15 rightweighting initiatives, delivering glass savings from the waste stream of ~32,000 tonnes per annum, against the project target of 20,000 tonnes.

Participants have variously undertaken such initiatives in the name of reducing glass use and PRN liability costs, improving process and line efficiencies, meeting retailer requirements for packaging reduction and shelf ready packaging, reducing their environmental impacts, and refreshing and enhancing marketing image.

Savings by sector category are summarised below:

**Table 8** Summary achievements by subsector

Sector	Achieved Tonnage Saving / tonnes	Number of Contributing Initiatives
Lager	10,600	4
Ale	11,600	9
Cider	9,600	3
Spirits	500	1
Total	32,300	17

Whilst significant activity has taken place in the lager and cider sectors, the high level of activity and achievement in the ale sector is particularly notable, with an apparent trend to taller, slimmer and significantly lighter bottles. The barrier of residual mould life occurred a number of times in this sector; however, in one case the benefits from rightweighting were considered to outweigh this barrier and the initiative proceeded, whilst in two other cases, initiatives are in plan for the project roll out period.

Overall in the beer and cider sectors there is encouraging evidence of growing levels of rightweighting activity and momentum. In order to maintain this momentum and maximise the benefits from the achievements under the project, it is believed that the nature of future GlassRite activity in these sectors should focus on advocacy, and thereby encourage 'me too' initiatives.

Notably, achievements in the spirits sector are by comparison very limited. Whilst extensive dialogue has taken place with players in this sector throughout the project, brand premiumisation is a barrier which it has not been generally possible to overcome within the limited project period and resources.

However, there are also increasing signs of movement in the spirits sector. During the latter stages of the project some very significant spirits brand owners have highlighted their renewed interest in rightweighting to GTS Environmental, at the same time speculating on possible brands which might be suitable for rightweighting.

It is hoped that when the one spirits sector initiative under the project reaches market, this will re-assure other brands that such moves can be made, yielding significant benefits without risk to brand image. In this vein, it is

believed that advocacy again has a significant forward role to play, in alliance with the relevant spirits trade associations.

To reinforce this message it is believed that further in depth consumer perception research may be required to address the brand image barrier and better understand how consumers really do regard and place value on such products. It is suggested that such an exercise might take the form of a cross brand study, giving it applicability to a wide range of brands.

Beyond achievement of delivery of tonnage savings, the project has delivered a number of pieces of research including:

- The impact of rightweighting on the light protection offered by glass – this work has shown that for amber and flint bottles, rightweighting has negligible impact on light transmission, and in particular that the excellent light protection offered by amber glass is not compromised. For green glass, light transmission does increase with glass thinning, but a ~50% thickness reduction results in only a 15-20% increase in light transmission;
- The future of forming technology – this desktop study has highlighted that technological possibilities exist for the further lightweighting of containers, but suggests that the development and use of such technologies is strongly interlinked with societal demands, and the operational needs of the glass manufacturers; and
- A spirits brand consumer perception study - this work demonstrated that strong consumer appeal can be maintained in a rightweighted spirit bottle.

## 7.0 Recommendations

The GlassRite Beer, Cider and Spirits project has been extremely successful in supporting the implementation of a number of rightweighting initiatives through the course of the project, resulting in tangible business and environmental benefits. Another key role of the project has been to support the development of a culture in which the benefits of bottle rightweighting are widely recognised, and rightweighting becomes a central consideration in any bottle re-design exercise.

Through advocacy activities during the project the rightweighting agenda, and some of the early achievements under the project, have been given high profile. However, many of the project initiatives are only now coming to market, in what are the closing stages of the project, and their achievements have not yet been shared or potential exploited.

It is therefore considered essential that in order to maintain the momentum created during the project and build on its achievements, significant advocacy work should take place going forward. This might take many forms:

- Events, including stakeholder round tables, sector events, conferences and seminars;
- Further approaches to and continued relationship development with brand owners, possibly in party with the relevant sector associations;
- Approaches to retailers and SME brand owners to promote uptake of rightweighted generic bottles, again, possibly in party with the relevant sector associations; and
- The development of case studies, and trade press articles highlighting the achievements under the project and promoting a call to action.

The above activities are applicable across the beer, cider and spirits sectors. However, given the particular spirits sector premiumisation issues identified during the project, the following additional recommendations are made for this sector:

- An audit of domestic and imported spirits bottle weights, to better understand where the opportunities lie in this sector; and
- An extended spirits consumer perception study to advise the thinking of marketers in that sector, including:
  - Hypothetical paper based re-design of a range of key branded spirits bottles; and
  - Consumer perception of these versus current bottles.

Finally it is recommended that consideration be given to how the outcomes from lightstrike and forming technology studies under this project be fully exploited.

# Appendix 1: Organisations worked with under Glassrite Beer, Cider and Spirits

Anheuser Busch
Allied Glass
Angus Dundee Ltd.
Ardagh Glass
ASDA
Aspall Ltd
Bacardi Martini
Bangor University
British Beer and Pub Association
Beam Global
Beatson Clark
Beverage Brands
Black Sheep Brewery
Brewlab
Brewing Research International
Broughton Ales
Brothers Drinks Co. Ltd.
Brown-Forman
Bulmers (Part of C&C Group plc)
CAMRA
Carlsberg UK Ltd.
Cider Industry Council
Constellation
COOP
Coors Brewers Ltd.
Wm Croxsons and Sons Ltd.
Devon Cider
Diageo
Distell
Edrington Group
Frederic Robinsons Ltd.
Fullers
G&J Greenall Ltd.
Gaymer Cider Company
Glenmorangie
Wm. Grants Ltd.
Greene King
Gin and Vodka Association
Hall and Woodhouse Ltd.
Halewood International Ltd.
Heiniken
Hook Norton
Inbev
Inverhouse Distillery
Loch Lomond Distillers
Marstons
Morrisons plc
O-I
Pernod Ricard

Quinn Glass
Refresh Drinks Brands
Scottish and Newcastle
SAB Miller
Scottish Traditional Ales
Sharps Ltd.
Shepherd Neame
Society of Independent Brewers
Scotch Whisky Association
Thatchers Cider
The Drambuie Liquer Co. Ltd.
The National Association of Cider Makers
Timothy Taylor
Waverley TBS
Whyte and Mackay
Wells and Young
Westons Organic Cider

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**Waste & Resources  
Action Programme**

The Old Academy  
21 Horse Fair  
Banbury, Oxon  
OX16 0AH

Tel: 01295 819 900  
Fax: 01295 819 911  
E-mail: [info@wrap.org.uk](mailto:info@wrap.org.uk)

Helpline freephone  
0808 100 2040

[www.wrap.org.uk/retail](http://www.wrap.org.uk/retail)

