

# Delivering Wine Bottle Optimisation and Increased Bulk Importation



Working with the wine supply chain, the project has delivered significant business benefits to many organisations through the lightweighting of glass wine bottles and increasing bulk importation of wine for UK filling, thereby using more recycled glass. Benefits include reduced costs, improved filling line productivity, and demonstrable responsiveness to retailer environmental requirements. Large reductions in glass entering the waste stream, increased use of recycled glass in UK manufactured wine bottles, and associated carbon emissions 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.

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**Front cover photography:** Filling of wine bottles, photograph courtesy of Quinn Glass

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# Executive summary

GlassRite Wine, a WRAP funded project delivered by British Glass, ran from July 2006 to March 2008. The project supported the supply chain for the wine industry in rightweighting<sup>1</sup> the bottles they used and maximising the opportunity to bulk import wine and fill in the UK. The project successfully delivered new lightweight wine bottles into the UK and substantially increased bulk importation and UK filling. This reduced the amount of glass in the UK waste stream and increased the demand for recovered glass back into new wine bottles.

The project has contributed CO<sub>2</sub> saving of over 28,300 tonnes/annum by increasing bulk importation of wine for UK filling by 79 million glass bottles which has in turn increased the use of UK recycled glass due to increased UK wine bottle manufacture by 23,930 tonnes/annum and reduced glass packaging for wine by 11,397 tonnes/annum due to lightweighting.

## The Drive for Packaging Reduction

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

Beyond the environmental arguments, there is a strong business case for packaging reduction due to the supply chain in terms of cost savings, process efficiencies, and marketing possibilities it offers. This can be achieved either through engineering out unnecessary elements of packaging, or as is the case here, increasing bulk importation of wine for UK filling and using lightweight bottles.

## GlassRite Lightweighting and Bulk Importation Activities

The project has worked extensively with stakeholders in the wine supply chain, and in particular retailers, brand owner, fillers and the UK glass manufacturers, to highlight the benefits of bulk importation of wine for UK filling and lightweighting.

The project has supported retailers and brand owners in the development of these opportunities and in addressing barriers which could prevent initiatives reaching the market. Key barriers addressed through the project have been the effect of UV and bulk importation on wine quality, CO<sub>2</sub> impact of wine transportation, lightweight bottle strength and consumer perceptions of lightweighted bottles.

Through representation at seminars, conferences and stakeholder meetings, along with project newsletters and press releases, significant profile has been given to bulk importation of wine for UK filling and the lightweighting agenda.

## Project Achievements

The project has identified and supported more than 10 initiatives for bulk importation of wine for UK filling and lightweighting and these are summarised in this report. In addition, the project has gained commitment from many companies from the wine supply chain and has the momentum to engage further in bulk importation of wine for UK filling and lightweighting. The project has achieved glass savings from the UK waste stream of approximately 11,397 tonnes/annum and an associated carbon emissions saving of some 7,810 tonnes of CO<sub>2</sub>.

Bulk importation of wine for UK filling has increased by approximately 79 million 75cl bottles (from 120 million to 199 million 75cl bottles during the project period). This move has consumed an additional 23,930 tonnes/annum of recovered glass back into closed loop recycling i.e. using recycled glass to make new wine bottles in the UK. The additional use of recycled glass will save approximately 7538 tonnes of CO<sub>2</sub>. In addition, from the Life Cycle Emissions study (section 5.4) it has been reported that when bulk importing and filling in the UK in a standard weight 75cl wine bottle from Australia (majority of wines filled in the UK are from southern hemisphere) there is

<sup>1</sup> 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.

164g CO<sub>2</sub> per 75cl wine bottle saving. Based on 79 million 75cl additional units per annum this would equate to approximately 12,950 tonnes of CO<sub>2</sub>. Therefore, bulk importation of wine for UK filling has saved in the order of 20,495 tonnes of CO<sub>2</sub>.

### Additional Research Overview

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

- **champagne and sparkling wine bottles** – an assessment of the commercial and technical barriers to lightweighting Champagne, sparkling wine and semi sparkling wine bottles;
- **consumer perceptions of lighter weighted wine bottles** –an assessment of the correlation between the consumer’s perception of a wine’s value and the bottle design and weight;
- **effect of ultraviolet light on wine quality** – a desktop study reporting on the effect of UV on wine quality, the effect of reducing glass thickness due to lightweighting and how UV protection can be maintained;
- **life cycle emissions of wine imported to the UK** – a desktop study to investigate the CO<sub>2</sub> impact of wine transportation, both bottled at source and bulk importation and then UK filled in lightweight bottles;
- **lightweight glass containers** – a study to investigate the strength of wine bottles and how lightweight bottles perform against standard weight bottles in term of strength and fitness for purpose; and
- **shipping wine in bulk** – a desktop study to investigate the effect on quality when shipping wine in bulk and logistical benefits.

### Recommendations

This study has both raised awareness of the benefits of bulk importation and lightweighting and delivered significant savings. In order to maintain the momentum created during the project and encourage further uptake of its achievements, significant advocacy work should be continued. This could include further events, one-to-one contact with retailers, brand owners, fillers, international glass manufacturers, the development of case studies, and trade press articles highlighting the achievements under the project.

In addition the advocacy role would require working closely with groups and/or individuals that have been briefed on the project and were familiar with all the supporting research that has been undertaken. This would necessitate the advocates to undergo training and support by the project team. This process would need to be closely managed to ensure the correct message is being disseminated, and engagement in glass packaging reduction and bulk importation of wine for UK filling continues to grow. Also, there will be a requirement to continue the monitoring of the impact of the project.

### Acknowledgements

British Glass would like to acknowledge the support of all elements of the supply chain without which this project would have not have been possible. The Project Steering Group and WRAP’s Retail and Manufacturing teams deserve specific mention for their commitment and involvement in the project and contribution to its many successes. Special thanks are also extended to Oakdene Hollins for their contributions throughout and to the University of Wales, Bangor, and the University of Sheffield, for their expertise in the specialist studies produced.

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## 1.0 Introduction

This section gives an overview of the previous lightweighting project and of glass recycling with context to bulk importation of wine for UK filling and use of lightweight wine bottles. It also covers the drivers for this project, background to bulk wine importation and lightweighting and the project aims and objectives.

### 1.1 Project Origin

GlassRite Wine is one of a suite of three projects under the 'GlassRite' banner, the other projects addressing the beer, cider, spirits, food, soft drinks and RTDs<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.

One of WRAP's key objectives is to drive initiatives to reduce waste, including glass, bound for landfill.

#### 1.1.1 ContainerLite Project

In 2004 WRAP issued an invitation to tender, seeking ideas for projects that could make significant reductions in the waste arising 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 requirement. This project was known as ContainerLite<sup>3</sup> and was the initial proof of principle to demonstrate that lightweighting of glass container was by 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 categories, with some significant successes. The most notable of these was the Coors' Grolsch beer bottle which significantly changed design and reduced weight by approximately 14% whilst maintaining market share, and yielding significant operational benefits. Other successes included the first sub-300g 70cl spirits bottle. All these activities yielded a total glass saving of over 8,000 tonnes for the 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 BG, the glass manufacturers' trade federation, 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 in the household waste stream.

#### 1.1.2 GlassRite Projects

ContainerLite was considered a success as a demonstrator project and WRAP was keen to build on this. 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 British Glass;
- GlassRite Food, Soft drinks and Ready-to-Drinks (RTDs) – managed by Faraday Packaging Partnership; and
- GlassRite Beer, Cider and Spirits – 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. The Beer, cider and spirits project started later in January 2007. All projects were completed in March 2008.

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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)

<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)

### 1.1.3 Courtauld Commitment

In addition to, and in conjunction with the above projects, a further significant driver for lightweighting is WRAP's Courtauld Commitment<sup>5</sup>, signed by UK retailers in 2005 and subsequently 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. 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.

## 1.2 Glass Recycling

In general the GlassRite projects do not by themselves directly address the issue of glass recycling. However, the GlassRite Wine project has the added objective of increasing UK manufactured wine bottles for bulk wine filled in the UK, which in turn generates a demand for more recycled glass to be used in making new wine bottles. The complexity of increased bulk importation of wine for UK filling, lightweighting and glass recycling interaction therefore needs to be explained further.

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 recycled glass (cullet) for the glass container re-melt industry. In recent years capacity has been increased 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.

### 1.2.1 UK Glass Manufacture

The UK manufactures approximately 2.2 million tonnes/annum of container glass, with a colour split of approximately clear (flint) 64%, green 20% and brown (amber) 16%. The UK also suffers from 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 an even larger import of green wine bottles, resulting in an overall excess of green glass in the UK waste stream. This presents issues in terms of colour profiles of what is collected for recycling in the UK and what UK glass manufacturers require (Figure 1)<sup>6</sup>.

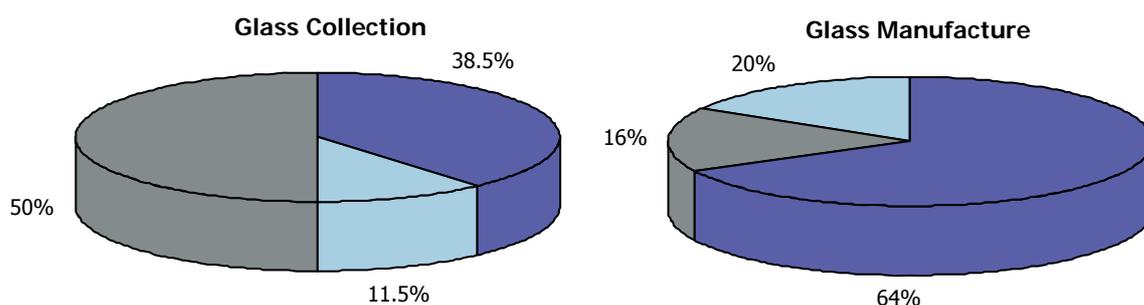
The UK cannot use the excess green glass that it imports in the production of clear glass. This is currently beyond that which can be re-processed into container re-melt in the UK, which is widely agreed to be the most beneficial solution. There are three main approaches to addressing this issue:

1. As promoted by this project, the increased bulk importation of wine for UK filling could be considered. Rather than importing wine to the UK in bottles, wine could be bulk imported and filled in UK manufactured bottles, thereby creating a demand for green bottles with a high recycled content. These bottles could also be lighter than their predecessors. By promoting bulk importation of wine for UK filling, the effective capacity to re-melt green recycled glass is increased, and overall glass recycling rates improved.
2. Reducing the import of green glass by encouraging the switch to flint glass, wherever it is practical, in the country of origin.
3. Finding alternative markets for glass container cullet is one method of addressing the colour imbalance in the UK and supported through various WRAP initiatives. Along with alternative markets, exporting of the excess green cullet for re-melt elsewhere has shown a steady, if slow, increase over the last five years.

<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)

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

Figure 1 Predicted waste glass collections and new glass production (2008).



### 1.2.2 Packaging Waste Regulations

The Packaging Waste Regulations which came into effect in 1997 have driven up recycling rates of all packaging materials through the Packaging Recovery Note (PRN) and Packaging Export Recovery Note (PERN) systems. The UK has been set a target of 60% for glass recycling in 2008 which translates into targets of 73.5% for those businesses with obligations under the regulations<sup>7</sup>. At the current time approximately 2,700,000 tonnes of container glass is consumed in the UK each year. Returning the glass to the melting furnaces is considered the best environmental option as it has significant environmental, raw material and CO<sub>2</sub> reduction benefits. However, only about 700,000 tonnes is recycled back into UK glass furnaces for the manufacture of new glass bottles and jars; a further 600,000 tonnes of glass is recovered for alternative uses such as aggregates or exported for re-melting overseas.

Approximately 1.4 million tonnes of container glass per annum is not currently recovered from the UK 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. However, given an approximate 50% overall recycling rate, it should be noted that reductions in un-recovered glass through lightweighting, will also reduce the amount of recycled glass available for re-melt, and the benefits associated with this. However, the GlassRite project objective of increasing bulk importation of wine for UK filling will have the positive effect of increasing the demand for recycled glass due to more UK produced wine bottles.

### 1.3 Background to Bulk Importation

Wine consumption in the UK has increased year on year for the last 30 years. The UK is a very small wine producer and consequently demand is met by imports which now exceed 1.3 billion litres making the UK the world's largest importer of wine.

Much of this wine arrives bottled in green glass. The UK has an effective glass recycling infrastructure and recovers approximately 1.3 million tonnes of glass for recycling per year. Of this total some 700,000 tonnes is of a high enough quality to be used by the container manufacturers. However, the colour profile of the recycled glass does not match the requirements of the glass manufacturers as approximately 50% of this collected recycled glass is green. The UK's container industry does not produce many items in green glass so demand for the collected green recycled glass is limited. The large inflow of wine bottles accounts for a significant proportion of the green glass found in the UK's waste stream.

An increase in the bulk importation of wine into the UK could help redress this colour imbalance by creating a demand for green recycled glass for the bottles which will be needed to fill the wine in the UK. Increasing the UK's demand for green glass would therefore be of great benefit to the UK's recycling infrastructure by creating a much needed high value market for the green glass collected.

Wine producers exporting their produce overseas have to decide on the logistics of transportation. The wine can be bottled at source, the bottles boxed into cases and packed into a large container. The container will be transported by truck to a suitable port for shipment to the export market. Alternatively the wine may leave the winery in some form of bulk tanker (around 22,000 litres per bulk tanker) which will itself be shipped to the

<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)

export market. On arrival the wine and holding tanker will be transported to a filling facility for bottling prior to distribution.

The UK wine consumers have a preference for wines produced in the New World which, by necessity, are transported by sea. If this wine could be shipped in bulk form to be filled on arrival, it would greatly increase the demand for green glass, help redress the current colour imbalance and provide support for the UK's glass recycling infrastructure. Shipping wine in bulk clearly offers large benefits with respect to the amount of wine that can be transported by a single standard container. This in turn has environmental benefits as the number of ship movements is reduced.

However, shipping wine in bulk has implications for wine quality. This is because wine comprises a complex organic mixture of subtle flavours and aromas that give individual wines and brands their distinctive tastes. The science behind making, bottling and transporting wine is well established and modern analytical techniques are now quite advanced thus significantly improving understanding. The effect of oxygen, fermentation and the impact of temperature are now well documented, and thus control of product integrity is more easily managed.

With a better understanding of the wine making process, better materials in which to transport the wine and much improved facilities within the UK to handle and bottle the product, bulk importation and UK filling has become an attractive option.

Bulk shipping also offers other less quantifiable benefits in respect of marketing opportunities as wine sellers and fillers are able to respond more quickly to changing market demands. Shipping in bulk allows the finished product to be filled closer to the final market and gives the retailers more flexibility to change packaging formats to meet changing market demands and respond to promotional campaigns. The likelihood of damage to packaging e.g. bottle and label scuffing is reduced when the product is filled near the destination market. Given the time differences from many long haul wine origins, having a UK supplier contact may make it easier for buyers to resolve any problems that may arise.

#### 1.4 Background to Glass Lightweighting

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 larger volumes of glass to be made, and moves towards higher production speeds and 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 'workhorse' 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 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 also provide improved machine control which is essential for the production of lightweight containers as they have 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 lightweight bottles 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 and 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 therefore offers an opportunity to explore redesign leading to reduced container weight.

The above discussion has largely addressed the technical capability to produce lightweight containers. However, the ethos of the GlassRite projects is not to move toward the lightest container technically possible, but to consider what is appropriate for a specific product. It is recognised that containers need to be fit for purpose alongside a number of other considerations including:

- be aesthetically acceptable to consumers;
- retain brand distinctiveness and avoid excessive market risk;
- ensure fitness for purpose during:
  - transport from the glass manufacturer;
  - filling and packing;
  - transfer to the retailer;
  - retailer display; and
  - consumer consumption; and
- assess financial viability for the supply chain, recognising the embedded costs of existing moulds, filling lines, labellers etc and any relevant 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 of market image, environmental considerations, and alignment with company sustainability agendas.

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 not to strive just for the lightest, unless commercially viable.

## 1.5 Project Aims and Objectives

The following aims and objectives were established for the project:

- encourage more bulk wine importation into the UK with a view to filling in domestically produced lightweight, green bottles;
- promote a comprehensive lightweighting programme for wine bottles within the UK and country of origin;
- work with the glass manufacturing sector to produce a wider range of wine bottle styles and weights;
- encourage those overseas suppliers for whom bulk importation is not feasible to change from green to clear bottles for their UK trade;
- identify and address any barriers to the above; and
- monitor progress toward project targets and disseminate findings.

The above objectives focus on waste minimisation and UK glass recovery and recycling.

The project was intended to be a collaborative venture encompassing all stages in the UK wine supply chain from wine producer to the point of sale, either retail or on-trade<sup>8</sup>. 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 obligations, potential for reduced costs and access to specialist technical services. For the retail sector the project specifically contributed towards meeting their obligations under the Courtauld Commitment.

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<sup>8</sup> On-trade is alcohol sales via licensed premises such as pubs, clubs and restaurants and off-trade is alcohol sales via retailers and off-licences etc.

## 1.6 Project Targets

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

- to promote the bulk importation of wine to the UK and to provide a major contribution toward WRAP's internal target of an additional 130 million bottles. This is equivalent to 97.5 million litres based on 75cl wine bottles or approximately 55,000 tonnes (assuming an average bottle weight of 425 g) of additional glass which could generate a requirement for recycled glass in the order of 27,500 (assuming recycled glass content of 50%) to be used in closed loop recycling back into new glass containers;
- to initiate at least 20,000 tonnes/annum of glass waste reduction through lightweighting of wine bottles;
- to identify the split between off- and on-trade savings and associated CO<sub>2</sub> savings; and
- to stimulate an additional 30,000/annum tonnes glass saving from wider take-up of lightweighting during the 12 months following completion of the project (the roll-out period).

Lightweighting initiatives counting towards the 20,000 tonne target comprise those entering UK retail during the project period (1<sup>st</sup> July 2006 to 31<sup>st</sup> March 2008), and/or projects agreed with WRAP which were initiated during the project period but will go to market after 31<sup>st</sup> March 2008.

The roll-out period runs from 1<sup>st</sup> April 2008 to 31<sup>st</sup> March 2009. Initiatives counting toward the 30,000 tonne target comprise those entering retail during this period, and are additional to those agreed counted under in project period.

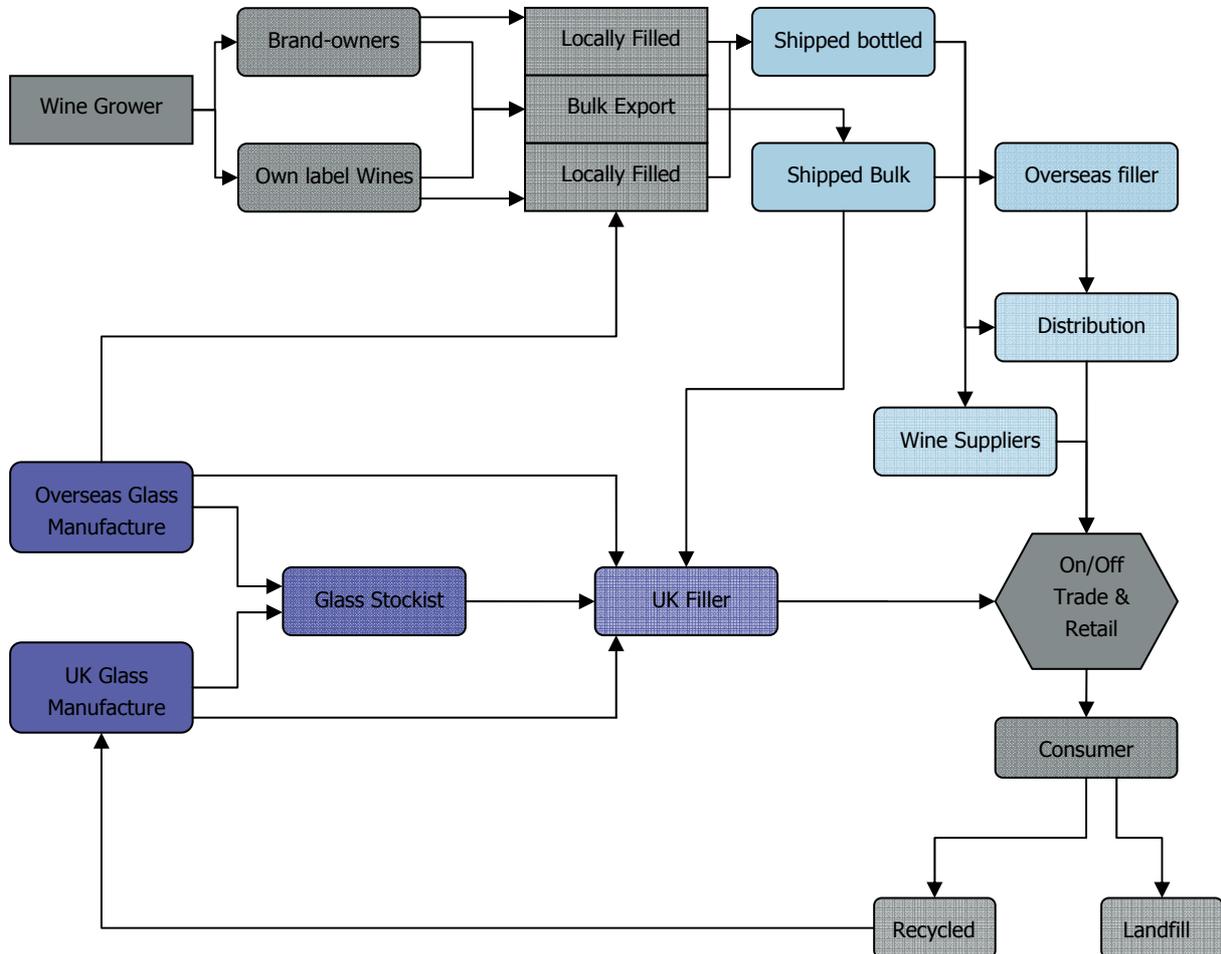
In either case, tonnage savings are based on the forward annualised sales from the point of introduction of a new lightweight bottle in retail or on-trade.

## 2.0 Market Overview

### 2.1 General Overview of the UK Wine Sector

The wine supply chain to the UK is complex and originates from a globally diverse supply, with a myriad of companies and brands playing important roles. Figure 2 shows the flow of the wine supply chain from production through to consumption and disposal of the packaging.

Figure 2 Wine distribution chain from wine production to consumption.



It is estimated that over 30,000 different wine labels are currently available in the UK<sup>9</sup>. Table 3 shows the top 50 wine brands sold through UK retailers.

<sup>9</sup> Private Communication from WSTA.

Table 1 Top 50 wine brands sold in supermarkets for the Year to May 2007<sup>10</sup>.

Position	Brand	Position	Brand	Position	Brand
1	Hardys	19	Oyster Bay	36	Brown Brothers
2	Gallo	20	Montana	37	La Châsse du Pape
3	Blossom Hill	21	Campo Viejo	38	Mateus
4	Jacob's Creek	22	Viña Maipo	39	Rivercrest
5	Wolf Blass	23	Black Tower	40	La Villa
6	Kumala	24	Oxford Landing	41	Evolution
7	Stowells	25	Fetzer	42	Chileno
8	Banrock Station	26	Piat d'Or	43	Torres
9	Lindemans	27	Turner Road	44	Calvet
10	JP Chenet	28	McWilliam's	45	Inycon
11	Echo Falls	29	Rawnsley Estate	46	Canto de Flora
12	Concha & Toro	30	Nobilo	47	Renaissance
13	First Cape	31	Yaldara	48	Marqués de Leon
14	La Gioiosa	32	Canti	49	35° South
15	Namaqua	33	Arniston Bay	50	Villa Maria
16	Calloway Crossing	34	French Connection		
17	Rosemount	35	Blason de Bourgogne		
18	Isla Negra	36	Brown Brothers		

The wine supply chain can be split into the following sectors:

**Wine Growers:** Responsible for cultivating the grapes and producing the wine; most vineyards produce numerous wine types.

**Wine Producers Own-label Wines:** Tend to be vineyards or collectives of vineyards that market their wines under a series of brands.

**Brand Owners:** Either own vineyards or are supplied wine via independent vineyards and market under their own brands (Table 2).

**Wine Fillers:** Responsible for filling wine in bottles or other formats such as bag-in-the-box. There are various models of operation such as ownership by brand-owners with some also filling for other brands, independent contract fillers and co-operative fillers filling for a collective of wine growers. They operate either in a country of wine production or export destination, such as the UK or Europe. The main UK fillers are Broadlands, Continental Wines, Corby Bottlers, Halewood International, Kingsland Wine & Spirits, Lanchester Wines and Quinn Glass.

**Bulk Exporters:** Responsible for the logistics of transporting bulk wine from vineyards or co-operatives to the fillers such as Braid Logistics, FG Hillebrand, Full-Pak, Hoyer and Trans Ocean Shipping.

**Filled Wine Bottle Exporters:** Responsible for the logistics of transporting bottled wine from fillers to distributors or wine suppliers.

<sup>10</sup> "Wine Report 2007: Flying off the supermarket shelves", <http://www.offlicencenews.co.uk/articles/47013/Wine-Report-2007-Flying-off-the-supermarket-shelves.aspx?categoryid=9078>, 13/07/07.

**Wine Suppliers or Agents:** Purchase wine direct from vineyards and in some cases have exclusive agreements for wine supply. In some case they could be classified as brand owners. Suppliers or agents supply both the UK's on- and off-trades. There are approximately 20 major wine suppliers currently supplying into the UK (Table 2).

**Glass Manufacturers:** Supply wine bottles to fillers and merchant glass suppliers as either bespoke or generic bottles. Bottles produced for the UK wine market are manufactured in the country of wine origin, sourced elsewhere or manufactured in the UK. The main UK wine bottle manufacturers are Allied Glass, Ardagh Glass, Beatson Clark, O-I Europe & Quinn Glass.

**Merchant Glass Suppliers:** Tend to hold stocks of wine bottles and are capable of providing relatively small orders, and supplying fillers. The main UK wine bottle suppliers are AE Chapman and Croxson & Sons.

**Multiple Retailers and Specialists (off -trade):** Purchase and sell wine supplied from various parts of the supply chain, ranging from the vineyard to the wine suppliers or agents. The main UK multiple retailers are Asda, Budgens, The Co-operative Group, Londis,, Marks & Spencer, Morrisons, Sainsbury's, Somerfield, Tesco and Waitrose. The main multiple specialists are Bargain Booze, Laithwaites, Majestic, Oddbins and Threshers.

**Licensed Trade Outlets (on-trade):** Purchase wine supplied from various parts of the supply chain, ranging from the vineyard to the wine suppliers, for sale in licensed premises such as pubs, clubs and restaurants.

**Consumers:** Finally, the wine is purchased and consumed by the consumer, who either recycles, re-uses or disposes the empty bottle to landfill.

Table 2 Summary of some of the brand owners, wine suppliers and agents supplying the UK market, and examples of their wine brands.

Brand owner, supplier or agent	Wine label examples and country of origin
Bibendum	Argento (Argentina), d'Arenberg (Australia), Melini (Italy), Laroche (France), Castillo San Lorenzo and Altivo (Spain)
Bottle Green	French Connection (France), Andrew Peace (Australia), Baron de Ley, Campaneo (Spain) and Morandé (Chile)
Brand Phoenix	First Cape (South Africa), Renaissance (USA), Porta and Gracia (Chile), Castillo de Liria (Spain) and Trapiche (Argentina)
Brown Forman Beverages	Fetzer Wines, Bonterra Vineyards and Sonoma-Cutrer Wines (California) and Bolla Wines (Italy)
Buckingham Vintners	Buckingham Estate (Australia) and Red Heart, Rare Bird, Las Rocas and 50 (Chile)
Castel	Castel, Cachet and Virginie (France) and Halana (Morocco)
Company of Wine People	Arniston Bay, Versus, Welmoed, Thandi and Kumkani (South Africa)
Concha & Toro	Casillero del Diablo, Isla Negra, Viña Maipo and Cono Sur (Chile) and Trivento (Argentina)
Constellation Europe	Hardy and, Banrock Station (Australia), Stowells (international), Echo Falls (US) and Kumala (South Africa)
D&D International	Canti (Italy), Luis Felipe Edwards (Chile), Bodegas Muriel (Spain), Salentein and Callia (Argentina) and Champagne Martel (France)
Delegats Wine Estate	Hawke's Bay and Oyster Bay (New Zealand)
Diageo	Blossom Hill (US), Piat d'Or and Heidsieck & Co Monopole (France), Antares (Chile) and Two Oceans (South Africa)
Distell Europe	Nederburg, Two Oceans, Drostdy Hof, Durbanville Hills and Fleur du Cap (South Africa)
E&J Gallo	Gallo Family Vineyards and Barefoot (USA), McWilliam's (Australia) and Viña Chilcaya (Chile)
Enotrica	Clos de los Siete (Argentina), MontGras (Chile), Trinity Hill (New Zealand), Henriot Champagne (France) and Peter Lehmann wines (Australia)

Fosters EMEA	Lindemans, Wolf Blass, Rosemount and Penfolds (Australia), Beringer (USA), Matua Valley and Secret Stone (New Zealand) and Castella de Gabiano (Italy)
HwCg	Blason de Bourgogne (France), Canaletto (Italy), Viña Montes (Chile), Jackson Estate (New Zealand) and Honeywood (California)
McGuigan Simeon Wines	McGuigan Black Label, McGuigan Gold, McGuigan Estate and Tempus Two (Australia)
Pernod Ricard	Jacob's Creek (Australia), Montana (New Zealand), Campo Viejo (Spain) and Mumm and Perrier-Jouët (France)
PLB	Chileno (Chile), Spier (South Africa), Sutter Home (US), Jacquart (France) and Piccini (Italy)
Raisin-Social	Beyerskloof, Goiya, Inanda, Leopards Leap and Namaqua (South Africa)
Thierrys	Nicolas Feuillatte, Chamarré (France), El Prado (Spain), Ravelli (Italy) and KWW (South Africa)
Waverley TBS	Trulli and Sartori (Italy), Ropiteau and Jeanjean (France) and Nederburg (South Africa)

## 2.2 Market Size

It is estimated that the total UK wine market by volume was 1,186 million litres<sup>11</sup> in 2007, 86%<sup>12</sup> of which is packed in 75cl bottles, equating to 1,360 million units. The off-trade accounts for 83% of the total sales by volume which reflects the trend towards greater home consumption of alcohol. The majority of these bottles (71% of UK sales) were sold through retailer multiples which equates to 965 million 75cl bottles, and a further 150 million 75cl bottles via multiple specialists including internet and mail order sales. Table 3 shows the market share of UK supermarket retail wine sales.

Table 3 UK supermarket wine sales for year to date from 20th May 2007<sup>13</sup>.

Retailer	Market Share %
Tesco	34.0
Sainsbury's	20.7
Asda	12.1
Morrisons	9.4
The Cooperative	6.8
Aldi, Lidl & Netto	6.3
Somerfield	4.4
Waitrose	3.9
Others	2.4

The off and on-trade wines are sourced from most wine making countries around the world, however, the top 10 countries account for over 90% of UK wines sales (see Table 4).

<sup>11</sup> Market Value and Forecast, Mintel, 2007.

<sup>12</sup> Container Lite - Light-weight Glass Containers – The Route to Effective Waste Minimisation, Final Report, WRAP, March 2006.

<sup>13</sup> Which supermarkets are selling the most wine in 2006, <http://www.offlicenews.co.uk/articles/47029/Wine-Report-2007-Price-hikes-drive-the-numbers.aspx?categoryid=9078>, 13/07/07.

Table 4 Top 10 off-trade wine sales by country of origin and value<sup>14</sup>.

Position	Country	Value (£ million)
1	Australia	1,112
2	France	786
3	USA	746
4	Italy	506
5	South Africa	359
6	Chile	338
7	Spain	308
8	Germany	150
9	New Zealand	143
10	Argentina	63

### 2.3 Potential Bulk Importation Opportunities

Over recent years the capacity to fill wine in bottles and other formats such bag-in-the-box in the UK has dramatically increased. Most fillers have undertaken to meet current quality requirements such as accreditation to BRC Food Standard<sup>15</sup>. In addition the infrastructure for bulk transporting and ensuring a wine's quality is maintained during its journey from the vineyard to the UK filler has greatly improved with a number of companies offering this service to UK fillers. In June 2006 approximately 90 million litres/annum were filled in 75cl glass bottles and by February 2008 approximately 149 million litres/annum were filled. Despite this large increase in it is believed that the UK still has underutilised filling capacity and additional capacity is about to come online in the UK. For example Constellation has announced that they intend to increase capacity up to 120 million bottles (equivalent to 90 million litres/annum) in 2009.

The increase in bulk importation of wine for UK filling has led to the increased demand for more UK manufactured wine bottles. Manufacturing the bottles in the UK has obvious environmental benefits as it negates the need to transport wine bottles great distances. Less obvious, but perhaps of equal importance, is the support for the UK's closed loop recycling infrastructure that this increase in demand for predominantly green glass affords. The UK glass recycling industry currently experiences a colour imbalance which tends to result in a surplus of green glass. The increased demand for UK produced (green) wine bottles will help redress this imbalance and thereby help maintain the recycling infrastructure. Bulk importation thus saves CO<sub>2</sub> by reducing the transportation of bottles and by ensuring that more recycled glass in the UK is used for remanufacture which is considered to be the best environmental option. It has been estimated that a tonne of recycled glass if used for glass manufacture saves approximately 315 kg/CO<sub>2</sub><sup>16</sup>.

### 2.4 Potential Lightweighting Opportunities

The average 75cl wine bottle weight sold in the UK, including both on- and off-trade, for the 12 month period prior to the start of the project (July 2006) was approximately 500g<sup>17</sup>. It was found that the average wine bottle weight varies for country of origin and wine type, for example New World wine bottles on average were heavier than Old World wine bottles, with bottles for red wine being on average heavier than bottles used for rosé or white wines (see Table 5).

<sup>14</sup> "Wine figures bring optimism", <http://www.offlicencenews.co.uk/articles/56278/Wine-figures-bring-optimism.aspx?categoryid=9059>, 2008.

<sup>15</sup> BRC Global standard for food safety, [www.brcbookshop.com](http://www.brcbookshop.com).

<sup>16</sup> Life Cycle Analysis of Glass Recycling, <http://www.britglass.org.uk/Files/LocalAuthorities/BGEnviroReport.pdf>, 2003.

<sup>17</sup> Average weight was determined using two WRAP commissioned reports: a DHL produced 'best in class' data set for wine sold in the UK and a cost-benefit analysis carried out by James Ross Consulting, 2006.

Table 5 Average wine bottle weights prior to the start of the project in July 2006<sup>17</sup>.

Wine Type	Average Bottle Weight
New World wines	507g
Old World wines	485g
Red wines	511g
Rosé wines	477g
White wine	485g

Assuming an average bottle weight of 500g and 75cl bottle sales in the UK of 1,360 million units there is a potential 680,000 tonnes/annum of glass being generated from glass wine bottles. As most of the wine consumed in the UK is from the New World and the top 10 brands, the project decided to focus on wine produced and bottled by these brands and countries, as these could potentially yield the greatest glass packaging savings. Analysis of these bottles indicated that it would require approximately a 12% wine bottle weight reduction of the 10 top selling wines to achieve the project's 20,000 tonnes of glass saved target.

Also, there is a forecasted growth in wine sales, with a prediction of 1,438 million litres<sup>11</sup> by 2012. Based on the average weight remaining at 500g and 86% packaged in 75cl glass bottles this would equate to a further 144,450 tonnes/annum of glass bottle arisings. This could be significantly reduced by cutting the average wine bottle weight further through new lightweighting initiatives.

## 2.5 Potential Benefits

Significant business benefits exist associated with bulk importation of wine for UK filling and using lightweight bottles.

### 2.5.1 Bulk importation

The practice of bulk importation of wine for UK filling of wine does not impair quality and has some environmental and logistical advantages such as:

- avoids deterioration in wine quality due to cyclic temperatures as experienced by bottled wine during shipping;
- supports closed loop recycling, UK manufactured wine bottles consume UK recycled glass;
- reduces the UK's recycled glass colour imbalance;
- reduces the environmental emissions associated with transport;
- increases cost savings;
- reduces damage to packaging during transportation;
- increases shelf life of the wine;
- is more responsive to marketing demands as filling closer to the final market; and
- increases utilisation of shipping space.

Many retailers and wine suppliers are seeing bulk importation of wine for UK filling as a next opportunity for reducing cost and environmental impact of bottled wines, which is being consumer driven.

### 2.5.2 Lightweighting

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

- reduced material and process costs;
- improved filling line productivity;
- improved responsiveness to retailer and brand requirements for packaging weight reductions;
- better opportunity to renew market image and create CSR opportunities; and
- clearer alignment of environmental sustainability policies and objectives.

However, these must be balanced against potential barriers to bulk importation of wine for UK filling and lightweighting, which are discussed below.

## 2.6 Potential Barriers and Solutions

### 2.6.1 Bulk Importation Perception

Wine can be transported in bulk for filling in the UK. The practice has been in operation for a many years and in recent times many technical advances have improved the quality of the service. However, some within the wine supply chain may not be aware of these advances and may be reluctant to consider the bulk option. A study outlining the benefits of bulk wine shipments has been undertaken under the auspices of the project (section 5.6).

### 2.6.2 Customer and Brand Perception

There is a risk of poor market acceptance associated with any product re-design. In the context of wine bottle lightweighting there is sometimes the fear that products in lighter weight bottles will be perceived by consumers as being cheaper and/or of a poorer quality. This negative marketing perception represents a particular challenge for lightweighting of wine bottles. Currently, there is little independent consumer research available to inform the debate on this issue. However, under this project a consumer perception study was performed by the University of Bangor to examine this issue in the context of lightweighting (see section 5.2). The study helped formulate a strategy of adopting a bottle at the appropriate weight rather than the lightest technically possible.

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 of a similar height or taller (see example in section 4.1.7). In addition, during bottle lightweighting, 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. Indeed, under this project market surveys and studies have informed a number of lightweighting initiatives. In the ContainerLite project, consumer perception work suggested that consumers are usually unable to detect a 10% weight reduction; a 30% weight reduction being about the detection threshold<sup>12</sup>.

### 2.6.3 Bottle Technical Performance

Wine bottles have to survive a number of process stages including:

- 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 very 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. An example of this is the introduction of a lightweight 70cl spirit bottle during the ContainerLite project<sup>18</sup>.

The trialling of a few hundred new bottles before full product is a good way to spot and iron out technical problems before a design is finalised. Such trialling might include:

- **fitness for purpose testing** - new bottles are invariably tested to ensure fitness for purpose. This may take the form of the glass manufacturer's in house tests, and independent third party tests. For champagne and sparkling wines, a fitness for purpose performance standard dealing with carbonated beverages is applicable. The UK glass industry relies on British Glass' 'Tec 7'<sup>19</sup> standards for strength and performance for the manufacture and use of carbonated beverages;

<sup>18</sup> *Spirit of Innovation: Co-op Roll Out World's Lightest Whisky Bottle*, [http://www.wrap.org.uk/wrap\\_corporate/news/spirit\\_of.html](http://www.wrap.org.uk/wrap_corporate/news/spirit_of.html), 2007.

<sup>19</sup> *TEC 7: Strength & Performance Standards for the Manufacture & Use of Carbonated Beverage Bottles*, <http://www.britglass.org.uk/industry/Technical.html>

- **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; 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 through its supply chain (for example vibration / humidity), and can evaluate how the bottle would perform during and after such transit. Such testing is generally of whole pallets or bottle packs.

Under this project a review of bottle strength was been performed to examine this issue in the context of lightweighting (see section 5.5).

#### *2.6.4 Light Protection – Product Quality*

It is essential that the wine quality is not compromised by using lightweight bottle. Wine is a complex chemical mixture which can react with daylight resulting in quality being impaired. Glass bottles offer a level of protection from the light wavelengths that can damage the wine. Amber glass provides the greatest protection. It might be perceived that thinning of the bottle walls associated with lightweighting could raise concerns over a possible increased propensity to light damage. This has however proved less of a concern than was anticipated at the project outset as there as been no reported cases of wine quality deterioration due to light damage. A study was conducted under this project to examine the effect of light on wine and how thinner glass due to lightweighting might affect the wine quality (see section 5.3).

#### *2.6.5 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. Costs might include:

- **write off of moulds or purchase of new moulds** - glass bottles are manufactured using mould sets comprising 'blank' and 'finishing' mould sets. These moulds gradually wear and have a natural life measured in the number of bottles they produce, which can be in the order of 20 to 30 million. Due to relatively modest numbers of bottles consumed by individual wine fillers, glass moulds of a particular design might have a relatively long life. The need to write off residual mould life if bottle design is changed prior to the end of the natural mould life can sometimes present a financial barrier to lightweighting. However, this barrier must be balanced against the potential benefits which might be accrued from lightweighting. 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 retailer or 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 know 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 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 capital and revenue costs in the context of payback period and also the risks 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 lightweight containers now successfully entering the market, there is strong empirical evidence that carefully planned lightweighting initiatives yield significant net benefit to the brands involved, both financially and environmentally.

## 3.0 Project Structure

### 3.1 Project Management Team

To deliver the objectives of the project, a project management team comprising WRAP and British Glass 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 British Glass 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.
- **British Glass – the project managers and delivery partners for WRAP.** British Glass<sup>20</sup> 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), and reporting project progress and achievements to WRAP and the project steering group.

### 3.2 Project Steering Group

To ensure that the project was aligned to meet the needs of the wine supply chain 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;
- provide those involved in the project with guidance and identify opportunities;
- ensure the project's scope aligned with the requirements of the wine sector;
- address any risk that could have had major implications for the project;
- review and monitor project progress; and
- 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 wine supply chain, it was formulated to reflect the sector structure, with individuals representing their component of the wine sector (see Table 6). The steering group met approximately every two months.

Table 6 GlassRite Wine steering group membership.

Name	Company	Business
Mike Bullock	Constellation Europe	Brand owner and Filler
Philip Bailey	Corby Bottlers	Filler
Michael Forde	Kingsland Wine & Spirits	Filler
Peter Lee	Oakdene Hollins	Environmental Consultant
Keith Reynolds	O-I Europe	Glass Manufacturer
Peter Fitzgerald	Quinn Glass	Glass Manufacturer
Andy Gale [Chair]	Tesco	Retailer
Mike Williams	Trans Ocean Distribution	Logistics
John Corbet-Milward	Wine & Spirits Trade Association	Trade Federation
Nick Kirk	British Glass	Trade Federation
Andy Hartley	Glass Technology Services	Technical Provider
Andy Dawe	WRAP	Project Director
Nicola Jenkin	WRAP	Technical Advisor
Tammy Strickland/Olwen Cox	WRAP	Project Manager

<sup>20</sup> GlassRite Wine forms one of a suite of 3 projects, the other projects addressing beer, cider, & spirits and food, RTDs & soft drinks sectors. In order to ensure possible synergies between the different projects were exploited, British Glass also provided overview project management across the suite of three projects.

### 3.3 Project Partners

Project partners comprised of companies directly participating in the delivery of the project trials. These companies included glass manufacturers, logistic suppliers, brand owners, retailers and packer fillers. Through their participation project partners had the following responsibility; to:

- agree to make their involvement in the project public;
- affirm the principles of the project to reduce the environmental impact of wine bottles in the UK and consider bulk importing wine to the UK;
- review product lines and operations and identify any project trial;
- discuss opportunities and progress those opportunities to product trial status;
- provide appropriate data to develop a baseline and monitor trial progress against agreed targets. This information typically related to: volumes of bulk wine imported, container weights and sales volumes;
- 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.

### 3.4 Project Support

Support was provided to project partners to carry out trials for and address barriers to bulk importation of wine for UK filling and lightweighting. The following was provided:

- design support for mould and filling machine changes that are not already scheduled and will be fully consumed or rendered worthless during the project duration;
- design support specifically associated with the lightweighting process including the design process itself and the production of wood/resin pattern samples;
- support associated with trial bottle manufacturing runs other than mould costs i.e. time and consumables;
- support associated with market impact analysis in association with proposed changes;
- research to look into and overcome barriers to bulk importation of wine for UK filling and lightweighting;
- support for monitoring and assessment equipment used to assess the effects of design change; and
- support for product performance testing.

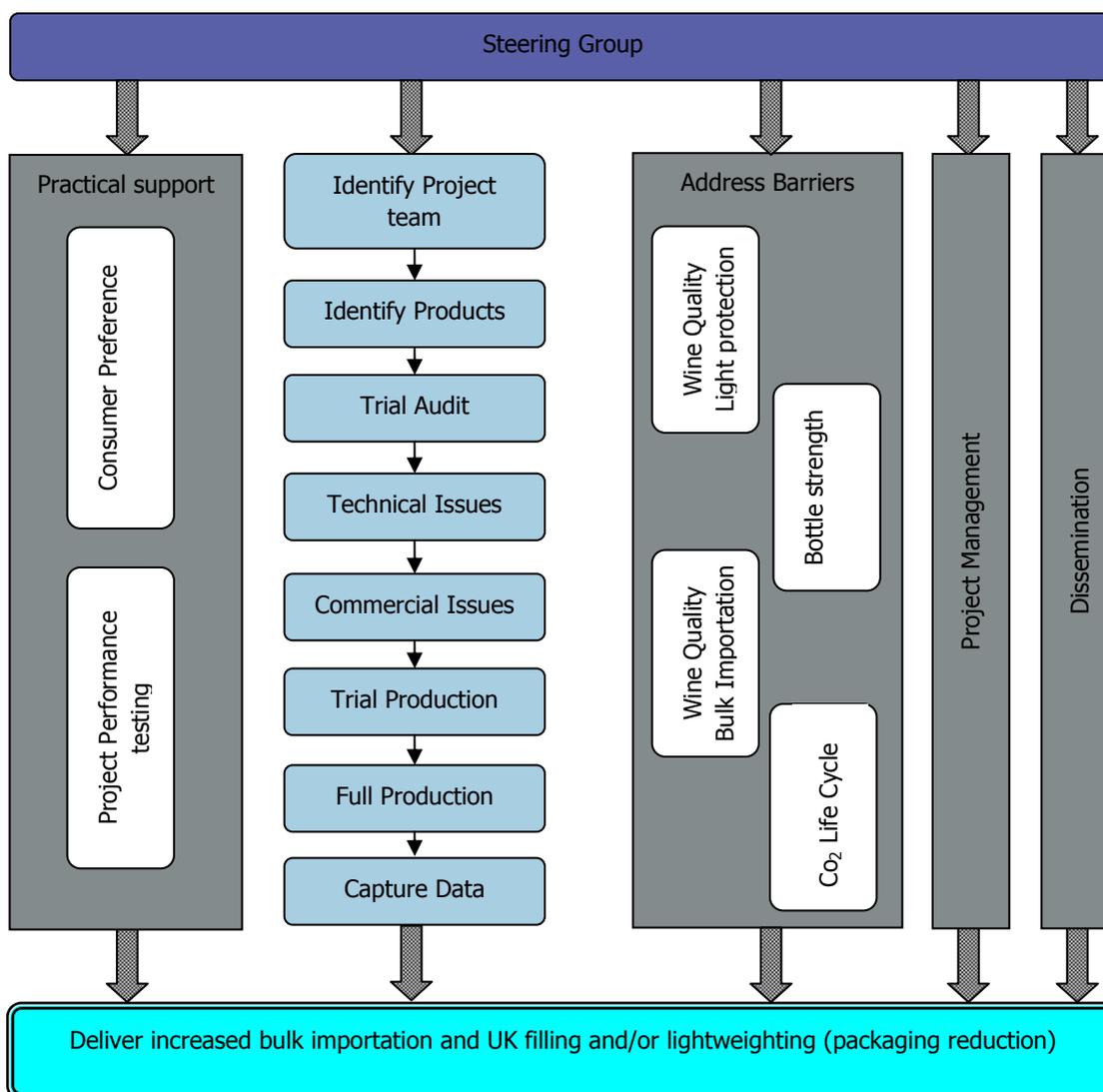
However, the project did not provide support for the following:

- purchase of capital equipment;
- trials or production which would have taken place irrespective of the project; and
- any activity with sole/exclusive benefit of the company carrying out the work, and hence not shared with the sector.

### 3.5 Project Methodology

The project aimed to initiate a number of bulk importation of wine for UK filling and lightweighting trials, and targeted removing specific barriers to ensure a success, which would then lead to wider replication across the sector. The project was initially divided into a series of tasks to enable the project objectives and barriers to be addressed and to ensure good engagement with the whole wine supply chain (Figure 3).

Figure 3 The project methodology showing the tasks undertaken during the project.



### 3.6 Project Partners & Interested Organisations

The project supported and provided advice to a number of companies involved in the wine supply chain, some of whom wish to remain anonymous for confidentiality reasons, hence the following list is not a full reflection of all those involved in this project:

**Wine Suppliers & Brandowners:** Bibendum, Bottle Green, Constellation Europe, Fosters EMEA, HwCg, McGuigan Simeon Wines, New Zealand Wine Company, Pernod Ricard, PLB, Raisin-Social, Thierrys, Vina Ventisquero and Waverley TBS.

**Wine Fillers:** Broadlands, Continental Wines, Corby Bottlers, Halewood International, Kingsland Wine & Spirits, Lanchester Wines and Quinn Glass.

**Glass Manufacturers & Suppliers:** AE Chapman, Allied Glass, Ardagh Glass, Beatson Clark, Consol Glass (South Africa), Croxson & Sons, O-I Asia Pacific, O-I Europe and Quinn Glass.

**Retailers:** Asda, The Co-operative Group, M&S, Morrisons, Sainsbury's, Somerfield, Tesco and Waitrose.

**Logistics:** Braid Logistics, Full-Pak, FG Hillebrand, Hoyer and Trans Ocean Shipping.

**Wine Federations:** Wine & Spirits Trade Association and Wine Federation of Australia.

## 4.0 Achievements

The GlassRite Wine project has succeeded in promoting the ethos and benefits of bulk importation of wine for UK filling and lightweighting throughout the wine supply chain.

During the project a considerable number of successful bulk importations of wine for UK filling and lightweighting initiatives took place. These initiatives overcame a range of barriers, and there is now clear evidence of a growing momentum within the industry to adopt these practices, particularly within the retail sector.

Whilst many of the initiatives were undertaken with the direct support of this project and fully documented, some brand owners felt constrained from publicising their achievements. Commercial and marketing considerations often related to a new brand launch were the usual reason cited for none or partial disclosure of information. That data that was released but deemed as commercially sensitive initiatives is presented in an anonymised form to protect the interests of the companies concerned, but the reported value underestimates the total contribution from these commercially sensitive sources.

### 4.1 Summary of Initiatives

The initiatives for the following companies are reported: Broadland Wineries, The Co-operative, Constellation Europe, Corby Bottlers, Fosters EMEA, Kingsland Wine & Spirits, Morrisons, PLB Group, Raisin Social, Somerfield, Tesco and Vina Ventisquero.

The summaries below provide a description of the different trials and activities that were undertaken during the project. Details include annual tonnes of glass saved from end of the project period with the CO<sub>2</sub> saving associated with the reduction in glass weight and quantity of bulk imported wine and UK filled represented in million 75cl units per annum. Many of the initiatives have already been reported in press releases and WRAP newsletters, and where appropriate a reference to such publications is given.

#### 4.1.1 Trial I – Retailer

Project Name	Retail Multiple 1		
Product	Various		
Type	Bulk importation & lightweighting		
Lead Company	Retailer		
Project partners	Various suppliers & fillers		
Sector	Retail	Date in retail	From September 2007
Original weight	Between 410 and 440g	New weight	Between 300 and 420g
Tonnes saved	142 tonnes/annum	On/off trade	100% off-trade
CO <sub>2</sub> Saved	97 CO <sub>2</sub> tonnes/annum	% weight reduction	Between 5 and 25%
Bulk importation	Yes (split between bottled at source and bulk importation)	Country of origin	Various
<b>Description:</b>			
This retailer has numerous own wine labels and is supplied by an extensive network of wine importers and suppliers. As part of their project commitment they have introduced lightweight bottles to over 20 own-label wine products which have resulted in this initial weight saving of 149 tonnes/annum.			
Future opportunity	This retailer is currently reviewing future opportunities and there is huge potential to make significant wine glass packaging reductions.		

#### 4.1.2 Trial II – Broadland Wineries

Project Name		English Sparking Wine	
Product	Bellabruso		
Type	Lightweighting		
Lead Company	Broadland Wineries		
Project partners	AE Chapman (glass supplier) & O-I Europe (glass manufacturer)		
Sector	Retail	Date in retail	November 2007
Original weight	480g	New weight	400g
Tonnes saves	120 tonnes/annum	On/off trade	10% on- / 90% off-trade
CO <sub>2</sub> Saved	82 CO <sub>2</sub> tonnes/annum	% weight reduction	20%
Bulk importation	n/a	Country of origin	England
<p><b>Description:</b></p> <p>This product is now best in its class (English Sparkling Wine). Broadlands worked with their glass supplier (AE Chapman) to identify and source a lightweight bottle for sparkling wine. The main barrier with this product was identifying a bottle that could withstand high internal pressures yet also display good mechanical strength. This was successfully undertaken and the new bottle was shown to be fit for its purpose without any reported problems during filling, transit or retail and no known consumer issues during use and consumption. There have been numerous publications in the trade press<sup>21</sup>.</p>			
			
Future opportunity	None identified.		

<sup>21</sup> Broadland Wineries launches light-weighted bottle for sparkling wine, Harpers, <http://www.harperssearch.com/news/5117/Broadland-Wineries-launches-li.ehtml>, Jan 2008

### 4.1.3 Trial III – The Co-operative

Project Name		Retail Multiple II	
Product	Various		
Type	Bulk importation & lightweighting		
Lead Company	The Co-operative		
Project partners	Kingsland Wine & Spirits and Quinn Glass		
Sector	Retail	Date in retail	From January 2008
Original weight	Between 540 and 390g	New weight	Between 484 and 350g
Tonnes saved	445 tonnes/annum	On/off trade	100% off-trade
CO <sub>2</sub> Saved	305 CO <sub>2</sub> tonnes/annum	% weight reduction	Between 10% and 25%
Bulk importation	8.3 million 75cl units/annum	Country of origin	Various
<p><b>Description:</b></p> <p>Initially the Co-operative had concerns over consumer perception, however, with support from the project team using previously undertaken consumer preference testing and with Kingsland Wine &amp; Spirits providing mock up samples of the various bottle options for further reassurance, this was satisfactorily addressed. Also, Quinn Glass worked closely with Kingsland to design a bottle that was suitable for their filling lines. This bottle was lighter than the previous bottles and formed a part of a rationalised bottle range for The Co-operative. From the mocked-up bottles provided by Kingsland, it was possible for the wine team to assess the potential impact of consumer perception from which it was agreed that the lighter bottles would not negatively impact on buying decisions. Therefore, The Co-operative wine team took the decision to rationalise and lightweight 26 wine products into essentially 3 different weight bottles. There have since been numerous publications in the trade press<sup>22</sup>.</p>			
			
Future opportunity	The Co-operative source wine from around the world and a number of their labels are Fairtrade that tend to be bottled at source which represents a huge future opportunity.		

#### 4.1.4 Trial IV – Constellation Europe

Project Name		Brand Owner I	
Product	Various wines under the Stowells & Echo Falls brands and including Jack Rabbit, Turner Road, Kumala Cape Classic brands		
Type	Bulk importation & lightweighting		
Lead Company	Constellation Europe		
Project partners	Quinn Glass		
Sector	Brandowner	Date in retail	From November 2007
Original weight	495g	New weight	435g
Tonnes saved	3261 tonnes/annum	On/off trade	10% on- / 90% off-trade
CO <sub>2</sub> Saved	2233 CO <sub>2</sub> tonnes/annum	% weight reduction	12%
Bulk importation	55 million 75cl units/annum	Country of origin	Various
<p><b>Description:</b></p> <p>Constellation worked with Quinn Glass to design a lighter wine bottle that could be filled on their existing filling lines with minimum investment. This was achieved by maintaining the bottle diameter, with a height drop of 7 mm and improved process control during glass manufacture to achieve even glass distribution (glass thickness). This resulted in a bottle of a similar shape and of equivalent mechanical properties to the original bottle, which was suitable for filling at Constellation’s existing filling facility. There have been numerous publications in the trade press<sup>23</sup>.</p>			
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>495g      435g</p> </div> <div style="text-align: center;">  <p>495g      435g</p> </div> </div>			
Future opportunity	Constellation has announced <sup>24</sup> that they intend to invest in a new filling facility capable of filling 120 million bottle/annum and will be considering the use of lightweight bottles.		

#### 4.1.5 Trial V – Corby Bottlers

Project Name	UK Filler		
Product	Imported Wines from Australia, California, Chile, & South Africa		
Type	Bulk importation and lightweighting		
Lead Company	Corby Bottlers		
Project partners			
Sector	On and Off Trade		
Original weight	460g	New Weight	360g & 400g
Tonnes saved	376 tonnes/annum	On/off trade	40% on- / 60% off-trade
CO <sub>2</sub> saved	260 CO <sub>2</sub> tonnes/annum	% weight reduction	13% to 22%
Bulk importation	5.4 million 75cl units/annum	Country of origin	New World
<p><b>Description:</b>            Light weighing into customer approved 75cl bottles, typically sourced from Europe. Alternative lighter bottles were supplied offering a gradual weight reduction over time or a more marked reduction, depending on customer preference. Flint bottles were introduced where appropriate, notably for Rose wines. Two bottle weights have been introduced, 360g &amp; 400g to replace the existing 460g. It is not possible to disclose the customer details (label removed on the example below), however, they were lead UK retailers and wine suppliers.</p>			
 <p>460g      360g      360g      360g            Cork finish      Screw finish      no label</p>			
Future opportunity	Corby Bottlers continue to offer their existing and potential customers lightweight bottle options.		

#### 4.1.6 Trial VI – Fosters EMEA

Project Name	Brand Owner II		
Product	Beringer + various		
Type	Bulk importation & lightweighting		
Lead Company	Fosters		
Project partners	Quinn Glass		
Sector	Brandowner	Date in retail	From March 2008
Original weight	580g, 550g, 515g & 495g	New weight	484g & 460g
Tonnes saved	772 tonnes/annum	On/off trade	20% on- / 80% off-trade
CO <sub>2</sub> saved	528 CO <sub>2</sub> tonnes/annum	% weight reduction	20%
Bulk importation	11.5 million 75cl units/annum	Country of origin	Various
<b>Description:</b>  Initially a 550g bottle manufactured outside the UK was reduced to 484g (UK manufactured). Fosters worked with Quinn Glass to design a lighter wine bottle that had the required shelf presence of the brand image. It was important that the bottle shape was not perceptibly different to the existing bottle, which was achieved. This was a good example of a lead brand bulk importing, filling in the UK in a lighter bottle, and still retaining a quality product Fosters are moving a number of products that were traditionally filled at source to bulk importation and UK filled in lightweight bottles and in addition they intend to launch some new products that will also be bulk imported and UK filled in lightweight bottles.			
Future opportunity	Potential opportunity for further bulk importation and lightweighting at source.		

#### 4.1.7 Trial VII – Kingsland Wines & Spirits

Project Name	Filler		
Product	Various over 100 wine labels including Four Crossings, Boulders & Balance		
Type	Bulk importation & lightweighting		
Lead Company	Kingsland		
Project partners	Quinn Glass		
Sector	Filler & Brand Owner	Date in retail	From January 2008
Original weight	Between 650g & 440g	New weight	Between 484g & 350g
Tonnes saved	1611 tonnes/annum	On/off trade	15% on- / 85% off-trade
CO <sub>2</sub> saved	1140 CO <sub>2</sub> tonnes/annum	% weight reduction	Between 15 and 35%
Bulk importation	28 million 75cl units/annum	Country of origin	Various

#### Description:

Kingsland has lightweighted over 100 different wine labels for their customers that include retailers and wine suppliers and also for their own wine brand, Four Crossings, Boulders & Balance, which is described below.

Two bottles were lightweighted, initially 650g and 460g bottles reduced to 484g and 400g respectively for New World red and white wines. Kingsland and Quinn Glass set up a design group to review bottle designs for all bottles filled by Kingsland. One of the objectives was to rationalise the bottle range filled by Kingsland and achieve a range of bottles with brand distinction for different value wines. There have been numerous publications of this in the trade press<sup>23</sup>.



#### Future opportunity

Potential opportunity for further bulk and lightweighting.

4.1.8 Trial VIII – Wm Morrisons Supermarkets plc

<b>Project Name</b>	<b>Retail Multiple III</b>		
<b>Product</b>	Working Dog & William Grove		
<b>Type</b>	Bulk importation & lightweighting		
<b>Lead Company</b>	Corby Bottlers		
<b>Project partners</b>	Morrisons & Corby Bottlers		
<b>Sector</b>	Retailer	<b>Date in retail</b>	September 2007
<b>Original weight</b>	460g	<b>New weight</b>	360g
<b>Tonnes saved</b>	231 tonnes/annum	<b>On/off trade</b>	100% off trade
<b>CO<sub>2</sub> saved</b>	158 CO <sub>2</sub> tonnes/annum	<b>% weight reduction</b>	22%
<b>Bulk importation</b>	1.7 million 75cl units/annum	<b>Country of origin</b>	New World

**Description:**

Two wine brands were lightweighted using a common bottle. Corby Bottlers were unable to source a lightweight wine bottle from the UK due to a temporary glass shortage and therefore obtained the bottle from outside of the UK. There have been numerous publications in the trade press<sup>25</sup>.



**Future opportunity**

Potential opportunity for further bulk and lightweighting at source.

#### 4.1.9 Trial IX – PLB Group Ltd

Project Name	Wine Supplier		
Product	Various Wine Brands		
Type	Bulk importation & lightweighting		
Lead Company	PLB		
Project partners	Broadlands & Quinn Glass		
Sector	Wine Supplier	Date in retail	From July 2007
Original weight	≈500g	New weight	420g & 460g
Tonnes saved	495 tonnes/annum* 220 tonnes/annum**	On/off trade	5% on- / 95% off-trade
CO <sub>2</sub> saved	340 CO <sub>2</sub> tonnes/annum* 150 CO <sub>2</sub> tonnes/annum**	% weight reduction	Between 8 and 16%
Bulk importation	8 million 75cl units/annum * 3.6 million 75cl units/annum **	Country of origin	Various

#### Description:

PLB is responsible for bulk importing and UK filling of approximately 30 different wines for both on and off trade. Working their UK fillers they have specified lighter weight bottle options which have contributed to significant weight savings. There have been numerous publications about this in the trade press<sup>23</sup>.



#### Future opportunity

PLB will be specifying the next generation of lightweight wine bottles (<400g) for their UK filled wines over the next twelve months.

\* 12 month period from Jul 06 to Jun07, \*\* predicted 12 month period from March 08, which does not account for seasonal and short run products.

#### 4.1.10 Trial X – Raisin Social

Project Name		South African Lightweight Wine Bottles	
Product	Various Wine Brands		
Type	Lightweighting at source		
Lead Company	Raisin Social		
Project partners	Consol Glass, South Africa		
Sector	Wine Supplier	Date in retail	From September 2007
Original weight	720g (one product) ≈500g (four products)	New weight	560g (one product) 450g (four products)
Tonnes saved	31 tonnes/annum	On/off trade	100% off trade
CO <sub>2</sub> saved	21 CO <sub>2</sub> tonnes/annum	% weight reduction	Between 10 & 28%
Bulk importation	n/a	Country of origin	South Africa
<p><b>Description:</b></p> <p>Raisin Social has reduced the weight of one product from 720g to 560g and introduced four new products in a lighter weight wine bottle (450g) rather than choosing a standard weight (typically around 500g).</p> <div style="text-align: center;">  </div>			
Future opportunity	Potential opportunity for further bulk and lightweighting at source.		

#### 4.1.11 Trial XI – Somerfield

<b>Project Name</b>	<b>Retail Multiple IV</b>		
<b>Product</b>	First Flight + Various		
<b>Type</b>	Bulk importation & lightweighting		
<b>Lead Company</b>	Somerfield		
<b>Project partners</b>	Quinn Glass		
<b>Sector</b>	Retail	<b>Date in retail</b>	From July 2007
<b>Original weight</b>	500	<b>New weight</b>	420g
<b>Tonnes saves</b>	167 tonnes/annum	<b>On/off trade</b>	100% off trade
<b>CO<sub>2</sub> saved</b>	115 CO <sub>2</sub> tonnes/annum	<b>% weight reduction</b>	16%
<b>Bulk importation</b>	1.9 million 75cl units/annum	<b>Country of origin</b>	Australian
<b>Description:</b>			
<p>Somerfield worked with their wine suppliers and filler to select a lightweight bottle for this new bulk imported wine, which resulted in considerable saving for two wine labels. The image below is the lightweight product. As this was a new product, no bottle from before lightweighting was available.</p>			
			
<b>Future opportunity</b>	Potential opportunity for further bulk and lightweighting at source.		

#### 4.1.12 Trial XII – Tesco

Project Name		Retail Multiple V	
Product	Tesco's own label wines		
Type	Bulk importation & lightweighting		
Lead Company	Tesco		
Project partners	Kingsland & Quinn Glass		
Sector	Retail	Date in retail	From November 2007
Original weight	460g & 420g	New weight	404g & 350g
Tonnes saved	3743 tonnes/annum	On/off trade	100% Off trade
CO <sub>2</sub> saved	2564 CO <sub>2</sub> tonnes/annum	% weight reduction	13 to 17%
Bulk importation	54 million 75cl units/annum	Country of origin	Various
<b>Description:</b>			
<p>Tesco, Kingsland and Quinn Glass have been working together on the design and introduction of new lightweight wine bottles to replace the existing bottles. This was conducted via a project team to deliver two wine bottles that met their design requirements, being suitable for high speed filling and also satisfied their brand image concerns. There have been numerous publications relating to this in the trade press<sup>26,23</sup>.</p>			
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>460g      404g</p> </div> <div style="text-align: center;">  <p>420g      356g</p> </div> </div>			
Future opportunity	Potential opportunity for further bulk and lightweighting at source. Tesco recently announced substantial glass weight saving over the next few years <sup>26</sup> .		

#### 4.1.13 Trial XIII – Viña Ventisquero Ltd

Project Name		Bottled at Source in Chile	
Product	Ventisquero Clásico		
Type	Lightweighting at source		
Lead Company	Viña Ventisquero		
Project partners	Cristaleras, Chile		
Sector	Brandowner	Date in retail	From January 2008
Original weight	459g	New weight	413g
Tonnes saved	3 tonnes/annum	On/off trade	100% On trade
CO <sub>2</sub> saved	2 CO <sub>2</sub> tonnes/annum	% weight reduction	10%
Bulk importation	n/a	Country of origin	Chile
<p><b>Description:</b></p> <p>This project was an example of lightweighting at source with long distance shipping to the UK. Viña Ventisquero worked with their glass supplier and filler in Chile to switch to a new lightweight bottle. The new bottle has been well manufactured and is capable of withstanding the transit from Chile to the UK. There have been numerous publications relating to this in the trade press<sup>23</sup>.</p>			
			
459g		413g	
Future opportunity	Already identified another opportunity that will yield further weight savings for the Q2 2008.		

## 4.2 Performance Against Project Targets

### 4.2.1 Bulk Importation & Consumption of Recycled Glass

The initiatives in section 4.1 account for approximately 174 million 75cl wine bottles per annum of bulk imported and UK filled. However, in order to capture the total impact of the project, as it was known that other wines were being bulk imported and UK filled but not being captured directly, all the major UK fillers were surveyed on a quarterly basis to monitor any increase in bulk importation of wine for UK filling. This enabled the net effect on the use of additional recycled glass (cullet) used in the manufacture of new bottles to be determined. Data on wine filled in 75cl bottles in the UK was gathered for the period July 2005 to June 2006 as a benchmark, and a final data set was taken at the end of February 2008. The assumption of 90% recycled glass for green glass and 50% recycled glass for flint glass was made in order to estimate the additional demand for recycled glass; this was based on glass production data<sup>27</sup>.

The baseline data was collated for the period July 2005 to June 2006, which was the benchmark period to assess the success of the project. The bulk wine filled in 75cl glass wine bottles in the UK for this period was approximately 90 million litres, which was filled in 120 million 75cl units glass wine bottles. In addition a further 57 million litres were filled in other formats such as bag-in-box, tetra, PET etc (Table 7).

Data for the bulk importation of wine destined for UK filling was collected from all UK fillers, bulk importation and UK filling in 75cl bottles at the end March 2008 was 149 million litres/annum (equivalent 199 million 75cl units). The UK fillers have successfully achieved considerable growth in bulk importation of wine for UK filling from 120 to 199 million 75cl wine bottle per annum, which is a 65% annual increase (Table 8).

Table 7 Bulk importation data for period Jul 2005 to Feb 2008.

Packaging Format	Mean monthly bulk imported volume (million litres)		
	Jul 05/Jun 06	Jul 06/Jun07	Jul 07/Feb08
75cl	7.55	11.65	12.45
Other formats	4.72	3.72	5.19

Packaging Format	Annual bulk imported volume (million litres)		
	Jul 05/Jun 06	Jul 06/Jun07	Feb08
75cl	90.60	139.80	149.40
other formats	56.60	44.60	62.28

Table 8 Bulk importation annual growth comparing two periods.

Packaging Format	2005/2006 to 2006/2007			2005/2006 to 2007/2008		
	M litres	M units	%	M litres	M units	%
75cl	49.2	65.6	54.3	58.80	78.40	64.90
Other formats	-12.0	n/a	-21.2	5.68	n/a	10.04

This increase in bulk importation and UK filling has increased the demand for wine bottles, in turn requiring additional recycled glass. Table 9 shows that demand for UK recycled glass has increased by 23,930 tonnes/annum of which 1/3 clear and 2/3 green recycled glass. This increase in UK recycled glass demand utilises recycled glass for closed loop recycling for a high value use rather than a low value application such as aggregates. Based on 315 kg/CO<sub>2</sub><sup>16</sup> saving for every tonne of recycled used for container glass manufacture, the additional use of recycled glass will save approximately 7538 tonnes of CO<sub>2</sub>. In addition, from the Life Cycle Emissions study (section 5.4) it has been reported that when bulk importing and filling in the UK in a standard weight 75cl wine bottle from Australia (majority of wines filled in the UK are from southern hemisphere), there is a 164g CO<sub>2</sub> per 75cl wine bottle saving. In order to avoid double counting, the standard weight wine bottle scenario was used rather than the lightweight scenario and the CO<sub>2</sub> saving achieved by lightweighting is identified

separately. Based on 79 million/annum additional units this would equate to approximate 12,956 tonnes of CO<sub>2</sub>. Therefore, the bulk importation of wine for UK filling has saved in the order of 20,494 tonnes of CO<sub>2</sub>.

Table 9 The effect of bulk importation growth on glass and recycled glass usage.

	Tonnes/annum
Jul 05 to Jun 06 glass usage	59,904
Apr 07 to Mar 08 glass usage	95,794
Increase in UK manufactured green glass usage	17,112
Increase in UK manufactured clear glass usage	17,055
Increased in UK manufactured glass usage	<b>34,167</b>
Increase in green recycled glass usage	15,402
Increase in clear recycled glass usage	8,528
<b>Total recycled glass increase</b>	<b>23,930</b>

#### 4.2.2 Identified Lightweighting – Packaging Reduction

The lightweighting trials and activities initiated during the project contributed 11,397 tonnes/annum of glass weight savings. Table 10 provides a summary of these activities including the individual bulk importation trials showing individual bulk importation of 174 million 75cl units at the end of the project period. Over 350 different wine brands and labels were been lightweighted during the project period.

Table 10 Summary of the reported lightweighted products.

Product	Delivered tonnes/annum			Saved CO <sub>2</sub> tonnes /annum*	Bulk Import million 75cl units/annum
	On-trade	Off-trade	Total		
Retailer		142	142	99	-
Broadlands	12	108	120	82	n/a
The Cooperative		445	445	305	8.3
Constellation	326	2935	3261	2233	55.0
Corby Bottles	150	226	376	260	5.4
Fosters	154	618	772	528	11.5
Kingsland	1340	271	1611	1104	28.0
Morrisons		231	231	158	1.7
PLB	25	470	495	350	8.0
Raisin Social		31	31	12	n/a
Somerfield		167	167	115	1.9
Tesco		3743	3743	2564	54
Viña Ventisquero	3		3	2	n/a
<b>Sub-total: Delivered tonnes</b>			<b>11,397</b>	<b>7,810</b>	<b>173.8</b>

\* CO<sub>2</sub> saving associated with the reduction in glass weight, does not include CO<sub>2</sub> saving for bulk importation nor transportation.

### 4.2.3 Impact of the Project

#### Bulk Importation

Due to the relatively small number of UK fillers it was possible to capture information on the quantity of wine that was bulk imported and filled in the UK, and to establish the recycled content of the wine bottles and the source of these bottles, whether UK manufactured or imported. Therefore, there is a high degree of certainty that the information captured and reported was complete and accurate. The project has been very successful in increasing bulk importation of wine for UK filling by over 65%, from 120 million to 199 million 75cl glass bottles/annum, an increase of 75 million 75cl glass bottles/annum. Generating the demand for over 23,930 tonnes/annum of recycled glass used in UK wine bottle production, equivalent to a saving of approximately 20,494 tonnes of CO<sub>2</sub>.

#### Lightweighting

The identified weight savings in section 4.2.2 understate the true impact of this project, as although wherever possible during the project period all new lightweight products were identified, inevitably not all were captured. This proved a very challenging task as there is a multitude of suppliers and brandowners importing wine into the UK, and prior to the project there was very little requirement to record the existing wine bottle weight.

Due to the complexity of the wine supply industry and with thousands of wine labels sold through UK retail and consumed in the on-trade, it has not been possible to capture details on the many bottles that are now lighter. Therefore, as a cross-check of the effectiveness of the project, other data sets (supplied in confidence) were used to calculate this additional change as follows:

- From a recent data set (DHL 2006), the average wine bottle weight was shown to be approximately 500g in 2006, which includes the first generation of UK available lightweight bottle (between 440 & 460g) used for approximately 154 million 75cl units (see appendix 1 for further details).
- For 2007 there were approximately 199 million 75cl bottles filled in the UK, of which half were filled in lightweight bottles (between 350 & 435g) and the remainder in lighter first generation bottles (between 440 & 460g). Based on the assumption of 1300 million 75cl bottles consumed in the UK, this potentially results in the average moving down towards 485g and a net weight saving of 23,275 tonnes/annum from June 2006 to end of 2007 (Table 11).

Table 11 Estimate of the wine packaging reduction (see appendix 1 for further details).

Year	Total Glass (tonnes/annum)
2005	656,500
Jun 2006*	653,250
2006	650,000
2007	629,975
Glass reduction at end 2007	23,275

\*Average of 2005 & 2006

Therefore, only 11,397 tonnes/annum out of at least 23,275 tonnes/annum (difference between June 2006 and end of 2007) have been captured and therefore can be reported as contributing directly to the project target.

## 5.0 Project Research

A number of areas of research were conducted under the project in support of the project objectives, to better understand and assist in overcoming industry barriers to lightweighting and bulk importation into the UK:

- **champagne and sparkling wine bottles** – assessment of the commercial and technical barriers to lightweighting Champagne, sparkling wine and semi sparkling wine bottles;
- **consumer perceptions of lighter weight wine bottles** – this research was conducted by the University of Wales, Bangor on a series of different wines, to assess the correlation between perceived wine value and bottle design, weight and height;
- **effect of ultraviolet light on wine quality** - a desktop study carried out by GTS, reporting on the effect of UV on wine quality, the effect of reducing glass thickness due to lightweighting and how UV protection can be maintained;
- **life cycle CO<sub>2</sub> emissions of wine imported to the UK** – a desktop study carried out by Oakdene Hollins to investigate the CO<sub>2</sub> impact of wine transportation, both bottled at source and bulk importation and then UK filled in lightweight bottles;
- **lightweight glass containers** – a study conducted by GTS to investigate the strength of wine bottles and how lightweight bottles perform against standard weight bottles in term of strength and fitness for purpose; and
- **shipping wine in bulk** – a desktop study carried out by GTS to investigate the effect on quality by shipping wine in bulk and the logistical benefits.

### 5.1 Champagne and Sparkling Wine Bottles

#### 5.1.1 Introduction

The UK's consumption of Champagne and sparkling wines is currently in excess of 60 million litres per year. The bottles used to fill these products are by necessity heavier than those used to fill still table wines by virtue of the need to contain the internal pressures. Most Champagne and many premium sparkling wines are filled in bottles manufactured at weights of around 900g. However, several highly carbonated wines are sold in significantly lighter weight bottles suggesting that the standard bottle is somewhat heavier than it need be.

The project team perceived that there would be reluctance on the part these wine producers to use lighter weight bottles on the grounds of the product image. The team recognised that, before engaging the wine makers in a dialogue aimed at changing their packaging format, they must first have addressed any concerns relating to the technical viability of lightweighting these carbonated bottles. However, the high sales volume and the potential to affect large unit bottle weight reductions did make this market worthy of closer examination. A brief scoping study was thus commissioned with a remit to quantify lightweighting opportunities, identify any barriers to their implementation and formulate a strategy for possible inclusion in WRAP's next business plan.

#### 5.1.2 Findings

The annual UK consumption of these products exceeds 60 million litres per annum with the associated bottles contributing over 65,000 tonnes/annum to the waste stream, based on the assumption of 95% of Champagne and sparkling wine is bottled in 75cl bottles weighing between 800 & 900g.

The study reported that there are no technical barriers to lightweighting by at least 200g the 900g bottle used almost universally by the Champagne trade and by many of the other premium sparkling wines. Weight reductions of 100g could also be made in producing the lighter bottles commonly used for less carbonated sparkling products. It is estimated that if all the bottles used to supply Champagne and sparkling wine were to be lightweighted to the "rightweight" then glass savings of 14,520 tonnes per year would accrue. If the savings were to be restricted to the five leading brands they would total 8,360 tonnes.

However, based on the experiences of the more general GlassRite wine project, it is anticipated that there could be reluctance on behalf of the leading brand owners to consider lightweighting. Champagne and to some extent Cava are marketed as luxury items and none of the leading brand owners would easily accept a change in packaging format that could be construed a lessening of quality. The lack of demand for lighter bottles from other counties and the logistical problems of filling UK-bound product in different bottles would provide the brand

owners with reasons not to consider lightweighting. However, some routes to address these barriers have been identified.

### *5.1.3 Conclusions*

The report recommends that the most fruitful and cost effective method of involving the sparkling wines sector in the lightweighting programme would be on a collective basis via their relevant trade bodies. To this end the report recommends that preliminary discussions are held with the Comité Interprofessionnel du Vin de Champagne (CIVC) which represents all the leading Champagne houses and the Federación Española del Vino (FEV) which represents the Spanish Cava producers. Carbon footprinting is an issue of international concern and as the CIVC has recently published its intention to address this problem it would provide the grounds on which to open preliminary discussions. Targeting the individual sparkling wine products of companies with portfolios that include still wine is not felt to be an efficient use of effort and in such instances a more general approach targeting all the products offered by a given company would be recommended.

The technical report on glass strength and the use of finite element analysis (FEA) written as part of this project could also be a useful tool to initiate talks with interested parties.

## **5.2 Consumer Perceptions of Lightweighted Wine Bottles**

### *5.2.1 Introduction*

The GlassRite Wine project seeks to persuade those involved in the sale of wine to consider the use of lighter weight bottles and also to use to clear glass if appropriate.

It is widely accepted that packaging influences customer behaviour. However, the significance of this influence is very dependent upon the nature of the product. Wine is an established product which until relatively recently would be purchased in glass bottles of a few standard shapes which would be predominantly green in colour. In practice the weights of the wine bottles varied considerably, but in general they were perceived to be "heavy" in comparison to other bottles. The GlassRite Wine project seeks to persuade those involved in the sale of wine to consider the use of lighter weight bottles and also to use to clear glass if appropriate. Many of those involved in the wine trade are of the belief that their customers would equate a reduction in the weight of the bottle used to package their product with a reduction in wine quality.

The purpose of the customer perception research is to challenge this perception that customers simply equate wine bottle weight with quality and to establish what factors are important determinants of customer choice. This research, carried out by the Centre for Experimental Consumer Psychology in the School of Psychology at Bangor University, seeks to measure the effect of various parameters on customer perception of wine consumption. It was anticipated that the results of this work will help overcome the natural reluctance of the wine trade to consider changes to their established packaging formats.

### *5.2.2 Method*

In the course of a five-part experiment, a sample of 100 consumers were tested for their perception of 3 wine products in different bottle categories:

1. Red wine in green glass bottles (75 cl)
2. White wine in green glass bottles (75 cl )
3. White wine in clear glass bottles (75 cl)

Each product was packaged in wine bottles without brand labels (and in one condition with artificial non-branded labels) that were either made from standard weight bottles or from lightweighted bottles. Exemplars from each category of wine and bottle type in each of the two glass weights (light, standard) fell into one of three different height categories (short, medium and tall). In all 18 wine products were examined (9 standard weight, 9 light weight bottles; three for each wine/bottle combination, one of each height class). The samples tested included three bottle heights:  $\approx 280\text{mm}$ ,  $\approx 300\text{mm}$  &  $\approx 310\text{mm}$ , each with two different weights (lightweight and standard weight), different glass and wine colours.

### Participants completed five tasks:

1. A shopping questionnaire to collect demographic information and shopping habit information.
2. A price estimation task requiring each participant to guess the price of each product whilst taking it from a shelf and then replacing it. This was done once for each of the 18 bottles without labels and then repeated with generic nonbrand wine labels affixed to each bottle in a quasi-random way that varied for different participants.
3. A choice task where a "favourite" was chosen between two same-category, nonlabelled products that differed in height and weight.
4. A 'pouring' task where participants poured non-labelled wine from full and half-full bottles into a typical stemmed wine glass, whilst seated at a "dinner" table setting. Each participant was assigned to one of the three wine/bottle categories. They subjectively rated the ease of pouring for each bottle (three times each for full and half full), whilst an objective measure of the speed of their actions was made each time.
5. A 'recycling' questionnaire to collect information regarding recycling habits, packaging preferences, and opinions on light-weighting information on product labels.

### 5.2.3 Findings

#### Estimates of Value

- This effect of lightweight bottles on value estimates appears to be largely due to reduction in their height, compared to the standard bottles. For all wine bottles, the taller the bottle, the higher the estimated price. Within the range of bottles studied, increasing the bottle height by 1 mm added about 4p to its perceived value.
- Wine presented in lightweight glass bottles was estimated to have less value than wine presented in standard weight glass bottles. This effect was 18p or 3% of average price for red wine; 15p or 3% of average price for white wine in green bottles; and 41p or 9% of average price for white wine in white bottles.

#### Choices

- From a pair of wine bottles, participants were more likely to prefer the product in the taller bottle, regardless of whether the wine was in a lightweight bottle or not.

#### Pouring task

- Lightweighting wine bottles made it easier for participants to pour wine into stemmed wine glasses. This is evidenced by both explicit (subjective) ratings of the ease of pouring and by the more objective technique of measuring the time participants took to lift the bottle, pour a single glass of wine, and then replace the bottle to its previous location. Both measures reveal that pouring is faster and perceived as less arduous when wine is bottled in lightweight, short bottles.
- Pouring red wine is slower and perceived as more difficult than pouring white wine.

#### Recycling attitudes

- The majority of the participants tested in this study recycle and prefer glass as a packaging material to plastic.
- When asked about the advantages and disadvantages of plastic and glass it was found that participants perceive the advantages of plastic to be light and unbreakable, and its main disadvantages are that it is hard to recycle and non-biodegradable. Glass by contrast is thought to be good for the environment, attractive, and strong, but heavy and dangerous if broken.
- Very few of the participants would be discouraged by explicit labelling on the product explaining that the packaging had been light-weighted.

### 5.2.4 Conclusions

The results of this study suggest that consumer perception of wine products packaged in traditional glass bottles was heavily influenced by the bottle's height and weight. Measurements of consumers' estimates of the value of wine were determined largely by the bottles' height whereas the ease of pouring was determined largely by the products' weight. In general (within the range studied) the taller the bottle, the higher its perceived value; the lighter the bottle, the easier it was to pour. When making choices, consumers opt generally for the taller bottle, regardless of whether it is in a lightweight or standard weight bottle. It should be noted that these results were

obtained in the absence of 'real' brand labels, forcing participants to base their judgement on whatever information was available to them, i.e., variations in height and weight. The contribution of branded labels to consumer perception was not addressed by this study.

These results have significant implications for plans to lightweight glass containers for wine. In that shorter bottles could have a detrimental effect on consumer perception if they were not introduced slowly. This study suggests that reducing bottle height in wine products should be avoided or kept to a minimum. On the other hand, consumers are typically sensitive to "ease of use" factors and here lightweighting is advantageous. It is not clear from this study how 'ease of use' might directly affect the perceived quality of wine products but it would not be psychologically inconsistent for consumers to perceive that easier to pour wine also tastes better. The results of the post-experiment questionnaire suggests that communicating that light-weighted glass is being used in a wine container might be helpful to and is unlikely to hinder consumer purchase decisions.

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

## 5.3 Effect of Ultraviolet Light on Wine Quality

### 5.3.1 Introduction

The GlassRite Wine project seeks to persuade those involved in the sale of wine to consider the use of lighter weight bottles and also to use to clear glass if appropriate.

Filling wine in clear and/or lighter weight, thinner walled bottles has implications on its quality, as the bottle may offer less protection to the detrimental effects of light and this could be perceived as a barrier to the adoption of lighter weight or clear bottles for use in the wine trade.

The interaction of light and wine and the detrimental effects on quality have been well research and documented by those involved in the production of wine. The influence of the wine bottle, its colour and wall thickness on this interaction between light and wine is less well understood.

This project seeks to help those involved in the wine trade who are actively considering using thinner walled or even clear glass by providing useful information on this specialist technical aspect of the trade. The report identifies those wavelengths of light that have been found to be critical in damaging wine and considers the practical limitations to the use of lighter weight, thinner walled bottles with respect to light protection.

The project also considers how the glassmakers could improve the protective properties of the bottles by small compositional changes and/or the application of coatings or sleeveings.

### 5.3.2 Findings

The quality of wine deteriorates when exposed to light but glass bottles do afford some measure of protection. The evidence gathered in this research clearly shows a simple hierarchy of effectiveness with amber glass typically able to block 90% of all harmful light whilst green and clear glasses blocks only 50 and 10% respectively.

However, despite its excellent light- blocking credentials amber glass is not the winemakers' usual choice. Green glass is the most common format for wine bottles with significant quantities also filled in clear bottles. The light-filtering ability of glass is also influenced by its thickness but it is not a linear relationship as demonstrated in Table 12.

Table 12 Filtering power (PF) for different glass thicknesses.

Glass colour	Glass thickness (mm)	Filter Power (%)
Amber	3.5	100
	1.8	95
Green	4.2	93
	3.5	54
Clear	3.0	10

Light-strike damage will occur under normal artificial lighting and this may be the principal mode of exposure for many wines. Artificial lighting can produce a discernible change in wine bottled in clear glass within a few hours. In-store measures relating to the intensity and direction of lighting can be taken which will reduce damage and increase shelf life. Depending on the lifecycle of the product, these may be a more effective means of reducing light strike than applying modifications to the packaging.

Glass technologists are aware of many minerals that can be added to a standard glass to improve its light-blocking properties. Unfortunately, the use of many of these materials imparts a strong colour to the glass. Producing a clear glass with good protection is a technical challenge. Currently, cerium oxide offers the best route but large additions would be required to achieve comparable protection to an amber glass and the cost would be high. A more cost-effective solution may be found by using smaller amounts of different additives whose combined effects can provide wider spectral cover.

Coatings could be used to protect the wine. The coatings could be sprayed and baked onto the bottle and a number of companies market such products which can be tailored to filter out specific wavelengths. Coating technology could be combined with lightweighting, and the production of a very thin-walled glass bottle having good strength and light-blocking properties is considered technically feasible. Coatings and sleeveings do however represent an additional cost. The practice is commonplace in the premium beer and larger market where price is less of an issue, but with low profit margins on the entry-level wines the additional cost would become a major issue.

As an aid to glass melters seeking to improve the UV filtering properties of their glass by batch modification, a mathematical programme has been developed within the scope of the GlassRite Wine project by materials science department at the University of Sheffield who have recognised expertise in this field. The programme, which is essentially an Excel-based tool, enables the glassmaker to calculate the transmission spectrum of a glass in the region covering the UV and visible spectrum from the batch formulation. Once fully tested and validated it will be made available, within the full report, to glassmakers who will be able to use it to reassure customers that a move to a thinner-walled or lighter-coloured bottle will not cause light-related problems. Users will be able to model the light-blocking properties of various additives and the associated batch costs.

The tool may also have wider applications in the food industry as the shelf life of many food products is influenced by light driven reactions.

### 5.3.3 Conclusions

- Wine bottled in glass is susceptible to damage by light. Ultraviolet light is particularly harmful but some regions of the visible spectrum can also have a detrimental effect on wine quality. Critical wavelengths have been identified at 340, 380 and 440 nm, the latter being located in the visible region.
- The damaging reactions occur rapidly; a detectable loss in quality can occur in a matter of hours.
- The fluorescent lighting used in many stores emits the shorter wavelengths that include those known to produce unwanted chemical reactions. Shelves displaying wine should therefore be illuminated with lighting that is free from ultraviolet emissions. Such lighting is commercially available. Where lighting is to be applied from above the shape of the bottle can have an important influence, with bottles having a less pronounced shoulder able to reflect more light.

- Only amber glass provides good protection for wine against light and is able to block more than 90% of all harmful exposure. Green glass is a less effective blocker, able to stop around 50% of damaging light, whilst clear glass affords only a 10% protection.
- The protective properties of clear and green glasses can be enhanced by the addition of various metal oxides but will never meet that afforded by amber glass. Most of the better candidates to improve protection are strong colorants and all add significantly to batch costs.
- Adding combinations of additives which act in concert could conceivably give good protection to clear glass at a reasonable cost and merits more study. The interaction of iron, ceria and titania would appear to offer the most promising route to such a solution.
- The relationship between glass thickness and the protection it affords to light protection is not linear. A relatively large reduction in thickness will be accompanied by a much smaller fall in protection.
- The small reductions in protection that would arise from the use of thinner glass could easily be restored by the addition of very small quantities of various metals.
- Light protection can be achieved by sleeving the bottles, but this adds cost.

## 5.4 Life Cycle CO<sub>2</sub> Emissions of Wine Imported to the UK

### 5.4.1 Introduction

The GlassRite Wine project seeks to persuade those involved in the sale of wine to consider the use of bulk importation and the use of lighter weight bottles.

The retail sector is increasingly being challenged on a range of environmental issues including that of transporting foodstuffs over long distances. Importing wine in bulk form rather than in bottles significantly reduces the environmental impact associated with transport.

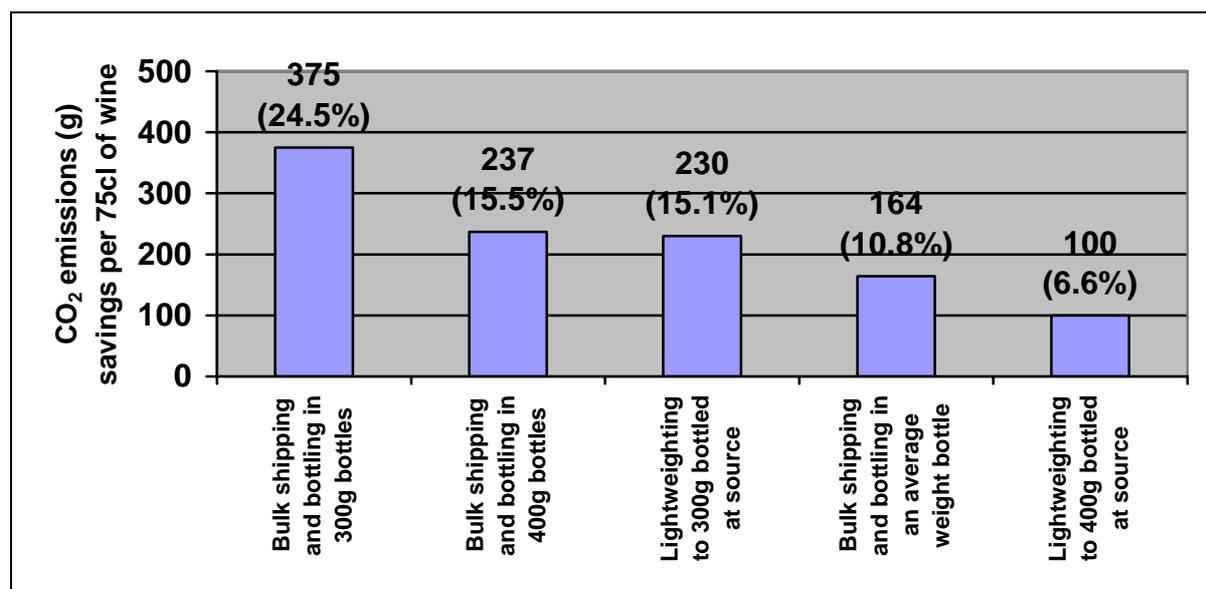
The report provides those involved in the wine trade and considering a move to bulk importation with sufficient information to quantify the environmental benefits of such a change. This desktop study was carried out by Oakdene Hollins and considered the different CO<sub>2</sub> emissions resulting from the transport of wine from Bordeaux, France and South Australia either in bottles, or in bulk for bottling in the UK.

### 5.4.2 Findings

This research demonstrates the huge potential for reducing CO<sub>2</sub> emissions during the transportation and packaging production stages in the total life cycle for wine imported into the UK. The importing of wine from the New World represents the most significant opportunity for emissions savings based on the fact that the shipping of bottled wine from the New World generates 70% more emissions during the transportation stage than its Old World counterparts.

Figure 4 ranks the different methods of reducing emissions in order of significance and shows that the combination of bulk importing and lightweighting of bottles to the current minimum weight of 300g would generate a saving of 375g CO<sub>2</sub> per 75cl of wine, representing nearly one quarter of CO<sub>2</sub> emissions.

Figure 4 The ranking of significant factors for reducing emissions from the import of wine from Australia.



The bulk transportation of wine is well proven and it is estimated that 20% of Australian wine is currently bulk imported into the UK. This equates to emissions savings of 11,000 tonnes<sup>28</sup> of CO<sub>2</sub> per year when compared against the traditional “bottled at source” scenario. However, as a scenario the combination of converting the remaining 80% to bulk and the use of 300g lightweight bottles could potentially save a further 122,500 tonnes of CO<sub>2</sub> per year from Australia alone.

The packaging production savings from lightweighting will be similar for New and Old World wines and hence the shift from the current mean weight bottle (500g) to the current lightest weight bottle (300g) would generate an emissions saving of approximately 140g CO<sub>2</sub> per 75cl or a total of 44,350 tonnes of CO<sub>2</sub> per year from French wines<sup>29</sup> alone. In addition, the bulk importing of Old World Wine into the UK and switching from road to rail or ship could have a significant impact on emissions.

### 5.4.3 Conclusion

This case study demonstrates the huge potential for reducing CO<sub>2</sub> emissions during the transportation and packaging production stages in the total life cycle for wine imported into the UK. Transporting wine in bulk vessels gives far better utilisation of the available space in a standard container and this translates into large reductions in the CO<sub>2</sub> emissions associated with transport including both seaborne and land transit. An indication of the improved packing efficiency is given in the Table 13.

Table 13 Packing Densities of bottled wine vs. standard bulk formats.

Mode of long haul transfer	No. of litres per Standard Container
Bottled	10,584
ISO Tanks	26,000
Flexitank	24,000

This study demonstrated that significant carbon benefits from shipping wine in bulk and the lightweighting of glass wine bottles can be realised. A reduction of between 30%-40% can be achieved by switching from shipping bottled wine to bulk importation.

The full report can be downloaded at [www.wrap.org.uk/docs/15149-07\\_BottlingWine\\_CS\\_Ir.pdf](http://www.wrap.org.uk/docs/15149-07_BottlingWine_CS_Ir.pdf)

## 5.5 Lightweight Glass Containers

### 5.5.1 Introduction

The GlassRite Wine project seeks to persuade those involved in the sale of wine to consider the use of lighter weight bottles and also to use to clear glass if appropriate.

This report seeks to provide those involved in the purchase and specification of wine bottles with information relating the strength of glass bottles. It aims to allay any fears on safety grounds by demonstrating that modern glass manufacturing methods can produce lighter weight, thinner walled wine bottles which have a comparable strength to those heavier versions that have traditionally been used by the wine trade. The report outlines the advances that have been made in container manufacture and presents evidence that lightweight bottles are safe to use and not more prone to failure than their heavier counterparts.

### 5.5.2 Findings

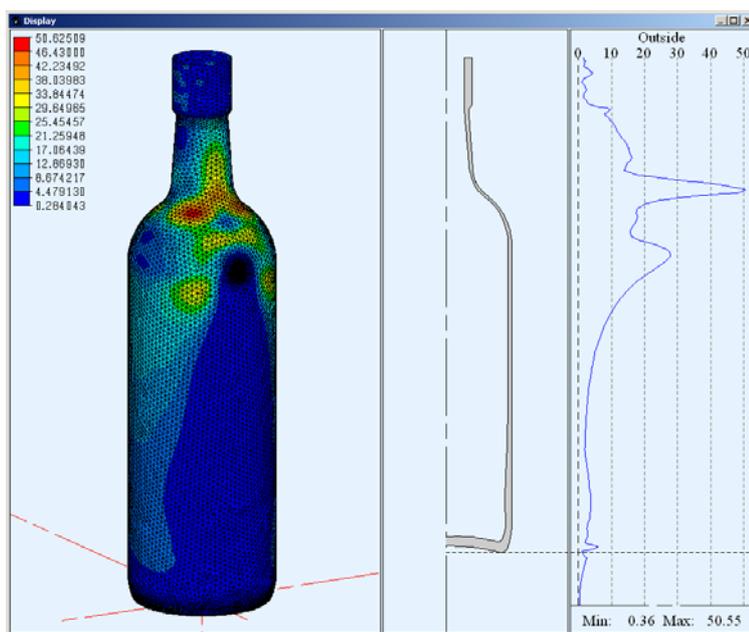
Production issues in glass manufacture and subsequent handling of products can produce a range of faults in glass containers which can eventually result in a number of failure modes. This research provides a brief overview of this technically complex subject.

Once a concept is available the designer can use computer assisted design techniques to produce 3-D images of the item and then apply finite element analysis (FEA) to discover any structural weaknesses that may accompany the new product. Typically the designer will wish to investigate the strength of a container at natural contact points including its heel where it will inevitable suffer knocks as it is filled and subsequently transported to the end user. The subject of FEA is dealt with, as an option, in some detail as it offers a cost effective method of pre-testing any modifications or new designs.

Lightweighting a container constitutes a design change. If glass is removed from a container and the outer shape remains unchanged the internal volume of the container would necessarily increase which, for an item sold by volume, would be unacceptable. Thus a change in weight often means a change in shape. In many cases the shape change need not be radical for example, a slight change in a shoulder radius, a flattening of the punt (bottom of the bottle) or slight height reduction. However, any of these barely discernible changes can have a major implication for the container's strength. Figure 5 shows an example of a FEA model of a wine bottle that has received an impact at the shoulder (upper contact point).

The work concluded that, in general, the lighter container was actually the stronger container.

Figure 5 An example of a finite element analysis, simulating an impact on the shoulder of a wine bottle.



### 5.5.3 Conclusions

The weight of a glass container is not necessarily a good indicator as to its strength. Good glass distribution and producing a container that has few surface defects are more important strength determinants. Glass is an inherently strong material but being brittle is susceptible to failure when subjected to high tensile stresses. Improvements in modern manufacturing methods permit container manufacturers to produce containers that are significantly lighter than was previously possible, without compromising safety.

With the improvements made in glass manufacturing process control, many glass containers are now much heavier than they need be to safely contain the intended liquid product (wine). Brand owners tend to be apprehensive about lightweighting, feeling that a move to a lighter version holds more risk than gain. Therefore this report demonstrates it is both technically and economically possible to design and manufacture lightweight wine bottles that are fit for purpose and will survive the typical life including filling, logistics, use and disposal.

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

## 5.6 Shipping Wine in Bulk

### 5.6.1 Introduction

The GlassRite Wine project seeks to persuade those involved in the sale of wine to consider the use of bulk importation and the use of lighter weight bottles.

The retail sector is increasingly being challenged on a range of environmental issues including that of transporting foodstuffs over long distances. Importing wine in bulk form rather than in bottles significantly reduces the environmental impact associated with transport and the work on in the lifecycle project has quantified these benefits. This report seeks to allay the concerns of those involved in the wine trade that the practice of bulk importation will adversely affect wine quality. The report gives an overview of how improved materials and practices can ensure that if the correct procedures are adhered to the quality of "bulked" wine will match that of its bottled counterparts.

### 5.6.2 Findings

This report found that the practice of bulk importation of wine does not impair quality and has some logistical advantages; specifically it concludes:

- the mechanism of wine spoilage including contamination, oxygen ingress and re-fermentation, all of which lead to wine reduced wine quality, are now better understood. This knowledge has driven improvements in handling procedures and in the materials of construction used to manufacture the bulk containers. Both these factors have led to significant improvements in bulk wine quality;
- excellent quality procedures are in place at leading UK fillers. The UK's Wine and Spirit Trade Association (WSTA) has also published a Code of Practice for its members for the transportation of wines, spirits and concentrated grape must in bulk, which addresses risk management issues and best practices;
- wine transported in bulk is less prone to experience large temperature variations during transit, as a larger single volume of liquid has a greater thermal inertia than a smaller one. Bulk wine is thus less susceptible to high temperatures which accelerate wine development and, in bottles can cause pressures that can compromise closures;
- apart from top end wine specifically made with bottle ageing and longevity in mind, wine effectively begins to deteriorate from the time it is filled into bottles and it is at this filling point that the shelf life is deemed to start. Bulk shipping defers the moment of bottling and thus the start of the shelf life. This has implications for the retailer in regards to stock levels and rotation, as the entirety of the shelf life is spent in the country of sale rather than during transport, which may be an advantage for entry level wines with a more limited shelf life;
- gulk shipments are more cost effective. A standard container typically holds 12,000 to 13,000 bottles, whilst a standard flexi-tank holds the equivalent of approximately 32,000 bottles and ISO tanks hold nearly 35,000 bottles. This improved utilisation translates into a cost saving;
- the finished product is filled closer to the final market. Filling and packaging close to market may also give the sellers more flexibility to change packaging formats to meet changing market demands and even enable them to respond to short term promotional campaigns; and
- damage to packaging for example bottle and label scuffing may be reduced if the product is filled locally to the point of sale and problems that do occur can be readily resolved with a local supplier.

### 5.6.3 Conclusions

The bulk shipping of wine would appear to offer several advantages without necessarily compromising its quality. Indeed, assuming that all those involved in the supply chain follow best practice in regard to handling and material selection, wine transported in bulk should arrive in the UK in a better condition than its bottled-at-source counterparts.

Temperature variations can be responsible for loss in quality but the thermal inertia of a large bulk load effectively smoothes out large variations in temperature. Improvements to the materials used for the construction of the bulk handling systems have significantly reduced the incidences of oxidation and taint.

The UK has sufficient high quality filling capacity to service the current demand for the bulk importation of wine, and additional capacity is being installed to cope with a predicted increase in the volume. Transporting wine in bulk involves fewer ship movements than moving wine in bottles and thus reduces the environmental impact of the wine trade. Filling the product close to the market place gives the sellers greater flexibility to change packaging formats to meet changing market demands and to respond to promotional campaigns.

Bulk shipping will benefit the UK's glass recycling efforts creating a much needed high value market for the green glass collected.

On balance the research concludes that the practice of bulk importing wines need have no adverse quality implications on the wine and brings actual benefits with respect to cost efficiencies, carbon emission reductions and recycling.

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

## 6.0 Summary

### 6.1 Project Achievements

This project has been successful in encouraging the widespread adoption of the bulk importation of wine and the use of lightweight bottles. Bulk imports have increased by 60% during the project. The use of lightweight bottles to fill wine has gained industry-wide acceptance and the glass savings from those directly contributing to the project's trials was 11,397 tonnes. In practice the glass savings were larger as many lightweighting initiatives were not reported to the project team. Estimates of total glass savings based on glass bottle production and average packaging weights would suggest that total savings exceeded 23,000 tonnes. Specifically the project delivered:

- a clear demonstration that there is a demand for lightweighting wine bottles;
- an increase in bulk wine shipments equivalent to 79 million standard 75cl wine bottles per annum;
- a reduction in transport related CO<sub>2</sub> emissions due to bulk importation of 12,950 tonnes/annum;
- an increase in demand and use of recycled glass of 23,930 tonnes/annum;
- a reduction in process CO<sub>2</sub> emissions due recycled glass being used for closed loop recycling of 7,538 tonnes/annum;
- a reduction of 11,397 tonne/annum in glass packaging from project participants;
- an overall reduction in glass packaging from the UK wine industry of approximately 23,000 tonnes/annum;
- a reduction in process CO<sub>2</sub> emissions due to the reduced glass requirements of lighter bottles of 7,810 tonnes/annum;
- total reduction of CO<sub>2</sub> due to bulk importation, UK filling, increased cullet use and use of lightweight bottles of 28,304 tonnes/annum; and
- a number of technical studies specifically addressing barriers to the widespread adoption of the projects objectives of increased bulk imports and the use of lighter wine bottles.

In addition to the target-related deliverables the project been beneficial in the following areas:

- raising the UK wine industry's awareness of the environmental impact of wine bottles;
- disseminating the project's objectives to an international audience including leading brand owners and glass manufacturers;
- promoting the positive aspects of bulk importing;
- fostering co-operation between the various sectors in the wine supply chain and establishing a mechanism to introduce new lighter bottle designs;
- actively encouraging glass manufacturers to produce lightweight wine bottles; and,
- assisting companies meet their Courtauld Commitment.

### 6.2 Barriers and Further Opportunities

Whilst the project has been successful inasmuch as it has demonstrated the advantages of bulk importation and the use of lighter bottles, it cannot as yet claim that the initiatives have gained universal acceptance.

The principal barrier to widespread adoption of the project's objectives is the sheer diversity of the market. It is estimated that the UK's retail outlets stock over 30,000 wine products. Most of these products are filled in the country of origin in traditional heavy bottles with only a limited quantity being destined for the UK market. Affecting a weight reduction in these products will not be achieved until the lightweighting ethos has been adopted by the country in question.

The case for bulk importation has successfully been made and, now that the issue of quality has been firmly addressed, it is anticipated that with support this growth in bulk importation will continue and in turn an increase in demand for recycled glass back into UK manufactured wine bottles.

Improvements in glass manufacturing methods and the introduction of 300g bottles have effectively removed any technical barriers to the introduction of lighter bottles but other barriers remain. The issue of bottle weight and perceived wine quality persists and this view is not entirely dismissed by the current perception studies. The public are however responsive to positive environmental messages and this should be route to increasing the demand for lighter bottles.

Taller bottles have more presence and a reduction in bottle height is often resisted by those responsible for brand promotion. Lightweight bottles need be not shorter but perhaps opportunities with shelf-ready secondary packaging may provide some solutions.

## 7.0 Recommendations

The GlassRite Wine has begun the necessary attitudinal change needed as a prerequisite to the widespread introduction of bulk importation and the use of lighter packaging.

As already discussed there are in excess of 30,000 wine labels sold in the UK market annually and so from a practical perspective, this project has only been able to impact on a limited fraction of these. The fraction did however cover most of the major volume labels and so had a significant impact. At the point of writing, engagement in glass reduction and bulk importation of wine for UK filling is now gaining significant momentum throughout the whole supply chain and therefore it is essential that support and guidance be continued to ensure that further increased bulk importation of wine for UK filling and packaging reduction to deliver the true potential highlighted in this report.

From discussions with the Wines & Spirits Trade Association (WSTA) it has been agreed that a productive way forward would be to employ an "advocacy" approach. Through this, groups and/or individuals in the countries of origin would be briefed on the WRAP's objectives and the UK requirement for reduced glass packaging and increase in bulk importation of wine for UK filling. Also, there will be a requirement to continue the monitoring of the impact of the project to assess the impact of any reductions in glass packaging and increased use of recycled content in the manufacture of new UK wine bottles.

It is considered essential that in order to maintain the momentum created during the project and exploit 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 direct approaches to and continued relationship development with retailers and brand owners, possibly in party with the relevant sector associations;
- the development of case studies, and trade press articles highlighting the achievements under the project; and
- to fully exploit all the technical studies as part of the advocacy role.

# Appendix 1: Estimation of Impact of the GlassRite Wine Project

This is an estimation of the potential impact of the GlassRite Wine project based on the assumption of 1300 million 75cl units consumed in the UK (2005 wine consumption). Bulk importation, filling and use of UK manufactured bottles increased from 120 million units in 2005 to 180 million units in 2006 and then to 220 million units in 2007 which displaced imported filled bottles and at the same time new lightweight wine bottles were introduced and used in the UK. The net effect of all these conditions have been modelled in the table below to estimate the impact of the project, which could potentially be in the order of 23,000 tonnes/annum glass reduction.

<b>2005 Case</b>			
<b>g</b>	<b>Units (m)</b>	<b>Weight (t)</b>	
506	1180	597,100	Prior to project, imports (filled at source)
495	120	59,400	UK manufactured bottle
	<b>1300</b>	<b>656,500</b>	
	Average	505g	Matches James Ross data
	tonnage	656,500	tonnes/annum
<b>2006 Case</b>			
<b>g</b>	<b>Units</b>	<b>Weight (t)</b>	
504	1140	574,850	Imports (filled at source)
495	70	34,650	Existing UK manufactured bottle
450	90	40,500	New UK lightweight bottle
	<b>1300</b>	<b>650,000</b>	
	Average	500g	Matches DHL data
	tonnage	650,000	tonnes/annum
<b>2007 Case</b>			
<b>g</b>	<b>Units</b>	<b>Weight (t)</b>	
495	1105	546,975	Imports (filled at source)
400	20	8,000	New UK lightweight bottle
350	25	8,750	New UK lightweight bottle
400	10	4,000	New UK lightweight bottle
435	50	21,750	New UK lightweight bottle
450	90	40,500	New UK lightweight bottle
	<b>1300</b>	<b>629,975</b>	
	Average	485g	
	Glass usage	629,975	tonnes/annum
<b>Potential weight saving over 2005 data</b>			
	2005	656,500	
	2005/2006	653,250	Estimate from start of project – July 2006
	2006	650,000	
	2007	629,975	
	<b>Possible Saving</b>	<b>23,275</b>	<b>Annual glass reduction</b>

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**Waste & Resources  
Action Programme**

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