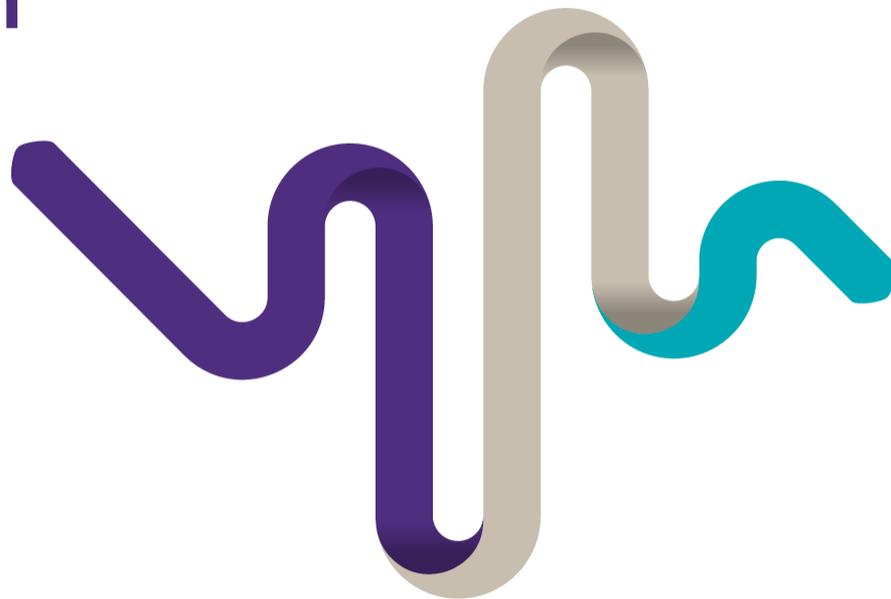


Glass Packaging Forum

Review of glass cullet data
collection methodology

17 August 2021

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Executive summary

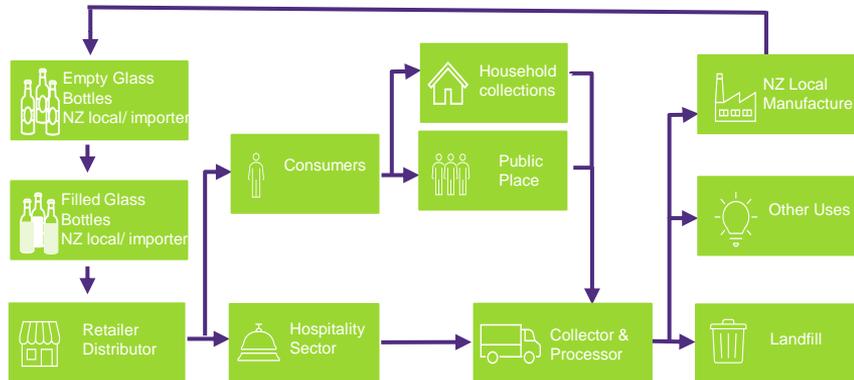
The Glass Packaging Forum (GPF) operates under a voluntary product stewardship scheme model and is continually working to ensure the data used in its annual accreditation report is the best available.

Glass to market

- There are assumptions driving the alcohol glass to market and loss in system components used in the capture rate. We recommend formalising an annual review of these assumptions to reflect any movements in industry trends, such as the shift toward canned beer and lighter weight wine bottles.

- The alcoholic beverage glass conversion assumptions are very material to the outcomes. Over time moving away from these assumptions to collected data will improve accuracy. We recommend developing an alternative with GS1/IRI data and a conversion for market captured with supermarket data. We understand this is underway.

The glass lifecycle



Collection

- Use the Council declaration survey to ensure the total collection matches total outcomes before submission is allowed - avoiding mismatch and typos. A 'loss in system' option could be added to balance small variances, like mass losses during each movement.
- The GPF can continue to develop a robust understanding of losses through building on and differencing of data sources along the glass collection process. Losses naturally occur at each stage and currently the relative size of these is estimated in total.
- This understanding of losses could inform targeted interventions in the form of education or funding of initiatives to reduce specific losses at a given stage in the collection process or in a specific region, and produce a measurable impact.

Contents

Background and Approach	04
Current process	05
Data sources	06
Assumptions	07
Data collection	09
Future state	10
Appendix	15
Approach	
Assumption sensitivity tables	



Background and objectives

Background

The purpose of the Glass Packaging Forum (GPF) scheme is to raise the profile of glass recycling in New Zealand, including reporting on the glass recycling rate and mass balance as per the conditions of accreditation.

The GPF is a membership organisation which represent the interests of both glass packaging and its recyclability. Each member completes quarterly declarations on the total tonnage of glass manufactured, imported and/or filled for the NZ market by their operation. The declaration dictates the amount of levy the member pays to the scheme. The levy covers all operational costs as well as the contestable funding of projects to improve glass recycling outcomes.

The scheme has received accreditation as a product stewardship scheme since 2010, and is reaccredited for a further period 2018-2024 which shows at that time it met the expectations of the Ministry for the Environment. As part of the accreditation, the scheme manager must supply an annual product stewardship accreditation report to the Ministry for the Environment (MfE). This report details the schemes performance against the accreditation criteria.

In 2020 the GPF engaged Grant Thornton to undertake a review of the GPF 2018/19 accreditation report. These findings were included in the 2019/20 accreditation report.

The GPF have built on the recommendations and have requested a review of the 2019/20 accreditation report to refine and show

continued improvement in its data collection and reporting process.

Notable improvements since last year

- Data sets have been compiled into one spreadsheet that notes the source of the data or where the proxy has been generated from.
- The questionnaire to both Councils and contractors was modified to include a COVID-19 data set (while the response rate was low).
- GS1 and IRI data is used to overlay catalogue and data scan set information for all non-beverage glass.
- A robust follow up process has been followed with non-respondents to conduct interviews where possible.

Objectives

The GPF operates a voluntary product stewardship scheme and wishes to ensure that in lieu of regulation that its data methodology is producing the best available glass reporting data.

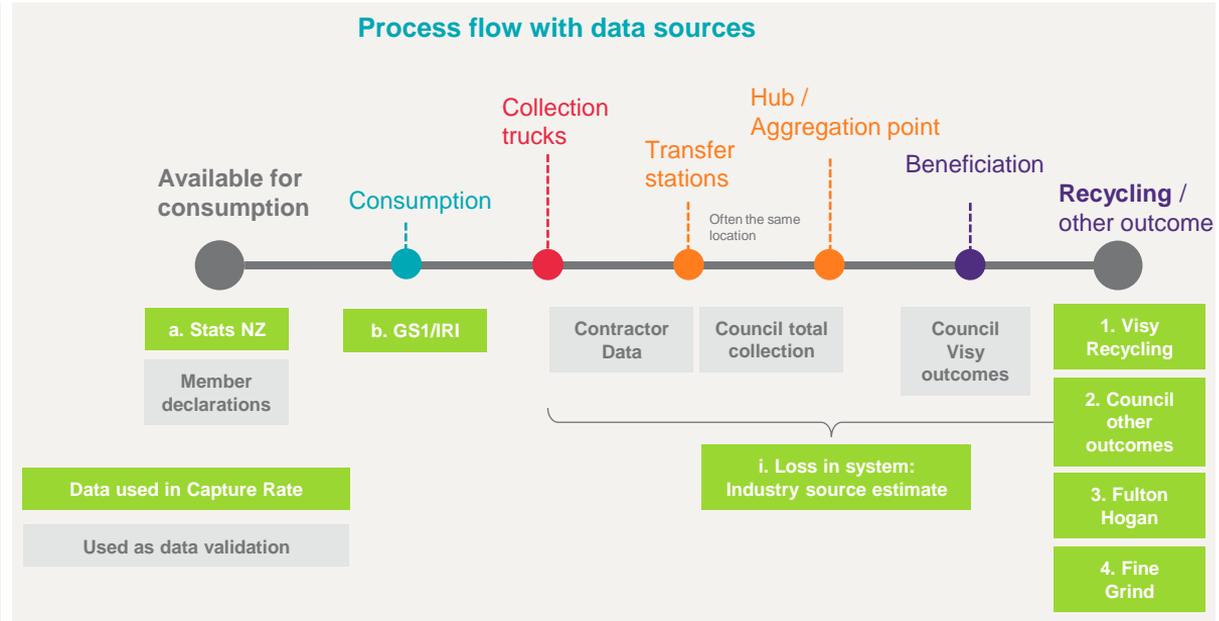
The objective of the assessment was to identify any areas of improvement in the data methodology and process for generating the mass balance data supplied as part of the product stewardship accreditation report.

The GPF would like to ensure continual improvement of its processes. This includes refinements to existing sources of information and processes and potential future options for improvements.



Current process

The GPF although operating under a voluntary product stewardship scheme model is continually working with all key stakeholders to ensure the data used in its annual accreditation report is the best available and that improvements are made each reporting period.





Data sources

The current process takes the best available data to produce a picture of glass to market, glass recovered and outcomes. To account for data gaps the loss in system is estimated based on industry knowledge of known loss points.

Summary of current key sources

- StatsNZ alcohol consumption data and GS1/IRI non-alcohol glass container data are key data points for glass consumption.
- The primary data sources in collection are: Visy Recycling for bottle recycling, Fulton Hogan for aggregate usage, and other reported Council outcomes data.
- Loss in system is estimated through industry knowledge and added to outcomes to arrive at total collection.
- Other data sources, such as industry production, Contractor data and total Council collection are primarily collected to cross check and build a wider picture of the glass industry and collection processes.

Waste Minimisation (Information Requirements) Regulations 2021

From January 2022 operators of Transfer stations must comply with Waste minimisation information reporting legislation.

This will include the measuring and reporting of diverted waste material entering facilities (gross tonnage) and exiting facilities (diverted tonnage).

The regulation's hierarchy of data collection is:

- Weighing at facility weighbridge
- Weighing at other weighbridge
- Converting volume to weight
- Ascribing average tons.

This will potentially have two beneficial outcomes for the GPF:

1. Improved data collection and accuracy of reporting across the industry.
2. Potential to collect reported data from the Ministry for the Environment (MfE). This could be used as a primary data source, or alternatively a cross check of direct sources.

We recommend investigating sourcing this data from MfE as the systems are established and reporting information becomes available.



Assumptions – alcoholic beverage conversion

There are three key assumptions used in the capture rate. We recommend formalising a periodic review of these assumptions to reflect any movements in industry trends.

Formulate a process and frequency for key assumption updates

Industry trends, such as the shift toward canned beer/RTDs and lighter weight wine bottles, will impact the mass conversion of beverages consumed. Investments and improvements in collection should also decrease or provide improved data relating to loss in system over time.

The glass capture rate is sensitive to three major assumptions. This sensitivity, particularly to the bottle weight assumptions, is a challenge. Small market changes will have a material impact here.

For these key assumptions an annual update alongside documented sources would help improve rigour of the methodology and maintain accuracy of the capture rate for any changes in industry trends.

As improved data becomes available, reducing reliance on sensitive assumptions towards collected data sources will improve robustness of reporting.

Verifiable collected data is preferred to assumption-driven figures. While there currently isn't any collected data in these areas, effort should focus on how to move to collected data sources to replace these assumptions over time.

A regulated scheme would provide a much more favourable environment to move towards collected data for these areas.

Key assumptions:

- 1. Alcoholic beverage glass packaging percentage sensitivity table**
$$\text{Litres} \times \% \text{ glass packaging} / \text{average bottle capacity} = \text{Number of bottles}$$
- 2. Alcoholic beverage average bottle weight sensitivity table**
$$\text{Number of bottles} \times \text{average glass bottle weight} = \text{Mass of glass to market}$$
- 3. Loss in system assumption**
$$\text{Total mass outcome} \times \text{loss \% estimate} = \text{Loss in system}$$

Loss in system assumption findings are detailed on the following page.



Assumptions – loss in system

A focus on identifying other collected data sources could supersede the need for a loss in system assumption. The loss in system could then be calculated as a difference between collected mass and outcome mass.

To a certain degree loss in system is unavoidable. It relates to organics, size, labelling, optical sort limitations, thermal glass/ceramics and caps. A certain loss will also occur with any movement of glass.

The current working assumption is 6% - 9% loss across the collection process, informed by industry knowledge. As outcome data is currently of higher quality (largely verifiable weighbridge data). Currently not all collected glass is recorded with which to validate the loss (as Council collections do not constitute all collections).

In order to quantify loss in system identifying and recording all sources of glass collection would be required. This approach will also begin to enable an understanding of the various losses throughout the process.

A key data source to allow this comparison is the breakdown of sources of glass cullet delivered to the beneficiation plant. This will help identify other collection sources (outside of Council collections), and ensure volume at outcome step is also counted at collection step.

The voluntary nature of data collection and completeness of reported data at steps in the process are current limitations to establishing the true loss in system and its causes, however this can improve with a more favourable social and regulatory environment.

Over time understanding of losses could be developed through collection and differencing of data sources along the collection process. See *Loss identification Pg. 14*.





Data collection

There are a few sources that are directly used in capture rate, improving the ease of reporting and validation of these should be a priority. Aligning data sources to June year-end will help comparability for future trend analysis.

Ease of collection

- Council collection surveys are straightforward and easy to fill out. They capture a variety of information, including some glass outcomes (used directly in capture rate) and other glass movement data (used for verification purposes).
- Interviews with councils indicated that reporting monthly tonnage is not cumbersome and data is accessible - especially as these are often reported to MfE as well.

Re-ordering questions to include outcomes data earlier in the survey could improve the quality of this key data (currently Q16). Consider using the survey to ensure the total data collected matches total outcomes before submission is allowed - avoiding mismatch and typos. A 'loss in system' option could be added to balance small variances likely mass losses with each movement.

Clarifying process step of data collection

Councils report bottle-to-bottle recycling data at different steps in the collection process. Some report contractor data, while others report the received quantity from Visy recycling. For Council declarations the preference should be data provided by contractors or weighbridge data at transfer stations.

This source can then be compared to the mass received at the beneficiation plant (may be aggregation of Councils).

Opportunities exist to use monthly collected data to better understand the impact of discrete events on glass capture (such as an earthquake or pandemic). This will be dependent on alignment of data sets used and resource to undertake this more detailed analysis.

Timing of data points

- Stats NZ data is for the calendar year, while all other sources are for the year 1 July - 30 June. This impacts the comparability of the data and reflection of yearly impacts through the glass flow e.g., COVID-19 did not materially impact Stats NZ data, but if it had then this would not have been reflected in the 2020 capture rate.

Avoid risk of reporting lag by aligning Stats NZ dataset to a June year-end. This will also show cyclical movements/trends (if any) to add further insight to data flows. While we note that this data isn't available for 2-3 months after a period, this delay would not impact other data collection and therefore should not delay the accreditation report.

Future state



Future state design considerations

Over time data source availability and accuracy will improve, allowing a greater understanding of mass flows along the collection process.

As more companies look closer at their environmental impact and additional drop-off collection sources are stood up, it will become more important to have a reporting framework that will capture all collection sources: Kerbside, Commercial and Drop off points.

This would involve building on existing knowledge of contractor collection for Councils and tracking this mass through the system. A key comparison point to this mass movement understanding will be the volume arriving at the beneficiation plant. Being able to identify volume delivered by a contractor/organisation will assist in identifying if the volume has not already been captured elsewhere in the collection process.

For many Councils data gathering from Contractors or Operators and reporting is very manual. Market subsidies and MfE's preference for weighbridge data will drive investment in assets and systems to collect, store and report this data. Over time this should improve ease of data collection, accuracy and consistency with other industry reporting.

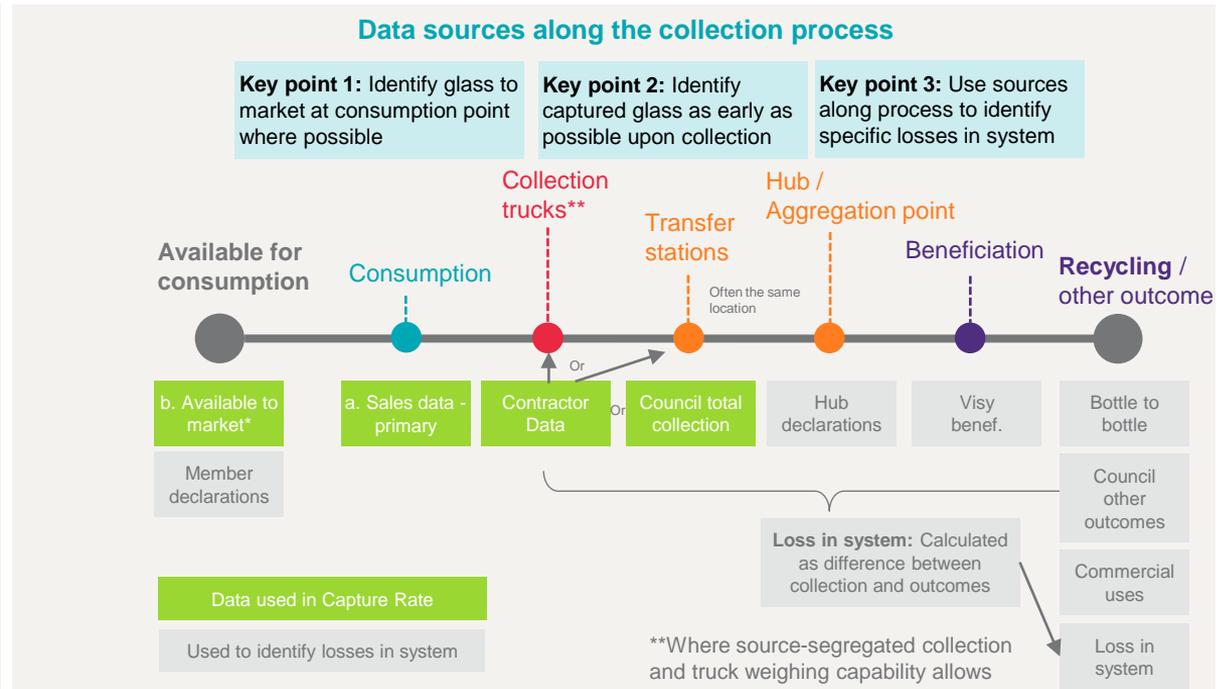
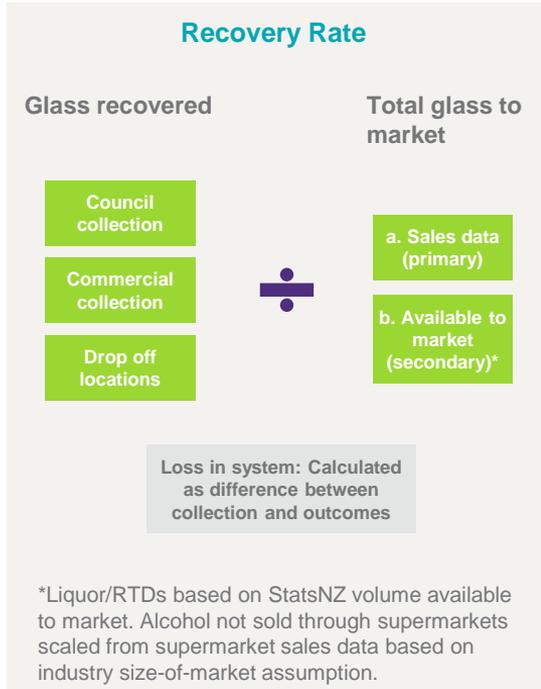
We recommend investigating weighbridge contractor and transfer station data sources as the systems are established. If Cloud databases are stood up in the industry, then establishing API's to extract data directly would provide an excellent data extraction method for the GPF.





Future state possible design

Strong data sources exist at the start and end of the glass collection process. Opportunities to improve exist in the intermediate stages to improve knowledge of the glass flows and specific losses along the way.





Future improvements

Favourable regulatory framework and technology improvements could provide valuable future data points to improve accuracy of consumption data and understanding of reverse supply chain to recycle glass cullet.

Enhance GS1/IRI data source

Expand GS1/IRI data source to also report on alcoholic beverage bottle category. We understand this is already underway.

For both of these categories establish a conversion factor to account for proportion of market not covered by GS1/IRI data. We recommend that this market size for Beer and Wine (the largest glass categories) could be determined by key member declarations of glass to supermarket vs other channels. As the Stats NZ conversion factors are quite sensitive, this cross check would be very valuable. If a good declaration of size of market was received this source could be used in preference to the Stats NZ volume conversion.

Truck collection data

Significant progress has been made in Australia on recording collection data directly from collection trucks. This model is particularly favoured for commercial collection as it provides valuable information on lost product (lost sales). Reference trucks are also being used to determine more accurately content from source and useful reference data. This trend is likely to come to New Zealand as well, providing an additional data source at the point of collection. Information on collection at-source would be able to inform very targeted education and interventions in the industry, even at the household level.

Contractor and intermediary data

Contractor and intermediary data could be collected and used as more than a cross check. Any truck movement into, and out of, a transfer station will soon need to be recorded and reported. This will provide a valuable data source which could be used to build understanding of losses in the collection and transfer/sorting stages, particularly under a regulated scheme.

Other outcome data collection

Capture other outcome data (such as landfill cover, aggregate, stockpile and alternate uses) as a transfer station outflow to enhance verifiability and consistency of reporting of outcomes data. Ensure this outcome data can be traced back to collected source.

Beneficiation plant inflows of Visy recycling declaration

Work with Visy recycling to identify tonnage weighed upon arrival at beneficiation plant by customer to enable greater understanding of loss in system from each contractor/council. This will also help identify if any volume has not been captured before this point, such as a commercial drop off, and allow this mass to be added to captured volume.

Furthermore, the total mass entering Visy's bottle recycling plant is useful to identify the loss in processing.



Loss identification along the collection process

Loss in system is currently a working assumption. Working towards identifiable losses along the collection process will help inform targeted loss reduction strategies, education and funding.

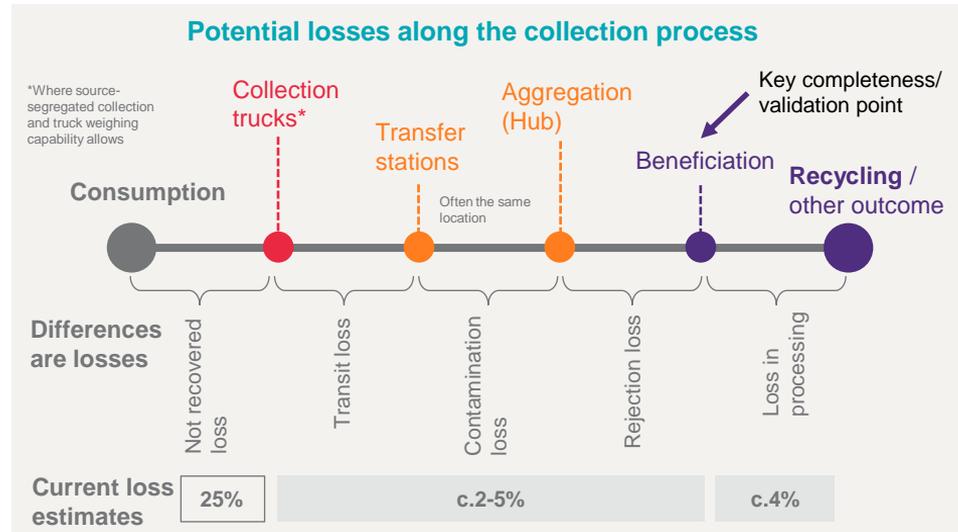
Through improved reporting at source the GPF could develop a robust understanding of losses through collection and differencing of data sources along the glass collection process. Losses occur at each stage and currently the relative size of these is only estimated. Losses are:

- Not recovered loss (*largest loss*)
- Transit loss
- Contamination loss
- Rejection loss
- Loss in processing

Measurement of glass mass along this process is required to quantify specific losses. Targeted interventions in the form of education or funding of initiatives could then focus on reducing specific losses, and produce a measurable impact, similar to those seen through recent initiatives at Collections phase.

This could be as detailed as bringing laggard Councils or transfer stations up to best industry practice by identifying larger losses at a point in their process and sharing learnings to reduce the loss. To kickstart knowledge of the size of these losses, reference Councils with more advanced collections could be used to understand the loss profile for similar sized Councils.

Collecting this level of data will initially be a challenge for many Councils but collection and reporting ability will improve with time. Moving towards a regulated scheme would require improved reporting by all parties in the supply chain.



Appendix

Approach
Assumption sensitivities





Approach





Assumptions – alcoholic beverage conversion

There are three key assumptions used in the capture rate. Sensitivity analysis, mirroring possible changes due to industry trends, shows the sensitivity of capture rate to these assumptions – particularly beverage bottle weights.

1. Alcoholic beverage glass packaging percentage sensitivity table

Litres x % glass packaging / average bottle capacity = Number of bottles

1) Alcoholic beverage glass packaging percentage (avg)	76%	78%	80%	82%	83%
Beer	71%	73%	75%	77%	79%
Wine	92%	94%	96%	98%	98%
Spirits	96%	98%	100%	100%	100%
RTDs	46%	48%	50%	52%	54%
Total Glass Consumption	244,934	250,928	256,923	262,739	267,204
Resulting Capture Rate	79%	77%	75%	74%	72%
Change %	4%	2%	0%	-1%	-3%

2. Alcoholic beverage average bottle weight sensitivity table

Number of bottles x average glass bottle weight = Mass of glass to market

2) Alcoholic beverage bottle weights (average kg per unit)	0.346	0.356	0.366	0.376	0.386
Beer	0.185	0.195	0.205	0.215	0.225
Wine	0.450	0.460	0.470	0.480	0.490
Spirits	0.580	0.590	0.600	0.610	0.620
RTDs	0.170	0.180	0.190	0.200	0.210
Total Glass Consumption	238,351	247,637	256,923	266,209	275,494
Resulting Capture Rate	81%	78%	75%	73%	70%
Change %	6%	3%	0%	-3%	-5%

3. Loss in system assumption sensitivity table

Total mass outcome x loss % estimate = Loss in system

3) Loss in system (% total outcomes)	4%	6%	8%	10%	12%
Loss in system actual	8,278	11,804	15,331	18,857	23,265
Total Glass captured	184,606	188,132	193,259	195,185	201,194
Resulting Capture Rate	72%	74%	75%	77%	78%
Change %	-3%	-1%	0%	2%	3%

