Life Cycle Analysis (LCA) of Container Glass in India – 2017

BACKGROUND OF THE STUDY

In 2011, AIGMF conducted 1st LCA study of Container Glass in India that was performed and reviewed against ISO 14040/44. The study was carried out by PE International AG using GaBi 5 Software for life cycle engineering. It was a Cradle-to-Cradle study which is the ultimate test in assessing the environmental impact of a product because it ensures that all aspects of a product's life, end-of-life and reincarnation are accounted for. The study showed that not only Indian glass manufacturing process is highly energy efficient & adopts best in the world technologies but with increased recycling by 75% & reduced weight by 20%, environmental footprints of glass can further be reduced by 50%.

From 2011 – 2017, plastic/PET packaging penetrated significantly into glass bottle segments, be it liquor, soft drinks, beverages or pharma. In spite of glass being most environment friendly & hygienic, cost & convenience became more predominant factors for consumers in India while selecting a packaging. Though the developed nations have taken a number of steps to retain glass packaging for the sake of environment & health, very little is being done in India by the Govt. Thus, it becomes all the more important for the glass industry in India to educate the consumers about goodness of glass vis-à-vis other packaging. Glass Industry also has gone through technological improvements in terms of less emission, light weighting etc., during last 5 years or so. With this in mind, AIGMF decided once again to engage Thinkstep (erstwhile PE International) for updation of LCA results obtained in 2011 using the same software and to bring the same under public domain.

PROCEDURE

The goal of the study was to understand environmental impact of container glass - focusing on cradle-to-cradle assessment and to identify and investigate potential improvement opportunities for container glass packaging. In the study, site-specific data representative of current technology used in India of reference year 2016-17 were collected and analysed for container glass. The data has been collected from member companies of AIGMF. The representative upstream data (mainly raw materials, energies, fuels, and ancillary materials) were obtained from GaBi 8 database 2016 and are representative of the years 2016 onwards. Overall, the quality of the data used in this study was considered high for glass.

KEY RESULTS OF THE STUDY

As evident, the values of most of the environmental impact indicators for 1 kg of container glass have reduced in 2017 as compared to that in 2012. These reductions are due to following reasons:

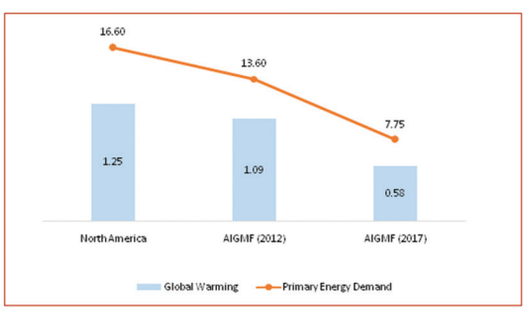
- Reduction in electricity and fuel consumption - In the melting process, the specific consumption of fuels like heavy fuel oil, liquefied petroleum gas and natural gas has reduced by 20.5%, 14.3% and 19.1% respectively from 2012 to 2017. Also, the specific electricity consumption in melting process has reduced from 2012 to 2017 by 29.0%. In non-melting process, the specific consumption of propane, diesel and natural gas

1. ENVIRONMENTAL IMPACTS FOR 1 KG OF CONTAINER GLASS IN 2012 AND 2017 LCA STUDY

Impact Categories	UOM	2012 Results	2017 Results	% Improvement
Acidification	kg SO_2 eq.	0.0083	0.0056	33%
Eutrophication	kg Phosphate eq.	0.0006	0.0003	50%
Global Warming	kg CO_2 eq.	1.0900	0.5811	47%
Human Toxicity	kg DCB eq.	0.1900	0.0954	50%
Photochemical Ozone	kg Ethene eq.	0.0003	0.0002	33%
Terrestrial Eco Toxicity	kg DCB eq.	0.0026	0.0011	58%
Primary Energy Demand	MJ	13.600	7.7513	43%

has reduced by 16.4%, 17.8% and 16.6% respectively from 2012 to 2017. The specific electricity consumption in non-melting process reduced from 2012 to 2017 by 6.0%.

- Increased recycling rate - The recycling rate of the container glass increased from 32% in 2012 to 45% in 2017. Increased recycling rate of post-consumer cullet resulted in substitution of virgin batch materials. Consequently, this indirectly resulted in reduced energy consumption in the melting furnace as identified in the first point above.
- Increased reuse rate - The rate of reuse of the container glass increased from 30% in 2012 to 35% in 2017. This increase resulted in reduction of production impacts which would have been due to manufacturing new container glasses.



2. COMPARISON OF NORTH AMERICA GLASS INDUSTRY AND AIGMF

The chart represents the comparison of results for 1 kg of container glass of North American Glass Industry, results of old study of AIGMF and results of new study of AIGMF. It shows that Indian glass manufacturing process is highly energy efficient & generates less carbon footprint compared to its American counterpart.

As evident from the table, in India today glass packaging has less environmental footprints compared to PET/Plastic packaging on almost all aspects except acidification where it is slightly higher. Hence, this result clearly establishes glass as clearly the greenest & safest mode of packaging for human beings & ecology as a whole.

3. COMPARISON WITH OTHER PACKAGING MATERIALS: (TAKING GLASS RESULTS AS BASE 100 IN 2012)

Impact Categories	Glass - 2012	Glass - 2017	PET
Acidification	100	67	60
Eutrophication	100	50	69
Global Warming	100	53	57
Human Toxicity	100	50	123
Photochemical Ozone	100	67	136
Terrestrial Eco Toxicity	100	42	246
Primary energy demand	100	57	74

For container glass industry in India, energy efficiency, weight reduction through new technologies and a better recycled glass (cullet) collection, segregation & treatment process will help to reduce its footprints further. It is equally important to create awareness about the positive impacts of glass packaging through its entire life cycle and educate consumers on the same as well ■

Quarterly Journal of Glass Industry, published and printed by Vinit Kapur on behalf of The All India Glass Manufacturers' Federation from 812, New Delhi House, 27 Barakhamba Road, New Delhi – 110001 and printed at New United Process, A-26, Ph-II, Naraina Industrial Area, New Delhi-110028

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Complimentary copy for Members / Government Departments / NGO's and those connected with Glass Industry

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Charges for Print issue:

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