



Environmental Benefits of Glass Usage



A Presentation by

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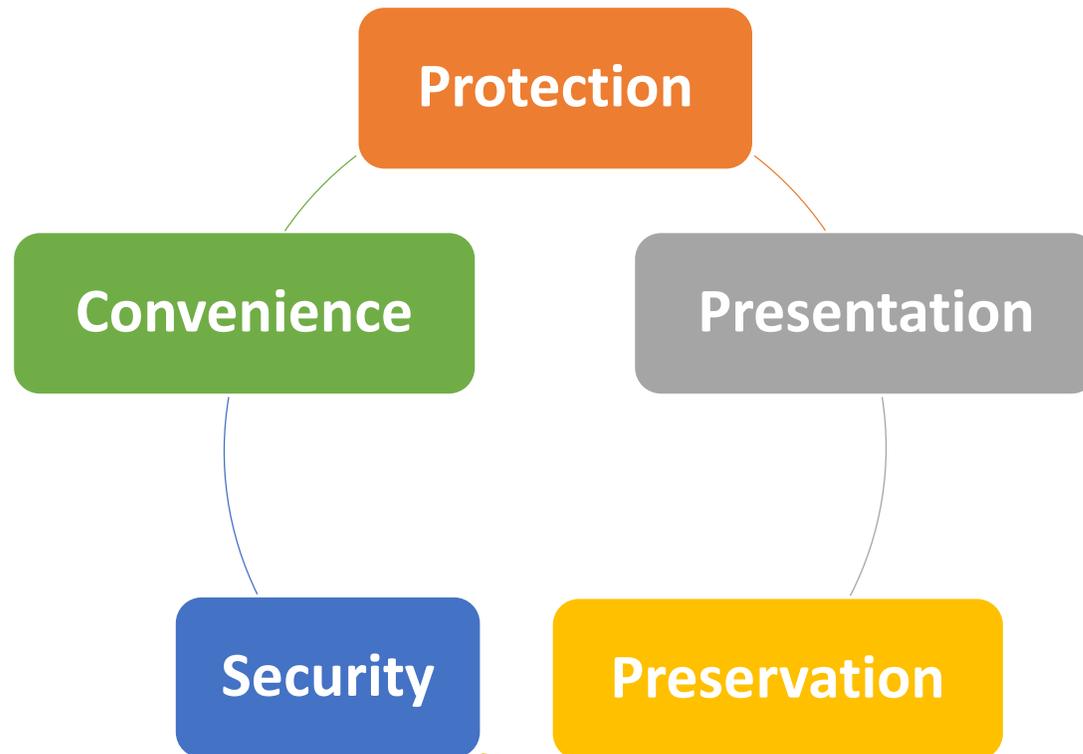
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Definition Of Packaging & its Function

Packaging is the science, art & technology of enclosing & protecting product for storage, distribution, sales & safe usage.

Objectives & Function of Primary Packaging



“Packaging can be theatre, it can create a story”

Steve Jobs

Primary Packaging

- A material comes in direct contact with content

Secondary Packaging

- Used outside the primary packaging for grouping & containment. Like CBB/MONO Carton etc.

Intermediate packaging

- Used to protect product from shock & vibration as intermediate cushioning material/BOPP tape

Tertiary Packaging

- Used for bulk handling during ware housing, distribution & shipping. Like pallets

Glass – what & why



- ✓ Made from all natural and sustainable raw material
- ✓ Mixture of silica sand, soda-ash, lime stone and other trace elements
- ✓ Glass is 100% Recyclable and can be re-used more than 40 times
- ✓ Glass is chemically inert and pure
- ✓ Glass is “Generally rated as safe (GRAS)” and is graded safe by the U.S. Food & Drug Administration

Every ton of glass recycled saves 322 KwH of energy, 246 kg of CO2 & 1200 kg of virgin raw material

Helps in Savings on Waste collection, Transportation and Disposal costs

Product packaged in glass denotes premium quality

Suitable for high speed filling lines

Reduces the Quantity of waste to be treated or disposed

Glass – Most environment friendly packaging

PET Packaging

- PET is actually down cycled not recycled
- It goes for **landfilling or down cycling**
- PET is **Non-bio degradable**. Stays in the soil/water for >700 years

Tetra Packaging

- Tetra consists of 75% paper, **20% plastic and 5% aluminum foil**
- It has 6 layers of different material -**Hence it is not possible to fully recycle it**
- It mainly goes for **landfilling**

Glass Packaging

- 100% Recyclable and can be re-used more than 40 times**
- Eco-friendly** packing material
- Chemically inert** and pure
- Every ton of glass recycled saves 322Kwh of energy, 246 kg of CO2 and 1200 kg of virgin raw material**



Glass Packaging – A comparison with other modes



<u>Properties</u>	Glass	PET/Plastics	Tetra	Aluminium
Inert	✓	X	X	X
Impermeable	✓	X	X	✓
Odorless	✓	X	X	✓
Non Leaching	✓	X	X	X
Infinitely Recyclable	✓	X	X	X
Microwave Safe	✓	✓ or X	X	X
Fragile	✓	X	X	X
FDA Approved	✓	X	✓	X
Hermetic Sealing	✓	X	X	✓
Prolonged Shelf Life	✓	X	X	✓
Connoting Premium Quality	✓	X	X	X

Hence Glass is -

- ✓ Safer
- ✓ Superior

Intense heat from volcanic eruption fuses rock & sand into glass called obsidian which people shaped into knives, jewellery & money thousands of years ago

**Energy from recycling
1 glass bottle can power a computer for 30 minutes**

Glass has the quickest turnaround of any recycling product; it can be back on shelves in as little as 30 days



LCA Study on container glass in India – Key findings



What is LCA ?

The Life Cycle Assessment (LCA) is a tool to measure, assess and orient improvements in the environmental performance and impact of a product from raw materials through to production, use, and end-of-life phases.

Why it is important ?

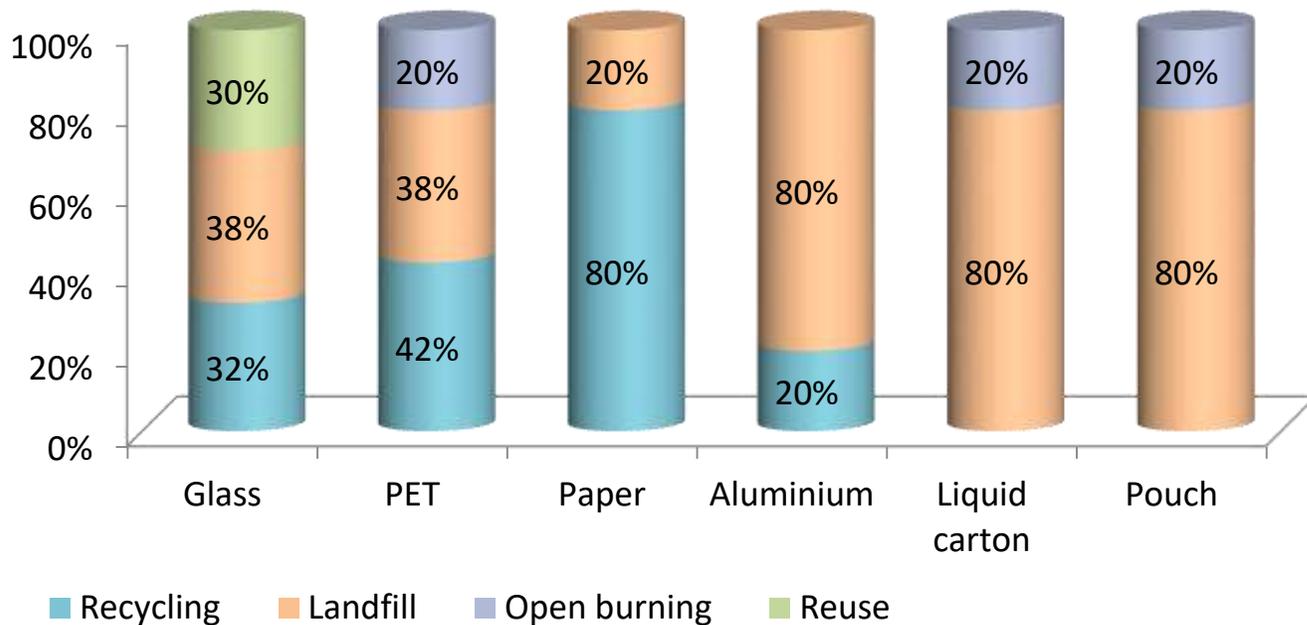
- ✓ AIGMF commissioned the study to establish a clear understanding of the environmental impact of container glass at all stages of the life cycle.
- ✓ The study will also help glass manufacturers to identify and investigate potential improvement opportunities for container glass packaging.

The study was conducted on Cradle – to - Cradle approach 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.

Methodology

- ✓ Data collected on Upstream processing , Transportation, Production & end-of-life disposal.
- ✓ Site visits done for 24 sites of various member companies of AIGMF.
- ✓ The LCA model was created using the GaBi 5 Software system for life cycle engineering, developed by PE International AG. The GaBi database provides the life cycle inventory data for several of the raw and process materials obtained from the upstream system.

LCA Study on container glass in India – Key findings

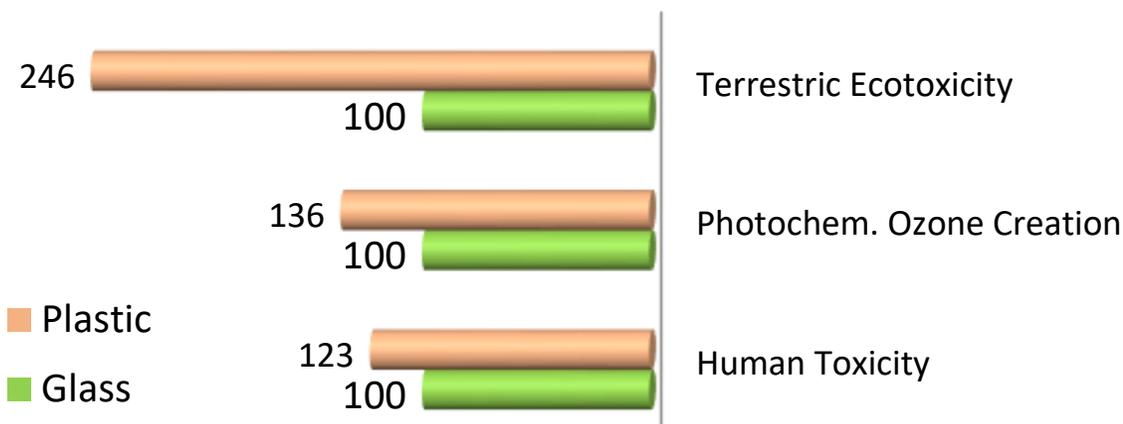


End of life for packaging mediums

- In India, only glass is being reused (30%).
- Very high landfill rate (80%) for Aluminium , Liquid carton board & pouch.
- Significant open burning for used materials in case of PET, Liquid carton & pouch leading to environment pollution & health hazard.

Glass vis-à-vis Plastic

- Glass is by far the most eco-friendly material while packaging is concerned
- Shelf-life of Food & Beverages with glass container is much more than other packaging mediums



LCA Study on container glass in India – Key Findings

Effect of weight reduction & recycling on environmental profile of glass

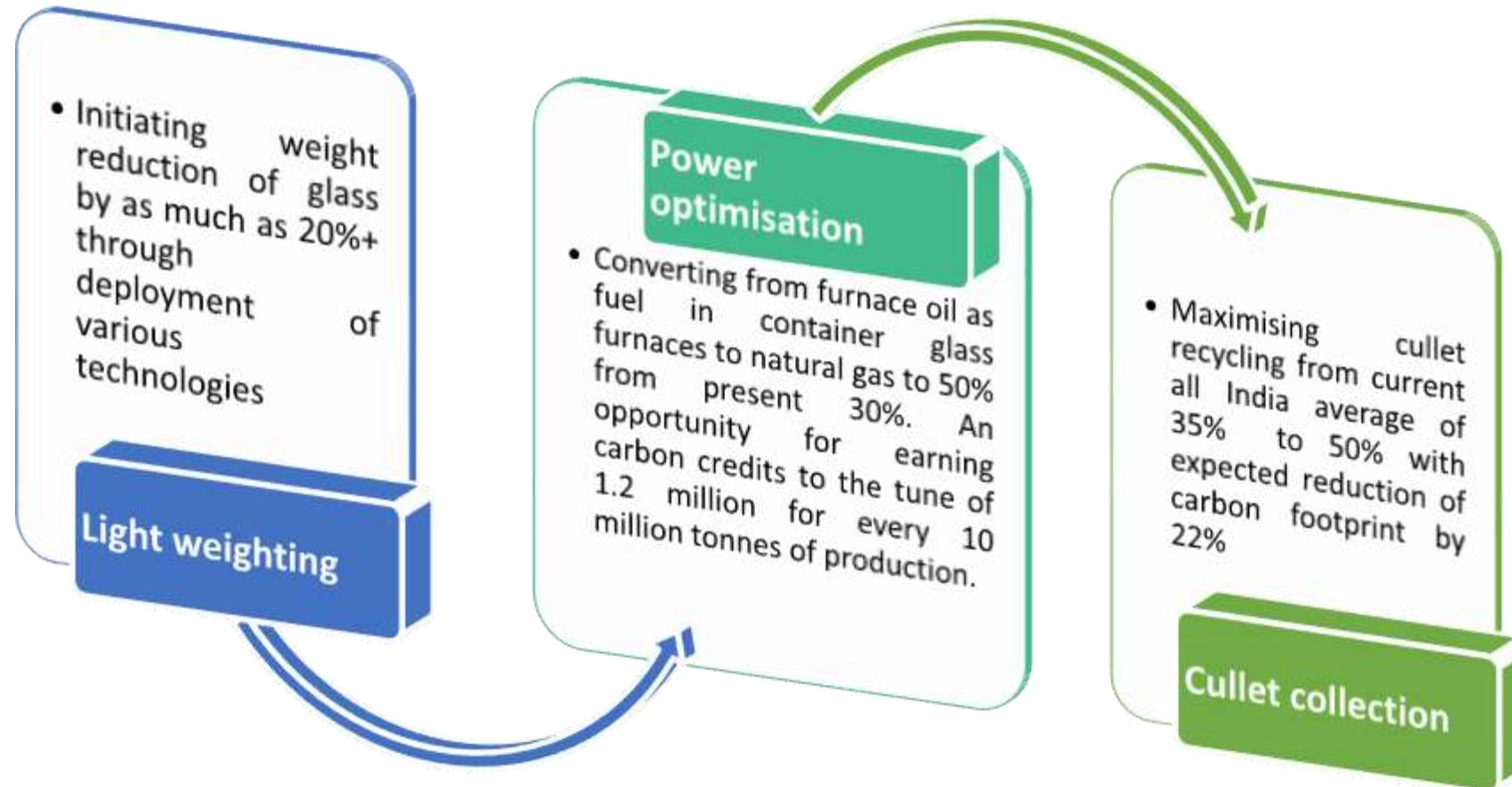
CML2001 - Nov. 2010	Weight reduction (-20%)	Recycling (75%)	Weight reduction (-20%) & Recycling (75%)
Acidification(increase in acidic nature of soil & oceans)	18%	40%	45%
Eutrophication(Depletion of dissolved oxygen in water)	17%	37%	44%
Global Warming	18%	39%	50%
Human Toxicity(Harm from chemical released)	15%	15%	27%
Terrestrial Ecotoxicity(effect of chemicals on organisms)	17%	35%	52%
Photochem. Ozone Creation(ozone creation potential)	18%	43%	45%
Primary energy demand from ren. and non ren. resources	16%	31%	41%

**With increased recycling & reduced weight ,
environmental effects of glass can be reduced by 50%.**

Source : LCA report on container glass, AIGMF

LCA Study on container glass in India – Recommendations

Glass manufacturers to lower environmental effects of glass to establish glass' green edge over other packaging mediums on human and environment impact parameters through.....



Source : LCA report on container glass, AIGMF

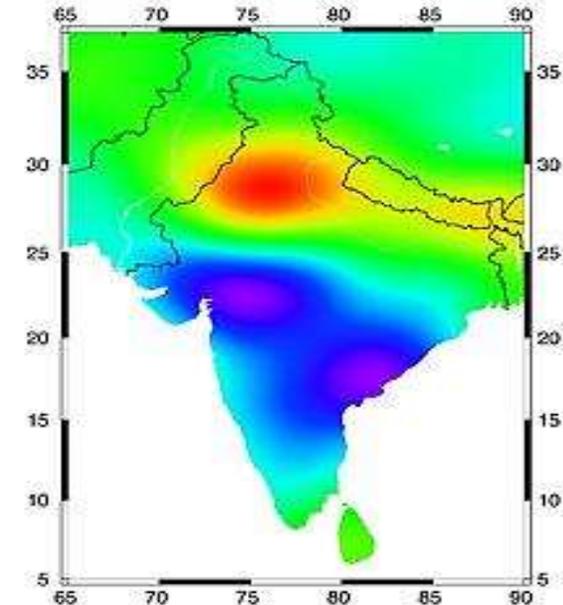
Water footprint – Glass has minimal impact

Freshwater is a scarce resource; its annual availability is limited and demand is growing

"If measures are not taken to ensure sustainable groundwater usage, consequences for the 114 million residents of India may include a collapse of agricultural output and severe shortages of potable water,"

Matt Rodell, NASA

The map shows groundwater changes in India during 2002-08, with losses in red and gains in blue. The estimated rate of depletion of groundwater in northwestern India is 4.0 centimeters of water per year



Source: NASA



PET

- It takes anywhere between 1 to 2 liters to manufacture a 500ml PET bottle

Tetrapack

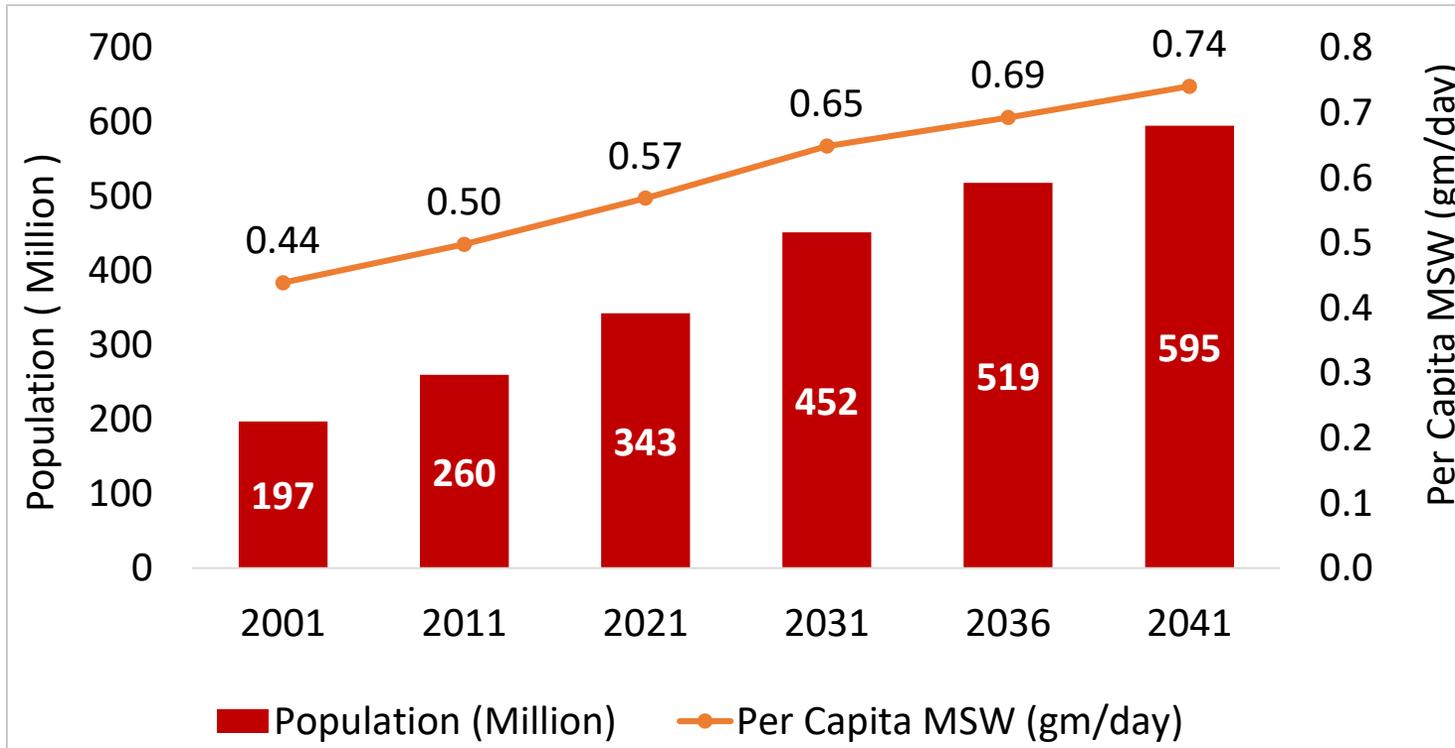
- The water footprint for a 500ml Tetra Pak carton stands at 200 ml of water

Glass

- 500 ml glass bottle will have water footprint of approx. 127 ml

Source: www.theguardian.com/sustainable-business

India - With growth in packaging Increases Waste !!!

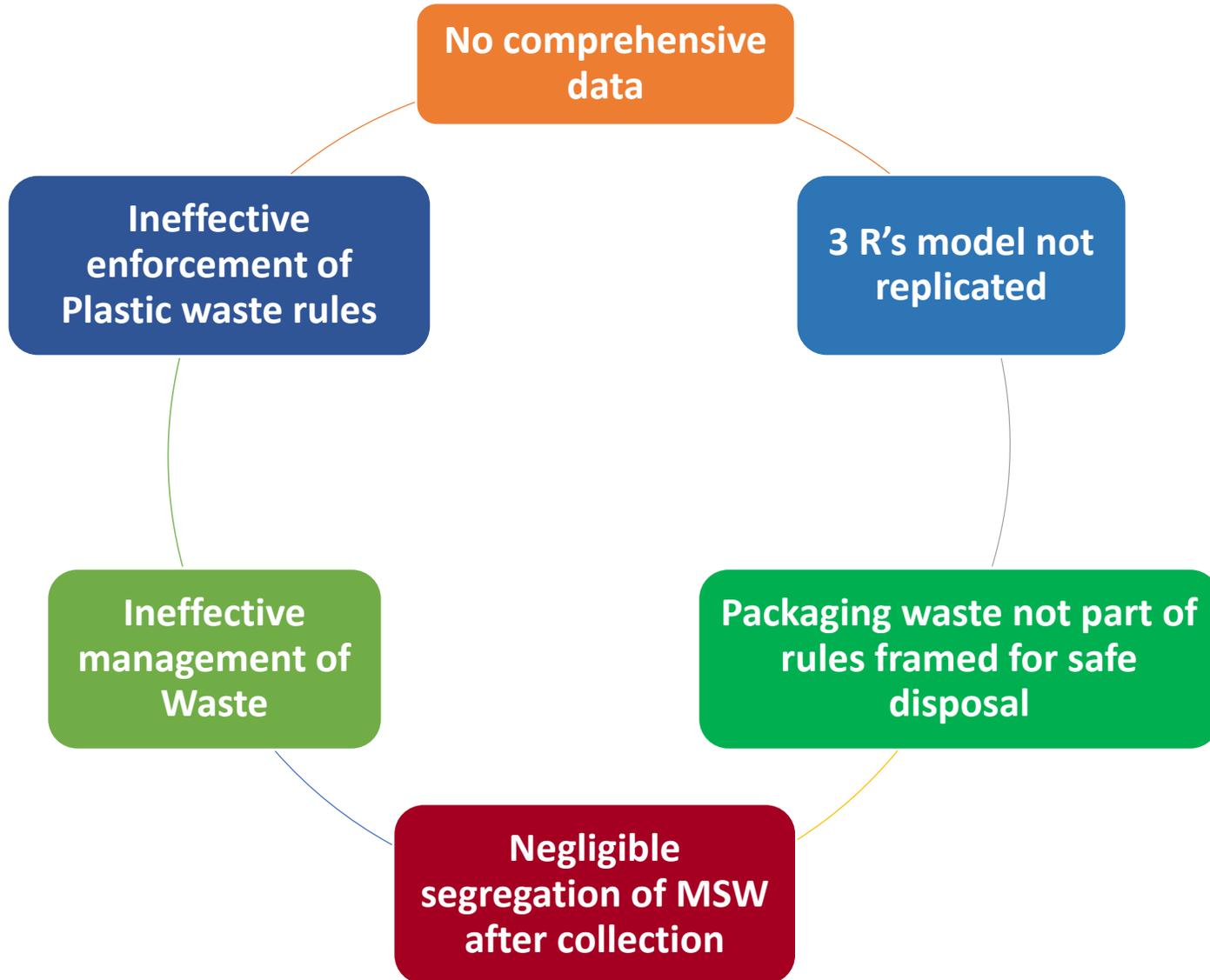


Magnitude of the problem

- ▶ This study covered 366 cities, representing 70% of urban India.
- ▶ Population growth, rapid urbanization and increased packaging means bigger and denser cities and increased MSW generation.
- ▶ Per capita consumption also growing every year.
- ▶ From 31.6 million tons of MSW in 2001, these cities will generate 161 million tons of MSW in 2041, a 5 fold increase in 4 decades.
- ▶ At this rate, total urban MSW generated in 2041 would be 230 million TPY (630,000 TPD) from 68 million TPY in 2011.

Total Urban MSW (Million Tons/year)					
2001	2011	2021	2031	2036	2041
31.6	47.3	71.1	107	131.2	160.9

(Source: ENVIS center on Municipal Solid Waste Management, sponsored by MoEF)



Lack of

1. Public awareness, Education Motivation & Civic sense
2. Treatment plants
3. Powers to levy spot fines
4. Proper & effective Rules
5. Institutional capacity

Packaging waste – A quick comparative

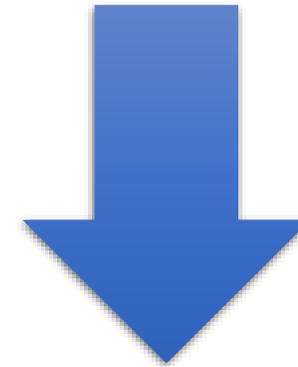


	Plastic	Glass	Tetrapack
Can it be RECYCLED ?	Post usage , it can only be <i>downcycled</i>	<i>100% Recyclable</i>	It has 6 layers of different material -Hence it is not possible to fully recycle it
Can it be REUSED ?	Causes <i>bacterial contamination</i>	Can be re-used more than 40 times	Not possible
Is it good for ENVIRONMENT ?	Landfills, Leaching – <i>Non biodegradable</i> material	<i>Fully Bio degradable –Causes no harm to environment</i>	<i>Non biodegradable</i> material also used
Is it good for HEALTH ?	Carcinogenic, cardiovascular diseases, respiratory problems	<i>Chemically Inert and pure</i>	Not inert

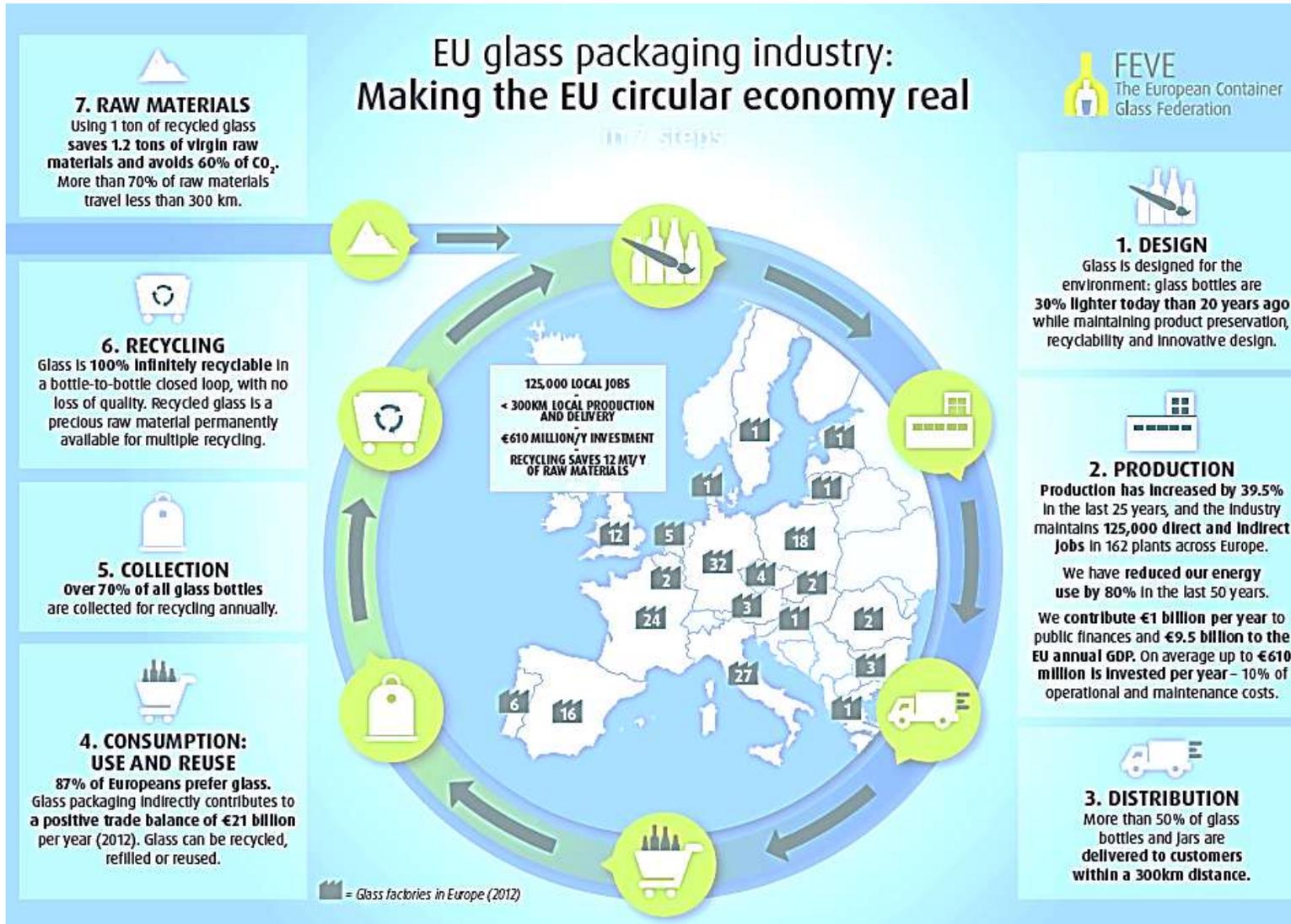


Hence,

A Packaging material which is 100% recyclable, can be reused multiple times without any loss in quality and which can be systematically collected would be the best mode of packaging.



Glass qualifies all of the above criteria & hence easily is the best packaging solution having minimum effects on health & environment.



- ❑ Glass holds a special place in the Circular Economy.
- ❑ It is a permanent material that is 100% and endlessly recycled without any degradation of its intrinsic properties, as long as it is separately collected and treated.
- ❑ In Europe, it has created local businesses and jobs that are now helping to recover more than 70% of all post-consumer glass packaging in the EU and keeping valuable resources out of landfills.

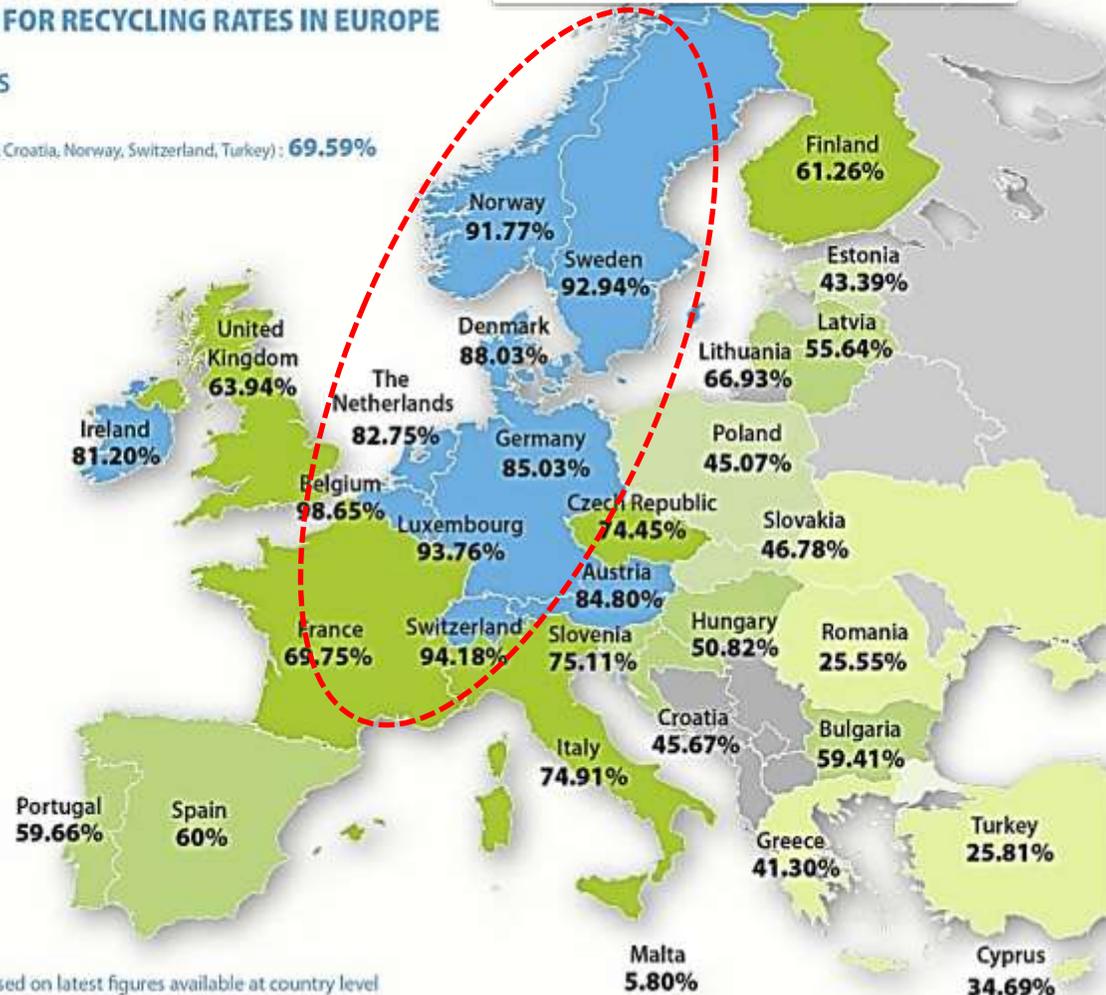
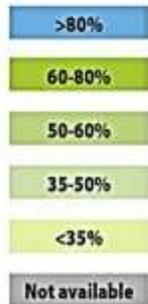
Glass recycling – more the better

CONTAINER GLASS - YEAR 2011 COLLECTION FOR RECYCLING RATES IN EUROPE

AVERAGE RATES

EU27: 70.28%

EUROPE (including Croatia, Norway, Switzerland, Turkey) : 69.59%



Estimated data based on latest figures available at country level

Source: European container glass federation (FEVE)

- ❑ Recycling glass decreases amount of raw materials used, lessens demand for energy, cuts CO2 emissions, extends furnace life.
- ❑ *At 50% recycled glass in manufacturing, Removes 2.2 million MT of CO2 emissions = 400,000 cars off the road each year.*

- Europe uses almost 70% recycled glass on the average
- Only 40% glass is recycled in India & rest goes into landfill

For the container glass industry, the Circular Economy remains an absolute priority and it is essential that the future legal framework provides effective, inclusive, strategic and targeted measures:

- 1. Effective**, so that waste creates value for the environment and the economy.
- 2. Inclusive**, so that all stakeholders in the value chain from production, consumption, waste collection and treatment are part of the solutions of the future.
- 3. Strategic**, so that public and private investments are channeled to reduce waste, improve separate collection systems and foster research into the use of technology as well as behavioural science to engage the end-consumer.
- 4. Targeted**, so that all the above are tailor-made for the needs and requirements of every waste stream.

What the consumers say across the globe ...



The Natural choice

Organic food and beverage manufacturers go to great lengths to ensure the quality and purity of their products.

Glass also portrays a premium image and enhances shelf appearance.

Taste

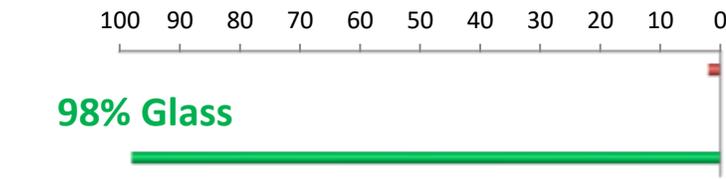
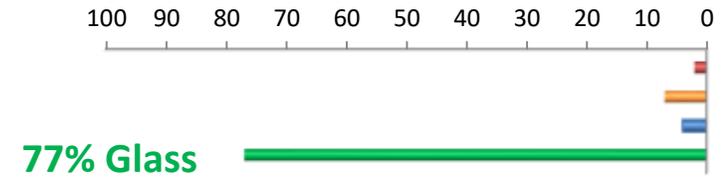
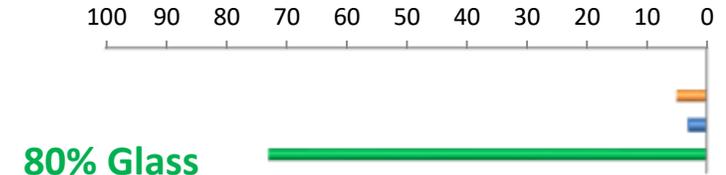
The fact that glass never loses purity makes it easy to see why nearly 80% of organic food consumers feel that **glass is best for maintaining the true flavor and taste of their products.**

Health

77% of organic American families feel that **glass is the healthiest way to preserve foods.** They also agree that healthy foods make healthy families.

Most Appealing

Just under 98% of consumers find the **appearance of glass to be most appealing when making a wine purchase.**

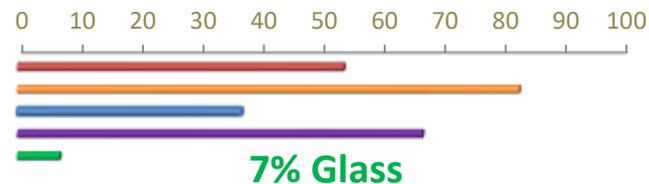


Source : Newton Marketing research SAINT GOBAIN VERELLIA

What the consumers say across the globe ...

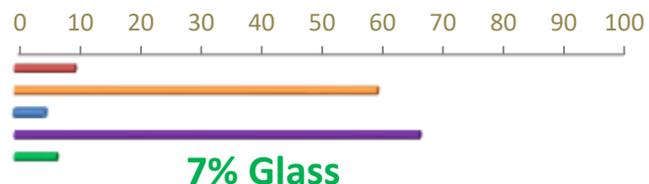


Protect your health



Glass safe

Glass is seen as one of the containers *least likely* to leach chemicals into foods.



Glass is green

Glass is seen as one of the *least polluting* containers.

Material Matters

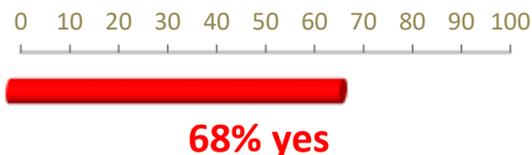
81% of consumers believe that **the container you choose, depending on its material, can leach chemicals** into the product.

Purchase persuasion

68% of consumer **purchases are influenced by the health impact of the container housing the product itself.**

Consumers are becoming more aware of packaging and how it can affect the foods and beverages they consume.

Not only do glass containers protect the flavor and purity of organics, but choosing glass demonstrates an elevated commitment to sustainability and the preservation of our natural resources.



- Metal
- Plastic
- Paper
- Plastic pouch
- Glass

Source : Newton Marketing research SAINT GOBAIN VERELLIA

2017 – What consumers want



Key findings from a survey conducted by EcoFocus Worldwide in 2017 on wellness and sustainability trends impacting the food and beverage industry....

Millennial Motivators

- 73%** Try to buy products in packaging that is recyclable
- 59%** Look for beverages in packaging that is made with renewable materials

Millennials aren't just thinking about the product's contents, they are also differentiating packaging for improved personal and planetary health.

Clean packaging gains momentum

86% of grocery shoppers and **87%** of Millennials believe some types of packaging can leave undesirable chemicals in beverages.

They say cartons and glass containers are the least likely to do so, and that cartons and glass best protect freshness without preservatives.

Fresh + Clean = Healthy

71% of grocery shoppers and **72%** of Millennials say that packaging that keeps beverages fresh without preservatives is the most important quality for healthy beverage packaging

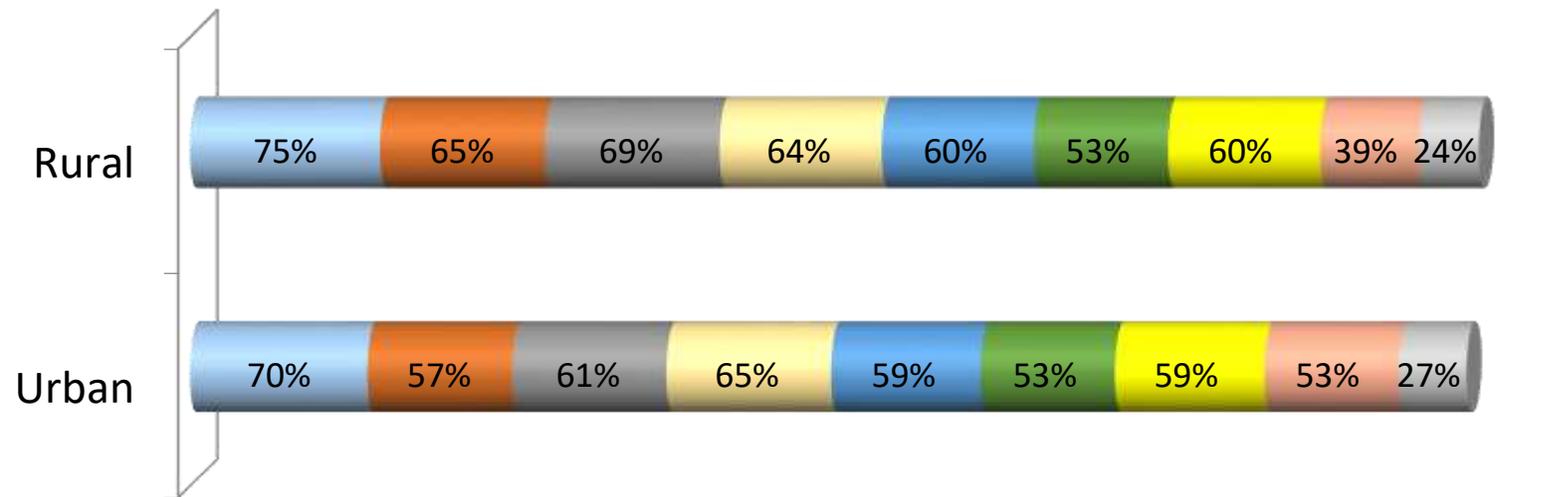
Smart brands must align with consumer values & effectively communicate commitments behind their product, processing, & packaging choices.

“For consumers, the priorities of health and sustainability are clearly linked together, packaging has a growing role in their perception of both of these attributes. These are powerful synergies that speak to the 2017 consumer's holistic view of what is healthy.”

Linda Gilbert, Chief Executive Officer of EcoFocus Worldwide

Do Indians prefer glass ???

- ❑ Rural consumers seem to prefer glass more than urban consumers considering all aspects
- ❑ Glass is considered the best in true preservation of taste and retention of freshness
- ❑ Safety in handling is the only major issue in which glass is least preferred



- True Taste preservation
- Purity
- Longer shelf life
- Retention of freshness
- Healthy & Hygienic
- Premium Look
- Provision for reuse
- Environment friendly
- Safe to handle

75% of respondents across all categories (urban and rural) are willing to pay premium for modified glass packaging

Source: Nielsen market survey

Weight reduction

NNPB/ABB technology enables Glass Containers to be 20-25% lighter and thinner.

The Glass Containers made through NNPB/ABB Technology have the same strength as compared to containers made through B&B and P&B.

Need to educate the users & customers

Strength increase

Can thermal tempering process, as followed for toughened glass, be applied to glass bottles ?

Can better coatings & chemicals be applied to improve strength of the bottle ?

Need more research & investment in bringing new technologies



Thank You