

# **PACKAGING SUSTAINABILITY**

## **CASE STUDY**

**SUSTAINABLE SOLUTIONS  
FOR MILK PACKAGING**

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# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

## INTRODUCTION

The boom in the organized retail is going to be a sea change in the way milk is sold in urban centers. With milk consumption expected to rise by 2.6% in 2009.

# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

## MARKET DRIVERS:

- Consumer Expectations
- Changing Life styles
- Industry Responsibilities
- Competition

# **SUSTAINABLE SOLUTIONS FOR MILK PACKAGING**

## **INDUSTRY CHALLENGES**

- **Cost Effective Recycling**
- **Coordinated Government Policy**
- **Durable Solutions**

# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

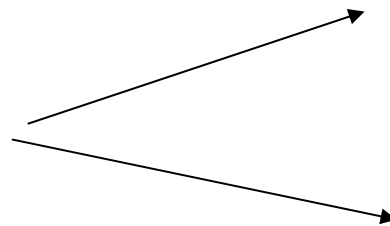
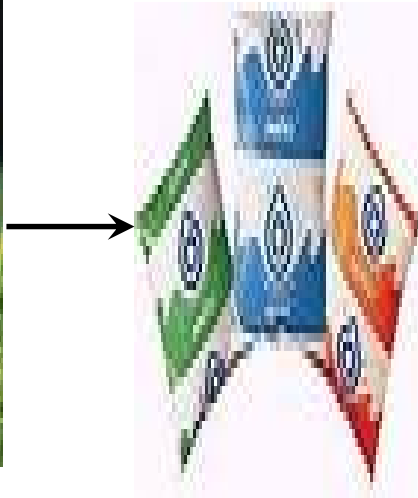
## OBJECTIVE

- Examine the total life cycle of milk packaging in order to quantify the potential environmental impact, and to compare various forms of milk packaging to attain a sustainable solution for milk packaging.
- From the various methods present for LCA we have considered data from Simapro database.

# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

**SUSTAINABILITY IS A CONTINUOUS PROCESS**

**Bulk --- Pouch --- Tetra pak & Bottles**



# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

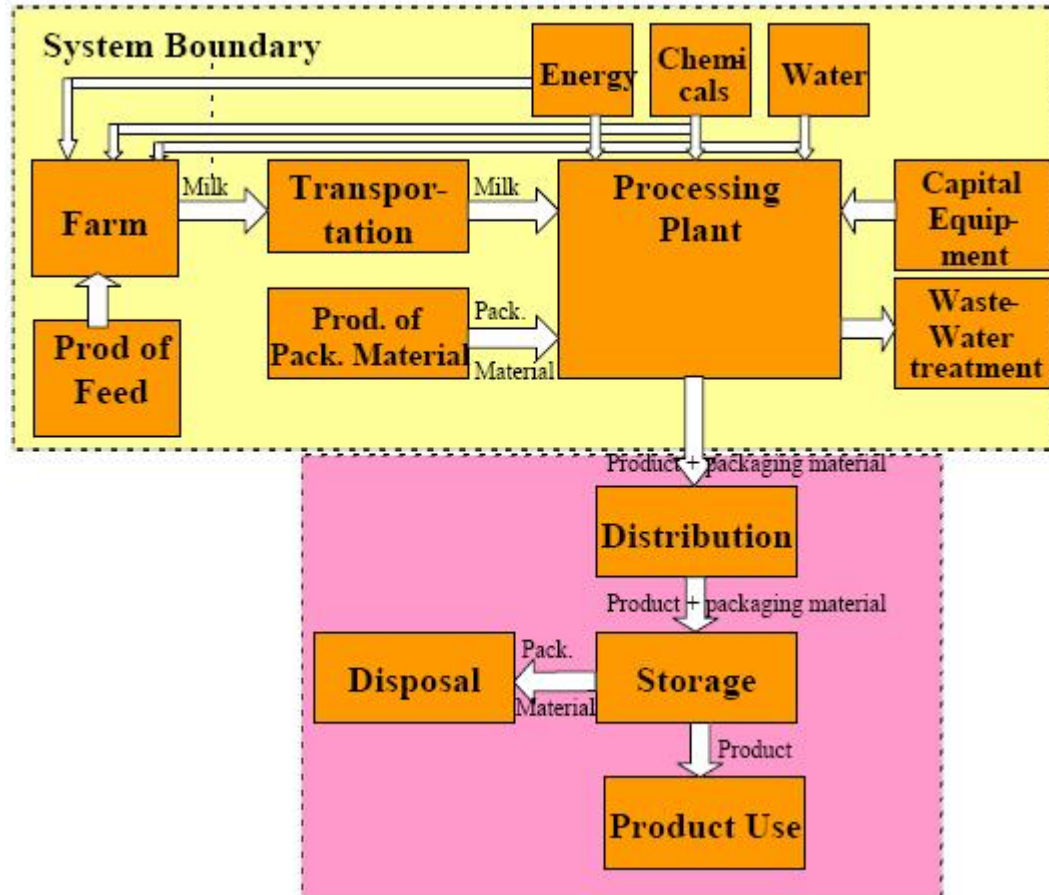
The dairy industry comprises of

- **agriculture,**
- **livestock,**
- **dairy farming,**
- **dairy packaging and**
- **product distribution.**

This study concerns the evaluation of Life cycle of Milk packaging in a cradle to cradle approach.

# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

## LCA Study - System Boundaries



# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

For the purpose of this study different milk packaging materials and concepts has been identified.

The common milk packaging forms that are currently available in India:

- Milk pouch (1/2lt, 1lt, 5lt)
- Tetra pak (250ml-1.5l)

# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

Alternate packaging systems that are also present in the global market but doesn't have a huge market in India are:

Flexible laminate structures, HDPE bottle (refillable, Single use), PET,.....

# **SUSTAINABLE SOLUTIONS FOR MILK PACKAGING**

Down gauging of the materials has been done to the optimum level so as to attain a sustainable design. The weight of packaging material discarded for milk and the rate of recycling has been assessed (see below)

| Product    | Package type      | Material            | Recyclig rate   | Package discarded per l of milk |
|------------|-------------------|---------------------|-----------------|---------------------------------|
| Fresh milk | Plastic pouch 1l  | LLDPE/LDPE          | Not significant | 6.2gm                           |
| Fresh milk | Plastic bottle 1L | HDPE                | 42%             | 28 gm                           |
| UHT milk   | Aseptic carton    | 1l gable top carton | 12%             | 28.4gm                          |
| Fresh Milk | Plastic bottle    | 4l bottl            | 42%             | 90 gm                           |

# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

A multicriteria analysis of the performance, cost, environmental and regulatory issues influencing each container system was conducted. The scoring table (shown below) summarizes the results of this analysis.

The Life cycle data are normalized to arrive at life cycles scores ranging from 0-10(best-worst)

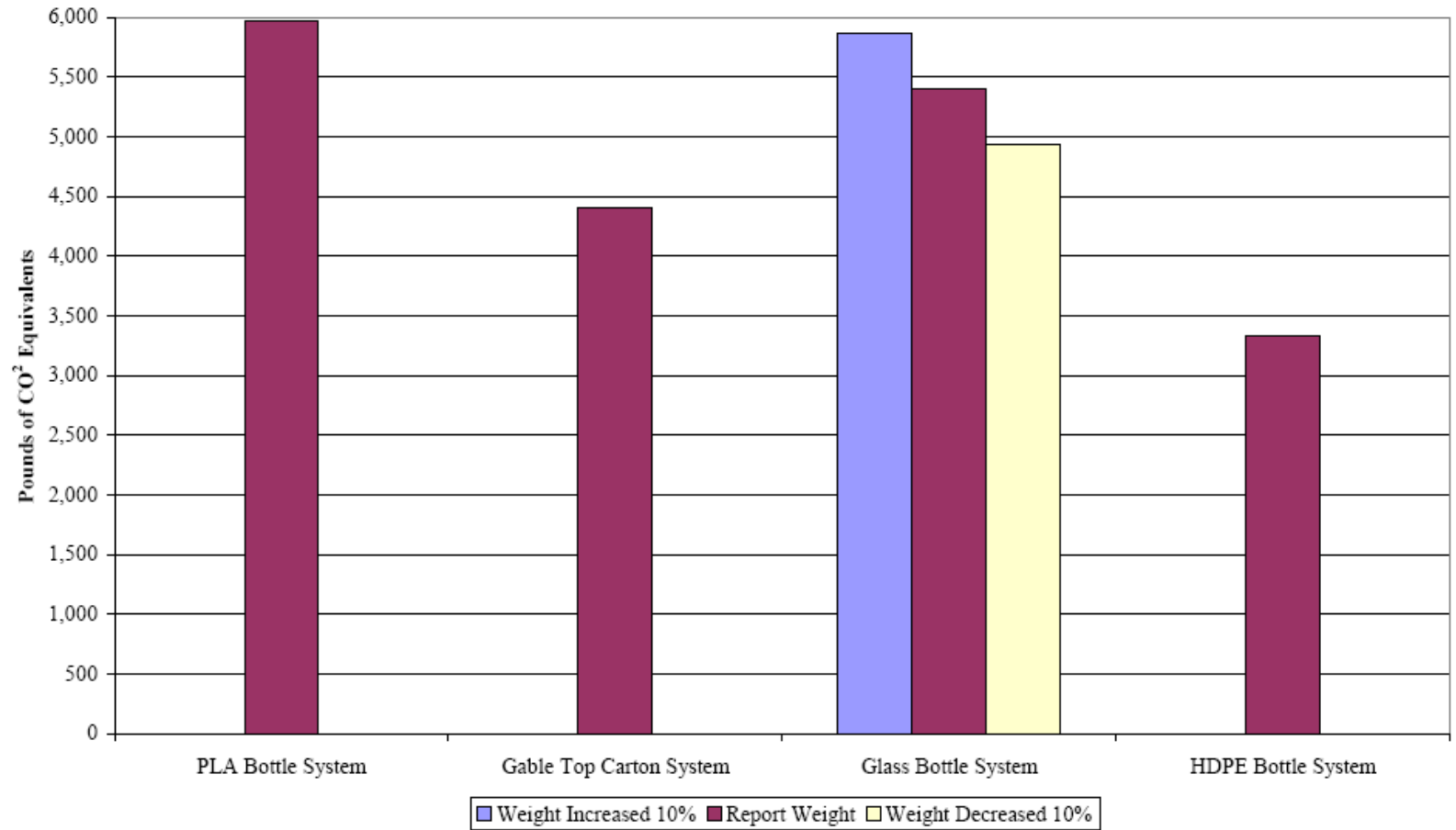
Courtesy-EPA

# Milk packaging evaluation

Using Scale from Best To Worst of 0-10.

| Container type   | Energy use | Solid waste | total Environmental | cost | performance | overall |
|------------------|------------|-------------|---------------------|------|-------------|---------|
| Flexible pouch   | 2.1        | 0.14        | 1.1                 | 1.1  | 6.2         | 2.8     |
| Gable top carton | 10.0       | 1.1         | 5.6                 | 1.8  | 5.0         | 4.1     |
| HDPE             |            |             |                     |      |             |         |
| Refillable       | 2.9        | 0.05        | 1.5                 | 0.7  | 3.8         | 2.0     |
| Single use       | 9.7        | 0.55        | 5.7                 | 3.4  | 1.2         | 3.2     |

**Figure 8. Total Carbon Dioxide Equivalents for Milk Containers with a 10 Percent Difference in the Glass Bottle Weight (Pounds of CO<sup>2</sup> equivalents per 10,000 half-gallon milk containers)**



# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

How Carbon reductions could be achieved

- Right-Weighting Packaging
- Increasing recycled content
- Reuse system
- Product redesign and reformulation
- Innovation in Engineering or processing
- Improving efficiency of production
- Structural re-design

# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

## INNOVATIONS IN MILK PACKAGING

- Green Bottle - cardboard pulp with a plastic inner bag..



# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

## INNOVATIONS IN MILK PACKAGING

- JUGIT: Dairy Crest  
Three-layer PE one-litre capacity bag that is effectively a cartridge that fits into a rigid plastic jug with a lid.



# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

## INNOVATIONS IN MILK PACKAGING

### Ecolean

Design modification incorporating an air filled handle and a pouring spout.



# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

## INNOVATIONS IN MILK PACKAGING

### MILK: HDPE SELF STACKING BOTTLES

- Avoiding crates for distribution
- Accommodates 9% more milk during distribution
- Reduces Contamination
- Ease of stacking



# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

## HDPE BOTTLE ADVANTAGES

- Refillable bottles: Most Eco friendly
- Single Use: Higher Impact
- Convenience
- Wide Range (500ml-5lt, 10lt)
- On the go drink
- Thermic treatments systems such as pasteurization, Aseptic Processing are applicable.

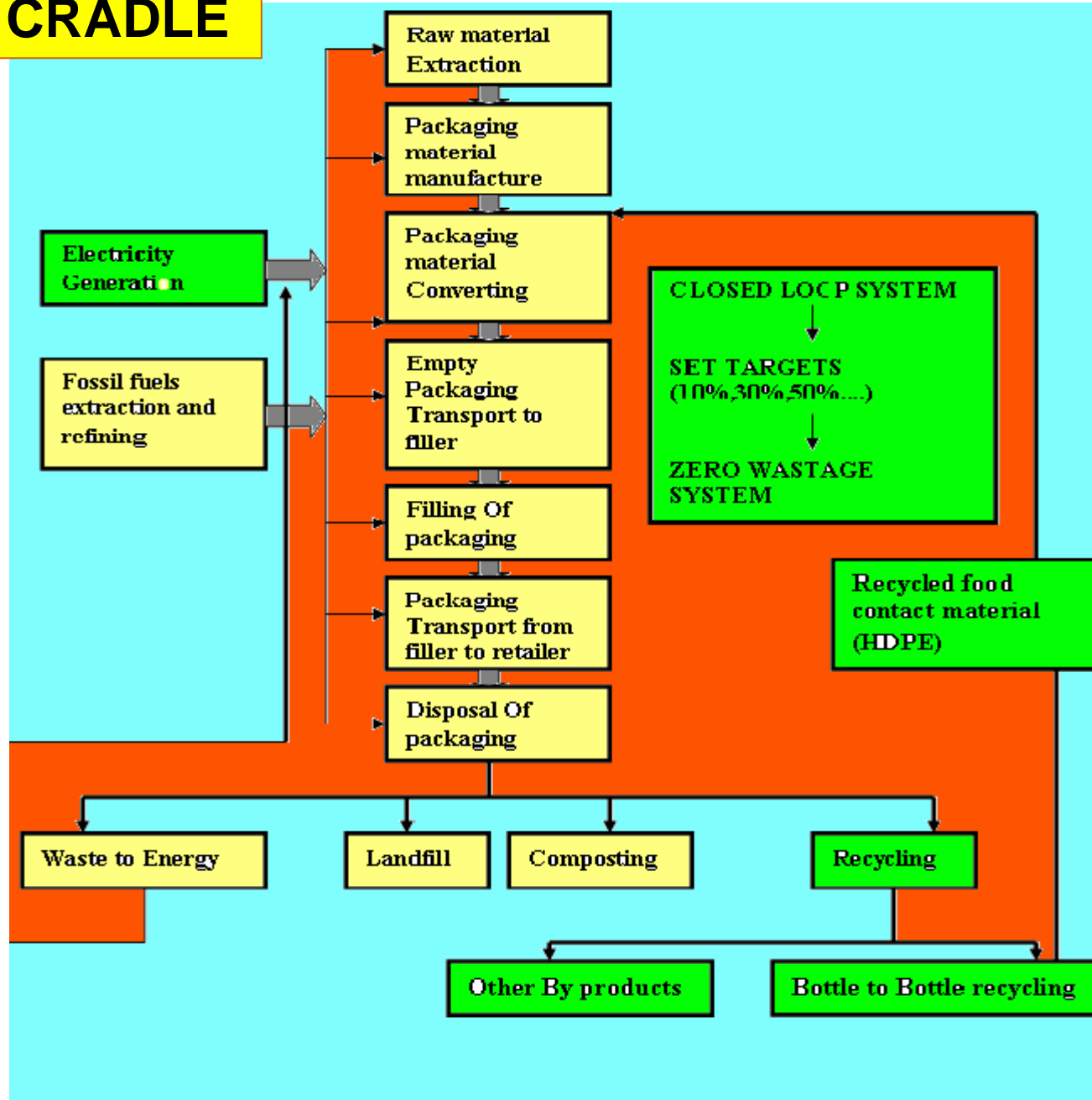
# **SUSTAINABLE SOLUTIONS FOR MILK PACKAGING**

## **CLOSED LOOP SYSTEM (B2B)**

- Bottle to Bottle Recycling Technology has been developed for HDPE by WRAP.
- Food contact recycled material with almost the same purity compared to the virgin material are being used for milk in UK.
- Conversion of bottle to bottle recycling to zero wastage system in the future

.....

# CRADLE TO CRADLE



# **SUSTAINABLE SOLUTIONS FOR MILK PACKAGING**

## **ADVANTAGES OF RECYCLING**

- Stabilizes the cost of raw materials
- 1tonne of plastic bottle saves 1.5 tonnes of Carbondioxide emissions.
- Milk bottle to Milk bottle technology is technically and commercially feasible

# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

Bioplastics:PLA –Most Promising Bioplastic

- Example: Ceralloy Eco HD  
50% non renewable HDPE  
50% Cere Starch &  
thermoplastic starch

# **SUSTAINABLE SOLUTIONS FOR MILK PACKAGING**

## **FUTURE VISION**

- Education programs that influence the way consumer feel about recycling
- The concept of “waste” is replaced by the concept of “Resource”
- Cradle to Cradle concepts in the design
- Zero waste is the target

# SUSTAINABLE SOLUTIONS FOR MILK PACKAGING

- Smart packaging concepts also have the potential of changing the basis of competition among packaging suppliers for milk.
- Nano Composites For food Packaging applications with high barrier films is one of the emerging trends in packaging.

# **SUSTAINABLE SOLUTIONS FOR MILK PACKAGING**

## **EXCLUSIONS FROM STUDY**

- Alternatives to pasteurization are being explored such as UV technology and running milk through a filter to remove bacteria without pasteurization would bring a huge change.
- There is need to initiate policies for Recycling mode, educating the consumers and bring out legislation for sustainability of milk packaging.

**THANK YOU ALL FOR PATIENT LISTENING**