

'Milking the Opportunity'

Closed Loop Recycling and the Dairy Supply Chain

Introduction

'Closed Loop Recycling,' a forward thinking SME in Dagenham, processes around six million plastic bottles a day, converting these materials that would otherwise be sent to landfill into pellets and flakes. The processed plastic can be re-sold and then re-moulded back into food-grade plastic containers, including milk bottles. This recycling plant fulfils a vital step in the milk packaging feedback loop essential to facilitating the UK dairy industry's goal of significantly reducing its carbon footprint.

Background – An Absence of Synergy

Every year 120,000 tonnes of HDPE plastic milk bottles are disposed of in the UK (data from 2011).¹ A large variation in the types of plastic, tints and labels used in the production of these milk bottles has significantly contributed to rendering recycling processes technically unviable. An absence of recycled plastic has forced milk bottle manufacturers to source predominantly virgin material with a significantly higher carbon footprint compared with recycled material. However the Dairy Roadmap changed this.

Opportunity

- Reduce CO₂ emissions – tackle by addressing embedded carbon in packaging

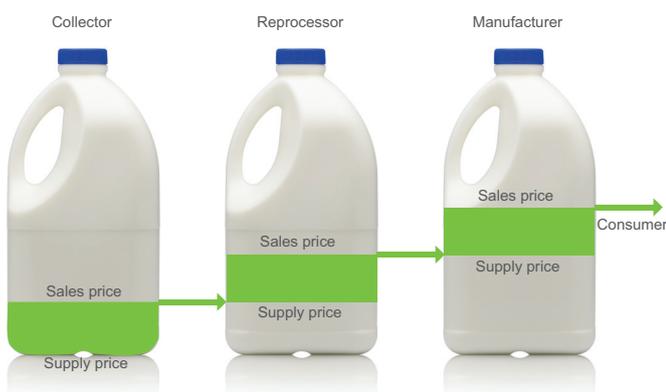
Approach

- Collaboration – between collectors, processors, recyclers, manufacturers and suppliers to develop widely adopted materials standards

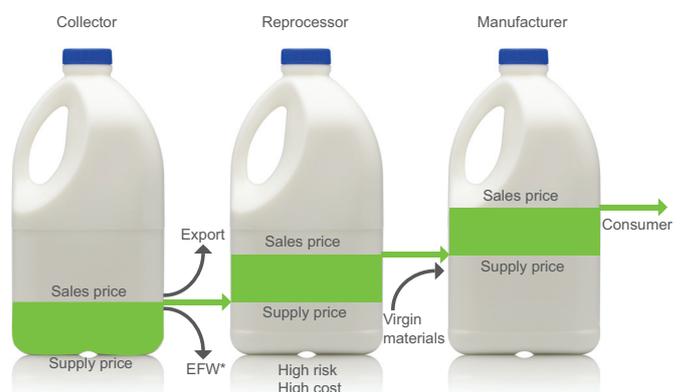
Impact

- Closed loop system enabled secure supply of recycled plastic material
- Reduced CO₂ emissions, as 15% recycled plastic incorporated into milk bottle
- Targets in place for further improvement
- Improved public image

Supply chain with co-operation



Supply chain without co-operation



*Energy from waste

Figure 1: A supply chain without cooperation reduces the flow of materials from collectors to reprocessors, and then on to manufacturers. The availability of exit/entry points for materials at both ends of the chain creates risk and increases price. Collaboration between collectors and manufacturers of plastic milk bottles enabled Closed Loop Recycling (a reprocessor) to secure not only a supply of collected material but also a customer for their processed pellet product. This relationship helps to mitigate the effects that the recycling plant could feel from upstream and downstream supply chain disruptions and price fluctuations, and equally secures trade for the collectors and manufacturers. Collaboration strengthens the chain as a whole and also allows manufacturers to be less influenced by virgin material suppliers.



Image: Reproduced with permission from Closed Loop Recycling

Opportunity & Drivers

The dairy industry's ambition to reduce carbon emissions and thus improve its public image was the primary driver for changing its business models. Retaining as much as possible of the carbon embedded in the milk bottle plastic through recycling provided part of the solution to this problem; moreover light-weighting milk bottles would also reduce the cost of production per bottle, thus providing an economic incentive for change with the added benefit of simultaneously curbing carbon emissions.

Approach

The Dairy Supply Chain Forum's (DSCF) Taskforce (a group which brings together all parts of the dairy supply chain) enabled the industry to collaborate, compromise where necessary and agree on changes to reduce its carbon footprint. In 2008, with management of communications overseen by WRAP, the dairy industry took the initiative to instigate change that resulted in the creation of the UK Dairy Industry Roadmap. By creating an environment for communication and collaboration, a reliable and sustainable recycled plastic supply-demand relationship was established (Figure 1).

There were also technical hurdles to be overcome to make the recycling process commercially viable. Discussions between the reprocessors, manufacturers and retailers allowed increased understanding of the issues faced by reprocessors, leading to the development of widely adopted materials standards. For example, the bottle cap tint concentration was reduced and the bottle labels were redesigned to use glue that decomposes at a temperature that does not interfere with the recycling process. These tweaks to the product design not only prevent physical problems with recycling, but also allow the colour quality of the plastic to be maintained so as to still appear aesthetically pleasing to customers when used in the remanufacturing of new milk bottles.

Benefits & Impact

Collaboration successfully led to the drafting of a Roadmap for incorporation of recycled plastic in manufactured milk bottles, to which all major players agreed. The targets laid out in the Roadmap guaranteed suppliers and customers for Closed Loop Recycling's processes. Consequently, a circular system was formed that enables around 10% of the plastic from milk bottles collected in the UK to be recycled and remain in the national materials supply chain, while providing economic and material security benefits to the aforementioned portion of the chain.

From 2010, the UK has been successful in decreasing the weight of plastic milk bottles by 10% alongside incorporating

at least 15% recycled high-density polyethylene (rHDPE) into all major retailer bottles.ⁱⁱ This has resulted in 12,000 tonnes of plastic being recycled to make new milk bottles and a CO₂ emissions saving of 27,000 tonnes in 2010 aloneⁱⁱ.
ii Bottle manufacturers are now aspiring to increase the recycled component to 30% by 2014, as well as continuing to decrease bottle weight in order to further reduce greenhouse gas emissions. When the recycled element reaches 50% the carbon footprint per milk bottle will decrease by up to 25%.

Plastic milk bottles now bought from any wholesale supermarket can be easily recycled at plants similar to Closed Loop Recycling. The recycling plant itself has estimated that through the recycling of plastic bottles (a significant proportion of which are milk bottles) approximately 52,500 tonnes per annum of carbon dioxide is prevented from being emitted into the atmosphere.

Through instigating and creating change to standards that suit the industry's needs, the dairy chain has circumvented the imposition of Government legislation or regulation. Intra-industry collaboration has also empowered manufacturers to be less influenced by virgin materials suppliers.

The soft drinks industry is now following suit by utilising WRAP's guidance to help implement changes to improve its sustainability which likewise involves improving the recyclability of PET plastic drinks bottles.ⁱⁱⁱ Closed Loop Recycling is once more proving a valuable resource to the industry in the execution of this mission by providing the technology to recycle collected bottles and generate recycled polyethylene terephthalate (rPET).

The dairy industry's pioneering agreement to collaborate exemplifies that developing a circular approach that improves materials security can also improve both the carbon footprint and the overall cost of a process to an industry. Utilising a synergistic approach has enabled the supply chain to implement changes with significant impact that benefits all members of its supply chain and the environment.



Image: Reproduces with permission from Closed Loop Recycling

This case study was produced by the [Materials Security Special Interest Group](#).

i. <http://www.wrap.org.uk/content/hdpe-categorisation-tool>

ii. <http://www.dairyco.org.uk/resources-library/research-development/environment/dairy-roadmap/>

iii. <http://www.britishsoftdrinks.com/pdf/roadmap%20signatory%20pack.pdf>