AUSTRALIAN INDUSTRY GROUP

A SUPPLY CHAIN BASED APPROACH TO CARBON ABATEMENT: CASE STUDY II – BULLA ICE CREAM

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Bulla

Sustainability victoria

State Government Victoria

introduction

The Australian Government has clearly signaled its intention to address climate change by setting targets to reduce Australia's greenhouse gas emissions. This will create a carbon constrained economy with implications for businesses and the supply chains they operate within.

The ResourceSmart Business Industry Pilot (the 'Pilot') delivered by the Australian Industry Group (Ai Group) in conjunction with Sustainability Victoria (SV) trialled an innovative approach using life cycle thinking to support Victorian industry to prepare for a carbon constrained economy by working with key companies across the supply chains for two iconic products.

Two products were selected for the study, both of which are produced in Victoria:

- 410 gram can of SPC peaches in natural juice produced by SPC Ardmona (SPCA); and
- Two litre tub of Creamy Classics vanilla ice cream produced by Bulla Dairy foods (Bulla).

This case study details the results of the two litre tub of Creamy Classics vanilla ice cream product.

the product and the supply chain

The first ice cream recipes appeared in the 18th century. However, it was the development of industrial refrigeration and more specifically the continuous process freezer in 1926 that enabled the commercial mass production of ice cream and the birth of the modern ice cream industry. Bulla began operations in Colac in 1922 with ice cream production starting in the late 1940s.

Bulla's two litre tub of Creamy Classics vanilla ice cream is produced at its Colac plant. Ingredients include milk, cream, milk solids, sugar syrup and vanilla flavouring. The tubs are supplied to retailers in shrink-wrapped packages of two.

Key contributions to the footprint and primary supply chain participants are listed in the following table. The process is represented in Figure 1.

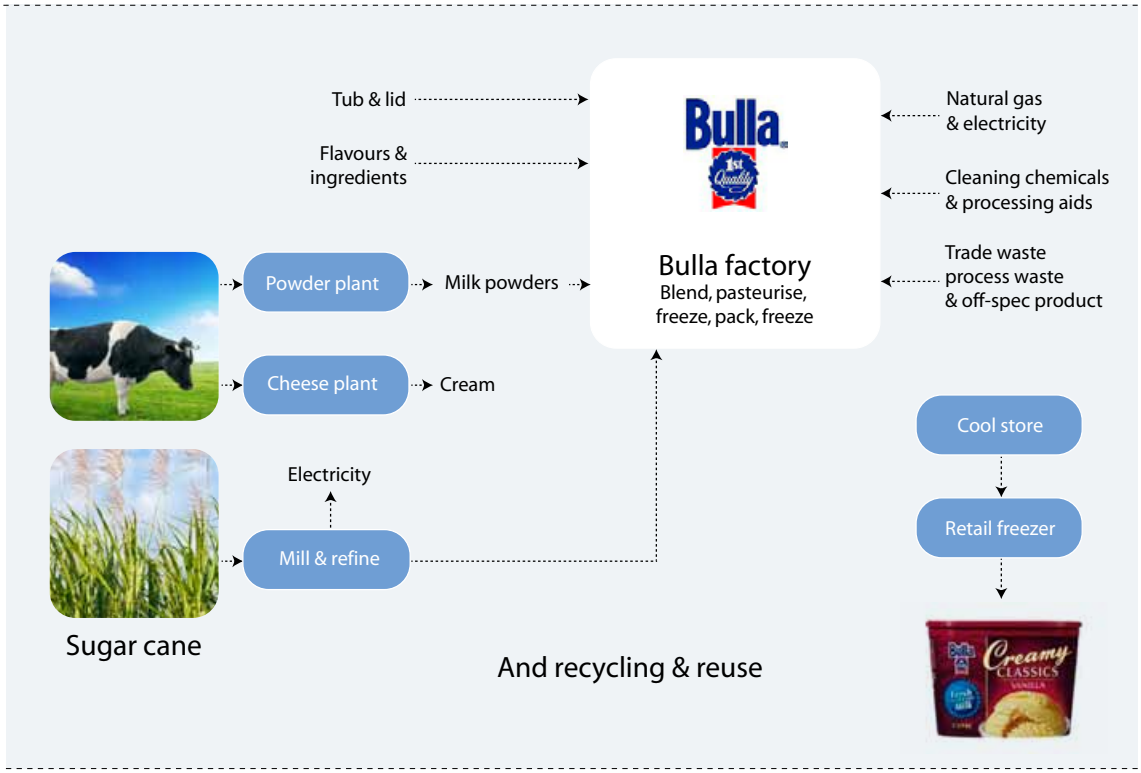
Table 1

Bulla ice cream tub: key contributions to the footprint and primary supply chain participants

Input	Description	Primary participant/s
Dairy ingredients		
- Dairy milk	Primary ingredient supplied by tanker direct from the farm	Farmers
- Cream	Primary ingredient supplied by tanker includes processing component	Milk processors
- Milk powders	Commodity milk products supplied in 25kg bags includes processing component	Milk processors
Sugar syrup	Sugar cane grown in Northern NSW and Queensland. Milled and refined sugar supplied as a bulk syrup by tanker	Refined sugar producers
Other ingredients	A number of flavours and functional ingredients supplied in small containers	Around six suppliers
Tub and lid	Injection moulded polypropylene tub and lid manufactured locally	Tub and lid manufacturer
Ice cream plant	Ingredients are mixed, homogenised and pasteurised and allowed to mature in storage tanks. The mixture is partially frozen, filled into packaging and held in a cold tunnel to freeze	Bulla
Cold storage and transport	Cold storage and transport prior to distribution to retailers	Bulla, retailers and a range of cold storage providers
Retail display freezers	Storage of ice cream in retail display freezers	Retailers

Figure 1

Bulla ice cream tub: supply chain



methodology

The Pilot applied life cycle assessment (LCA) techniques to determine the carbon footprint associated with the production and distribution of the product. The results of this Pilot enabled the identification of 'carbon hot spots' across the supply chain and investigation of abatement opportunities.

Key project steps included:

- Carbon footprint studies (LCAs);
- Site assessments aimed at carbon hot spots in the supply chain; and
- Workshops with representatives from the supply chain to identify carbon abatement opportunities.

LCA results

The streamlined LCA estimated that the carbon hot spots were associated with dairy farming, retail freezers and ice cream manufacture at Bulla. Similar to the peaches study, this was confirmed by the detailed study that determined the following major contributions:

- Dairy farming (43%) – primarily enteric methane emissions from cows and nitrous oxide emissions from cow excretions and soils;
- Retail freezers (36%) – mainly electricity use; and
- Bulla (9%) – mainly electricity use associated with ice cream manufacture.

retail display freezers

Bulla's Creamy Classics ice cream is sold from a vast array of food outlets and display freezer arrangements. Related carbon emissions can therefore vary substantially from site to site and even within stores. The Pilot determined that average emissions are associated with electricity use (84%) and refrigerant loss (16%).

The key influences on electricity use associated with the ice cream tub were found to be:

- Storage time: The longer the tub spends within a retail freezer, the greater the footprint. The results assume an average seven days storage time in a retail freezer. In practice this will vary depending on throughput and freezer size.
- Freezer type: The design of the freezer can have a significant effect on the footprint. Horizontal or well types are generally more efficient than vertical freezers. The well design holds cold air more efficiently whereas vertical freezers lose cold air when the doors are opened and require energy to prevent condensation on the doors.
- Loading rates: Energy usage per tub is reduced for a well stocked freezer.

A sector wide approach to emissions reduction from non-domestic refrigeration is being coordinated by the Department of Sustainability, Environment, Water, Population and Communities in consultation with the industry. [2]

Bulla ice cream plant

Emissions associated with the ice cream manufacturing process at Bulla consist primarily of electricity (86%) and natural gas usage (11%). The majority of electricity is consumed by refrigeration processes, especially for freezing the ice cream.

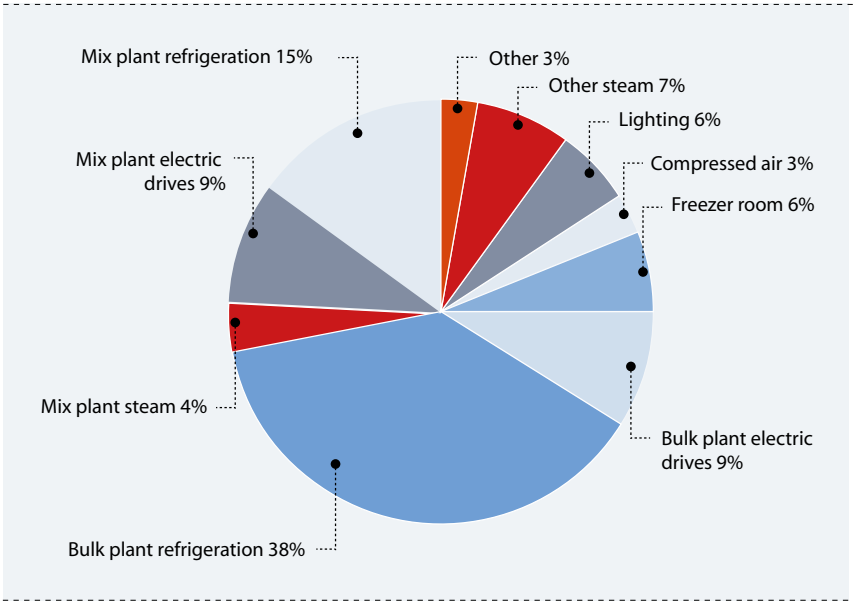


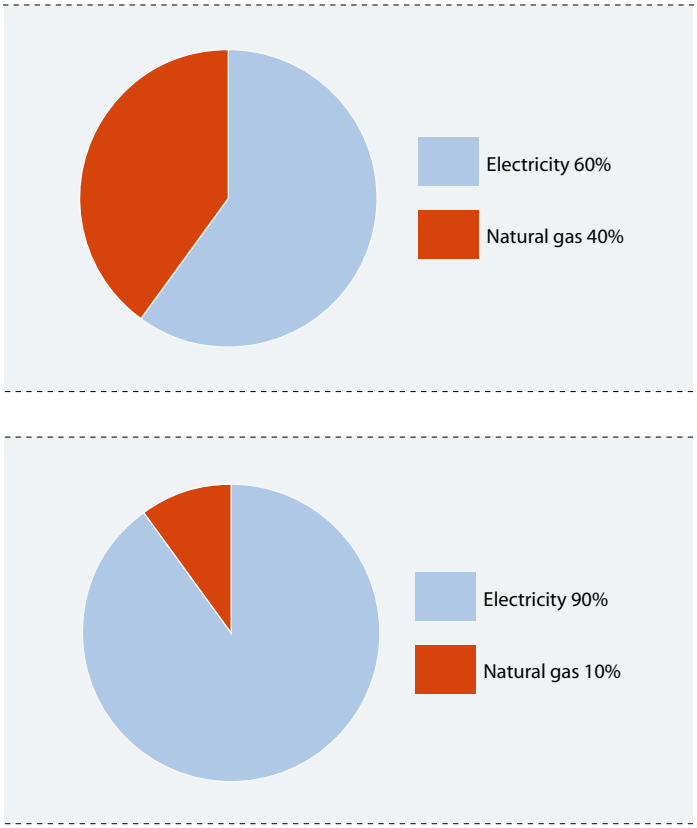
Figure 2

Contributions to the carbon footprint at the Bulla ice cream plant

[2]Further information: http://www.energyrating.gov.au/library/details200912-in-from-the-cold.html

Figure 3

Energy contributions to the carbon footprint at the Bulla ice cream plant



A detailed energy audit conducted at the Bulla site identified the following carbon abatement opportunities:

- Enhanced energy management program;
- Energy efficiency measures; and
- On-site electricity generation from natural gas with reuse of generated heat.

An alternative approach to carbon abatement at Bulla could review the product formulation to use less carbon intensive ingredients. This would require comparative analysis of the footprints of the ingredients to determine the preferred option. Of course, Bulla would need to consider the consumers' acceptance of any such modifications.

consumer use phase

Though the use phase has not been included in the carbon footprint study it is likely to be significant due to the use of individual home freezers and the need to re-cool the product following transport from the supermarket and use at home. Consumer education could assist to:

- Minimise heat loss from ice cream during transport home and during use (e.g. serving); and
- Encourage consumers to use energy efficient freezers.

supply chain roadmap

Opportunities that arise from supply chain co-operation are listed in Table 2 below.

The supply chain roadmap is intended to be used as a communication and collaboration tool among supply chain participants and to form the basis of on-going monitoring.

Table 2

Bulla ice cream tub supply chain roadmap

Sector	Carbon reduction opportunities across the supply chain
Dairy farming (for all dairy ingredients)	Work with fellow dairy farmers, processors and industry bodies to: - Share information to improve on-farm carbon management - Energy generation from 'community' dairy farm effluent ponds - Source lower carbon inputs such as fertilisers - Share and implement on-farm energy efficiency and alternative energy generation programs - Improve efficiencies of transport of fresh milk to the processor
Dairy ingredient processing	On-site energy and process efficiency and alternative energy generation Work with Bulla to reduce packaging e.g.: - Bulk delivery of milk powders - Transport powders in reusable containers
Other ingredients	Work with Bulla to: - Minimise packaging and transport where possible
Sugar syrup	Work with cane growers to: - Reduce de-nitrification from applied urea fertiliser Work with Bulla to: - Optimise carbon associated with sugar supply into the product including syrup temperature and optimised solid/liquid conversions
Bulla ice cream plant	Work with water supplier and regional trade waste producers to: - Optimise energy recovery from biogas - Minimise discharges to trade waste and reuse trade waste Work with processing technology providers to: - Review lower carbon processing options for ice cream manufacture Work with energy service providers: - Implement alternative energy generation projects
Tub and lid	Work with polypropylene suppliers to: - Identify sources of lower carbon polypropylene Work with plastics and waste sector to: - Increase polypropylene recycling rate
Cold chain – storage and transport	Retailers work with Bulla, cold storage providers, retailers and transport companies to: - Reduce storage time in the cold chain - Maintain high retail freezer stocking rates - Minimise over chilling of product beyond required temperatures - Improve energy efficiency of cold storage chain
Retail display freezers	Work with refrigeration equipment suppliers to: - Reduce carbon emissions associated with retail freezers Work with Bulla and consumers to: - Reduce carbon emissions associated with handling of ice cream

key insights associated with this supply chain

- Bulla's direct emissions account for less than 10% of the product footprint. Greater opportunities for footprint reduction may be available by working with the supply chain;
- Elements of the footprint may require a sector-wide approach to emissions reduction;
- Consumer education may help to reduce emissions associated with the use of the product.

"As we expand our efforts from carbon to other sustainability practices, we've already got these key suppliers communicating," says Stephen Mitchell, Environment Manager from Bulla, who has used the detailed LCA to sell sustainability initiatives to management, including the employment of two additional environmental co-ordinators.

overall benefits

- The Pilot helped develop a shared understanding of carbon issues between supply chain participants;
- The LCA results and identified opportunities can be drawn upon by supply chain members on an ongoing basis (e.g. during current and future commercial negotiations);
- The results aid identification of business opportunities and risks associated with carbon management and the impact of any price on carbon emissions across the supply chain;
- Participants advised that the carbon footprint results were easily understood and provided ongoing value. This promotes broad internal engagement within participating organisations and enables incorporation of learnings into company sustainability strategies;
- The methodology was able to promote supply chain engagement. Participants worked together to identify and prioritise a broad range of carbon abatement opportunities including supply chain efficiencies and product design changes; and
- The Pilot methodology can be easily applied to other products and services.

acknowledgements

The Australian Industry Group and Sustainability Victoria would like to thank all of the participating companies, primary producers, government agencies and stakeholders for their time and effort in contributing to the success of the Pilot.

further information

Further information about this case study please contact:
Ai Group Energy and Sustainable Business Help Desk
T: 1300 733 752 E: sustainablebusiness@aigroup.asn.au