CASE STUDY

Betta Foods cooling tower investigative study

1. Company profile

Betta Foods Australia (established in 1954), which is located in Broadmeadows and employs 200 staff, began as an ice cream cone manufacturer and is one of Australia's leading manufacturers and suppliers of ice cream cones. Betta Foods has also expanded into the manufacture and supply of confectionery in particular liquorice products, marshmallows/ snowballs and jellies. The major focus of Betta Foods activities in recent years has been developing an export liquorice business under the Capricorn Brand, in Europe, Canada and most recently the United States. This has resulted in their "Capricorn" branded liquorice being the No.1 premium liquorice product in Canada.

Betta Foods has been actively looking at ways to reduce water consumption. They have already reduced their annual consumption from over 50 ML to around 26ML.

Betta Foods is currently involved in the Victorian Government's water management action plan (waterMAP) program to further reduce their consumption. As part of the program users of > 10 ML of drinking water per year are required to:

- Assess their current water use
- Identify inefficiencies and opportunities for water savings
- Prepare an action plan to implement water conservation activities
- Annually report on implementation of water conservation activities

2. waterMAP Assist

Ai Group is committed to working with member companies to encourage continuous improvement, resource efficiency, use of recycled water where possible, and reduced usage of drinking water. Ai Group's waterMAP Assist program has provided resources and funding to member companies to assist them implement initiatives contained in waterMAPs and deliver water savings in industry.

3. Project summary

Currently Betta Foods has six cooling tower systems supplying condensing water to five chillers located inside the factory. These chillers are due for replacement and Betta Foods is investigating alternative options including air cooled systems.

Ai Group's waterMAP Assist program provided funding to enable Betta Foods to conduct an investigative study to:

- Help determine the feasibility of replacing the water cooled system with an air cooled system
- Identify practical feasibility of the project in terms of cost, design and operation, including inherent increases in energy consumption and any measures available to minimize or offset this
- Provide assistance in design of the project including a budget breakdown and any operational factors that must be managed

The project also addressed issues relating to *Legionella* and provided information on the projected reductions in drinking water consumption and water treatment costs.

4. Existing cooling system

Betta Foods' cooling system consists of six cooling towers supplying condenser water for the chillers and other facilities. Table 1 describes the role of each cooling tower.

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TABLE 1 COOLING TOWER AND CHILLERS

Cooling Tower	Chiller	Cooling Capacity (kW)	Services
CT1	Chiller 1	317	Production in liquorice line
CT2	Chiller 2	734	
CT3	Chiller 3 and two HE	734	Production in liquorice all sorts line
CT4	-	250	Air conditioning cooling to panning room
CT5	Chiller 5	370	Marshmallow dry room
CT6	Chiller 6	575	

TABLE 2 PAYBACK PERIOD

Option	Capital Cost	Net Operating Savings	Payback Period
Air Cooled Condenser	$ 305,000	$ 83,000	3.7 years
Air Cooled Chiller	$ 495,000	$ 81,000	6.1 years

5. Options

The current cooling system operates inefficiently due to the age of the equipment. The two options to replace the existing water cooling system are:

- Air cooled condenser connected to the existing chillers
- Air cooled chillers

The benefits of installing an air cooled condenser are:

- No need for cooling tower
- No water make up is required as a cooling medium
- Less operational problems i.e. no float valve, water treatment, cooling tower

The benefits of selecting an air cooled chiller include:

- Avoids the need for cooling towers, condenser pumps and condenser piping
- Avoids the maintenance and health issues of cooling towers
- Offers very good performance at part load

6. Scenarios

The feasibility study identified a range of scenarios for an air cooled condenser connected to the existing chiller and air cooled chillers. The scenario for each option was based on the following criteria:

- Capital cost
- Net operating savings
- Available space for installation
- Air flow restrictions

The payback period for the best scenario of each option is displayed in Table 2.

7. Project benefits

The feasibility study:

- Identified substantial potential operating savings by the elimination of water treatment costs for the existing cooling towers
- Identified water savings of approximately 10 ML/year
- Provided background information on the occupational health and safety issues involved in air cooled condenser and air cooled chillers
- Provided an understanding of the possible problems and maintenance actions involved in air cooled condensers and air cooled chillers

Further information

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Ai Group's waterMAP Assist program, supported by the Department of Sustainability and Environment (DSE) has enabled Ai Group to work with large industrial water users to identify and implement water savings.