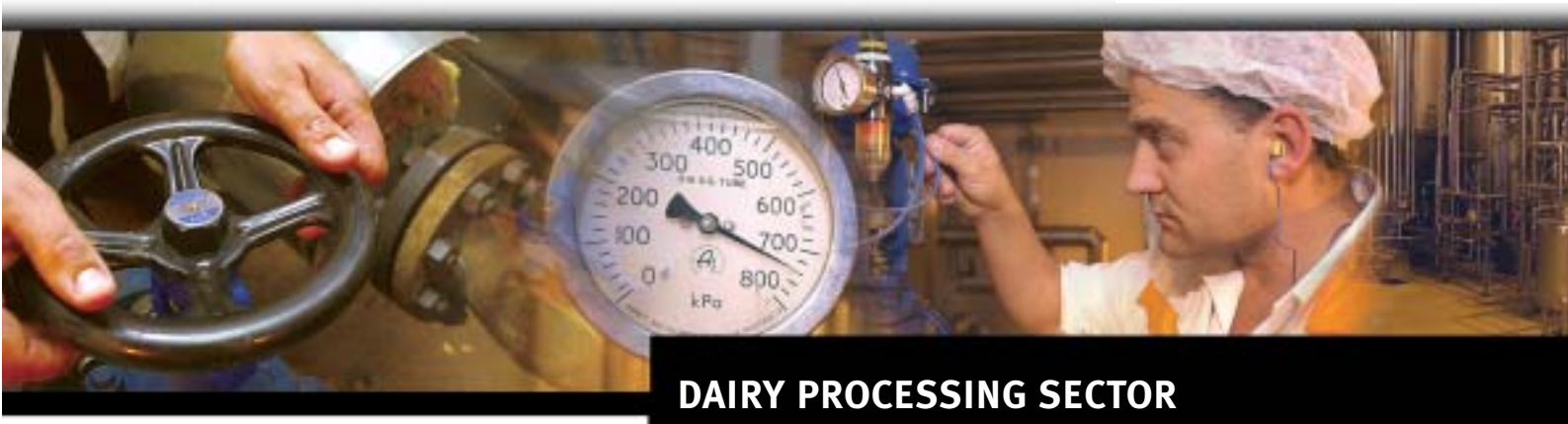
CASE STUDY



DAIRY PROCESSING SECTOR

MURRAY GOULBURN CO-OPERATIVE, ROCHESTER BRANCH

Benefits include energy savings, reduced greenhouse gas emissions, improved operations and staff knowledge.

Introduction

A team-based approach relying on 'people know-how', combined with sound measuring and monitoring, has enabled a dairy processing company to gain impressive bottom line savings.

The 12-month pilot project, which measured energy use in the various stages of milk processing at the Rochester (Victoria) Branch of Murray Goulburn Cooperative, has proven its worth in many ways.

Positive outcomes go well beyond energy savings. They have reduced greenhouse gas emissions and resulted in other significant business benefits, including improved operations at the site, improved knowledge and confidence of staff, and the motivation to continue to optimise energy efficiency.

Achievements to date include:

- Savings based on projects already implemented, amounting to $180 000 per year with a reduction in greenhouse gas emissions of 1 536 tonnes.
- Additional short-term future savings, based on projects currently being implemented, of $223 000 per year with a reduction in greenhouse gas emissions of 1 895 tonnes.
- Demonstrating the success of a cross-functional team approach to improving operational efficiencies—an approach Rochester plans to use as part of their waste and yield program.
- Improving steam safety and efficiency through the use of a training video (which also built community links as it was filmed and edited in collaboration with Rochester High School).
- Positioning Rochester to meet the new licensing requirements of the Environment Protection Authority Victoria, which requires EPA licensed premises that produce greater than 100 tonnes of CO_2 equivalent per annum to develop a greenhouse gas emission reduction action plan by December 2003 and implement the plan by December 2006.

INDUSTRY TOURISM RESOURCES
COMPETATIVE AUSTRALIA

energy efficiency
best practice

SETTING THE SCENE

The Commonwealth's Energy Efficiency Best Practice program (EEBP) initially approached Murray Goulburn to participate in a pilot project designed to demonstrate energy efficiency savings to the dairy processing industry—a significant energy user. The pilot aimed to reveal the significant benefits that could be achieved in part by creating an Energy Management Team (EMT). The team would work on a series of projects that would build both site level awareness and the capacity to implement energy efficiency initiatives. Their work would be supported by measuring and monitoring.

Murray Goulburn's Rochester site was selected for the pilot because of the energy intensity of its operations, the range of products it produces and its interest in trialling a new approach. The site, for example, used around $7 million of energy to produce 114 000 tonnes of product, including milk powder and cheese—in 2001–2002 alone.

Once agreement on a pilot was reached, consultants experienced in organisational facilitation, and technical experts from the Dairy Process Engineering Centre (DPEC), were invited to lend support to the initiative.

This case study provides an overview of the Rochester pilot, including a description of the four energy efficiency projects implemented, or being implemented, at the site. It also reports on the real results that continue to benefit the site.

THE APPROACH

The project followed the Best Practice People and Processes methodology developed by EEBP and tested successfully across a range of industries.

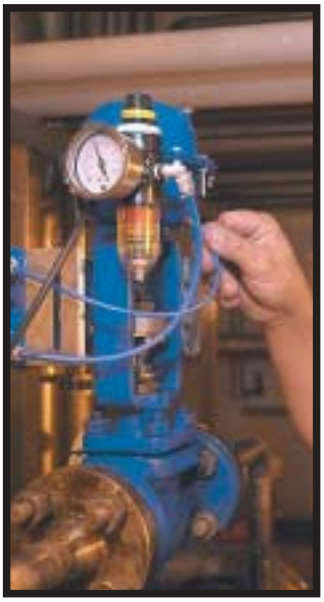
The approach involved:

- establishing and training a strong site-based Energy Management Team (EMT) through a series of facilitated workshops;
- developing a business plan for site-based energy efficiency projects;
- developing a strategy for the ongoing involvement of the team in energy management; and
- implementing projects, with support from the DPEC.

THE TEAM

Integral to the success of the project was the formation of the EMT with representatives from each part of the factory, including operators, supervisors, and maintenance and boiler personnel.

Team members had to be active participants, rather than observers. They also had to be highly motivated, prepared to challenge core assumptions and think laterally about new and innovative solutions to improved energy efficiency. A technical specialist from DPEC supported the team.



THE WORKSHOPS

A series of five, facilitated workshops were held during the pilot, each designed to build on the last.

Workshop one

The objective of the initial workshop was two-pronged. First, it established the overall rationale for, and outlined the importance of, energy management. Second it focussed on developing a list of related projects the team might work on.

Throughout the workshop, many team members gained a new perspective on energy and greenhouse matters. As Neville Toohey, Lactose Dryer Operator and union representative, said: 'It opened my eyes to things I had not thought much about such as Greenhouse. Before it was just a word but now I realise it is something that affects us all.'

Over two consecutive half-days, the Energy Management Team brainstormed a list of possible projects. It was essential that projects had the potential to:

- achieve quantifiable financial savings;
- involve all team members wherever possible;
- be useful in promoting energy management to other sites; and
- provide new ways of operating that could be transferred and applied to other sites.

Workshop two

After the first workshop, team members gathered as much data as possible on energy use at the site. They soon discovered that only a limited amount of concrete data was available. Motivated by the need for more comprehensive data, the EMT developed a final list of projects that would enable them to gather information, assess it and use the results to determine opportunities for improvement.

As Rob Jurg, then Waste and Yield Manager for the site, said: 'We have a wide range of monitoring equipment as part of our waste and yield program, but when it comes to understanding our energy use we have very little monitoring equipment in place. Data is essential in helping us understand the way we use energy so we can then work out how to improve our efficiency.'

The team identified three projects:

1. Improving steam-raising efficiency through improved communications with the boiler house.
2. Improving start up procedures for the evaporator and dryer.
3. Improving condensate return, fixing steam leaks and improving lagging.

A fourth project, developing a steam safety and efficiency video, was subsequently identified and implemented.

Workshop three

For this workshop, key stakeholders from within the company, including the Environment Manager, Site Manager and a Project Engineer, were invited to provide further input. They discussed the suitability of the projects identified, the potential support available for implementation, possible sources of internal funding, and the corporate attitude toward the EMT.

The information gathered was invaluable in clarifying many of the questions team members had. It also highlighted issues the EMT needed to explore in more detail, including the importance of effective communication and the need to address barriers to implementing changes.

Workshop four

By this workshop, projects were well defined. The team relied on the information gathered to develop a final business plan, covering:

- the background rationale for having an EMT;
- the rationale for, and scope of, each project identified;
- resources required to complete the projects;
- a risk assessment of each project;
- a plan to communicate the overall project and the importance of energy management; and
- a timeline for implementation.

Workshop five

At the final workshop, EMT members presented their final business plan to the Managing Director of Murray Goulburn, Stephen O'Rourke, and discussed how energy efficiency supports current business priorities.

IMPLEMENTING PROJECTS AND GETTING RESULTS

Since presenting their business plan, the EMT has been gathering energy use data with support from the DPEC and progressively implementing their projects. Each project is described below and, where possible, data on actual and potential savings provided.

Project 1: Improving steam raising efficiency

The primary role of boiler attendants is to ensure that steam of acceptable quality is available during production. Delays in the supply of steam, or unexpected boiler shutdowns, can damage equipment, interrupt production and spoil product.

The operating efficiency of boilers is proportional to their load. The higher the load, the more efficient the boiler. On the two John Thompson boilers at Rochester, for example, the difference in efficiency between operating at 30% load and 80% load is 5%.

The EMT discovered that it was difficult for boiler attendants to operate at a higher load and gain energy efficiencies. They determined that this was directly related to the flow of communications—boiler attendants did not have enough information in advance on the amount of steam required to change their operational procedures. As a result, they would run a number of boilers on low load (and therefore low efficiency) so they could quickly increase steam supply at any time to meet production expectations.

To resolve this issue, the EMT developed and implemented new operating procedures and a communications plan for the site, which have increased and improved the information flow between boiler attendants and operators. This in turn has resulted in boilers operating at significantly higher efficiency levels.

Monitoring and measuring data on steam efficiency demonstrates the success of this project. The average load of one John Thompson boiler, for example, has increased from 30% to 60%, contributing to a 4% increase in steam raising efficiency. The savings on this boiler alone are estimated to be $180 000 per year with greenhouse gas emission reductions of 1 536 tonnes.

Next steps for the EMT on this project include examining and investigating how the load profile affects all four boilers. This is critical to ensure that some boilers are not operating at higher efficiency while others are operating at lower efficiency. Monitoring load profiles will also demonstrate the potential net savings relating to increasing efficiency overall and shutting down boilers normally kept on standby.

As Phil Chapman, Boiler Attendant and EMT member, explains: 'Before this project we would only be warned about the need for steam about 40% of the time. Now it is 95% of the time and we are learning more about the factory and the processes that require steam. It means we can work the boilers more efficiently and have the confidence to take them offline without compromising production needs.'

Project 2: Improving start up procedures for the evaporator and dryer

Murray Goulburn Rochester currently produces milk powder on site in their Niro Evaporation and Spray Drying plants. These plants are designed to produce five tonnes per hour of whole milk powder. They are also used to produce skim and whey powders.

The EMT identified the need to improve procedures for start up at both plants. Start up procedures are energy intensive since they use large amounts of steam to heat stainless steel equipment. The EMT decided to quantify how much steam was being used for start up and whether adjustments would lead to energy savings.

They organised monitoring equipment to be installed at one plant and with support from the DPEC, examined data collected over eight consecutive days during which time the plant was producing whey protein concentrate. The team observed the following from this exercise.

Evaporator

Too much time was being spent on heat mode and stabilise mode during start up of the evaporator from cold. In both cases, plant temperatures had stabilised well before the next mode began. This occurred consistently over the eight-day period.

Dryer

Too much time was spent on the stabilise mode during start up of the dryer from cold. Plant temperatures had stabilised well before the next mode began. This occurred consistently over the eight-day period.

Based on data collected, the EMT discovered that reducing the time required to start up both the evaporator and dryer would reduce the amount of steam used in the plant. It would also decrease the amount of gas required, reduce energy costs and reduce greenhouse gas emissions.

Now that the EMT has the hardware in place and a method for identifying potential savings, they can assess the efficiency of different start-up procedures. Prior to implementing any changes, however, the EMT would routinely carry out a risk assessment, incorporating information from equipment manufacturers.

Initial estimates from the data collected during this project demonstrate potential savings of up to $23 000 annually and a reduction of 195 tonnes of greenhouse gas emissions. Since the plant was producing whey protein concentrate during the monitoring, however, the EMT intends to gather more data on whole and skim milk powder production runs to estimate the frequency of cold start ups more accurately.

Project 3: Improving condensate return, fixing steam leaks and improving lagging

Steam is piped to various locations throughout the Rochester site for many heating purposes. Some heat from steam, once transferred to product or equipment, condenses to hot water. This 'condensate' contains usable energy. The value of condensate is often underestimated in a manufacturing environment and this becomes significant when condensate is not returned to the boiler or another plant for re-use.

While some condensate is re-used on site at Murray Goulburn Rochester, most is not. The EMT logged the temperature entering the feed tank for the John Thompson boilers. This tank contains a mixture of town water and returned condensate and is used to feed the boilers. It was found that the temperature of the water in the tank was an average of 45°c.

Data on how feed water temperature affects boiler efficiency was sourced from the boiler manufacturer. This revealed that if the temperature could be raised by just 20°c (to 65°c), this would increase the steam raising efficiency in the boiler by 3.3% and reduce the amount of gas required to produce the same amount of steam by 3.3%.

The EMT also conducted a site wide study into the steam and condensate distribution system, physically inspecting all piping. Results showed that while most steam piping was lagged, little condensate piping was.

The potential savings from this project overall are around $200 000 per year once the identified changes are made. This will result in a potential reduction in greenhouse gas emissions of 1 700 tonnes.

Work by the EMT in raising awareness of the implications of steam leaks has also led to improvements that will contribute to direct energy savings as well as less stress on plant and equipment.

Nick Kaminski, Maintenance Fitter and member of the EMT, explains: 'Awareness and confidence that things will be fixed has really led to improvement of the steam system overall and will save us money in ways that will make our job a lot easier. Staff report more steam leaks now because they realise that the worse it gets the more it costs and the greater the disruption in the long run. In the past we would have valves worth over $5 000 ruined because leaks weren't reported.'

Project 4: Producing a steam safety and efficiency video

A steam safety and efficiency video—a key element in the Rochester energy awareness program—was produced by a subgroup of the EMT. The project drew on a wide range of skills from developing the concept, writing the script, getting input from key staff, reviewing the script, and working with the school to complete filming, editing and voiceovers.

The team will initially use the video to provide support in ongoing efforts to raise steam safety and efficiency awareness across the Rochester site. In pairs, team members also plan to show the video to work teams and be available to take questions and suggestions.

The EMT is also exploring other options for using the video, including in the site's staff induction process.

FROM THE ROCHESTER SITE TO THE REST OF MURRAY GOULBURN

Twelve months after the EMT delivered their final business plan, interviews were held by the external consultant involved in the project from the beginning to 'reality check' success. This overall assessment examined the benefits of the approach adopted, the lessons learned and ways to improve the processes used for the project.

This overall assessment is important in informing next steps within Murray Goulburn, as they consider rolling out the project to other sites. The EMT also hope it will inform how this type of energy efficiency pilot can be used across the entire dairy industry.

All of the original EMT members are still closely involved in building on the projects implemented during the pilot and identifying and implementing new initiatives relating to energy efficiency. They will present their experiences to other Murray Goulburn sites, encouraging them to take up energy management and benefit from reducing both overhead costs and greenhouse gas emissions.

The interviews held with team members and Murray Goulburn managers highlighted the concrete benefits of the program and the lessons learned, both of which are summarised in this case study.

BENEFITS

1. Energy and greenhouse gas reductions through more efficient operations
Although implementation of the projects is ongoing, the team has achieved measurable cost savings and reductions in greenhouse gas pollution associated with energy use at Rochester.

2. Improving staff understanding of site operations and involving staff directly in operational improvement
Staff reported that they learned more about how the site worked and had greater opportunity to improve operations and procedures. For many, this improved job satisfaction.

3. Building staff experience and skills
The emphasis of the Best Practice People and Processes approach on building capacity to manage energy efficiency at site level led to a new range of skills for team members. Participating in the project enabled staff to gain a better understanding of:

- energy and greenhouse issues;
- organisational priorities;
- team processes, including allocating actions and responsibilities;
- how to develop a business case and a business plan;
- safety awareness relating to the operation of the steam system; and
- the contribution and role of other staff on site.

4. Building links with the local community
Producing the steam safety and efficiency video, in collaboration with the local school, helped build links with the community and provided the EMT with an opportunity to promote the positive activities of the Rochester site.

5. Positioning Rochester to meet the new requirements of the Victorian Environment Protection Authority (EPA)
Since the pilot began, the Victorian State environment protection policy (Air Quality Management) has been reviewed and varied. The policy now requires EPA licensed premises above an energy use threshold to put in place a greenhouse gas emission reduction action plan.

LESSONS LEARNED

As with all pilots, lessons were learned at Rochester. These will be valuable to all Murray Goulburn sites and other organisations in the industry interested in adopting a team-based approach to energy management.

1. Need for a dedicated site energy representative
The Rochester EMT benefited from having a single representative coordinating the project. This worked well at the start of the project. However, the coordinator began to work on shift rather than on a day roster, which made it difficult to maintain a key point of contact for information flowing into, and out of, the team and effective overall project management.

The person selected as site energy representative does not need a technical background in energy management. Rather, their role is to keep momentum—by calling regular meetings, reviewing progress on projects with the team and site management, and ensuring team meetings are run efficiently and effectively.

2. Ensure the team achieves 'quick wins' soon after workshops

The Rochester EMT experienced a delay between the completion of the workshops and the formal start of the project (mainly due to the time required to coordinate and install monitoring equipment). This made it challenging to maintain momentum and team morale.

In the interim, however, the EMT identified a need to produce the steam safety and efficiency video. They used the delay to plan, write and produce their first video project.

3. Ensure time and resources are available to enable the team to progress

Time and resources are often scarce in many companies, including at the Rochester site. The EMT found it challenging to dedicate time to energy activities during peak production and they had to find ways around this issue. As a result, they:

- shared their energy management team responsibilities with another person. There were two boiler operators in the team, for example, and if one could not attend a meeting the other would. Then the team member who attended would brief their colleague on meeting outcomes;
- built on established communication networks by speaking to supervisors and managers about technical energy efficiency issues;
- ensured the support of site management. The team achieved this by involving site management in their stakeholder consultation session; and
- scheduled major energy efficiency activities outside peak production times.

SUMMARY

In summary, the key factors contributing to the success of the Rochester pilot include:

- the commitment and contribution of EMT members;
- the involvement of site employees in planning the pilot;
- management support for team decisions and projects;
- a wide cross-section of skills and experience in the EMT; and
- the structure of the BPPP workshops.

EEBP has developed an information kit which describes the Best Practice People and Processes approach and how it can be applied at other dairy processing sites and manufacturing industries.

EEBP supports industry sectors to identify and implement cost-effective solutions for a more sustainable and competitive future. The program has a combined focus on innovation and training and also offers practical tools, information and assistance. EEBP is working with a growing list of sectors, which includes alumina production, beverage and containers manufacturing, bread baking, dairy processing, wine making, supermarkets, and pulp and paper. Information programs also cover vehicle fleet management, electric motor systems, energy performance contracting, and hotel management.

Through its work with industry, EEBP is learning valuable lessons that are contributing to policy development related to innovation and sustainable development.

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