BEEFING UP THE SAVINGS THROUGH REDUCED HOT WATER USAGE

A clever engineering solution has already paid dividends for a meat processing plant in Auckland – and looks set to deliver approximately $4.5 million in energy savings on hot water in the next 10 years.

The project was undertaken at Auckland Meat Processor's (AMP) Otahuhu factory, where it has reduced hot water consumption by up to 36%. As an energy-saving innovation, the project received a grant under Energy Efficiency and Conservation Authority's (EECA) Energy Intensive Business (EIB) grants programme.

The new automated cleaning method was the brainchild of John Farmer, who is AMP's engineering manager. He designed a new way to clean some of the plant's moving processing tables – an idea that will result in predicted savings of $206,405 in the first financial year.

"When I joined AMP two years ago, it was obvious to me that there were opportunities to reduce our hot water consumption," explains John Farmer.

"Energy costs for hot water generation are continuing to rise, and the costs and environmental impact of disposing of waste water are also becoming more significant."

John put forward a wash water management proposal, outlining the methodology and predicted savings. John says receiving the grant gave the project extra impetus along the way.

"Having the EECA support not only helped financially – it also gave the project credibility and a higher profile within the company."

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About Auckland Meat Processors

The Auckland Meat Processors Otahuhu site has operated for 100 years, and was originally known as the Auckland City Municipal Abattoir.

Today, five species are slaughtered under export license – including beef, sheep, goat, pig and deer. Auckland Meat Processors is unusual in the industry in that it operates 52 weeks of the year, and is not seasonal like other plants.

As John explains, this was another reason why improved hot water management would be so beneficial at AMP. "Because our plant operates 52 weeks a year, energy management provides a benefit we can bank all year round."

The business case

Like most meat processing plants, animals at AMP are processed on slaughter chains – which can be described as the reverse of a car assembly line.

Hot water is a key component of hygienic animal slaughter, and two networks of hot water are used on site at AMP. Water is preheated with waste heat from the rendering process, then blended to the appropriate temperature using coal-fired boilers and hot/cold water blending. Two networks of hot water are used on site – 43 degrees Celsius for hand/apron washing, and 88 degrees Celsius for knife/tool sterilising.

As part of its chain, AMP operates three continuously moving viscera (internal organs of animals) tables – for beef, mutton and pig slaughter.

These tables are made of stainless steel, and are designed to separate the viscera of each carcass for inspection, trimming and selection of various offal products. Each section on the viscera table must be cleaned before the pan is used again.

As John explains, maintaining high standards for the cleaning process is critical for business revenue.

"For offal products to be saved as edible production, it's important that we properly clean the surfaces of the viscera tables," he says.

"Most of our offal is exported, and can't be comprised by the risks of inadequate cleaning."

Prior to the introduction of the new technology, the wash process was applied to the moving conveyors in a non-stop sequence of: two cold potable sprays (at feed and discharge), one 88 degrees Celsius sterilisation spray, and one cold spray to cool pans.

John's idea was to replace the continuous wash system with an 'on demand' wash cycle – and thus reduce both the 88 degrees Celsius water and some of the potable water used in the process.

The new on-demand technology

Having previously designed two stop-start chain beef plants, John knew water savings could be made by only using water when required – and turning it off when it wasn't. These pans move very quickly during cleaning, then park in a fixed position.

So John's challenge was to somehow simulate the stop-start operation in AMP's continuous chain.

"We knew that stop-start designs adequately clean pans with a pan speed of 0.12m/sec. Our system moved continuously at a speed of 0.04m/sec...which is 25% of the speed of a stop-start system."

The first step was to install an 'on-demand' controls across the three beef, mutton and pig production floors. The conveyer has a proximity sensor that ensures the table is automatically cleaned and sterilised before the next carcass arrives.

Under the new control system, the 82 degrees Celsius hot water is only applied to contaminated pans, and not unused or clean pans. When processing stops – during lunch breaks, smokos, or any other reason – cleaning also stops. The cold potable water is also applied as necessary, rather than continuously.

When it came to the beef table, where the carcasses move more slowly, there were even more efficiencies to be made. By designing a reciprocating sparge pipe system that moves hot and cold sprays back and forth, cleaning time was reduced by 50%.

As there was no existing technology to base it on, the sparge pipe design process was one of trial and error. It took 12 months from designing the initial concept to commissioning the new system.

"We redesigned it three times before we got it right," says John.

"Like most prototypes, it took longer and cost more than what we originally expected but the results were well worth it."

Where do the savings come from?

A monitoring report completed in March 2008 showed there were significant reductions made in hot water consumption and energy costs.

During the two study periods (March 2007 and February 2008), overall production increased at the plant – with seasonal variations compounded by a rise in throughput.

Despite this increase in production, specific thermal water usage decreased by more than 30%.

This translates to savings of 89 litres per carcass of hand wash water, and 71 litres per carcass of sterilising water.

Compared with the original system, the project will improve energy consumption and cost by 1,524 tonne of coal – or $206,405 – in the 2007/2008 financial year.

The return on investment (ROI) is particularly impressive. At a capital cost of $158,525, the new system has paid for itself in less than a year. Over a 10-year life cycle, it will return in excess of $4.5m in savings.

According to John, an added bonus has been the reduced costs of disposing of the waste water.

"When you're talking about energy savings in hot water, you can't just consider buying and heating – there's also the disposing of it as well."

John Farmer believes this is the first time the reciprocating sparge pipe technology has been used in this application, although he says "there's no reason why other meat processing plants couldn't do it."

"I think this project demonstrates that if you are serious about reducing your energy costs, you can find a way to do it differently."

PROJECT SAVINGS: ACTUAL & PREDICTED

Summary	
Hand Wash Savings/Carcass	89 L
Sterilising Water Savings/Carcass	71 L
Total Thermal Water	
Savings/Carcass	160 L
Coal Savings/Carcass	1.10 kg/ccs
Energy Savings/Carcass	22,975 kJ
Coal Cost Savings/Carcass	$0.15
Future Savings	
Budget Carcasses 2007-2008	1,384,894 ccs
Budget Savings Tonnes Coal	1524 T
Budget Savings Coal Energy	31,818 GJ
Budget Savings Coal Cost	$206,405.86

AUCKLAND MEAT PROCESSORS

Energy Intensive Businesses – Project Grants

EECA has grants available of up to 40% of the capital cost of a project, with a maximum of $100,000 for each grant. Projects that implement new or under utilised technologies to New Zealand are encouraged to apply.

The implemented technologies should:

- be capable of reducing the energy intensity of an organisation's operation
- have the potential to be applied to a majority of businesses across their industry sector
- be commercially available and offer an acceptable payback period.

Businesses who receive a grant must be willing for their project to be used as a case study, so others can learn from their experiences. Other businesses can look to you as an example of good energy management making you a leader in your field.

Contact: Phone: 0800 358 676
email: eib@eeca.govt.nz

Other energy grants

Emprove

EECA offers the following services and funding for businesses energy efficiency projects:

Energy Achiever

- Hour-long session with EECA Emprove Account Manager to scope current energy usage
- Free for businesses spending more than $500,000 a year on energy.

Energy Audit

- Comprehensive energy audit carried out by an independent consultant
- Funding available through Emprove programme towards the cost of an energy audit for businesses with energy bills of more than $100,000 a year.

Contact: Phone: 0800 358 676
email: emprove@eeca.govt.nz

Supporting the use of wood residue

The Wood Energy Grant Scheme offers help, by way of funding and information, to businesses interested in using wood residue as an energy source.

EECA can provide:

1. Funding for demonstration projects
2. Funding for feasibility studies that review the use of wood residue as a fuel
3. Relevant information to sawmills, forestry owners and the general public on the use of wood residues via the Bioenergy Knowledge Centre (www.bioenergy-gateway.org.nz).

Funding available for business grants

Business grants for capital/demonstration projects may be up to 40% of the capital cost of the project, with a minimum of $10,000 and maximum of $200,000.

Funding is available for projects involving technologies that:

- Have the potential for widespread industry adoption
- Have an acceptable payback period or ROI.

Applicants must be willing to have their project monitored by a third party and allow the results to be published to help promote energy efficiency.

Funding available for feasibility studies

Grants for feasibility studies are available up to a maximum of 75% of the feasibility study costs and the applicant must be willing to have the results of the studies publicised as a case study.

Funding is available for feasibility studies involving technologies that:

- Have the potential for widespread industry adoption
- Are capable of saving energy or have potential for increased use of renewable energy.

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