



Australian Government
Department of Resources,
Energy and Tourism



Dairy
Australia
Your Levy at Work



Saving energy on dairy farms



Table of contents

Foreword	iii
Introduction to energy use	iv
Dairy shed energy saving checklist	vi
Electricity at the dairy	1
Water heating	4
Milk cooling systems	9
Milk harvesting	13
Renewable energy generation on dairy farms	16
Need more information?	17

ISBN 978-0-9871000-5-4

Published by Dairy Australia Limited.

Whilst all reasonable efforts have been taken to ensure the accuracy of the 'Saving Energy on Dairy Farms' booklet, use of the information contained herein is at one's own risk. To the fullest extent permitted by Australian law, Dairy Australia disclaims all liability for any losses, costs, damages and the like sustained or incurred as a result of the use of or reliance upon the information contained herein, including, without limitation, liability stemming from reliance upon any part which may contain inadvertent errors, whether typographical or otherwise, or omissions of any kind.

© Dairy Australia Limited 2013. All rights reserved.

This activity received funding from the Department of Resources, Energy and Tourism as part of the Energy Efficiency Information Grants Program. The views expressed herein are not necessarily the views of the Commonwealth of Australia, and the Commonwealth does not accept responsibility for any information or advice contained herein.

Foreword

Electricity accounts for a significant proportion of a dairy farm's shed cost. Dairy farmers are under pressure from the rising cost of electricity and an increased focus on carbon emissions. Real opportunities exist for dairy farmers to better control their energy costs while simultaneously reducing greenhouse gas emissions.

Electricity usage from energy assessments of dairy farms

Dairy Australia has recently acquired \$1 million in Australian Government funding to deliver the project 'Smarter energy use on Australian dairy farms', aimed at helping dairy farmers use energy more efficiently. This project will give 900 Australian dairy farmers access to personalised on-farm energy assessments, workshops and information resources.

Many of the farmers across Australia who have had energy efficiency assessments at the dairy are already reaping the benefits of having identified areas for improvement, and are investing in changes. The assessments have found that while no two dairies are the same, milk cooling, milk harvesting and hot water

production are the areas of highest energy use. The assessments have also revealed that similar herd sizes have significant variation in energy costs at the dairy. Focusing on ways to reduce energy consumption for milk cooling, milk harvesting and hot water production provides the greatest gain for improving energy efficiency.

For more information dairy farmers are urged to contact their local Regional Development Program. A contact list can be found on page 17.

In producing this publication, Dairy Australia aims to present tips, technologies and ideas for reducing energy use in the dairy. The publication also provides examples of farmers who have implemented some energy saving ideas to reduce dairy running costs. It begins with a checklist that brings together some simple things you can do to check your dairy is using energy efficiently. This publication focuses on improvements that are relatively low cost, have short payback periods and can be implemented in most dairies across Australia.



Introduction to energy use

Saving energy is a team effort

There are three parts to energy efficiency at the dairy:

1. Energy-efficient equipment.
2. Cost-effective tariffs.
3. Correct operation and maintenance of equipment.

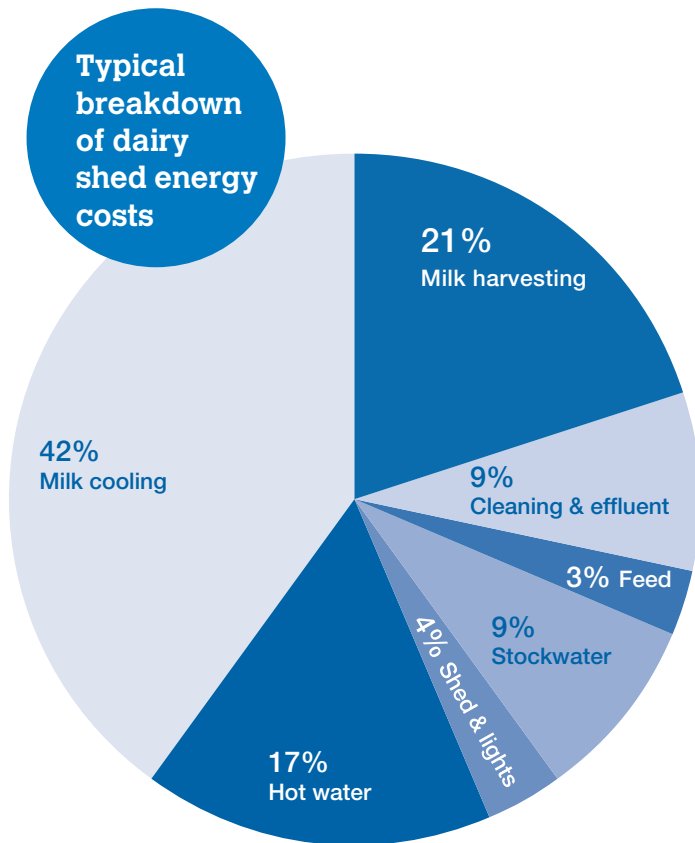
Getting everyone in the dairy to think about energy efficiency is important. Have you discussed energy efficiency with your staff? They may have good ideas on how to reduce your energy bills.

It is important to make sure staff have been instructed properly on the operation and maintenance of electrical equipment including guidelines on timing and volumes for your dairy.

Some aspects to cover include:

- **Hot water:** checking/replacing anodes, Clean In Place (CIP) processes, noticing changes (for example a boiling hot water system), noting temperatures on gauges and excessive use of hot water.
- **Milk cooling:** noticing if the compressors run for longer than normal, monitoring milk temperature going into the vat, flushing out/cleaning the plate cooler properly, periodically checking water flow rates.
- **Milk harvesting:** knowing the expected milking time for your dairy; longer milking times equal equipment running for longer.
- **Cleaning:** appropriate volume of water used for washdown.
- **Lights:** switched off when not required.
- **Tariffs:** Off-peak electricity utilised when practical.





Graph courtesy of NBA Consulting

Dairy equipment categories

Energy assessment referred to in this manual typically covers the energy use of:

- **hot water:** includes water used for cleaning milking plant and vats
- **milk cooling:** vat compressors, ice banks, glycol chillers, plate cooler equipment and cooling towers
- **milk harvesting:** vacuum pumps, milk pumps and rotary platform drives
- **cleaning/effluent:** wash pumps, effluent pumps and dairy water pumps
- **feed:** mills, mixers, transfer augers, delivery augers and feed pumps
- **stockwater:** pumps on waterways, dams, bores and tanks to fill troughs
- **shed and miscellaneous:** electric fences, air compressors, computers, fridges and fans
- **lights:** lights and floodlights.

The breakdown of power consumption on each dairy by all of the different categories expressed as a percentage of the total energy consumed can help to identify potential areas to save energy.



Dairy shed energy saving checklist

	Yes	No*
Tariffs		
Are you making the most of off-peak tariffs or controlled load tariffs?	<input type="checkbox"/>	<input type="checkbox"/>
Have you compared your current tariffs with others on offer?	<input type="checkbox"/>	<input type="checkbox"/>
Have you checked for better offers from electricity retailers?	<input type="checkbox"/>	<input type="checkbox"/>
Hot water systems		
Have you reviewed your hot water use volume and temperatures with your chemical supplier?	<input type="checkbox"/>	<input type="checkbox"/>
Have you checked actual hot water temperatures delivered, compared to thermostat reading?	<input type="checkbox"/>	<input type="checkbox"/>
Do you check the sacrificial anodes regularly?	<input type="checkbox"/>	<input type="checkbox"/>
Do you flush the unit regularly?	<input type="checkbox"/>	<input type="checkbox"/>
Do you have sufficient hot water storage capacity to use the lowest off-peak tariffs?	<input type="checkbox"/>	<input type="checkbox"/>
Are your timers or off-peak clocks set correctly?	<input type="checkbox"/>	<input type="checkbox"/>
Are metal pipe connections well insulated?	<input type="checkbox"/>	<input type="checkbox"/>
Have you checked your hot water is NOT boiling at night?	<input type="checkbox"/>	<input type="checkbox"/>
Does the Clean in Place (CIP) storage fill quickly and is it used immediately?	<input type="checkbox"/>	<input type="checkbox"/>
Milk cooling		
Precooling		
Are you using the coldest water available?	<input type="checkbox"/>	<input type="checkbox"/>
Do you know the milk temperature entering the vat?	<input type="checkbox"/>	<input type="checkbox"/>
Is it less than 2–3 °C warmer than the water temperature entering the plate cooler?	<input type="checkbox"/>	<input type="checkbox"/>
<i>If not:</i>		
Has the plate cooler been correctly sized for the job?	<input type="checkbox"/>	<input type="checkbox"/>
Do the milk and water flow in opposite directions through the plate cooler?	<input type="checkbox"/>	<input type="checkbox"/>
Do you have an even flow of milk through the plate cooler?	<input type="checkbox"/>	<input type="checkbox"/>
Does the water flow rate exceed the maximum milk flow rate by a ratio of at least 3:1 for 'm' type plate exchangers (2:1 for industrial types)?	<input type="checkbox"/>	<input type="checkbox"/>
Refrigeration plant		
Is the refrigeration unit protected from rain and direct sunlight?	<input type="checkbox"/>	<input type="checkbox"/>
Has your refrigeration technician checked for leaking refrigerant?	<input type="checkbox"/>	<input type="checkbox"/>
Does a qualified refrigeration mechanic undertake annual maintenance?	<input type="checkbox"/>	<input type="checkbox"/>
Condenser units		
Are they located to take advantage of prevailing winds and to allow unrestricted airflow?	<input type="checkbox"/>	<input type="checkbox"/>
Are the fins clean and undamaged?	<input type="checkbox"/>	<input type="checkbox"/>
Have you checked that oil from the vacuum pump has not blown/is not blowing on the condenser fins?	<input type="checkbox"/>	<input type="checkbox"/>
Dairy equipment		
Are annual tests carried out by a technician to check vacuum regulation, airflow, leaks, drive belts etc.?	<input type="checkbox"/>	<input type="checkbox"/>
Has your milk plant technician checked you do not have excess reserve in your plant?	<input type="checkbox"/>	<input type="checkbox"/>
Do you milk for less than five hours/day?	<input type="checkbox"/>	<input type="checkbox"/>
Is the vacuum pump motor clean and well ventilated?	<input type="checkbox"/>	<input type="checkbox"/>
Water pumping		
Can water pumping be done in off-peak times?	<input type="checkbox"/>	<input type="checkbox"/>
Can the existing pump(s) be changed to a more efficient type?	<input type="checkbox"/>	<input type="checkbox"/>
Do you regularly check for leaks in the system?	<input type="checkbox"/>	<input type="checkbox"/>
Dairy shed		
Are you using energy-efficient lights?	<input type="checkbox"/>	<input type="checkbox"/>
Do you clean your light globes and fittings annually?	<input type="checkbox"/>	<input type="checkbox"/>
Are lights switched off after milking?	<input type="checkbox"/>	<input type="checkbox"/>
Have you investigated sky lights as an option?	<input type="checkbox"/>	<input type="checkbox"/>
Is your dairy shed well ventilated?	<input type="checkbox"/>	<input type="checkbox"/>
Are the walls and structures positioned to maximise airflow and reduce the need for fans?	<input type="checkbox"/>	<input type="checkbox"/>

* If you have ticked 'no' for any question you may like to investigate the energy use of your dairy by reading this booklet, having an energy assessment or referring to the additional resources on page 17.

Electricity at the dairy

What can I do?

- Check your tariffs and service charges.
- Check your supplier is offering the best deal.
- Check offers, rates and service charges from other suppliers.

Review the energy efficiency of equipment in the dairy by:

- getting an energy assessment on your dairy to establish the breakdown of costs and the range of options to reduce your usage
- reviewing the times you use electricity in the dairy and considering how much 'off-peak' power you use
- measuring and reviewing water and milk temperatures in the dairy
- carrying out the low-cost actions to reduce your bills
- considering installing energy-efficient equipment
- researching available rebates and government funding.

Dairy energy assessment

The first step to reducing the amount of power you use in the shed is understanding how much you use and what equipment uses the most. There are several online tools that can help you calculate your dairy energy usage and identify the areas where efficiency gains and savings can be made. An example is the CowTime dairy energy monitor, you can access it on the following link;

www.cowtime.com.au/EnergyMonitor/index.aspx

What wattage?

You can check the wattage on motors and multiply the kilowatts (kW) by the run time to calculate the kilowatt hours (kWh) of energy usage.

Tariffs and energy supplies

There are a number of types of tariff available:

- **General tariff:** all electricity use is charged at the same rate. This tariff can be the best option where milking in the morning continues into the peak tariff period and if used in conjunction with a "controlled load" (see page 2).
- **Time of use tariff (TOU):** provide a range of charges depending on the actual time power is being consumed. Polyphase meters with TOU capability record both the time and kilowatt hours during each of these periods: peak, shoulder and off-peak on a daily basis. Normally, these tariffs attract higher service fees, so it is worth checking the savings achievable.

At a glance

Savings can be made on power bills by taking advantage of as much "off-peak" and/or "controlled load" power as possible where available. This is ideal for water heaters, ice banks, chillers and stock water pumping.

TOU tariffs have higher service fees than general tariffs and controlled load tariffs, but can offer substantial savings for dairy farms where milking is completed before the peak tariff comes on in the morning or equipment is installed with timers to take advantage of the lower off-peak tariff times.

Case study 1

The EWEN Project: Tariff change Leo and Luke Cleary, Wauchope, NSW



Photo courtesy of DAGs

Leo and Luke Cleary operate a 120-hectare farm near Wauchope, NSW. In 2009 they built a new 24-aside swing-over rapid exit dairy to reduce milking times.

Morning milking starts at 5.45 am with cups off by 8.45 am. The afternoon milking is another three hours from 3.00 pm to 6.00 pm. Plant washing takes nine minutes after each milking.

The hot water heaters were wired to a separate meter operating on Controlled Load 2 tariff (overnight plus limited use during the day). All other energy used at the dairy was billed at the normal business tariff.

An energy assessment of the dairy showed that nearly 50 per cent of the total power was being used at the dairy during off-peak times. Even with the extra service charge, considerable savings could be made by changing to TOU tariffs.

Polyphase meters were already installed, suitable for TOU tariffs; all it took was a phone call to their energy provider to request the tariff change. There was no charge to make the change.

By switching to the TOU tariff from the normal business tariff has saved \$5187/year.

Electricity at the dairy (cont.)

Electricity tariffs

Energy providers have a range of tariffs for different customers and for electricity supplied at different times of the day. Cheaper rates at lower or off-peak times encourage consumers to run water heaters and other appliances or motors during off-peak periods and help the energy provider spread the load.

It is worth checking that the tariff you are on is the most suitable for your use pattern. Some farmers have found that their tariff has increased in cost compared to other tariffs available from the same supplier.

Any power used during off-peak times, usually between 10.00 pm and 7.00 am weekdays and all weekends, will be billed at off-peak rates. Savings will depend on timing of the morning milking and any other tasks that use power performed during the off-peak period.

If approximately 40–50 per cent of the activities at the dairy are done during off-peak times, TOU metering can result in significant savings.

Potential savings can be calculated by:

1. Reading the existing ordinary meters at specific times during the day.
2. If polyphase meters are in place, an analysis of power bills will determine whether a change to TOU tariff can save money.

Controlled loads

Controlled load tariffs are available for specific equipment such as water heaters, stockwater pumps, ice banks and chiller units. There are various names for these tariffs, but essentially there are two types:

- **Overnight:** this is normally the cheapest tariff, with power available to the equipment wired to the meter ONLY during the night, normally 10.00 pm–7.00 am. This tariff is typically used for water heaters where there is sufficient hot water storage available for the day's requirements.
- **Overnight and limited availability during the day:** this is normally more expensive than the overnight tariff, but less than the general tariff. Power is available to the equipment wired to the meter during the night and limited periods during the day. This is typically used for pumps and ice banks, chillers or hot water systems with insufficient storage for the whole day.

Not all distribution areas have 'controlled loads' available.

Changing electricity tariffs

TOU tariffs require polyphase meters. Normally these meters are provided free by the energy supplier, but the cost of installation is borne by the customer. A Class 2 electrician is required to change meters.



Above is an electricity metre.

Negotiating a price and supplier

What can I do?

- Get quotes from a number of suppliers; they will need your NMI number (you can find it on your bill).
- From your bills calculate your peak, shoulder and off-peak use and controlled load use.
- Take meter readings of the times you actually run the equipment at the dairy, if peak and off-peak are not displayed on your bills.
- Look at changing to TOU, controlled load tariffs.
- Take into account the extra service fees charged for some tariffs.
- Bear in mind the cost of breaking contracts.
- Read all the fine print and conditions.

It is definitely worth contacting your energy supplier to negotiate a better deal for your electricity. In addition, contact other suppliers to find out their best rates, even if it only gives you a better price to negotiate with your current supplier.

'Obsolete' tariffs are no longer available for new connections, but sometimes have better conditions or rates than current tariffs.

It is also worth checking that your obsolete tariff is

not more expensive now than alternatives. Many tariff charges have changed in recent times, in particular service fees.

There are a number of online brokers who can give you a good list of suppliers to contact. Bear in mind each site may not access all suppliers available, so review a few brokers:

- electricitywizard.com.au
- energy.iselect.com.au
- goswitch.com.au
- easyswitch.com.au
- energyaction.com.au

If you consume more than 160 MWhr/year on one meter, you are 'contestible' and may be required to move to a larger business plan or non-standard contract. These contracts contain different terms and conditions to a 'standard' contract and may include variations in price, fees, charges, contract length, payment options and early termination and exit fees.

- These contracts also charge you for 'losses' of kVa in your system.
- The cost of kVa can be 30–50per cent of your bill and is dependent on your 'power factor'.
- Power factor is often shown on your bill: 0.95 is

achievable; if yours is 0.70 there is potentially a 25 per cent saving in your kVa costs by installing power factor correction equipment.

Paying you for power

Currently only available in WA for dairies

As demand for electricity continues to rise, utilities and grid operators continue to look for ways to increase the electric grid's capacity. Where once the only option was to fire up costly backup plants, power providers can now look to energy users to relieve the grid of excess demand at critical times.

See www.enernoc.com for more information.

To be financially viable, farms would generally require a generator on farm already.

Case study 2

Energy – watts it worth?

Jack Laidlaw and Tim Clarke, West Gippsland, VIC



Jack Laidlaw and Tim Clarke have cut the cost of plant cleaning consumables by 60 per cent at DPI's Ellinbank dairy.

Jack Laidlaw knows a bit about saving energy in the dairy. He's Farm Manager at DPI Ellinbank, where they've cut plant cleaning consumable costs (power and chemical) by a whopping 60per cent, saving more than \$4500 a year.

"Our researchers estimated we could save up to 75 per cent of our energy use. It sounded good but my first priority was to ensure milk quality was protected," said Jack.

The savings came from two simple changes: altering the cleaning system and maintenance.

Most of the energy saved was achieved by altering the cleaning system to reduce the amount of hot water used. Some of the hot waste wash phases were replaced with 'cold chemical' phases, using chemicals specially designed and registered for this purpose.

The hot water services were reviewed to make sure they were sized appropriately and functioning correctly.

Water heating

What can I do?

- Minimise the volume of water used to wash the plant and vat.
- Wash at the lowest temperature possible without compromising hygiene.
- Use a thermometer to monitor hot water inputs and outputs.
- Install a water heater with capacity for all daily wash requirements so that all heating can occur on the off-peak tariff.
- If a TOU tariff is in place, install a timer to ensure water is only heated during the overnight off-peak period.
- Install a hot water preheating device such as a heat recovery unit or solar hot water heater so that most of the heating can occur without using extra electricity.
- Insulate pipes to reduce heat loss.
- Keep storage tanks out of breezeways and drafts.
- Use the best quality water available—high levels of minerals or organic matter reduces heating performance.

Washing regimes: is there a better way?

What can I do?

- Check the temperature of the wash water in the drum as the wash cycle commences (it should not exceed 85 °C).
- During recirculation the drum should be around 20 per cent full as the wash water returns. If it is more than smaller wash quantities should be considered.
- Investigate detergents that work effectively at lower temperatures.
- Use a chemical sanitiser in the final wash cycle to reduce hot water demand.
- Capture the final rinse for use next time.

Low temperature wash with recycled chemicals

Automated energy-efficient systems have been developed specifically for dairy farmers that utilise low temperatures and reuse the cleaning solutions.

They comprise of an automated cleaning unit that is capable of capturing, storing and re-using the wash solutions. They use chemicals that are specifically designed for reuse and to work at lower temperatures (less than 50 °C). Heating of the wash solutions utilises energy from renewable sources such as solar and heat recovery. The storage tanks are well insulated to minimise heat loss. This same wash program can be used at every washing and the control unit monitors the concentration of the cleaning solution and doses as required.

The key to success with these systems is the automatic controls. You need to check the feasibility and cost-effectiveness of your dairy, as capital outlay for a complete system ranges from \$25,000–\$40,000 depending on dairy size and the existing system.

Solar hot water systems

In many cases preheating hot water for the dairy using a solar hot water system is a great option financially and environmentally. Preheating water to 60–65 °C using solar and then boosting it to the required temperature with the dairy heater can save more than 40 per cent of electricity costs of heating water.

There are two types of solar hot water systems: flat plate collectors and evacuated tube solar collectors.

Flat plate solar collectors have copper pipes running through a glass covered collector, often connected to a water storage tank on the roof. The water thermo-siphons in and out of the tank, heating the water.

Evacuated tubes use a glass tube with a vacuum inside and copper pipes running through the centre. The copper pipes are attached to a common manifold connected to a slow flow circulation pump. This pumps water to a storage tank below, heating the hot water during the day. The hot water can be used at night or the next day due to the insulation of the tank. For more information and references visit;

www.dpi.vic.gov.au/agriculture/dairy/energy-in-dairy.

Note: Beware of too much boosting.

This table is a comparison of flat plate and evacuated tube hot water solar systems.

Flat Plate	Evacuated Tube
– May be less expensive.	– Can be more expensive.
– Operates most efficiently in the middle of the day.	– Can heat water to a higher temperature as they have a greater surface area exposed to the sun at any one time (approximately 40 per cent more efficient).
– More sensitive to frost causing damage to the collectors.	– Can be used in sub-zero and overcast conditions (can extract heat out of the air on a humid day).
	– Risk of overheating. As the water reaches its maximum temperature in the tank the pressure and temperature valve automatically activate and release some hot water to allow for cold water to come back in, reducing the temperature build-up. To minimise the risk, the number of tubes must match the quantity of water to be heated.
– Heavier.	– Lighter—some lightweight designs can be mounted on walls and even poles.
	– Uses smaller roof area.
	– Less corrosive than flat plate systems.
	– Are durable and broken tubes can be easily and cheaply replaced.



A flat plate collector solar hot water system.
 Photo courtesy of SCE Energy Solutions

An evacuated tube collector solar hot water system.

Factors to consider when installing solar hot water system at the dairy

- For many dairies, the solar system will not produce hot water at a high enough temperature for plant wash when required, and the preheated water will need to be boosted to the required temperature. If this boosting uses peak power, it can be a costly. The system must be carefully designed to take advantage of the solar preheating, but not increase the use of peak electricity.

- Correct installation and mounting is critical to success. The roof needs to be strong enough to hold the system. The collector should be mounted to face north or the amount of energy that can be captured is reduced. The tilt angle should be the same as the latitude of the installation site.
- The higher the quality of collectors in the system the hotter the water produced.
- If your gas/electric hot water system has plenty of life in it, consider retro-fitting the collectors, pump and controller to an existing storage tank. The retrofit option can save large amounts on installation and eliminates the need to replace an existing hot water cylinder.

Case study 3

Solar preheating

Chris McRae, Gloucester, NSW



Chris McRae milks 75 cows in an eight-aside swing-over herringbone dairy on his farm at Gloucester, near the Barrington River. It was costing Chris nearly \$1500 each year to heat water for the dairy in an old domestic hot water heater on normal business electricity rates.

Chris took part in the Efficient Water Energy and Nutrients (EWEN) program to investigate other options for water heating. He installed a solar preheating unit with two solar panels and a 300-litre tank. The tank has a booster element that also runs on normal business tariff.

The thermostat in the heater was increased from the factory setting of 70 °C to its maximum of 80 °C.

The booster, which runs on normal business tariff, is only required if the sun’s energy has not already heated the water to the set temperature.

Chris has measured his savings as 35 per cent on his water heating costs. Most benefit from the solar system is achieved for the afternoon wash, as the water has been heating during the day

The total cost of the solar preheating system was \$3300. With a 50 per cent rebate from the NSW Department of Environment, Climate Change and Water and annual power savings of more than \$500, the unit will pay for itself in just over three years.

Thermal heat recovery systems

A large amount of waste heat generated during milking can be harvested and used. Sources include plate coolers, refrigeration systems and some vacuum pumps.

Heat recovery systems are available that capture the heat from the milk refrigeration system and use it to heat water (to 50 °C to 60 °C).

- The system sits between the compressor on the milk vat and the air cooler condenser to extract the heat during milk cooling.
- The hot refrigerant gases from the compressor are transported to the heat recovery system where the heat is released into the cycling water in the system.
- Most of the commercial units available have 450-litre capacity. This water can be fed into the hot water system.
- Using water to remove heat from the refrigeration system is more efficient than using air so improves the efficiency and life of the compressor.

Cost

A recent project from DPI Victoria developed a case study dairy farm in south Gippsland to demonstrate the cost and savings of a heat recovery system to heat 700 litres of water to 65 °C.

- The preheated water entered the electric hot water service to heat to 90 °C overnight.
- The energy saved under the system was 41kWh which equated to \$2905 saved in the first year.
- The capital investment of the system was \$7375 plus \$3000 for installation.

The savings generated by the system meant that the initial cash outlay was recouped by the fifth year, after which the system would be a cheaper alternative to electric hot water. At the end of the tenth year the system was \$16,800 better off than business-as-usual and had an internal rate of return (IRR) of 27 per cent.

www.dpi.vic.gov.au/agriculture/dairy/energy-in-dairy/thermal-heat-recovery-system-for-the-dairy-shed

Advantages	Disadvantages
– Free energy from the refrigeration system	– Capital expense (\$7000–\$11,000)
– Can reduce milk refrigeration costs if properly designed	– Poorly designed systems can result in water that is too hot and reduce the overall efficiency of the refrigeration
– Can prolong the life of the compressor	– Difficult to recover heat from the large volume of warm water generated from the plate cooler (without insulated storage)
– In some cases can heat water to greater than 75 °C	

Case study 4

Saving energy is easy

Murray, Margaret Klemm and Ben, Angonston, SA



Murray and Margaret Klemm, with son Ben, milk about 200 cows year round at their property near Angonston in South Australia's Barossa Valley.

In mid-2000 they built a new 15-a-side double-up herringbone dairy with the view to expanding the herd to 250 cows. In November 2012 they carried out an energy assessment under Dairy Australia's Smarter Energy Use on Australian Dairy Farms Project to find out how they could reduce their energy bills and work out what was worth looking at in the future.

Murray Klemm was very happy with the results of the assessment, which confirmed changes they suspected needed to be made. "There was a spike in our energy bill so we knew something was not working properly. The energy assessment helped us work out where to start and gave us a range of options to think about."

The assessment identified improvements could be made to the plate cooler and compressors. The plate cooler was given a thorough overhaul, costing approximately \$500; a faulty valve was fixed in the compressor costing \$4700, including \$2700 for gas. These changes have already had an impact on the compressor running time and savings of up to \$2600 per year are expected.

Other options identified by the energy assessment that the Klemms will consider in the future include:

- installing a heat recovery system on the vat compressor to preheat water to approx 60 °C , saving approximately \$1380 per year for a set-up cost of approximately \$7000.
- installing a variable speed drive on the milk vacuum pump, saving approximately \$950 per year for a set-up cost of approximately \$8000.
- replacing T8 fluoro lights with T5 conversion kits, saving \$250 per year for a set-up cost of \$1040.

Factors to consider when installing thermal heat recovery systems:

- Correct installation on the existing milk cooling system to achieve target water temperatures.
- The volume of the water tank and volume used during and between milkings.
- The amount of milk to be cooled will determine how much heat can be captured.
- The type of refrigerant gases and the configuration of the installation.
- Combining an evacuated tube solar hot water system with the thermal heat recovery system. This can be an option that will reduce dependency on electricity but the complexity of combining the different systems will need to be considered.



Heat pumps

A heat pump can reduce power consumption and costs by preheating large volumes of water to 60 °C. An air-conditioned (solar) heat pump works like a refrigerator in reverse. The compressor on the heat pump transfers heat from the surrounding air to water held in an insulated tank. The water from the heat pump is then transferred to the hot water heater so it can be heated to the temperature required to wash the milking machine. They are not a substitute for the hot water system.

Savings of approximately 40 per cent can be made with heat pumps. To heat 800 litres of water to 85 °C, savings ranged from \$700 for off-peak hot water systems to \$2500 when there was no off-peak hot water at the dairy (EWEN Project). Careful installation is essential to prevent short-circuiting in the water delivery pipeline, otherwise no savings will be achieved.

Heat pumps are also highly technical equipment and require fully qualified technicians to repair; when they go wrong they can be an expensive fix.

Manufacturers recommend that heat pumps are operated during the warmer part of the day, as they will work most efficiently when the ambient temperature is highest. They can operate at night, however, as they do not require direct sunlight to work. Some heat pumps have been designed to work in ambient temperatures ranging from -10 °C to + 40 °C.

Costs and savings

Before 2010, heat pumps were a very attractive option with high government rebates available. However, these rebates have been significantly reduced and costs and savings must be carefully considered before installing them.

Facts about heat pumps

- Most have a volume of 340 litres, however 400 litres and 1000 litres tanks are also available. Two or more tanks can be installed in manifold to supply large volumes of hot water.
- Tanks are made of stainless steel, copper or ceramic lined steel.
- Compressor motors are usually small drawing 0.7 kW to 4.2 kW depending on the model and size of the unit.
- Smaller units run off single phase and large models require three phase power.
- Of the energy required to heat the water, two thirds comes from the heat in the air, and the remaining one third from the power used to drive the compressor.

Case Study 5

Heaps of hot water

Bob and Jacqui Biddulph, Cowaramup, WA

Bob and Jacqui Biddulph realised that heating up to 1600 litres of water, to wash their 44-stand rotary in Cowaramup, WA, formed a big part of their electricity bill. Participating in Western Dairy's Energy Audit program in 2011 confirmed that the decision to purchase an Energy Recovery System (ERS) was the right one.

The dairy already had two 800-litre Wilson hot water storage tanks, which heated cold water during off-peak periods. This was complemented by the installation of two 550-litre DeLaval Energy recovery tanks, which heat water using the waste heat generated from the vat compressors. The ERS system cost \$12,500 (45 per cent was installation of electrics and plumbing) and at current electricity rates (not counting rising rate increases) the payback period is estimated to be three years.

Bob has been very happy with the result. "We recently measured surplus water from the heat recovery tank and it varies between 60 °C and 73 °C. This means that the electric hot water system only has to heat it another 20–30 °C before it is ready for washing out the milking machine," Bob said.

An analysis of their electricity bills estimates that the Biddulphs are using approximately 15-20 per cent fewer units of electricity than for the same period last year, despite milk production over that same period being up 20 per cent. Due to rises in electricity prices over the same period, their bills have increased 45 per cent meaning that energy saving has been crucial to managing energy costs.

Bob and Jacqui had toyed with various ideas to reduce costs associated with heating water but felt that the heat recovery units gave them the 'biggest bang for their buck'. The ERS also allows for quick access to hot water through an outlet direct from the tanks. This has proved handy for washing calf buckets and general cleaning, and means that water is not sourced directly from the hot water storage tanks.

Bob and Jacqui are now looking into variable speed drives as the next potential opportunity to save energy.

Milk cooling systems

What can I do?

- Ensure the plate cooler is the correct size for the volume, pressure and milk flow rate. This will ensure effective cooling of milk so vat compressors are not running for extended lengths of time.
- Use a plate cooler with a single pass of cool water that is not recirculated unless it is re-cooled, for example with a cooling tower.
- Consider double bank plate coolers where the coldest source of water flows through the first plate cooler. The second plate cooler can use glycol or chilled water to cool the milk even further. It is beneficial if the chiller can be run during off-peak power.
- Have your plate cooler regularly serviced by a technician.

Cooling milk from 35 °C to 4 °C accounts for the biggest proportion of total dairy energy costs (30–60 per cent). Designing and operating an efficient milk cooling system can reduce energy demand and operating costs. In many cases the cooling system needs to be evaluated to ensure it is working efficiently and not costing you money.



A plate cooler.

Plate coolers

Plate coolers are an extremely cost-effective way to cool milk, but in many cases are poorly utilised. There are several factors that impact on the effectiveness of plate coolers.

Flow rates

The system needs to be designed according to the peak flow rate of milk expected from the milk pump. Providing an even flow of milk from the milk pump by installing a variable speed drive will help make the plate cooler system easier to size and make use of the cooling water more efficient. Using a transfer (rather than pressure) pump is a preferable way to supply the cooling fluid.

Surface area

The latest plate coolers are designed to have a greater surface area to give them greater heat exchange capacity and improve their cooling efficiency. Different types of plate coolers require different flow rates for the cooling medium. The standard 'M' and 'P' series plate coolers operate on a ratio of 2.5–3 litres of water per litre of milk passing through the cooler. Newer industrial models work on 1.5–2 litres of water per litre of milk.

Plate compression

Plates that are too tight restrict flow so aim for three millimetres for each plate and gasket.

Plate cleanliness

Contaminants of either the water or milk that adhere to the plates will affect the heat exchange capacity, flow rate and efficiency of the plate cooler.

Source water

The temperature of the source water is the greatest limitation to plate coolers. In winter, when water temperatures are low, plate coolers operate very efficiently. In summer, when water temperatures increase, there can be very little margin between the water temperature and milk temperature. This means the vat will do the majority of the chilling, which uses a lot of electricity, usually at peak tariff rates.

Plumbing

To maximise heat transfer the water should flow through the plate cooler in the opposite direction to the milk.

(Information sourced from CowTime)

Is your plate cooler doing the job?

The best way to check if your plate cooler is up to the task is to compare the temperature of the milk leaving the plate cooler with the incoming temperature of the cooling water. A plate cooler working properly should cool milk to within 2–3 °C of the incoming cooling fluid. If water coming into the plate cooler is 18 °C then the temperature of the milk should be about 20–21 °C.

- Step 1** Identify water inlet and milk outlet pipes.
- Step 2** Apply strip thermometers to water inlet and milk outlet pipes and measure the temperature of the water and milk during peak milk flow as it exits the plate cooler.
- Step 3** If you get more than 3 °C difference there is room to improve the performance of your plate cooler.
- Step 4** Measure the flow rate of water leaving the plate cooler. This is done by timing how long it takes to fill a 20 litre bucket when the pump is operating at normal speed and flow rate. If the water is being recycled or recirculated into a tank put the bucket under the discharge pipe. For example, if it takes 13 seconds to fill a 20 litre bucket the flow rate is $20 \div 13 = 1.5$ L/sec).
- Step 5** Measure the time taken to fill the bucket with milk at the vat entry point while the milk pump is working at capacity (all cups on). If it takes 40 seconds to fill a 20 L bucket the flow rate is $20 \div 40 = 0.5$ L/sec. If it is not possible to measure during milking, simulate using water at a later point.
- Step 6** Divide the cooling fluid flow rate by the milk flow rate to determine the ratio. Using the numbers mentioned in steps 4 and 5 the flow rate would be $1.5 \div 0.5 = 3$. The water flow rate is three times the milk flow rate or 3:1.

(Information sourced from CowTime)

How hot is it?

There are two quick and easy ways to test the temperature of either milk or water running in and out of the plate cooler.

Thermometer test strips—temperature difference is easy to measure by applying strip thermometers to the water inlet pipe and to the milk outlet pipe. Contact your RDP or milk company for purchase.

Digital non-contact infrared thermometer gun—can measure surface temperature of hot, hazardous or hard to reach objects. Simply point the red light at the pipe/object to be measured and pull the trigger to get a quick temperature reading. They are a great tool for around the farm. You can find them at hardware or electronics shops.



In warmer climates where the available water is warm, plate coolers have limited impact. In addition, high humidity can mean cooling towers are not a viable option. Off-peak chillers may be an option, but the high costs mean you will need to carefully consider the savings achievable.

Bring in the expert

Testing the efficiency of your plate cooler is an important first step that you can do yourself. If you have determined there is a problem it may be a good idea to call on the services of a skilled technician. They will be able to clean the plates (a harder job than it looks) and ensure the plate cooler is reassembled properly. They will also be able to advise on resizing, extra pumping capacity, additional cooled water storage or a complete dismantle and service. The additional capital and cost of the servicing should be compared to the cost of an inefficient plate cooler. The cost of an inefficient plate cooler can run into the thousands of dollars a year depending on milk production and the difference in temperature of the water and milk entering and exiting the plate cooler.

Cooling towers

If you discover that the water entering your plate cooler is too warm, a cooling tower could be an option. They also allow for water from the plate cooler to be cooled so it can recirculate without jeopardising milk cooling. Cooling towers can be very effective at cooling water in areas of low humidity.

A cooling tower is a heat rejection device. A cooling tower relies on evaporation to remove heat from the water. The tower allows a small portion of the water being cooled to evaporate into a moving air stream to provide significant cooling to the rest of that water stream. The heat from the water stream transferred to the air stream raises the air temperature and its relative humidity, and this air is discharged to the atmosphere. Water can be cooled to within 5 °C of the wet-bulb temperature* in a tower that is properly designed.

- Cooling towers are a relatively cheap technology.
- They do not work well on days of high relative humidity and high wet bulb temperatures.
- They can reduce the temperature of the water entering the plate cooler, improving its efficiency and reducing the cost of milk cooling. Check the temperature of the water entering the plate cooler to see if a cooling tower could be an option.
- Bore and well water will have a relatively stable temperature all year round but the temperature may rise considerably in hot weather depending on how this water is stored.
- Positioning, burying, screening or planting shade around tanks are options to help insulate.
- Mechanical-draft cooling towers rely on power-driven fans to draw or force the air through the tower and are more effective than natural-draft cooling towers.

* Wet-bulb temperature is measured using a standard mercury-in-glass thermometer, with the thermometer bulb wrapped in muslin, which is kept wet. The evaporation of water from the thermometer has a cooling effect, so the temperature indicated by the wet-bulb thermometer is less than the temperature indicated by a dry-bulb (normal, unmodified) thermometer against the warming effects of direct sunlight.

New technology in refrigeration

Electronic control valves have been used to improve energy efficiency of refrigeration units, with claims of 15–25 per cent savings. These valves are an add-on component that can help to improve the performance of milk vat refrigeration. The valves change the liquid dynamics of the refrigerant gas, allowing more of it to come into contact with the copper and cooling plates. This reduces temperatures faster and more efficiently. It also enables temperatures to be held more consistently. It can be installed without altering any of the other system components. The starting cost is \$2400, and estimates for return on investment anywhere between nine to 36 months.

Case Study 6

Cooling tower not so cool in humid areas

Dennis Granshaw, Gympie, Qld

The Gympie couple were hosts for *Watts 'n' Your Dairy*, CowTime's 2006 Shed Shake-up event. They milk 170 cows year round in a seven-year-old, 16 unit swing-over herringbone dairy.

The Granshaws were considering a water cooling tower, but discovered it wouldn't be viable for their system. "I learnt at *Watts 'n' Your Dairy* that they are not efficient in humid climates so that saved me wasting thousands of dollars," Dennis said.

CowTime's Darold Klindworth said that milk cooling towers rely on evaporative cooling so work best in dry climates such as northern Victoria. "They are not efficient in humid climates such as Queensland," he said. "The other disadvantage of cooling towers is that they are much more effective in the cooler months and less so in the summer when the vat is working the hardest."

The effectiveness of the Granshaw's plate cooler is limited by their water supply. "It would work much better if we had cooler water entering the plate cooler," said Dennis.

The Granshaw's water currently comes from a shallow dam. One option they are looking at is to use water from a deeper dam on the property.

Ideally, the water entering the plate cooler should be as cold as possible, and certainly less than 20 °C all year round.

Another option could be to refrigerate water before it enters the plate cooler. This system is becoming popular on larger dairies. To be efficient, it must run on night electricity rates and hold enough water for both milkings.

One of the benefits of refrigerated systems is that they provide consistently cool water all year round. But the up-front investment costs need to be considered.

Case study 7

Glycol chiller for milk pre-cooling

Gavin and Alan Parbery, Candelo, NSW



Gavin and Alan Parbery's vat was playing up and they were looking to improve the energy efficiency of their dairy. After having an energy assessment, it was revealed that their two 11 kW compressor motors were running for around 12 hours per day using 96,360 kWh per year, costing them \$16,300 per year. The installation of a glycol fluid chiller was identified as a good option for milk pre-cooling, in addition to a new vat. The cooling system at the dairy is made up of a standard plate cooler which cools the milk from 34 °C to 26 °C. The glycol chiller and secondary plate cooler cool the milk to 2.5 °C prior to entry into the vat.

As a result, the vat compressor unit should run less frequently to keep the milk below 4 °C. The three 11 kW motors on the glycol chiller are expected to run for only 4.5 hrs per day, with the third motor only runs for short periods when required.

It is anticipated that a glycol chiller will cost around \$7675 per year to run, a saving of \$8706 per year. In addition, the glycol chiller is fitted with a heat recovery unit on two of the motors. Once the storage vessel is connected to the system, it will preheat the required 1200 litres of water to 60 °C before being dumped into the the hot water service each night for heating to 85 °C. Once connected, this activity will save Gavin and Alan approximately \$5000 on their hot water energy costs each year.

Milk harvesting

What can I do?

- Investigate variable speed drives for vacuum pumps (best suited to blower-type vacuum pumps) where there is sufficient excess vacuum being produced for the motor to be able to reduce power output.
- Reduce milking times where practical.
- Consider variable-speed drives for large water pumps.

In many dairies vacuum and milk pumps operate at a constant speed, which is required to create a desired vacuum or flow rate. Power savings of 40–65 per cent can be made when a variable-speed drive (VSD) is fitted to the vacuum pump (EWEN Report). Further savings can be made when VSDs are fitted to the milk pump as they can improve the efficiency of heat exchange through the plate cooler.

A VSD uses a sensor in the vacuum line to detect changes in pressure and then adjusts the speed of the pump motor to match the demand for vacuum or flow rate. This lowers energy consumption. There is less wear and tear on the motor and noise levels are lower during milking. One VSD can control up to two motors at one time and can work with both three-phase and single-phase power supplies.

VSDs can be fitted to new or existing pumps.

Vane and blower vacuum pumps are the two most commonly used vacuum pumps. Blower vacuum pumps are more efficient than vane pumps but are more expensive.

VSDs are better suited to blower vacuum pumps as they can operate at lower revolutions than vane pumps and still maintain sufficient vacuum. They are usually quieter and have a longer life.

Some vane pumps are not suited to VSDs if the revolutions can not be lowered without wearing out the pump. They will also require additional lubricating oil, which will be an added cost.

Factors to consider before installing VSD on milk and/or vacuum pumps:

- Existing pump—blower vacuum pumps are generally more efficient than a vane pump. The working condition of the pump can influence potential savings, particularly on older pumps.
- The size of the dairy relative to the number of cows being milked. The greatest gains are made on longer running times.
- The size of the pump is relative to the size of the shed. A small pump in a large shed provides opportunity to save money by upgrading the pump and installing a VSD.

VSD on vacuum pumps

Advantages	Disadvantages
– Only uses energy needed to meet the load on the milking system.	– Capital expense.
– The longer the milking time the better the savings.	– Not everyone can repair them. Requires yearly servicing.
– Reduces noise in the dairy.	– Typical payback times range from 4 to 7 years depending on how many hours per day they are used.
– Reduces wear on the motor and pump, prolonging their lives.	

VSD on milk pumps

Advantages	Disadvantages
– Can give better milk cooling due to more constant rate of milk flow.	– Capital expense
– Enables better matching of pre-cooled water to daily milk volume, which can save water.	– Typical payback times for VSDs range from 2.5 to 5 years depending on daily milk volume and the expected improvement in milk cooling efficiency.
– Reduces the need for a ‘choke’ on the milk line, which may have an impact on milk quality.	– Not everyone can repair them. Requires yearly servicing.

* information from CowTime

Milk harvesting (cont.)

A VSD needs to be correctly installed by a qualified technician. The full energy savings are often not achieved if the VSD is installed without filter protections and if it is not tested to ensure it is operating efficiently.

Different vacuum pumps with the same motor size can have different air consumption due to the layout of the system. Leakage of air in the system as a result of incorrect installation can also reduce efficiency.

Greater energy savings are possible where the pump can operate at lower RPM. A 1400 RPM motor that can be geared down to 700 RPM will benefit from adding a VSD. If the pump can only be lowered to 1100–1200 RPM there is relatively little benefit from installing a VSD. Motor speeds should not be lowered below the minimum operating requirement of the motor as the motor will wear out prematurely.

Cost

Cost will vary depending on the make, country of manufacture and whether the VSD is pre-programmed for the model and type of vacuum. The EWEN project quotes prices (ex GST) for VSD that range from \$2300 for a 4 kW motor/pump to \$10,500 for a 22 kW motor/pump.

A recent project from DPI Victoria developed a case study dairy farm in south Gippsland to estimate the cost and energy savings of installing a VSD on new and existing pumps.

The most profitable option was installing a VSD kit on an existing blower vacuum pump. New blower vacuum pumps were profitable investments but new oil vane pumps would not recoup the initial costs by the end of year 10.

	Existing Pump		New Pump	
	VSD on vane	VSD on blower	VSD on new vane	VSD on new blower
Net present value (7per cent discount, 3per cent inflation on cash flow)	\$10,336	\$18,789	-\$833	\$2102
Internal rate of return (real)	34 per cent	51 per cent	6 per cent	9 per cent
Years to breakeven (before interest and tax)	4 years	3 years	>10 years	10 years



Case study 8

VSD gets thumbs up at Bengier Michael and Sophia Giumelli, Bengier, WA

After shifting their dairy operation from the Ferguson Valley to Bengier in 2006, Michael and Sophia Giumelli, who milk 380 cows in a 20-unit double-up herringbone, began looking at ways to reduce electricity costs in the dairy. Installing a variable speed drive on the milk pump appeared to be one of the areas where big savings could be achieved.

In December 2011 a variable speed drive was fitted to the existing DeLaval LVP4500 blower-type vacuum pump at a cost of \$5000. Michael and Sophia have noticed savings in their power consumption compared to the same time last year.

“When you compare last month’s power bill with the same time last year we are using about 4000 units less of electricity. Our power bill has come down, even though the price of power has gone up, so we are pretty happy,” Michael said.

One of the significant advantages of installing the VSD has been a reduction in the noise in the dairy at milking time.

“Since we have installed the VSD it is very quiet in the dairy. The only time you hear the motor is when a set of cups is kicked off and the vacuum pump has to speed up to alter the vacuum. We can’t quantify the effect of reduced noise but we know it is definitely a big plus,” Michael said.

Michael has also envisaged that there will be less wear and tear on the pump, reducing maintenance costs in the future.

Michael and Sophia are investigating other energy savings including a heat recovery system to complement the existing electric hot water system. In the short term, Michael and Sophia have also negotiated better rates for their power by entering into a non-standard contract with Synergy.

Case Study 9

Putting it all together: planning to keep costs low Dennis Byrnes, Atherton tablelands, Qld



NBA Consulting

Dennis milks 320 cows on the Atherton Tablelands in far north Queensland. By investing in energy efficient options when he built the dairy in 2007, Dennis has been able to keep the cost of electricity to run the dairy very low, relative to other dairies of a similar size in the region. Some of the lessons learnt from Dennis include:

1. A variable speed drive on the milk pump has kept the cost of running the vacuum pump very low. For an investment of approximately \$10,000 (in current value), the variable speed drive has saved approximately \$1500 per year. This is equivalent to a payback of six to seven years, and any increases in electricity prices will reduce this payback time.
2. Installation of a large capacity hot water heater has kept his hot water costs low. The heater is capable of storing sufficient hot water for both milkings each day and heating overnight on the lowest tariffs available. Further savings can be made by installation of a heat recovery unit for a payback of four years on current electricity tariffs.

3. A large capacity industrial plate cooler using the coolest water available means the milk entering the vat is the coolest it can possibly be, resulting in the vat refrigeration plant working as little as possible. Measuring the milk temperature entering the vat has shown Dennis that the performance of the plate cooler can be improved by increasing the flow rate of the water to at least 2:1.

The milk refrigeration unit is serviced annually to keep it working as efficiently as possible and the condenser unit is located in an elevated, shaded position, with plenty of airflow across the fins, with no recycling of hot air.

Renewable energy generation on dairy farms

Dairy farmers are large users of electricity. Offsetting at least some of this use, and cost, by generating electricity using renewable sources such as solar, wind or hydro resources on farm is an appealing option. It is essential, however, to evaluate the real costs and savings that can be delivered.

Feed-in tariffs for power delivered into the grid from renewable resources are currently very low if approval can be obtained for installation, and these change over time. It would not be economic to invest in renewable schemes based on feed-in tariffs alone. The best way to make an investment worthwhile is to utilise as much renewable power generated as possible to replace alternative peak power. Where the power generated replaces off-peak power used, this lower tariff must be used in calculating the benefit or return from the renewable energy generation project.

The first step in designing a renewable energy generation system is to establish the current electricity use (or demand) profile for the dairy and whole farm. If the demand matches supply from the renewable source, and if a high proportion of this demand is normally filled by from using peak rate electricity, the investment has a good chance of being worthwhile. The demand profile will also help determine the most appropriate size or capacity of the renewable source you are considering.

Demand and supply profiles

Peak demand in most dairies occurs early in the morning and later in the afternoon during and immediately after milking times. However a significant proportion of the farm's total power demand can be overnight: for example where off-peak chillers, ice banks or hot water systems are in use.

On many farms, irrigation pumps are run overnight in the off-peak period, with the additional benefit of reduced evaporation losses during application. During the summer months, however, irrigation may be required during daytime hours to apply sufficient water, and offsetting this peak demand with renewables may improve the cost-effectiveness of the investment.

For solar or wind systems that supply more than the demand on the farm at any time, surplus power may need to be either fed into the grid or stored in batteries. Currently, however, battery storage is very expensive with a lifespan of up to 10 years, although the technology is improving.

Renewable energy resources for dairy farmers

A series of fact sheets and calculators are available on the Dairy Australia website to assist dairy farmers determine the suitability of renewable energy resources for their farm.

<http://frds.dairyaustralia.com.au/events/smarter-energy-use>

Case Study 10

High Power Use Glenn and Roma Britnell, Koroit, Vic.

The Britnell's dairy at Koroit was an early recipient of an energy assessment in 2012 through funding from the Young Dairy Development Program. Manager David McConnell was curious as to why the dairy hadn't seen any real power savings despite a recent upgrade of its vat cooling system, and was looking for ways to reduce the energy bill.

The assessment identified that the Britnell's power use compared to similar size of dairies was high and so started the hunt to work out why. One of the assessors, an electrician, identified that something big was still drawing power despite most of the equipment being turned off. The culprit was found to be a bore that was no longer in use. It had been covered over in the yards but was still connected and running. Now fully disconnected the savings are estimated to be around \$5000 per year.

David is delighted that they have achieved significant savings and is still working on implementing other recommendations. "One simple thing we do now is not leave lights on after milking. We are much more aware of saving power," he said.

Need more information?

Western Australia Dairy Energy Audit Project Summary

A summary report which presents the outcomes, observations, results and recommendations as determined by the Western Dairy Energy Audits. Copies available by contacting Western Dairy on (08) 9525 9222.

CowTime

A national dairy industry project aimed at making milking easier. It encompasses milk harvesting research and extension from when the cows leave the paddock for milking right through to cleaning up the milking shed.

www.cowtime.com.au

Victorian Department of Primary Industries Report

Energy in Dairy resources.

www.dpi.vic.gov.au/agriculture/dairy/energy-in-dairy

The EWEN Project

Efficient Water Energy and Nutrients Project, Nick Bullock and Associates—Fact sheets and case studies on energy use in dairies on the Mid North Coast of NSW.

www.nickbullock.com.au/facts.php

Dairying for Tomorrow—Dairy Self Assessment Tool

To help you identify areas for improvement in all areas of dairying.

www.dairyingfortomorrow.com

Dairying for Tomorrow—“RRR” Reduce Reuse and Recycle at the Dairy Shed 2007

Series of factsheets on improving energy use at the dairy.

www.dairyingfortomorrow.com

Useful contacts

GippsDairy

Unit 4/71 Korumburra Road
PO Box 1059
McMillan Campus
Warragul VIC 3820
Phone: 03 5624 3900
Fax: 03 5623 6322
Email: executiveassistant@gippsdairy.com.au

WestVic Dairy

Physical location:
7161 Princes Hwy
Terang VIC 3264
Postal Address:
PO Box 67
Terang VIC 3264
Phone: 03 5592 2477
Fax: 03 5592 1342
Email: info@westvicdairy.com.au

Murray Dairy

255 Ferguson Road
TATURA, VIC, 3616
Phone: 03 58 33 5312
Fax: 03 58 33 5929
Email: sarahp@murraydairy.com.au

Dairy Tas

PO Box 1352
Burnie 7320
Phone: 6432 2233
Fax: 6432 2277
Email: tasdairy@bigpond.com

Dairy NSW

PO Box 833
Mudgee NSW 2850
Phone: 02 6373 1435
Email: info@dairynsw.com.au

DairySA

PO Box 197
Lucindale SA 5272
Phone: 08 8766 0127
Fax: 08 8312 2043
Email: info@dairysa.com.au

Western Dairy

PO Box 341
Mundijong WA 6123
Phone: 08 9525 9222
Fax: 08 9525 5008
Email: esther@estherprice.com.au

Subtropical Dairy and Queensland Dairy Organisation

PO Box 13061
George St Post Office
Brisbane QLD 4003
Delivery Address:
Level 8, Primary Producers House
183 North Quay
Brisbane QLD 4003
Phone: (07) 3236 2955
Fax: (07) 3236 2956
Email: steve@dairypage.com.au

Dairy Australia

Level 5, IBM Centre, 60 City Road
Southbank, Victoria 3006
Postal address:
Locked Bag 104, Flinders Lane,
Victoria 8009
Tel: + 61 3 9694 3777
Fax: + 61 3 9694 3733
Memberline: 1800 004 377
Consumerline: 1800 655 441
www.dairyaustralia.com.au

For the latest information on the project, fact sheets, information resources or further copies of this booklet, please go to <http://frds.dairyaustralia.com.au/events/smarter-energy-use>



Dairy Australia Limited ACN 105 227 987
Level 5, IBM Centre
60 City Road, Southbank VIC 3006 Australia
T + 61 3 9694 3777 F + 61 3 9694 3701
E enquiries@dairyaustralia.com.au
www.dairyaustralia.com.au

