



## Smarter energy use on Australian dairy farms

# Energy monitoring for dairy farms

Since 2012 almost 1,400 dairy shed energy assessments have been conducted in all dairy regions across Australia as part of the national Dairy Australia project *Smarter energy use on Australian dairy farms*, funded by the Department of Industry and Science as part of the Energy Efficiency Information Grants Program.

During the project, the importance of energy monitoring, for specific situations on dairy farms, was highlighted. This fact sheet provides advice and some examples on how energy monitoring can be used within the dairy industry.

### What is energy monitoring?

While power bills and energy audits can give a good overview of how energy is being used in a dairy shed, the only way to drill down into exactly where and when energy is being used is to monitor.

Energy monitoring involves attaching current transformer (CT) clamps to electrical circuits to measure the electricity going through the circuit (Figures 1–3). It is the only way to measure how much energy individual circuits in the shed are using. For example, the energy used by the hot water circuit or the energy used by the vat circuit.

### When is energy monitoring needed?

The power bill for the dairy shed gives an overall figure for total energy use in the shed in kilo-watt hour (kWhr). From the power bill alone, it is not possible to work out how where energy is being used. Energy monitoring can be used in this situation.

Energy monitoring can help independently quantify savings from energy efficiency or renewable energy upgrades.

Energy monitoring can help troubleshoot anomalies or inconsistencies in the power bill. If the power bill is unusually high, energy monitoring can help track the problem.



Figure 1 CT clamps on dairy shed circuit



Figure 2 Unit to log and record energy use

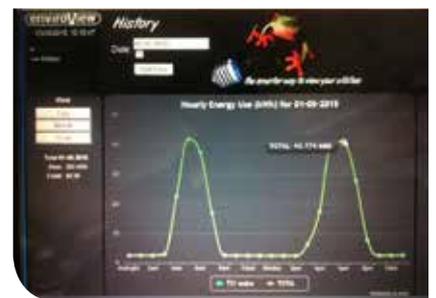


Figure 3 Software with simple graphics to view energy use on each circuit

## How to access energy monitoring equipment

Energy monitoring gear is now commercially available, but there are tangible differences in costs and practicality of different set ups. Dairy farmers need robust gear that logs over time and can be viewed with easy-to-use software.

Some electrical contractors now offer energy monitoring services where gear can be hired and installed in sheds for a fixed period at fixed cost.

A starting point for queries is Darren Cooper, Smarter Energy Use assessor, ph. 0457 555 883 who can advise on what is needed for energy monitoring in dairy sheds.



Figure 4 Software output for energy monitoring showing energy use on vat circuit



Figure 5 Vat compressors. Monitoring identified that one was running but no cooling effect

## Applications for Energy Monitoring Examples from Tasmania

### Case study: Tasmanian dairy farm in East Ridgley – Working out what is going on

Michael Chamley's dairy shed at East Ridgley had an energy audit as part of the *Smarter Energy Use in Australian Dairy farms* project. His audit clearly showed an unusually high amount of energy was being used in his shed. Energy monitoring gear was installed at the dairy, which showed the vat was working a lot harder and longer than had been estimated.

Energy monitoring identified two spikes for vat energy use (Figure 4). This highlighted that the vat was running longer than it should. The reason was an old compressor (Figure 5) that was using energy, but with no cooling benefit.

This example demonstrates the importance of energy monitoring. The only way to be accurate about when equipment is running is to monitor it – or at least make a written record of vat temperatures and running times when leaving the shed for that milking.



Figure 6 Different examples of monitoring equipment installed in dairy sheds in 2012

### Energy monitoring project: Trialing the technology in the dairy industry

Energy monitoring equipment was installed in 10 Tasmanian dairies in 2012 to trial the practicality of energy monitoring technology for dairy sheds (Figure 6). As part of this project, water monitoring equipment was also installed in some sheds. This project was the first attempt at energy and water monitoring in Tasmanian dairies. Further information available at [dairytas.com.au/nrm/energy/](http://dairytas.com.au/nrm/energy/)

The Tasmanian energy monitoring project compared monitoring equipment with actual meter usage (Figure 6a) and results were very similar. This project found significant differences in the practicality of different types of monitoring equipment for application in dairy sheds. Some domestic gear is not robust enough, while some of the industrial gear is overkill for dairy applications and very cumbersome to install. With increased interest in energy monitoring some more practical options have come onto the market recently.

Water monitoring (Figure 6c) is very useful for quantifying water use in the shed. Water monitoring showed variations from average 40 L/cow/day to 140 L/cow/day. The industry average figure for Tasmania is 50 L/cow/day but the monitoring shows that there are large variations, which need to be taken in account, particularly for effluent system design.

Farm hot water energy	Month	Days	kWh total	kWh average/day
	Feb-14	7	902	128.8
	Mar-14	27	3702	137.1
Solar hot water fitted 28 March				
	Mar-14	4	178	44.5
	Apr-14	30	1259	41.9
	May-14	31	1239	39.9
	Jun-14	30	1233	41.1
	Jul-14	31	1308	42.1
	Aug-14	31	1196	38.5
	Sep-14	30	1323	44.1
	Oct-14	31	1375	44.4
	Nov-14	30	1104	36.8
	Dec-14	31	1209	39.0
	Jan-15	31	900	29.0
	Feb-15	9	238	26.4



**Figure 7** Energy monitoring data (above left) for Lancaster dairy shed before and after fitted with solar hot water system (above right)

### King Island project: Before and after with installation of solar hot water

Energy monitoring equipment was installed in two dairies on King Island to quantify the savings achieved with installation of solar hot water systems funded by Tasmanian Government. The results showed around 65% saving on hot water energy use with commercial evacuated tube solar hot water system fitted. Further information available at [youtube.com/watch?v=0-iuKIBsQqs](https://www.youtube.com/watch?v=0-iuKIBsQqs)

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