Dairy Shed Energy Use Check

Energy costs in the dairy shed have risen since the mid 2000s, but there are opportunities that can provide for savings. A simple way to check how your dairy shed energy consumption compares to industry benchmarks is by calculating the kilowatt hours of energy used per kilolitres of milk produced (kWh/kL). A benchmark established from energy assessments completed in the Subtropical Dairy region between 2009-2014 showed an average of 50 kWhr / 1000 L of milk for dairy shed energy use.

Calculating your annual dairy shed energy use over multiple years can help you identify if there are any leaks in your system or if efficiency levels have reduced or increased.

How to calculate your dairy shed energy use

Step 1 **Calculate total milk for the year (A)** **1,250,000**

Step 2 **Convert milk to kL A ÷ 1000 (B)** **1,250**

Step 3 **Calculate total kWh consumed by your dairy shed**

Your kWh are found on your electricity bills. Bills are generally every quarter. Sum the bills for the 4 quarters and add the number of days for each bills period (as shown below).

Period	Total kWh	No of billing days
15 July to 18 October	17,021	95
19 October to 16 January	17,624	89
17 January to 12 April	17,215	86
13 April to 12 July	16,121	90
Total	67,981 (X)	360 (Y)

Note: You should make allowances in kWh for items by subtracting kWh usages other than items not associated with hot water for cleaning plant, milk cooling, milk harvesting, cleaning/effluent, mills and mixers, stockwater, shed operation and lights.

Calculate consumption for 365 days

X ÷ Y = Z **67,981 ÷ 360 = 189**

Z x 365 = C **189 x 365 = 68,985**

Calculate total kWh consumed by your dairy shed (C) **68,985**

Step 4 **Calculate benchmark of kWh / kL of milk C ÷ B =** **55**

Find any leaks

The energy saving checklist produced by Dairy Australia provides a preliminary energy assessment of your dairy shed and identifies potential opportunities for energy savings.

Dairy shed energy saving checklist

Reducing your electricity bill	Yes	No
Tariffs		
Are you making the most of off peak tariffs or controlled load tariffs?	○	○
Have you compared your current tariffs with others on offer?	○	○
Have you checked for better offers from electricity retailers?	○	○
Measuring and monitoring		
Are you using an interval meter to quantify and/or monitor energy use?	○	○
Are meter readings taken regularly and do they seem to be reflective of billing cycle and seasonal energy use?	○	○
Have you updated to digital meters (from analogue)?	○	○

Reducing demand and improving energy efficiency	Yes	No
Hot water systems		
Have you reviewed your hot water use volume and temperatures with your chemical supplier?	○	○
Have you checked actual hot water temperatures delivered, compared to thermostat reading?	○	○
Have you considered option of pre-heating the water that goes into your hot water service (solar hot water systems, heat pumps, and/or heat extraction from refrigeration units)?	○	○
Do you check the sacrificial anodes regularly?	○	○
Do you flush the unit regularly?	○	○
Do you have sufficient hot water storage capacity to use the lowest off peak tariffs?	○	○
Are your timers or off peak clocks set correctly?	○	○
Are metal pipe connections well insulated?	○	○
Have you checked your hot water is not boiling at night?	○	○
Does the Clean in Place (CIP) storage fill quickly and is it used immediately?	○	○
Milk cooling		
Precooling		
Are you using the coldest water available?	○	○
Do you know the milk temperature entering the vat?	○	○
Is it less than 2–3°C warmer than the water temperature entering the plate cooler?	○	○
If not:		
Has the plate cooler been correctly sized for the job?	○	○
Do the milk and water flow in opposite directions through the plate cooler?	○	○
Do you have an even flow of milk through the plate cooler?	○	○
Does the water flow rate exceed the maximum milk flow rate by a ratio of at least 3:1 for ‘m’ type plate exchangers, or 2:1 for industrial types?	○	○
Milk harvesting		
Have you considered options for reducing milking times, in order to reduce the time that equipment is running?	○	○
Are annual tests carried out by a technician to check vacuum regulation, airflow, leaks, drive belts, etc.?	○	○
Has your milk plant technician checked you do not have excess reserve in your plant?	○	○
Is the vacuum pump motor clean and well ventilated?	○	○
Have you considered installing a variable speed drive (VSD) to match the speed of vacuum pumps with air flow?	○	○

Maintenance and cleaning	Yes	No
Refrigeration plant		
Is the refrigeration unit protected from rain and direct sunlight?		
Has your refrigeration technician checked for leaking refrigerant?		
Does a qualified refrigeration mechanic undertake annual maintenance?		
Condenser units		
Are they located to take advantage of prevailing winds and to allow unrestricted airflow?		
Are the fins clean and undamaged?		
Have you checked that oil from the vacuum pump has not blown/is not blowing on the condenser fins?		
Water pumping		
Can water pumping be done in off peak times?		
Can the existing pump(s) be changed to a more efficient type?		
Do you regularly check for leaks in the system?		
Dairy shed		
Are you using energy efficient lights?		
Do you clean your light globes and fittings annually?		
Are lights switched off after milking?		
Have you investigated sky lights as an option?		
Is your dairy shed well ventilated?		
Are the walls and structures positioned to maximise airflow and reduce the need for fans?		
Are you considering the future energy saving potential for all new equipment purchases?		

Renewables and offsets	Yes	No
Before seeking quotes for any renewable project (solar, wind, hydro, biogas or storage):		
Have you established the current electricity use (or demand) profile for the dairy and whole farm?		
› If so, will the energy demand match the supply from the renewable source (e.g. maximum daytime use for solar energy)?		
› If not, do you have access to real-time energy use data for all sites?		
Do you know your peak and/or demand charges? Be sure to ask for advice on whether there is potential for renewables/storage technology to reduce or avoid the peak and demand charge, as this will outweigh the up-front and operational costs of installation.		
Have you considered whether you want to build, own and operate or lease the renewables? And/or have you sought advice on the best financing option for your renewables project?		
Have you considered the type of system (grid-connected, to allow for Feed-in-Tariffs, or stand alone) best suited to your site and situation?		
› If grid-connected, have you checked/sought advice on whether this is feasible with your existing grid supply and if there are any restrictions to the generation capacity of the system?		
› If stand-alone, have you considered all storage options (thermal, pressurised or electrical energy storage)?		
Do you have irrigation pumps running during daytime hours in summer? If so, offsetting this peak demand with renewables may be an option.		
If not already, have you considered installing monitoring equipment to track your use of energy over time (and the performance of energy efficiency/renewable measures implemented)?		

Further advice on selecting a supplier and the key questions to ask to ensure the design of a renewable system matches your needs, is available in the revewables section (p30) in the following link https://bit.ly/2NNlyym