

Dairy Farm Energy



Farm businesses are under increasing pressure to become more energy efficient. Milk cooling, water heating and vacuum pumps amount for the biggest proportion of energy use on dairy farms. It is these areas that offer scope for the greatest savings. Each of these three areas accounts for 20-30% of electricity consumption on a typical farm. There is a massive range in total energy use (electric and fuel) across

farms. Electricity costs vary from €15 - €45 per cow per year.

The variation is due to many factors from fuel use to the proportion of more expensive day tariff (normally 9am until midnight) electricity used and the unit cost. With profit margins under pressure there is an urgent need to review all business costs including electricity and diesel.

CUTTING COSTS

The first step any farmer can take to improve efficiency is to identify the main consumers of electricity. Record consumption, collect data from bills, read meters regularly or install a smart meter. Next ensure that the business is on the best tariff and maximise the use of off-peak electricity.

Basic measures such as using timer switchers, lagging pipes (hot and cold) and water tanks, replacing halogen floodlights with sodium lights, plus ensuring that equipment such as condensers are clean and well maintained also make a big difference. Condenser maintenance is a common problem. Half an hour spent cleaning condensers with a low pressure hose and a soft brush will pay-off instantly. Make sure condensers are well located to avoid recirculating warm exhaust air.

Installing energy efficient equipment such as bulk tanks, variable drive vacuum pumps, or heat recovery units can make a big difference to energy use. However the high capital costs often mean that the scale of energy savings is unlikely to warrant replacement. Working out the simple payback for energy efficiency projects is a good way to prioritise cost saving measures.

Electricity only accounts for 4% of the variable cost of producing milk (about €0.05 cent per litre). This needs to be kept in context before investing heavily in new equipment. At present the DAFM funded Targeted Agricultural Modernisation Scheme (TAMS) is in operation until 2020 and will cover 40% of the cost of many upgrades including new milk cooling tanks and compressors, plate coolers, water heaters and heat recovery units. Up to 60% of the cost will be covered for young farmers. For more information on this scheme consult the website of the Department of Agriculture, Food and the Marine.

<https://www.agriculture.gov.ie/farmerschemes/payments/tams/tamsiidairyequipmentscheme/>

Breakdown of energy consumption on Irish dairy farms

Costs of Electricity on Irish dairy farms

- Average costs are €5 per 1,000 litres of milk produced. There is large variation in energy costs on dairy farms from €2.60 to €8.70 per 1,000 litres of milk) or from €1,500 to €4,500 on a 100 cow farm

- The main drivers of energy consumption on dairy farms are milk cooling (31%), the milking machine (20%) and water heating (23%)
- The average farm could save €1,800 per year through a combination of altered management strategies and energy efficient technology

Energy Audits

Energy audits are an effective tool to reveal areas where savings can be made. These results were obtained from energy audits carried out on 22 commercial dairy farms over 12 months. The average herd size was 118 cows but the study included farms ranging from 47 to 290 cows. Further results from this study are presented in Table 1.

Table 1: Breakdown of electricity consumption per litre of milk produced on 22 farms including cost of electrical energy consumed and tariff distribution profile by percentage of day rate tariff usage

	Electricity Consumed (Wh/L) ¹	Cost of electricity (€ c/L) ²	% day tariff ³
Milk Cooling	13.02	0.16	60%
Water Heating	9.83	0.11	45%
Milking	8.44	0.11	71%
Lighting	1.37	0.02	89%
Other	7.54	0.10	69%
Pumping	2.13	0.03	38%
Total	42.34	0.51	62%

¹ Wh/L = Watt hours / Litre, ² € c/L = Euro cent per Litre of milk ³ Percentage of electricity consumed from 9 am to 12 midnight

Calculate your energy costs

A simple calculation can be made to approximate on-farm electricity costs. Firstly add up the total electricity charges over a year excluding standing charges, VAT and PSO levy, these figures can be found on the electricity bill. Multiply



by 100 to convert from euro to cents. Next add up the total number of litres of milk sold to the processor over the same period. Dividing the electricity cost in cents by the number litres will give the cost in cent per litre. The average three bedroom house in Ireland uses approximately 5,000 units of electricity per year, this could be deducted to account for domestic usage if the dwelling house is on the same meter as the farm. Checking your pricing and tariff structure against the best available rates can also yield significant savings. This can be done using a pricing comparison website such as www.bonkers.ie. All you need is information about your present tariff, annual usage and night rate usage in order to make comparisons and calculate possible savings. If you decide to switch suppliers it is important to read the small print. Check the standing charges and termination charges.

ENERGY SAVING ACTIONS AND PAYBACK

Action	Cost of Action	Annual Saving	Simple Payback
Move to cheapest supplier	none	€500	immediate
Milk pre-cooling (installing a plate cooler)	€3,200	€1,000	3 years
Install night rate electricity	none	€1,000	immediate
Synchronise water heater with night rate	€50	€170	<1 year
Variable Speed Drive (VSD) on the vacuum pumps	€460	€3,300	7 years
Solar thermal heating	€4,000	€350	>10 years
Heat recovery system (in addition to pre-cooling)	€3,500	€350	10 Years
Photovoltaic system	€6,000	€700	8.5 years
Wind turbine	€25,000	€800	>30years

SIMPLE ENERGY MANAGEMENT ACTIONS

Check hot water temperature?

Avoid unnecessary use and too high a temperature, 75 degrees is adequate.
Check thermostat setting and for leaks.

Yes No

Have you improved tank and pipe insulation?

Good tank and pipe insulation significantly reduces heat loss and energy costs.

Yes No

Is your bulk tank thermostat accurate?

Small inaccuracies, e.g. 1°C overcooling, can result in significant extra electricity costs.

Yes No

Is your refrigeration condenser sufficiently ventilated?

They run more efficiently in a location which gives adequate inlet and outlet ventilation.
Clean regularly.

Yes No

Have you identified and fixed water leaks

Water leaks increase pumping costs significantly. A hot water leak of 1 drip per second can cost €300 per year.

Yes No

Do you record energy use?

Consumption should be monitored to assess current performance and identify high demands.
Records also allow quantification of the benefits from any proposed energy reduction measures.

Yes No

Savings may not be cumulative, as alteration of one item may affect another.