

# DAIRY DESIGN

## ENERGY SAVERS LEAD THE WAY

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More than 50 dairy farms are saving money on energy this season thanks to Government-backed energy efficiency incentives.

Run by the Energy Efficiency and Conservation Authority (EECA), the programme has achieved its goal of having 50 farms on board with grants used for heat recovery equipment in retrofitted projects in existing dairies, and new installations. The grants are due to close at the end of June.

EECA business project manager, Kirk Archibald, said EECA had achieved a good

representation of installations across the country.

"We've seen more projects at the larger end of the scale, but we're happy that we've got a good set of projects and results across the board."

The 50 farm dairies with heat recovery equipment installed now form a valuable feedback source to EECA on actual savings achieved and the relative success of the project.

Heat recovery technology that pulls heat lost through the milk cooling process back into heating dairy wash water offers the low hanging fruit opportunity for the industry to make some serious savings in its gross energy bill.

Electricity use for heating hot water

in dairying amounts to 24% of the \$250 million annual dairy power bill. There's potential for the industry to slice \$30m a year off that simply through more efficient water heating using heat recovery. An additional \$12m could be shaved off through vat insulation and installation of variable speed drives, among other actions.

EECA calculates if the whole industry installed heat recovery equipment, the savings would amount to the equivalent to all the electricity used by a city the size of Masterton, and individual farm savings would amount to an average of \$4000 a year.

Of the three key energy saving technologies available, including variable

speed drives and vat insulation, heat recovery stands to reduce farm power bills by the greatest amount.

Archibald said so far the feedback from participating farmers had been positive. The installation includes a contract with service providers that the equipment will save at least 80% of the amount claimed in the proposal. On average the equipment is saving 21% of farm energy costs and data collected from 15 farms so far has only one not meeting expected savings.

"Overall we are finding, based on the data, there is a payback period of only three years on the equipment."

The average value of the grant is \$4000, leaving on average \$8000 to be paid by the farmer.

Another area of focus for EECA is variable speed drive (VSD) motors that match speed to the load placed on them. Work it carried out in 2012 showed a reduction of half in electricity use in vacuum pumps with VSDs fitted.

For farmers wanting to get a better idea of how their dairy energy consumption compares with other farms EECA has developed an online tool to calculate dairy efficiency.

**'Overall we are finding, based on the data, there is a payback period of only three years on the equipment.'**

Farmers go to [www.eecabusiness.govt.nz/tools/dairy-tool](http://www.eecabusiness.govt.nz/tools/dairy-tool) and complete some simple questions on dairy configuration and electricity use. The tool benchmarks their dairy against 150 others around NZ then provides a dollar figure for their potential savings.

Archibald said farmer interest in energy efficiency might step up as new milk cooling regulations that require temperatures to be lowered from 7C to 6C within six hours of the start of milking come into play from 2016. In light of this EECA is reviewing its support for heat recovery programmes and whether a successor is needed.

"This is still work in progress for us, but early feedback is that many dairy farms aren't currently compliant with that requirement."

EECA is also moving its sights further down the processing chain with a new programme to be launched in July for meat and dairy plants. It aims to prevent 7000 tonnes of carbon from entering the atmosphere each year by identifying energy efficiency opportunities in these two processing sectors, the biggest producers of industrial heat.

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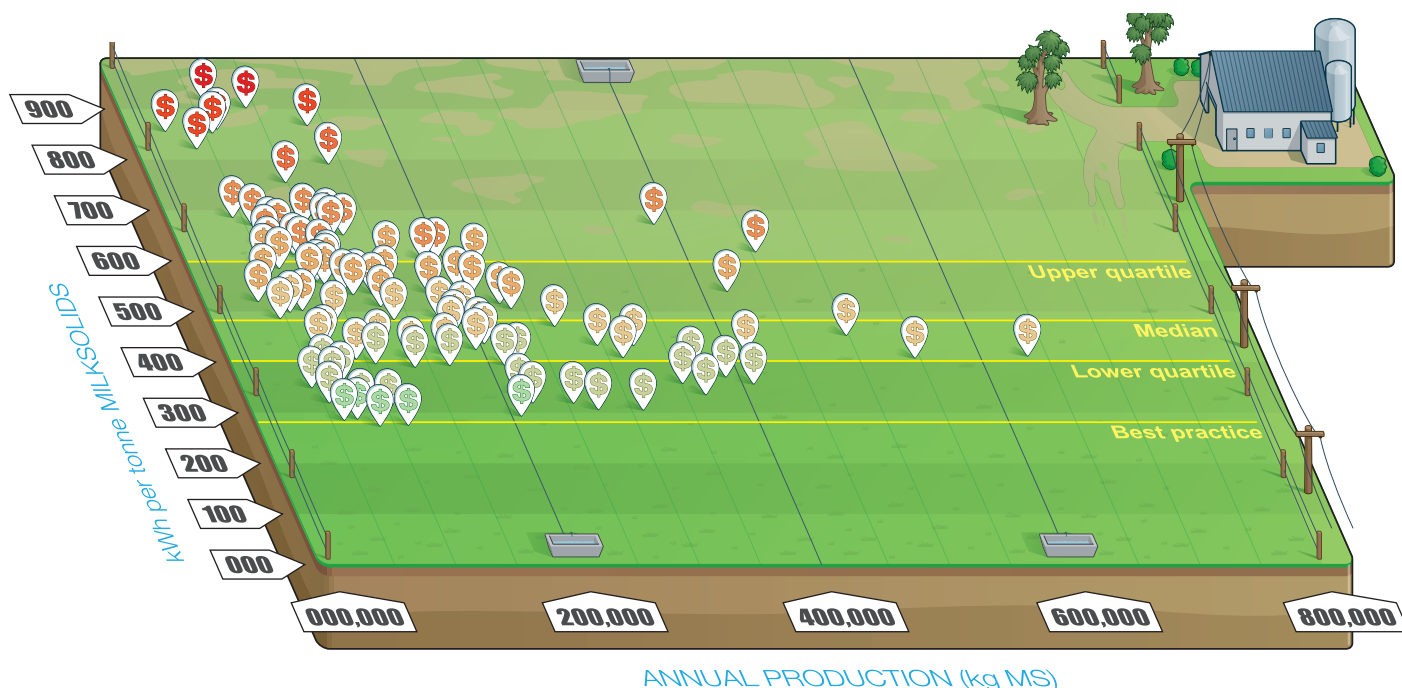
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Tom Leys, of Auckland-based company GridSpy, shows the devices used to monitor power use.

# CLOUD CONTROL FOR ENERGY USE

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There's now a real-time option for identifying exactly what "vampires" are sucking up energy use in dairies.

Auckland-based company GridSpy is one of the finalists in this year's Energy Efficiency and Conservation Authority's (EECA) energy awards. GridSpy founder and director Tom Leys said it had developed a cloud-based electricity monitoring system to identify power consumption from specific devices, highlight the use profile in an easily understood dashboard, and provide benchmark data to improve or reduce energy use.

He believes there's a significant opportunity in larger dairy farming operations to rationalise power consumption by attaching GridSpy GridNode wireless data collectors to specific devices. The GridNodes communicate power consumption wirelessly to a central GridHub that exports the data to a cloud server, enabling remote internet access.

"There are monitoring systems around already, but none will offer real-time updates capable of being stored for up to six months, at an affordable price for businesses."

The flexibility of the GridSpy system should appeal to farmers who want to customise monitoring themselves for dairy or irrigation use, he said.

"It's very hard to separate out what your actual usage is from a power company's account, and it certainly will not provide an indicator of what equipment is working efficiently, nor of any behavioural activity that affects power consumption, like leaving lights on in the farm dairy."

"It could be that by installing LED lights in the dairy you can calculate how much energy will be saved against conventional, and how much more through getting behavioural changes, like turning the lights off sooner."

The ability to store the usage pattern and compare over time provides a benchmark when installing improved equipment.

GridSpy also helps analyse the "power factor" or efficiency in specific motors, and indicate whether corrective equipment needs to be installed, such as capacitors.

The system's flexibility extends to the ability to lease monitors for periods from three months upwards, and with nodes able to be added or removed.

"Typically you could expect to save at least 10% by having better knowledge of power use and loss, and being able to make changes. For an average farm dairy there could be a potential saving of \$2000 a year."

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The Bosch Skid installation at the Steiner farm at Matamata.

# MOVE TO PEAK LOAD CHARGING

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Changes to how lines companies charge customers for their electricity use may prompt changes in dairy farm power technology sooner than was expected.

As electricity demand nationally remains flat to slightly declining companies are looking harder at the return on line investment, and how to maximise the infrastructure in place without over investing in major line structures.

Maverick Energy director Richard Upperton said thanks to smart metering technology, lines companies now had data to more closely calculate when peak loads were occurring, and were moving towards peak load charging rates.

His company specialises in installing energy systems combining conventional with latest innovative technology for specific energy needs. It's one of four certified by the Electricity and Energy Conservation Authority to sell and install dairy heat recovery systems under the authority's grants scheme.

"You have large dairy operations requiring power at those peak times in morning and afternoon," he said.

"Some parts of the West Coast south of Hamilton down to National Park already have it in place."

He believes the immediate future in dairy energy technology will focus on how to shift that peak load demand around.

"Things like thermal storage to chill milk will advance, and technology to have some equipment turn off sooner."

He points to Maverick's latest development, the iCycle 5000, a snap chiller to be unveiled at this year's National Fieldays.

"This will mean the chiller will not have to run during milking, and get rid of half a dairy's peak load with it."

The farm dairy energy market is evolving quickly as more farmers are forced to upgrade systems to comply with new chilling regulations coming into force in 2016. It may also hasten the development of co-generation installations in dairies, where methane gas from effluent digesters is held, and used to fire electricity generators and heat water.

"The technology is there, it's just waiting for the market to catch up."

Technology company Bosch has teamed up with Hamilton stainless steel fabrication company Longveld to bring gas-heated hot water technology to farm dairies.

The commercial continuous flow water heater can be retrofitted to farm dairy water cylinders, or installed as a portable, relocatable skid system with a horizontal tank and dump tank. The advanced technology means heating is required for less than an hour per wash for an average sized dairy.

Bay of Plenty farmer Grant Rowe was one of the first to use the system and is saving 45% off his farm heating bill.

"Staff love it, they have 600 litres of hot water ready to go in less than an hour," he said.

"We are saving money even though we are using more hot water. We can also easily hot wash our colostrum vat during calving without worrying about running out of hot water."

Longveld is the exclusive distributor of the system and managing director Pam Roa said the flexibility of always having hot water when needed and lower water heating costs are the key benefits. Hot water heating accounts for 24% of the average farm dairy's power bill.

The latest in cooling technology from GEA Farm Technologies have developed the iConverter range of snap chillers, comprising two distinct technologies.

One is thermal storage capacity, ensuring reduced peak load draw during milking and the ability to utilise cheaper off-peak power.

The thermal storage systems also offer a "one system one chiller" package, doing away with conventional silo chillers, lowering overheads and maintenance costs. Such systems also offer controlled hot water production as standard.

The company's direct online systems offer a "plug and play" installation simplicity with minimal installation that keeps existing vat chillers in service, but significantly reduces the load placed upon them.