

ENERGY AND IRRIGATION EFFICIENCY

The dual drivers for change

MONITORING ENERGY USE CAN HELP ANSWER A RANGE OF QUESTIONS SUCH AS:

- Why has the consumption of energy changed from last year and what are the causes?
  - Has there been new technology introduced or more rain therefore less irrigation but higher fuel use due to more sprays?
- Where is energy being used – which areas, processes, vehicles, plant?
- When is energy being used?

Answers to these questions can help identify specific parts of the operation to target for potential energy efficiency measures and gains.

DAIRY SHED SAVING MEASURES

The single biggest energy user in a dairy shed is hot water heating therefore efficiency measures that focus on this should be a top priority.

- Insulate hot water cylinders and pipes.
- Use a 24-hour timer that heats water only when it is required.
- Use night rates.
- Ensure the correct thermostat temperature is set.
- Detect and repair leaks.
- Use heat recovery from milk chillers to preheat water.
- Investigate solar energy.
- Use less hot water!

The need for improved energy efficiency in the agricultural sector is driven by both energy prices and customer expectations about sustainable production practices. Many leading farmers are already improving energy efficiency on their properties.

Increasingly, customers want information about how food is being produced and the consequent environmental impacts. This includes information on whether farmers are adapting to a changing climate and taking steps to minimise their impact on the environment, now and into the future.

As electricity and fuel prices rise, it makes economic sense to invest in reducing energy use or increasing energy efficiency. One of the biggest barriers to implementing energy efficiency measures is time. However, taking action on-farm or orchard will benefit the bottom line of your business and reduce greenhouse gas emissions.

MONITORING ENERGY USE

Monitoring energy use is typically the single largest and least expensive energy saving measure you could implement. Not only is it essential for your understanding and evaluation of any measures you implement but it also establishes an awareness of energy use and establishes a culture of energy efficiency.

IRRIGATION EFFICIENCY – WHAT TO FOCUS ON?

Generally irrigation efficiency measures can be divided into two categories: management and technology.

Management efficiency measures include:

- Better knowledge through monitoring.
- Use of water meters.
- Using rain gauges and weather data.
- Soil moisture monitoring.
- System maintenance.
- Avoiding irrigating in windy conditions.
- Irrigating at night if possible.
- Improving irrigation uniformity through an irrigation audit.

For example, improving the irrigation uniformity of a system from 70 percent to 90 percent can reduce water applications by 30 percent, which consequently cuts energy use by 30 percent. As well as a huge cost saving, this water could be used

elsewhere to increase the total area under irrigation, thereby boosting overall productivity.

Better system design and technology methods include avoiding an allowance for excessive capacity and/or total head by selecting the most efficient pump type and size at the onset.

Use variable-speed drives (VSD) to avoid losses from throttle valves and bypass lines. VSD technology matches motors to the load, reducing losses and in the case of irrigation pumps, often means not having to throttle the flow which is enormously wasteful of energy.

Further measures include using two or more smaller pumps, instead of one larger pump, so that excess capacity can be turned off. Regular maintenance of pumps and all system components will also help avoid efficiency losses.

WHERE CAN I SAVE ON FUEL USE?

On orchards, mowing and spraying accounts for approximately 40-60 percent of fuel use. Whilst the majority of passes are unavoidable, land managers should assess if each particular pass is totally necessary.

Reducing mowing for aesthetic purposes, using tank mixes where possible, and the use of monitoring and pest/disease risk models are all ways of reducing the number of tractor passes and creating fuel savings.

Like many energy saving measures, reducing the number of tractor passes is also likely to lead to cost reductions due to the associated reduction in labour and maintenance costs.

Tillage operations offer more opportunities for fuel and cost savings. Key points in saving fuel during tractor field use are keeping a current maintenance schedule, proper ballasting and tyre inflation, and selecting a fuel saving gear and throttle setting. Change up, throttle back.

Correct maintenance will improve fuel efficiency by around four to five percent.

The use of biofuels like tallow-based biodiesel or bioethanol can also reduce greenhouse gas emissions, although not necessarily costs or fuel consumption.

THIS IS ONE IN A SERIES OF FACT SHEETS CALLED *ADAPTING TO A CHANGING CLIMATE* THAT CAN BE FOUND AT
WWW.MAF.GOVT.NZ/CLIMATE CHANGE

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Key points

1. **The need to improve energy efficiency is driven by both energy costs and customer expectations regarding sustainable production practices.**
2. **Start by investing time in monitoring basic energy use within your business.**
3. **Determine where the energy is being used and consequently focus your efforts on where you will get the biggest reward.**
4. **Hot water heating is the largest energy user in a dairy shed – there is a range of practical methods for reducing energy use and making cost savings.**
5. **To improve irrigation efficiency, focus on soil moisture and water use monitoring, and target pump performance.**
6. **To reduce fuel use, focus on tractor driver education, setup and question the need for each pass.**

FOR MORE INFORMATION

- Read *Seven Case Study Farms: Total Energy and Carbon Indications for New Zealand Arable and Outdoor Vegetable Production*, by Andrew Barber. Available on the Agrilink website **www.agrilink.co.nz**
- Visit the MAF Sustainable Farming Fund website for a large number of project reports targeting irrigation efficiency **www.maf.govt.nz/sff**
- Visit the Energy Efficiency and Conservation Authority website for a range of information on energy efficiency, solar energy for dairy sheds and irrigation case studies **www.eecabusiness.govt.nz**
- Visit the Hydrolic Institute website for information on pumping technology **www.pumps.org**
- The Venture Southland website has information on improving dairy shed energy efficiency **www.cowshed.org.nz**
- Read the *Dairy Exporter Great Farming Guide: Saving Energy* available from DairyNZ **www.dairynz.co.nz**
- Read the Ministry for the Environment booklet *Energy efficient ways to improve the economic bottom line of your dairy farm* **www.energyfed.org.nz/Dairy_Farm.pdf**