Fact sheet

Energy efficient irrigation

As irrigation is usually the major user of energy on most farms, ensuring that you are irrigating energy-efficiently can reduce overall energy costs, and often also results in water efficiency and irrigation efficiency.

Irrigation is usually the major user of energy on most farms

- Are you sure you are on the right tariff? You can check by reading Aurora's guide to electricity tariffs "What's the Best Rate for my Business".
- Plan your irrigation to use the cheaper night rate.
- Check all your current equipment is running efficiently.
- Consider installing new, more energy-efficient equipment, such as high efficiency motors with improved bearings and other up to date design technologies.
- Ensure motors are correctly rated for the load/purposes.

Maintaining equipment efficiency

- Maintain your system to minimise leakage, especially if you have numerous connections.
- Check that your pump and irrigation systems are running at recommended flow rates and pressure with the correct suction setup.
- Make sure all your irrigation fittings and pipes are clean on the inside. Internal scum can increase friction and pumping costs.

Management tools

- Make sure you are not applying water at a rate that is higher than the soil can accept without run-off.
- Check the system is distributing the water evenly.
- Introduce irrigation scheduling. Water crops when they need it (by using soil monitoring equipment) rather than following a set routine.

Variable speed drives

Variable speed drives can reduce energy use by up to 50% by adjusting the speed that pumps rotate. This is so that the pressure and flow requirements of the pump will match the pressure and flow requirements of your delivery system. They are generally only necessary, however, if you run more than one system (e.g. drippers and solid set irrigation) on the one pump.

Energy efficiency of delivery system

Centre pivot irrigation – very low energy use.

The number of centre-pivot irrigation systems installed each year in Tasmania has increased dramatically since they were installed about a decade ago. Centre-pivot is best suited to large areas, crops with high water requirements and higher crop values.

Advantages	Disadvantages
Low pressure, therefore, low energy costs	Circles create unirrigated areas (without end-gun irrigators, they irrigate only 78% of a square)
Very high uniformity of application	High instantaneous application rates towards the end of the line can cause run-off on sloping sites and heavier soils
Irrigation events can be scheduled more frequently when required	Perceived (not generally actual) high capital costs

Flood irrigation – low energy use.

Flood irrigation uses little energy as it relies on gravity to spread water across an area. Flood irrigation is best suited to pasture and even slopes with heavier soil types.

Advantages	Disadvantages
Low pressure required to pump and no pressure required to spread water, therefore, low energy costs	Unless areas are laser planed, can result in very low irrigation efficiency due to inaccurate application and losses from run-off and seepage
	Very low uniformity of application
	Run-off and seepage losses can cause waterlogging and promote salinity issues in susceptible soil types

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Energy efficient irrigation (cont.)

Energy efficiency of delivery system (cont.)

Micro irrigation – low energy use.

Micro irrigation includes dripper systems as well as very small sprinklers. Micro irrigation is best used for permanent installations of high value perennial crops such as vines and tree crops.

Advantages	Disadvantages
Low pressure, therefore, low energy use	Generally requires sophisticated water filtration systems
High uniformity of application	Best used only on solids where water can spread evenly to match the root zone of the crop

Linear-move irrigation – low energy use.

Linear-move irrigation systems have a similar infrastructure to centre-pivot irrigators, the difference being that rather than pivoting on a central point the whole arm moves across the area being irrigated. As with centre-pivot irrigation, linear move is best suited to large areas, crops with high water requirements and higher value crops.

Advantages	Disadvantages
Low pressure, therefore, low energy costs (higher than centre pivot due to hose friction losses)	Less appropriate for undulating or irregular terrain as system is not "anchored"
Very high uniformity of application	Generally higher capital costs/ha than centre pivots

Fixed and portable solid set – medium energy use.

Fixed sprinkler systems are best suited to perennial crops, especially trees or shrubs. Portable sprinkler systems are best suited to high value, intensive, vegetable and herb and ornamental crops.

Advantages	Disadvantages
Medium pressure required for sprinklers, therefore, relatively low energy use	If designed with inappropriate sprinkler spacings can result in inefficient uniformity of water application
If appropriately designed with adequate sprinkler spacings have good uniformity of application	
Opportunity for frost control	

Travelling gun (soft and hard hose types) – high energy use.

Travelling gun irrigators are popular in Tasmania and are best suited to annual crops with low water requirements.

Advantages	Disadvantages
Very flexible and portable systems	High pressure, therefore, high energy costs. Hard hose systems can have higher costs due to friction losses in the hose if not designed properly
	Very low uniformity of application primarily from wind effects, inappropriate lane spacings and start and end-of-run issues

Long lateral – high energy use.

Long lateral systems are best suited to pasture application and less suited to crops.

Advantages	Disadvantages
Well suited to areas of irregular shape and steep undulating terrain	Friction losses in lateral hoses result in increased pressure requirements and therefore higher energy costs
	Very low uniformity of application
	Generally low efficiency due to low uniformity of application

Smarter irrigation

Momentary power interruptions can often be a headache, resulting in pumps switching off, often making manual restarts necessary. This can be a problem when it affects several pumps spread out over many kilometres.

The answer could be an automatic pump restarting system. This is a device that sits in the pump box and monitors the power supply. The pump will wait 5 minutes after shutdown before automatically restarting the first time, 10 minutes if it happens a second time and if it fails a third time the system will lockout, avoiding burnout. The automatic restart system can be retrofitted to any pump and is easily installed.

For more information contact your irrigation supplier.

Information is current as at April 2008 and is subject to change without notice.

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