

Irrigators Energy Savers Program

targets significant energy savings for a
North Queensland sugar cane farm

PROPOSED SOLUTION 

Potential energy savings

30-46%

Key facts

Farm / Industry

Sugar cane

Location

Home Hill, Burdekin

Irrigation

Flood and drip micro irrigation

Pumps

Centrifugal, submersible, turbine

Solution

Proposed:
Variable speed control

Farm profile

The farm is situated adjacent to the Burdekin River and receives average annual rainfall of approximately 940mm. The farm cultivates sugar cane, irrigated mainly by low pressure flooded furrow irrigation.

For improved irrigation efficiency and reduced water-logged soils at flood outlets, the farm owner has been trialling trickle irrigation technologies, with success, and closely monitoring the results.

A barrier to the wider application of trickle irrigation has been the cost of energy per hectare to implement.

Current irrigation

The irrigation system comprises nine pumps ranging in size from 7.5kW to 37kW:

- Five centrifugal pumps from wells with significant suction line heights to drive motors above the water table for flood irrigation.
- Two submersible pumps, with one dedicated to flood irrigation and the other 30kW pump for trickle irrigation.
- Two turbine pumps used for flood irrigation.

The site water table is 10 metres deep (approx.) and pumping for flood irrigation is distributed from open risers connected to lay flat plastic fluming. The trickle system differs from the traditional low pressure methods as it pumps from a sealed bore to pressurised mains into four stations that distribute to the paddock trickle pipework.

Action

An energy audit for each pump installation evaluated:

- installation of variable speed controls
- replacement with a more energy-efficient drive unit
- benefits of reduced flow to suit a single trickle irrigation station.

Results

Annual energy savings from identified initiatives ranged from between 30% to 46% in consumption terms. The best payback period being just over 1 year and the average payback period was 6 years. Variations in payback were a result of pump configuration, age and performance.

One energy-saving initiative met the farmer's desired financial payback period of less than 3 years. The installation of a variable speed control replaced a pressure regulator valve to the 30kW trickle pump to maintain 15-20 psi (approx) would eliminate pressure reduction devices. Another VSD installation to a 50hp (37kW) flood irrigation pump had a payback of 4.8 years.



Beyond energy savings, the other benefit has been increased on-farm productivity made possible through more cost-efficient irrigation methods and better use of previously unproductive farming land which is being converted to sugar cane.

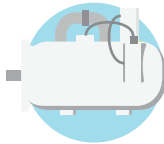
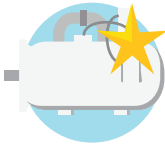

The Irrigators Energy Savers Program is funded by the Queensland Department of Agriculture and Fisheries



Recommendations

The energy audit recommendations are summarised below:

Solution	 Variable speed control to 30kW submersible pump supplying trickle irrigation	 Add Variable speed control to 50HP turbine pump supplying (37kW) flood irrigation
Type of irrigation	Drip and micro irrigation	Flood
Est. energy savings (kWh/annum)	31,940	7,953
Est. energy savings	46%	30%
Est. operating cost saving	\$6,028	\$1,551
Est. cost to implement	\$8,000	\$7,500
Payback period (years)	1.3	4.8
Est. demand reduction (kW)	14.8	10.2

Forecast savings in pump operating costs (for both solutions)	 Existing system	 Upgraded system	 Reduction in operating costs
Annual pump operating cost	\$42,390	\$34,811	\$7,579
Cost to implement	-	\$15,500	-
Operating costs for first four years	\$169,560	\$154,744	\$14,816
Annual pump operating cost for years 5 to 10	\$42,390	\$34,811	\$6,028
Total pumping costs for 10 years	\$423,900	\$363,610	\$60,290

Farmer feedback

The range in savings has allowed the farmer to prioritise the recommendations based on the best payback period together with the associated capital outlay required.

The farmer is keen to implement the recommended irrigation energy saving solutions, subject to start of the wet season providing relief from irrigation commitments. At time of writing, rainfall had not been sufficient to allow a shutdown of pumps to complete upgrade works.