Irrigators Energy Savers Program

targets significant energy savings for a

Queensland sugar cane farm

PROPOSED SOLUTION

Potential energy savings 19-30%

Key facts

Farm / Industry

Sugar cane

Location

Mackay

Irrigation

Centre pivot

Pumps

Centrifugal

Solution

Proposed:
Consider upgrade to variable speed control on failure

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

Farm profile

The 180 hectare farm, located in the Mackay area, cultivates sugar cane.

For irrigation, the farm mainly relies on rainfall supplemented by a centre pivot and hard hose irrigation system which sources water from a creek. The operation of the irrigation system varies according to the season and the weather conditions.

The volume of water delivered to the sugar cane changes according to the growth stage and is varied by managing the irrigation time as the system delivers a constant flow of water.

Electricity consumption is mainly for irrigation purposes, followed next by the shed/workshop.

Current irrigation

The irrigation system comprises:

- Two 46kW pumps that pump water from the creek to a hard hose irrigation system.
- One 45kW pump that pumps water from the creek to a different hard hose irrigation system.
- Two 55kW pumps that transfer to the centre pivot system, one from the creek and the other from an on-site dam.
- One 22kW pump that transfers water from the creek to the dam.

Action

An energy audit of the pumping systems evaluated:

- installation of variable speed controls
- replacement with more energy efficient drive units.

Results

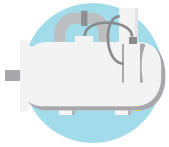
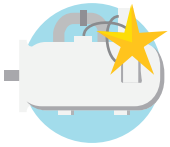
Of the energy-saving opportunities evaluated, one initiative was identified to implement variable speed drives on the centre pivot and hard hose irrigator pump to reduce head pressure. Subject to operating conditions, savings of between 19% and 30% and payback periods of 8.4 to 23.9 years (approx) were identified.

The other pump systems were considered to be operating efficiently and viable upgrade options would depend on future maintenance or replacement.

Recommendations

The energy audit recommendations are summarised below:

Solution	 Scenario 1 – Implement variable speed drive and reduce head by 10%	 Scenario 2 – Implement variable speed drive and reduce head by 20%	 Scenario 3 – Implement variable speed drive and reduce head by 30%
Est. energy savings (kWh/annum)	4,237	8,244	12,008
Est. operating cost saving	$1,130	$2,199	$3,203
Est. cost to implement	$27,000	$27,000	$27,000
Payback period (years)	23.9	12.3	8.4
Est. demand reduction (kW)	7	13	19
Est. energy savings	19 to 30%		

Forecast savings in pump operating costs – Scenario 3 (30% reduction in head)	 Existing system	 Upgraded system	 Reduction in operating costs
Annual operating cost	$5,877	$2,674	–
Cost to implement	–	$27,000	–
Operating costs for first 9 years	$52,893	$51,066	$1,827
Annual pump operating cost for years 10 onwards	$5,877	$2,674	$3,203
Total pumping costs for 10 years	$58,770	$53,740	$5,03 0

Farmer feedback

The farm is not proceeding with implementation of the audit recommendation due to long payback periods. The customer noted that the existing pumping arrangement had been sized appropriately and the audit report findings would be considered in the event of a pump failure requiring replacement.

This case study was originally developed during 2016-17 as part of the Queensland Government funded Irrigators Energy Savers Program, delivered by the Queensland Farmers' Federation.