Irrigators Energy Savers Program

targets significant energy savings for a

Central Queensland cotton farm

PROPOSED SOLUTION

Potential energy savings 37%

Key facts

Farm / Industry

Cotton

Location

Central Queensland

Irrigation

Flood

Pumps

Centrifugal

Solution

Proposed:
Pump replacement and piping upgrade

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

Farm profile

The farm cultivates cotton over a 560 hectare site north-east of Emerald in Central Queensland. Flood irrigation is used, with water being supplied via a common irrigation channel network.

Irrigation occurs year-round with 10 irrigation cycles per year, each running continuously for 2.5 or 5 days, depending on the site. The farm uses three pumping stations, two with electric pumps, and the third diesel-powered.

Current irrigation

The irrigation system comprises:

- One 220kW axial flow pump that supplies water to the irrigation channels from the Nogoa River.
- One 45kW mixed-flow pump that lifts water from the low channel system to the upper channels at the farm.
- One diesel pump station that was not assessed.

Action

An energy audit of the pumping systems evaluated:

- replacement with more energy-efficient drive units
- upgrading the distribution pipework
- replacing pumps.

Results

Of the energy-saving opportunities evaluated, several initiatives were identified with short-term savings up to 37% and a payback period of 1.3 years (approx). These initiatives included upgrading the 220kW pump and retrofitting a variable speed drive to the motor. An upgrade of the existing steel pipework on the 220kW axial flow pump to plastic to reduce friction losses was recommended.

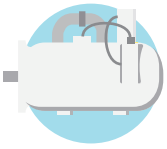
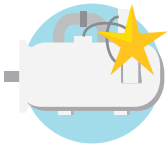
The energy audit recommendations included a suggestion to review the tariff pricing structure for one pump's electricity account to realise savings of $1,146 per year.

The 45kW electric motor could be upgraded to a premium efficiency model but this has a long payback period of 11.3 years and should be considered for end-of-life replacement.

Recommendations

The energy audit recommendations are summarised below:

Solution	 Pump replacement and variable speed drive installation with piping upgrade
Est. energy savings (kWh/annum)	90,280
Est. operating cost saving	$19,585
Est. cost to implement	$25,500
Payback period (years)	1.3
Est. demand reduction (kW)	40
Est. energy savings	37%

Forecast savings in pump operating costs	 Existing system	 Upgraded system	 Reduction in operating costs
Annual pump operating cost	$79,528	$59,943	-
Cost to implement	-	$25,500	-
Operating costs for first 2 years	$159,056	$145,386	$13,670
Annual pump operating cost for years 3 to 10	$79,528	$59,943	$19,585
Total pumping costs for 10 years	$795,280	$624,930	$170,350

Farmer feedback

The farm owner is completing a review of the water storage capacities on the farm in conjunction with the review of pump upgrade requirements. Timing for implementation is yet to be confirmed.

This case study was originally developed during 2017-18 as part of the Queensland Government funded Irrigators Energy Savers Program, delivered by the Queensland Farmers' Federation.