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# ENERGY case study

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## Energy efficient audit delivers cost savings

**AN ENERGY efficiency audit of the new overhead irrigation system on Adam McVeigh's Darling Downs farm in southern Queensland has set him on the path to reducing emissions and making big savings in energy costs.**

The audit, which was conducted through the cotton industry's myBMP energy and input efficiency module, has given Mr McVeigh the accurate, hard data he needs to make adjustments to the system to help control emissions and maximise energy efficiency.

"The great thing about it is to get a better understanding of the capabilities of the system and how we can fine tune it to get maximum efficiency," he said.

"The recommendations from the report are the really valuable part.

"There are some minor changes that can potentially reduce energy consumption, leading to 10 per cent savings in energy costs, which also helps lower the carbon footprint of the business by reducing emissions."

Mr McVeigh and his wife Edwina grow cotton and grain crops on farms at Macalister near Dalby and Murgon in the South Burnett.



*Darling Downs farmer Adam McVeigh has used the findings of a comprehensive audit of his overhead irrigation system to reduce emissions and energy costs.*

Two years ago they converted the flood irrigation system on the Macalister property to overhead irrigation, installing two centre pivots with corner arm extensions and one lateral move irrigator.

The two centre pivots are fed by three 30kW electric motors with variable frequency drives (VFDs) and the lateral is run by a John Deere diesel pump.

By being able to demonstrate how the new system would create substantial savings in energy and water usage, the project attracted funding through the Healthy Headwaters program.



Australian Government  
Department of Industry and Science

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Best Practice

“It involved us showing how much water we were potentially going to save with the conversion to overhead irrigation, then offering that water back to the government for sale,” he said.

“So we traded it back to the government for 80 per cent of the infrastructure cost.”

Mr McVeigh said a key aim of the project was to achieve water savings of 1.4 megalitres per hectare on a fully irrigated cotton crop but it also had a follow on effect of reducing emissions.

“We have had limited water scenarios since we put the overhead system in, but I believe we can potentially improve our yields and reduce our water use, and emissions per bale of cotton produced,” he said.

“This farm had a high energy usage which was a high cost to run (under flood irrigation) because it is on a creek system and we had a lot of lift pumps and tailwater which required monitoring around the clock.

“There was at least one person operating a four-wheel-drive around the clock costing diesel, maintenance and wages. And there were a lot of diesel engines to maintain.

“There was wear and tear on equipment, diesel being burnt and lots of man hours.”

Mr McVeigh said one of the main recommendations in the audit report was the need to adjust the variable frequency drives (VFDs) that operated the three electric pump motors supplying the two centre pivots.

“They were programmed as if the two pivots are running together, but depending on water supply and cropping rotation, often we will only be running one machine,” he said.



*Subtle adjustments to the variable frequency drives (VFDs) that operate three electric pump motors on Adam McVeigh's Macalister farm have saved power input and costs.*

“The recommendation is that when we are only running one machine we don't have as high a pressure requirement, so we were able to plug in different parameters into the VFDs and lower the pressure demand. That is saving power input and dollars of about 10 per cent.

“The recommendation is that when we are only running one machine we don't have as high a pressure requirement, so we are able to plug in different parameters into the VFDs and lower the pressure demand. That is saving power input and dollars of about 10 per cent, and reducing our emissions.

“Depending on whether we are running one machine or two together, there is a different setting for each.”

Another recommended change was to a one-way valve in the pump that was creating turbulent water flow and a 25 per cent loss of suction.

It was losing 10 kilopascals out of a total 40kPa, or 3 per cent of total head.

Modifying the valve is a complex option because



of the existing pipe and pump configuration, so Mr McVeigh is weighing up whether to install a better, but much more expensive, valve.

He said it was a good lesson for anyone looking at setting up a new irrigation system that they needed to carefully assess the design up front.

“It is much easier to start from scratch than try to modify something afterwards,” he said.

Mr McVeigh said being involved in the audit program had allowed him to put real figures on the energy and efficiency savings he was achieving. These worked out to be about \$4.10/ML/hectare equating to \$20.50/ha over a 5ML/ha season, or \$1450/year.

He was also able to estimate that he was achieving a 10 per cent reduction in the greenhouse gas emissions from his energy usage as a co-benefit to the environment.

“I can assume I might be getting 92 litres per second flow rate because that is what the pump is supposed to do but the people doing the audit came out and put meters on and told me I was getting a flow rate of exactly 94.1L/second,” he said.

“We can compare that to the power consumption and get an actual dollar value of about \$41/ML/ha which is \$205/ML/ha for the pumping and movement of the machine over a 5ML/ha season.

“They are real figures and hard data as opposed to an educated guess. As a cotton grower and irrigator, it is great to get the full value out of the equipment.

“The process has helped lower the energy cost and greenhouse gas emissions by about 10 per cent so I have the added benefit of knowing I can reduce the



*Irrigator spray nozzle.*

carbon footprint of the business at the same time as reducing energy costs.”

This project has been supported by funding from the Commonwealth Department of Industry and Science and the Australian Government through the Cotton Research and Development Corporation (CRDC).

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