

Energy Savers Plus Program

targets significant energy savings for a

Bundaberg Sugar Cane & Macadamia Nut Farm

Proposed
Solution



Potential
Energy
Savings



Site profile

A sugarcane and future macadamia farming enterprise located in Bundaberg could benefit from a recent Energy Savers Audit.

The total area of cropping lands consists of 82 ha and is divided into three sectors that are serviced by four pumps, while only three have been included in this proposal.

Farming requires constant decision making to maximise production and profit.

Often irrigation systems are out of date and are in need of replacement to incorporate new technologies and updated knowledge.

Current system

The current pumping systems service two sections of the farm through interconnecting underground mainline. These sections are mostly utilised for sugarcane production while an area to the north of the sugarcane fields is being developed as a macadamia nut orchard.

Pump site one services 35 ha of sugarcane with travelling gun and gravity feed furrow methods. While the incoming pressure is adequate to irrigate much of this area through gravity feed furrow irrigation, when supplying the travelling gun, a pressure management gate valve is used on the distribution side of the pump to enable restricted operation to maintain pressure.

Pump two is only used occasionally to support the main irrigation system and to irrigate the developing macadamia nut orchard. The site has historically been connected to tariff 66 which includes a fixed monthly charge based on motor size and when use is limited this charge can present a significant portion of the account.

Finally, pump three services 20 ha of sugarcane with low pressure hand shift sprinklers and trickle irrigation. It has a low capacity motor which draws an average 10 kW/hr delivering irrigation at 115 kWh per ML of water pumped.

None of the pumps are currently connected to tariff 33.

Energy consumption from the pump site showed that a total 61,387kWh at a cost of \$21,228 was used during the 2018-2019 period.

Action

A recent energy audit showed how improving the current systems can lead to energy and cost savings. The recommendations explored in the audit included:

- The replacement of pump, motor and installation of VSD at pump one.
- Solar PV at pump one.
- Conversion to Tariff 33 at all pumps.

Results

The replacement of pump, motor and the installation of VSD at pump one will lead to a significant reduction in energy use and cost and provide potential for sustainability of current levels of high productivity. Energy demand will decline as the VSD will manage factors related to incoming water delivery pressure fluctuation

Key Facts

Farm/Industry

Sugar Cane & Horticulture

Product

Sugar Cane & Macadamia Nut

Location

Bundaberg, QLD

Case study focus

Pumping, irrigation and production

Solution

Installation of Solar PV, new pump, motor & VSD. Change to tariff 33

Results cont.

It is estimated that these works would result in an approximate reduction of 17,950 kWh annually which represents an energy cost saving of \$5,645. The addition of a Solar PV system to the improved pumping system will further reduce grid energy demand for pumping and provide an additional income stream from energy export.

With all pumps (1, 2 and 3) connected to Tariff 33 and water use similar to that required for the 2019 crop, operating cost at pump one when combined with pumps two (\$962) and three (\$2,348) will result in an annual cost of \$4,560. This will lower the annual estimated cost of irrigation for each tonne of cane produced to \$0.56/tc.

The quoted cost for all the recommendations is \$61,645 ex GST which, with an estimated annual energy cost saving of \$17,137 is predicted to provide a simple payback period of 3.0 years.



Outcomes

Recommendation	Crop	Estimated Cost to Implement	Energy Savings (kWh)	Cost Savings	Cost Savings (Inc. productivity gain)	Payback Period (Years)
Pump 1 – Installation of pump, motor and VSD	Sugarcane	\$ 16,018	17,950	\$5,645	\$ 5,645	2.8
Pump 1 – Installation of Solar PV	Sugarcane	\$ 41,939	16,160	\$5,082	\$8,829	4.8
Pump 1, 2 & 3 –Change to Tariff 33	Sugarcane & Macadamia nuts	\$7,500	N/A	\$6,410	\$6,410	1.1
TOTAL	N/A	\$61,645	34,110	\$17,137	\$20,884	3.0

Conclusion/Farmer Feedback

This energy audit proposes higher efficiency via VSD technology, efficient motor and pumping equipment and integration of solar to significantly reduce the annual kWh's of energy used which will enhance the profitability and productivity potential of the enterprise.

	Cost/ML	kWh/ha
Before recommendations	\$107/1ML	748 kWh/1ha
After recommendations	\$53/1ML	332 kWh/1ha

A solar recommendation was not considered suitable for all pumps under review as the annual cost of operation on pumps two and three was too low for there to be sufficient saving to recover cost within a reasonable pay back period. The combined effect of all the proposed upgrades will reduce the annual energy demand by an estimated 34,110 kWh saving \$17,137, reducing the annual irrigation cost from \$2.57/tc to \$0.56/tc. By installing all the recommendations of the audit, the business could reduce energy consumption by 56%.

Case studies

To see how other agriculture businesses are saving energy and costs, go to www.qff.org.au/projects/energy-savers/