Energy Savers Plus Program

targets significant energy savings for a

Bundaberg Sugar Cane Farm

Proposed Solution

Potential Energy Savings 101%

Site profile

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

The total area of cropping lands consists of 35.41 ha and is serviced by one pump.

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Often irrigation systems are out of date and are in need of replacement to incorporate new technologies and updated knowledge.

Key Facts

Farm/Industry

Sugar Cane

Product

Sugar Cane

Location

Bundaberg, QLD

Case study focus

Pumping, irrigation and production

Solution

Installation fit for purpose solar PV system to improve efficiency.

Current system

The current irrigation system is run by one irrigation pump that supplies water to 35.41ha of sugarcane crop by underground mainline and trickle tape placed on the ground surface between each cane row.

The pump has recently been connected to Tariff 33. It has already been fitted with a Variable Speed Drive and with the connection to Tariff 33, has reduced energy usage from the previous 40kW to 22kW (45% reduction) and lowered cost per kWh from the previous operational average based on Tariff 65 of 28.60c/kWh to Tariff 33 rate of 19.268c/kWh (32.6% reduction).

This pump accesses water from the ground water aquifer.

The energy audit's focus for this pump is on time efficient and cost-effective irrigation methods for a particular situation with the possibility of combining solar technology.

Energy consumption from the current site showed that a total 34,032 kWh at a cost of $7,870 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:

- Install 30kW solar PV system to existing pumping system

Results

Prior to the energy audit (in March 2019) the pump was fitted with a VFD drive and converted to Tariff 33. It now operates at much lower energy demand when compared to pre February 2019 (40kW > 22kW, 45% reduction). It is also costing considerably less per hour to operate as a result of the installation of tariff 33; previous average daily cost per kWh with tariff 65 averaged 28.65c/kWh which has now been reduced to 19.268c/kWh with tariff 33 (33% reduction).

The Energy Savers Plus Program Extension is funded by the Queensland Department of Energy and Public Works.

QFF

Queensland Government

Bundaberg Regional Irrigators Group
Representing member irrigators in the Bundaberg Irrigation Area

Results cont.

Investigation into an alternative form of irrigation such as low pressure lateral move was considered however, with the limited area serviced full time by this pumping unit (17ha) and the cost of installing a low pressure unit there would be a very high cost to return ratio and is therefore unfeasible.

The energy audit has recommended a 30kW solar array for this site which will be connected to grid feed in tariff (FIT) via a 25kW AC inverter. Current energy regulation allows for a feed in supply of up 30kW per NMI. The pumping unit provides the annual irrigation demand for 17ha of trickle irrigated sugarcane and is used intermittently to irrigate (depending on season) an additional 18ha.

Estimates indicate that the 30kW of solar will further reduce daytime grid energy consumption by 99kWh per day and when the pumping system is not operating in daytime, surplus solar production will feed in to the Ergon grid.

Outcomes

Recommendation	Paddock Area (ha)	Crop	Estimated Cost to Implement	Energy Savings (kWh)	Emission Reduction (tCO^2-e)	Cost Savings	Payback Period (Years)
Pump 1 – Installation of Solar PV	35.41	Sugar cane	$41,959	34,640	28.4	$6,835	6.3

Conclusion/Farmer Feedback

An energy audit is a great first step in moving a business towards a more efficient future by reducing energy use, costs and carbon emissions onsite. The audit recommendation to install a 30kW solar PV system at the pump site will enhance the long term security of this sugarcane farming enterprise. Gone will be pumping constraints based on energy cost uncertainty.

Progressive development of the pump site technology including VFD capacity and a change to tariff 33 has lowered both energy demand and unit cost which places the system in a strong position to utilise solar as a final step as shown in the table below:

Pump 1	Cost/ML	kWh/ha
Before VSD	$68/1ML	961 kWh/1ha
After VSD	$9/1ML	0 kWh/1ha

The quoted cost of the planned solar installation is $41,959 ex GST which, with an estimated annual energy saving of $6,835, will provide a simple payback period of 6.3 years. By installing all the recommendations in the audit, the business could reduce energy consumption by 101%.

Case studies

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