Energy Savers Plus Program

targets significant energy savings for a

Queensland Sugar Cane & Small Crop Farm

Proposed Solution

Proposed Energy Savings 41%

Site profile

A mixed farming enterprise located in the Bundaberg region growing sugarcane, Sugar Cane, Sweet Potato, Pumpkin and Peanuts could benefit from a recent Energy Savers Audit.

The farm consists of 64.8 ha and is divided into two paddocks which are irrigated using two different pumps. Farming requires constant decision making to maximise production and profit.

Crops are often rotated due to season changes, weather variations and higher value products though sometimes the systems in place are outdated and are in need of replacement.

Key Facts

Farm/Industry

Sugar Cane & Small Crops

Product

Sugar Cane, Sweet Potato, Pumpkin and Peanuts

Location

Moore Park Beach, QLD

Case study focus

Pumping, irrigation and production

Solution

Installation of VFD on both pumps and installation of Solar PV on pump one.

Current system

The current irrigation system is run by two individual irrigation pumping units. Energy consumption from the two pumps showed that a total of 91,913 kWh at a cost of $22,090 was used during the 2019-2019 period.

Pump site one supplies water to 38.88 ha of sugarcane and other crops through a big gun traveller and trickle irrigation which is run through gravity feed. It had a high input flow rate and it capable of sustaining systems like low pressure lateral move. This system currently uses mechanical valves to manage the fluctuation in supply pressure and the potential for damage to farm irrigation infrastructure. Unfortunately this site is not suitable for Tariff 33 due to the metering requirements required for the size of the motor.

Pump site two supplies water to 25.98 ha of sugarcane and other crops, also through a traveling gun system and was connected to Tariff 33 during the audit. It too was installed prior to the development of variable frequency technology and uses mechanical valves.

Both pumps receive their water supply from the Bundaberg Irrigation Water Supply system.

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 two Variable Frequency Drives (VFD) to existing irrigation systems
- Install 30kW Solar PV to pump one (as well as VFD)

Results

Installation of a VFD at pump one will not only decrease energy demand but also efficiently manage the available incoming pressure of water in the Sunwater scheme and the impact of pipeline capacity contraints.

The issues of demand spike at start-up which historically has caused fuse failure requiring Ergon intervention will also be resolved.

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QFF

Queensland Government

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

Results cont.

The combination of these factors will reduce energy demand and improve potential for productivity improvement. The addition of solar PV will further reduce energy demand and provide an income off set from surplus generation.

Pump two is currently being choked back to reduce the pressure and match the travelling gun and trickle irrigator requirements. In the instance of the trickle irrigation, the choke back effect could mean that the internal pump pressure could be as much as 60% higher than that being released to the distribution system. The end result of this operation is that the pump motor is constantly working under load. The VFD will solve this issue and reduce the energy demand. Estimates indicate that the combined benefit of the introduction of VFD to both the Home and Hill pumps and 30 kW of solar PV to the home pump will lower the demand by 37,609 kWh annually.

Outcomes

Recommendation	Paddock Area (ha)	Crop	Irrigation Type	Energy Savings (kWh)	Cost Savings ($)	Payback Period (Years)
Pump 1-Installation of VFD	38.8	Sugarcane and other crops	Travelling gun	15,984	$2,864	3.3
Pump 1-Installation of Solar PV	38.8	Sugarcane and other crops	Travelling gun	10,079	$5,981	7.1
Pump 2-Installation of VFD	25.98	Sugarcane and other crops	Travelling Gun & Trickle	11,546	$3,844	2
Total	64.75	N/A	N/A	37,609	$12,689	N/A

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 following table shows how the efficiency of the system is likely to improve after the recommendations are implemented a this Sugarcane and Small Crop Farming Enterprise in Bundaberg.

Pump 1	**Cost/ML**	**kWh/ha**
Before VFD	$89/1ML	1571 kWh/1ha
After VFD	$72/1ML	1159 kWh/1ha
Pump 2	**Cost/ML**	**kWh/ha**
Before VFD	$104/1ML	1190 kWh/1ha
After VFD	$47.5/1ML	746 kWh/1ha
Pump 1	**Cost/ML**	**kWh/ha**
Before solar PV	$89/1ML	1571 kWh/1ha
After solar PV	$16/1ML	1311 kWh/1ha

The combined effect of all the recommendations will reduce the annual energy demand by an estimated 37,609 kWh; it will also provide a feed in to the energy grid of 41,797 kWh. The estimated annual total energy saving and off set value is $12,689. At a captial cost of $59,682 and from the estimated annual energy and cost savings of $12,689 the payback period is only 4.7 years.

Case studies

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