Energy Savers Plus Program targets significant energy savings for a

# Gin Gin Sugar Cane Farm

# Site profile

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

The total area of cropping lands consists of 95.37 ha and is serviced by three pumps.

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Often irrigation systems are out of date and are in need of replacement to incorporate new technologies and updated knowledge.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

Gin Gin, QLD

Case study focus

Pumping, irrigation and production

#### Solution

Installation of VFD, installation of a centre pivot irrigation system

# **Current system**

The current irrigation system is run by three pump sites which are interconnected by underground mainline. Each pump can supply water to all sectors of the farm if required. All of the pumps have recently been connected to Tariff 33.

Pump one has already been fitted with a Variable Frequency Drive and with the connection to Tariff 33 has reduced energy usage by 25% and lowered cost per kWh by 28.6%.

Pump two has a consistently high energy demand (48 kW) and is currently being restricted via a pressure choke valve . This pump accesses water from the SunWater supply and the adjacent on-site dam although very little dam water has been available in recent times. Pump two is used sparingly due to the systems inefficiency.

Pump three is known as the backup pump and there is no plan to conduct further work at this time. The reason for not proceeding with upgrades to this system is the ability for this site to irrigate without pumping (gravity feed) when in the flood irrigation mode. Energy consumption from the three pumps sites showed that a total 78,335 kWh at a cost of \$19,213 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 centre pivot irrigator at pump one.
- Install Variable Frequency Drive (VFD) to pump two and take back some irrigation load from pump three.

# Results

The Energy Audit has recommended that a low pressure centre pivot irrigator be installed at pump one. This would mean a huge energy reduction for this site. The energy demand before the use of a centre pivot was 30 kW compared to an estimated 17 kW after it's installation.

Another recommendation from the Energy Audit was to install a VFD on pump two. It is envisaged that on

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Proposed Solution

Potential Energy Savings



# Results cont.

the completion of this recommendation, pump two will become an equal contributor to the annual irrigation program as operational cost will be reduced by the installation of a VFD and the benefit of the already installed Tariff 33. The installation of a VFD will free up the pump (it will no longer have to be choked back) to take on a greater amount of the total farm irrigation effort.

Finally pump three services a portion of the farm that lends itself to low pressure furrow irrigation. However in recent years, pump three has been used more than usual to offset the higher cost of operation at pump two; this will change and operating hours at pump three will decrease as well as it's energy use and cost. Pump two will pick up this demand where a reduction in energy demand and cost for a similar pumping effort will be realised due to the VFD installation and tariff 33 upgrades.

The estimated cost of the planned combined upgrade is \$145,765. It is predicted that the annual energy cost savings will be approximately \$7,814 with a potential net return from improved productivity of \$18,200.



# Outcomes

| Recommendation                           | Crop          | Standard<br>Electricity<br>Tariff | Energy<br>Savings<br>(kWh) | Emissions<br>Reduction<br>(tCO <sup>2</sup> -e) | Electricity<br>Savings | Cost<br>Savings<br>(Inc.<br>productivity<br>gain) | Payback<br>Period<br>(Years) |
|--|---------------|-----------------------------------|----------------------------|---|------------------------|---|------------------------------|
| Pump 1 –<br>Installation<br>centre pivot | Sugar<br>Cane | Т33                               | 17,346                     | 14.2  | \$5,275                | \$15,775  | 8.7                          |
| Pump 2 –<br>Installation of<br>VFD       | Sugar<br>Cane | Т33                               | 4,040                      | 3.3   | \$2,539                | \$10,239  | 0.8                          |
| Total                                    | N/A           | Т33                               | 21,386                     | 17.5  | \$7,814                | \$26,014  | 5.6                          |

# **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 recommendations from the audit would result in huge savings for this Sugarcane Farming Enterprise in Gin Gin. The combined effect of all the recommendations will reduce the annual energy consumption by an estimated 21,386 kWh saving \$7,814 and increasing production by an estimated 650 tonnes of cane annually, which at a cane price of \$35 less harvesting cost of \$7 per tonne cane will provide additional net income of \$18,200 annually.

|                        | Cost/ML  | kWh/ha      |
|------------------------|----------|-------------|
| Before recommendations | \$66/1ML | 821 kWh/1ha |
| After recommendations  | \$39/1ML | 597 kWh/1ha |

Progressive development of the pump site technology including VFD capacity and the installation of a centre pivot system will lower energy demand and unit cost which places the system in a strong position for the future. If all recommendations are carried out, it is predicted to provide a simple payback period of 5.6 years and an actual energy saving of 27%.

### **Case studies**