Irrigators Energy Savers Program

targets significant energy savings for a

Queensland nursery

IMPLEMENTED SOLUTION

Actual energy savings 28%

Key facts

Farm / Industry

Nursery

Product

Nursery plants

Location

Brisbane

Irrigation

Drip and micro irrigation

Pumps

Centrifugal

Solution

Implemented: Lighting upgrade, solar hot water system, new pump and variable speed drive

The Irrigators Energy Savers Program was funded by the Queensland Department of Agriculture and Fisheries

Farm profile

The nursery north of Brisbane cultivates small to medium plants, shrubs and trees for supply to the property development sector. The irrigation method varies depending on the type of plant being cultivated and its stage of growth but generally, drip irrigation is the main method.

Irrigation continues all year round for an average of 12 hours per day with the load subject to temperature and weather conditions. Water is sourced primarily via bore water pumping and from an on-site dam that captures surface water runoff. The main on-site users of electricity include the irrigation system, hot water system, lighting and air conditioning.

Prior to implementing energy-saving initiatives, the nursery was facing a move to a demand tariff due to high annual consumption. To avoid moving to the tariff, the nursery would need to reduce consumption to below 100,000kWh per year.

Current energy usage

The irrigation system comprises:

- One main 5.3kW bore pump that draws water from a bore to fill the main holding tank for irrigation purposes.
- One main 7.5kW irrigation pump that draws water from the main holding tank to feed the outdoor irrigation system.
- Various pumps (2.2kW to 3kW) that circulate water through the dam to increase dissolved oxygen and draw water from the bore to fill the holding tank used to supply the greenhouse misting system.

The hot water system comprises:

- The hot water system is used to heat the greenhouses and operates at 50°C with a 3,000 litre storage tank and 750 litres in the associated pipework. It has an 18kW electric element and accounts for over 50% of the site's electricity consumption.

Lighting systems comprises:

- T8 type fluorescent fittings are used in the potting area and internal office areas and operate for 9.5 hours per day with a combined power usage of 1.8kW.

Air conditioning comprises:

- Three split system air conditioners are used in the main office building and use 3kW of combined power.

Action

An energy audit for the on-site electricity usage evaluated:

- installation of variable speed controls on pumps
- replacement pumps with more energy efficient drive units
- hot water system replacement
- lighting replacement
- air conditioning upgrade options
- installation of solar photovoltaic system.

Results

Of the energy-saving opportunities evaluated, six initiatives were identified including upgrading existing fluorescent lighting to energy efficient LED lighting, replacing the electric hot water system with a heat pump and installing a solar photovoltaic system in the medium to short term, and upgrading the aerator and irrigator pump with more efficient units at their end of life.

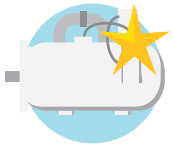
The customer was proactively involved in the assessment of energy conservation measures and has implemented the following to date:

- Fluorescent tube lighting has been replaced with LED lamps.
- The 7.5kW main irrigation pump has been replaced with a new 5.5kW pump with built-in variable speed drive.
- The 18kW hot water system has been replaced with an evacuated tube solar hot water system.

The customer has delayed installation of a solar photovoltaic system as the reduction in electricity consumption from the measures implemented is being evaluated.

Energy savings

A summary of the energy savings achieved is as follows:

Solution	 Lighting upgrade	 Solar hot water system	 New pump	 Variable speed drive
Annual energy consumption before implementation (kWh/annum)	113,328			
Savings during the 5 month reporting period (Jul-Aug 2015 and Jan-Mar 2016)				
Energy savings (kWh)	12,849			
Energy savings	28%			
Operating cost saving	$2,354			
Cost savings	23%			
Demand reduction (kW)	20			

Farmer feedback

The nursery owner is extremely satisfied that the objectives to minimise annual energy consumption to less than 100,000kWh per year were realised. Total electricity consumption is anticipated to reduce by greater than 20,000kWh per year or approximately $4,000 per year.

The customer has commenced development of further electricity consumption-reducing initiatives within their on-site packaging facilities on the basis of the benefits already realised.

This case study was originally developed during 2017-18 as part of the Queensland Government funded Irrigators Energy Savers Program, delivered by the Queensland Farmers' Federation.

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