

## Case story 2: variable speed drives for irrigation

Swan Hill, Victoria

The 'Watts in Your Business' project has completed energy audits of 30 packhouses and orchards Australia-wide. This case story of Sunfruit Orchards shows where energy use and costs could be reduced.

The Sunfruit Orchards in Tresco, Victoria, comprises 68 acres of fully irrigated orchards and produces and packs about 500 tonnes of stone fruit (apricots, plums, nectarines and peaches) per annum. The irrigation system uses four main pumping stations, three are powered by electric motors and one by a diesel motor. From June 2012 to May 2013 the three electric stations consumed approximately 70,000 kWh of electricity at a cost of approximately \$12,000 (excluding GST) and represented 25% of the business's total electricity consumption.

### Variable speed drives

A variable speed drive is used to adjust a flow or pressure supplied by a motor to meet the actual demand of a system. A variable speed drive fitted to an irrigation motor regulates the frequency of the electrical power supplied to the pump to match the volume or pressure requirements of the irrigation system. They are most effective where variable loads and fluctuations in electrical power requirements occur regularly, such as in irrigation systems that have

Improving irrigation efficiency is key to saving energy at Sunfruit Orchards.



### Site savings opportunities:

- Save \$1,510 every year including with a one-off capital investment of \$3,700.
- Achieved by installing a variable speed drive onto an irrigation motor in the orchard.
- Payback period of 2.5 years.

continual valve configurations. To further increase the efficiency of an irrigation system, the installation of the variable speed drives on the motor should be complemented with the use of high efficiency motors. Motors must be sized to meet the system's needs, as even a high efficiency motor operating under part load conditions can operate inefficiently and result in excessive electrical power demand and associated costs.

### Best option to save energy

Two of the three electric irrigation stations at Sunfruit have motors already fitted with variable speed drives. The third station did not have any speed control fitted to the motors, therefore a variable speed drive could be installed to help the station operate as efficiently as possible and minimise electricity consumption and associated operating costs.

The third irrigation station has two 7.5 kW electric motors and a series of seven media (sand) filtration systems. These two motors are around 15 years old and are likely performing at lower efficiencies due to their age and corresponding wear and tear. The

irrigation system for this station has automated valves to configure the irrigation requirements for the different zones as needed.

Due to the variable irrigation patterns, crop demands and climatic conditions it is difficult to accurately model the energy savings from the installation of a variable speed drive. The audit findings estimate an average of 7-10% reduction in the operating speed of the motors (equivalent to a 20-27% reduction in energy). To obtain more accurate savings a detailed study is recommended.

### Benefits of opportunity

By implementing the opportunity of installing a variable speed drive to the two motors on Sunfruit's irrigation system, it is estimated that the orchard could save \$1,510 in electricity costs and reduce consumption by almost 9,000 kWh. In addition to energy cost savings, variable speed drives can also reduce the maintenance costs of the motors and increase equipment lifespan as a result of less stress on rotating parts, windings, insulation and reduced vibration from throttling. The overall savings would therefore be much larger than that identified.

### Implementation requirements

- Obtain quotes and appoint a qualified contractor.
- Agree on a schedule for implementation.



Variable speed drives on electric irrigation pumps can save energy.

- Consider the irrigation demands of the orchard at the time of installing the variable speed drives. Installation should occur when pumps can be offline (i.e. in winter) and irrigation is not required.
- Perform pre-analysis of energy consumption according to International Performance Measurement and Verification Protocol method.
- Install according to manufacturer's guidelines.
- Measure circuit power after installation.
- After installation, monitor motors to ensure appropriate operation.

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