

Voltage power optimisation

Goulburn and Yarra Valleys, Victoria

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

The Geoffrey Thompson Fruit Packing Co Pty Ltd (Geoff Thompson's) packhouse and cold storage in Shepparton, Victoria produces and packs around 52,800 tonnes of apples and pears per year and is one of the largest temperate fruit cold storage facilities in Australia with 56 cold storage rooms. From October 2012 to September 2013 the facility used just over 7.8m kWh (7889MWh) of electricity at a cost of just over \$1m (excluding GST).

Montague Narre Warren (Montague's) in the Yarra Valley, Victoria, produces and packs approximately 13,560 tonnes of apples, stonefruit and pears annually and is classified as a large enterprise. From May 2013 to February 2014 their packhouse and cool rooms consumed over 3.7m kWh (3744MWh) of electricity at a cost of over \$534,000 (excluding GST).

Both these orchard facilities demonstrated high potential for energy savings through the optimisation of voltage power.

Voltage Power Optimisation

The average voltage supplied from the Australian grid is around 242V, however most electrical equipment is designed to operate efficiently at 220V. Voltage Power Optimisation (VPO) units optimise the voltage supplied from the grid to reduce the voltage to the preferred level (typically 220V) to enable plant equipment to run as efficiently as possible.

VPO units implement a controlled reduction in the voltage supplied to the equipment to reduce usage, demand and reactive power. This is important because reduced usage means a lower electricity bill.

VPO systems are generally installed on the main electrical supply to a building, allowing all equipment within the building to benefit from the controlled voltage supply.

Site savings opportunities:

- Install Voltage Power Optimisation units to main electrical supply to packhouse buildings.
- Save \$54,000 to \$58,000 every year with an initial investment of \$125,000 to \$285,000.
- Payback period of 2.2 to 5.2 years.



A Voltage Power Optimisation unit can be installed on the building's main electrical supply to reduce electricity costs.

Costs and savings of installing Voltage Power Optimisation at two sites:

	Annual Electricity savings (kWh)	Annual Electricity cost savings (\$)	Capital Cost (\$)	Simple Payback Period (years)	Percent reduction of total electricity usage
Geoff Thompson's	453,947	\$54,474	\$285,000	5.2	8.0%
Montague's	404,593	\$57,857	\$125,342	2.2	10.8%

At Montague's, a VPO unit could be fitted to the facility's single 1250kVa transformer. At Geoff Thompson's two VPO units would be required to service their 1500kVA and a 750kVA electrical supplies.

Benefits of Voltage Power Optimisation

The benefits of VPO depend upon the grid voltage supplied and the types of equipment on site. The greatest benefits occur when the supplied grid voltage is at the high end of the acceptable range and the electricity on site consists of predominantly inductive loads such as motors and certain types of lighting.

A total site electricity savings of 8% for Geoff Thompson's is possible. At Montague's, total site electricity savings could be 10.8%.

Additional savings at both sites include:

Enable power conditioning – reduced voltage enables the strain on electrical equipment to be reduced, achieving reduced maintenance requirements and longer service life for equipment. For some businesses that have implemented VPO, they have reduced maintenance costs by as much as 10%.

Improve power factor – improvements in power factor of between 3% to 10% are immediately identifiable as a result of VPO reducing reactive power.

Provide transient protection – VPO can protect equipment from common transient events, which are short spikes in the supply voltage that can damage equipment.

Implementation requirements

- Conduct voltage logging to determine power saving potential. Confirm supply and installation costs.
- Engage local electricity authority to ensure compliance of installation.
- Identify the least disruptive time of day to install the VPO as power will be shut down and arrange for temporary alternative power if needed.
- Organise pre-works in advance to minimise power shutdown and down time.