

Case story 4: power factor correction

Batlow, NSW

The 'Watts in Your Business' project has completed energy audits of 30 packhouses and orchards Australia-wide. This case story of the Woodburn Orchard's packing shed shows where energy use and costs could be reduced.

The Woodburn Orchard's facility in Batlow, NSW, produces and packs around 4,000 tonnes of apples per annum. Woodburn is classified as a large enterprise when compared to other orchards that were audited. From March 2013 to February 2014 the pack house and cold stores consumed over 488,000 kWh of electricity at a cost of approximately \$138,000.

The biggest opportunity for Woodburn to reduce electricity costs is to optimise its 'power factor'.

Best option to save energy

Power factor is the ratio of the active (or useable) power measured in kilowatts (kW), to the total (active and reactive) power measured in kilovolt amperes (kVA).



Installing a power factor correction unit at Woodburn would help to reduce energy use.

Site savings opportunities:

- Save up to \$3,500 a year, with an initial capital investment of \$8,500.
- Payback period of 2.4 years.

The optimum power factor value is 1.0.

Woodburn has an average power factor of 0.75, which indicates significant room for improvement as 25% of the electricity metered at their site is lost as reactive power.

Causes of poor power factor

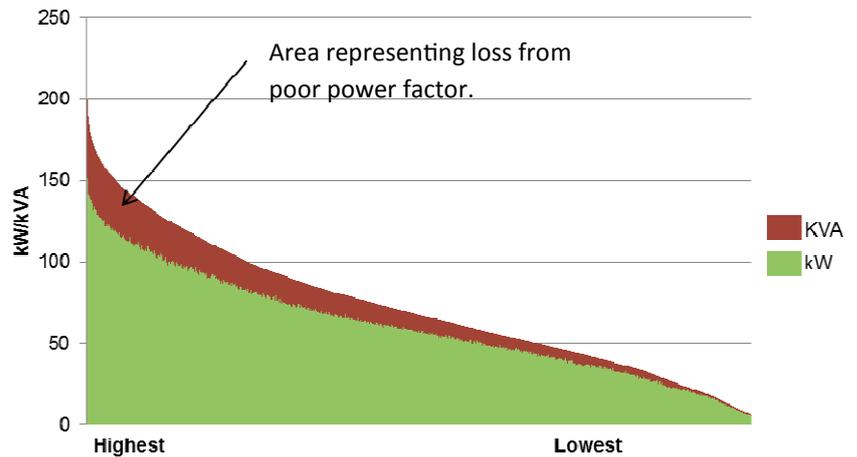
Inductive loads can cause poor power factor due to the difference between the voltage and current at the load terminals. Woodburn Orchards operates various equipment that produce inductive loads, including:

- fan motors,
- refrigeration pumps, and
- fluorescent tube lighting.

Woodburn currently has demand charges that account for 49% of the packhouse and cold storage total electricity bill. This is exceptionally high when compared to other audited businesses and is exacerbated as a result of poor power factor. As a result, the auditors investigated ways to reduce this excessive demand charge.

Woodburn annual demand profile

The graph shows the demand distribution profiles for Woodburn Orchards throughout the different electrical loads over a year. As the electrical demand (kW) increases the kVA also increases, but at an accelerated rate. As the kW and kVA lines diverge, they create a void which represents inefficiencies in the system caused by a poor power factor.



Energy losses due to poor 'power factor' at Woodburn.

Benefits of Power Factor Correction

The benefits of Power Factor Correction depend on how a site is charged for their demand. The greatest benefits occur when electricity network charges for demand per kVA (as with the Woodburn Orchard). *If a site's demand tariff is calculated per kW the benefits of installing PFC are **extremely limited** and would generally not be considered viable.*

Electricity and cost savings: Initial estimates show a total site electricity cost savings of \$3,500 in demand charges for Woodburn per year. This opportunity only reduces demand charges and not electricity consumption.

Increased load carrying capabilities in existing circuits: The reduction in current flow from improved power factor can allow the circuit to carry new loads without having to upgrade the distribution network when increased capacity is required.

Reduced maintenance costs: Achieved due to improved motor life through more efficient running and less motor burn out.

Installing power factor correction

Woodburn could keep its power factor above 0.95 by installing a Power Factor Correction unit. This would reduce the reactive power load by ensuring that current and voltage stay in phase. It would also reduce the amperage draw, which will reduce demand charge and reduce their peak demand by roughly 20kVA (valued at \$295) per month. For Woodburn, a 75KVARS Power Factor Correction Unit has been recommended.

Acknowledgement: 'Watts in Your Business' is funded by the Department of Industry as part of the Energy Efficiency Information Grants program and managed by Apple and Pear Australia Ltd (APAL).

Disclaimer: The views expressed herein are not necessarily the views of the Commonwealth of Australia, Apple and Pear Australia Ltd, KMH Environmental, Summerfruit Australia Ltd or the Cherry Growers of Australia Inc. and none of these organisations, neither jointly or severally, accepts responsibility for any information or advice.

Watts in Your Business is supported by the following organisations:



For more information contact APAL:

03 9329 3511 | info@apal.org.au | www.apal.org.au