Network Demand Management Case Study– Willows Shopping Centre, Townsville

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Toward 2 Tomorrow's Queensland

Queensland Government

ERGON ENERGY

Network Demand Management Case Study
Willows Shopping Centre, Townsville

Key challenge

Dexus Property Group was keen to install power factor correction equipment at its Willows Shopping Centre to maximise network utilisation, help protect its existing electrical equipment and extend the service life of that equipment.

Coincidentally, it was undertaking a major expansion program and was keen to have power factor correction equipment installed at the time of construction.

Willows Shopping Centre, Townsville.

Background

Willows Shopping Centre, owned by the Dexus Wholesale Property Fund, is in Townsville, one of the fastest growing areas of regional Queensland. On average, 500,000 shoppers pass through the centre's doors every month.

At the time, Willows Shopping Centre comprised 23,630 square metres of lettable space accommodating three major and 80 small tenants. Under an $83 million redevelopment plan, it would add 17,000 square metres of lettable space to accommodate six major and 125 small tenants. As well, it would build an $8 million, 500-seat food court and upgraded amenities.

Dexus Property Group is a leading manager and developer of shopping centres in Australia and New Zealand, with 15 centres under management.

Dexus Property Group is committed to being a market leader in corporate responsibility and sustainability and adopts sustainable practices at Willows Shopping Centre as well as supporting the local community's sustainability initiatives.

Energy Management Plan overview

Willows Shopping Centre Management was aware of interstate programs that offered financial assistance for power factor correction and approached Ergon Energy to inquire if any assistance was available in Queensland.

Ergon Energy was able to offer a financial incentive payment for delivered kVA reduction on the shopping centre's business-as-usual scenario under its Townsville Network Demand Management Pilot project.

As well, Dexus Property Group needed to install an additional 1500kVA substation to extend the shopping centre as planned. Under the amended Connection Agreement and in accordance with the National Electricity Rules, Ergon Energy required a power factor of at least 0.9.

Business-as-usual scenario
The existing power factor at Willows Shopping Centre's six connection points was poor, with five points recording PF 0.75 and one 0.74.

The lighting within the centre was predominantly 36-watt fluorescent lamps. Air-conditioning accounted for 50-60 per cent of the shopping centre's power consumption.

Demand management solution
The demand management solution focussed on 'fixing' the existing electrical installation and extending the life expectancy of that equipment, while protecting from the outset the installation of new electrical equipment in the extended shopping centre.

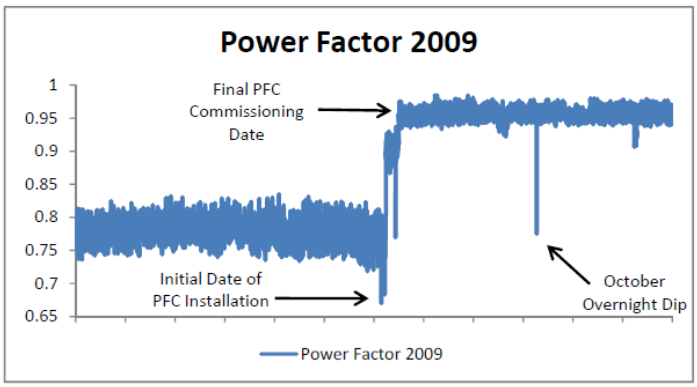
Independently, Dexus Property Group had approached the market for a quote to replace some 700 fluorescent lamps with energy-efficient LED lighting.

It also had instigated the installation of power factor correction equipment on two supply points in the existing shopping centre, prior to the start of construction on the planned extensions when an additional four power factor correction units would be installed.

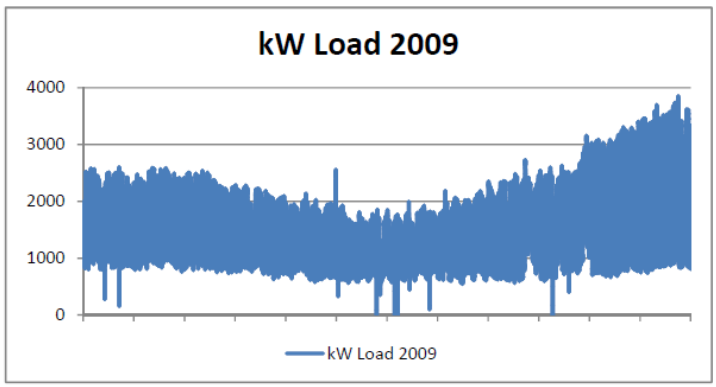
After approaching Ergon Energy, an initial site inspection by the electricity utility immediately confirmed the potential demand savings that could be achieved through improved electricity reticulation around the shopping centre if a power factor greater than 0.92 could be achieved.

Ergon Energy commissioned a Level 2 audit which confirmed the poor power factor and harmonics across the site. It also identified that power factor correction would:

- take stress off the main switchboards and transformers feeding them
- reduce heat load and harmonics
- improve electrical infrastructure within the complex, i.e., switchboards and sub-mains; and
- provide a more reliable installation overall.



The graph above shows the immediate improvement in power factor following installation of the correction equipment. The dips are the result of explained anomalies in load and did not require further investigation.



The graph above shows the kW load in 2009. The load increases from June to after Christmas and is much higher going in to 2010, possibly as a result of the centre extensions.

Results

Utilisation of the electricity supplied to Willows Shopping Centre improved immediately after the first installation of power factor correction equipment in July 2009.

The power factor correction equipment has maintained power factor at above 0.9, and mostly between 0.95 and 0.98 (that is, more than 90 per cent of the electricity delivered to site is used). Power factor has been maintained at these high levels during times of heavy shopping traffic, such as Christmas Eve, and from 2010 when the extensions to the shopping centre opened.

Measurement and Verification (M&V) Results Table			
	Business as usual	Post-EMC* implementation	Savings / annum
Demand (kVA)	4062	3384	16.69%

*** EMC = Energy Management Concept**

Before the renovations and installation of power factor correction, the maximum kW load was 2596. This occurred at 3216 kVA and 0.807 PF. After the renovations and installation of power factor correction, the maximum kW load was 3850. This occurred at 4075 kVA and 0.945 PF. Based on the PF of 0.807 at the maximum load before and the maximum load afterwards, an independent auditor confirmed there had been an approximate saving of 700 kVA due to the power factor correction installation.

Bonus outcome

Willows Shopping Centre has achieved optimum utilisation of the energy supplied to it and sees itself as 'being ahead of the game' in the event that a kVA billing component is introduced to commercial and industrial connection contracts.

Cost

Ergon Energy paid Willows Shopping Centre $70,000 for delivering a reduction in demand of about 700 kVA.

Partners

Electroserv Pty Ltd
Eco Efficiency Experts Australasia Pty Ltd
Energy Correction Options

Customer testimonial

"If it helps to reduce the supplier's need to build further electrical infrastructure and if we all can reduce demand in the longer term we can avoid load-shedding and blackouts. In the short-term it helps the shopping centre regulate voltage," Willows Shopping Centre Operations Manager Tony Armit said.

Power-factor correction equipment in the older part of the shopping centre.

Future Initiatives
Dexus Property Group has installed power factor correction equipment at its adjacent Sunland Plaza property. It will consider installing power factor correction equipment in all its future commercial building applications.

Willows Shopping Centre Management has since upgraded the centre's high-voltage network and is continuing to pursue greater electrical efficiency with its air-conditioning. It also is considering installing LED street-lighting in its car parks.