

## Charlestown Zone

### Summary

EnergyAustralia completed an initial investigation of demand management (DM) options in the Charlestown Zone area, including Dudley Zone in July 2009. The initial aim was to determine if there were cost effective DM measures that could reduce electrical loads during the 2012/13 summer peak period enough to defer the need for a new zone substation.

This report concludes that we were unable to confirm enough timely and cost-effective demand management options to defer the need for the investment.

The second aim of the investigation is to determine whether DM options exist that would be helpful in maintaining network performance in the period prior to completion of the new zone substation. This will be the subject of a further report.

### Screening Test Outcomes

An initial DM screening test completed in February 2009 concluded that the DM requirement was so high that it would not be reasonable to expect it to be achievable. A change in the forecast reduced this requirement and a revised DM Screening Test was issued in March 2009 (refer Appendix B). It showed that if the demand could be reduced by 4.9 MVA in summer 2012/13, then the need for investment could be deferred by one year. The cost of the supply side project was estimated to be \$40.5 million, so a one-year deferral would lead to a savings of \$2.64 mill or \$540/kVA.

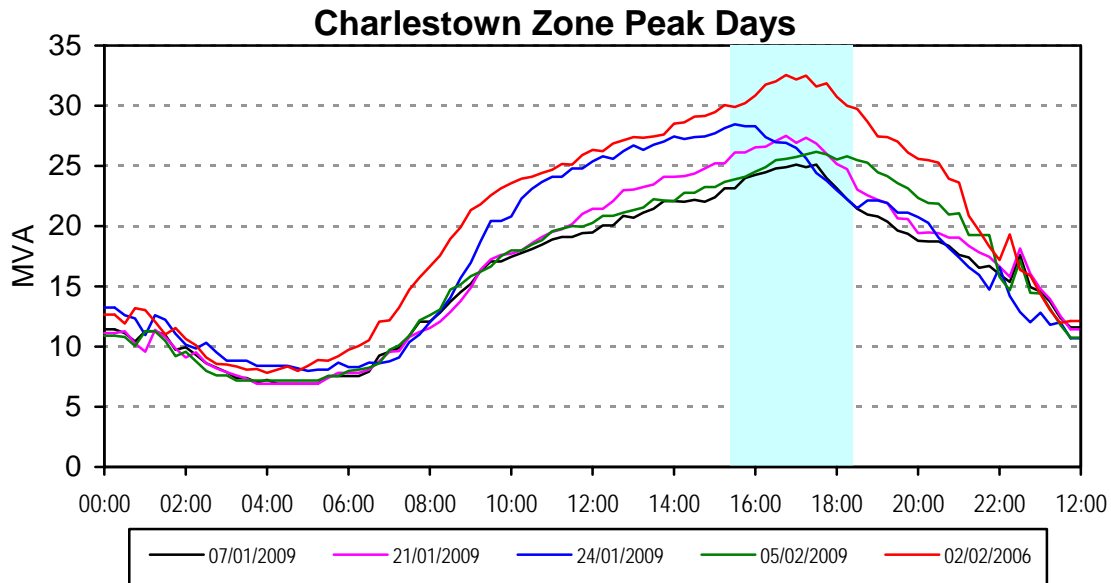
### Demand Management Investigation

Because the opportunity had only been identified following a revision to the forecast, there was little time available for investigation before a final decision on timing was required. Our approach was to attempt to identify and firm up any large and easily identifiable options quickly so an assessment could be made about whether the need could be deferred. The overall investigation approach was to identify potential DM options, assess the likely size of the demand reduction and if sufficient reductions are identified, rank them based on their cost (\$/kVA) to EA.

We identified major customers based on their maximum monthly peak demand and collected information about the usage of energy and possible DM options (refer appendix A). For each of the options we assessed the likely size of demand reduction that would result at the time of network peak at the zone substation.

### DM Characteristics - Peak Day Load Profile

The following chart shows the daily peak load profiles in Charlestown zone, during the 2006 and 2009 summer peaks. The load profile suggests that the load is a combination of commercial and domestic influences. Any DM solution would need to be effective during business day between 3:15pm and 6:30pm in summer.



### Identified DM options

- Customer tri-generation system
- Customer power factor correction
- Relocatable generators
- Commercial lighting upgrades

### Demand Management Investigation

#### Customer tri-generation system

Tri-generation is a system which can simultaneously generate electricity, heat and chilling from a single process. We identified that owners of Charlestown Square, The GPT Group, are planning to install a tri-generation system, to be commissioned by February 2011. The system has a potential capacity of 3.5MVA electrical. The owners were approached and would be happy to enter a Network Support Agreement. Public announcements and our own discussions with the proponent show a high degree of commitment and design work is well advanced. However, a formal application for connection to the network has not yet been submitted.

#### Power factor correction

Where customer's loads exhibit poor power factor, peak demands on the network are higher than they would otherwise be. During the period 2007 to 2008 EnergyAustralia implemented a PFC program in the Lake Macquarie area. We investigated the current situation with the top 10 customers in the Charlestown and Dudley Zones and identified that there was no significant opportunity for further PFC projects.

#### Relocatable generators

EnergyAustralia has used relocatable generators to provide reliable temporary load reductions in other areas. In general, using leased generators can be a cost effective DM option if a suitable location can be identified. As at the time of completion of the initial investigation, we had identified no suitable candidate sites that would provide sufficient confidence that a generation plant could be installed.

### Commercial lighting upgrade and fixed dimming units

From the survey of major retailers and multi-story residential apartments within the Charlestown CBD, we identified several opportunities to reduce peak demand by modifying lighting systems. These included installing lighting voltage reduction units; replacing high wattage dichroic down lights with efficient low wattage ones; and upgrading light fittings to efficient T5 fittings. We assessed the likely potential demand reduction from these opportunities at less than 150kVA.

### **Conclusion**

Within the time available, the investigation did not identify enough DM options that could be judged as sufficiently reliable to defer the need for the proposed investment.

**Appendix A**

	<b>CUSTOMER</b>	<b>ADDRESS</b>
1	Lend Lease Management	Charlestown Square Smart St Charlestown 2290
2	Coles Myer Ltd	Grace Bros Smart St Charlestown 2290
3	Woolworths Ltd	Smart St Charlestown 2290
4	Franklins Ltd	Charlestown Square Smart St Charlestown 2290
5	Dept Of Education & Training	King St Warners Bay 2282
6	Dept Of Social Security - Centre	Charlestown Rd Charlestown 2290
7	Coles Myer Ltd	Charlestown Square Smart St Charlestown 2290
8	The Hoyts Corporation Pty Ltd	Cinema Forum Pacific Hwy Charlestown 2290
9	Cartier Holdings Pty Ltd	Hilltop Plaza Pearson St Charlestown 2290
10	Colonial First State Property	Forum Centre Pacific Hwy Charlestown 2290

## Appendix B

NIG 11628 Charlestown Zone Substation

### DEMAND MANAGEMENT SCREENING TEST

#### Charlestown Zone Substation

##### Current Supply Arrangements

Charlestown Zone Substation consists of two 25MVA 33/11kV transformers. It is supplied from Merewether Subtransmission Substation (STS) via two 33kV feeders.

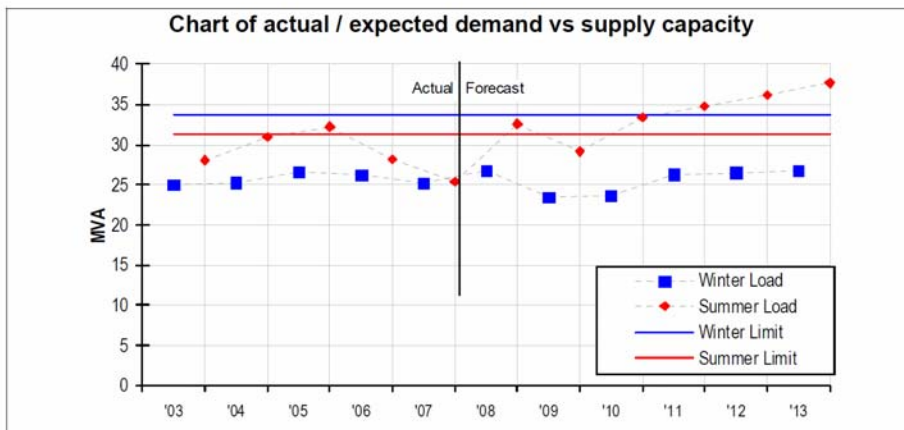
There are aged asset issues at both Charlestown Zone Substation and the adjacent Dudley Zone Substation.

These substations supply the following suburbs in the north east Lake Macquarie area – Charlestown, Dudley, Whitebridge, & Kahibah.

##### Supply Capacity and Demand Forecast

Summer is the critical season for this zone substation. The load is a mix of residential and commercial customers.

The capacity of Charlestown Zone Substation is limited to 31.3MVA in summer and 33.7MVA in winter. We forecast that demand would exceed capacity by 2.1MVA in summer 2010/11, rising to 6.4MVA by 2013/14.



The switchgear at Charlestown Zone Substation is approaching the end of its serviceable life, with switchgear due for replacement in 2012-2017, and transformers within 10-20 years. Switchgear at Dudley Zone Substation is due for replacement before 2011.

##### Supply Strategy Option

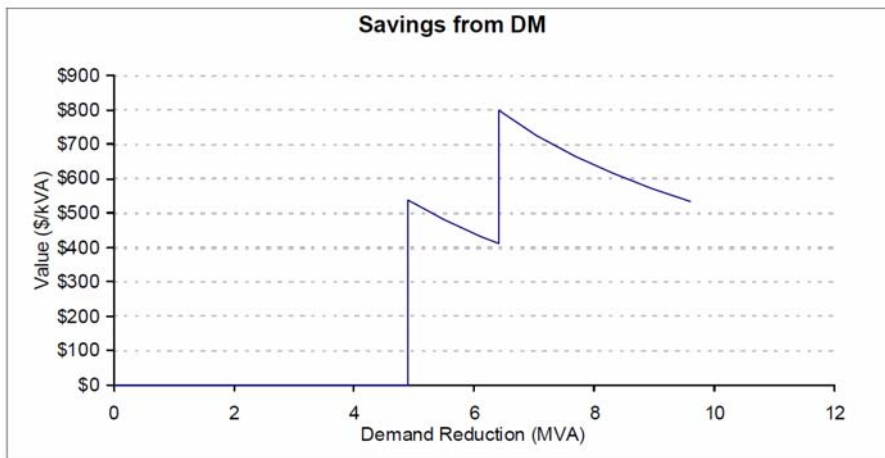
The proposed supply side investment is construction of a new 132/11kV Charlestown Zone Substation, with retirement of the existing Charlestown and Dudley Zone

Substations. The total cost of this project is estimated at \$40.5m, with commissioning proposed in 2012. A decision on this investment must be made by June 2009.

**Required Demand Management Characteristics**

If demand could be reduced by 4.9MVA before summer 2012/13, then the investment could be deferred by one year. This reduction represents 14% of the total demand on Charlestown Zone. A one year deferral would lead to savings of \$2.64m, or \$539/kVA, which is high.

If demand could be reduced by 6.4MVA before summer 2013/14, then the investment could be deferred by 2 years. The value of this deferral is \$5.11m, or \$799/kVA, which is high.



Note that if the 11kV switchgear replacement at Dudley Zone Substation is still required before the deferred commissioning date of Charlestown Zone Substation, then the actual deferral values will be lower than those stated above.

The demand reduction requirement is moderate in absolute terms and high in relative terms. The deferral value is very high, but the timeframe for a decision is relatively short. We are aware of a potential opportunity at a major shopping centre that may be suitable for providing demand management.

On balance, it is considered reasonable to expect that the investment could be deferred by implementing demand management.

**Recommendation**

Based on this analysis it is considered reasonable to expect that it might be cost-effective to postpone the proposed supply-side solution by implementing demand management strategies. A further demand management investigation will be undertaken.