Demand Management Investigation Report

Greenacre Park (GAP) – Sefton Load Area

Summary

EnergyAustralia carried out an investigation of demand management (DM) options in the Greenacre Park (GAP) - Sefton Load area in 2008. The aim was to determine if there were cost effective demand management measures that could that could reduce peak electrical loads during the peak period, to help maintain network performance at the required level in summer 2009/10, 10/11 and 11/12. This report concludes that cost effective demand management options are available.

GAP Sefton DM requirements

To ensure that demand remained within the firm rating at Greenacre Park in summer 2009/10, a reduction of 3.7MVA would be necessary, rising by an addition 2.2MVA each year thereafter. The calculated value of these reductions, based on the methodology specified by the regulator, is $12.5m. Lesser reductions would result in a proportionally reduced value.

Demand Management Investigation

The overall investigation approach was to identify potential DM options, assess the likely size of the demand reduction and rank them based on their cost ($/kVA) to EA. The most cost-effective options might result in a feasible project. We identified major customers based on their average daily usage, analysed information about their usage of energy and possible DM options. We also reviewed existing investigation reports from the Demand Management and Planning Project for major customers in GAP Sefton Load area. Using all this information, we prepared a list of potential DM options for further investigation.

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 substations. We also estimated the cost of implementing DM options to EnergyAustralia. Based on these estimates, we ranked the options and compared them to the potential savings from deferring the proposed supply side investment.

Identified DM options

- Power factor correction
- Customers' standby diesel generators
- Relocatable leased generators
- Commercial lighting upgrades and dimming units
- HVAC improvements at commercial sites

DM Options Analysis

a) Power factor correction

Where customer's loads exhibit poor power factor, peak demands on the network are higher than they would otherwise be. Based on the expected zone electrical demand data for 2008/09, we identified that GAP zone had reasonably good power factor of 0.9375 and Sefton had one equal to 0.845. Assuming customer acceptance rate of 0.7 and a customer-zone peaks coincidence factor of 0.8, the estimated potential demand reduction at Sefton zone can be approx. 1.5MVA in summer. From our experience, the estimated cost of facilitating the program is about $65,000 or < $50/kVA.

b) Customers' standby diesel generators

Based on the analysis in this area, we found that 6 major customers have standby diesel generator sets, ranging in unit capacity from 380 kVA to 1.675 MVA. Four of these gensets at one site are fully synchronised and equipped for full parallel operation with the grid, though not geared up for export of electricity. Two gensets at another site have Synchronise, Close, Transfer, Trip (SCTT) capability whereas all other gensets have a manual switching arrangement and are mostly used for essential or critical loads. A summary of available standby gensets is given below:

Customer	Diesel Gensets Configuration	Interconnection arrangement with grid	Probability of using these gensets for demand reduction
Site 1	4 * 1.5 MW	Fully synchronised but can't export	Likely
Site 2	2 * 1.65 MW	Have SCCT capability	Likely
Site 3	1 * 1 MW	No SCCT/manual switchover	Unlikely
Site 4	1 * 1.7 MW	Synchronised	Highly likely
Site 5	1 * 500 kW	Manual switchover	Tenant moved out/no need - unlikely
Site 6	1 * 380 kW	Manual switchover	unlikely

c) Relocatable leased generators

EnergyAustralia has used relocatable generators to provide reliable temporary load reductions in other areas. We are trying to identify potentially suitable locations for installation of up to 4 *1MVA generators. The estimated cost to EnergyAustralia would be approximately $1m or $250/kVA.

d) Commercial lighting upgrade and fixed dimming units for lighting

From the survey, we identified 8 commercial customers who have the potential to upgrade their existing light fittings or install voltage reduction units (dimming devices) on their lighting systems. A few typical lighting measures are:

- Replacement of single/twin 58W fittings with 35W ones
- Replacement of twin 36W fittings with single 36W one with a reflector and electronic ballast
- Replacement of twin 36 W fittings with T5
- Installation of dimming controls
- Installation of occupancy sensors

The most common lighting upgrade option is to change the existing light fittings with an efficient lighting system consisting of a single triphosophor lamp, a reflector and electronic ballast.

The estimated total demand reduction would be about 1MVA. The net cost to EnergyAustralia is estimated to be $1000/kVA.

	Potential Customer	Lighting Measure	Potential Demand reduction	Subsidy required
	Site 1	36W twins to single 36W with reflector	98 kVA	$1200/kVA
	Site 2	Replace 58W with 35W	41 kVA	$787/kVA
	Site 3	250W MH in car park to 70W CFL	66 kVA	0
	Site 4	36W twins in production area to single 36W+reflector	28 kVA	$395/kVA
	Site 5	36W Twin to T5	31 kVA	$1479/kVA
	Site 6	6*18W CFL with 3*18 W or T5	67 kVA	$872/kVA
	Site 7	36W twins with single 36 W + reflector	54 kVA	$1391/kVA
	Site 8	36W twins with T5	60 kVA	$2205/kVA
	Site 9	36W twins with a single 36W	32 kVA	$109/kVA
	Site 10	36W twins with T5	35 kVA	$980/kVA
	Site 11	36W twins with single 36W	100 kVA	$633/kVA
	Site 12	36W twins with T5	79 kVA	$1872/kVA

e) HVAC improvements at commercial sites

We identified 4 major commercial customers, which may benefit from improvements in their Heating Ventilation and Air Conditioning (HVAC) systems and associated equipment e.g. replacement of reciprocating with screw chillers and refrigeration compressors, VSD for AHU and Cooling Tower fans, pumps for chilled and condenser water.

The estimated total demand reduction would be about 750kVA. The net cost to EnergyAustralia is estimated to be $1100/kVA.

Summary of DM Project Cost and Load Reduction

Based on our investigation, we have estimated the DM project cost and potential load reduction. The following table summary results of the studies. We ranked the options according to the cost to EA ($ per kVA).

DM Options for summer	Peak Load Reduction	Total cost to EA ($NPV)	Cost to EA ($/kVA)	No. of Customers Involved	Time for Implementation
Power factor correction	1.5MVA	$50,000	$50	15	0.5 - 1 year
Customers' standby diesel generators	2 – 8MVA	500,000 – 2,000,000	$250	5	1 – 2 years
Relocatable leased generators	4MVA	$1,120,000	$280	0	1 year
Commercial lighting upgrade and fixed dimming unit for lighting	1MVA	$1,000,000	$1000	8	1 – 2 years
HVAC related improvements	0.75MVA	$825,000	$1100	4	1 – 2 years

Feasible Options

On the basis of this analysis, we considered any or all of these options might form part of a cost effective DM strategy. However, some were unlikely to be developed and implemented before summer 2009/10, so we concentrated on development of the more readily implemented options. A more detailed review of each of these was undertaken.

- **Customer PFC**

A re-analysis of all current customer data and application of reasonably expected take up and coincidence values revealed a potential for and effective level of reactive support at the zone substations of 4.87MVAr in Greenacre and 2MVAr in Sefton. This translated into a 1.58 MVA (1.66%) reduction at Greenacre and 1.06MVA (1.3%) at Sefton. Estimated cost for implementation remained at $50,000.

- **Customers Standby generation / Interruptibility**

We approached a third party aggregator regarding contracting for network support and identified up to 8MVA of available capacity from three customer sites in Greenacre that could be available for up to 10 dispatch events of up to 6 hours per dispatch. We estimated overall cost at $250/kVA for a contract for both years.

Usage of these has been mapped to the forecast load profile and assumed to be called on the 10 worst days of each season.

- **EA leased embedded generation**

EnergyAustralia has used leased diesel generators in other areas as a successful DM option. In the even that other less expensive options could not be delivered, this would provide a reliable project that would be under our control and could be delivered at a well-defined cost.

Identification of a suitable site is a critical element of this option. However, the area is large and there are several likely locations where we believe we could locate such a project. We assumed that only one site could be successfully identified and negotiated for an 18 month deployment of a 4MVA installation.

Based on our experiences from similar project, we estimated costs based on our current contracts for generator leasing and experience with previous projects. Based on analysis of the forecast load profiles we estimated likely usage (after allowing for PFC and standby gen measures). The cost for this project would be $1,120,000 for a 4MVA installation.

- **Commercial Energy Efficiency**

It was considered unlikely that the majority of these opportunities could be converted within a compressed timeframe, so benefits were only ascribed to risk reduction in later years. Cost estimates were not changed.

Summary of Feasible DM Project Cost and Load Reduction

Based on our investigation, we have estimated the DM project cost and potential load reduction. The following table summary results of the studies. We ranked the options according to the cost to EA ($ per kVA).

DM Options for summer	Peak Load Reduction (Greenacre)	Peak Load Reduction (Sefton)	Cost to EA ($NPV)	Cost to EA (cum)
Power factor correction	1.58MVA	1.06MVA	$50,000	$50,000
Customers' standby diesel generators	8MVA		$2,000,000	$2,050,000
Relocatable leased generators	4MVA		$1,120,000	$3,170,000
Commercial lighting upgrade and fixed dimming unit for lighting	1MVA		$1,000,000	$4,170,000
HVAC related improvements	0.75MVA		$825,000	$4,995,000

Based on our analysis, a strategy comprising some of the above elements would be cost effective.

Conclusion

We identified several feasible DM options that could form a cost effective strategy for reduction of peak demand to help maintain performance levels in the Greenacre – Sefton load areas. Development actions will be commenced on all options.