

## NSW Electricity Information Paper No 3/2008

# Demand management in the 2004 distribution review: progress to date

*A series of information papers on the performance of NSW electricity businesses*

## Introduction

This Information Paper is one of a series published by the Independent Pricing and Regulatory Tribunal of NSW (IPART), which aims to ensure that all stakeholders in the distribution and retailing of electricity in NSW have ready access to pertinent information.<sup>1</sup>

This paper reports the performance of the D-factor scheme introduced by IPART's determination, *NSW Electricity Distribution Pricing 2004/05 to 2008/09* (the 2004 Determination) to encourage demand management in NSW, and its impact on customers.

## Electricity peak demand growth and capacity constraints

Electricity demand in New South Wales has become increasingly peaky over time as consumers demand more electricity at peak times. High peak electricity demand growth places strain on the electricity network at these times and in certain locations. The typical response by the electricity distributors is to expand their network capacity to meet peak demand through capital investment. This type of investment to meet peak electricity demand on a system is particularly expensive as the new network assets can be idle for much of the time, that is,

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<sup>1</sup> Other information papers include:

- *Retailers' performance against customer service indicators,*
- *Distribution businesses' performance against customer service indicators,* and
- *Reliability and quality of supply of electricity to customers in NSW.*

underutilised. For example, 10 per cent of EnergyAustralia's total distribution network is used for only 1 per cent of the time.<sup>2</sup>

Another cost effective way to respond to capacity constraints is to reduce demand during peak periods by undertaking demand management. Typical examples of demand management solutions include:

- ▼ paying large customers to reduce their demand for electricity at peak periods;
- ▼ off peak control of household appliances (such as hot water systems);
- ▼ setting higher prices for electricity supplied in peak periods; and
- ▼ embedding electricity generation closer to where network capacity constraints occur.

Other measures that reduce electricity demand at all times (not just at peak times) include installing energy-efficient light globes and changing electric hot water systems to gas.

## IPART's D-factor scheme

In 2002, IPART found that certain network limits that were being reached because of rising demand could be relieved through demand management at a lower cost than through network investment.<sup>3</sup> The Tribunal identified that few demand management activities had been undertaken by NSW distributors to that point, so it sought to create some incentives for the distributors to apply such solutions.

In its 2004 Determination, IPART introduced a demand management incentive, or D-factor, scheme to encourage the implementation of specific types<sup>4</sup> of demand management solutions. The scheme allowed NSW distributors to recover the costs of implementing approved non-tariff based demand management measures through an increase in the weighted average price cap (WAPC). The scheme also allowed distributors to recover any foregone revenue from approved non-tariff demand management measures. In short, the scheme allowed slightly higher prices to encourage the NSW distributors to find more efficient ways to meet consumer demand.

The scheme introduced in the 2004 Determination was supplemented with specific scheme guidelines following extensive consultation. One set of guidelines specified the demand management costs that could be counted towards the D-factor.<sup>5</sup> The costs were capped at the value of the distribution costs that the distributor avoided by undertaking the demand management measure. Another set of guidelines set out how to measure the value of the revenue foregone as a result of the successful application of the demand management measures.<sup>6</sup>

IPART saw the D-factor as a short term incentive for businesses to overcome barriers to the greater use of demand management solutions in supplying network services, particularly with the introduction of the WAPC, and to support the emergent market for these solutions.<sup>7</sup> The D-factor scheme was intended to encourage distributors to develop cost-effective ways of relieving network constraints, encouraging efficient investment and benefiting end-users through lower electricity costs over time. IPART expected that demand management, and its related costs, would become part of standard business practices of distributors so that, in the medium term, a special D-factor incentive would be no longer necessary.

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<sup>2</sup> IPART, *NSW Electricity Distribution Pricing 2004-05 to 2008-09 - Final Report*, June 2004, p 89.

<sup>3</sup> IPART, *Inquiry into the Role of Demand Management and Other Options in the Provision of Energy Services - Final Report*, Review Report No. Rev02-2, October 2002.

<sup>4</sup> The D-factor scheme provides financial incentives to NSW distributors for the implementation certain, but not all, types of demand management solutions. In particular, the scheme seeks to overcome the disincentives for distributors to undertake efficient demand management solutions created by the weighted average price cap form of economic regulation. For more information on the structure of the D-factor please consult IPART's website [www.ipart.nsw.gov.au](http://www.ipart.nsw.gov.au)

<sup>5</sup> IPART, *Guideline - Calculation of Avoided Distribution Costs*, 28 April 2005.

<sup>6</sup> IPART, *Guideline - Calculation of Foregone Revenue*, 29 April 2005.

<sup>7</sup> IPART, *NSW Electricity Distribution Pricing 2004-05 to 2008-09 - Final Report*, June 2004, p 89.

## Cost of Demand Management and D-factor outcomes

Since the 2004 Determination, IPART has conducted three reviews of the demand management projects undertaken by the NSW distributors. These reviews focused on demand management activities, as defined by the 2004 Determination, undertaken through the D-factor scheme.

Since the 2004 Determination, the total cost of demand management has been \$12.5m as a result of the D-factor scheme.<sup>8</sup> Table 1 summarises the demand management costs incurred by the distributors from 2004/05 to 2006/07 and the associated D-factors approved by IPART.

**Table 1 Demand management costs and D-factor claims approved by IPART**

DNSP	2004/05		2005/06		2006/07	
	Cost of DM (\$m) <sup>a</sup>	Rounded D-factor	Cost of DM (\$m)	Rounded D-factor	Cost of DM (\$m)	Rounded D-factor
EnergyAustralia	3.592	0.005	3.349	-0.001	2.779	-0.001
Integral Energy	0.460	0.001	0.709	0.000 <sup>b</sup>	1.286	0.001
Country Energy	None	None	0.146	Deferred <sup>c</sup>	0.170	Deferred <sup>c</sup>

**a** The claimed amount includes DM program costs (up to the amount of avoided distribution cost), foregone revenue and time value of money.

**b** Integral Energy submitted a D-factor of 0.0004. This was rounded down to zero as required by the 2004 Determination.

**c** Country Energy submitted a D-factor of 0.0003 in these two years. However, Country Energy did not receive any D-factor because the claims were below the materiality threshold of 0.001. The Determination allowed the DM costs to be deferred to the following financial year.

Source: DNSPs' demand management costs and D-factor submissions.

### *Demand management projects and cost*

From 2004/05 to 2006/07 the distributors implemented a number of demand management programs under the D-factor scheme. These include:

- ▼ power factor correction<sup>9</sup>
- ▼ installing embedded generation
- ▼ implementing energy efficiency schemes (such as distributing compact fluorescent lamps, doing lighting retrofits, optimising car park ventilation and replacing electric heaters with LPG heaters)
- ▼ providing customer incentives (such as payments to large customers willing to lower demand during peak periods).

Table 2 presents the demand management projects undertaken by each distributor from 2004/05 to 2006/07 along with the related implementation cost and avoided distribution costs (or potential network cost savings) due to each project type. Of these programs, those focused on lowering peak electricity demand included the installation of embedded generation and customer incentive arrangements. Other programs, such as power factor correction and energy efficiency initiatives, focused on lowering demand more generally, and not just at peak times.

<sup>8</sup> Costs include foregone revenue and the time value of money.

<sup>9</sup> Power factor is an indicator how efficiently the capacity of the network is being used. Low power factor loads mean that more network capacity must be provided to supply the required amount of energy. The power factor is the ratio of the peak energy delivered to the network capacity required – a power factor of one is best. Applying power factor correction at the customers' switchboard corrects this problem and ensures that the minimum network capacity necessary is used to deliver the required energy.

**Table 2 Demand management program costs and avoided distribution costs (\$ million)**

DNSP	Number of programs <sup>10</sup>	Actual program cost	Avoided distribution cost (net present value)	Foregone revenue <sup>11</sup>
<b>EnergyAustralia</b>				
2004/05	10	2.163	5.579	0.857
2005/06	17	2.369	6.045	1.177
2006/07	17	0.788	5.829	1.605
<b>Integral Energy</b>				
2004/05	6	0.234	4.411	0.155
2005/06	7	0.304	8.072	0.287
2006/07	9	0.486	13.339	0.583
<b>Country Energy</b>				
2004/05	-	-	-	-
2005/06	1	0.108	0.118	0.014
2006/07	1	0.118	0.142	0.024

Columns may not add due to rounding.

Source: Distributors' D-factor submissions, 2004/05 to 2006/07

### *Impact on network investment*

The demand management initiatives undertaken since the introduction of the D-factor have allowed some planned capital investment, initially expected to be necessary for distributors to meet rising demand, to be deferred. Such deferrals result in cost savings for the distributors - known as avoided distribution costs. The avoided distribution costs are the differences between the cost of network investment without any demand management and the cost of the network investment with demand management.<sup>12</sup>

EnergyAustralia estimated that the DM measures implemented by them delivered a reduction in peak demand of 64 MVA in the three years to 2006/07. The annual peak demand reduction achieved by Integral Energy's DM programs totaled 31 MVA over the period.<sup>13</sup> The avoided/deferred network costs averaged 6.5 times of the distributors' demand management spending over the period.

Relative to the distributors' forecast distribution expenditure (capital and operating) the amount of distribution costs avoided or deferred was small. EnergyAustralia's avoided costs (\$17.5m) represent 0.8 per cent of its forecast capital and operating expenditure. The costs avoided or deferred by Integral Energy were \$25.8m and Country Energy \$0.26m. These costs account for 1.7 per cent and 0.02 per cent of their respective forecast capital and operating expenditure.

The demand management initiatives put in place by the distributors resulted in varying deferral times depending on the type of project implemented. In general, the projects implemented meant that required network investment was able to be deferred for between one to three years. A small number of power factor correction programs also resulted in indefinite deferral of investment. The most common investment deferral time achieved by the NSW distributors was one year.

<sup>10</sup> Most projects undertaken by DNSPs span over several years.

<sup>11</sup> Foregone revenue means revenue from prescribed distribution services provided by the DNSP which has not been recovered by the DNSP in that year and would in all likelihood have been recovered by the DNSP in that year but for the non-tariff demand management measures undertaken by or on behalf of that DNSP: IPART, *NSW Electricity Distribution Pricing 2004-05 to 2008-09 - Final Determination*, June 2004, p 36.

<sup>12</sup> Avoided distribution costs resulting from a distributor's non-tariff demand management measures for a year means the expected change in the present value of the distributor's operating and capital expenditure resulting from the deferral (temporarily or indefinitely) of expenditure on the Distribution System as a result of those measures: IPART, *NSW Electricity Distribution Pricing 2004-05 to 2008-09 - Final Determination*, June 2004, p 33.

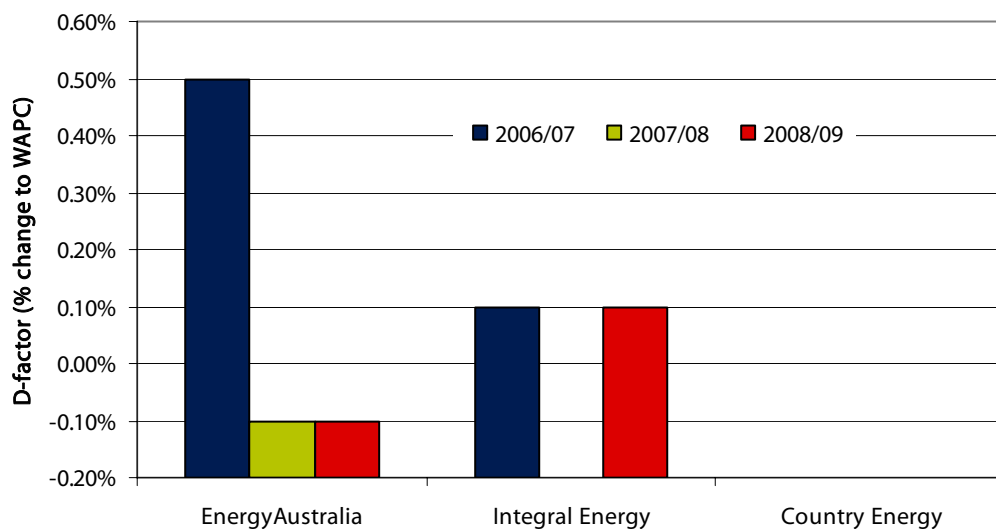
<sup>13</sup> DNSPs' D-factor submissions to IPART, 2004/05 to 2006/07.

## Impact of the D-factor on customers

The D-factor impacts customers through its effect on network prices. The D-factor affects the percentage by which average network customers prices, or the weighted average price cap, can rise in a year depending on the amount of approved demand management undertaken by a distributor.

Figure 1 shows the rounded D-factors included in the distributors network prices from 2006/07 to 2008/09.

Figure 1 D-factor adjustment to weighted average price cap, 2006/07 to 2008/09<sup>14</sup>



To date the impact of the D-factor on prices has been very small. For example, EnergyAustralia received a D-factor of 0.005 in 2006/07. For a residential customer, this increased the typical annual electricity bill of \$850 by less than five cents.<sup>15</sup>

Since the D-factor is based on a year-to-year comparison of demand expenditures, distributors must maintain or increase their level of demand management expenditure each year to justify ongoing higher prices. If a distributor does not maintain their level of demand management spending from one year to the next it will receive a negative D-factor which will reduce the size of allowed price rise in the relevant year.<sup>16</sup> In the case of EnergyAustralia, as it did not maintain the level of spending on demand management as in the first year, it received a D-factor of -0.001 (or -0.1 per cent) in the following two years.

For 2007/08, Integral Energy submitted a D-factor of 0.0004. However, the 2004 Determination requires D-factor value to be rounded to three decimal points. As a result, Integral Energy received a D-factor value of zero in 2007/08.

The 2004 Determination also implements a 'materiality threshold' that required D-factors to exceed 0.001 (or 0.1 per cent) before they are permitted to change the weighted average price cap.<sup>17</sup> For 2007/08 and 2008/09, Country Energy's D-factor result was less than the materiality threshold therefore the 2004 Determination required it to defer the benefit until a future year.

<sup>14</sup> The D-factors claimed by the distributors for 2006/07 to 2008/09 were based on demand management costs incurred by them in 2004/05 to 2006/07 respectively.

<sup>15</sup> The typical customer bill is based on EnergyAustralia's regulated retail tariff *Domestic All Time* (without off peak) and typical consumption of 7,000kWh. The amount of the bill excludes the Climate Change Fund (CCF) (formerly Energy Saving Fund) and GST.

<sup>16</sup> The D-factor represents the allowed yearly change in the weighted average price cap which enables distributors to recoup the incremental costs of demand management compared to the previous year. A negative D-factor is applied when expenditure in a year is less than the year before. This results in a reduction in the weighted average price cap as compared to the previous year. This ensures that distributors do not recoup more than what they spent on demand management in that year.

<sup>17</sup> See clause 11.3 of *IPART, NSW Electricity Distribution Pricing 2004/05 to 2008/09, Final Determination*, June 2004.

*For further information on the demand management programs implemented by each distributor please see the websites of EnergyAustralia, Integral Energy or Country Energy.*