

NSW Electricity Information Paper No 2/2007

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.¹

This paper presents the incentives provided by IPART to the distributors of electricity in NSW to manage demand, especially at peak times. It outlines one such incentive scheme for demand management, known as the D-factor scheme and considers the scheme's impact on customers during the first two years of its operation.

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 key times. High peak electricity demand growth places strain upon the existing electricity network at these times and certain locations. The typical distributor response to such strains is to build more network capacity 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, underutilised. For example, 10 per cent of EnergyAustralia's total distribution network is used for only 1 per cent of the time.²

¹ Other current information papers include: no. 4/2006: Retailers' performance against customer service indicators; no. 5/2006: Distribution businesses' performance against customer service indicators; and no. 1/2007: Reliability and quality of supply of electricity to customers in NSW.

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

Another response to capacity constraints caused by sharp, albeit short, periods of peak electricity demand is to seek to limit the rise in demand during these peaks, that is, undertake demand management. This can be done by dampening total demand, encouraging customers to switch their electricity usage into off-peak periods, or by generating an alternative source of electricity supply to remove the demand placed on the network at particular times.

Typical examples of peak 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
- ▼ embedding electricity generation closer to where energy is consumed to reduce the strain on the distribution network.

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 or heating 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.³ 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,⁴ IPART introduced a demand management incentive, or D-factor, scheme to encourage the implementation of specific types⁵ of demand management solutions. The scheme allowed NSW distributors to recover the costs of implementing approved tariff and non-tariff based demand management measures through an increase in the weighted average price cap. 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.⁶ 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.⁷

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.⁸ 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. The Tribunal 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.

³ 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.

⁴ IPART, *NSW Electricity Distribution Pricing 2004-05 to 2008-09 - Final Report*, June 2004.

⁵ 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

⁶ IPART, *Guideline – Calculation of Avoided Distribution Costs*, 28 April 2005.

⁷ IPART, *Guideline – Calculation of Foregone Revenue*, 29 April 2005.

⁸ IPART, *NSW Electricity Distribution Pricing 2004-05 to 2008-09 - Final Report*, June 2004, p 89.

Spending on demand management and D-factor outcomes, 2004/05 - 2005/06

Since the 2004 Determination, IPART has conducted two 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.

Between 2004/05 and 2005/06 the NSW distributors spent around \$8.26 million on demand management programs as a result of the D-factor scheme.⁹ The results achieved by each distributor are shown in Table 1.

Table 1 Demand management implementation costs and D-factor results

DNSP	2004/05		2005/06	
	Cost of DM (\$)	Rounded D-factor (%)	Cost of DM (\$)	Rounded D-factor (%)
EnergyAustralia	3,592,004	0.005	3,348,660	-0.001
Integral	460,492	0.001	709,228	0.0*
Country Energy	None	None	146,216	Deferred**

*Integral Energy received a raw D-factor of 0.00129. However, the change in expenditure between 2004/05 and 2005/06 was less than the D-factor materiality threshold for adjustment or deferral.

**Country Energy received a raw D-factor of 0.0003. The determination allows this result to be deferred to the 2008/09 financial year.

D-factor projects implemented

In 2004/05 and 2005/06 the distributors introduced 26 demand management programs under the D-factor scheme - EnergyAustralia 17, Integral Energy 8 and Country Energy 1. These projects include:

- ▼ power factor correction¹⁰
- ▼ installing embedded generators
- ▼ 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 outlines the projects implemented by each distributor along with the related average implementation costs 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.

⁹ Demand management costs includes foregone revenue and time value of money.

¹⁰ Power factor is a characteristic of certain loads that means they use the capacity of the network inefficiently. 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 DM projects, average costs and savings

Distributor	Number of programs	Average implementation cost (\$)	Average foregone revenue (\$)	Average avoided distribution costs (\$)
EnergyAustralia				
Power factor correction	8	48,375	32,119	608,371
Embedded generators	5	640,513	-	896,568
Compact fluorescent lamps	1	nil*	1,735,225	189,786
Customer incentives	1	21,827	17,600	488,165
Combined programs	2	57,225	-	798,011
Integral Energy				
Customer Incentives	6	39,787	1,623,667	1,623,667
Energy efficiency programs	1	147,435	1,375,000	1,375,000
Energy Audits	1	93,338	1,366,000	1,366,000
Country Energy				
Gas appliance purchase	1	108,000	14,459	118,020

Source: DNSPs' 2004/05 and 2005/06 D factor submissions. * EnergyAustralia did not claim DM implementation costs for this project as it was able to receive NSW Greenhouse Abatement Certificates (NGACs) income for the project.

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 difference between the cost of network investment without any demand management and the cost of the network investment with demand management.

In 2004/05 and 2005/06, EnergyAustralia avoided \$5.58 million and \$6.05 million of capital and operational costs through approved demand management activities. These represent 0.81 and 0.85 per cent of EnergyAustralia's forecast network investment program and operating costs of the respective financial years.

Integral Energy avoided \$4.41 million of capital and operational costs in 2004/05 and \$8.07 million in 2005/06. These costs represent 0.9 and 1.6 per cent of Integral Energy's forecast network investment program and operating costs for the corresponding financial years. Country Energy avoided \$0.118 million in capital costs in 2005/06, representing 0.05 per cent of its 2005/06 forecast capital expenditure program.

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- approximately 75 per cent of investment was deferred for this time.

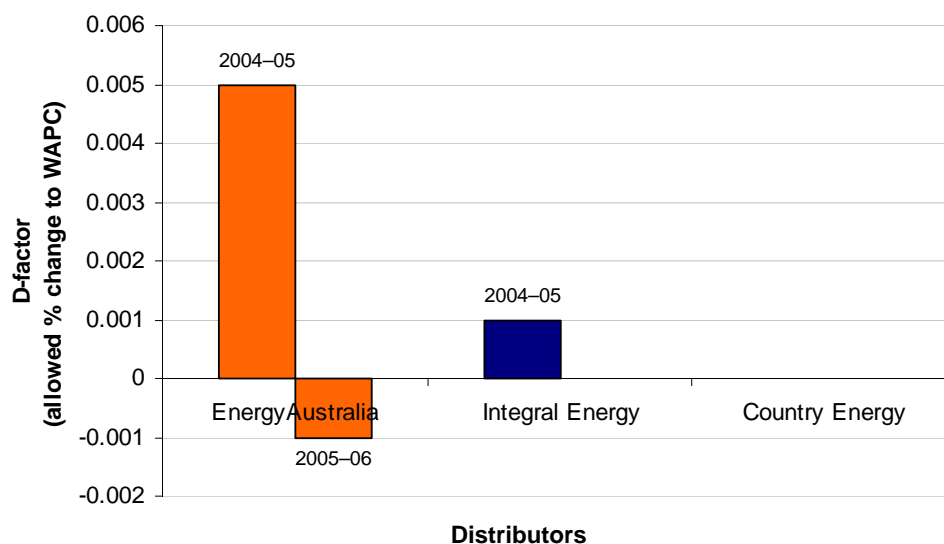
The deferral times achieved by the distributors were closely related to the cost of the investment. The higher the value of the investment required, the shorter the deferral time achieved. EnergyAustralia was able to defer a number of small projects (less than \$1 million) indefinitely. However, capex projects greater than \$1 million were deferred for only one year. Similarly, Integral Energy deferred three projects with a value less than \$3.5 million for three years while higher value projects (greater than \$3.5 million) could only be deferred for one to two years.

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 customer prices, or the weighted average price cap, can rise in a year depending on the amount of approved demand management undertaken by a distributor.

To date the impact of the D-factor on prices has been very small. During 2004/05, EnergyAustralia achieved the highest D-factor to date of 0.005 per cent. This increased the typical annual residential electricity retail customer bill of \$875 by less than five cents.¹¹

Figure 1 D-factor adjustment to weighted average price cap 2004/05 to 2005/06



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 DM spending from one year to the next they will receive a negative D-factor which will reduce the size of allowed price rise in the relevant year.¹² In the case of EnergyAustralia in 2005/06, it did not maintain the level of spending on demand management from 2004/05, so that the D-factor became -0.001.

Figure 1 shows the relative rounded D-factor results of the NSW distributors in 2004/05 and 2005/06. Integral Energy and Country Energy did not receive a D-factor result in 2005/06 although they engaged in expenditure. In the 2004 Determination, IPART implemented a materiality threshold that required D-factors to exceed 0.001 per cent before they were permitted to change the weighted average price cap.¹³ In 2005/06, Country Energy's D-factor result was less than the materiality threshold therefore Country Energy was required to defer the benefit until a future year. In 2005/06, Integral Energy submitted a D-factor of 0.0004 per cent and the value was rounded down to zero by the 2004 Determination.

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

¹¹ The typical customer bill is based on EnergyAustralia's 2006/07 regulated retail tariff *Domestic All Time* (without off peak) and typical consumption of 7,000kWh. The amount of the bill excludes the Energy Saving Fund (ESF) and GST.

¹² 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.

¹³ See clause 11.3 of the *IPART, NSW Electricity Distribution Pricing 2004/05 to 2008/09, Final Determination*, June 2004.