Determining Sales Volumes for the 2004 Electricity Network Review

INDEPENDENT PRICING AND REGULATORY TRIBUNAL
OF NEW SOUTH WALES

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1 BACKGROUND

The Tribunal is currently undertaking a review of the economic regulatory arrangements to apply to NSW distribution network service providers (DNSPs) for the regulatory period commencing 1 July 2004. In June 2002, the Tribunal released its *Notice under clause 6.10.3 of the National Electricity Code – Economic Regulatory Arrangements*, which established that the Tribunal would:

- apply a weighted average price cap to the distribution component of network prices
- allow DNSPs to recover actual transmission charges through a pass through arrangement
- determine exhaustive lists for miscellaneous charges and monopoly fees and apply maximum charges to these charges and fees.

The calculation of the X-factor in the weighted average price cap formula requires an assessment of the likely volumes of sales for each tariff component. The volume forecast has important implications for the ability of the DNSPs to recover efficient costs:

- if actual sales turn out higher than forecast, DNSPs will earn more than is required to recoup costs
- conversely, if actual sales turn out lower than forecasts then DNSP will not earn enough to recover their costs.

As discussed in the Tribunal's issues paper, this creates an incentive for DNSPs to understate their volume forecasts in order to earn greater revenue than would be required to recoup costs.

In its issues paper, the Tribunal proposed two possible approaches that it could use to forecast energy volumes:

1. Developing forecasts based on those put forward by the DNSPs, subjecting these to review by an independent consultant, and then considering public comment on the DNSP forecasts and the review.
2. Using a mechanistic approach whereby volumes are presumed to continue growing at an average of recent historical growth rates.

The Tribunal had originally intended that its consultant undertaking the total cost review (Meritec) would review the growth forecasts as part of their review of operating and capital costs. However, given the timeframe available, it has not been possible to review the growth forecasts as extensively as the total cost projections put forward by the DNSPs. The Tribunal is therefore releasing this paper to:

- present the forecast growth in customer numbers, energy sales and maximum demand submitted by the DNSPs
- summarise the key assumptions underlying the forecasts
- compare the submitted forecasts with estimates generated via a mechanistic approach and to other publicly available forecasts
- seek views from stakeholders on:
  - the appropriateness of the DNSPs' growth forecasts and
  - whether the Tribunal should utilise the DNSPs' own forecasts in the WAPC or apply a mechanistic approach to determine future growth rates.

1.1 Responses to this paper

The Tribunal invites comments on issues raised in this paper. Responses should be received by the Tribunal by **14 August 2003** and addressed to:

2004 Electricity network review – review of growth forecasts
Attn: Anna Brakey
Independent Pricing and Regulatory Tribunal
PO Box Q290
QVB Post Office NSW 1230

The Tribunal's draft decision on the issues raised in this paper will be made and set out in the 2004 Electricity Network Draft Determination.

2 THE DNSPS' FORECASTS

Table 2.1 presents the forecasts that have been submitted by the DNSP in their submissions and in their completed information requests. In developing their submissions, DNSPs were asked to provide estimates for low, medium and high growth scenarios, with the medium scenario intended to be the 'most likely' scenario at the time submissions were prepared.

Table 2.1 DNSP energy and customer growth rate projections

	Projection scenario		
	Low %	Medium %	High %
Customer numbers			
EnergyAustralia	0.7	1.0	1.2
Integral Energy	1.8	2.3	2.6
Country Energy	1.0	1.4	1.9
Australian Inland	0	0	0
Weighted average	*1.0*	*1.4*	*1.7*
Energy Sales			
EnergyAustralia	1.0	1.8	2.5
Integral Energy	1.3	2.0	2.5
Country Energy	1.1	1.7	2.8
Australian Inland[a]	0.7	1.5	2.3
Weighted average	*1.1*	*1.8*	*2.6*
Maximum Demand			
EnergyAustralia			
Summer	1.6	2.9	3.8
Winter	0.8	1.4	1.9
Integral Energy[b]			
Summer	2.1	2.7	3.2
Winter	1.3	2.0	2.5
Country Energy			
Summer	2.3	3.1	4.4
Winter	2.1	2.8	4.0
Australian Inland			
Summer	N/A	N/A	N/A
Winter	N/A	N/A	N/A

(a) Australian Inland assumed that energy sales for non-CRNP customers would grow at 1%, 2.25% and 3.5% under the three scenarios with no growth assumed for the CRNP customers. The figures presented in the table are the resulting growth rates across the full customer base.

(b) Integral Energy uses compound annual growth rates rather than average annual growth rates to forecast maximum demand. N/A denotes that no maximum demand forecasts were submitted.

In terms of their most likely 'medium' growth scenarios, the DNSPs are projecting average annual growth rates for energy sales of between 1.5 and 2.0 per cent over the next determination period. Across all the DNSPs the weighted average growth rate in energy sales is forecast to be 1.8 per cent.[1] In general, customer numbers are projected to grow at a slower rate than energy sales, between 0 and 2.3 per cent a year suggesting that consumption per customer is projected to increase. Integral have forecast residential customers numbers to increase by 2.4 per cent and for domestic consumption (ie non

[1] The weights applied were actual customer numbers and energy sales for 2001/02.

controlled load) to increase by 2.7 per cent which implies a fall in consumption per customer. However, Integral is also forecasting a decrease in the number of residential customers with an off peak hot water system and a consequent decrease in off peak (controlled load) consumption. Integral have indicated that the reasons for this forecast decrease in off peak customer numbers and consumption include State and Local Government planning requirements which restrict the use of off peak electricity for domestic hot water heating in new dwellings and an increasing proportion of new dwellings served by gas. On average, the low and high scenarios indicate a range of between 40 to 45 per cent about the medium term forecast.

Under the medium growth scenario, the DNSP's are forecasting average annual growth rates of between 1.4 and 2.8 per cent for maximum demand in winter over the regulatory period. Maximum demand in summer is forecast to grow annually between 2.7 and 3.1 per cent. The fact that summer demand growth is growing faster than consumption has important implications for network costs and network pricing.

2.1 Methodologies and key drivers

2.1.1 EnergyAustralia

Methodology

EnergyAustralia's forecasts are based on modelling and analysis of historical and expected trends in energy market, economic and demographic conditions in the EnergyAustralia Network region. The impacts of the following drivers are considered in developing the forecasts:

- economic activity
- residential customer numbers and customer characteristics, including appliance holdings
- electricity and gas prices
- fuel substitution and energy market share trends, including competition from natural gas and solar fuel sources
- energy efficiency improvements and environmental impacts
- short-term abnormal weather and day type impacts.
- the political, economic and market uncertainties associated with future trends in the above issues.

The analysis features a disaggregated approach. The prospects for the residential and non-residential sectors are assessed and forecasted independently using statistical models.

The residential forecast is based on an end-use forecasting approach that disaggregates electricity usage into 17 common electrical appliances. Key inputs into the forecast modelling are:

- Independent projections of residential sector customer numbers, provided by the National Institute of Economic and Industry Research (NIEIR), based upon their socioeconomic modelling and judgement about future population and housing trends in EnergyAustralia's network area.
- Projections of penetration rates for the appliances in the model, based upon historical trends and in-house judgement about future trends.

- Projections of annual average consumption for the appliances in the model, based upon load research information. Annual efficiency improvements for certain appliances are incorporated. These efficiency gains were assumed on the basis of historical trends published in the Australian Greenhouse Office report "*Strategic Study of Household Energy and Greenhouse Issues*" June 1998.

The non-residential forecast is based on an econometric model that identifies the statistical relationship between electrical energy consumption and New South Wales Gross State Product (GSP). The key input to the forecast modelling is projected economic activity within EnergyAustralia's region. The projections were sourced from NIEIR, but were increased by EnergyAustralia which has a view that NIEIR had overestimated the extent of drift of investment to the western part of Sydney, particularly in the context of the 2004-09 period. The NIEIR forecasts are included in Table 2.2 below.

In recognition of the inherent uncertainty in predicting future trends in the drivers of electricity consumption, EnergyAustralia analysed a range of projections corresponding to three economic and energy market scenarios (high, expected and low growth). As noted above, the detailed economic and demographic projections in each scenario have been provided by NIEIR. The scenarios that underpin the global forecasts are consistent with those used in NEMMCO's Statement of Opportunities.

The forecast process features regular and ongoing reviews and updates of the forecasts and the forecast procedures.

Key assumptions and drivers of forecasts

Table 2.2 summarises the assumed trends in the key drivers of the global forecasts.

Table 2.2 Assumptions underlying EnergyAustralia's scenarios

Driver	Source	Projected Scenario Outcome, 2004-09		
		Low	Medium	High
Economic Growth - NSW	NIEIR	1.8% pa	2.9% pa	3.8% pa
Economic Growth - EA	NIEIR	1.7% pa	2.8% pa	3.7% pa
Residential Customers:				
• Overall Nos	NIEIR	0.7% pa	1.0% pa	1.2% pa
• % with Air Conditioning	EA	50%	58%	63%
• % with OP Water	EA	39%	40%	41%
• % with Elec Heat / Cooking	EA	60% / 65%	62% / 67%	65% / 70%
• Average Consumption	EA models	-0.6% pa	-0.2% pa	0.3% pa
Weather Conditions		Average	Average	Average

Source: EnergyAustralia.

EnergyAustralia notes that energy growth over the 2004-09 period is expected to be lower than that expected during the current regulatory period. It suggests the reason for this is a combination of factors:

- marginally lower economic growth in the EnergyAustralia region, reflecting a weaker global economic outlook, the impact of increasing household debt and a gradual shift of activity toward western Sydney as transport and infrastructure improvements take effect

- lower growth in residential customer numbers, with growth returning to near long term rates after recent above average growth (fuelled by urban consolidation and strong dwelling building activity)
- stabilisation of average consumption per residential customer as a result of penetration of natural gas and solar as alternative fuel sources, and as air conditioning penetration growth slows as saturation levels are approached
- Improvements in energy efficiency due to improved public awareness of energy efficiency and demand side management issues.[2]

2.1.2 Integral Energy

Methodology

Integral Energy applied different methodologies for residential, non-residential and special categories such as inter-distributor transfers and streetlighting etc. These methodologies and resulting forecasts were subject to independent review. The methods applied were:

- end-use forecasting for energy consumption by residential customers based upon
  - forecast customer numbers
  - average consumption for each household appliance
  - forecast changes in penetration rates for each appliance
  - forecast efficiency improvements
- causal (econometric) forecasting for energy consumption by non-residential customers based upon the relationship between electricity consumption and NSW Gross State Product and real average electricity prices
- qualitative assessments of annual growth rates for the special categories of demand and
- forecasts of customer numbers based upon:
  - historical trends in population and number of dwellings in Integral's area as provided by ABS census data
  - historical information on the relationship between regional economic activity and number of non-residential customers and also specific regional planning information at a local government area level.

Key assumptions and drivers of forecasts

Underlying the non-residential forecasts are macroeconomic projections of New South Wales Gross State Product and regional economic activity. Integral commissioned National Institute of Economic and Industry Research (NIEIR) to develop projections for these aggregates. Table 2.3 summarises the specifications of scenarios underlying the NIEIR forecasts. Integral's submission does not identify the assumed values for these aggregates.

[2] EnergyAustralia submission, Appendix 3, pp 4-5.

Table 2.3 Assumptions underlying Integral's scenarios

Scenario	Assumptions
Medium (Base) Case	• Interest rates are held at near current levels. • Prudent government expenditure maintains growth. • Housing and equity prices stabilize towards the mid to late period. • Households begin to reduce debt relative to income; this increases savings but reduces household demand growth. • Growth in NSW GSP consistent with current economic forecasts.
High Case	• Strong public and private sector investment in Australian industries. • Full time employment growth and income increases leading to strong household driven growth.
Low Case	• Rapid world recovery places upward pressure on interest rates. • High debt service costs lead to very slow household consumption growth. • Falling house and equity prices result in wealth losses. • Government reduces infrastructure investment. • Increased import penetration stifles established industry sector growth. • Slow down in growth of NSW GSP compared to current economic forecasts.

Source: Integral Energy submission, pp 176-7.

Integral Energy identify some key factors influencing its forecasts:

- Significant demographic change in Integral's area with rapid growth in population, number of dwellings and household incomes.
- High and rapidly increasing penetration of weather sensitive appliances such as air conditioners and swimming pool pumps, influenced by high inland summer temperatures in Integral's area.
- A slowing in the economic growth rates affecting consumption in the non-residential sector which accounts for a large proportion of overall energy consumption. This will offset expected growth in the residential sector consumption.

2.1.3 Country Energy

Methodology

Country Energy commissioned NIEIR to develop forecasts for customer numbers, energy sales and system demand. NIEIR developed forecasts on the basis of the old county council areas that were merged to form Country Energy's supply area. The forecast methodology involved a tops down approach where the 'economic outlook for Australia is allocated between the states and then different regions within each state'.[3] Country Energy's forecasts are based upon a combination of time series and regression econometric models that:

- forecast trends in energy sales
- determine the relationship between energy sales and economic and demographic variables and other key drivers of demand.

[3] Country Energy submission, p 8-8.

Specifically, electricity sales are determined from a regression model based upon average electricity consumption for residential dwellings and the number of domestic premises, taking account of factors affecting energy consumption including real income growth, weather variables, population growth, gross state product and real electricity prices. In the model, non-residential electricity sales are linked to gross state product. Growth rates in customer numbers are based upon NIEIR's regional economic model which is based upon projections of gross regional product, population growth, construction activity and dwelling stock and have been tailored specifically to the region serviced by Country Energy.[4]

Full details of the methodology and key assumptions can be found in NIEIR's full report to Country Energy which was included as Attachment C to the Country Energy submission. This is available on the Tribunal's website.

Key assumptions and drivers of forecasts

The key macroeconomic assumptions identified in Country Energy's submission underlying Country Energy's projections are:

- Regional economy (defined as Country Energy's service area) forecast to grow at 2.1 per cent through to 2012 — 0.9 per cent under the state-wide average.
- Housing expected to grow at average rate of 1.2 per cent per annum.
- Population of Country Energy region is forecast to grow at an average rate of 0.5 per cent — 0.5 per cent below the statewide average. The population growth rate is lower than the expected increase in housing, suggesting a fall in the number of persons per dwelling.

The base case scenario for residential energy sales are assumed to be supported by high sales of air conditioning and an upturn in dwelling construction from 2004/05. Business sales are expected to mirror GSP growth in the Country Energy region. Country Energy's high and lower growth scenario are based upon higher and lower assumed GSP and population growth rates.

4 Country Energy submission, p 8-10.

2.1.4 Australian Inland

Australian Inland's projections are based upon overall network energy trends since 1989/90. Adjustments have been made for the consumption of its major CRNP customer that accounts for around one-third of Australian Inland's total supply. Including its CRNP customer, Australian Inland has experienced average growth of around 1.6 per cent. Over the past decade there has been significant variations across years and regions within Australian Inland's supply area[5].

The key features of Australian Inland's sales projections are:

- a relatively flat projection for the CRNP customer under all scenarios
- general sales growth based upon historical growth trends for non CRNP customers
- the high growth scenario incorporating a potential new mining operation (still regarded as speculative in nature.

Customer numbers are assumed to show no growth over the determination period. This reflects recent trends where population is tending to fall in the northern region centred around Broken Hill but rising in the southern region[6].

5 Australian Inland submission, p 24.
6 Personal communication, Australian Inland, 10 June 2003.

3 COMPARING THE DNSP FORECASTS WITH OTHER APPROACHES

3.1 Historical averages

Table 3.1 compares the DNSPs' submitted forecasts with average growth rates observed since 1996/97 when the current businesses were established. While, in principle, it ought to be possible to aggregate sales and customer data from the individual businesses that were merged to form the current entities to form a longer time series, the Tribunal is not confident in the quality of this earlier data.

Table 3.1 Historical Rates of Growth in Customers and Energy Sales

	1997/98	1998/99	1999/00	2000/01	2001/02	Average 1996/97 to 2001/02	Average 1998/99 to 2001/02	DNSP forecast 2004-09
	%	%	%	%	%	%	%	%
Customer numbers								
EnergyAustralia	1.5	1.5	0.9	3.0	3.3	2.0	2.4	1.0
Integral Energy	1.0	1.0	1.1	2.4	2.0	1.5	1.8	2.3
Country Energy	3.0	1.4	1.6	1.7	-1.7	1.2	0.5	1.4
Australian Inland	12.4	-0.4	-0.3	2.8	0.2	2.9	0.9	0.0
Network sales								
EnergyAustralia	4.0	4.5	5.6	3.7	0.5	3.7	3.3	1.8
Integral Energy	5.1	2.5	1.6	3.4	3.1	3.1	2.7	2.0
Country Energy	3.2	4.1	0.9	3.0	0.3	2.3	1.4	1.7
Australian Inland	3.6	4.5	-0.7	0	-2.4	1.0	-1.0	1.5

Source: Regulatory Accounts, DNSP submissions, Integral Energy personal communication.

Across the DNSPs there does not appear to be any clear relationship between historical and forecast growth rates – some DNSPs are forecasting higher growth rates than in recent years, while others are projecting lower growth. Some key observations can be made about the forecasts in relation to historical growth rates:

- EnergyAustralia and Integral Energy are forecasting lower growth in energy sales than has been achieved over the past 3 to 5 years.[7]
- EnergyAustralia is forecasting a significant reduction in the rate of growth in customer numbers.
- As discussed in chapter 2, Integral Energy is forecasting more rapid growth in customer numbers than in energy sales – suggesting a fall in per customer consumption. This is in contrast to the forecasts of the other DNSPs and also Integral's recent experience. As noted earlier, Integral Energy have indicated that this difference is primarily due to declining off peak energy consumption due to energy efficiency requirements for building approvals.
- Country Energy has forecast growth in network sales that is higher than in the past three years but lower than achieved since 1996/97.

[7] In part, this may reflect any increase in growth for EnergyAustralia and Integral Energy as a result of the Olympics in 2000 pushing up electricity demand.

- Australian Inland's forecasts for energy sales are higher than the rates of growth achieved over the past 3 to 5 years.
- Australian Inland's energy sales have shown considerable volatility over the past 5 years.

3.2 TransGrid's forecasts

As part of its annual planning review process, TransGrid prepares load forecasts for New South Wales. These forecasts are used to facilitate ongoing planning analysis and identification of network constraints. The forecasts are also provided to NEMMCO for inclusion in its annual Statement of Opportunities. The latest publicly available forecasts from TransGrid were included in its 2003 Annual Planning Report that was released in late June.[8] These forecasts are the most up-to-date and supersede those included in the New South Wales Statement of System Opportunities, which were produced in October 2001.

Table 3.2 summarises the expected low, medium and high growth scenarios for 2004 to 2009 as contained in 2003 TransGrid's Annual Planning Report. The series presented is 'End-use Consumption' representing the energy actually consumed by customers — residential and commercial and also large industrial loads including those supplied directly from the transmission network. Customers are predominantly supplied from the distribution network but could also be supplied from distributed generators located at the customer's site or, in the case of large customers, directly from TransGrid. Because TransGrid series includes customers supplied from the transmission network and also customers supplied by on-site distributed generation — and so does not pass through distribution networks — the series is not directly comparable to the DNSP forecasts. However, TransGrid report that beyond 2005, their projections assumed steady industrial load.[9] This suggests the growth rates reported in Table 3.2 are largely attributable to growth in residential and commercial customers supplied via the distribution network and should be broadly comparable to the DNSPs' projections.

Table 3.2 TransGrid Projections 2003, End Use Consumption for NSW

	Scenario					
	Low		Medium		High	
	GWh	%	GWh	%	GWh	%
2004/05	69460	-	69840	-	70520	-
2005/06	70860	2.0%	71520	2.4%	72740	3.1%
2006/07	72080	1.7%	73270	2.4%	75140	3.3%
2007/08	73250	1.6%	74940	2.3%	77470	3.1%
2008/09	74380	1.5%	76660	2.3%	79680	2.9%
Average		1.7%		2.4%		3.1%

Source: TransGrid, *Annual Planning Report 2003*.

It should be noted that TransGrid's forecasts have not yet been subject to any review, public consultation or regulatory approval.

8 This is available on TransGrid's website: http://www.transgrid.com.au/media/20030630_apr2003.html.
9 Personal communication, TransGrid, 11 June 2003.

The key assumptions regarding Gross State Product, population growth, CPI, electricity and natural gas prices, which are inputs to the TransGrid modelling, are summarised in Tables 3.3 and 3.4. The Annual Planning Report notes that these assumptions were sourced from scenarios developed by NIEIR.[10]

Table 3.3 TransGrid assumptions about Gross State Product growth

	Low %	Medium %	High %
2004/05	2.5	3.4	4.5
2005/06	2.1	3.5	4.3
2006/07	1.4	2.3	3.4
2007/08	1.7	2.9	3.5
2008/09	2.2	3.3	4.3
Average growth rate 2004-09	2.0	3.1	4.0

Source: TransGrid, *Annual Planning Report 2003*, p 120.

Table 3.4 Other key assumptions in TransGrid forecast

	Average annual percentage change 2002/03 to 2012/13		
	Low	Medium	High
NSW resident population	0.8	1.0	1.2
All groups Sydney CPI	4.0	2.6	1.8
Real electricity prices	1.0	1.4	1.7
Real natural gas prices	0.2	0.7	1.2

Source: TransGrid, *Annual Planning Report 2003*, p 121.

The TransGrid projections suggest overall growth rates for NSW of between 1.7 and 3.1 per cent a year on average, with a medium growth projection of 2.4 per cent. These growth rates are higher than those projected by the DNSPs. For example, the weighted average growth rate for New South Wales as implied by the DNSPs' forecasts (medium scenario) is 1.8 per cent compared with TransGrid's medium scenario of 2.4 per cent over the regulatory period. One explanation for the difference could be that the TransGrid forecasts are based upon a forecast of growth in Gross State Product that averages 3.1 per cent over the 2004 regulatory period, whereas, for example, EnergyAustralia's forecasts are based upon a scenario that assumes Gross State Product will average 2.9 per cent over the same period (see table 2.3). It is not clear why these assumptions, which are sourced from the same agency, are different.

10 TransGrid, *NSW Annual Planning Report 2003*, p 120.

3.3 ABARE forecasts for electricity demand

ABARE have produced forecasts for final energy consumption in New South Wales for various types of fuel including electricity as depicted in Table 3.5.

Table 3.5 Final energy consumption growth rate projections for NSW by fuel type

	Projection	
	2004/05 Petajoule	2009/10 Petajoule
Fuel type		
Black Coal	41.7	51.5
LPG	35.0	36.9
Other petroleum products	496.5	546.7
Natural gas	127.1	139.6
Electricity	245.0	271.9
Biomass	39.9	42.0
Solar Energy	1.1	1.3
Total	**986.3**	**1089.9**

Its energy projections are based on ABARE's model, *E4cast*. *E4cast* is a partial equilibrium model of the Australian energy sector that estimates the main interdependencies between energy production, conversion and consumption. The model incorporates real incomes and industry production trends, fuel prices and technical change (or improvements in energy efficiency). The model covers a number of different fuels and forecasts end use consumption across twenty sectors.[11]

Some key assumptions of the model include:

- Gross State Product is forecast to grow at an annual rate of 3.1 per cent between 2000/01 and 2005/06 and up to 2019/20.
- Demand for each fuel source is estimated to fall by 0.5 per cent per year up to 2019/20 based on technical changes in the drive to achieve greater energy efficiency.

ABARE forecasts that electricity demand in New South Wales will grow by 2.1 per cent each year from 2004/05 to 2009/10, which broadly spans the 2004-09 regulatory period. This projection is lower than TransGrid's medium scenario and higher than the weighted average of the DNSPs' forecasts.

11 ABARE, 2003, *Australian Energy: National and State Projections to 2019/20*, Commonwealth of Australia, Canberra.

4 A MECHANISTIC APPROACH

In its issues paper, the Tribunal suggested that a mechanistic approach could be applied to derive sales and customer forecasts. A number of different mechanistic approaches are possible. One approach would be to look at the recent trends in the data and use this to form a forward looking forecast of likely growth in the forthcoming regulatory period. Section 4.1 considers this issue and looks at two possible trends — a linear (straight line) trend and a logarithmic trend which allows for a more rapid reduction in the annual growth rate.

The issues paper suggested a lagged approach that could applied across a number of regulatory periods, on a consistent basis. Section 4.2 examines recent historical growth rates for each of the DNSPs and calculates an average annual growth rate that could be applied going forward into the 2004 regulatory period. That section also discusses this approach more fully.

These two broad approaches are illustrative and not exhaustive — stakeholders are welcome to suggest other mechanistic approaches that the Tribunal could apply.

4.1 Trend analysis

Using the standard trendline function in Excel, it is possible to fit various trendlines to the historical data on energy consumption underlying Table 3.1.[12] In fitting these trends, Excel looks for the trendline that best fits the historical data. Trend analysis relies on a good time series data set. This analysis has been conducted using only six years of data. This may be a limiting factor in using trend analysis. Charts 4.1 to 4.4 illustrate for each of the DNSPs the effect of fitting:

- a linear trend (basically a straight line through the historical data points)
- a logarithmic trend (basically a downwardly curving line through the historical data points).

For comparison purposes, the DNSPs' forecast are included in the charts.

The fitted trendlines generally fit the observed data quite well. The exception is Australian Inland which over the period has experienced quite volatile energy sales. As can be seen, in general, the DNSPs' forecasts lie between those of the linear and logarithmic trend lines (and below the historical average growth rate). For example, EnergyAustralia's medium scenario growth rate is 1.8 per cent. A linear trend would imply an annual growth rate averaging 3.1 per cent while a logarithmic trend would imply an average growth rate of 0.9 per cent. This latter trendline is picking up the drop off in growth in energy demand in 2001/02. In comments to the Secretariat, EnergyAustralia has indicated that preliminary figures for 2002/03 indicate a continuation in the lower growth trend.

Two different forms of trendlines fit the data well, giving quite different results. This reflects the fact that there are only 6 data points from which a possible trend can be determined. This limited data set is likely to pose problems in terms of using an estimated trend line as a forward looking forecasting tool.

[12] A similar calculation can be made for customer numbers and maximum demand but for illustrative purposes only energy consumption is discussed here.

Chart 4.1 Comparison of approaches — EnergyAustralia energy sales

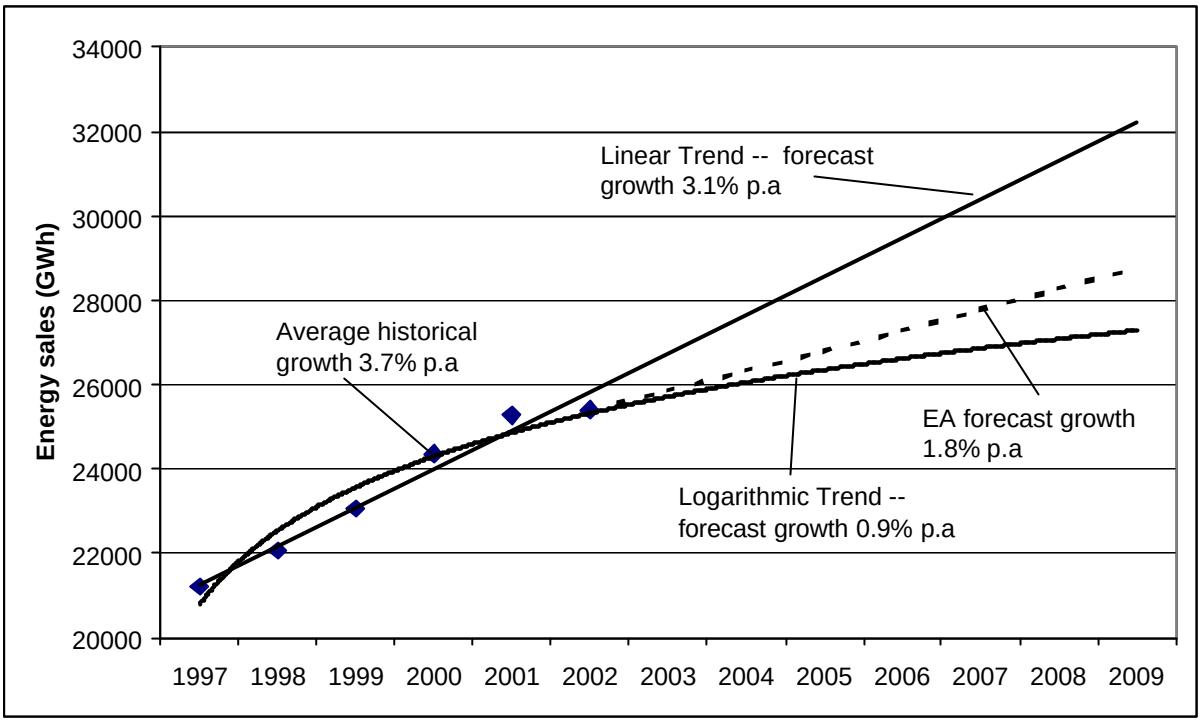


Chart 4.2 Comparison of approaches — Integral Energy energy sales

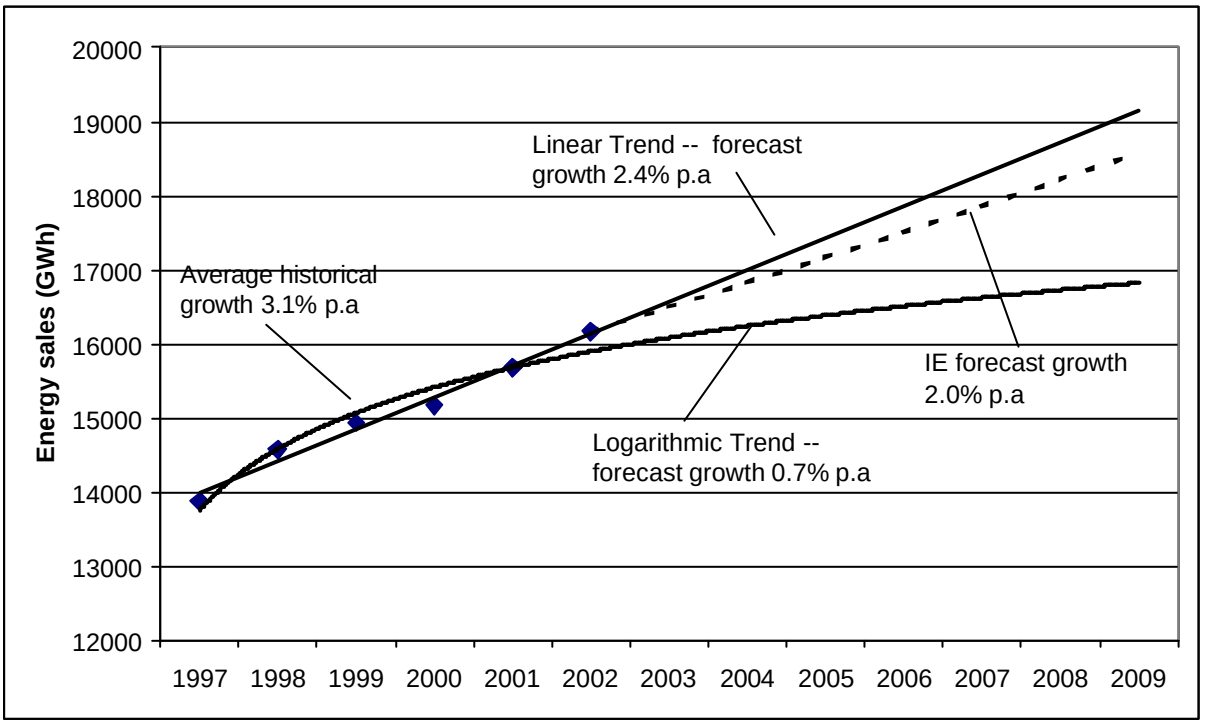


Chart 4.3 Comparison of approaches — Country Energy energy sales

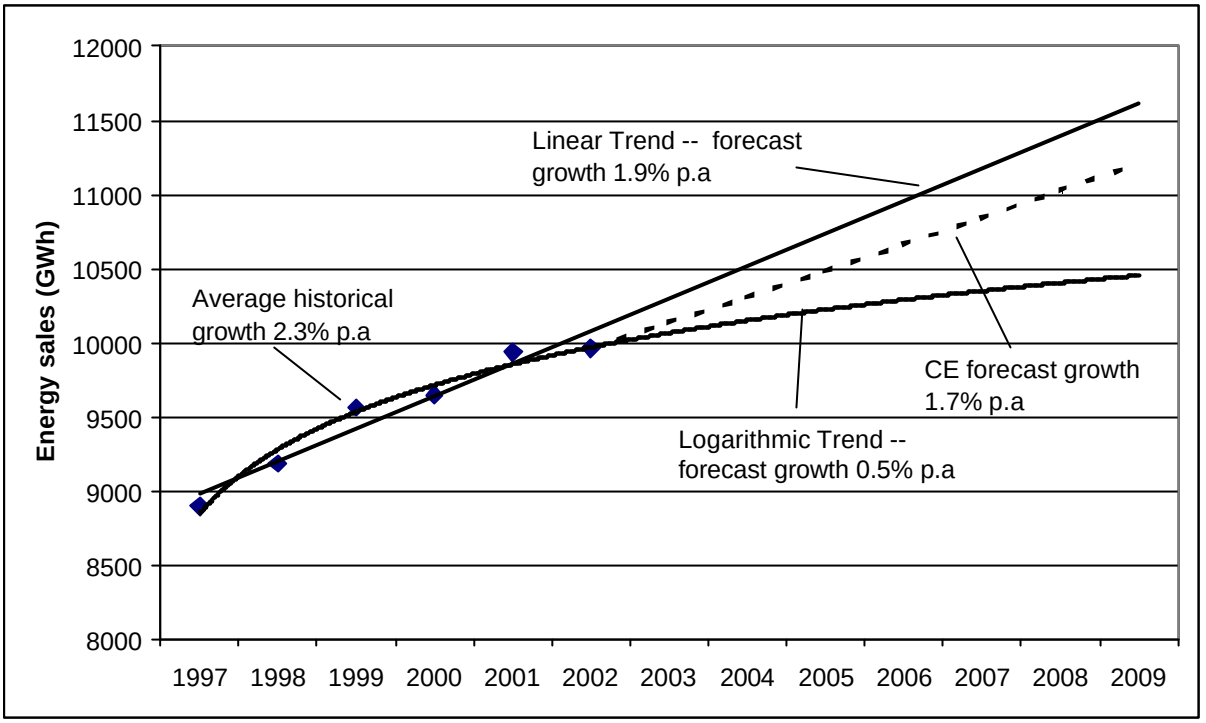
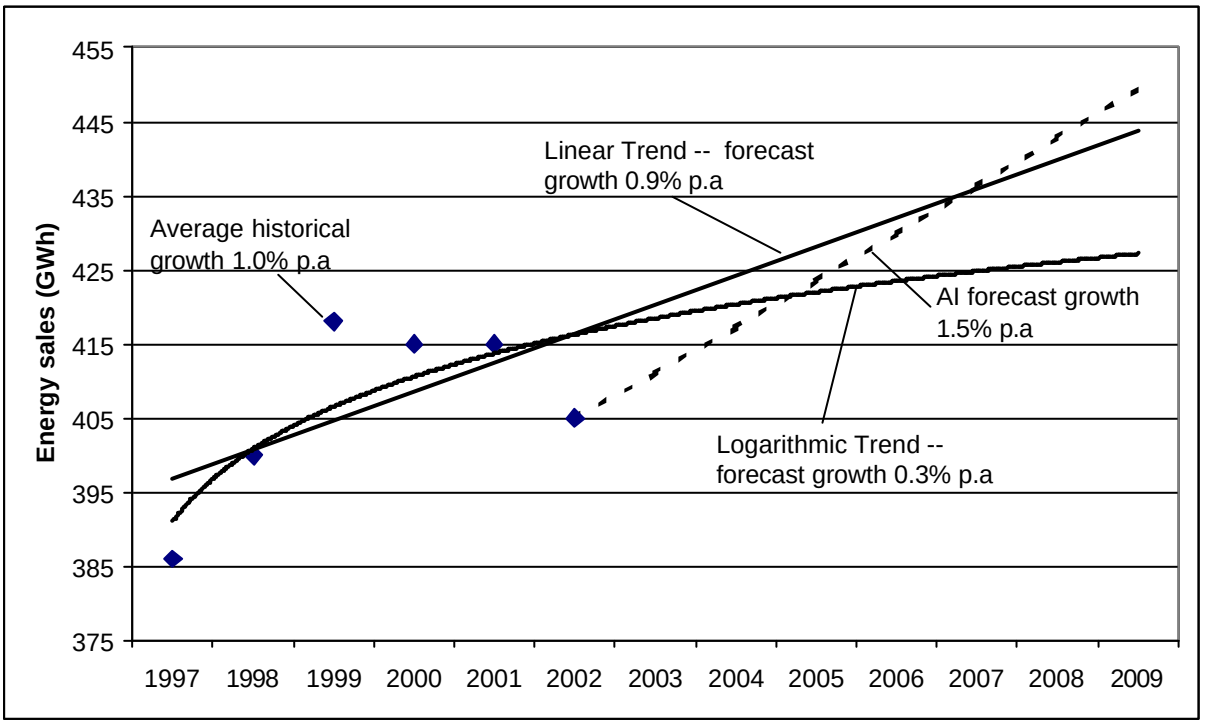


Chart 4.4 Comparison of approaches — Australian Inland energy sales



4.2 A lagged approach

Under the lagged approach, the assumed growth rate for the forthcoming regulatory period would be set equal to say a three or five year average of sales volumes in the years preceding the regulatory period. This approach does not seek to accurately forecast future growth over the regulatory period but recognises that over a number of regulatory periods the lagged approach would ensure, on average, that the applied sales growth rates are on average equal to actual long term average growth. The use of lagged values means that it will be an unbiased and self correcting approach. An implication of this approach is that, while in any given regulatory period DNSPs might over or under recover notional revenue requirements due to differences between actual and forecast growth rates, across a number of regulatory periods, DNSPs would recover aggregate revenue requirements, on average.

Table 4.1 illustrates the growth rates that would be assigned to the DNSPs under a lagged approach and compares them to their submitted forecasts. The following observations can be made.

- Under a lagged approach calculated over a 5 year period, EnergyAustralia, Integral Energy and Country Energy would all be assigned higher growth rates in energy sales than those forecast in their submissions. Australian Inland would receive a lower rate.
- Over a shorter horizon of three years, Country Energy and Australian Inland would be assigned a lower growth rate than forecast in its submission while EnergyAustralia and Integral Energy would be assigned higher rates. Australian Inland would actually face a negative growth rate under a 3 year average.
- In terms of customer numbers, EnergyAustralia and Australian Inland would face higher future growth rates under a lagged while Integral Energy and Country Energy would both be assigned lower growth rates.

Table 4.1 Growth rates under lagged approach

	5 year average %	3 year average %	DNSP forecast 2004-09 %
Customer numbers			
EnergyAustralia	2.0	2.4	1.0
Integral Energy	1.5	1.8	2.3
Country Energy	1.2	0.5	1.4
Australian Inland	2.9	0.9	0.0
Network sales			
EnergyAustralia	3.7	3.3	1.8
Integral Energy	3.1	2.7	2.0
Country Energy	2.3	1.4	1.7
Australian Inland	1.0	-1.0	1.5

5 ISSUES FOR DISCUSSION

The Tribunal has two options for forecasting energy and customer volumes during the 2004 regulatory period:

- it could accept the DNSPs' submitted forecasts, perhaps choosing a lower or higher growth scenario as appropriate
- it could adopt estimates generated by a mechanistic approach such as those discussed in chapter 4.

The Tribunal is seeking comments from stakeholders on whether, if it were to adopt the DNSPs' submitted forecasts, the DNSPs' medium growth forecasts represent the most likely outcome looking forward into the 2004 regulatory period. If not, would the lower or higher growth scenarios be more appropriate?

The Tribunal is also interested in stakeholder views on the mechanistic approach. The advantages of a mechanistic approach are that:

- it would be free of any biases created by incentives created by the weighted average price cap arrangement for businesses to understate forecasts
- recent historical growth is an unbiased forecast over successive regulatory periods if consistently applied over successive regulatory periods (as discussed in section 4.2).

The disadvantages of a mechanistic approach are:

- there is a limited data set (six years) from which a forward looking forecast could be determined
- it ignores detailed knowledge that DNSPs might have about demand conditions in their supply areas
- it may not take into account of structural and demographic changes that could affect forward looking estimates of growth — for example, loss/development of large industrial customers, new residential estates etc.

In submissions, DNSPs have generally argued against a mechanistic approach to forecasting volumes for inclusion in the WAPC.

The Tribunal seeks comment from stakeholders on the two possible approaches to generate the growth forecasts.