



The Demand for Electricity in Australia to 2020

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Pursuing a secure electricity supply future for Australia is easily among the top ten priorities for government at national and State levels.

The test of this assertion is simple: cut off power to any major centre for one or two days. Such an eventuality is unthinkable to the Australian community.

Electricity is unique among commodities. Society cannot function without it and it is the most perishable of perishables – it must be used as it is generated. It is virtually impossible to store power efficiently. As a result demand must match supply perfectly at every given moment – or else the lights go out.

Since power cannot be stored, no centralised buffer supply can be maintained – as developed countries do for example with oil – and thus supply security means that sufficient generating capacity must be available to exceed peak load.

As an example of the difficulties encountered when supply is inadequate, one need not turn to the headline-making blackouts in recent months in North America, London, Denmark and Italy – these can all be tracked back to either human operating errors or to sudden impacts on the system from storms.

No, as an example of what occurs when the power supply is inadequate, turn to China, which has just ended a summer where its economic growth and residential demand has well outstripped power supply in 19 of its 31 provinces. Officials planned for an increase in demand of the order of 8 percent a year – it is running at 15 percent. As a result, in Shanghai for example, 1,300 factories have been forced to cut production to four days a week and often to shift operations to weekends. In another province 200 factories shut down. And this is not a problem that is over – predictions for summer 2004 and summer 2005 for the imbalance between supply and demand in China indicate that firms and households will continue to endure difficulties as the State-owned utilities struggle to build new plants. In this situation, the issue is generation capacity – but, as has been demonstrated in the north-east US and Canada, a lack of transmission capacity can be

just as big a problem, even a bigger problem, and no less difficult and expensive to remedy.

Pursuing a secure, reliable electricity supply, therefore, is easily explained as a high national priority here as elsewhere and the cost of doing so in the next 12-20 years will be measured in billions of dollars – according to ESAA calculations, some \$30 billion by 2012 and probably more than \$40 billion by 2020, not including the billions likely to be needed to ensure an adequate supply of natural gas to generators.

In any scenario that makes sense to ESAA, natural gas, black coal and brown coal will dominate as fuels for electricity generation. Obviously, renewable energy, driven by government subsidy through a program that mandates retailer purchases, will grow in use, but at 2020 it is not remotely likely that fossil fuels will have less than 80 percent of the generation mix.

A brief word here about the prospect for nuclear power use in Australia in this time frame. ESAA simply cannot see a nuclear development being pursued – for political reasons if for no other.

Our brief for this conference is to comment on the demand for electricity in Australia to 2020. Our projections are based on modelling undertaken for ESAA over several years by the National Institute of Economic and Industry Research (NIEIR), trading as National Economics.

The latest modelling undertaken for us by National Economics was produced in July this and, as with earlier modelling, is presented as three scenarios:

1. a business as usual (or most likely) scenario;
2. a high growth scenario; and a
3. low growth scenario.

Under the base case, Australian GDP averages 3.1 percent growth between 2003 and 2020 while population growth averages 1.1 percent. In the high growth scenario, GDP rises by an average of 4.1 percent per year and population by 1.3 percent a

year. Under the low growth scenario, GDP rises by nly an average of 2.2 percent a year and population growth averages 0.9 percent annually.

Of course a range of assumptions are built in to these scenario models – for example assumptions regarding the timing of major project developments in the mining and mineral processing areas – and it needs to be emphasized that these projections are not forecasts.

An important point that needs to be highlighted is that demand for electricity in this country is focussed in a major way in three regions – Victoria, New South Wales and the Australian Capital Territory, and Queensland. They account for some 80 percent of all electricity consumption and hence of investment in supply infrastructure. The only change our scenarios perceive in this situation is that Queensland will overtake Victoria as the area of second highest demand for power.

This geographic dimension is important in terms of fuel supply. Victorian supply is dominated by brown coal generation, while that of NSW and Queensland is predominantly black coal. Coal-fired power stations are continuing to be built in Queensland; they are not proposed in actual developments in train for NSW and Victoria at present in any significant way. The rise of natural gas as a supply source for Victoria and NSW, and also for South Australia, is seen as highly likely, raising questions about availability of reserves and about the cost of gas. Apart from the Snowy Mountains System and some smaller generation plants, hydro-electric power plays a small role on the eastern seaboard – unlike Tasmania where it is the dominant power fuel source in a small market. There are many opportunities for relatively small, new renewable energy plants but in aggregate they are not foreseen as accounting for more than 2 to 5 percent of demand, depending on political decisions. The prospect of the introduction of geothermal power, based on Cooper Basin hot rocks, is not to be discounted, but again it will not greatly change the fossil fuel dominance of the generation “fleet.”

In order to look forward with understanding, it is helpful to look back. ESAA can produce supply and demand data for more than 50 years, nationally and on a State-by-State basis.

For the purposes of this presentation, we point out that:

1. 50 years ago total Australian demand was little more than that of South Australia today at 12,450 GWh a year, with residential demand accounting for more than 40 percent of total consumption.
2. 30 years ago total Australian demand was four times higher than in the 1950s, driven by business and residential consumption increases,

and with householders accounting for about 35 percent of demand. It totalled 50,500 GWh a year.

3. 10 years ago total Australian demand was 2.5 times what it had been in the 1970s, with business demand almost treble its 1970s level and residential consumption now less than 30 percent of the total. Consumption amounted to 132,400 GWh a year.
4. Last year, consumption totalled 176, 300 GWh with 125,300 GWh used by business and residential demand down to some 28 percent of the total. Between 1993 and 2002 total demand had risen by more than the consumption today of Victoria.

We have become an energy-intensive economy with growth in demand for electricity a function of a number of factors, including:

1. rising economic activity;
2. rising population;
3. increased used of computers and other technology developments;
4. increased use of air-conditioning in homes;
5. and low prices for power by world standards: Australia has the fourth cheapest electricity for factories in a basket of 24 nations studied by the British Electricity Association and the fifth cheapest residential power prices.

So where is power demand headed, according to the National Economics modelling?

For the purposes of this presentation, we will use only the base case (most likely) scenario. Under this scenario, on a national basis, the outlook is for:

1. demand in 2010 to pass 218,000 GWh with business consumption at 156,000 GWh;
2. demand in 2015 to pass 248,000 GWh with business consumption at 180,00 GWh; and
3. demand in 2020 to pass 281,000 GWh, with business consumption at almost 206,000 GWh.

As already indicated, the major areas of consumption and of demand growth will be The National

Economics’ “business as usual” modelling indicates that:

1. NSW/ACT demand in 2020 will be 35,000 GWh higher than it was last year, reaching 98,000 GWh;
2. Queensland demand will have virtually doubled to reach 70,500 GWh in 2020; and
3. Victoria’s consumption in 2020 will be almost 20,000 GWh higher than in 2002, passing 59,500 GWh.

This says that consumption in these three States will have absorbed well over 85 percent of the total level of growth – or to put it another way, in electricity demand terms, another New South Wales will have been added to Australia.

Under-estimating the power pressures arising from population growth and use of power plus demand from industrial and commercial customers, as indicated earlier, has been the undoing of Chinese planners in the past northern summer – and it was a significant factor in the problems encountered by California in 2001.

Under the National Economics scenarios, the “high growth” version sees total consumption nation-wide in 2020 exceed 325,000 GWh – that is adding another Victoria to the additional New South Wales represented by the base case predictions for growth.

Demand rises under either scenario place substantial pressure on governments to get the environment for investment right and to do so in a timely manner. The data we have presented here relates to overall consumption – it does not dwell on the issue of summer peak loads, where, particularly in South Australia and Victoria, possibly in NSW and possibly in southern Queensland the pressures created by five or six extremely hot and humid days a year are a constant challenge.

A Chinese-like supply problem would be an economic disaster for Australia; a failure to meet summer peaks would be a political disaster for incumbent governments in affected States.

The policy challenges include the need to ensure that the wholesale market operates efficiently while providing incentives for new generation capacity, both baseload and peak load; the need to get the regulatory regime right to ensure that network infrastructure upgrading and development keeps up with customer requirements; and the need to get environmental policy and regulation right to avoid

running in to the sort of problems that have plagued California and Italy in recent crises.

As the old joke goes, “if it was easy, they would all be doing it;” “it” – getting the supply/demand balance right, keeping prices affordable, meeting the need for appropriate greenhouse gas abatement, maintaining quality of supply – is anything but easy.

The marketplace abounds in emotive four-letter words – “risk” and “cost” and “time” chief among them. The messages from a number of places around the world is that it is only too easy to stumble and that the challenge is continuous.

For Australia, the demand prospects, thanks to the modelling undertaken for ESAA and others, including the Federal Government, are relatively clear. Policymakers cannot pretend they do not know the dangers – but then policymakers in the US have known for a decade that transmission congestion posed major risks and that network investment was very significantly below what is needed. They still managed to set themselves up for the blackout of 14 August.

In Australia, under pressure from ESAA and others, governments launched the Parer review in 2002 and have, via the CoAG ministerial council process, showed a considerable determination in 2003 to pursue a truly efficient market and to provide certainty for investors. The testing time is the next 6-12 months as process needs to give way to implementation and discussion to development of a new regulatory regime and new policy approaches with respect to sensitive areas such as transmission planning and greenhouse gas emissions management.

The signs are moderately positive, but there is much still to do and not a huge amount of time in which to do it. The demand scenarios we have set out today are not forecasts, but they are not guesses either – the consumption ballpark is not imaginary, nor are the marketplace risks.