From: Joe Schady [mailto:Joe.Schady@waitakere.govt.nz]
Sent: Friday, 4 April 2008 9:48 a.m.
To: Public Submissions - Electricity
Cc: PolicyAdvisor@ipenz.org.nz
Subject: Draft Government Policy on Electricity Governance

Dear Sir / Madam

I wish to table a few comments on the above. These are given in my private capacity and do not represent those of my employer.

Power Generation

The New Zealand economy may reasonably be expected to continue expanding over the next fifty years. I have used a time frame of fifty years as this represents the approximate economic life of power generation assets before replacement or refurbishment takes place. Economic growth is a reasonable proxy for growth in electricity demand. As an economy expands, the means of production will increase as well as showing growth in the service sector - both need more power. Overall electricity demand less that provided by savings in efficiency, less savings due to improved home insulation, plus increased demand from a growing population, equals the net power generation demand for the country.

Forecasting the above net demand over 50 years is clearly impossible to be done with accuracy and so one will need to allow for a measure of reserve capacity as a safeguard plus a further surplus in peak capacity to allow for load factoring. Initial "back of envelope" calculations show that with a 50 year compound growth in the economy of 3% per annum, savings due to efficiency and home insulation of say 0.5% per annum, and a population growth rate of 1%, results in a doubling of demand over 20 years and a five fold increase in 50 years, caused by 3.5% growth in electricity net demand per annum.

One can argue that over fifty years, the numbers are hugely distorted because of compounding effects. If one does a sensitivity analysis and reduces the long term economic growth to say 2%, the demand reduces to 1.6 times current demand in 20 years and 3.4 times current demand in 50 years. No matter what the assumptions are, the fact remains that within 20 years at least 60% or more of current generating capacity needs to be built plus that which needs to be replaced or be refurbished. If the economy does not grow over this period, the power demand will be less.

The current average annual power demand is about 37,000 GWH (source Electricity Commission) or about 4,500 MW installed capacity. To achieve 1.6 (2.0) times this value, that is 7,200 (9,000) MW, power generation of 2,700 (4,500) MW or about 135 (225) MW per year on average will have to be installed every year over the next 20 years as a minimum. This would need to rise to about 270 (450) MW per year thereafter as a minimum.

The supply of 135 to 225 MW per year could provided by about 70 to 120 wind turbines (but keep in mind that the wind does not always blow), by 2 to 3 gas turbine engines (very fuel intensive and inefficient and non sustainable), by one large size hydro project (environmental considerations will probably preclude this and in any event the number of sites is limited). Other power options are the new design of pebble bed nuclear reactors (greater efficiency than conventional nuclear), coal fired generators (CO2 is an issue although harmful contaminants can be partly removed by scrubbers), gas powered units (unsure of gas supply until off shore strikes are proven) or tidal generators (still unproven technology). Thermal fired generators are ideal to supply the base load so that wind and hydro can provide the peak load power as they come up to speed very quickly.

In my opinion, to achieve economies of scale, it would make sense to install a large scale thermal generator of size say 1,000 MW every 5 to 7 years or so, rather than build small size units more frequently. Wind powered units can then be built on a fill in basis from time to time as and when opportunities arise to manage the diurnal peaks.

The policy speaks about sustainable supply and this is a very worthwhile goal. But because of variability in water and wind power supply, one can not escape the inevitable fact that the base load has to be provided by thermal generators. Pebble bed nuclear is probably the least polluting thermal generator and the closest one can get to lowering the carbon foot print. Spent fuel disposal of nuclear "balls" is an issue but is less objectionable than millions of tons of CO2 being pumped into the air. On a matter of nuclear grade weaponry, pebble bed reactors do not lend themselves to the production of nuclear bombs. This may make the publics' attitude to nuclear power more accepting.

Capital Supply

Because power generators are private companies, they have an incentive to cut costs and to maximise profits, focussing on short term returns. This may not be an approach that is consistent with the supply of very expensive new generating capacity by the private sector. One may also form the view that the Crown may have a lower cost of capital than a private company and so generator supply should be in the hands of the Crown.

Past behaviour of New Zealand Railways under private hands has been abysmal with every incentive for the private owner not to invest and maintain assets. A parallel argument can be made for power generators being in private hands too. Furthermore, because of the extremely long periods between up front expenditure and delayed return on power generation assets, private companies have every reason not to expand capacity.

The best interests of New Zealand would be served by having the Crown manage and own power generation assets. Distribution and retail of power could remain in the private sector, although a case can be argued that distribution should also be a Crown responsibility. Perhaps the public need to be consulted on who should own the power generators of the nation?

Certainty of Supply

I have recently returned from a visit to South Africa. Until a few years ago, South Africa had a very well developed and inexpensive power supply system, possibly the world's cheapest. Their low cost enabled South Africa to expand industry, build energy intensive refineries, smelters, mines and provide power for the millions of low income homes without electricity. Long term supply contract with low cost power guarantees enabled large multinationals to develop and expand the aluminium smelter industry in South Africa. In essence an aluminium smelter is an energy exporter par excellence.

While South Africa had for some years a great deal of surplus power, recent population growth and economic expansion have consumed all of the power surplus. The Government failed to provide capital for further new power generation construction. There is now a serious power shortage in that country with rolling and planned power load shedding occurring throughout the country. As an example, a small town or part of a city will have a typical 2 hour power outage once to twice per week during day time. This means that power is shut off to traffic lights, hospitals, businesses, homes, factories, retail etc. In short everything stops for 2 hours. The harm to the economy must be devastating.

While I was in South Africa, it emerged that one aluminium smelter announced the closure of two of its pot lines because of non supply of power. This resulted in 800 job losses. The fear of being trapped 2,000 metres under ground in a mine must be a nightmare for any miner, particularly with rising water levels as the pumps are not powered and lack of ventilation.

New Zealand has wonderful blessings with cheap hydro power, large untapped coal fields, the possibility of extensive off shore gas fields, hillsides exposed to high winds and a very competent body of engineers. Please can the Crown ensure the certainty of power supply over the next 50 years?

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