Supply and demand – New Zealand gas

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Abstract

This paper presents an independent view of the demand and supply of gas over the next 15 years or so. Three demand and supply scenarios are presented along with some discussion on the key drivers behind gas demand and supply in New Zealand.

Introduction

The issue of gas supply in New Zealand has been a source of much debate for a number of years, the intensity of which has increased as we get closer to the depletion of the Maui filed, New Zealand's largest gas resource. The continuity of unconstrained gas supply was brought into sharp focus earlier this year when restrictions on the Maui gas supply resulted in less available fuel for thermal electricity generation in the NI, which, coupled with low hydro storage in the SI, threatened the security of electricity supply.

Demand for natural gas remains high from both the electricity and industrial sectors. The principal casualty of Maui's early depletion appears to be Methanex which has cut its production in New Zealand by 60% and, from recent news reports, appears to have no secured supply from 2005 on.

However, demand from electricity generators is not guaranteed either. It is now a fact of life that in the event of a dry year, electricity generators are no longer guaranteed access to unlimited and supplementary amounts of natural gas to fuel their gas fired plants. As a result, many generators are arranging alternative sources of fuel, such as coal, fuel oil and there is increased talk of importing LNG.

The key drivers behind supply and demand for gas in New Zealand, some of which are discussed in this paper are as follows:

- The role of Methanex or a similar sized major user of gas in the future;
- The building of "alternative fuel" electricity generation assets;
- The ability to increase production from existing gas fields in the short term;
- The timing of bringing on new gas fields, such as Pohokura, on stream;
- Whether the forecast gas price increases are sufficient to spark increased exploration activity in New Zealand;
- The establishment of a wholesale gas market.

Supply and demand

As the charts below show, there could be another shortfall in the gas supply as soon as next year, unless production can be adjusted to meet demand.

The supply scenarios assume our estimate of proven plus probable reserves of 1,813 PJ of gas as at 1 January 2004. There are two supply scenarios presented in Figure 1 and Figure 2:

1. Maui continues to produce until 2009;
2. Maui continues to produce until 2007.

The assumptions behind the supply scenarios are as follows:

- Production rates of other gas fields are based on average historical production rates over the past 6 years;
- Maui's production rates are based on the existing life of the field with production spread evenly over the remaining life of the field;
- Pohokura is forecast to come on stream in 2006, producing 60 PJ pa;
- Kupe is forecast to come on stream in 2006, producing enough to fire Hlye3P, around 22 PJ pa;
- Smaller fields provide around 2 PJ pa from 2006 on.

There are three demand scenarios presented in Figure 1 and Figure 2:

1. Methanex stays indefinitely and uses 80 PJ pa;
2. Methanex continues at 40% capacity, requiring 32 PJ pa;
3. Methanex uses 32 PJ pa until 2005 when it leaves New Zealand.

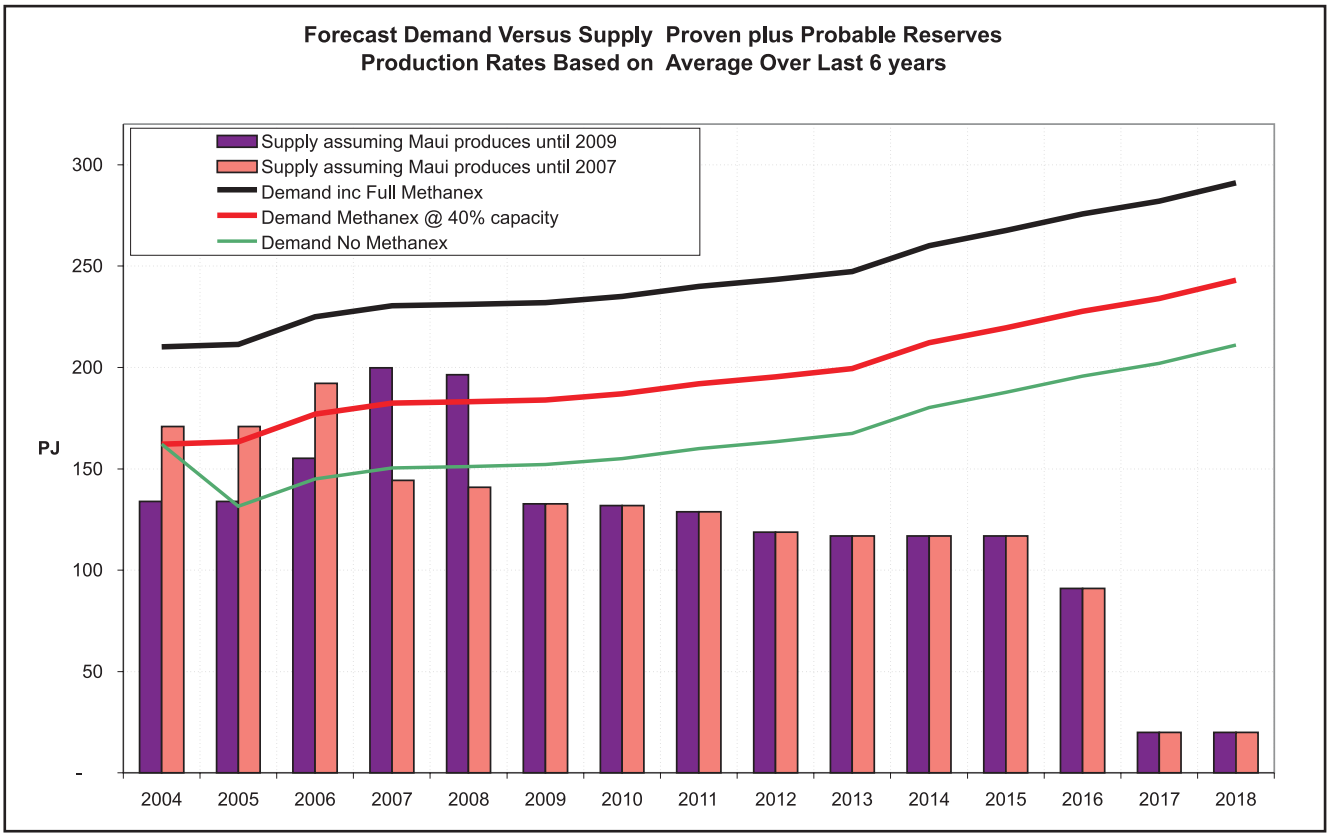

Figure 1 – Forecast Gas Supply and Demand based on Historical Production Rates

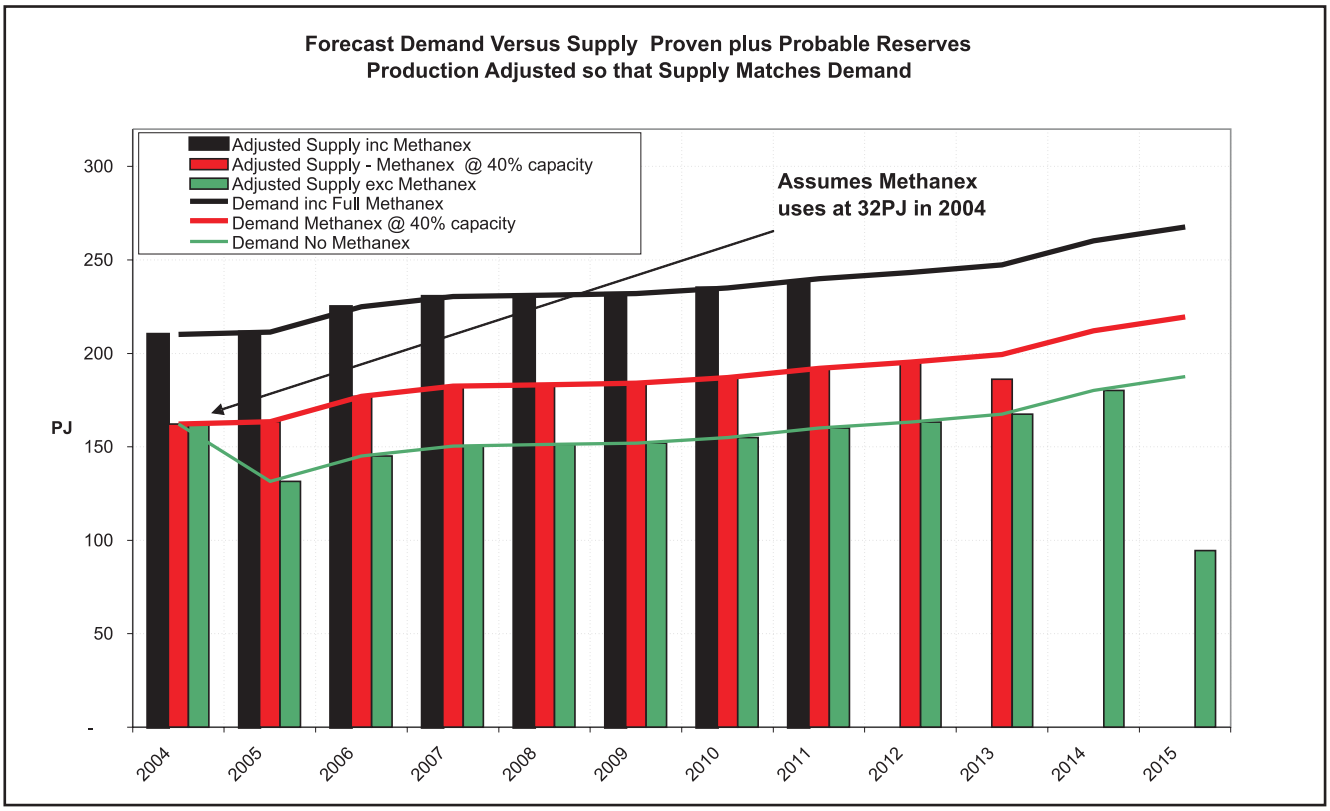

Figure 2 – Forecast Gas Supply and Demand Based on Adjusted Production Rates to Meet Demand

The assumptions behind the demand scenarios are as follows:

- Electricity generators use gas required under a mean inflow sequence[1];
- Genesis runs only 1 unit at Huntly on gas – this equates to around 22 PJ per annum;

The chart shows that if Methanex were to stay and continue to require 80 PJ per annum, it would be necessary to increase the rate of production under both supply scenarios to ensure that there are no shortages over the next few years. However, doing so would obviously impact significantly on the life of existing reserves.

Even if Methanex does leave, and Maui is extended to 2009, there is very little "fat" left in supply to cover additional fuel requirements should we encounter a "worse" than mean inflow year. This could occur due to low hydrological inflows and/ or high increases in electricity demand, over and above the 2% demand growth per annum that we model in our electricity price path.

The next chart shows that should the production of the existing fields be adjusted, demand could be met under both demand scenarios until 2011 assuming Methanex stayed and until 2015 if it left in 2005.

Again it should be noted that the gas demand from electricity generators is based on a mean inflow year. Under a dry inflow year, gas demand from this source would be expected to be higher, resulting in a shortfall earlier.

Our estimate of proven plus probable reserves is around 1,813 PJ as at 1 January 2004 and our analysis and research leads us to estimate an additional 900 PJ in possible reserves. The supply of this gas is, of course, dependent upon the profile of demand at the time.

If Methanex leaves, then we forecast average annual growth in gas demand of around 4% per year, or an average of 7 PJ pa over the next 16 years. Implicit in this forecast is our own forecast of gas demand from the electricity sector, and less significantly, industrial and residential demand. It should be noted that our forecast of new gas fired plant is low after Hlye3P coming on stream in 2006. Between 2007 and 2013, we forecast only 135 MW, or 9 PJ, of additional gas fired generation, with the remaining demand being met by alternative sources such as wind, coal and geothermal. However, if the price is right and all the new generation that is required is gas fired, then we will need around 40 PJ for new generation assets, by 2013, (excluding current gas fired stations and Hlye3P).

Market structure

The gas market is an oligopoly and is likely to remain so in the future, so the assumptions underlying price in perfectly competitive markets[2] do not necessarily apply. All players in the gas industry, at the wholesale level, have some degree of market power, as evidenced by the recent decision of the Commerce Commission to authorise an anti competitive arrangement allowing the joint marketing of Pohokura gas by Shell, Todd and OMV. Major suppliers include SNZL[3] but there are also major users, the largest being Methanex.

One consequence of this is that prices may be attained by suppliers that exceed the total cost of production by a significant margin. Another is that development of new fields may be delayed, or production limited, in order to maintain prices at certain levels. This risk has been nullified to some extent over the medium term with the Commerce Commission's conditions that Pohokura be producing at least 60 PJ pa from 2006.

On the demand side, there may be strength in numbers and maybe the recent partnering between Contact and Genesis in commissioning a feasibility study into LNG is a forerunner to joint negotiations for the purchase of the Pohokura gas.

Gas prices

One cannot discuss supply and demand without some reference to price and future price. At the simplest level the price for natural gas will be capped by the price of an alternative energy source. Conversely, the lowest potential price for gas, in the absence of excess supply over the next few years, could be estimated as the marginal cost of production from a field such as Pohokura.

In the case of electricity generation, one of the current alternatives to highly efficient Combined Cycle Gas Turbine generators is the less efficient Integrated Coal Gasification Combined Cycle Plant. Not only is the latter less efficient, thus requiring more fuel for the same output, the capital investment for a coal plant is around twice that for new CCGTs, such as the Taranaki Combined Cycle Plant and Contact's Otahuhu B station.

Assuming a delivered coal price of round $4/ GJ, our estimates show that the equivalent gas price could rise to around $6.90/ GJ at the wellhead and still be economic against the alternative, excluding any allowance for a carbon charge.

A simple calculation of the estimated marginal cost of production at Pohokura, assuming amongst other things[4], an annual output of 60 PJ pa and total reserves of 600 PJ gives a "lower bound" price of around $4.30/ GJ.

In reality, the final contracted gas price is likely to fall somewhere in the middle of these two bounds and much may depend on the ability of the demand side to reduce the price in their favour. One would speculate whether Methanex could bear a gas price in excess of $4.50/ GJ for any extended

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1 These figures have been taken from our electricity price path Base Case scenarios assuming 2% demand growth pa, refer *Ten Year Price Path to March 2014* report dated September 2003.

2 The usual assumption is that prices will equal marginal costs.

3 Shell New Zealand Limited.

period, which leaves the major electricity generators, Genesis Power and Contact Energy, in the hot seat. Their recent joint exercise in investigating the potential for LNG in New Zealand may auger further joint enterprises, perhaps with a view to enhancing their influence in the bidding for gas.

So, in the short tem, the supply and demand for gas is well balanced, but only between a very small number of players which makes it difficult to estimate the future price of gas – much may indeed depend on who wants it the most, or which party is the better negotiator.

The role of Methanex

Given a tightly constrained gas supply situation, the continuity of gas supply depends heavily on the demand for gas. As discussed above, the most cost effective option for a relatively cheap electricity supply demonstrates that there should always be demand from the electricity sector, dependent on price of course. But what of other users, such as major gas users like Methanex?

Gas suppliers may be keen to sign Methanex up on a long term contract at a good price, guaranteeing a good return over a short period of time – bearing in mind that to run Methanex's NZ plant at 100% capacity requires as much gas as four CCGTs, each of around 360 MW in size.

On the other hand, Methanex has the option of either moving its operation to another country, or simply closing down the plant and reducing its world wide production of methanol, if it cannot get a low enough price for gas. Thus, the cost of production in other countries sets an upper limit on the price that Methanex will pay for gas in New Zealand. However, Methanex's plans for overseas options have faltered somewhat over the past six months and this may force them to contract for gas at a higher price than was the case previously.

The international price of Methanol has been volatile over the past nine years, ranging from $US105/ Tonne in 1999 to $US288/ Tonne in 1994. As a result of this volatility, Methanex has posted an operating loss in three of the last ten years. The price paid for natural gas is a large factor in Methanex's operational costs and our analysis tends to indicate that there is little room for the gas price paid by Methanex, to increase. The current buoyancy in Methanol prices can be attributed to reduced supply on the world market. Given Methanex's global presence in the methanol market, it is feasible that this reduced supply will continue to keep prices up, thus softening the blow of higher gas prices. However, the restrictions placed on Methanex's ability to produce methanol will more probably than not have a negative impact on its bottom line.

Conclusions

There is a possibility that there will be insufficient supply of gas to meet demand as early as next year. Much depends on whether the remaining reserves in the Maui field are eked out to 2009 or used less sparingly and used up by 2007.

Our supply scenarios are very sensitive to the timing of new fields coming on stream, and if Pohokura is delayed beyond 2006, then there could be a significant impact on the supply side's ability to meet demand.

Many users are evaluating alternatives, not leaste the electricity generators. Whilst price will be a key driver behind the economics of alternative generation sources, such as coal, there is also emphasis on the requirement to meet electricity demand from a variety of sources to create more diversity and less exposure to security of supply problems. However, it is unavoidable that alternative sources will incur a much higher cost and hence drive both electricity and gas prices up.

Much hinges upon whether Methanex stays in New Zealand, and if so, to what capacity it operates its plant. Our analysis suggests, that even with world methanol prices on the rise, it is unlikely that Methanex will be able to bear the loss incurred by higher gas prices in New Zealand to remain operating here beyond the short term.

Authors

SIOBHAN RUFFELL is the Principal Consultant at Energy Link Limited, specialising in forecasting and modelling of the wholesale electricity market. She is also the author of Energy Link's Gas Reserves Forecast and Price Path which has been published biannually since August 2001.

4 Assumptions have been made about total capital investment, return on investment targets, annual operating and maintenance expenses and so on.