# New Zealand gas market – a user perspective

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## Abstract

New Zealand's gas supply industry is growing rapidly, requiring greater knowledge and awareness by retailers and end users of supply reliability and safeguards that ensure gas is the preferred energy source. Fostering more exploration requires willing buyers and sellers and transparency in the forward market. New entrants are needed to invest in exploration, and retailers need to be available to contract new gas fields as they come available. Failure to build a sustainable domestic gas market leaves no option but to import LNG and LPG at higher prices than currently seen by consumers. Consumers and governments need to influence the market from time to time to achieve sustainable growth. The current electricity and gas reform legislation provides for the establishment of an Energy Commission which is recommended as the preferred regulatory body.

## Introduction

Establishing a viable gas market is integral to growing a healthy community and industrial sector. Expanding the availability of reticulated gas is a next step for developed countries, such as New Zealand.

The take up of gas for heating and cooking across New Zealand is low by world standards and provides an opportunity for retailers, such as Genesis Energy, to enhance lifestyle and industry growth prospects for the future. Take up of gas in rural sectors is half that of rural Australia. Gas heating, along with reverse cycle air conditioning, are the appliances of choice for modern living.

Gas is preferred for steam raising, dry cleaning, bakeries, and cooking in hotels and motels. Gas is essential for process heating, although electric induction heating has a role in metal forming processes.

In the production of synthetic polymers and methanol, gas as a feedstock provides a high volume market which gives certainty for investment in large gas fields.

In power generation, gas fired technology has filled the void brought about by significant growth in demand for electricity. Gas turbine technology has brought higher efficiency in the short history since Frank Whittle developed the first gas engine in 1943. Today the combined heat and steam available from using the gas turbine exhaust enables gas to be converted to electricity with 60 per cent efficiency.

There is considerable economic benefit from pursuing gas fired cogeneration options. Investment in gas fired technology is capital intensive and long term with gas fields, treatment plants and end use equipment expected to operate reliably for 25 years to pay back the investment. Markets for gas, therefore, need to be sustainable; they need to deliver gas safely and at competitive prices. There needs to be ongoing exploration and the market has to be attractive for upstream explorers to continue their work. **At all times, and in every sector of the industry, there has to be downward pressure on price.**

The role of the regulator is important, therefore, to be invisible at times, light handed at times, and heavy handed when exploitation is upon us. **Who should fill the role of the regulator and how many regulators can a small industry afford?** At the end of the conference we should have achieved a clearer vision and agreement to solve the problems facing the industry. Oil and gas provide the basis of economic growth of any country. Transmitting gas to the door of industry and households across New Zealand in safe, economic terms is our challenge.

## Reliability of Supply

Unlike electricity transmission, gas transmission, using underground mains, has high reliability. Single radial feeders are, therefore, accepted practice and reliability has not been questioned. However, reliability of a single gas source can have devastating results (eg Moomba, South Australia, New Years Day 2004). Aging assets, such as the Maui Platform, have extended life due to duty and standby plant being available.

Future offshore platforms will have less redundancy and operators will not want to provide the same guarantee over supply, forcing gas retailers and end users to assume greater risk. Dispersement of supply risk will increasingly come from contracting multiple fields and processing plants, requiring further interconnection of treatment plants and transmission networks. Whereas integration of electricity transmission is the responsibility of a single body (Transpower), gas transmission is shared between Maui Development Ltd, NGC and Nova Gas, with Vector and Powerco managing sub-transmission systems. There are no clear plans for linking radial gas lines into a meshed grid that would secure supply against the greatest risk being from accidental breakage of gas pipes by earth moving machines etc. **There is at present no blueprint for a national gas grid.**

Reliability of supply extends to end use appliances and connections. We need no reminding of the fires that devastated Canberra (Australia) suburbs in January 2003. The reports on these fires are essential reading. Canberra brought a wake up call for the gas industry with plastic fittings on above ground meters disintegrating under intense heat feeding an already intensive fire.

**Who then sets and maintains the standards for appliances and gas meters and fittings across New Zealand?** This is where we need a positive attitude to regulation.

## Market growth prospects

Market growth in 2004 is likely to be negative across New Zealand due to the inability of gas retailers to reach agreement with gas producers on the terms for contracting additional gas. In 2005 and 2006 a critical shortage of gas will impact on a number of major users.

This is not to suggest gas is running out; in fact, there will be a surplus of gas on the market once Pohokura and Kupe are at full production. The surplus may exist for several years, whilst Maui continues to deliver, but is likely to present a serious shortfall from 2010 onwards. The short term surplus will allow gas retailers to open up new markets, but customers will want certainty of supply post 2010.

So where are the growth prospects? With the economy growing at above three per cent, the demand for gas for residential and small business will grow at a higher rate. Gas appliances for household heating and cooking are more efficient than electrical energy for the same application. In industry, gas is essential for process steam and drying. Use of coal or heavy oil is not favoured for small to medium industry due to environmental clean up requirements and the capital cost. **Reticulation of gas to the east coast of the South Island is an opportunity for the future.** This will replace wood burning and encourage new industries. Further expansion of gas reticulation across the North Island is ongoing.

For power generation, economics favour gas firing due to higher conversion efficiency and reduced lead time for commissioning. Gas turbine technology driven by strong competition in the airline industry is producing higher reliability for gas turbines. The integration of steam cooling with gas firing in place of air cooling has been introduced in the 'H' series gas turbine, now being offered by Mitsubishi Heavy Industries and General Electric. Output for the single shaft 'H' series CCGT reaches 480MW with energy conversion efficiency of 60 per cent. These machines use 20PJ of gas per annum for 3,500GWh at a capital cost of $1,200/kW.

Coal fired technology has been static for 20 years during the 'dash for gas' period. The use of higher steam pressure and temperature and improved blading design has increased the efficiency of conventional boiler/turbine units to 43 per cent, compared to previous technology giving 38 per cent. Output of single shaft coal fired boiler turbo-generators are available up to 700MW, consuming 2.0 million tonnes of coal for an annual output of 5,000GWh at a capital cost of $2,000/kW. Coal firing requires a higher air to fuel ratio than gas turbines to support combustion, producing higher levels of carbon dioxide and nitrogen in the exhaust gases. Traditionally, those have been dispersed by use of extra high chimney stacks pushing the gases into the upper atmosphere.

With the realisation that carbon dioxide is the major 'greenhouse gas', the users of coal fired technology have turned their attention to carbon dioxide extraction from nitrogen in exhaust gas. As known coal reserves worldwide have a life of 100 years, compared to oil 20 years, and gas 30 years, there is significant benefit available from scrubbing exhaust gases on coal fired plant.

Renewable energy will continue to grow where water can be stored and dropped through hydro power generators. Hydro generation normally is kept for peak load application due to the scarcity of water. Mini hydro using in-stream generators are now being developed.

Wind technology is producing larger, more reliable generation with output up to 3.6MW per machine. These machines stand 100 metres high with blade length of 30 metres. Visual impact and noise are issues to be addressed. Experience over the past summer in Germany has shown that in a heat wave, winds do not blow, restricting over 10,000MW of wind generation at the same time as high temperatures reduced cooling efficiency of conventional nuclear and thermal power plants and increased airconditioning demand. Wind generators, like hydro generators, need to be supported by conventional technology during periods of drought or low wind, adding to the cost of holding reserve generation.

Overall, gas turbine power generation has been the most cost effective, but will the world reserve for gas allow continued growth in gas turbine investment?

## Gas discovery prospects

New Zealand is considered by world standards to be under-explored for gas and oil. Prior to the recent price rises, there was little incentive to explore for gas alone and much of New Zealand offshore drilling was focused on oil. The dominance of Maui gas in the market meant that new gas discoveries were price takers and not economic.

Today with growing demand, gas prices are increasing, making gas exploration more attractive. Large gas users, such as Contact Energy and Genesis Energy, acquire gas on a portfolio basis, reducing dependence on individual gas fields and reducing the risk carried by gas field developers. This approach enables fields to be developed with less equipment redundancy than was the case when Maui was developed. There is a need for retailers to herald the forward gas shortfall, so that gas exploration companies can see the opportunities. **This conference presents an opportunity for retailers to put their future gas shortfall to producers.**

The role of swing consumers is important in providing incentives for further exploration. Methanex is one such consumer that has capacity to use up to 80PJ per annum. These swings, integrated into a residential, commercial market and power generation of 150PJ per annum, will provide incentive for further exploration and field development.

New gas field investors, such as the Kupe joint venture, provide a catalyst for further exploration by bringing together explorers, producers, investors and retailers. Only four exploration wells were drilled in 2003. **We need to drill 30 wells over three years to confirm future New Zealand gas reserves.**

Central to exploration is access to existing gas transmission systems. Access to the Maui Development Limited owned gas main is needed for all producers to ensure that gas can be delivered to the North Island markets.

Intervention by a regulator has been resisted by the gas industry, however, some intervention is needed when key aspects of competition are being frustrated by lack of incentive to drill new wells.

LPG, a by-product from oil and gas processing, has provided a flexible source of fuel for specific applications, particularly in remote regions. The LPG market continues to grow as households move away from wood-fired heating and cooking. Large LPG installations servicing hotels and motels are not going to get any cheaper as the Australian Government moves to bring LPG within the excise threshold applying to oil and gas. Fields such as Kupe will provide 200,000 tonnes of LPG into the New Zealand market.

LNG provides a means of transporting large volumes of gas across oceans from high producing regions such as the North West Shelf, including Timor, Indonesia and the Malaysian Peninsula to markets in China, Japan and the Philippines. Recent announcements by the US Government will result in LNG being imported into the US West Coast to supplement the shortfall of gas and hydro generation which crippled the Californian energy market in 2001.

Gas prices in California, historically US$2.00/GJ prior to the power crisis, have risen to US$4.00/GJ with spot markets being much higher, making imported LNG an attractive option.

Can LNG prices come down? Infrastructure costs associated with chilling and thawing LNG are high, as are shipping costs, making it necessary to defray capital costs over 15-20 years and set minimum delivery rates above 100PJ per annum. Wharfage is critical for LNG tankers with high demurrage charges, making it necessary to construct purpose built jetties or offshore floating jetties. Large onshore storage facilities need to be available to accommodate deliveries of LNG.

Genesis Power and Contact Energy have teamed up to evaluate the import of LNG. A feasibility study is currently underway using Kellogg Brown and Root, a global LNG specialist to carry out the engineering study and Poten and Partners (USA) to carry out the economic study. The study is expected to be completed mid-2004 and be followed by an application for resource consents, expected to take two years. A decision on importing LNG would, therefore, not be taken until 2006. Construction time for onshore facilities would take a further three years. **New Zealand has a two year window of opportunity to locate replacement domestic gas fields before having to revert to LNG.**

Whilst LNG is a high cost gas option, the absence of any viable alternative to meet the New Zealand gas market in 2010 is more critical if existing markets for gas cannot be supplied and large users move offshore.

## Gas industry regulation

The New Zealand gas industry historically has been managed by government agencies, with responsibility for establishing Petrocorp and its successors. Following the sell down of interest by Fletcher Energy in 2000, the industry has run on a number of contracts between producers, pipeline owners, retailers and direct supply end users.

Self governance, which relies on mutual respect at best or court ruling at worst, has been the norm. This approach, whilst simplistic and low cost, is not sustainable in a fully developed market. The Gas Industry Governance Steering Committee (GISC), Gas Association of New Zealand (GANZ) and Petroleum Exploration Association of New Zealand (PEANZ) have sought to address issues affecting the establishment of a robust gas market. **Can self governance work in a fully deregulated market?**

Efforts to achieve self governance in electricity industry reform failed due to self interest predominating. The same may well be the result in gas industry reform. The industry needs to move away from self interest to a new level of maturity that will support growth of the New Zealand economy. Regulation is unavoidable in most industries. Some examples in the gas industry include:

### Upstream sector

Failure to provide open access to existing and new gas transmission networks at competitive prices can bias the market against new developments.

Access to foreshore and ocean floors can restrict drilling activity.

Securing mining licences without the intention to develop the field in a reasonable time can withhold new capacity in favour of existing capacity.

### Market conditions

The absence of information, in relation to the forward market, can leave developers with surplus gas if the market is oversupplied, or discourage exploration at a time when the market is undersupplied.

Running gas mains in parallel by competing distributors is not an economic solution to gas supply.

Clear responsibility and liability in the event of system shutdown, including appropriate communication links and contingency plans, need to be in place and regularly tested.

### Downstream sector

Appliance certification and tradesmen licensing requires a system of registration and testing that protects property and life. 'Do it yourself' gas plumbing provides risks of gas explosion.

Consumer complaints can be best dealt by an ombudsman, rather than having to file a dispute through the courts.

A customer data base with accurate data and clear switching protocols are needed to encourage competition in gas retailing.

**Appointment of an Energy Governance Board would appear to be the best means of meeting consumer and Government needs to ensure sustainable growth, while maintaining competition and transparency across the industry.**

The Australian gas industry in 2003 merged with the electricity industry to form the Energy Supply Association of Australia, a move that would, in New Zealand, enhance communications within the industry.

There is a lot of work ahead of us to ensure gas is the preferred energy source. This conference will provide an opportunity to debate the issues and set priorities for building a mature gas industry.

## Author

MURRAY JACKSON was appointed Chief Executive of Genesis Power Limited on 1 April, 1999 following the split up of ECNZ. Genesis Power Limited has generating capacity of 1 600 MW; comprising hydro, thermal, wind and cogeneration plants, as well as a large portfolio of commercial and industrial customers and approximately 600,000 residential electricity and gas customers. Genesis Power has interests in coal and gas, including an 81 per cent share of the off-shore Kupe gas field.

Murray holds a Masters Degree in Business, a Bachelor Degree in Economics and a Diploma in Mechanical Engineering. He is a Fellow of the Institution of Engineers, Australia and a Fellow of the Australian Academy of Technological Sciences and Engineering.

Murray's engineering career included the commissioning of 200MW, 500MW and 660MW coal fired power plants in Victoria and New South Wales.

In 1993 Murray took up the position of Commissioner of the Snowy Mountains Hydro-Electric Authority, a dual electricity generation and irrigation scheme located within Australia's high alpine Kosciouszko National Park. Responsibility included restructuring the Authority to participate in the National Electricity Market as a provider of 3,700MW of renewable energy.

On 1 April, 1999 Murray moved to Auckland, New Zealand to establish Genesis Power Ltd as a state owned enterprise, competing in the New Zealand wholesale and retail energy markets. Genesis has assets valued at NZ$1.2 billion and turnover of NZ$1.4 billion per annum and is active in development of new generation opportunities in New Zealand.

Murray is a guarantor member of the Mt Eliza Business School in Melbourne, Chairman of the Genesis Oncology Trust and Chairman of Energy on Line, a wholly owned subsidiary of Genesis Power Limited.

Murray was awarded the Centenary Medal by the Australian Government in June 2003 for service to industry and society.