

# An investment banker's perspective on the New Zealand petroleum sector

**Chris Stone**

*Executive Director, McDouall Stuart Group Ltd, Level 6, Bayleys Building, Brandon St, Wellington. Ph +64 4 472 2716, Fax +64 4 472 2719 Email chris.stone@mcdonallstuart.co.nz*

## Abstract

NZ's energy markets are in a state of transition, from a period of abundance and artificially low energy prices, to a period of shortfall and rising market-set prices. The NZ economy will suffer bearing these rising prices, but less so than it would with supply shortfalls. Three winter electricity crises in a decade, a scramble to import coal last winter, and the dwindling Maui flows, illustrate that supply constraints are a reality. With energy demand rising inexorably, NZ can import energy to meet the shortfall (oil, coal or LNG). However, with more palatable domestic solutions beckoning, surely NZ should facilitate their emergence. This will require the support of energy players, and greater leadership from government. A decade ago, at the 1994 Petroleum Conference, the theme was titled "The Post Maui Challenge". Are we too late to step up the challenge now?

## Introduction

NZ has enjoyed a golden period of energy supply since the 1950's – subsidised electricity and discounted gas. Those golden times were always going to end, and it is surprising both that they lasted so long, and that it has apparently come as a shock.

The NZ economy faces two principal energy problems:

- Moving from an era of artificially low energy prices, to one with market pricing; and
- Ensuring that new energy supply can be established in time to avoid shortages.

The energy markets are moving increasingly from a negotiated contract model to a market pricing model. However, this does not fully explain the lack of anticipation and action by energy players and the government. The challenge is whether, after a decade of delay, NZ now has sufficient time to find a timely and palatable solution. This will require better communication and co-operation amongst the energy players, and a greater leadership role from government.

In October last year I published a report on the NZ energy sector. Much of its content would be

familiar to followers of the energy sector. The inescapable conclusion is that NZ has a substantial energy supply/price problem – that is, a crisis.

## Energy supply – tightening

The NZ economy consumes 630PJ of energy each year. Despite having close to the highest ratio of hydro electricity generation in the world, 65% of NZ's energy supply nevertheless comes from hydrocarbons; being 33% from oil, 25% gas and 7% coal. Figure 1 shows that 65% of the gas, and 90% of the renewables (hydro and geothermal) are converted into electricity, with some quite substantial (and largely unavoidable) losses. It also shows that 95% of oil is used in transportation.

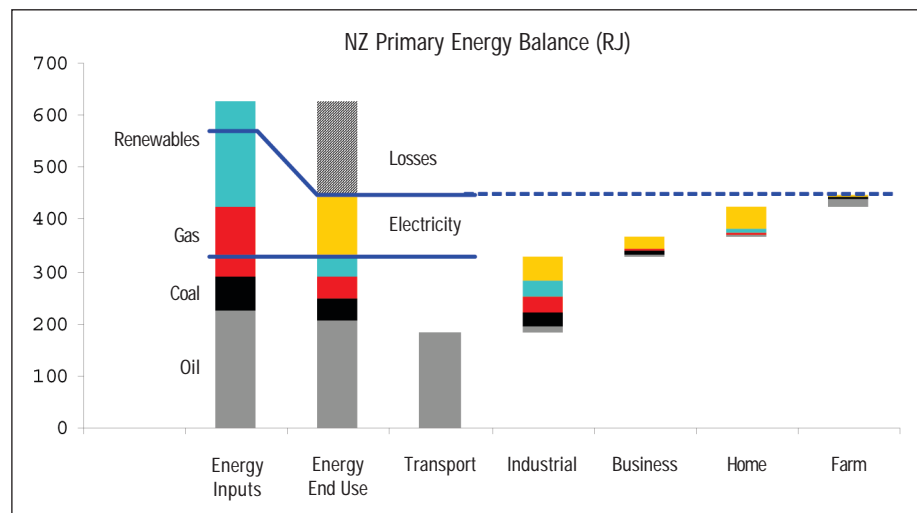


Figure 1: NZ Primary Energy Balance

NZ has had an insatiable demand for energy over the last 25 years – Figure 2. Domestic energy demand has grown at 2.4%/yr since 1980. While demand for all other energy forms has grown collectively at 1.7%/yr, demand for gas (excluding petrochemicals) has grown at 6.2%/yr. The domestic economy’s reliance on gas is now brought into sharp focus given the magnitude of the gas supply crisis. Electricity supply is directly impacted, given that most of NZ’s increase in electricity generation capacity built over the last decade has been gas-fired.

Overall demand for gas (and indeed electricity) has been further boosted by the energy export industry. The key export players are Methanex (exporting gas as methanol), Comalco (exporting electricity as aluminium), and NZ Steel (exporting coal and electricity as steel), although we could

also consider local forestry processors (Carter Holt Harvey and Norske Skog). It is currently fashionable to forget the contributions these companies have played in the NZ economy. We shouldn’t – they should be encouraged to have a role in NZ’s future.

While the domestic demand for gas has accelerated (at 6.2%/yr since 1980, and 6.0%/yr since 1995), gas supply has dwindled. The exploration effort over the last 25 years has simply failed to arrest the decline in gas reserves – Figure 3.

Gas supply is now under serious pressure. The scale of the Maui redetermination, even though well foreshadowed by the upstream sector, has been the catalyst for a wider realisation of the problem. Filling the imminent energy gap (with any alternative) is now, undeniably, a huge challenge.

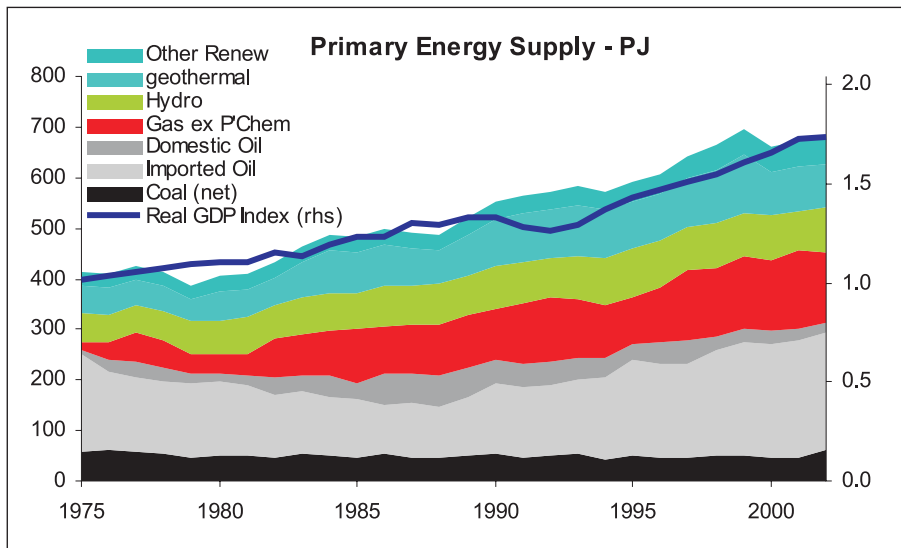


Figure 2: NZ Demand for Energy

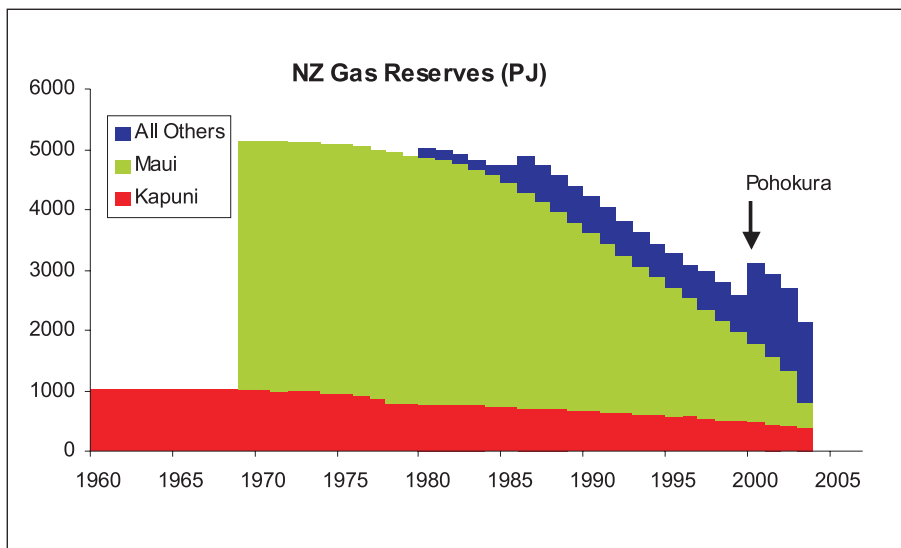


Figure 3: NZ Gas Reserves

## Energy supply and price – pressure from all sides

NZ's energy bill is rising fast – simplistically summarised in Figure 4. This reflects both rising energy demand and rising unit energy prices, and is affecting all energy sources. The forecast costs shown are based on continuation of demand growth, and conservatively forecast price increases – it could be worse.

NZ Cost of Primary Energy								
	Demand		Price NZ\$m/PJ (NZ\$/GJ)			Cost NZ\$b <sup>1</sup>		
	PJ (2003)	Growth <sup>2</sup>	2000	2003	2006 <sup>3</sup>	2000	2003	2006
Oil	230	3.1%	10.9	8.5	9.4	3160	3060	3470
Coal	60	5.2%	3.7	3.7	3.7	190	220	260
Gas	150	9.0%	2.5	4.0	6.0	290	600	1170
Electricity <sup>4</sup>	80	2.2%	8.9	12.5	18.0	660	1000	1540
<b>Total</b>	<b>520</b>					<b>4300</b>	<b>4880</b>	<b>6440</b>

1 Raw commodity cost, ignores transportation and refining costs.

2 1990-2002.

3 Assumes Oil at US\$30/bbl, NZ\$=US\$0.60, Electricity at \$65/MWh as per MED Energy Outlook.

4 Electricity output from renewables, actual prices (ex spikes) and MED forecast price.

Figure 4: NZ Cost of Energy

### Oil

NZ imports both crude oil and refined products at a cost exceeding NZ\$3 billion annually. Demand, particularly for diesel, has grown in line with the vehicle fleet, with the increase met by increased importation of oil products. Domestic oil production has fallen to less than 10% of demand, while the oil price jumped from less than NZ\$35/bbl (1985-1998) to more than NZ\$50/bbl (since 1998). NZ can import more oil, but for what? Only 5% of demand is from uses other than transport and agriculture.

### Coal

Coal remains a sadly neglected part of NZ's energy equation, largely given political antipathy. Domestic consumption has been low (8% of total supply), used principally by industry (such as NZ Steel) and electricity (at Huntly). NZ exports higher-grade coal. NZ has huge untapped coal reserves, and new technologies are available to extract and utilise coal more efficiently. The impediments to wider use are environmental and political

### Gas

Gas prices have risen recently – because they can. Maui, having saturated the NZ gas supply for 25 years, is near its end, creating opportunity for emergence of new supply, a wholesale market, and rising prices. While this was inevitable, contractual complexities and a short-term focus delayed addressing the looming gas supply issue. While no wholesale market yet exists, there is enough anecdotal evidence of sharply rising gas prices, and even higher yet, seller expectations. Domestic gas provides the lowest capital and unit cost option, after coal, for new energy supply.

## Electricity

NZ has benefited from 65% of its electricity being generated by hydro stations. However, this creates two dynamics which are only now being felt:

1. Supply. Gas-fired plant has taken up the shortfall, and growth in electricity demand, with the flexibility of Maui output accommodating natural hydrological volatility. That flexibility is now gone; and

2. Price. Some 850MW of the modern CCGT stations were built between December 1996 and January 2000, fuelled by cheap Maui gas. Dry winters and tightening gas supply have seen prices rise at \$5/MWh/yr since 1996, with some savage winter price spikes in 2001 and 2003. With tight gas supply, and high capacity utilization, wholesale prices are expected to remain firm.

Given NZ is now fundamentally short of useable energy, other possible solutions include:

- Renewables – for conversion into electricity. While hydro, wind, geothermal are environmentally friendly (from a CO<sub>2</sub> emission perspective at least), and attracting strong political support, they will typically only be competitive at substantially higher electricity prices. Renewables represents only a small fraction of generation capacity added in the last decade;
- LNG – while providing supply certainty, it is considerably more expensive than domestic gas, will require large capital investment, and will kill off domestic exploration;
- Nuclear has attracted opprobrium since the mid-1980's, whatever its true merits; and
- Conservation, which has considerable merit, but should be driven by demand-side response (to price) rather than shortages.

Gas prices have risen, and it is clear from Figure 5 that they can rise much further before any real threat of substitution eventuates (assuming, of course, that supply can be assured). Clearly, given that gas prices are a key driver of electricity prices, electricity prices would also rise (by approximately

\$8/MWh per \$1/GJ rise in gas prices). Given electricity generators are currently using Maui gas (at \$2.5/GJ), a gas price rise to \$6/GJ suggests an electricity price rise of \$30/MWh (or 70%) to almost \$70/MWh. Should NZ import LNG, the electricity price could exceed \$100/MWh.

gas, with a current sales value of \$130m (at NZ\$50/bbl oil, and NZ\$4/GJ gas). NB. Naturally, the Net Present Value of those reserves is materially lower. With a strike rate of 1 discovery per 8.2 wells, the average discovery establishes 20mmbbls oil and 110PJ gas, with a sales value over \$1000m.

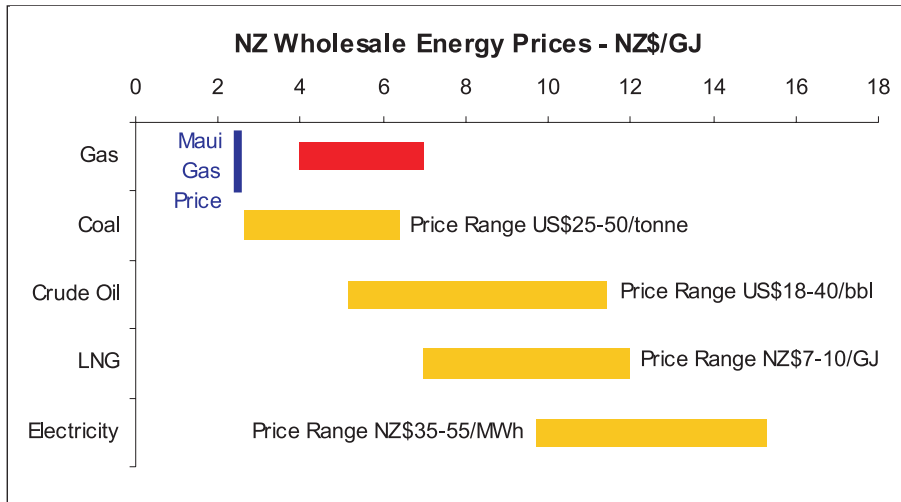


Figure 5: Price of Energy Substitutes

## Exploration in NZ – prospectivity established

NZ has proven prospectivity – in fact, it has been cursed by past success. While the small size of the domestic market could be a constraint on future gas production, the export markets provide overflow potential. Drilling activity surged following the discovery of Kapuni and Maui, and a rising oil price. Much of this activity was attributable to state involvement through Petrocorp (prior to it being sold to Fletcher Challenge in 1988). 2/3 of exploration wells and all commercial discoveries have been in Taranaki. Exploration is expected to continue focusing on Taranaki.

Even with more than 600 wells (and 140 post-1980 exploration wells), NZ (and Taranaki) is still considered to be a “frontier” exploration region. However, the prospectivity of NZ, based on the historical success rate, provides ample encouragement for explorers.

The average proven reserves established by each exploration well (post-Maui) are 8.2PJ (1.3mmbbls) of oil and 11.6PJ of

While clearly distorted by large discoveries (such as Pohokura), that is surely a prize worth pursuing.

## Exploration – the need now recognised, funding required

NZ’s domestic consumption is currently 160PJ/yr. At historical discovery rates, 14 exploration wells would need to be drilled annually to replace consumption. NZ has drilled barely 6 wells annually since 1980. While understandable given the overhang Maui presented, there has been no meaningful increase in drilling activity since 2000. Encouraging greater drilling activity is now imperative – what is required?

## New market opportunities

The downstream industry had been very slow to provide any encouragement to exploration activity. Since the Maui redetermination, NZ now faces a gas shortfall of 50PJ/yr by 2012. This is equivalent to 7600GWh/yr of electricity generation – that is, nearly 4 Clyde dams or the entire output

	NZ Exploration Drilling Statistics					Reserves			
	All Wells	post-1950	post-1980	Apprsl & Dvlpt	Net Expln	PJ		PJ/well <sup>1</sup>	
						Oil	Gas	Oil	Gas
Taranaki Onshore	288	259	234	170	64	958	1622	9.3	8.3
Taranaki Offshore	94	94	65	30	35	1695	4828	15.8	31.0
Other	235	152	78	37	41	0	0	0.0	0.0
<b>Total</b>	<b>617</b>	<b>505</b>	<b>377</b>	<b>237</b>	<b>140</b>	<b>2654</b>	<b>6450</b>	<b>8.2</b>	<b>11.6</b>

1 Reserves/well calculations exclude Maui and Kapuni

Figure 6: Drilling Success

of Contact Energy. Given their interests are closely aligned, the gas buyers must provide greater encouragement to explorers, and to the extent they are able, provide upstream funding (such as gas pre-payments, development and appraisal costs) to ensure further gas supplies are established,

## Gas price

The magnitude of the supply shortfall means that gas price will continue to rise towards the substitution price (and indeed in the short term could rise even higher). The alternatives (oil, renewables, LNG) all suggest prices over \$10/GJ – Figure 5. The move from Maui to LNG gas prices will add a burden to the economy or more than \$1 billion annually, ignoring any associated capital costs. We can but wonder which NZ industries will become uncompetitive (unprofitable) with NZ\$10/GJ gas, and \$100/MWh electricity?

## Government facilitation

NZ has, apparently, an attractive petroleum fiscal regime, it maintains a substantial open file database, and it is politically stable. However, this is clearly not enough – NZ has failed to attract sufficient exploration activity. While the Maui overhang was undoubtedly a factor, there has been no recent pick-up in drilling activity. NZ competes for the global exploration dollar, and needs to provide enticement to attract it. The government could assist this by:

- Adopting a facilitative stance, helping streamline development activities, particularly with regard the Resource Management Act (which a recent OECD report identifies as a key impediment to infrastructural investment);
- Offering more attractive fiscal terms, particularly for gas (such as royalty holidays, accelerated depreciation, tax-breaks), even if only for a period of 5-10 years; and
- Being more objective about future energy options (unlike the NZ Energy Outlook to 2025). While renewables have worthy environmental benefits, they bring high costs and supply uncertainty. Hydrocarbons (oil, gas and coal) have been unaccountably and undeservedly overlooked.

## Conclusion

The lack of exploration activity over the last decade is disappointing. However, it is ironic that it is the small, capital constrained, exploration companies which have been most active, and upon whom NZ's energy future has rested – Big Oil has been largely absent:

- Drilling - the most active company over recent years has been minnow, Indo-Pacific Energy, followed by Westech. The “majors” rank well down the list;

- Acreage - of the 10 largest acreage holders (adjusted for acreage prospectivity), 7 are small companies, 2 (OMV and Todd) have good access to funds, while Shell has opted out of exploration in NZ.

These small companies have extensive portfolios of prospects, leads and ideas, and play a valuable role doing the hard exploration leg-work. Most are “punching well above their weight”, and would be keen to be more active but for lack of funding. There is an INCREASINGLY active farmout market, a key element in funding and risk management, and opportunities FOR any NEW players to gain EXPLORATION interests. The small companies do not, as suggested by one oil major, hog the acreage. Rather, they are filling a vacuum left by larger companies, and providing plenty of ENTHUSIASM AND IDEAS. And thank goodness.

However, historically at least, there has been a lack of encouragement from gas buyers. While downstream companies (such as NGC and Contact Energy) will resist investing in exploration (being non-core business), they may become more willing to invest in appraisal and development, and enter pre-payment arrangements to ensure they have a business.

With an estimated 14 wells/yr required to simply maintain reserves, and at an estimated average cost of \$10m per well (assuming 1/3 offshore), at least \$150m needs to be invested in drilling, let alone other exploration activities (such as seismic and office studies).

McDouall Stuart recently assisted Indo-Pacific Energy Ltd to raise \$8m in a NZ public share offer. The demand was strong – investors are clearly aware of the opportunities represented by small, NZ-centric explorers. It suggests there is far greater scope for quality exploration companies to raise equity in NZ.

The magnitude of the energy supply issues facing NZ are large by any measure, and finally, widely acknowledged. The most attractive solution (economically and environmentally) is to find and develop new gas reserves. The next most attractive option is to utilise NZ's extensive coal reserves. The last resort should be the importation of energy (either oil or LNG) given this will cost more, severely affect NZ's current account, and deny the economy the flow-on benefits of a domestic upstream industry. Conservation will rightfully play a part, but must reflect a demand-side response, not supply-side constraints.

To achieve the goal of sustainable supply at lowest cost, all players in the market need to pursue a more co-operative approach.

## **Author**

CHRIS STONE is an Executive Director of McDouall Stuart, an investment bank and sharebroking firm he co-founded in early 2002. He has 20 years involvement in the energy sector, starting in 1983 as a graduate geologist with NZ Oil & Gas, before joining Ord Minnett (later JPMorgan) as a financial analyst in 1993. He holds B.Surv. and B.Sc. from University of Otago, and an MBA from Victoria University.