exective summary

THE LEGACY OF MAUI

New Zealand is an energy-rich country yet in the absence of any identified strategy to secure primary energy sources for the long term, it will once more return to a situation of dependency on foreign energy markets.

The Maui gas discovery in 1969 gave to this country a one-off opportunity to secure its energy future. Catalysed by the oil crises of the 1970s, New Zealand took action that was at the forefront of world thinking and effort at the time. As a consequence of the decisions taken, New Zealand self sufficiency in primary fuel improved dramatically to over 85%, and a gas market evolved to become a key part of New Zealand's energy sector and industry infrastructure.

But the security and flexibility that the New Zealand energy market enjoyed as a result has had the counter effect of diminishing the importance of primary energy in people's minds. For most people and businesses, access to energy has been taken for granted. We require and expect electricity, natural gas and transport fuels to be readily available and to be able to increase or decrease consumption at will. New Zealand's focus turned to consumer energy requirements, market governance issues and investment efficiency.

With very few exceptions, New Zealand has had the benefits of inexpensive energy without giving thought to the future. This year, the onset of another winter power shortage and the redetermination of the Maui gas reserves have suddenly caused a refocus on energy supply.

But, behind the delivery of energy services lie decades of essential large capital investment in generation, transmission and distribution of electricity, as well as investments in the discovery, development, production and distribution of gas and other primary fuels. Decisions taken during development of the Maui discovery anticipated such investments plus investigation into alternative energy forms and ongoing energy planning. Because there was no coherent national action, these imperatives were not addressed.

Critical investments in further delineation of primary energy sources and expansion of energy reserve capacity have simply not occurred. Inadequate levels of exploration investment has led to failure to secure gas reserves adequate to maintain gas markets. Public policy initiatives to avoid wasteful use of energy have languished and, despite government policy objectives for sustainable economic growth, the market share of consumer energy provided by renewables has reduced. The opportunity for New Zealand to leverage its investment in Maui to secure a sustainable future energy supply has simply disappeared.

Instead the New Zealand energy sector is rapidly entering a period of transition and uncertainty which will be characterised by uncertain supply, higher costs, and a loss of flexibility and reliability. In particular, gas supplies to the electricity industry will be tight and major gas users will have to consider alternatives. If nothing is done to secure adequate indigenous primary energy sources the alternative is to import. The question then becomes from where, at what price and for how long?

The risks to the New Zealand economy are significant. New Zealand is in danger of reverting to a situation where it becomes once more dependent upon and vulnerable to global oil markets. Shut down of major gas-based industries and/or postponement of new power plants could become major disincentives to those considering further investment in our manufacturing industries. If these markets contract, incentives for gas exploration also decline and the supply side will contract further – leaving New Zealand further exposed to economic downturn and the vagaries of global energy markets.

NEW ZEALAND'S ENERGY PROFILE

New Zealand's energy sector has experienced a period of significant change since the development of the Maui gas field and the reforms of the 1980s. As importantly, the onset of Maui gas into the New Zealand fuels mix signalled a radical repositioning of natural gas as New Zealand's primary fuel source for thermal power generation and allowed significant substitution of foreign oil in our domestic fuels market.

But whilst the way the sector operates and the dynamics of the industry itself may have changed, the underlying fundamentals of energy supply remain unchanged. Primary energy sources, either indigenous or imported, form the resource base available to a country for meeting its future consumer energy demand as input into virtually all industrial, commercial, transport and household activities. From this resource platform, patterns of energy use are determined by the industrial and transport mix of a country, its economic growth, and by individual decision on energy efficiency and conservation.

The questions from a fuels perspective are:

- to what extent can oil and gas from indigenous sources supplement current Maui reserves
- what likely contribution to primary energy supply can be anticipated from new renewables
- how might demand for imported fuels be reduced through fuel switching, demand management and the uptake of distributed generation technologies.

The answers are dependent on patterns of energy use and demand growth.

NEW ZEALAND'S ENERGY RESOURCES AND FUTURE SUPPLY OPTIONS

New Zealand must maintain an efficient energy sector with security of supply during and beyond the transition phase begun with the decline of the Maui gas field. The close historic coupling between economic growth and energy consumption means that meeting future economic growth target will require similar growth of energy supply, efficiency gains notwithstanding.

About 30% of New Zealand's energy consumption and 70% of its electricity comes from renewable sources. This is very high by international standards but is declining, particularly because of the favourable economics of combined cycle gas technology for electricity generation and the increasing contribution of transportation in the total energy demand. The question that arises is how New Zealand might act to meet projected future growth in energy demand, particularly for electricity generation.

Oil and gas

New Zealand is self sufficient in all energy forms apart from oil. A complicating factor is that currently imported products meet oil supply almost entirely. Most indigenous product is exported, leaving New Zealand about 34% self-sufficient in liquid oil products, a proportion which is falling and will do so more rapidly as Maui is depleted.

The replacement of gas reserves is critical to managing the transition phase of the energy sector away from Maui gas surpluses. Recent investment history within the electricity sector underscores the vulnerability of generation to any disruption in natural gas supplies and the increasing vulnerability to delays in commissioning new plant.

Oil and gas inventories are declining because there has been inadequate investment in exploration to replace the reserves being consumed. New Zealand is not short of prospective targets, but there are few incentives to explore outside of Taranaki, even at expected future gas prices.

Government has not placed sufficient urgency on securing new oil and gas supplies and as a result has effectively lost control of its hydrocarbons inventory. Small discoveries make little difference to the national inventory, and even new fields of moderate size such as Pohokura do not replace the role that Maui has had.

Coal

Coal dominates New Zealand's energy inventory. Over 80% of the total in-ground resource is in the South Island, mainly in the huge lignite deposits of Southland and Otago. There are other large reserves in the Waikato, Taranaki and the West Coast.

Coal has the potential to contribute a far higher proportion of New Zealand's primary energy supply than it has since the development of hydro power and gas reserves over the last 40 years or so. However, without a rethink of the potential role of coal in the New Zealand economy and more robust forward planning, there is likely to be formidable barriers to the development of new large coal mines. There is also increasing pressure under international agreements to limit CO_2 emissions, causing a strong disincentive for development of coal-fired generation plant. Yet the certainty of knowledge about New Zealand's coal resources means that it is arguably the most robust option there is for long-term security of electricity supply.

Advanced fossil fuel technologies are leading to fundamental changes in thermal power generation world-wide. These need to be fully assessed and weighed against the risk of future supply shortfall from reliance on imported energy feedstocks.

Renewable energy

New Zealand's renewable energy sources comprise hydro power, geothermal and the new renewable such as wind, biomass and solar. Despite New Zealand having a wide experience in hydro and geothermal energy, there are substantial barriers to realising their potential for contribution to New Zealand's energy supply in the immediate future.

Geothermal energy could make a significant additional contribution to New Zealand's generating capacity, and it will be difficult to meet the Government's renewable energy targets without new geothermal plant. Only about 10% of New Zealand's potential has been developed. Delays and uncertainties in the resource consent process, and subsequent compliance costs, have been identified as the biggest obstacle to investment.

New Zealand is unusual in having such a high proportion of hydropower but a high dependence on river inflows because of limited water storage capacity. Dry years reduce hydro generation by up to 40%. Whilst there is considerable undeveloped hydropower generation capacity that has the potential to be exploited, much of this capacity is itself prone to dry year conditions. Most of this capacity could potentially generate electricity at a lower total cost than wind power and other renewables, but for a range of reasons, New Zealand must thus anticipate a decreasing contribution from hydro power over the long term.

'New renewables' such as wind, solar and biomass can make a useful contribution to generation in New Zealand, although wind and solar power are inherently intermittent and this reduces their value. They also remain higher cost options than other renewable technologies such as hydro and geothermal.

Electricity supply

Whilst electricity is not a primary fuel its importance to the New Zealand economy as a consumer energy source is critical. Of the power stations commissioned in recent years, almost all have been fuelled by natural gas, and gas remains the preferred fuel for new power stations. Recently announced plans for distillate conversions and increased coal use are still seen only as interim measures. The reality is, however, that the declining inventory of gas reserves is affecting investment in new generating plant.

With electricity demand in the immediate future unlikely to shrink while the economy continues to grow, New Zealand is facing increasing risk of generating capacity shortfall and, irrespective of any dry year reserve, by 2010 or thereabouts demand is likely to exceed normal-year generating capacity.

There has been inadequate investment in electricity supply infrastructure. A fragmented and incomplete market is not delivering supply-side solutions. Despite the planned contributions for new renewables, New Zealand will continue to depend on fossil fuels for some considerable time to come because the backbone of its renewable energy supply is hydropower, which is vulnerable to rainfall variation. The depletion of the Maui field will have the effect of reducing most of the base and swing capacity for gas as a thermal feedstock. If additional new gas reserves are not discovered soon, coal or distillates are the only realistic alternatives at a time when the Government is moving to a regime of full cost accounting for environmental costs.

PRIORITISING EFFORT

Current institutional arrangements are not effectively delivering security of energy supply despite accurate targeting of some key issues by Government initiatives. Having progressively shifted the delivery of energy services from a centrally planned and managed system, the nation now depends on a fragmented market to deliver continuously through the necessary transition to an energy future without Maui gas.

As the discussion document outlines, we have yet to arrive at a consistent national approach to meeting this need.

After twenty years of neglect, New Zealand is now once more at a crossroad not dissimilar to where it was in the 1970s. New Zealand needs to think differently about the energy services on which it depends. A more robust route towards assessment of supply and demand is needed that looks at energy sector issues in an interrelated way, rather than dealing with its parts. Only an holistic view will derive the equations for success.

There is no single action available to this country. The nature of New Zealand's resource base, the size of its energy markets, and our patterns of energy use limit the options available to us. We do not have the luxury of another Maui. Our thinking needs to take account of several unique factors in both supply and demand. Industry needs to re-examine its role in the wider New Zealand context. Government needs to rethink how it can facilitate and encourage the necessary investments in critical energy infrastructure.

There are three essential strands to the effort required:

- extending New Zealand's primary resources
- development of a strategic reserve capacity
- long-term investment in alternative solutions.

The analysis set out in the discussion that follows offers three performance measures that if examined, adopted and expanded into an agreed industry strategy would offer a framework for future planning and investment:

- minimum levels for self-sufficiency in primary fuels
- appropriate dry year margins
- acceptable levels of reserve capacity and system reliability.

It is within this framework that the desired transition to renewable energy and a fully sustainable energy future can be plotted.