30 March 2007

New Zealand Energy Strategy
Ministry of Economic Development
PO Box 1473
Wellington

Email: nzes@med.govt.nz

SUBMISSION FROM THE

CANTERBURY MANUFACTURERS' ASSOCIATION

ON THE

# Draft Energy Strategy

**Canterbury Manufacturers' Association**
**P O Box 13152 Armagh**
**CHRISTCHURCH**
**Tel 03 353 2542**
**cma@cma.org.nz**

The Canterbury Manufacturers' Association appreciates the opportunity to provide feedback from our members.

**BACKGROUND**

The Canterbury Manufacturers' Association represents manufacturers predominantly in Canterbury and Westland, with members from the remainder of the South Island and Auckland. The numbers of staff employed by our members represent approximately 40% of those employed by the manufacturing sector in the Canterbury region. Locally the manufacturing sector is a significant contributor to the economy, representing about 15% of employment.

Elaborately transformed manufactures account for over 30% of New Zealand tradeable exports; export sector sales total over $30 billion and total national employment numbers around 170,000. New Zealand manufacturers face the ever-increasing onslaught of the cost of local regulation and global competition from low cost countries without any significant support and protection.

The historical reliance that New Zealand has placed in the primary sector and basic manufactured goods has seen New Zealand's position in the rankings of the Organisation of Economic Co-operation and Development fall from 5th in 1950 to 21st in 2005, placed between Spain and Greece - well into the lower middle bracket of gross domestic product per capita. New Zealand has grown more slowly than other countries due to the dependence on the primary sector. In comparison the manufactured goods sector of the internationally traded economy has grown much faster.

Without economic development, based on elaborate transformation commanding high prices from global customers, we will increasingly see issues such as 'health problems' correctly characterised as 'wealth problems'. Recent headlines on the 'management' of the waiting lists are bringing this issue to the attention of the public. Falling productivity, growing trade deficits, higher tensions in segments of the New Zealand economy will be a feature of the competitive tensions in world markets. Energy in the environment; wind, water, tidal, wave and geothermal, coupled with the relatively small population of New Zealand offers the prospect of low cost electricity (energy) forming a comparative advantage for New Zealand exporters, similar to that low cost grass enjoyed by the agricultural sector. Such advantages can help offset the ever-growing costs faced by manufacturers in New Zealand.

The issues around carbon are global. If manufacturing is pushed to the developing world the net change in carbon emission is likely to be adverse from a climate perspective. Taking a leading position on carbon that simply speeds the transfer of activity to the developing world, or makes local activity uncompetitive, does nothing for the climate. Further, neglecting methane emissions from ruminants “because they are too hard to deal with” is another example of political spin choosing to ignore logic. On the one hand we can use less energy, pay carbon charges, drive fewer miles, use smaller cars, get on the bike and that is fine, yet fewer animals is not seen as any part of the “low carbon” aspiration.

Competition from low cost countries, based on price, is accelerating the pace of change for manufacturers in New Zealand. New Zealand manufacturers compete with every manufacturer on the planet. Costs in many countries are far lower than in New Zealand where the increasing costs and regulation seem to have no end, resulting in job losses and business relocations.

## DRAFT ENERGY STRATEGY

Our comments will be largely confined to electricity. In this regard we believe the energy strategy is fundamentally flawed. Throughout the document there is no sense of any clear and present danger, or the magnitude of the task. We believe the document to be dangerously complacent.

Because electricity is a vital interest of our members, the CMA has put a substantial amount of effort into the consideration of electricity issues. The general conclusion from our work is that New Zealand should have a renewable vision for energy, the implications of adopting such a view are not stated strongly enough in the strategy document. In working through the energy strategy we had a strong feeling we were on our way back to the future – but really lacking the will to face up to the matters that must be faced.

Had the draft Energy Strategy and Energy Efficiency and Conservation Strategy, been significantly more pragmatic, accurate and filled with a sense of clear and present danger we could have seen a major step in the right direction increasing the coordination of New Zealand’s disparate and often failing electricity system. However, the recommendations contained in those documents do not redress the ongoing problem of price increases and inadequate supply and distribution of electricity. An action plan by definition must contain actions.

In our view New Zealand's electricity demand is growing at around 2.3% per year, and this growth is calculated net of savings. Our extrapolations of past growth factors in all demand side responses. **<u>If the Energy Strategy depends on escalating prices driving an increased demand side response, it should be explicit and as a result face the consequences</u>**. At this level our historically based estimate of demand growth is almost double that in the National Energy Strategy, which means that the future supply problem is much more immediate than the report would suggest. Calling on consumers to use less electricity or creating rules that increase the cost of electricity to ration on price does not offer a competitive solution sensitive to consumer needs. A better alternative would be to focus the rules of game to improving supply reliability at lower prices when compared to other countries.

Developing a low cost renewable supply by aggressively utilising New Zealand's available hydro and geothermal resource is a vital part of our energy future. Clearly starting on existing hydro rivers makes the best sense, but eventually all our rivers will have to be exploited. These sources can balance more wind generation, which is limited to about 20% of the installed generation capacity. Without the technical balance from other sources, wind alone will not be able to support the real level of growth that inevitably mirrors population growth. We feel the strategy does not address real world issues with any conviction of the seriousness of the problem – political spin will not generate electricity however correct that spin might be.

Based on our work, we believe that more hydro and geothermal development is necessary to enable wind generation to bridge the gap before marine generators and alternate fuel sources become available. Wind is complementary to hydro and geothermal generation, rather than a one-for-one replacement. The problem with wind is that it doesn't always blow and there are questions as to its load factor. The more we choose to rely on wind, the more we will need other sources of generation to provide supply stability. Wind generation is **<u>not</u>** a stand alone solution.

If New Zealand can coordinate and correctly implement its energy strategies, it should be possible to rebuild its reserve capacity using a mix of hydro, geothermal and wind over the next 10 to 15 years. After that, we can use, tidal and marine sources available in the environment – if the technology is available via a northern hemisphere solution or local solutions off the back of the contestable fund for technology development.

Further out into the future, nuclear (fission certainly and perhaps fusion) may become the only available carbonless solution. Until a real alternative is available, nuclear power should not be eliminated from New Zealand's energy debate. It is better scheduled out for the next 25 or 30 years. By that time the northern hemisphere may have developed the technology as an acceptable solution.

Available photovoltaics (PV) do not offer any sort of cost effective solution, battery cost and life; system complexity and maintenance costs make any PV solution viable only in special off grid applications. It should be noted that all sources and different behaviours have an environmental impact. PV must be manufactured at some point, and the use of a microwave in the home might increase energy use not reduce it, as 'oven ready' meals might prove to be much more energy intensive than cooking from scratch using traditional methods. In energy and environment matters all costings and other assessment should based on real "whole of life" considerations.

An "electricity first/transport fuels next" approach is valid, but we need pragmatic solutions. Solutions that work, aspirations for a low carbon future that ignore other greenhouse gases are just so much political spin. Methane is a much more destructive greenhouse gas than carbon dioxide and any credible low carbon policy must address all carbon emissions across all sectors of the economy, not just a few of the easy targets. Anything less is political grandstanding, doing nothing more than warming the hearts of politicians along with the atmosphere

In aspiring to a clean, green low carbon future, this strategy and those that will follow need to note that in 1971 renewable sources made up over 75% of New Zealand's electricity generation but by 2005 that figure this had fallen to around 53%. It should also consider that by 2030, assuming that net load factors remain unchanged; to achieve the renewable ratio in electricity generation we had in 1971, at a growth rate of a low 1%, we will have to **double the every single watt** of capacity of our existing renewable generation. If growth is closer to 2.3%, we will have to **add two watts for every watt** of renewable capacity that exists today. This highlights the magnitude of the task now facing New Zealand.

This Energy Strategy is a step in the right direction, but aspirations should include comparatively lower prices to consumers, a secure reliable supply and low carbon.

Delivery will depend on the urgent and effective development of large hydro and geothermal plants, a robust failure tolerant north-south transmission infrastructure, backed by a diverse range of cost effective generation. With the right rules and incentives we might get back to what we had in 1971 - a 75% renewable content in electricity generation, and a secure supply of electricity at some of the lowest prices in the world.

On Page 41 of the Energy Strategy we see "*the experience however is that investment in new generation is occurring in the near to medium term, there is sufficient generation planned to ensure adequate generation capacity*". This statement, in our view, is dangerously optimistic. Planned generation will not keep the lights on. Experience shows, for a multitude of reasons, plans do not always translate to action. It seems the reports on the demise of the Meridian project at Makara are overstated but the project is under threat as costs escalate – this on a site claimed to be the best wind farm location in the world. This is yet another indicator of clear and present danger. The reserve margin in New Zealand currently stands at around 9%, when international best practice would suggest for New Zealand's generation inventory a reserve capacity margin of 25% is required. Yet for "economic" reasons it seems even world class sites in New Zealand's are marginal. Something is terribly wrong with the system, its rules and incentives.

## Incentives and Rules

Our own studies indicate a growth of around 2.3% and that after 2008, on current published plans, the reserve margin that would have shown some improvement on the 2006 levels will begin to be eroded. New generation and transmission infrastructure is not being installed soon enough. The claim that delay saves money only works when costs escalate at a rate below the weighted cost of capital, if we add to this notion a higher cost of lost load we might see more urgency.

In our view the state of the electricity system in New Zealand is a major threat to the economy and the quality of life in New Zealand.

- There is no system incentive to build large capacity, low lifetime cost generation. In fact, with the way that the market operates, there are incentives to delay capacity increases, build high cost generation and run the system at, or close to, a supply deficit.

- The Government has a major conflict of interest. It is impossible to promote green energy efficiency goals, receive increased SOE profits and keep prices to consumers internationally competitive at the same time.
- There are no action plans in place to address the looming energy crisis that address responsibility for implementation on long lead times, RMA complications, and strategies for measuring the effectiveness of the actions.
- There are too many barriers against transmission upgrades and development.
- There is insufficient focus on engineering and deterministic assessments for individual investment. N-1 should mean N-1 not some abstracted probability function. Our view is that insufficient emphasis is given to the cost and reputation impacts on the wider economy. Imagine the impact if under adverse system wide conditions the HVDC link failed and really did take six months to fix. The classification of the Cook Strait DC links as economic assets as opposed to reliability assets beggars belief.

## Costs & Cost Implications

The cost analysis[1] that suggests that large hydro installations cost roughly the same as thermal installations is driving flawed decision-making. The source documents use parameters that vastly overstate the cost of hydro and understate the cost of fuelled thermal generation. A review of the statements made around Mighty River's recent profitability reports demonstrate this to be clearly the case in practice, as far as the theory goes the examples of inadequate parameterization are:

- Life of hydro installation – 50 years this should be much longer.
- Load factor – 56% hydro and wind 50% are these reasonable?
- Escalating cost of fuel - $US60 per barrel to how high?
- Exchange rates 60¢ US – when if ever?
- No carbon loadings – how much and when?
- RMA costs – focused on "if" not "reparation".

These are all biased against large hydro-generation development. It is simply unacceptable to continue to lock up our rivers and impose massive RMA costs

[1] See the appendix which discusses costing issues associated with different energy sources.

debating the merits of a project rather than focusing the resources on mitigating and compensating for the impacts of the development on those affected. A national interest test should override the 'if' debate and focus on getting it done and helping compensate those who suffer the fall out. The way forward must be cleared to unlock all our rivers and having a resource management system that helps those directly impacted. The massive consumption of time and money on litigation and debate artificially introduced by the RMA is obscene in the face of the problem that confronts us.

Economic tests based on the value of lost-load need much more debate; our view again is that the cost of lost load is massively underestimated, in financial and reputational terms. It is easy to acquire the 'third world' persona by power cuts and random system outages. As mentioned elsewhere the classification of the HVDC links as 'economic assets' subject to the Grid Investment Test as opposed to 'keep the lights on assets' reliability assets subject to must function criteria has the potential to be equally disastrous.

## Governance and Coordination

The conduct of the Electricity Commission could improve, comments when the previous Chair exited, "a 9% reserve margin is fine", and public disagreements in the Electricity Commission are not seen as helpful. The delay in appointing a new Chair needs to be explained.

The rules and responses from the Electricity Commission are complex, slow and cumbersome. Why does it take five years to consider the impact of wind and distributed generation on the electricity system, when elsewhere, the Government is promoting the adoption of both? Having the cart and horse in the right order, overall alignment and simplicity in the rules is badly needed but seems to be as scarce as common sense.

## Growth

Our analysis indicates that to restore the reserve margin (accommodating plant retirement, demand growth, load factors, losses, and increase efficiency) we need to install around about 270 megawatts of capacity each year, representing around 2.3% growth.

Taking the 2030 horizon in the Energy Strategy, we see at a low 1% growth projection, the need to add approximately 50% more capacity to the system. If we take, for an objective, a return to the 1970 levels of renewable generation, say around 2/3's renewable, we would need to replicate each and every existing component of renewable generation. If the growth runs out closer to our projection at 2.3%, the hurdle is much higher, and problems will happen much earlier.

To meet this growth, bearing in mind accurate costings of the alternatives, we need to unlock all available hydro-generation resources. Environmental impacts must be mitigated but must not be allowed to block this development on the basis of national interest. Given we can unlock our rivers, there is sufficient hydro resource available to balance an increase in wind generation to meet the 1% growth projection. However, at 2.3% new energy sources will be necessary. **There is a real gap.** How will it be filled? The Energy Strategy is silent on this question – a gross omission in our view.

We know of the possibility of tidal energy, which is yet unproven, but system operators are going to face the same issues as they face with wind and hydro when there is no wind, no water or slack tides. New Zealand will still need solid and dependable generation for grid firming, which at this stage will have to be thermal. Carbon sequestration may turn out to be the solution but it is a hope at this point. The three major test sites around the world will take thousands of years to be proven, and they all are even now recording environmental concerns. Placing $CO_2$ out of sight will not make it go away.

## Conclusion

The rules associated with the electricity system in New Zealand are wrong. They are driving incrementalist, high cost and late outcomes that reduce the security of supply, encourage gaming and largely ignore the consumer. This must change.

Consider the test we have raised in our recent presentations – "If I could give 2000MW of free generation, with a zero environmental impact, at no cost to New Zealand right now, would I be a hero or villain?" The different answers and who those answers come from demonstrate that the system does not serve us all well.

Just in time solutions increasingly show themselves to be just-too-late. The confusions, and tension between productive and allocative efficiency and the almost complete absence of the consumer from "electricity system considerations" must be resolved if things are to improve.

The RMA requires a "National Interest" override, which focuses on mitigation and compensation not the go or no-go of a given project. This would wipe many millions off the cost of hydro-generation and transmission projects – we are authors of our own disaster in this respect. The RMA costs of the Makara wind farm at $10 million and counting, project Aqua at over $50m are luxuries we can no longer afford. This must change.

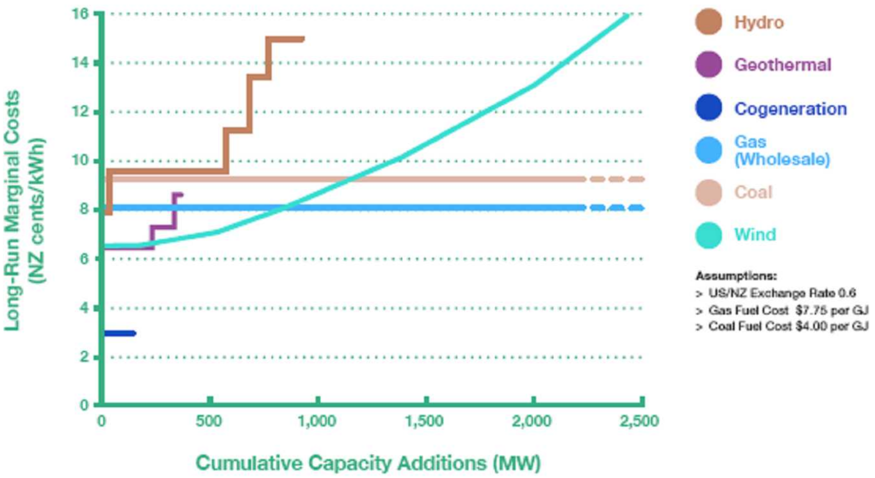
Do we really have to learn the hard way as more blackouts and massive electricity cost escalations help us see the light?

John L Walley
Canterbury Manufacturers' Association

## Appendix One

*Energy Outlook* is a background document that helps to inform New Zealand's energy policy debate. It is published by the Ministry of Economics Development (MED) about every three years, which provides a 25 year projection of New Zealand's energy future. In order to examine possible future outcomes; the cost of additional generation capacity was assumed (see Figure 8.1), based on the reports[2] by East Harbour Management Services (EHMS). By simply looking at the graph, some might argue that it is cheaper to produce electricity using the fossil sources; both hydro and wind are available at greater generation capacity, though wind is presented as a cheaper source than hydro. However, because these figures are projections, which are estimated under some specific assumptions, it is necessary to exam the validity of the underlying assumptions before drawing any conclusions.

**Figure 8.1: New Plant Generation Costs Assumed in Base Case to 2015**




For fossil sources (Gas and Coal), it is assumed that the gas fuel and coal fuel cost are fixed at $7.75 per GJ and $4.00 per GJ respectively. As both gas and coal are non-renewable, the costs are likely to increase due to scarcity. Thus, the horizontal cost curves are unlikely to be realistic.

For renewable resources (Hydro, Geothermal, Wind and Biomass, etc), the figures were taken corresponding to the high confidence[3] estimates at 10% WACC[4]. The assumptions within the EHMS's unit models include expected life, conversion efficiency, load factor, construction periods and fuel cost. Without any in depth investigation, it is reasonable to question a few assumptions made for the calculation of hydro unit cost.

2 EHMS (2005), East Harbour Management Services, *Availabilities and Costs of Renewable Sources of Energy for Generating Electricity and Heat*; EHMS (2004), East Harbour Management Services, *Fossil Fuel Electricity Generating Costs.*

3 The EHMS report gives energy supply cost and availability for three levels of confidence: high, medium and low. High confidence implies these resources are well proven resources, assessed as readily able to be permitted and developed. Achievable development rate has been taken into account. They represent an 80-90% confidence that the uptake will occur.

4 WACC (Weighted Average Cost of Capital) is often used as a discount rate for financed projects. It takes into account the relative weights of each component of the capital structure (equity and debt) and presents the expected cost of new capital.

First, it is assumed that the expected life of the hydro plant is 50 years. Mighty River Power[5] is one of the main electricity suppliers, its generation assets collectively account for up to 22% of New Zealand's peak energy demand, and nearly 80% of their energy production is hydro. It operates nine different hydro stations, and most of the stations have been in operation since the 1940s. The oldest operating station on the Waikato River is Arapuni – completed in 1929, which still is the largest capacity of any single station within the Waikato River hydro system. 50 years of expected life for hydro is obviously far too short.

Secondly, the load factor[6] for hydro is assumed to be 56%. It is correct that the electricity output may be affected by rainfall and lake levels, however, 56% is considered to be quite low. Especially when wind generation is considered to have load factors up to 50%, and its electricity can only be produced when the wind is blowing. Since the unit costs used in this study are normalised unit costs across the projected life of the asset divided by the benefit derived from the asset. For a given project this unit cost is derived by taking the present value of costs, i.e. capital, O&M, tax, depreciation (including tax benefits of depreciation), fuel (where applicable) and dividing it by the present value of the kWhs generated over the lifetime of the project. Hence, understating the expected life and load factor of hydro are likely to significantly overstate the unit cost of hydro-generation.

The other readily available renewable alternative is wind generation. Its generation costs have dropped rapidly over the last decade, due to maturation of the technology. However, wind generation operates at only 20 – 45% load factors; typically quoted is 35% over the long run. "For wind to make up a significant share of electricity generation, it would have to be carefully integrated with other forms of generation and storage, wind generators would have to be widely dispersed around the country" as suggested by MED in *Energy Outlook to 2030*. It also pointed out that the potential to use hydro-generation to complement the inherent variability of wind generation is necessary, since hydro-generators can provide a fast response to changes in load requirements. When the wind blows we can save water given system wide coordination.

Finally, the US$/NZ$ exchange rate is assumed at 0.6 for both fossil and renewable source. As at 30 March 2007, the exchange rate is at NZ$1.00 = US$0.714, which is nearly 20% higher than the assumed rate. Since some of the cost estimates (both capital and O&M costs) were based in overseas information, the actual unit cost will be somewhat different due to the different exchange rate used.

As the result of the sensitivity test[7], the exchange rate has a relatively smaller cost impact in hydro compared with other sources. So hydro-generation projects are relatively distanced from exchange rate impact, in construction and operation.

Up to this point, all our evidence indicates that more focus on large hydro-generation and better transmission infrastructure is essential to have any confidence in New Zealand's electricity supply in terms of reliability and price. Without investment that exploits all available hydro-generation a low price, reliable electricity supply will become a distant memory in New Zealand.

End

[5] For more information, visit www.mightyriver.co.nz

[6] Load factor is the average power divided by the peak power over a period of time.

[7] EHMS (2005), East Harbour Management Services, *Availabilities and Costs of Renewable Sources of Energy for Generating Electricity and Heat,* p.182.