



EnergyWatch

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Lignites or LNG?

Electricity generation from hydro and wind energy sources reached a low point of 55 percent of total generation during the year ending 30 June 2006. If geothermal energy is included as renewable, the percentage from renewable sources increases to about 62%.

Although the proportion of our electricity produced from renewable sources (and especially from wind) is likely to increase again over the next few years, NZ is still facing a dilemma about future sources for electricity generation as we approach the year 2015, when the availability of natural gas from already-confirmed sources is likely to begin to fall off sharply (refer EnergyWatch 41, p19) to a level well below present annual gas consumption.

This will mean that there will be insufficient already-confirmed gas supplies available to fuel any new power stations (such as Otahuhu C) beyond about 2015.

Genesis Energy states that the new gas-fired power station at Huntly (e3p) due to be fully commissioned in April 2007, and possibly a new 240MW gas-fired power station at Rodney, will have a fuel supply from the Kupe field for at least 15 years from when that field is opened. Genesis has gas available from other fields until Kupe starts producing in 2009.

But Contact Energy has stated that it is short of gas not only for any new generation (Otahuhu C) but also for its existing gas-fired plants beyond about 2010 (including Otahuhu B and Taranaki Combined-Cycle).

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However Contact has since stated that it has bought a block of additional Maui gas and should now have sufficient gas through to about 2015 including gas which it expects to obtain from the recently opened Pohokura field, but beyond 2015 their position is still unclear.

It is therefore not surprising that (as reported elsewhere in this issue) Genesis and Contact have announced their “backstop plan” to build a \$600 million facility at New Plymouth to import liquified natural gas (LNG) and to begin the resource consent process which they believe may take up to three years.

It may only be a coincidence that the above announcement was made only a week or so before Contact also announced its decision to seek tenders for a new 400MW gas-fired combined-cycle power station and that it may proceed with that investment (Otahuhu C) from next year, as also reported in this issue.

Contact already has the resource consents for Otahuhu C, which could be up and running by 2009 or 2010 if it decides to proceed, whereas it would be at least 2012 before a LNG terminal could be built at the proposed site at Port Taranaki. However Contact is probably now confident that it has secured enough domestic gas to “tide over” a period of several years from when Otahuhu C may open until a LNG terminal can be completed.

Compressed natural gas (CNG) as an alternative to LNG has been considered by Todd Energy (refer EnergyWatch 40, p3). However it is understood that there is an economic limit on how far CNG can be brought to NZ by tanker ship, such that it can only be brought from Australia or perhaps Papua New Guinea. Contact and Genesis have recently stated that in their opinion, the CNG technology is not far enough advanced, that there is as yet no international trade in CNG, and dedicated CNG carrying vessels have yet to be built.

Contact and Genesis also state that a CNG importing facility would be more complex and more expensive than their proposed LNG terminal. This is believed to be because gas

storage would take up much more space than for liquid tanks.

There may be possible strategic advantages of CNG in that it can be obtained from closer to NZ than LNG, but the complexities and cost of equipment for high pressure gas storage and transfer might limit the potential scale of CNG operations.

On the strategic issue, Dr Keith Turner, CEO of Meridian Energy (refer EnergyWatch 39, pp 26-27) has stated that if NZ puts its electricity supply at risk to LNG availability, we put our economy at risk to activities and events which are far beyond our shores, over which we have no control.

As discussed elsewhere in this issue, the energy potential of the very extensive lignite deposits in Otago and Southland is well known, with one deposit alone, the Hawkdun deposit (in Central Otago), possibly providing as much energy as two Maui gas fields. **However the amount of greenhouse gas emissions produced from using lignite is such that to consider doing this without carbon dioxide capture and storage would have very serious implications for NZ’s climate change policies.**

It seems that unless NZ is lucky enough to soon experience the finding of a major new gas field, we’re getting to be “between a rock and a hard place” in our future energy choices for electricity generation.

Other alternatives such as more wind power should be considered as well, as discussed on pp 4-6 of this issue.’

Also, wood residues have considerable potential to substitute for electricity (including pellets, firelogs and conventional firewood) but time is getting short if these are to make a significant impact on our electricity needs by 2015.

John Blakeley

Errata

In EnergyWatch 41, page 10, Column 1, Paragraph 5 the year 1994 was inadvertently stated instead of the year 2004. The paragraph should have read:

“The CCO now states that carbon dioxide is the

major greenhouse gas in NZ's emissions profile. I calculate that at the end of 2004, the actual proportions would have been about carbon dioxide 45%, methane 38% and nitrous oxide 17%”

(Note that in 1994 the proportions would have been approximately carbon dioxide 43 percent, methane 40 percent and nitrous oxide 17 %, so that in the ten year period 1994-2004 the carbon dioxide proportion went up 2%, the methane proportion went down 2% and the nitrous oxide proportion stayed the same.

Methane emissions actually declined, in the early 1990's until 1994 due to a downturn in the agricultural sector. Since then, they have been increasing again but at a much slower rate than for carbon dioxide and nitrous oxide emissions.)

Global Warming Profile Raised

In recent months in NZ, the awareness of both policymakers and the general public about climate change/global warming issues has been raised by several events.

First, in July the former US Vice President Al Gore's film "An Inconvenient Truth" was released on the film festival circuit (refer EnergyWatch 41, pp 11-13), followed by a more general release, and it is estimated that nearly 70,000 people in NZ have now seen it.

Second, in early October the National Party released its policy proposals for the environment entitled "A Bluegreen Vision for NZ" which proposed a tradeable emissions permit system to manage our greenhouse gas emissions, the first step of which will be capping electricity emissions by requiring all additional emissions from fossil-fuel power stations to be offset by forestry planting or other emission reductions.

Third, at the end of October the Stern report was released in the UK (refer to pg 22 in this issue) and this report has received worldwide publicity.

Fourth, in late October at the Labour Party conference in Rotorua, the Prime Minister, Helen Clark, made a call for NZ to be a world leader in sustainability. She said that she wanted to eventually make NZ "carbon neutral", a goal much more ambitious than that set by the Kyoto

SEF Discussion Forum and AGM

The Discussion Forum of the Sustainable Energy Forum originally planned for 20 November and then postponed to 8 December, has now had to be deferred until February or March because of delays in the announcement of the NZ Energy Strategy. Further details about the Discussion Forum will be available early in the New Year.

The AGM of SEF will now be held on:

12 noon, Friday 8 December, 2006

Edison Room of the EECA Offices

44 The Terrace, Wellington

All SEF members are urged to attend the AGM if they possibly can, or arrange for a Proxy to vote on their behalf.

Protocol, and in a country where it is now generally conceded that we will have no chance of achieving our Kyoto target by 2012 without the substantial purchase of carbon credits from overseas.

While it is commendable for politicians to express lofty long-term goals, more reachable goals for the immediate future are what we need right now. It will be interesting to see what goals are expressed in the soon-to-be- released NZ Energy Strategy.

John Blakeley

STOP PRESS

On 23 November 2006 it was announced that the Government is investing \$15.5 million in an initiative to increase the use of solar water heating in NZ. The programme will run for five and a half years from now, with the \$15.5 million being allocated for the first three and a half years. Funding levels for the final two years will be decided after a review in 2009. Further information on this initiative will be in the next issue of EnergyWatch, or refer to the SEF News posting on this topic on 23 November.

NZ Electricity System

Dollar Fall Hits Wind Farms

Almost 1000MW of generation capacity in new wind farm projects is having its economic viability threatened as the lower NZ dollar hits turbine costs.

A “cocktail of negative factors” led by the falling NZ dollar means that some wind farm projects “in the pipeline” risk being abandoned or deferred as uneconomic.

Any slowdown in the growth of wind farms would be a major blow to the Government’s attempts to encourage renewable power generation and would handicap moves to boost output to meet growing electricity demand.

Wind farms are an important part of the new generation being built as NZ scrambles to cope with the impending exhaustion of the Maui gas field and problems in getting resource consents for new hydro power stations.

TrustPower’s CEO, Keith Tempest, has said that the 93MW Tararua Stage 3 wind farm, now under construction, would not have gone ahead if conditions six months ago had been the same as they are today.

And a 300MW project TrustPower is investigating at Waipori, near Dunedin, would not be built unless conditions improved. The suggested impediment was the NZ dollar which had fallen 20 percent against the Euro since TrustPower committed to buying the Danish Vestas V90 turbines it is installing at Tararua.

Turbines are around 70 percent of a wind farm project’s costs. This alone would have made Tararua Stage 3 to be 14% more expensive.

Tempest said that if Tararua 3 had faced today’s prices, another 35 percent would be added to its \$180 million cost, with factors such as:

- Rising prices for raw materials and especially, high steel prices.
- The Government’s abandoning of its proposed carbon tax regime.
- Strong US demand for turbines caused by US Government financial support for wind power (subsidies are being captured by the turbine suppliers).
- Competition in NZ with the public sector for civil contractors.

Other wind farm developers agree rising costs are reducing the viability of projects, although none has yet “pulled the plug”, except for

Name	Developer	Region	Capacity	Sub-total
Under Construction				
Tararua 3	Trust Power	Palmerston North	93MW	
Te Rere Hau	Windflow/NZ Windfarms	Palmerston North	48MW	
White Hill	Meridian	Southland	58MW	199MW
Consented and Appealed				
West Wind	Meridian	Wellington	<210MW	<210MW
Consented				
Hawkes Bay	HB Wind Farm	Hastings	<270 MW	
Titiokura	Unison	Hastings	<48MW	
Awhitu	Genesis	Franklin	18MW	<336MW
In Consents Process				
Te Waka	Unison	Hastings	<111MW	
Taumotatotara	Venus	Waitomo	<38MW	
Awakino	Venus	Waitomo	<41MW	<190MW
Total up to 935MW				

Table 1

Source: Information from NZ Wind Energy Association

Genesis who have announced they are not going ahead with Awhitu.

Up to 935MW of wind generation is presently planned in 10 projects now either in the consents process, consented or under construction (see Table 1 on previous page).

The biggest is the \$350 million, 270MW Hawkes Bay wind farm near Hastings. Alastair Wilson, General Manager of developer Wind Farm Developments, said that the lack of certainty on carbon policy was probably a bigger factor affecting project economics than the exchange rate. His company has not yet decided where it will source its 78 turbines. He said "I wouldn't expect the farm not to proceed. It's a question of when".

Meridian Energy is dealing with an appeal of its consent for the 210MW West Wind Project at Makara near Wellington. Spokesman Alan Seay said that the exchange rate was having an impact on project economics "but whether it necessarily means an end to these projects is another matter."

Hawkes Bay lines company, Unison Networks, has applied for consents for the 111MW Te Waka wind farm and has consent for a 48MW wind farm at Titiokura. Business Development Manager, Nigel Purdy, said that his company would be happy if one or two of the conditions cited by Keith Tempest above improved. "The economics is certainly getting a lot harder but at this stage we're progressing".

Mr Purdy said that resolving the uncertainty over carbon pricing in the 2008 to 2012 Kyoto commitment period would be helpful to project planners.

Source: Independent Financial Review, 2/8/06, pg1.

In addition to the above, Meridian Energy has recently lodged a resource consent application for Project Hayes, a staged development of between 150 and 630MW on the Lammermoor Range, Central Otago, for which public consultation began earlier in 2006.

Source: Meridian Energy Report for the year ended 30/6/06.

Wind Electricity Generation from Existing and Planned Projects

In its recent annual report, Mighty River Power (MRP) announced that it is to proceed with a 90MW geothermal power station at Kawerau and noted that it will produce more energy annually than all of the country's existing wind turbines. (Note that the plant factor for a geothermal power station is approximately double that for a wind farm, meaning that about twice as much generation is produced for a given capacity).

This prompted me to ask the question as to how much electricity is currently being produced from wind? The recent Energy Data File (January 2006) states that for the year ending March 2005, electricity generation from wind was 466GWh, which is about 1.1 percent of total electricity generation (Table G1, pg 120).

The seven wind energy projects currently in operation are shown on Table 2 with a total capacity of 166.9MW, which is indeed not quite double the capacity of the geothermal power station to be built at Kawerau. Hence, based on the information in the MRP annual report, the total electricity output from all NZ's completed wind energy generation projects meets the equivalent of about a third of the present residential and industrial electricity demand in the Eastern Bay of Plenty.

Table 1 has detailed a further up to 935MW capacity in ten projects at present under construction, consented or in the consents process, which is approximately 5.5 times the present capacity in operation. (This does not include the very large Project Hayes for which a resource consent application has just recently been lodged).

SEF member Molly Melhuish has provided me with a list of 32 projects which have been publicly announced (including the above 17 projects and Project Hayes), with a total combined capacity of 2995MW and widely spread throughout NZ. How many of the other 14 projects will proceed in the reasonably near future is unclear, especially with the present uncertainties over a carbon tax and over carbon credits.

John Blakeley

Table 2

Wind Energy Generation Projects Currently in Operation

Name	Owner	Region	Capacity
Wind Farms (5 projects)			
Hau Nui 1	Genesis	South Wairarapa	3.5MW
Hau Nui 2	Genesis	South Wairarapa	5 MW
Tararua 1	TrustPower	Palmerston North	32MW
Tararua 2	TrustPower	Palmerston North	35.7MW
Te Apiti	Meridian	Palmerston North	90MW
Demonstration Turbines (2 projects)			
Brooklyn	Meridian	Wellington	0.2MW
Gebbies Pass	Windflow	Christchurch	0.5MW
			Total 166.9MW

Contact to Call Tenders for Otahuhu C

Contact Energy is to call tenders to build a new 400MW combined-cycle gas-fired station at Otahuhu, alongside its existing Otahuhu B Plant.

CEO, David Baldwin says a final decision to build will not be made until after tenders are received, but Baldwin believes that the proposed plant is the best new generation option for NZ as it would provide a significant amount of base-load electricity directly to Auckland and help improve security of electricity supply, not only to Auckland but to the country.

It would also take pressure off Transpower to build its controversial new 400kV power lines through the Waikato into Auckland, which could be delayed for several years. But Baldwin stresses that the new Otahuhu plant would not serve as an alternative to upgrading the transmission system.

Contact already has resource consents for the proposed plant which will be known as Otahuhu C. Baldwin says the final decision will depend, among other things, on Contact's ability to secure gas in the post-Maui environment. Analysts say Contact would probably want an assurance of at least 10 years of confirmed gas supply before proceeding with the new station.

This could be helped by the prospect of Maui gas lasting up to four years longer than originally anticipated and the possibility of Contact securing gas from the Pohokura field.

A decision to proceed with the Otahuhu C station will not be linked to Contact's possible plans to import liquefied natural gas (LNG). Rather it is based on growing confidence of an adequate supply of domestic gas.

Editors Note: Confirmed reserves of natural gas in NZ are still likely to drop off markedly from about 2015 as shown on Figure 1 of EnergyWatch 41, pg 19, meaning that any new power station proceeding from now on, including Otahuhu C, is unlikely to have a sufficient supply of domestic natural gas beyond that date.

It would be at least 2012 before a LNG terminal could be built at the proposed site at Port Taranaki, whereas the Otahuhu C station could be up and running by 2009 to 2010 if Contact decides to proceed.

Contact's existing gas-fired power stations (mainly Otahuhu B and Taranaki Combined-Cycle) helped the country get through a period of extremely tight electricity supply during the 2006 winter, reinforcing gas as the cleanest, most efficient back up for NZ's hydro generation. (What about wind power? - Editor).

Source: NZ Energy & Environment Business Week, 25/10/06, pg 2

Further articles on Otahuhu C appear on pages 14 and 25 of this issue.

From the Electricity Company Annual Reports (for the year ended 30/6/06)

1. Contact Energy

Contact Energy has reported a bumper profit of \$280.9 million, with earnings up 14 percent on last year. The good result was helped by the driest year in the South Island for 29 years which kept hydro levels low and saw heavier than usual demand for Contact's gas-fired generation.

Contact says that the solid annual result highlights the importance of gas-fired power stations in backing up NZ's hydro system, particularly during dry and cold years.

Contact's hydro generation was down 23 percent on the previous year, while generation from its thermal plants was up to 10 percent. If NZ is unable to source sufficient new natural gas, it is likely that future energy shortfalls will be met using coal, which produces more than twice the level of carbon dioxide emissions as natural gas.

Contact is investigating new options in geothermal, hydro and wind generation, as well as continuing to develop plans for additional combined-cycle gas capacity.

2. Genesis Energy

Genesis Energy is eyeing NZ's coal reserves as a sensible option for generating power, while at the same time downplaying wind power as it estimates power prices would need to rise about 20 percent to make wind farms commercially viable without subsidies.

It estimates that a small wind farm currently needs a subsidy of 3 cents/KWh and a larger wind farm needs a subsidy of 1.5 cents/KWh in order to be economic.

It notes that there is a vast amount of coal still untapped in NZ and it makes a great deal of sense to develop techniques to use it cleanly.

Genesis has posted an annual profit of \$83.7 million on revenues of \$1.9 billion in a year when its coal-fired Huntly power station was

running at almost full capacity for six months over winter. Huntly generated a record 6009 GWh during this year.

Whenever the Huntly plant is available, it is offered on the electricity market. This year's high dispatch reflects the current narrow gap between supply and demand to the point where a lengthy outage of one thermal generator can drain the lakes and threaten the entire system.

All Genesis' profit is earmarked for investment in new electricity generation with no dividend for shareholders this year.

The new 385MW Huntly combined-cycle gas turbine station (e3p) will provide welcome relief when it is fully commissioned in April 2007. This plant will meet about three years of NZ's demand growth and will enable Genesis to catch up on refurbishing the coal-fired plant at Huntly in preparation for a second 20-year operating cycle.

Genesis is also exploring for gas, and developing the new \$1 billion offshore Kupe field which is expected to produce 254PJ of gas, 1.1 million tonnes of LPG and 14.7 million barrels of condensate during its 20 year lifetime.

3. Mighty River Power (MRP)

MRP is to proceed with plans to build a 90MW, \$275 million geothermal power station at Kawerau, after gaining consent from the Environment Court.

It is the largest geothermal development in NZ in more than 20 years and will produce more energy annually than all of the country's existing wind turbines.

The new power station will meet about a third of residential and industrial demand in the Eastern Bay of Plenty, without the need for investment in new transmission as it is adjacent to industrial users.

MRP has already spent \$50 million on geothermal exploration of the Kawerau reservoir during the past three years. Construction of the plant is due to start in November 2006.

Meanwhile MRP is well advanced with the installation of an additional generator at its

gas-fired co-generation plant at Southdown in Auckland, which will lift the plant's total generation capacity to 170MW.

4. Meridian Energy

Meridian Energy has reported a massive \$856.8 million profit for the year. The result was boosted by a one-off gain of \$652 million from the sale of its Australian subsidiary, Southern Hydro.

Even without this extra windfall, Meridian's profit was a healthy \$243 million, up 11.5 percent on the previous year. Turnover increased 34% to \$2.2 billion.

The good result has been achieved despite a dry year with low inflows into South Island storage lakes. Meridian states that it could see the low lake levels coming as early as September 2005, due to a lack of snow in the mountains, so it was conserving water from late 2005 onwards. NZ's biggest power consumer, Comalco, helped by reducing power demand by 10 percent in late autumn.

Meanwhile Meridian is pressing ahead with a tunnel-based hydro scheme of about 200MW on the north bank of the Waitaki River, as a downsized replacement for the discontinued Project Aqua.

Meridian is confident that it can reach a deal with Comalco to keep supplying electricity for the Tiwai Point aluminium smelter when the current contract runs out in 2012. Comalco has been looking at generating its own power in Southland, using coal and wind, because it believes that it may be cheaper than any future deal it can negotiate with Meridian.

But Meridian says that recent talks with Comalco have been positive and it has growing confidence of concluding an agreement to keep supplying the smelter with power from Manapouri, and it expects a deal to be finalised by early next year.

The Tiwai Point smelter consumes about 14 percent of NZ's electricity so its future consumption, or even whether it remains in NZ after 2012, is of major significance for the electricity industry.

5. Transpower

Transpower is to invest all its profits back into upgrading the national grid and shareholders are not likely to see any dividends until at least 2008/09.

The grid operator has posted a profit of \$96.9 million for the year to June 30, down from \$141.5 million the previous year.

The result was achieved despite the time and resources it had to divert to managing pricing and investment issues with the Commerce Commission and the Electricity Commission.

Transmission revenue was \$506.3 million, slightly down on the previous year's \$509.4 million. Transmission price increases which were set to begin on 1 April 2006 did not occur, as part of the administrative settlement process agreed with the Commerce Commission. This reduced Transpower's revenue by \$22.4 million in the last three months of the financial year.

Sources: NZ Energy & Environment Business Week, 30/08/06, pp 1-2, and 18/10/06, pp 2-3

Hydro, Wind Only 55% of NZ Power

Hydro and wind resources accounted for just 55 percent of the electricity generated in the year to June 2006, the lowest ever for a June year.

Annual generation continued the increase shown since June 2000, reaching a record 39,650 gigawatt hours (GWh) this year, up 0.4 percent on the June 2005 year, figures from Statistics New Zealand (SNZ) show.

Editor's Note: Energy Data File (EDF) January 2006 on page 120, Table G.1 shows 41,335 GWh of electricity generated in the year ending March 2005. The discrepancy is believed to be that EDF includes electricity from industrial co-generation projects using geothermal energy, gas and coal, whereas SNZ only includes grid-connected electricity generation. The Ministry of Economic Development have advised that if they did not include embedded generation consumed on site (including co-generation) and only include grid-connected generation, the EDF figure would reduce to 39,500 GWh.

SNZ said that hydro and wind electricity generation provided 22,377 GWh, a drop of 3,675 GWh on the year ended June 2005, while thermal generation increased by 3,831 GWh (28.5 percent) to 17,269 GWh, with gas and coal-fired generation making the biggest contribution to the increase.

During the quarter 1 April to 30 June 2006:

- Electricity generation levels were the highest ever for a June quarter at 10,259 GWh, 1.5% greater than in the June 2005 quarter.
- Bad weather over much of the country during the quarter including flooding and snow storms contributed to the record demand.
- Thermal generation accounted for all the increase, contributing 4,469 GWh, the highest ever in a June quarter and the third highest on record for any quarter.
- Thermal generation was 3.5% higher than for the June 2005 quarter, with geothermal generation up 13.8% and gas-fired generation up 6.3%, while coal-fired generation fell 6.4% (presumably because during that quarter the Huntly power station was operating partly on natural gas).

Source: www.stuff.co.nz, 5/9/06

Editor's Note: If electricity produced from geothermal power stations is regarded as "renewable electricity", then, since approximately 6.5% of NZ's total electricity generation is produced from geothermal energy, the total percentage of NZ's electricity coming from renewable sources in the year to June 2006 was still about 62%, and would probably be up to 10% more than this is a "wet year".

Hydro Lake Levels Low Again in August
Lakes Tekapo and Pukaki, the two lakes at the heart of NZ's largest hydro system, had less storage in them in the third week of August 2006 than at the same time in the 1992 and 2001 winter electricity shortages.

The combined storage in Lakes Tekapo and Pukaki had fallen to about 750 GWh in the

third week of August 2006, although it had been as low as 500 GWh in early August 1992 and in October 2001.

State-owned generator and retailer, Meridian Energy, the operator of the Waitaki hydro scheme says it will continue to use the southern lakes cautiously while it waits for the spring thaw.

Source: The Press, 23/8/06.

Tidal Turbine in Cook Strait by 2009?

Christchurch company, Neptune Power, is pressing ahead with plans to generate tidal energy from Cook Strait, despite a lack of interest from NZ's major electricity generators.

Neptune hope to have a trial turbine operating in Cook Strait by 2009 and intend to lodge a resource consent application with the Greater Wellington Regional Council early next year.

They are working closely with NIWA on researching tidal energy but have failed to get any of the major generating companies on board.

Neptune, says it is not deterred by the scepticism of the power companies but concedes that the cost of tidal power, at about 12 cents/kWh is less attractive than other options such as wind. Neptune believes tidal energy has a big future and is prepared to put in the next few years to reap what they believe will be substantial rewards from the proposed Cook Strait project. A secondary tidal generation project in Foveaux Strait is also being considered.

Neptune says that some recent media reports have implied that they intend to build a major tidal power station in Cook Strait within a few years and these reports have hurt the company's credibility. In reality the company is taking a long-term view and is particularly watching results of a pilot project off the Orkney Islands using a technology developed by a UK firm.

The turbines are about 30m in diameter and each generates 1MW. They are anchored to the sea floor and are buoyant, so they float upwards and rest about 30m below the sea surface. When

maintenance is needed on the turbines, they can be untied from the sea floor and towed into port.

Neptune notes that the amount of tidal energy in Cook Strait is “equivalent to 8,000 Waitaki Rivers”, so the potential is enormous if NZ can find a way to tap into it.

It believes that the biggest challenge is not technical but environmental, due to Cook Strait being on a migration path for whales and this could potentially scuttle the project or limit its size. The Department of Conservation is now studying whale migration paths about which little is known. Neptune says it is encouraged by talks with the fishing industry, which has so far shown no opposition to the project.

Reactions to date by power generating companies are as follows:

1. Meridian Energy

Meridian is ruling out any involvement in tidal energy generation in Cook Strait in the foreseeable future because it is not commercially viable and would have huge technical and planning issues.

Meridian spokesman, Alan Seay, says his company has discussed the Cook Strait proposal with Neptune Power but that is as far as it has gone. “We have our hands full at the moment with a serious wind energy programme”.

2. TrustPower

TrustPower spokesman, Graham Purches, is equally dismissive of tidal power stating that “We always look at opportunities but we don’t see any potential whatsoever in tidal energy in the foreseeable future”.

Source: NZ Energy and Environment Business Week. 30/8/06, pg1.

Liquid Fuels from Southern Lignites

Background

This matter was raised in the previous issue of EnergyWatch (41), pp 29-31.

The future energy potential of the extensive deposits of lignite in Eastern Southland and Central and South Otago was investigated by the then Liquid Fuels Trust Board (LFTB) in the late 1970s and early 1980s. Their mission was to investigate alternative liquid fuels for NZ and they concluded:

“Taken together, the ten South Island lignite deposits so far identified could, if developed in sequence, provide all of New Zealand’s transport fuel requirements for a period of 200 years”.

Source: LFTB. Report No. LF6020. “Final Report on Activities”, January 1990, pg 50.

Until recently, little serious consideration has been given to exploitation of these lignite deposits because the lignite coal is “young and low grade” making it uneconomical to transport more than a very short distance.

Therefore to use these lignite deposits for electricity generation would require the location of a coal-fired power station close to the deposits, with consequent issues of electricity transmission over very long distances to NZ’s centres of load growth.

Over the last year, some Government officials have been “talking up” the future potential of these lignite deposits for producing liquid fuel, and with electricity generation as a by-product of the process utilising the heat generated by the plant. They have noted that one deposit alone, the Hawkdun lignite deposit (in Central Otago), could provide as much energy as two Maui gas fields.

But what are the greenhouse gas implications of producing liquid fuels in this way? Steve Goldthorpe expressed the view (EnergyWatch 41, pg 31) that even advanced coal liquefaction is bad news for climate change as it is unlikely

that the ratio of the greenhouse gas footprint of coal-derived fuel could be reduced to below twice that for conventional transport fuels.

An article by Steve Goldthorpe follows describing his analysis using Full Fuel Cycle greenhouse gas assessment methodology. The accompanying figure shows very clearly that transport fuels made by gasification and synthesis from lignite will produce considerably more than twice as much carbon dioxide per GJ of energy in a vehicle's fuel tank as will conventional transport fuels obtained from light crude oil.

Steve Goldthorpe also notes that even if carbon dioxide capture and storage was to be successfully integrated into future production of transport fuels from lignite, the full fuel cycle carbon dioxide emissions from the resulting transport fuel would still probably be greater than those from today's conventional transport fuel.

John Blakeley

Greenhouse Gas Consequences of Alternative Fossil-derived Transport Fuels

By Steve Goldthorpe

Peak Oil and Climate Change are the "rock" and the "hard place" that we find ourselves between. As often happens in such dilemmas; solutions to one problem aggravate the other.

The end of cheap oil, which is already self-evident, is opening up the commercial viability of a number of alternative more expensive ways of making transport fuels from fossil-derived energy sources. These alternatives have the potential to extend transport fuel availability, but with adverse climate consequences. The scale and timing of the introduction of these alternatives will depend on economics. Climate Change policy initiatives might influence the relative economics of alternatives, but cannot significantly change the greenhouse gas emission factors of those alternatives.

The following chart shows indicative Full Fuel Cycle greenhouse gas emissions for a number

of alternative ways of making transport fuels from fossil-derived primary energy sources. All of these alternatives, except for the electric car, have greater greenhouse gas impacts than the conventional production of transport fuel from light crude oil.

This outline assessment indicates that the greenhouse gas impact of using transport fuels derived via the coal liquefaction routes is more than double the greenhouse gas impact of using conventional petroleum transport fuels.

If CO₂ capture and storage were to be successfully integrated into future production of diesel fuel from lignite, the Full Fuel Cycle CO₂ emissions from the resulting transport fuel would still probably be greater than from today's conventional transport fuel.

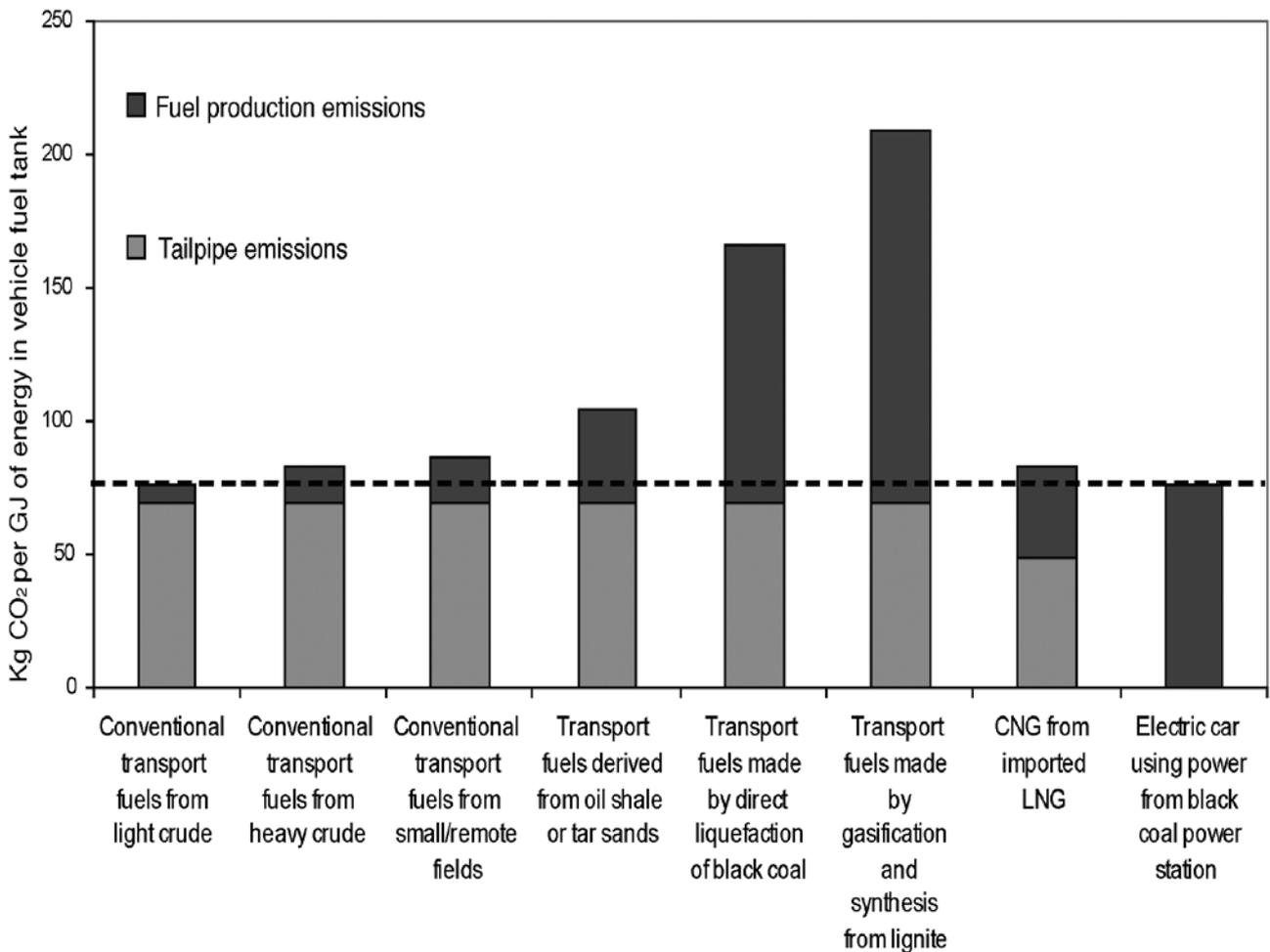
Assessment basis

The generalized data shown in the accompanying chart are based on the following indicative assumptions that are not case-specific. All of these indicative assumptions are debatable and intended to indicate international state-of-the-art. There will be a range of actual values for individual technology applications. The approximate nature of these assumptions is indicated by the figures being presented in 5% increments.

- The exploration, production and transport of conventional oil consume 5% of product energy;
- The refining of conventional light crude consumes 5% of product energy;
- The refining of heavy crude consumes 15% of product energy;
- The exploration, production and transport of crude oil from small remote locations consumes 10% of product energy;
- The production of transport fuels from oil shale or tar sands, with economically viable emission reduction measures, consumes 50% of product energy;

- Direct liquefaction of black coal via solvent extraction has an overall thermal efficiency of 60%;
- Full Fuel Cycle emission factor for black coal is 100 kg CO₂/GJ;
- Indirect liquefaction of lignite via synthesis gas has an overall thermal efficiency of 50%;
- Full Fuel Cycle emission factor for lignite coal is 105 kg CO₂/GJ;
- 90% of LNG energy is delivered to a vehicle as CNG;
- Full fuel cycle emission factor for imported LNG is 75 kg CO₂/GJ;
- A modern electric vehicle using 16.5 kWh (as generated) per 100 km has the same functionality as a modern petrol car using 5.5 to 6 litres per 100 km.;
- New coal fired power station efficiency is 40%.

Full fuel cycle CO₂ emissions from transport fuel fossil alternatives



Fuel Availability and Cost

NZ Gas Production Increases Slightly

Figures released by Statistics New Zealand (SNZ) show that natural gas production for the year ending 30 June 2006 increased for the first time since 2002, increasing by 0.1 percent from June 2005 to 163.472 petajoules (PJ). Gas production in NZ peaked in the June 2002 year at 257.996 PJ.

Source: www.stuff.co.nz, 5/9/06.

Editor's Note: Gas re-injected or flared, LPG extracted, production losses, and own use and transmission losses need to be deducted from the above figures in order to determine the amount of gas available to the user. Generally about 90 percent of gas production is available for supply to the user.

Contact Warns on Gas Supply

Contact Energy, NZ's largest user of natural gas for electricity generation, was able to increase the amount of its generation from gas by 41 percent in the year ending 30 June 2006.

It says that generation from its gas plants was able to cover a significant shortfall in available hydro-electric generation, driven by the South Island's driest year in the last 29 years, coupled with a cold winter.

Contact's hydro-electric generation was down by 23 percent on the previous year, while generation from the company's thermal plants, fired by Maui gas, increased to meet demand.

As a result, Contact's total electricity generation was up by 10 percent on the previous twelve months. But Contact warns that the year ending in June 2006 was the last one during which the bulk of its contracted gas position was sourced from relatively cheap and flexible Maui gas. Contact stated that the new domestic gas supply environment is very different.

Contact notes that in June 2004, the parties to the Maui contract reached agreement on the recovery of the remaining gas reserves in the Maui field.

Under this agreement the Maui mining companies in the joint venture are committed to delivering 367 petajoules (PJ) of gas as from 1 January 2003 at existing contract rates. (The total of 367PJ constitutes the amount determined by an independent expert as economically recoverable under the Maui contract as at 1 January 2003).

The Maui mining companies can make additional sales above the 367PJ quantity at prices to be determined outside the Maui contract.

Contact holds a right-of-first-refusal (ROFR) on additional gas produced over the 367PJ threshold. Contact acquired some recently negotiated higher priced Maui gas under its ROFR agreement, and this was used at New Plymouth power station at periods when there was relatively low hydro inflow and storage.

Using higher-priced gas in an inefficient old power station such as New Plymouth is not a very sensible thing to do economically, unless prices on the electricity market are very high in a time of shortage, and the electricity produced can be sold on that spot market. It is certainly not a good thing to do in terms of efficient use of resources.

It is expected that average gas prices which were 15 percent higher in the year to June 2006 than the year before, could be up to a further 25 percent higher in the following year to June 2007, because of the increased average cost of gas and increased open access transmission costs.

Contact says that it needs to secure its long-term fuel position beyond 2010 to support its existing thermal generation stations. It is also continuing to develop plans for a key growth option of an additional combined-cycle gas plant, Otahuhu C.

Note that the 385MW combined-cycle gas plant at Huntly (e3p) presently being built by Genesis Energy and due to be commissioned in April 2007 only proceeded after the NZ Government

stepped in two years ago to underwrite its fuel supply (refer to EnergyWatch 41, pg 17). The e3p plant will use most of the gas produced after the new Kupe field comes into operation in mid-2009 and is expected to use Maui gas prior to that time.

Hence it is difficult to see Otahuhu C being able to operate in the longer-term unless and until a new source of gas is found.

Contact had earlier noted (refer to EnergyWatch 41, pg 15) that as a “prudent risk management strategy” it would continue to investigate importing liquefied natural gas (LNG) together with Genesis Energy, but any decision to proceed to construction of an LNG import terminal “will be delayed as long as possible to allow future domestic gas discoveries to come to market”.

Contact is also expected to use gas from the recently opened Pohokura field as an alternative to Maui gas, but it is most unlikely that this gas will be available in sufficient quantities for Contact to consider using Pohokura gas as a primary fuel source for a new Otahuhu C power station, but rather this gas will be needed to maintain sufficient supplies to its existing plants (including Otahuhu B and Taranaki Combined-Cycle).

Contact states that it is also currently looking at building upon its established renewable generation base, which at present makes up half of the company’s portfolio. Contact is actively investigating new options in geothermal, hydro and wind power.

Source: NZ Energy & Environment Business Week, 20/9/06, pg 3.

Contact Energy and Vector have recently announced that they have secured long-term rights to more gas from the Maui gas field (170PJ and 105 PJ respectively). This additional gas will only last till about 2015. Contact, and Vector (because they bought NGC), have a right of first refusal for all additional Maui gas.

Source: RNZ 27/10/06 and NZ Herald, 28/10/06, pg C8.

Enough Gas for Otahuhu C to Proceed?

At its annual meeting held in Auckland on Thursday 19 October, the chairman, Grant King, said that one of the biggest challenges facing Contact this year is to get competitive supplies of natural gas as cheaper supplies wane at Maui, the nation’s largest field.

He stated that Contact was considering building a new power station at Otahuhu that could double output from the site.

Contact built a 390MW power station in Auckland in 1999 (Otahuhu B), but a lack of long-term gas supplies delayed the company’s plan to build a similar-sized generator at the site. (Resource consents for Otahuhu C were obtained several years ago but plans to proceed were then put on hold).

Contact is now seeking tenders for a new plant at the Otahuhu site and may proceed with an investment next year (presumably at least partly depending on the results of those tenders).

A falling off in available natural gas supplies is predicted about 2015 (see EnergyWatch 41, pg 19). While some gas industry commentators are confident that there is plenty of gas “out there” which can be brought into production by 2015, this is quite different from entering into a firm contract to deliver gas by then, sufficient to secure a supply for a new power station such as Otahuhu C (and presumably with substantial penalties for non-supply).

Perhaps the decision to call tenders for Otahuhu C is linked to the possible expiry of the resource consents which Contact has to build the plant?

Contact is the second-largest power retailer in NZ and typically produces more than 60 percent of its power from dams and rivers. The company tries to ensure stable earnings and cash flow in dry and wet years by producing electricity from dams, geothermal bores and gas-fired power stations.

Source: NZ Herald, 20/10/06, pg C1

New Plymouth Confirmed for LNG Import Terminal.

Contact Energy and Genesis Energy have confirmed Port Taranaki as the preferred site for a terminal for importing liquefied natural gas (LNG).

The two power companies are pressing ahead with a \$600 million “backstop plan” to import LNG and have formed a new joint venture company called Gasbridge to manage the project.

They stress that the importation of LNG is a fallback option, in case NZ can’t produce enough domestic gas, and they hope that they won’t have to proceed to build the terminal but state that “it is simply prudent commercial risk management”.

The next step is to apply for a resource consent for the terminal, which could take up to three years. The biggest challenge will be to convince residents living near the proposed terminal site that it is safe. Contact and Genesis intend to consult individually with up to 1600 householders. The nearest house is about 1km away from the terminal site.

Although a site near Marsden Point was also considered, Port Taranaki is an obvious choice for an LNG terminal, given its experience in handling natural gas and hydrocarbons, its deep water port and its natural gas distribution infrastructure.

The proposed terminal includes a new purpose-built berth to accommodate 300 metre long LNG tankers. LNG could be piped to a new storage tank next to the New Plymouth Power station (owned by Contact).

LNG has been safely shipped around the world for more than 40 years and several Asian countries rely heavily on LNG. Worldwide, there are 17 LNG export terminals, 40 import terminals, 200 custom-built LNG ships and more than 100 LNG storage facilities.

Contact and Genesis have also looked at the option of importing compressed natural gas

but have concluded that the technology is not far enough advanced. As yet, there is no international trade in CNG and dedicated CNG carrying vessels have not yet been built. A CNG importing facility would be more complex and more expensive than the proposed terminal.

The NZ Government is “cool” on the idea of importing LNG, as are local gas explorers and Meridian Energy, who fear it will make NZ more dependent on imported energy.

Source: NZ Energy and Environment Business Week, 11/10/06, pg 3.

Vulnerability of US Oil Supplies

An interesting discussion took place recently on the SEF News discussion group about the fragility of the position of domestic oil reserves within the USA and a possible connection to US foreign policy and fraught international relationships with some countries, including Iran.

Postings to SEF News in early September (in regarding some new very deep oil finds in the Gulf of Mexico) noted that the USA within its own borders has reserves of 29 billion barrels of oil and is at present consuming 20.5 million barrels of crude oil per day, which converts to 7.48 billion barrels of oil per year.

This means that within its own borders, the USA has only enough oil reserves to cover four years of required supply at the current rate of consumption.

Also the current total world oil consumption is now around 84 million barrels of crude oil per day, so the consumption within the US is using up just under 25 percent of total world consumption, in a country with a population of 300 million, about 4.5 percent of the world’s population.

The USA presently imports just over half of its crude oil requirements, so its current consumption of its own oil is around 10 million barrels per day or 3.5 billion barrels per year. At that consumption rate and without discovery of new domestic oil fields which can be brought

into production within about eight years, the USA will run out of its own oil by around 2015.

One posting on SEF News in response to this noted that the restricted availability of domestic oil reserves in the USA is not new, and for decades they have been discovering some new oil reserves which has helped to slow down the rate of decline of their domestic oil reserves.

Nevertheless, the world's only superpower having become so dependent on imported oil represents a real area of vulnerability, especially when so much of the world's present oil reserves are in countries which are relatively unfriendly or even hostile towards the USA.

Perhaps this gives some more insight into reasons behind the 2003 US invasion of Iraq, although under present conditions, Iraq will be lucky to maintain its present level of output of about 1.5 million barrels per day (or 7.3 percent of the daily requirements of the USA). Even in the medium term, it is doubtful if Iraq can return to its record 1979 production of 3.5 million barrels per day (or 17 percent of the daily requirements of the USA) until at least 2009 (refer to EnergyWatch 38, p 9).

So what are the chances of the world experiencing a further oil resource war by about 2015?

In response to this question, one posting on SEF News suggested that oil wars will continue and intensify and asked "what do you think the fuss about Iran is - not weapons of mass destruction?"

It was suggested that the only realistic way to avoid such oil resource wars is for the world to move rapidly towards much greater usage of available heavier crude oil and the very substantial oil sands deposits in Alberta, Canada (with negative greenhouse gas implications).

In response, a posting suggested that going to oil sands is "a very energy and carbon dioxide intensive approach". So what alleviates one problem exacerbates another, and that it is not the way to go.

The posting suggested that we all "have to go on an oil diet" while we develop more expensive solar options.

John Blakeley

Understanding the Falling Oil Price

Understanding the oil market is difficult, making reasonable forecasts almost impossible. That is why most analysts were surprised by the dip of prices from the historic high on 8 August 2006 of nearly \$US79 per barrel to below \$US60 in recent days.

Suddenly the alarmists who foresaw an imminent era of oil scarcity are silent, OPEC is again discussing supply cuts and oil share prices are down. And new conspiracy theories are flowing, like the one about the Republican Party pushing petrol prices down before the US mid-term elections!

Over the last few years, the public has been bombarded by pessimistic warnings about a world inexorably running out of oil, in the midst of growing instability in oil states from Iran to Nigeria, and rising demand - particularly from China, India and other emerging economies. As this bleak scenario gained acceptance, it became easy to assume that the price of oil would "defy the laws of gravity" and break the barrier of \$US100 per barrel.

In fact, the current oil crisis has nothing to do with a catastrophic shrinking of global oil resources, while the spectre of rising Asian demand is largely a myth - China has huge potential to reduce its oil consumption.

Supply is tight because two decades of low prices discouraged the exploration and development of new fields in the world's most oil-rich areas. That has cut spare production capacity - the critical cushion to cope with crises to just 2-3 percent of global oil consumption. This makes the price of oil a hostage to political and climatic events.

What has happened recently is a global-market mood swing in the face of evidence that consumption growth is slowing while

production is still rising. US oil inventories - and even reserves - have turned out to be higher than previously thought. Forecasts for the hurricane season in the Gulf of Mexico switched from severe to mild. Temporary shocks, particularly the BP spill and shutdown in Prudhoe Bay, Alaska, proved less disruptive than expected. Also the US summer driving season ended; and geopolitical risks seemed to recede, as confrontations involving Iran and Lebanon eased, at least for now.

In the present situation where fleeting news can move markets, almost anything can happen from a new price spike to a further drop in the oil price. But in a few years time between roughly 2010 and 2012, there is a good chance that supply trends will overtake demand, raising spare production capacity to a range between 7-10 percent of demand. That large a cushion would drive down both the price of oil and the market's major vulnerability to minor rumours.

Essentially the underlying causes of the new century's first oil crisis are in the process of being solved. Since 2002, the major producing countries and oil companies have gained the confidence to invest in exploration, development and refining.

This investment will take time to bear fruit. Oil field development takes several years and there is now a serious shortage of equipment and qualified personnel.

If investment continues at current rates, the global production capacity of crude oil could increase by 12-15 million barrels per day between 2010 and 2012, outstripping expected demand growth of about 7-9 million barrels per day. This would boost spare capacity and drive prices down.

While much of the industrial world seems to assume that global demand will continue to rise sharply, oil producers most assuredly do not. They worry that demand may pop like a bubble as has often happened in the past.

In recent years, the belief has grown that the world economy has become almost indifferent

to the price of oil, ignoring the simple truth that any economic system will react to big price changes for any vital good. Even after the oil shock of 1973 - much more intense than the current crisis - oil consumption continued to grow for six years before the backlash set in.

This time, however, the data suggests that high oil prices are already affecting consumption. While oil-demand growth began to recover from the 2002 recession by 2003, and then jumped by a startling 4.3 percent (3.2 million barrels per day) in 2004, it slowed down again in 2005 to 1.3 percent and the International energy Agency (IEA) has steadily lowered its forecast for 2006, which now stands at a modest 1.3 percent.

There is also the "China myth", which holds that the growing Chinese economy will absorb ever-more oil. This ignores several important factors. First, China's oil consumption is growing fast but it represents only 8 percent of global demand, and need not be a source of concern in a normal market. Second, China's booming demand in the last two years largely represents a rebound from the stagnation of previous years. Third, China and Asia's thirst for oil has been heavily subsidised by local Governments and price controls, making oil products much cheaper than on the international market. Starting in mid-2005, however, the Chinese and most other Asian Governments announced plans to end or reduce subsidies.

Fourth, China continues to use oil where it can be replaced by other sources of energy. The transportation sector (in which oil remains largely irreplaceable) absorbs less than 40 percent of Chinese consumption, as against 75 percent in the US. This means, contrary to all the scare scenarios, that China's oil consumption growth has the potential to ease substantially, while in most industrial countries, consumption growth is approaching zero and may start to drop.

One thing is certain, if prices should drop significantly before the investments in the oil industry now under way reach the point of no return, they could come to a screeching halt,

precipitating another price spike. Only a major recession could prevent this, by killing demand. Hardly comforting. But remember the main point: it's not possible to forecast future oil prices with real accuracy - so it's not wise to place great stock on any one forecast.

Source: Newsweek, 9/10/06, pp 37-38.

Looming Problems for Big Oil Companies?

From the outside the oil industry might look like a bunch of "fat cats" enjoying record prices, profits and CEO salaries. But what many executives dwell on are costs - which are rising as fast or faster than profits - and past experience, which tells them not to enjoy high prices because they are not likely to last.

Most see the recent price dip below US\$60 a barrel as only the first sign of a slide that will take prices below US\$40, or even US\$30, as new supplies come on line.

The bottom line: value creation at oil companies is stagnating. Companies are making more money than ever before, but they're also spending unprecedented amounts to generate those profits. The problem is a perfect storm of factors: two decades of under-investment, rising oil nationalism, the "maturing" of old reserves, and more risky exploration projects.

All of which has conspired to limit the access of major Western oil companies to easy oil, and to send their costs spiralling out of control.

For some time now, oil companies have been making mid to long-term investment decisions on the assumption that oil prices will ultimately fall to US\$35 per barrel. People tend to forget that it has only been two years since the price of oil has been above US\$40 per barrel, and only one year since it has been above US\$50.

While some banks expect oil prices to creep back towards US\$75 as the (northern) winter heating season kicks in, the recent drop in oil prices is an important reminder that the oil industry is a volatile business, full of peaks and troughs.

In fact, the troughs over the last two decades, when average prices were around US\$20 per

barrel and twice dropped as low as US\$10 per barrel, is responsible for some of the present problems of the oil industry at large.

Oversupply, and to a lesser extent lower demand after the Asia financial crisis of the late 1990's, kept oil prices low until about 2002.

By 2000, after more than 15 years of under-investment, the oil industry had virtually "tapped out" its spare capacity and began spending again with the result that costs for exploration and oil field development escalated rapidly, with estimates that since 2000, overall offshore costs have risen by 68 percent. Shell's Canadian oil sands project is facing capital costs 50 percent higher than it was expecting last year.

The spiralling costs are compounded by another mega trend within the industry - oil nationalism. As prices began to rise a few years ago, countries such as Mexico, Russia, Venezuela and others began taking back control of their oil wells, and cutting the access of Western major oil companies to new drilling areas. The result is that only about 25% of known oil reserves in the world are open to the Western major oil companies today, down from 85% in the 1960's.

When they do let outsiders in, these countries are taking more of the profit from projects, around 90 cents of every dollar of oil revenue, up from 70 or 80% in the past.

Source: Newsweek, 9/10/06, pp 39-43.

Oil Price Falls Below US\$60

Oil prices have fallen from a record high of US\$78.40 a barrel in mid-July 2006 to US\$57.88 on Thursday 19 October which is within US\$1 of a low point for 2006.

The oil price fall over the previous three months happened as global inventories swelled above historical norms, weather supply risks eased and geopolitical concerns faded.

Opec ministers were due to meet in Qatar to decide on a move to cut daily output by 1 million barrels per day (bpd), but the lengthy debate over how to share the cut - first mooted two weeks earlier - may blunt its impact.

Opec members have been divided about whether to cut their output from actual production of roughly 27.5 million bpd or from its nominal 28.0 million bpd ceiling.

The Qatar Oil Minister had said that he believed that the cut would come from actual production because in his opinion a message has to be sent to the market as stock levels are very high. The Kuwaiti Oil Minister said he believes that some members wanted an even bigger cut.

A further slide in prices may be limited by fears that the approaching northern winter may be chillier than last year, driving up heating oil and natural gas demand.

Note: Current world oil production is around 84 million bpd so the output from Opec member countries is about one third of the total production.

Source: New Zealand Herald, Friday 20/10/06, pg C4

Editor's Note: Subsequently Opec agreed on 20 October to reduce its output by 1.2 million bpd, its first cut for more than two years, to halt a precipitous fall in oil prices. This reduction of 4.3 percent when compared with Opec's September production, was deeper than anticipated and the biggest since January 2002.

It trims the Opec output to 26.3 million bpd from 1 November. Some ministers of Opec countries said that a further cut of 0.5 million bpd could follow when Opec meets in December, in order to address high fuel stocks in consumer countries, particularly in the USA, and a projected drop in demand for Opec oil in 2007.

Source: Reuters as reported in NZ Energy & Environment Digest, 19-25 Oct 2006, pg 1.

Russia Overtakes Saudi Arabia

According to the latest figures from Opec, Russia is now the world's largest oil producer, overtaking Saudi Arabia.

In June 2006, Russia extracted 9.236 million barrels of oil per day, about 46,000 more than Saudi Arabia. Combined together, they produce

about 22 percent of total world oil production (which is around 84 million barrels per day).

Russia has re-nationalised and modernised much of its oil industry and that policy now appears to be paying off. Oil and gas now make up 35 percent of Russia's export earnings.

Source: NZ Energy & Environmental Business Week 30/08/06, pg 4.

Oil Crisis by 2010?

World oil production will peak in just 1500 days. After that, shortages will force massive changes to our lifestyle and business, experts have predicted.

An Australian group concerned with "peak oil" urged higher fuel taxes to deter people buying as much, strict fuel rationing and the production in Adelaide of small "fuel frugal" cars.

Chris Skrebowski, a trustee of the Oil Depletion Analysis Centre and editor of the Energy Institute's Petroleum Review in Britain was visiting Adelaide and said that "peak oil is real and imminent".

Source: Adelaide Advertiser, 25/08/06

Question Marks Over Renewable Hydrogen

Is using electricity from renewable sources (such as wind generation) to produce hydrogen as a transport fuel an efficient use of both energy and resources?

Scientists of the European Fuel Cell Forum say that it may not be the most efficient "environmentally friendly" means of providing transport energy, as only 25 percent of the energy generated at the turbine is available to move a hydrogen vehicle, whereas if that electricity is distributed via the grid and used to charge batteries, only 10 percent of the energy is lost.

Also, fuels produced with no or low greenhouse gas emissions; including refined biomass, and hydrogen from renewable electricity (wind, hydro) or from nuclear electricity; use large

quantities of water. In the case of hydrogen this can be as much as 9 litres of water per kilogram of hydrogen produced.

Source: Reuters, 12/7/06 as reported in NGV Global.

NZ Urged to Take Lead on Biofuels

A report by the Royal Society of New Zealand's Energy Panel has recommended that fossil fuels in NZ be largely phased out in 14 years.

The report says that not enough is being done to secure energy supply, and recommends that the country move to a low- or zero-carbon system for energy and transportation. It warns that pricing on greenhouse gas emissions is inevitable, and NZ should be prepared.

The recommendations include the rapid development of a home-grown biofuel industry to cut the 6.3 billion litres of petrol and diesel consumed each year, which comes at a cost of \$4.5 billion - nearly a third of NZ's annual current account deficit.

It also recommends that electricity generation be fully renewable by 2020 with zero carbon emission. The report says wind, geothermal and hydro generation all have great potential but are hampered by the resource consent process. These renewable energy sources have the potential to replace coal and gas-fired generation.

The report says that NZ could begin to develop a biofuel industry immediately if legislation removed the barriers. NZ has been slow to act so far, despite the Government setting a target for biofuel use by April 2008.

The report warns that relying on international markets for biofuels was "hazardous" as major producers such as Brazil and the US already had enormous domestic demand.

The report says that the drive to reduce carbon emissions, such as the "food miles" debate in Europe puts NZ's food exports at substantial risk and the response should be for NZ to put substance to its clean, green image. "If we are going to maintain an image that's going to

ensure that our food finds markets, we have to be exemplary in the quest for alternative energy sources."

The panel wants a National Energy Task Force set up to research, import technology, and develop solutions.

"The urgency is to do it, and not to think that the rest of the world is going to solve these problems for us".

Some important points:

- NZ currently produces enough tallow to produce around 200 million litres of biodiesel annually, less than 5% of annual diesel consumption.
- Renewable sources for transport fuels include maize, pine trees, and applicable woody crops such as salix, a type of willow.
- Woody crops offer the best potential with 1 million hectares being able to produce 3-4 billion litres of bioethanol per year.
- In the North Island alone, there is more than 1 million hectares of marginal land suitable for energy farming. In the South Island there are more than 2 million hectares of such land.

Source: NZ Herald, 4/10/06, pg A6

Biofuel Sustainability Safeguards Needed

T & E, a Brussels-based environmental NGO says that the increased use of biofuels could be disastrous for biodiversity and create more environmental problems than they solve, if sustainability safeguards are not added to EU policy.

The EU's current biofuel directive has a target of replacing 5.75 percent of fossil fuels with biofuels in transport by 2010, but a study part-funded by the European Commission has said that between 14 and 27 percent of EU agricultural land would be needed if all those biofuels were

home-produced. As this is clearly unrealistic, large amounts of biofuels would have to be imported, many from countries which strip rainforests for land and grow biofuel crops without certain safeguards.

T & E said that “we are not rejecting biofuels but as well as the need for environmental safeguards, we must be careful that biofuels don’t distract us from the primary goal of improving energy efficiencies. Also, if biofuels are to be part of the energy solution, it is essential that we prevent fuels produced by clearing rainforests and protected habitats from finding a market in Europe”.

At a recent Council meeting, the 24 energy ministers of the EU issued a resolution on biofuels which included the possibility of a sustainability certification scheme for transport fuels. This text had previously been deleted but was reinstated at the last minute.

As well as concern about the lack of overall environmental benefits, NGO’s have expressed concern about the efficiency of conversion rates when biofuels are used in transport. Also there is a question of balancing the interests of large agricultural producers and countries with large numbers of small farms.

Source: T & E, 19/6/06 as reported in NGV Global

Food for Fuels Not Recommended

Two separate reports have raised questions about the wisdom of using food crops for the production of transport fuels. A University of Minnesota (UM) report released by the US National Academy of Sciences says that neither soybeans nor corn should be used for producing biofuels due to the impact on food prices.

The Washington DC - based environmental research group, Earth Policy Institute, is saying that competition between food and transport could impact on 2 billion low-income people worldwide.

The UM report says that biofuels cannot replace much petroleum without impacting on food supplies, noting that global demand for food is expected to double within 50 years, while global

demand for transportation fuel will double in 32 years based on current consumption growth rates.

Lester R Brown, author of the Earth Policy Institute statement, is even more cutting. “In agricultural terms the world appetite for automotive fuel is insatiable. The grain required to fill a 25 gallon SUV petrol tank with ethanol will feed one person for a year. The grain to fill that tank every two weeks will feed 26 people for a year.

Brown says that the return on investment is making ethanol or biodiesel production more profitable than food production. “With a US subsidy of 51 cents per gallon in effect until 2010, and with oil priced at around US\$70 per barrel, distilling fuel alcohol from corn promises huge profits for years to come”. He said that this could impact on poorer nations that rely on imported grain for food including Egypt, Nigeria, Indonesia and Mexico.

Rather than relying on biofuels, Brown suggests a shift to increased vehicle efficiency in the use of fuels and the use of plug in hybrid vehicles for transport. He also suggests a switch to the use of grass or other non-food crops for biofuels production.

Source: NGV Global, 12/7/06.

SEF Biofuels Submission

The SEF Bioenergy Working Group recently prepared a submission on “NZ’s Proposed Biofuels Sales Obligation”.

The submission suggested that the proposed regulations should not be related to the proportion of biofuel in the transport fuel, but to the fossil carbon dioxide emission factor, eventually on a Full Fuel Cycle basis.

Climate Change/Global Warming

The Stern Report

What is this report?

It is the first comprehensive review of the economics of climate change. For nearly 20 years, the science of climate change has made all the headlines, as the world gradually realised that the continuing accumulation of greenhouse gases in the atmosphere was causing global temperatures to rise.

We've heard a thousand calls to stop global warming but what would that cost? And what would doing nothing cost us? No one had any real idea. Now Sir Nicholas Stern and his team have come up with some concrete numbers.

Does it have a fundamental conclusion?

Yes. That, although dealing with global warming by cutting emissions of greenhouse gases will cost a lot of money – about 1 percent of the world's gross domestic product – doing nothing will cost the world anything from 5 to 20 times more.

Why is that conclusion important?

Because the world's leading climate change sceptics – the Republican business community in the USA, and the Bush Administration which so faithfully reflects its views – are against acting to prevent climate change by cutting carbon emissions on the grounds that to do so would damage the US economy.

And as the Americans have 4 percent of the world's population producing nearly a quarter of all the world's greenhouse gases, any efforts to fight climate change without the USA is doomed to failure.

The Stern report says, quite simply, that not acting is the much more expensive option and the US will be hit as hard as anywhere else.

Will the American sceptics listen to that?

No. The Bush Administration and the Republican National Committee are not going

to go down on their knees and admit that they were wrong. Or at least, not overnight.

But the report cannot but have a very widespread and steadily growing influence, partly because of its scope and detail, and also because Sir Nicholas Stern is an authoritative and respected figure.

What else does the report tell us that is important?

Another absolutely vital conclusion is that dealing with climate change, even though very costly, need not derail worldwide economic growth. The two are compatible the report says.

This will be very welcome to business, and to developmentalists, who for example see growth as Africa's only hope of escaping from poverty.

But it will seem counter-intuitive to some more radical environmentalists, who have long said that the world's remorseless pursuit of ever more riches cannot go hand in hand with solving its greatest environmental problem.

But politicians will be the most relieved of all at the Stern conclusion – British Prime Minister, Tony Blair, made this quite clear at the time of the release of the report.

Source: The "Independent" as reported in the NZ Herald, 1/11/06, pg A22

Air Bubbles Tell an Unprecedented Story

The rapid rise in greenhouse gases over the past century is unprecedented in at least 800,000 years, according to a study of the oldest Antarctic ice core.

Air bubbles trapped in ice for hundreds of thousands of years have revealed that the way humans are changing the composition of the atmosphere has no known natural parallel.

Scientists at the British Antarctic Survey, located at Cambridge U.K., found that there have been eight cycles of atmospheric change in the past 800,000 years when concentrations of carbon dioxide and methane rose. Each time, the world experienced relatively high temperatures.

However, levels of carbon dioxide and methane existing now in the atmosphere are far higher than anything seen before.

Over the past 200 years, human activity has increased carbon dioxide concentration in the atmosphere to well outside the natural range and there is no precedent for what will happen next.

The ice core was drilled from a thick area of Antarctic ice known as Dome C. The core is nearly 3.2km long and reaches to a depth where air becomes trapped in ice that formed 800,000 years ago.

Atmospheric carbon dioxide concentration has increased by about 35 percent in the past 200 years (since the time of the Industrial Revolution). Before that 200 year period, which is when humans have been influencing the atmosphere, it was relatively steady to within 5 percent.

The core shows that carbon dioxide concentration was always between 180 parts per million (ppm) and 300 ppm during the 800,000 years. However it is now 380ppm.

Methane was previously never higher than 750 parts per billion (ppb) but it now stands at 1780 ppb.

The rate of change is even more dramatic, with increases in carbon dioxide concentrations never exceeding 30ppm in a 1,000 year period - and yet carbon dioxide concentration has now risen by 30ppm in the last 17 years.

Source: The Independent" as reported in the NZ Herald, 6/9/06, pg B3.

NZ's Kyoto Liability Now NZ\$656M
Although NZ's projected carbon deficit during the first Kyoto commitment period has fallen

from 64 million to 41.2 million tonnes (refer EnergyWatch 41, pg 11), the financial liability has risen by \$56 million to \$656 million due to higher international carbon prices and a weaker NZ dollar. (The above liability figure equates to NZ\$15.90 per tonne of carbon dioxide equivalent).

The Minister of Finance, Dr Michael Cullen points out that the liability number "keeps bouncing around like mad" so the Government is not too worried.

The lower projected carbon tonnage is mainly a result of re-estimating emissions from livestock, vehicles and industry.

Source: NZ Energy & Environment Business Week, 18/10/06, pg 1.

Kyoto Talks May Last Until 2010?

Michael Zammit Cutajar, who heads a UN group looking at how to extend Kyoto beyond 31 December 2012, believes it is vital that the USA is involved in any new deal.

Therefore talks on extending the Kyoto Protocol beyond 2012 may last until 2010 to allow for a wider US role after George W. Bush steps down as President.

Bush's term ends in January 2009 and his successor may well be more amenable to getting the USA involved in a post-2012 Kyoto pact (but would still need to obtain support from the US Congress and Senate).

Source: NZ Energy & Environment Business Week, 18/10/06, pg 3

President Bush Tried to Silence Research?

Fourteen US senators are calling for an investigation into allegations that the Bush Administration has repeatedly tried to prevent scientists publishing research or speaking out about the dangers of global warming.

The Senators have written to the heads of NASA and the National Oceanic and Atmospheric Administration (NOAA).

Their letter follows a report in the journal "Nature" alleging that the Bush Administration blocked publication of research by NOAA scientists linking global warming to the increasing frequency and intensity of hurricanes.

Source: NZ Energy & Environment Business Week, 18/10/06, pg 3

Australian PM Still Sceptical About Global Warming

The Prime Minister of Australia, John Howard, says that he accepts that climate change is occurring but remains sceptical about some of the "doomsday predictions" being made about its impact on the world.

Howard states that he wants more evidence before he is prepared to jeopardise Australia's economy by imposing changes on companies which produce greenhouse gases.

Howard said that he still does not believe it is necessary to make drastic changes in response to the threat of climate change.

He said "I accept the broad theory about global warming. I am sceptical about a lot of the more gloomy predictions. I also recognise that a country like Australia has got to balance a concern for greenhouse gas emissions with a concern for the enormous burden to be carried by consumers through much higher electricity prices, higher petrol prices and falls in gross domestic product."

Source: NZ Energy & Environment Business Week, 30/8/06, pg 2

Government Move on Fuel Economy and Car Age?

The NZ Government is directing the Ministry of Transport to consider options to reduce greenhouse gas emissions from vehicles. These include setting minimum fuel economy standards and a limit on the age of imported vehicles. This could result in a 20-30 percent increase in the price of used vehicle imports from Japan.

Although an age restriction has not yet been set, the expectation is that only cars made after 1999, when new emission standards were introduced in Japan, will be allowed to be imported.

Associated Transport Minister, Judith Tizard, disputes the view that a rise in second hand car prices is inevitable. She said that buyers could be pushed into buying smaller cars which meet fuel economy and emission standards.

Cabinet will consider in November a report on the policy proposals. Vehicles weighing less than 3.5 tonnes including cars, light vans, and 4-wheel drives will be affected. Buses and bigger trucks will be excluded, though controls on harmful exhaust emissions will apply.

Source: NZ Energy & Environment Business Week, 18/10/06, pg 3

Editor's Note:

What the Associate Minister, Judith Tizard, seems to be implying here is that from a climate change mitigation point of view, it would be much more effective to push the NZ car buying public towards much smaller new cars rather than buying large imported used cars (instead of just relying on the fact that post-1999 cars may be more efficient and better tuned).

Reducing the weight of the cars is likely to be a much more effective tool for reducing fuel consumption than reducing the age of imported used cars.

However it remains to be seen whether the Government would have the political will to impose such a requirement. In the late 1970's the then National Government imposed higher import taxes on new cars with larger capacity engines, but this had the effect that a considerable number of underpowered larger new cars came into NZ which were only marginally more economical than their larger engined counterparts - so weight should be the target for any restrictions or punitive taxation rather than engine cubic capacity.

John Blakeley

Otahuhu C or Hip Replacements?

In an interesting media release following the announcement by Contact Energy that Otahuhu C is to proceed to the tender stage, Dr Russel Norman, Co-Leader of the Green Party noted that if built, this plant will emit 1.14 million tonnes of carbon dioxide per year, which will cost the NZ taxpayer \$34 million per year to pay for the carbon credits, based on a price of \$30 per tonne. (Note that this is about twice the price per tonne currently being suggested by the NZ Treasury and the Minister of Finance, Dr Michael Cullen).

Dr Norman noted that NZ's Kyoto commitments mean that it is the taxpayer who will pick up the bill for carbon dioxide emissions, particularly in light of the failure of the present Labour-led Government to put a price on carbon emissions.

Dr Norman noted that \$34 million per year would pay for 2800 hip replacements or 1700 coronary bypass operations, or 21,000 cataract removals and he asked whether that is a better use of the taxpayer money rather than paying for carbon credits to cover Contact's emissions?

Dr Norman added that the importation of gas would become more expensive in future and will add to our record current account deficit.

In a response posted to SEF News, Stephan Heubeck suggested that arguing that the planned 390MW gas-fired power station could cost the taxpayer the equivalent of 2800 hip replacements is a "double edge sword" because the climate change doubters and Kyoto critics could then argue that if NZ had never signed up to the Kyoto agreement, New Zealanders could get another 4,000 hip replacements a year for the cost of credits to meet the present carbon dioxide emissions from the Huntly power station.

Also Stephan suggested that it is not the best tactics to argue that the only way for NZ to meet its Kyoto commitments is to buy overseas credits. He pointed out that we still have over six years until December 2012, and if someone would start to spend all the "money reserved" (for the required credits from overseas) instead

on a range of NZ projects to reduce carbon dioxide emissions, things would look a lot better. (Such projects might include covering landfills to reduce methane emissions, insulating more homes and planting more forests).

In addition to "carrots" for projects to reduce emissions, Stephan also asked where are the "sticks" such as higher road user charges for SUV's and tighter building standards?

Source: SEF News Posting by Russel Norman and Stephan Heubeck on 19 and 20 Oct 2006

A Climate Sceptic's View on Vehicle Emissions

Article by Chris de Freitas

In an editorial this week, the NZ Herald has fallen into the same trap as many of the public and those in Government: confusing greenhouse gas emissions with air quality.

Testing vehicle exhaust emissions is an air-pollution issue. The main greenhouse gases are not pollutants. The greenhouse gas emitted from motor vehicles is carbon dioxide.

All green plants live and grow by absorbing carbon dioxide from the atmosphere. Low levels of carbon dioxide in the Earth's atmosphere limits photosynthesis and thus plant growth.

It is not uncommon for farmers using greenhouses to improve conditions for plant growth by injecting carbon dioxide into their greenhouses to levels almost three times the concentration outside.

When it comes to motor-vehicle exhaust emissions many people are surprised to learn that a poorly tuned engine emits less carbon dioxide than when it is well-tuned. As combustion efficiency decreases, the oxygen content in the exhaust rises and carbon dioxide falls. This translates to an over-rich or over-lean air fuel ratio, poor compression or an ignition problem. Therefore having motor vehicle engines well-tuned does not reduce carbon dioxide emissions but actually increases these emissions (see the contrary view at the end of this article.)

Nevertheless, it is true that driving a motor vehicle is the single most polluting thing that most of us do. It is also true that NZ is the only country in the OECD without effective vehicle-emission control standards and vehicle checks.

Hundreds of people in NZ die prematurely each year from air pollution and many more get sick from it.

So what is the Government's plan of action? The answer reflects the Government's naivety in dealing with this serious matter. From 27 October, subjective assessment of exhaust emissions will be based on visual evidence of smoke during routine warrant-of-fitness tests.

This is consistent with the so-called "10 second rule" that took effect in March 2001. The legislation allows police to issue a fine to the driver of any motor vehicle that emits smoke for 10 seconds or more.

This will do little to improve air quality because most motor-vehicle emissions are too small to see. In fact the most dangerous ones are invisible.

They include oxides of nitrogen, carbon monoxide and hydrocarbons as well as invisible particulate matter. Even well-tuned diesel engines cause invisible pollution in the form of particles smaller than 10-millionths of a metre. Called PM10 they are especially dangerous as they penetrate deep into the sensitive lining of the lungs.

Asthmatics and people with heart and lung disease are particularly susceptible. A high concentration of PM10 is associated with an increase in hospital admissions and lost work days.

All air monitoring sites in Auckland reach "alert levels" for PM10. PM2.5 is four times smaller than PM10 and is even more damaging to human health. In Auckland there are also regular breaches of guidelines for PM2.5. For both PM10 and PM2.5, there is actually no "safe threshold".

Invisible nitrogen dioxide affects the respiratory system, irritates the lungs, worsens asthma and lowers resistance to infections.

Another poison emitted by motor vehicles unchecked in NZ is carbon monoxide (CO),

which interferes with the blood's ability to absorb and circulate oxygen and can be lethal. At certain concentrations, CO can affect people with heart conditions such as angina, and can impair co-ordination and concentration.

Auckland's figures for CO has been compared to those for London for the period 1998 to 2004. The results show that the CO concentrations in London are declining steadily; this is not the case in Auckland.

Source: NZ Herald, Friday 20/10/06, pg A13

Editor's Note: Steve Goldthorpe comments that badly tuned engines actually increase greenhouse gas emissions because reduced performance increases fuel use, methane formation increases and carbon monoxide emissions soon oxidise in the atmosphere to become long-lived carbon dioxide.

An Insurer's View on Global Warming

Article by Chris Ryan, Chief Executive of the Insurance Council of NZ

Until about a decade ago, the idea of global warming was mainly one discussed by scientists but since then, it has been widely discussed and accepted within society as a whole.

The original idea suggested that since the industrial age, we've burnt too much fuel, to the point where the carbon dioxide released into the atmosphere had started the uncontrollable heating of the planet by trapping the sun's heat

Global warming is just not a local problem for New Zealand. It's a serious, severe, long-term change to the climate affecting the whole planet that will make parts of our country uninhabitable.

New Zealand is experiencing ever-increasing extremes of weather that are destroying whole communities, and it is intensifying in the "geological blink of an eye".

The NZ Climate Change Office says that the world's 10 warmest years have all been since 1983, seven of these since 1990. Warmer

temperatures stir gigantic forces in the energy levels of air and ocean, changing the weather.

In the USA, the 2005 hurricane season was the most intense since record-keeping began in 1851. Drought has settled in Australia and Africa, winters in Europe are the coldest in decades, and in the Antarctic and Arctic, ice sheets have been thawing, raising ocean levels worldwide.

The BBC even reports concern that polar bears may soon become extinct because the ice flows on which they depend for hunting are melting and may disappear in 50 years.

The American Insurance Information Institute reports that the three worst storms in the US last year generated nearly 2.8 million insurance claims, costing US\$46.3 billion (NZ \$72.6 billion). In fact they say that seven of the ten most expensive storms (in insurance payments) in US history have happened from mid-2004 to mid-2005.

If the frequency of big floods continues, and farms and even whole towns on a river's flood plain are inundated regularly, what insurer will be able to keep premiums affordable and what implications does that hold for the farmer or householder who may not be able to afford insurance premiums?

Towns and farms developed 120 years ago tended to hug the course of rivers. A 100-year flood would cause damage but its ferocity would recede in memory.

Recently, as evidenced by the Insurance Council's statistics, floods of this magnitude are recurring every five or so years. In the US in 1993, the Mississippi River carried a so-called 500-year flood, destroying vast areas of built up land and buildings that had been settled on the rich alluvial land along the big river's flood plain. The insurance bill totalled US\$27 billion.

If it happened again, many previously productive farms and suburbs might become uninsurable - a situation that has dawned on inhabitants of New Orleans as the clean-up continues after hurricane Katrina.

Changes wrought by climate change are not limited to weather damage and the ability of citizens to be able to insure their property and possessions. There are dangers ranging from widespread crop failure causing famine, drought and wildlife extinction, to whole populations fleeing the effects.

But insurance, seemingly a small piece of the whole, is something that needs to be included when the implications of global warming are being totted up.

Footnote: The Insurance Council says New Zealanders are experiencing an increasing number of expensive storms.

On top of the \$50 million expected to be paid out for the snow storms in Canterbury and Otago recently, the Insurance Council paid out \$22 million for the Coromandel weather bomb, \$112 million for the Manawatu floods, \$58 million for Queenstown flooding, \$10 million for Greymouth tornados, and \$30 million for recent floods in Matata and Tauranga.

The Insurance Council says that as well as these major events, there has been increased frequency in payments for floods and landslip throughout all parts of New Zealand.

Source: New Zealand Herald, Monday 25 September 2006 pp F6 and F7

UK Drivers can now "Neutralise" Emissions

BP has launched a programme that allows UK motorists to neutralise carbon dioxide emissions caused by their driving.

The Target Neutral Scheme costs around 20 pounds (UK) a year (NZ\$60) for an average driver covering 16,000km.

The money goes to a portfolio of carbon dioxide reduction projects, including alternative and renewable energy.

Initially there are five projects, including a biomass energy plant and a wind farm in India, and a methane capture programme in Mexico.

Source: NZ Energy & Environment Business Week, 6/9/06, pg 3

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For climate change news, join the Climate Defence Network email news group: climatedefence-subscribe@yahoogroups.com

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Readers are invited to submit material for consideration for publication.

Contributions can be either in the form of Letters to the Editor or short articles addressing any energy-related matter (and especially on any topics which have recently been covered in EnergyWatch).

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