EnergyWatch

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EDITORIAL

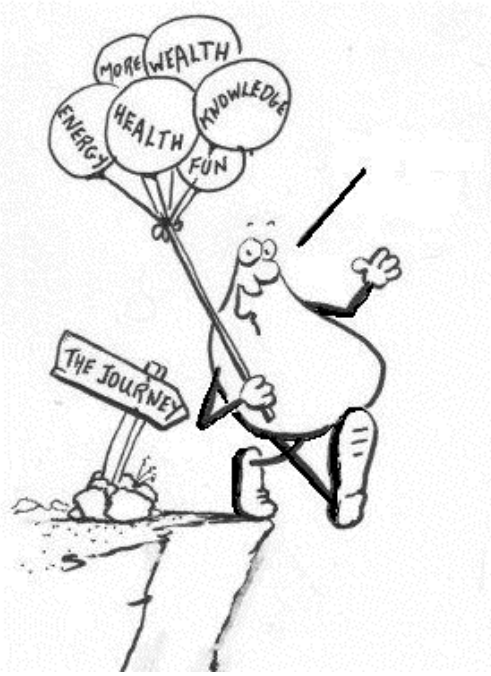
Beware of False Hope

When I emigrated from the UK to New Zealand in 1995, I was stuck by the pervading sense of optimism here compared with the general air of gloom that I had left behind in the UK.

I would express it in this way. The response to new ideas here was generally *"Yeah! – Go for it! – She'll be right!"* I had become used to the staid British response to new ideas generally being *"Nah! It won't work. – We've tried something similar and it failed."*

The positive can-do attitude in New Zealand, reinforced with some No 8 fencing wire, was invigorating and refreshing, albeit a bit over-the-top at times. Sixteen years on I have got used to the pervasive positivity in NZ.

At the personal level, a glass-half full approach to issues is empowering but when that approach becomes institutionalised there are serious potential pitfalls.



from Bonus Joules and the Knowledge Economy

In the field of energy supply there is a tendency for a Techno-Polly-Anna approach to provide false hope. That is the belief that new technologies can overcome all difficulties and meet all our energy desires. There are many examples. The original proponents of nuclear power claimed that it would be *"Too cheap to meter"*. We are encouraged to believe that NZ can mine and drill its way into a bountiful energy future. The natural forces of the planet are seen as a resource just waiting to be tapped. We are told that capture and use of plentiful solar energy is just a matter of joining the dots. There is also a delusion that advances in information technology can be mirrored in energy technology – but information is not subject to the laws of thermodynamics.

The Techno-Polly-Annas were given a modest challenge in the Wild Energy competition to explore new ideas, but they failed to find indication of a game-changing techno-fix around the corner to meet the criteria. In the cold light of day the realities of physics and chemistry triumph.

In this issue of Energy Watch Tim Jones comments on the Government's draft Energy Strategy and its philosophy of mining and drilling to meet our future energy needs. Ralph Sims comments on the IEA scorecard.

The draft Energy Strategy highlights marine energy schemes, such as proposed for the Kaipara Harbour, as one of the new renewable technologies to be actively encouraged. A reality check is essential.

The Minister of Conservation, after years of arguments about the effect on fish, recently gave the RMA go-ahead for an initial, part Government-funded, trial of up to three tidal turbines in the Kaipara Harbour. However, RMA consenting does not address technical performance. A resource consent is like a WoF, which ensures that a car will stop, but not that it will necessarily go.

In Northland there is hope that the "200 MW" Kaipara scheme would greatly reduce the reliance on electricity transmitted through Auckland. The promise of clean and silent energy is alluring. However, consideration of technicalities of tidal generation, as reported in this issue, indicates that, regrettably, that appears to be a false hope.

The disastrous Christchurch earthquake has given rise to much discussion about how to turn a problem into an opportunity. Dr Susan Krumdieck shares a vision of a Sustainable Christchurch city by declaring *"We can no longer pass on our heritage, but we can leave a legacy."* In contrast, Nigel Williams cautions that there are some harsh realities to be faced up to before the construction crews move in. In addition various ideas have been forthcoming from the SEF forum which are summarised here as a means of forwarding them into the on-going reinvention process.

New Zealander Nigel Jollands has now left the IEA in Paris, from where he sent us an international perspective. As of mid-March, he took up a position as Principal Policy Manager in the Energy Efficiency and Climate Change group of the EBRD in London.

John Blakely has contributed a review on the global sales of New Light Vehicles showing some worrying trends. To counteract the earlier gloominess of this issue, I have taken a Techno-Polly-Anna approach with a short piece about a future vehicle concept. Innovative road transport solutions will be needed with the apparent demise of rail sevices in New Zeland.

This issue is, as usual, wrapped up with data on the ever increasing crude oil price.

Steve Goldthorpe, Editor

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AN ENERGY STRATEGY THAT SHOWS THE GOVERNMENT'S TRUE COLOURS

By Tim Jones,
Former SEF convenor

During its final term, after a long and intensive consultation process, in which SEF was quite heavily involved, the previous Labour-led Government produced a detailed New Zealand Energy Strategy (NZES) and New Zealand Energy Efficiency and Conservation Strategy (NZEECS).

The NZES was a project close to the heart of Labour Energy Minister David Parker, while the Greens, especially the then Government energy efficiency spokesperson Jeanette Fitzsimons, had a lot of input into the NZEECS.

These documents were far from perfect - in particular, the NZES was too timid a response in the face of concerns about climate change and resource depletion - but they did represent an attempt to shift the focus of both stationary energy and transport energy policies away from an increasing reliance on fossil fuels.

A month before the 2008 General Election, I heard Gerry Brownlee tell an audience of energy company chief executives and lobbyists that, when National won the election, they would ditch Labour's emphasis on climate change and the environment, and make exploiting whatever energy resources they could the top priority.

He was as good as his word. Shortly after coming to power, the National-led Government scrapped Labour's NZES and NZEECS, drafted an alternative, much briefer strategy based around the exploitation of New Zealand's fossil fuel resources, and held a desultory consultation process - a process which, all the same, attracted over 300 individual submissions, and many more form submissions, the great majority of them objecting to the move away from renewables and towards fossil fuels.

A week ago, a close-to-final draft of the document found its way to the Coal Action Network Aotearoa (CANA), which published it and told an interested media.

http://coalactionnetworkaotearoa.wordpress.com/2011/04/04/press-release-advance-copy-of-the-governments-new-zealand-energy-strategy/

Has anything changed since the consultation? Well, yes: the document is now in the name of Acting Energy Minister Hekia Parata, rather than Gerry Brownlee; and there are a few other very minor tweaks. But, in essence, the Strategy is no such thing: instead, it's a 40-page brochure, full of pretty pictures, which enshrines the Government's energy priorities to be:

1. Develop petroleum and mineral fuel resources
2. Develop renewable energy resources
3. Embrace new energy technologies

There are a few problems with these priorities. First, developing petroleum and mineral fuel resources is profoundly incompatible with the commitments the Government has made in international forums to reduce New Zealand's greenhouse gas emissions. What's more, developing these resources is likely to foreclose opportunities for developing renewable energy resources and new energy technologies.

But unfortunately, as the sham consultation process has shown, these aren't arguments the Government is interested in. "Dig for victory" is this Government's mantra, and they aren't referring to vegetables.

What now? Unfortunately, this Government has shown time and again that, especially in the energy, transport, water, and agriculture sectors, they are impervious to the arguments of anyone except their big business and agri-business backers. It will take action as well as words to reverse the massive retrograde step that this supposed Strategy represents.

THE IEA SCORE CARD

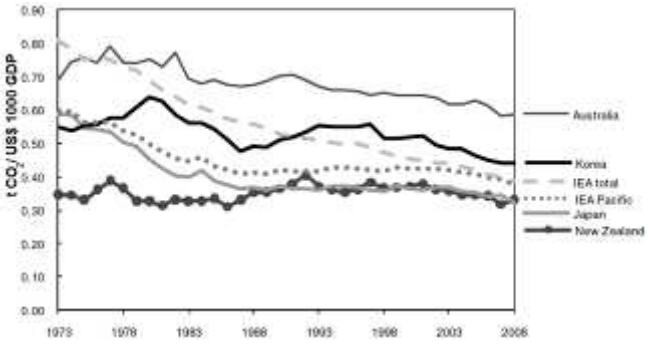
ByProf Ralph Sims

It was largely kept out of the media, but just before the "draft" NZ Energy Strategy was in the news recently, the IEA launched its latest in-depth country review of New Zealand where it analysed our current energy policies.

In essence we got a "6/10 – could try harder", but this assessment was kept away from many concerned New Zealanders.

As well as for our national policy statements already in place on Electricity Transmission, Gas Governance and Land Transport Funding, the IEA gave us big ticks for the following achievements.

1. Achieving greater than 70% renewable electricity share of the generation mix and without the need for subsidies. (In fact, based on what she has been saying on radio and in press statements, Acting Energy Minister Parata thinks we have reached 74% of renewable energy. Enrolling for one of our Massey energy papers could therefore be of benefit to her perhaps since renewables only contribute around 20% of our total primary energy – the actual share depending on what accounting method is used for geothermal).
2. Having a 90% renewable electricity target by 2025 in place "providing this does not affect security of supply". This proviso is actually not needed as some studies have already shown NZ, with its 60% or so of hydro power, could reach up to 30% of variable wind penetration with little risk of supply outages. In addition, the IPCC Special Report on Renewable Energy (to be released May 8th assuming it gets through the Government approval process) has a whole chapter on "Integration" that covers having more flexible grids, possibly some storage, improved forecasting, better demand-side management etc. which by 2025 will be the norm.
3. Introducing and retaining the emission trading scheme. A whole chapter of the 142 page IEA report covers "Climate Change" but a comparison of greenhouse gas emission reductions with other countries shows we are actually not doing so well in terms of CO_2 reductions per unit of GDP.



4. Energy efficiency efforts were recognized including EECA's work on the energy database and statistics (which were the subject of one criticism made in the previous 2006 IEA country review) and the Warm Up NZ insulation programme.

The review was launched by IEA Executive Director Tanaka Nobuo in Wellington on 28 March, followed by the Minister's media release stating the IEA review was positive and that we are "making good progress towards implementing recommendations

outlined". However, many of the key recommendations made didn't back this up.

The usual process is that the IEA review team come across (this happened in December 2009) to interview many in the energy sector. They then write a draft that is then sent to the Government for comment and, after any minor amendments, for their agreement. Normally this takes 4-5 months in total from my personal experience having been a member of IEA review teams. The process on this occasion however took almost a year (the original launch date was then delayed from November 2010 due to the Pike River mine disaster). Whether this is because the government was not happy with the original IEA draft being too critical is hard to know. (Certainly the IEA Director was not too happy that he and a colleague were suddenly given one day's notice by the Minister to come to NZ a day earlier than planned for the formal launch, and then, having managed to rapidly change their flight bookings, only to find when they arrived in Wellington that the meeting time had been changed and so had the venue. However, the press had not been notified of these changes and only two journalists were able to be present! The IEA staff had waited till the next day when some other journalists did turn up at the original scheduled time (apparently many put out by the last minute time changes), so they did manage to present their recommendations informally.

An excellent critique of the NZ "draft" National Energy Strategy was recently made by Rod Oram[1] who also succinctly summarized that the IEA had "judged that NZ government policies would do little to reduce our economy's high dependence on carbon".

The IEA recommendations which confirm that view included:

5. to complete the Strategy "in a manner that will inform long-term strategic policy direction for the energy sector based on a co-ordinated approach to economic, environmental and consumer priorities";
6. to implement the energy efficiency strategy by setting realistic goals and defining clear objectives for the transport, building and industry sectors and support them by adequate cost-effective measures and long-term investments;
7. to provide a detailed roadmap detailing exactly how to achieve the 90% renewable electricity target; and
8. to continue to support the development of the electricity grid to meet renewable energy targets, maintain a secure and diverse supply, and help facilitate the emergence of a low-carbon economy.

Mr Nobuo summed up the in-depth review by stating at the launch that "over the long term, New Zealand must continue to enhance its policies in order to ensure a secure, sustainable and decarbonised future[2]." This is in contradiction with the government's press release headline "*Energy Review of NZ Positive*". There is an obvious disconnection between the IEA recommendations and the National Energy Strategy but this doesn't appear to have been made by the media.

Maybe now, based on the IEA independent review, the so-called "draft" Energy Strategy will be totally rewritten by Government before its formal release.

But maybe not! *Ralph Sims*

[1] http://www.stuff.co.nz/sunday-star-times/business/4866200/Oil-no-good-for-these-waters

[2] http://www.iea.org/index_info.asp?id=1897

EXPERT QUERIES TIDAL TURBINES

Mike Barrington, Northern Advocate

A British specialist is questioning whether the Crest Energy turbines planned for installation in the Kaipara harbour are the best design or would be in the best place for tidal power generation in this country.

Peter Fraenkel is the chief technical officer for Marine Current Turbines Ltd, the Bristol company which developed the SeaGen, a structure resembling an underwater windmill, which has become the world's only commercial scale tidal current turbine to generate power into an electricity grid.

Mr Fraenkel told the Northern Advocate he had followed the progress of Crest. Kaipara Harbour data he had seen suggested currents were not fast enough for viable generation.

"We believe a viable project needs a mean maximum surface velocity of at least 2.5 m/sec and preferably 3 m/s. That is with a much bigger and more efficient turbine, such as ours, rather than with a smaller, less efficient one deep in the water column where the current is even slower" he said.

"I believe there are other much more potentially viable sites off the New Zealand coast."

However, Crest Energy chairman John McLachlan, of Auckland said yesterday the Crest had made no commitment to any particular turbine design and was constantly reviewing the seven different tidal energy design projects underway around the world.

He congratulated Marine Current Turbines for its SeaGen success. He said "The nuclear power plant problem in Japan was emphasising the need for sustainable alternative power generation sources".

The SeaGen turbine at Strangford Narrows in Northern Ireland has twin 16m diameter rotors and produces 1.2 MW.

The SeaGen turbine differs from the 200 turbines which Crest Energy plans to install at the entrance to the Kaipara Harbour.

The totally submerged Crest machines are designed to stand about 22m above the sea bed with each generating about 1 MW.

By contrast the SeaGen turbine has two rotors which can be raised or lowered on a 29m long cross beam attached to a 55m pile standing 40.7m above the sea bed.

The pile weighs 245 tonnes and the cross beam, including the two rotors, is 151 tonnes.

Northern Advocate – 31 March 2011

Editor's notes[3]

Surface tidal flow data for Strangford Narrows is 2.9m/s (spring/flow), 2.7m/s (spring/ebb), 2.3m/s (neap/flow) & 2.1m/s (neap/ebb).[4] The two 16m diameter near-surface turbines together generate 1.2 MW under peak spring flow conditions. Since power output is proportional to the cube of velocity, at a minimum generation speed of 0.7m/s the overall load factor for this installation would be about 30%.

Water velocity reduces with depth, so turbines on the sea floor might see 10% less water velocity than near-surface turbines.

In the Kaipara entrance surface tidal flow is 2.5m/s (spring/flow) and 1.6m/s (neap/ebb). Based on the actual SeaGen data, the estimated maximum output from a single 16m diameter Open Hydro turbine on the sea floor in the Kaipara harbour is 210 kW. At 30% load factor the annual output from 200 units would be about 110 GWh compared with over 1000 GWh indicated on the Crest Energy website.[5]

The power output from tidal generation would oscillate between maximum output and no output - for one hour every 6.2 hours. This pattern would go in and out of phase with the electricity demand pattern. Crest Energy claim that *"If fully implemented* [200 x 1 MW units], *it is estimated the development could generate enough electricity to power the whole region from Albany to Cape Reinga."* However, the intermittent unresponsive nature of tidal generation would not meet the need for continuous electricity supply North of Auckland.

The Crest Energy Website features the OpenHydro design. A full scale OpenHydro turbine was deployed in a trial in the Bay of Fundy, Nova Scotia last year. When retrieved in November 2010 it was found that the blades of that OpenHydro turbine had been completely destroyed. Blade failure is commonplace in tidal turbine trials.

A large amount of sediment is carried by the water in the Kaipara harbour. Visibility is very poor. Crest Energy claim that the sand-blasting effect on the turbines would keep them clear of barnacles.

Another issue, which will not be addressed by a trial of individual turbines, is the shadowing effect of turbines on each other in an array. As each turbine draws energy from the flowing water, the water velocity would reduce, with a corresponding slight increase in depth. Since power output is the cube of velocity, any progressive reduction in water velocity would significantly reduce power output from an array of tidal turbines.

In view of these issues, and the fact that Crest Energy have not yet reached agreement with a turbine developer willing to trial their turbines in the Kaipara Harbour, the optimistic view that the Kaipara scheme will contribute to solving electricity supply problems is a false hope.

Editor

[3] Please excuse my inborn British negativity - Editor

[4] www.marineturbines.com

[5] www.crest-energy.com

Ammonia engine fuel?

The use of anhydrous ammonia as a carbon-free IC engine fuel was discussed recently on SEFnews. The technology proponent's website claimed that the ammonia fuel releases zero greenhouse gases on combustion. When questioned about this claim in the context of potential nitrous oxide emissions from ammonia combustion, the Chair of the NH_3 Fuel Association indicated that there had been no quantification of nitrous oxide emissions, despite its 310:1 global warming potential. He also observed *"Although I was always against the "zero emissions" statement on our web site, this exaggeration pales in comparison to the deliberate, systematic data falsification that occurred in Great Britain regarding global warming data."*

We can no longer pass on our heritage, but we can leave a legacy

SUSTAINABLE CHRISTCHURCH CITY

By Dr Susan Krumdieck, Associate Professor of Mechanical Engineering, University of Canterbury

The cathedrals and other heritage buildings are now a part of history. This fact leaves a painful gap in our sense of place. People died where they went to learn, work and enjoy. The investment and labour people put into making homes and neighbourhoods has been silted over and heaved into heaps. The basic infrastructures of modern life in a developed country have broken down. Those of us who suffered minimal damage cannot help thinking about those who have lost everything. And the aftershocks just keep coming. It is a time of grief, damage, loss and confusion.

Businesses, the council, the university, the hospital; we are all taking stock, focusing on core business, and re-starting. Finding temporary premises, patching together systems, pulling together to make things work – the effort of managing the disaster is keeping us going.

Looking forward, we realise that we have to re-define our role in the history of this place.

When the Pakeha first came here, they had a vision. That vision looked a lot like England: a port, a cathedral, a square, civic amenities, bustling business district, botanical gardens, fine schools, stately homes, then ¼ acre suburbs surrounded by pastoral countryside, but with a backdrop of stunning mountains. How sweet is that? That is why we all live here, right? We inherited this fine vision plus reticulated water, sewer, telephone and plenty of electricity. We were going to pass it on with our own vision: big shopping malls, unlimited automobile mobility, high tech industry, international tourism, world class university, architecturally designed town houses, lifestyle blocks, high speed internet, global export economy, piles of electronic gadgets from Asia, and at the core - a vision of unlimited economic growth to keep it all working.

But even before the city was shaken, many people were starting to think about transition. Why would a people who have everything want to change those things? What is the transition vision? It is actually more of a realisation. Some of the good things were built on unsustainable foundations. The ever-increasing energy inputs required to keep up our appearance of prosperity are illusions. The accelerating destruction of environmental systems resulting from our continuous demand growth is a nightmare. Some people have been trying to transition from the illusions and the nightmares into a new vision of a fruitful way to live. They formed groups, watched movies, listened to speakers, and worked through ideas for positive action. But they still had the infrastructure and services and jobs provided by the growth economy. Then, a fault ruptured.

Looking forward, we realise that we have to re-define our expectations of this place.

The legacy we leave for the next 150 years will hinge on how we approach this turning point. The distinctions we use to frame up our debates; liberal, conservative, progressive, will be irrelevant to our great grandchildren. The only thing that will matter to them is whether we were right or wrong. It is absolutely possible that we can leave a legacy of empty expectations and dysfunctional assets. We will get it wrong unless we work out new ways to explore and develop our vision that is founded on our world-class science, design and engineering. We will have to use real facts and real modelling, not just speculative economic imagining. Our historical structures; central government, councils, corporations, financial institutions, are not up to the task of creating a sustainable

legacy. Their core business is managing the growth economy. At turning points in the past, people have discovered the ever more democratic structures they needed to realise their vision of a better way to live. We will need to develop a new systems-oriented transition structure in order to realise our legacy vision. This transition structure will have to be granted the power to do the right thing and to carry out the will of the people as a community with a future.

Looking forward, we realise that what really matters is quality of life.

Our legacy for the future is quality of life - not the trappings of the growth economy.

- A civil society with rule of law and human rights, justice and protection of the powerless
- A society committed to mutual help, charity, mercy, humanity, freedom, honesty, tolerance, and equality
- A free and quality education, and a world-class tertiary education for those with the capability
- Health care and wellness
- The infrastructures that provide our basic needs for health, safe shelter, clean water, sanitation, food, light, heat, communication
- A garden city where all people have access to participate in employment, markets, social and other activities
- Free and fair markets that reflect the social values and equity of labour and trade
- Energy supplies, materials, goods and production systems that work with natural systems in a biophysical balance
- A flourishing and diverse natural environment, nurtured agricultural land and humanely cared-for domesticated animals

The foundations of this legacy will be healthy ecosystems resilient to climate change, infrastructures resilient to natural hazards, energy and transport systems resilient to the rapid decline of fossil fuel use, food and production systems resilient to weather extremes, manufacturing and economic systems resilient to recession of the global growth economy, and civil and social systems that are resilient and adaptable.

Looking forward, we realise that we are at a turning point and must build more than just new buildings.

How will we achieve this legacy? It may require some degree of grass-roots revolution, as there are powerful vested interests in un-sustainability. It will of course require vision and focus on the core business of humanity – working toward the best quality of life we can achieve. It will also require application of the scientific capabilities and understanding that we have built up over the last century, and the engineering capabilities and lessons learned from oh so many mistakes.

And finally, we will achieve a legacy of a safe, resilient and sustainable Christchurch city by putting together a new transition structure. My own thinking on this is the model of a commission. This Transition Commission must be independent, non-political, systems-oriented, and able to pull in expertise and input from all stakeholders. It must also be democratic and focused on the core business of sustainable quality of life through infrastructure design. The new Transition Commission must have the power to overcome embedded un-sustainability in governance and business. The Transition Commission would need to have the power over investment in infrastructure and buildings to ensure that un-sustainability is not built into our city any longer. I don't know what kind of an act of parliament or local democratic action it would take to establish a Transition Commission, but that would be the first group of experts needed to help set it up.

And so starts the legacy.

Susan Krumdieck

CHRISTCHURCH - FIRE, FOOD AND FLOOD

By Nigel Williams

This paper gathers together information that is relevant to the condition of Christchurch, New Zealand. It raises some `home truths' that will be unpalatable to many, particularly at a time so close to the recent series of tragic events.

But as a Christchurch-born boy I feel I have a duty to drag these harsh realities into the open. So, before you shoot the messenger, please listen to what he has to say.

Introduction

As the dust begins to settle on another devastating earthquake in my dear hometown, the clamour to resume business as usual and rebuild something new and `iconic' on the rubble of the old is gaining momentum.

Our government is struggling to find the money to help restore the city to its former glory, especially with the multiple hits of the earthquakes on top of the generally depressed economic conditions nationally and globally.

Deep down I'm sure the decision-makers know that they are going to have to be very careful with every penny that is spent on Christchurch.

The city is proud of its heritage. The combined European and Polynesian presence has left its mark on place and history stretching back at least 800 years. If we are to build a new and more resilient city then we must look for a place and manner of community function that has a genuine potential to provide a future at least as long as the city's noble past.

We must use the knowledge we have of the state of the world today to ensure that what we re-build today will be of service to our children, and to their children for many generations; to ensure that our efforts will reap the same rewards that we enjoy today from the efforts of our forefathers many centuries ago.

Among the mud, dust and rubble of this trembling town there are many spirits stirring. Some will urge us to take swift and decisive action with the risk of repeating many of the errors of the past; others, three in particular, will demand of us the utmost strength to think deeply of them, and to find the courage to make very hard choices based on what these spirits tell us.

These three sleeping spirits stand on each other's shoulders; each reinforces the effect of the ones beneath as time passes.

The first spirit will awaken in a time frame of years, perhaps months. Its name is FIRE.

The second spirit raises its head in a time frame of decades, perhaps years. Its name is FOOD.

The third spirit bares its teeth in timeframes of centuries, perhaps decades. Its name is FLOOD.

Fire

To support in just a few years the building of a third of a city that has taken 150 years to build before will require a significant amount of energy. That first build and work to date was enabled by the fire of cheap readily available high-density energy; first coal, then oil.

In one of its many increasingly blunt statements about the global energy predicament the International Energy Agency stated in 2009 that *"…global oil supply is expected to decline at about 6.7% per year from its peak in 2008*."

This means that by 2020 the theoretical oil supply for NZ will be only 55% of the 1990 level. That's the IEA, and they should (and do) know.

The recent Parliamentary Research Paper *"The next oil shock"?"* restates warnings by other agencies that: *"…another supply crunch is likely to occur soon after 2012 due to rising demand and insufficient production capacity…"*

http://www.parliament.nz/en-NZ/ParlSupport/ResearchPapers/4/6/a/00PLEco10041-The-next-oil-shock.htm

The report *Peak Oil Vulnerability Assessment for Dunedin* (Dr Susan Krumdieck et al.; 2010) notes that: *"The peak and decline in world oil supply will be a driver for long-term fuel consumption reduction to around 50% of current levels by 2050. The possibility of fuel shocks will be ever-present."*

http://www.dunedin.govt.nz/__data/assets/pdf_file/0008/159857/Peak-Oil-Report-Final-March-2011.pdf

Comment: These are not idle threats to our way of life; these are plain realities that we ignore at our peril. Sometime soon we will have another oil price spike and within the next 10 to 40 years (2020 to 2050; that long, if we are so lucky) global supplies of conventional oil (the stuff we use to rebuild cities and to take Johnny to school) will be down to 50% or less of today's level.

This will impact not only on the choice of urban form for a rebuilt city but also on our ability to move food supplies long distances, and to obtain materials for the production of essential manufactured goods and agricultural efforts.

The FIRE is flickering now, and it will surely die.

Food

Christchurch's new town will continue to rely on the production of its rural hinterland as the cornerstone of its economic wealth and reason for being. How viable is that production? Remember that by 2050 for sure we will be fortunate to have perhaps half the oil for transport, agricultural chemicals and production that we have today. We will `eat local', or we will not eat at all.

What else can go wrong with our ability to feed ourselves in Christchurch?

Refer to the New Zealand Ministry of Agriculture and Forestry: The EcoClimate Report - *Climate change and agricultural production*.

http://www.maf.govt.nz

The EcoClimate report presents projected changes based on the IPCC 3rd and 4th assessment reports.

Figure 7: `Projected changes to the frequency of droughts' shows the projected driest annual conditions in the 2080s under (a) low medium and (b) medium high scenarios for conditions that currently occur on average once every 20 years.

This figure shows Canterbury experiencing once-every-20-year drought conditions every 5 to 10 years under the low-medium scenario and every 2.5 to 5 years under the medium-high scenario.

Comment: So, bearing in mind the necessarily conservative approach adopted by the IPCC, it is virtually certain that Canterbury will be experiencing once-in-20-year drought conditions every 5 to 10 years by 2080, possibly as frequently as once ever 2.5 years.

The eastern areas of New Zealand have already had samples of these conditions, and the Ministry's report confirms that these dry conditions will continue to arrive with increasing frequency. Agriculture (especially with low energy inputs) will be hard to sustain as Canterbury Plains dry out.

Because, by 2080, the Earth's atmosphere and temperature will not yet be in balance with the climate-altering forcings we have imposed, these conditions in Canterbury will continue to get worse for some considerable time beyond 2080.

The absence of readily available or affordable oil for transport, agri-chemicals, fertiliser, and energy for irrigation will make it very difficult for Canterbury to sustain a form of

agriculture that will provide local food to a population of four to five hundred thousand people.

Agricultural production will be in dire straights, as will one of Christchurch's main reasons for being. In Christchurch by 2080 the combination of the energy situation and the increasing frequency of drought conditions will mean that FOOD will be hard to produce.

Flood

If we are looking at local food supplies, then the most productive land (before much of it was filled over for housing – Bad move!) was on the coastal soils including Marshland and in the rich soils of the valleys of the Port Hills (Watch that rock-fall!). In common with all coastal cities, Christchurch has to consider the impact of sea level rise on its plans for investment in the development of the repaired town.

Hansen recently suggested 5 metres sea level rise by about 2100 was plausible.

http://www.columbia.edu/~jeh1/mailings/2011/20110118_MilankovicPaper.pdf

Bell et al's recent work finds a likely contribution from ice sheets of 150mm by 2050.

http://www.realclimate.org/index.php/archives/2010/04/science-story-the-making-of-a-sea-level-study/

This rate extrapolated gives a sea level rise of at least two metres shortly after 2100, while Vermeer & Rahmstorf (2009) estimate at least one metre, and as much as two metres, by 2100 under IPCC AR4 temperature scenarios.

http://www.pnas.org/content/106/51/21527.full.pdf

However, extrapolation from current trends, whilst perhaps reasonable for the melting of land-based ice on Greenland and East Antarctica, cannot take account of destabilisation and collapse of the West Antarctic Ice Sheet, which is currently grounded. This geographic feature alone has the capacity to raise global mean sea level by 5 metres. The unanswerable question is not if but when will this come about?"

http://geology.com/research/west-antarctic-ice-sheet.shtml

Comment: The steps into Christchurch's Cathedral are at 6.2m above current mean sea level, a bare 5 metres above high water spring tide.

Under a worst case scenario, high tide could see herrings nibbling at the Cathedral's altar cloth and the coastal strip containing the premium market gardening soils being awash with salt water. With further increase of sea level to 10 m above the current datum; Captain Cook would be right in calling it 'Banks Island' not 'Banks Peninsula'; Lyttelton Port would become inaccessible from The Mainland and two-thirds of present-day Christchurch City would be reclaimed by the sea. The timeframes are unknowable but could be as short as the duration of European association with the Cathedral City. Not long. Certainly not long enough for a sense of permanence.

The sea will rise faster and faster over a number of centuries until the amount of grounded ice left to melt begins to decline significantly.

As James Hansen declared in his 2008 testimony to Congress: *"No stable shoreline would be re-established in any time frame that humanity can conceive."*

http://www.columbia.edu/~jeh1/2008/TwentyYearsLater_20080623.pdf

Sea levels will eventually stabilise at about 75 metres above today's, plus thermal expansion. Rangiora and Rolleston would be gone, and Dunsandel and Ashburton would be seaside towns perched on the 15 metre high eroding sea cliffs of the shrinking and desolate Canterbury Plains.

http://tinyurl.com/69eskta

By late in this century the lack of oil-powered transport and construction equipment will mean that it is impractical to consider

building any sort of barrier to the rising sea (after all it may have to be built by hand), and the inevitability of continued sea level rise for centuries makes any development or reconstruction within the long reach of the rising ocean a temporary arrangement at best, and in the style of King Canute, a misguided waste of effort, money and resources.

In time FLOOD will wipe clean the slate that was Christchurch.

Conclusion

We have lit the fire and consumed the oil, the burning of the fire has changed the climate, the changed climate is bringing the heat and drought, and the heat is melting the ice that is filling the oceans.

Within the next decade the all-sustaining fire of cheap energy is going to flicker. Oil (and all it means for us) will be beyond our economic reach within 10 to 40 years. In particular the city's ability to source staple food supplies from long distances away will be compromised; the principal source of food will have to be that grown locally. Ten years to perhaps 40 years, if we're lucky.

Over the next 60 to 70 years progressively worsening drought conditions on the Canterbury Plains will become so extreme that, in combination with the lack of oil supplies to support drought-tolerant agricultural production, the overall viability of large-scale commercial food production will be suspect. 60 to 70 years, and it will not get better.

Within the next 50 to 100 years the progressive and inexorable rise in sea levels will become inescapable as coastal areas are inundated. In the next century the surf could be running through Cathedral Square. The sea will continue to rise and "*...No stable shoreline would be re-established in any time frame that humanity can conceive*".

These are the realities that a local view of the much-discussed impacts of resource depletion, climate change and the inevitable and progressive rise in sea levels will have on the existing city of Christchurch.

Over our lifetimes and the lives of our children and grandchildren these impacts are – as far as we are concerned – inevitable and unavoidable.

So Where and How for Christchurch?

The changed climate is expected to give rise to more floods in the rivers over the plains. Perhaps a modest new city in the foothills at the top of the plains watered by gravity fed canals from the great rivers may be a possibility.

The hills above Timaru will eventually be the best harbour on the edge of the plains, and the downs there may become a safe haven if water supply can be assured.

But whatever the solution we have a marvellous opportunity to take part in a consciously joyful process to re-establish a meaningful and viable city that can look forward to a future at least as long as it's past. To achieve that we must bring the talents of the entire community to bear on the realities that confront us.

We must ask: "Where is the best place to apply the effort and money we are planning to spend rebuilding Christchurch with a sense of permanence?" Sadly, one place is certain; NOT Christchurch.

We have no time and no money to loose. Is it sensible to put massive resources into making temporary use of coastal land that is here today and gone tomorrow? Is a managed retreat approach sensible? The informed community must debate the final answer to these questions before resources are committed to a flawed plan.

With the open and honest debate and acknowledging the harsh realities, we can look forward to the best and most meaningful times of our lives.

Nigel Williams

SEF PERSPECTIVES ON CHRISTCHURCH

There have been many thoughts expressed on SEFnews, and on a special interest group network set up under the SEF umbrella, about the problems posed by, and the opportunities presented by, the Christchurch earthquake. Some of these ideas are assembled here as a means of capturing them and feeding them forward to the various think tanks.

Russell Bailey suggests grasping the opportunity of a major rebuild to implement greater sustainability into the council district plan and zoning requirements.

Review and update to provide

* solar shading protection from neighbours' buildings – i.e. solar angles, etc.;

* maximum office and apartment floor plate depths to optimise daylight penetration and passive / cross flow ventilation;

* enhanced energy performance standards, based on actual post construction performance, not computer models;

* not mandating technologies – e.g. .SHW that may worsen Christchurch's winter peak electricity consumption profile, but identifying the most efficient solution for each specific requirement;

* acknowledgement that 90% (Some winter north to south transfers occur) of Canterbury's electricity comes from renewable generation which may be better environmentally than extensive photo voltaics.

* green roofs (as are now mandated in parts of London)

* rain water collection and re-use

* inter-seasonal thermal storage (residential – deep insulated slabs to absorb excess summer Solar Hot Water heat)

Then infrastructure like

* reduced private car access to the CBD, c/w appropriate allowances for delivery vehicles, taxis, buses, etc.

* extend the tram system, from tourist route to full suburban commuter;

* cycle ways, walk ways, etc.;

* flexible joints in sewer, water and similar systems to accommodate future quakes;

* dual water supply systems – potable and non-treated; non-treated being linked into numerous local rainwater collection systems;

* permeable paving and permeable roading systems to aid aquifer replenishment (instead of the standard stormwater to river/beach systems)

* sewage treatment plant(s) whose first focus is the extraction of product to create fertilisers and gas capture for bio-fuel vehicles (rubbish trucks) before treating residues for other disposal methods (perhaps combined heat and power);

* green/food waste collection for compost creation and reduction of land fill site pressures;

Seizing the opportunity of major partial rebuilding to implement district heating schemes was promoted by Ian Bywater, who referred to numerous websites citing examples of modern schemes in Europe, such as Freiburg and Reiselfeld in Germany, Boraas in Sweden, Copenhagen in Denmark and Dunkerque in France.

Of course, wholesale redevelopment of large areas will be compromised by existing buildings that are OK or are easily repairable.

Readers are referred to Ralph Sims' IEA report "Cities, Towns and Renewable Energy – YIMFY – Yes in my Front Yard" – available from the www.iea.org website.

It was suggested that the massive amount of silt brought to the surface by liquefaction might be a useful material. Whilst it apparently has interesting and consistent properties as a construction material, it is evidently completely devoid of organic

material and would not make a good growing medium.

The matter of height restriction was debated. It was observed that the beauty of many cities is enhanced by a height restriction of five stories. Whilst the main reason for that limit in the pre-industrial era was the absence of elevators, a similar limit makes good sense for a city that is not horizontally constrained.

Furthermore, now that Christchurch is established as prone to earthquakes, wood rather than steel and masonry becomes the obvious construction material of choice, thus generally limiting building heights.

In the context of Nigel William dire warnings about impending Sea Level Rise, Alastair Barnett made this case for managed retreat.

"I would recommend a retreat from the coast back towards the mainly higher ground occupied by Christchurch in my youth.

"For over twenty years now we have been reporting that the tsunami hazard is comparable with the earthquake hazard throughout suburbs built on essentially the old Waimakariri coastal lagoons, in studies commissioned by both the Christchurch City Council and the Ministry for Civil Defence and Emergency Management. These hazards will only get worse with rising sea level.

"There is a widespread impression that we can wait until our properties fall below the high tide mark before retreating from the coast. In fact we will first notice rising sea level by the increasing frequency of inundation by minor events such as small tsunamis and storm surges. In other words, a tsunami of a size recurring every 20 years will reach as far inland as formerly a tsunami recurring every 200 years would have reached, and this will be well above high tide. No action has been taken on our reports, because the right of property developers to satisfy the demand for housing has taken priority through our laissez-faire building code adopted in the Douglas-Richardson years.

"So we have since seen a great extension of all these suburbs on old coastal lagoons. For example, no housing is supposed to be erected where surface water (specifically defined to include water flowing from the sea) will enter in a 1 in 50 year event. This is fine, except in the central/local government reshuffle of the early nineties no-one was given responsibility for checking this. Anyone remember leaky buildings? Here we have leaky suburbs!

"The old seaside towns of New Brighton and Sumner are on higher ground (the coastal dune ridge and the lower slopes of a volcano respectively) so should be defensible for at least one hundred years yet. The rest of the coastal area should be returned to market gardens, parks and reserves or retained for valuable utilities such as the sewage treatment station, which can be designed to survive occasional inundation without major disruption.

Murray Ellis commented: - "There is always the Dutch solution - build a sea barrier across the estuary entrance and drop the water level inside it. The estuary would become a fresh water lake. It would not be hard to do, but could mean a permanent overhead of pumping, although flap gates might suffice, letting the water out at low tide but not back in at high tide."

Steve Goldthorpe responded: - "The engineering solution of building coastal defences is founded on the experience of the last couple of centuries, when mean sea level was effectively constant. In the 21st century mean sea level is rising and is certain to continue to rise for centuries to come. The only uncertainty is how quickly or slowly mean sea level will rise. The King Canute approach is ill-advised. Instead the planning philosophy of "Managed Retreat" is more apt for the 21st century."

A LETTER FROM PARIS

By Nigel Jollands,
ex Head, Energy Efficiency Unit,
IEA Paris
8 March 2011
(i.e.pre Japanese disaster)

Paris in the spring seems a world away from the destruction wrought by the Christchurch earthquake. For those of us expats it is hard to focus on our work seeing the suffering in Canterbury.

But the diplomatic wheels keep turning and energy remains in the spotlight with oil cruising above USD 100 per barrel and with unrest in North Africa, issues of energy security are on energy policy-makers minds. And if you need an indicator of the current political trends in energy, look no further than the World Energy Outlook – the 2010 version features energy security heavily.

Interestingly, I think the energy efficiency rhetoric has cooled down. I think this is partly because of message fatigue – many decision makers have been banging the energy efficiency drum for some time, and I suspect they perceive the message to be passé – as we say in New Zealand. But that is not all bad. Perhaps attention has shifted from media sound bites to implementation action. And at the IEA, we do note a lot of implementation action ramping up around the world. The roll out of energy performance building labels is one example – even in France (generally a laggard in buildings energy efficiency in Europe) real estate agents are showing the energy ratings of properties in their front windows.

A focus on implementation is certainly something the IEA Secretariat is advocating. In November last year we launched a new series of publications called Policy Pathways. These documents are prepared by people with hands on experience in policy development and implementation. The documents focus on identifying the key steps needed in implementing an energy efficiency policy. We've produced two: one on compliance and enforcement of appliance policies, the other on building energy performance certification. They are available free of charge at (http://www.iea.org/publications/free_new_result.asp?title=Policy+Pathways). This year we have several more planned focusing on industry energy management, building windows and glazing policies, fuel efficiency standards for light and heavy duty vehicles and establishing public private partnerships for energy efficiency finance.

Speaking of finance, it would be fair to say this is the hottest 'policy' issue at the moment internationally. Energy Efficiency nerds have understood for ages the critical need for finance to help deploy energy efficiency. But what has changed I think is the spreading knowledge of the issues in banking sector. Some banks like KfW in Germany were real path blazers. And now, primarily through the multi-lateral climate change fora, MDBs are getting engaged (for e.g. The European Bank for Reconstruction and Development (EBRD) reportedly made € 4.6 billion of sustainable energy investments since 2006). The last part of the puzzle is commercial banks. They seem to be moving on sustainable energy, but the movement is slow.

The IEA Energy Efficiency Unit has a couple of other headline projects you might be interested in. You may recall the 25 energy efficiency recommendations presented to G8 in 2009. These recommendations are in the process of revision. The aim is to have the revised set presented to the IEA Energy Ministerial in Paris in October this year.

The other project is a repeat of the exercise that evaluates the extent of implementation of the 25 energy efficiency recommendations. We last published such an evaluation in 2009. The repeat exercise is due for completion in October 2011 – again in time for the Ministerial. It would be fair to say that this is not a popular project with many IEA member countries. But it does help hold governments' feet to the fire. *Nigel Jollands*

GLOBAL SALES OF NEW LIGHT MOTOR VEHICLES

By John Blakeley

Carbon dioxide emissions from cars and other light motor vehicles (including SUV's) contribute significantly to global greenhouse gas emissions, as well as to major pollution problems in many large cities.

Therefore trends in global sales of new vehicles are of interest in predicting future increases in greenhouse gases globally from such vehicles. I have been following the reported sales figures and trying to understand them.

After a steep dip in sales during the economic downturn around the world in 2009, it now seems that sales are rising significantly again, especially in developing countries, particularly China and India.

My best estimate of global sales of new light motor vehicles in 2010 is as follows -

China	15 million
Western Europe	13 million
USA	11 million
Japan	10 million
Eastern Europe (including Russia)	5 million
South America (esp. Brazil)	5 million
Korea	5 million
Mexico	3 million
India	2.7 million
Other countries (including Africa) and Asia/Pacific	2.3 million
Total	72 million

In the USA, there were only 8.6 million new cars, light trucks (including SUV's) and crossover vehicles sold during 2009. That was barely half of the record sales level of 17.4 million vehicles that the US motor industry set early in the last decade, with more than 16 million vehicles still being sold as recently as 2007.

A big sales recovery is now predicted in the USA with 12.8 million sales in 2011, rising to 14.8 million in 2012 and increasing to 17.2 million by 2016.

On the other hand, motor vehicles in the USA are becoming increasingly reliable and there is now less pressure to trade in a three or four year old vehicle on a new one. As a result, it is realistically possible that the US motor industry will not see another 17.2 million sales peak anytime soon.

In contrast to the USA, European sales (East and West) are expected to drop slightly in 2011 to about 18.1 million units. Sales in Japan are also expected to decline.

It is in emerging Asian countries where car sales are most rapidly rising, and especially in China and India. General Motors (GM) sold more cars and light trucks in China in 2010 than it did in the USA. It was the first time in the company's 102 year history that its sales in another country had exceeded those in the US.

In 2010, GM sold 2.35 million vehicles in China with its sales surging 29% as an expanding middle class gained more wealth. In contrast, Toyota sold just 846,000 vehicles in China in 2010.

Despite this rapid growth of GM sales in China, Toyota just held on to the title of the world's largest car producer in 2010, registering 8.42 million sales worldwide compared with GM's 8.39 million.

During 2010, China had an increase in new car and light vehicle sales of 30%, with sales predicted to surge from 15 million to almost 19 million in 2011.

India is also experiencing a rapid increase in sales but starting from a much lower base, with sales rising by 30% during 2010 to 2.7 million units. Sales are expected to rise another 18% to 3.2 million units in 2011.

After experiencing a drop in sales of 2% in 2010, Europe is expecting to recover in 2011 and show strong growth in 2012. This will help to boost global car sales to around 85 million in 2012.

In 2010 global sales reached a record of 72 million, beating the previous record of 70.5 million sales in 2007, before the global economic recession cut into car sales. These global sales are expected to increase by a further 6% in 2011 to a record 76.5 million sales.

The world's car market is then seen as climbing to around 85 million in 2012 and to 90-91 million in 2013 and could surpass 100 million new car and light vehicle sales in 2015.

The year 2011 is expected to see a stable and increasing market for new car and light vehicle sales with more manageable growth rates balanced across the world as the recovery in the auto market will continue in many countries.

John Blakeley

References:

1. *"GM Sells More in China than US for the First Time" NZ Herald 5/2/11*
2. *"Asian Buyers Drive Record Sales in Light Vehicles" NZ Herald 19/2/2011*
3. *"Car Sales Tipped for New Record This Year" NZ Herald 26/2/2011*

The Paradox of Energy Efficiency discussed in EW60 is exemplified in a recent TV advert I saw :- "*Efficiency isn't about cutting back. It's about giving you more and more and more. - The Skoda Octavia"*

FREEVEE
THE EV WITH THE PV ?

Fast-forward a decade, add a good dose of the Techno-Polly-Anna philosophy, and one might envisage a future advertising campaign with the strap line "Freevee – The EV with the PV"

Of course, on-board PV could not provide all the instantaneous power needed to drive a car. However cars usually sit around in the sun for a long time and are actually used for a relatively short time. Could PV on the roof of a car recharge its batteries and provide a useful amount of guilt-free energy?

A back of the envelope calculation indicates that three square metres of PV mounted on a car that is kept outdoors might generate enough power for 10km per day in winter and about 20 km per day in summer.

As for capital cost, bulk purchased PV might add about 5% to the cost of an EV.

This concept follows the principle of minimising the energy conversion steps between the primary energy source and the end use. At a modest speed on the flat in full sun an aerodynamic Freevee's panels might possibly generate enough power to cruise, thus eliminating battery charge/discharge losses. The sun to mobility energy flow pathway would be most efficient when solar panels directly drive the cruising vehicle with the stored energy only used intermittently for hill climbing and acceleration.

A benefit that could ensue from such vehicles becoming commonplace would be to generate acceptance in the minds of the users that 15 km per day of personal mobility was the sustainable ration that was guilt-free (perhaps with an external display panel to show the neighbours your sun-to-grid ratio). Is 5000 km per year of independent personal mobility too restrictive a ration?

It this idea too far fetched to be credible ?

Steve Goldthorpe

WHITHER RAILWAYS ?

The writing is on the wall that New Zealand is gradually losing its rail infrastructure. As each peripheral line is closed the usefulness of the whole network is weakened. The relative efficiency benefits and fuel savings of rail compared with road for transporting freight and people would obviously come into its own in a medium to long term fuel-constrained scenario. However the blinkered view of short term economic rationalism does not have a mechanism for recognising long term potential strategic benefits of rail.

From discussion on SEFnews it is clear that the Stratford/Taumarunui line, which has not been used for over a year, will not be reinstated. It is KiwiRail policy that after a line is disused for five years the land can be released for other purposes, such as Tourist cycle trials.

In Northland there is an active "Save our Rail" campaign in progress. The rail line up from Auckland through Whangarei and beyond is under review, with a decision likely after the election. There is no passenger service, but there are regular trains carrying logs and mixed freight, which would put substantial strain on SH1 if the rail line were closed. There have been plans to add a rail spur to the deep water port at Marsden for three decades, but these are still just plans.

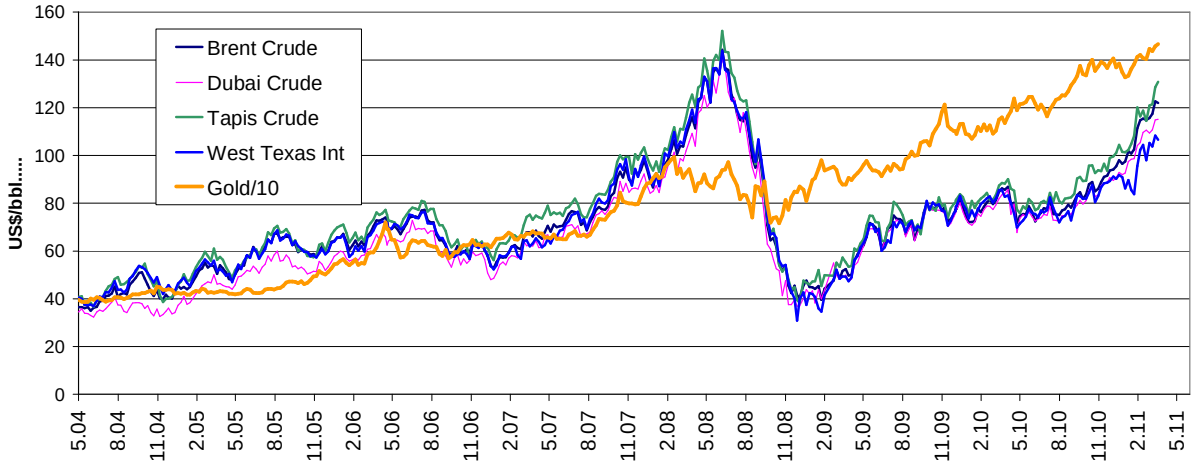
A recent letter from Hon Phil Heatley, MP for Whangarei indicated that the review of the viability of the service would focus on a short term economic comparison with road transport. He also said *"In my view Northland rail becomes economic when the rail link goes in, the rail link will go in only when Marsden becomes a significant importing port, and it will become that only when Auckland starts shedding its business due to CBD congestion and better potential uses of the Auckland waterfront land. So a whole series of decisions need to be made to have the link viable."*

Whither Rail in New Zealand?

Editor

Neil's Oil Price Chart

This chart, compiled by Neil Mander, tracks a basket of oil prices in comparison with the gold price. Oil prices are from the NZ Herald for Brent (UK North Sea), Dubai (Middle East), Tapis (Malaysia) and West Texas (USA). This year the mean oil price has increased by an average of 1.5% per week and is now well above $100/bbl. The variance between prices remains high. The Parliamentary library report suggested that the next peak could occur in 2012. Could it be sooner?



Join our sustainable energy news & discussion group

SEF Membership provides a copy of our quarterly EnergyWatch magazine. In addition, many members find the SEFnews email news and discussion facility an easy way to keep up to date with news and views as it happens. The discussion by the group of sustainable energy "experts" who have joined the service offers an interesting perspective.

Non-members are invited to join the SEFnews email news service for a trial. To do this send a blank email to: <SEFnews-subscribe@yahoogroups.com>. To help us stop spammers, non-members need to supply a name and contact details, and a brief statement of their interest and/or involvement in sustainable energy issues, before their trial is approved.

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

EnergyWatch

While every effort is made to maintain accuracy, the Sustainable Energy Forum and the editor cannot accept responsibility for errors. Opinions given are not necessarily those of the Forum.

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Contributions Welcomed

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 or SEFnews).

Material can be sent to the SEF Office, PO Box 11-152, Wellington 6142, or by email to editor@sef.org.nz, or by directly contacting the Editor, Steve Goldthorpe at PO Box 96,Waipu 0545.

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