



How do we reach a sustainable energy future?

We are not very good at the future, especially when we haven't done it before

The sustainable energy community takes every opportunity to answer our headline question, but are we over-confident? Those on SEF News are often reminded, by computer modeller and founder member Robbie Morrison, that we have no real idea of the question-of-the-moment until it has been modelled. Is this self-interest? Possibly. A useful insight? Certainly. A reality check? Yes, but with limitations. Is it crucial? Very likely.

Now David Cogan offers an interesting approach to uncertainty:

Professor Percy Hammond of Southampton University, said ... that the type of analysis performed is far less important than actually to know what you are doing... Even the most painstaking analysis may suffer from a fundamental flaw otherwise. On the other hand, even a simple analysis can provide valuable insights to those who know the subject.

So whether you are going for something to do now, or want a comprehensive long-term strategy, get advice from someone who has been in the business (successfully) for twenty years or so.

There is still a potential problem: to take full advantage of this approach in a fast-moving field you must be up to 20 years behind the leading edge. However, it should help to blunt both horns of the dilemma posed by economist Peter Jay:

Either you rigorously extrapolate current trends, in which case you get rigorous nonsense, or you adopt an imaginative, blue-skies approach, in which case you get imaginative nonsense.

A UK engineering paper once linked a long series of bridge failures, all with the same fundamental cause: an old design theory had been preferred to

a new and more realistic alternative. It was then taken beyond its assumptions, which had been forgotten as it became a routine tool. The theory was discarded in the aftermath of the collapse, or series of collapses, but a generation later the same thing happened with another theory. The series was traced back to cast iron railway bridges in the 1840s (critical components too easily broken in a derailment) and through to the box girder failures of the 1970s (welding distortion and re-learning the importance of fit).

A generation later we have now seen the next failure in the cycle, fortunately with nobody hurt. London's high-profile Millennium Bridge — a very light, flat pedestrian suspension bridge — swayed alarmingly and was closed for embarrassing investigations. Everyone knew (if they thought about it) that pedestrians' feet exert small lateral forces, as well as larger longitudinal and much larger vertical forces. The lateral forces were thought negligible, but when several people come into step — as they eventually must — a very light bridge moves slightly. What nobody knew is that the movement will itself bring other people into step. That bridge, with its expensive retrofitted dampers, will be in the textbooks for centuries.

Getting back to SEF's core business and taking a viewpoint of energy sustainability, we can offer options; possibilities; advantages and cost savings. We can propose more windfarms and less use of coal; more CF lamps and fewer heated driveways; fuel cells and bicycles; regulation and legislation. But all this is just imaginative nonsense until it has been integrated into a sustainable economy. Are we simply mirroring the other side: the generators,

Continued on page 2

EnergyWatch

Issue 35, December 2004

The Journal of The Sustainable Energy Forum

	Page
Opinion: How do we reach a sustainable energy future?	1
Sustainable Energy <i>The Government's new consultation document</i>	3
Liquified Natural Gas Kerry Wood	4
<i>What is it? is it safe? Do we want it? Can we afford it?</i>	
The case for renewable generation Keith Turner	7
<i>Meridian see LPG as creating more problems than it solves</i>	
Russia ratifies	10
<i>The Kyoto Protocol comes into force on 16 February</i>	
Call for papers: 5th NZ Cycling Conference 14–15 October 2005, Hutt City	11
NZ oil storage too low	11
<i>If the taps are turned off we will run out quickly</i>	
The Uppsala Protocol for the management of hydrocarbon depletion	12
<i>A sane collective response to Peak Oil, but how is it to be implemented?</i>	
PPP schemes have little to offer taxpayers	13
<i>Are public-private partnerships a con?</i>	
Climate change accelerating?	14
<i>Inconclusive but worrying signs of accelerating climate change</i>	
Is wood the most green building material?	14
<i>A US study thinks so but SEF Newsgeeks have other ideas</i>	
Climate change skeptics 'wrong' BBC	15
<i>A body blow to the heat island fallacy</i>	
Opinion: Whistling in the dark	16
'Energy passports' for German homes	17
<i>An energy efficiency rating for the house as well as the fridge</i>	
Climate change 'tipping points' BBC	17
Winnng the oil endgame RMI	18
<i>The Rock Mountains Institute believes that the US can use the market to end oil dependence in a few decades. Read the summary, then download the book</i>	
Canadian clean coal CCPC	21
<i>A preliminary study of sequestration costs by the Canadian Clean Power Coalition, and a note on adapting their figures to New Zealand</i>	

Continued on the next column

Continued from page 1

industrialists, oil giants and policy wonks, who we see as ignoring our precious insights as they cling to their rigorous nonsense?

Has EnergyWatch — amongst others — been too prescriptive, over-enthusiastic, or impatient with the pedlars of rigorous nonsense? Probably. We need to remember the uncertainties of untried practice and unquantified ideas; the need for modelling; the differing conditions of overseas examples; the inevitability of failures; the certainty that nobody has a monopoly of the truth.

Times are changing, quickly, and our responses must change too. The Government are beginning to sing our tune, with Government Policy Statements and now the consultation document *Sustainable Energy* (see page 3). This is not the time to complain that they are singing flat, let alone that only we have The Answer. Our ideas will have inconsistencies and weaknesses, just as others do. We must be open to all the ideas, insights and skills on offer: successful future-proofing requires avoidance of simplicities. It helps to have experience, or ask the right questions, and it is handy if other people are twenty years ahead. (But only maybe: have you tried, "it works in [city / country]" on a rigorous wonk?)

It is crucial to remember that we blue-sky wonks don't have all the answers, and that rarely or never do we have to either find the money or carry the can.

So before getting into a millennial fervour about saving the world, spare a thought for the Millennium Bridge, its embarrassed promoters and the inevitability of failures: not just in bridges but in policy, practice and politics. And pressure groups. □

The Windflow 500 kW turbine <i>Made in NZ for NZ conditions</i>	22
Paying what we owe James Jones	24
<i>A plea for ecological taxation</i>	
More on oil supply limits Zittel & Schindler	25
<i>An import reason why oil supply peaks when there is 'plenty' left is that the easiest fields are developed first</i>	
Miniwhats:	26
<i>Hydrogen from the sun; NZ's solar potential; Tui hopes and Pohokura go-ahead; a DoC/Transpower agreement for transmission lines; points from ASPO; a DoC/Transpower agreement; and much more.</i>	

Sustainable Energy

This was the title of a document released by Minister of Energy Pete Hodgson on 27 October. It is available on the web at: www.med.govt.nz

Sustainable Energy is designed as the focal point for six months of consultation. The outcome will be the starting point for formal policy development.

Pete Hodgson said at the release, "New Zealand, like the rest of the world, faces a significant challenge in how to meet its future energy needs. Climate change and the forthcoming peak in global oil production mean today's ways of producing and consuming energy will not be sustainable in the future. Our challenge is to find a way to continue to meet our needs for energy in a way that enables us to protect our way of life, economy and the environment over the coming decades."

The document explores what a sustainable energy system might look like, and how we might achieve it. Co-ordinating Minister for Sustainable Development, Marian Hobbs said, "Energy must be developed with regard to economic, social and environmental impacts. This document is an excellent starting point from which to develop a truly sustainable energy future for New Zealand."

Eyes on the prize: seeking sustainable energy

This is the title of a presentation by Pete Hodgson as *Sustainable Energy* was released. It contains some interesting comments:

- The hard thing is to see beyond the issue of the moment to our longer-term energy future. When we are preoccupied with where oil prices might go next year, or where our electricity will come from in ten years, how do we think clearly about the systems we will need in 20 years, or 50?
- The central idea is sustainable energy: what a sustainable energy system for New Zealand might look like, and how we might achieve it. Sustainable energy would have to be secure, affordable and environmentally responsible. Easy to say: very hard to do.
- Fundamental change must happen. Two huge challenges will force the development of a radically different energy system this century. One is the coming peak in global oil production,

which will probably occur within our lifetimes or our children's. The other is global climate change. Both compel us to think about the decline of the fossil fuel era, and what comes next.

- The place to begin is not with supply but with demand. It is too easy to focus on expanding supply to meet our growing energy needs, and forget that our energy needs are ours to control. By making smarter energy choices we can get more value from the energy we use, waste less and start building a cleaner, more dependable energy system. These choices belong to all consumers, large and small.
- Although we can re-think our energy consumption, we will still need new sources of energy... We have barely begun to tap the enormous resources of clean, renewable energy available to us. But these resources, are generally, technically harder and more expensive. That's why we use oil. The global transition away from fossil fuels will need to be phased, deliberate and timely.

The *Sustainable Energy* paper discusses our current energy situation, the challenges and opportunities facing us, the government's thinking on sustainable energy and our policy response so far. It identifies some possible further steps towards a more sustainable energy system. It is not a blueprint for change, but a step towards one.

Green response

The paper was welcomed by Green Party Co-Leader Jeanette Fitzsimons, who described it as, "by far the best analysis of the energy issues and challenges facing New Zealand that any Government has ever produced."

Her main complaint was that, "...it does not convey the sense of urgency that is needed if New Zealand is to make a relatively smooth transition to a sustainable energy future." Fitzsimons said that a key example is Peak Oil. Treasury is still saying the world price will soon fall to US\$ 19/bbl, but it is currently US\$ 54/bbl: what if it never falls again?

"So this document should be asking 'what if?' What if oil peaks in the next decade? What if the next international climate change round imposes much tougher limits on carbon emissions? What if we don't find enough natural gas to replace the depleted Maui fields? There are no such scenarios here for people to react to and discuss. It would have been helpful to ask some key questions to help focus responses." □

Liquefied Natural Gas

What is it? Is it safe? Do we want it? Can we afford it?

Kerry Wood

In September, energy companies Genesis and Contact reported an investigation of whether Liquefied Natural Gas (LNG) could fill a shortfall as gas supplies from Maui run out, saying, "The preliminary results of this study indicate that LNG is likely to be a viable 'backstop' option for New Zealand."

The proposal

On 16 November Contact Chief Executive Steve Barrett and Genesis Energy Chief Executive Murray Jackson released more information, saying that it was vital that New Zealand had more certainty on fuel replacements after the Maui gas field runs down in 2009.

"The rundown of Maui and increasing demand for energy threatens to put NZ into energy deficit at the end of this decade. From the study, we now know LNG is a feasible and practical option for meeting the looming gap in NZ's energy supply, should new sources of NZ natural gas not become available at a pace sufficient to meet demand growth.

"Our clear preference is for sufficient new sources of NZ natural gas to be discovered... however, it would simply not be prudent in the meantime to rely on new gas discoveries to meet future demand.

"World-wide, the market for liquefied natural gas is growing. Plentiful supplies can be imported to NZ at \$ 6.50 – 7.50/GJ — prices which are within striking distance of the expected future cost of local New Zealand gas. The required infrastructure could be built within three years.

"If liquefied natural gas were required early in the next decade, construction would need to start in the next three to four years, with applications for resource consents required in the near future.

"Contact and Genesis Energy are committed to further work to ensure liquefied natural gas is available as a future option for NZ. The consortium is now underway with the next phase which is to identify the best sites for a liquefied natural gas receiving terminal and gas

transmission route and commence work on detailed development plans."

LNG could supplement local gas supplies by meeting around half of the country's gas needs, or if local supply were severely constrained it could meet all of NZ's requirements. There is plentiful supply of LNG available that can more than meet the relatively small volumes — in international terms — that NZ will likely require. Based on current estimates, an initial project could deliver 50–60 PJ/yr or around half the country's gas requirements beyond 2010. Indigenous gas would provide the remainder.

A LNG receiving terminal and associated pipework would cost an estimated \$M 550–600 (for 60 PJ capacity) and take around three years to construct once resource consents and an LNG supply contract had been secured.

The media briefing contained more information (see www.mycontact.co.nz):

- Non-petrochemical gas demand in NZ will exceed supply from mid-2007.
- LNG is a "prudent backstop," to be used "if needed" from 2010.
- Supply would be from Australia or Indonesia.
- Most likely terminal sites are Marsden Point or Port Taranaki. The Forth of Thames is thought viable but unlikely because of environmental concerns. "Attractive sites for an LNG terminal exist."
- "As LNG is a backstop option, supply contracts are unlikely to be struck unless prices were comparable to other fuel sources."
- A development timetable shows final site selection by the end of this year, a final investment decision after resource consent approval in 2007–8 and LNG flowing by mid-2011.

LNG Characteristics

LNG is natural gas that has been cooled to about minus 160°C. At this temperature it is a liquid at atmospheric pressure, with a volume some 600 times smaller than gas at the same pressure. With insulation it can be shipped in low pressure storage tanks. The liquid specific gravity is about 0.47. Composition is mainly methane but with small quantities of heavier gases. Natural gas imported into the US as LNG has a calorific value of 35.5–39.5 MJ/m³, for compatibility with gas from other sources, but as high as 49 MJ/m³ is possible. NZ would probably have to take a

calorific value specified for other markets but this should only be a minor problem.

Safety

The US DoT say that most LNG leaks disperse quickly and safely, but that is tantamount to saying that most leaks are small, most ports windy and all LNG equipment is designed to minimise risk. For example, a photograph in a paper presented to the 2004 NZ Petroleum Conference (Kennedy, fig 5) shows new tanks at a coastal liquefaction plant being constructed on an artificial point, presumably to maximise wind.

There was a significant accident at a liquefaction plant at Skikda, Algeria on 19 January 2004, which caused deaths and injuries outside the plant — the first time this had happened for 60 years. A steam boiler could not be shut down because it was burning LNG in its air supply, and in the end an explosion wrecked the boiler and the subsequent fire wrecked much of the plant. There was too much damage to allow any conclusions about where the LNG had originally come from. Now regulators world-wide are taking a new look at LNG safety.

Two earlier major accidents are well-known and are probably still the basis of much of the fear of LNG. However, they contribute little to the current debate:

- A tank explosion at Staten Island, New York in 1977 caused 40 deaths. The tank was under maintenance — all the dead were inside it — and the problem was gas management during maintenance, not specifically LNG.
- A tank rupture in Cleveland, Ohio, in 1944 allowed LNG to flow into the stormwater system and killed 128 people. The primary causes of this accident are avoided today by using tank materials not subject to brittle fracture; providing secondary LNG containment and ensuring that any drainage can be trapped before it reaches the public system.

If LNG is spilled onto water it will float (like a very light cooking oil), and 'boil' to natural gas as it absorbs heat. A large leak will quickly spread over the water surface with gas boiling off it. Where the gas goes, and how quickly it is dispersed to a safe concentration, is heavily dependent on wind, wave and topography, but the gas cloud is at least visible: moisture in the air is cooled as it gives up heat to LNG or cold gas, and forms a fog. If any part of the air/gas interface is within the flammable range (5–15% gas) it has the potential to ignite, but when it disperses to below

5% gas it is generally safe. Similarly, a leak on land will tend to flow downhill.

If gas boiling off the LNG does catch fire, the big issue becomes heat radiation — any major explosion is very unlikely. How much clearance is needed depends on what is considered the maximum credible accident and the maximum tolerable radiation. A report, by Prof James Fay, on the proposed terminal at Harpswell, Maine, gives safe radiation clearances ranging from 100 to 250 m (industry), or from 370 m to 2900 m (Fay). Consideration of terrorism issues may be tending to push industry figures up.

Phrases such as 'maximum credible accident' look very much like the nuclear power industry but comparisons with Chernobyl (let alone Hiroshima) are unfair. The real link is a public policy dilemma common to both: what do you do if there is a very small risk with very large consequences? A realistic approach is to recognise that, just as aircraft are expected to be much safer than cars because accidents are bigger and less survivable, an LNG fire will not be accepted in the same way as a domestic chimney fire. The industry is stuck with safety and consequent planning issues. There is at present a lot of discussion in the US on LNG terminal safety, including terrorism risks, and offshore reception terminals are being seriously considered.

LNG terminals

An LNG reception terminal would have several key components:

- An LNG carrier, with insulated tanks and secondary containment. Of course, the carrier is not a regular part of the terminal, but it is a mobile source of potential thermal radiation. It follows that the terminal storage tanks should be located too far from the unloading berth for any single incident to affect both.
- A safe tanker berth. Conventionally this needs a harbour but a sea island off a reasonably sheltered coast might be enough.
- Storage tanks, with pipeline connections from the unloading terminal. Tank capacity would have to be substantially larger than the LNG carrier, so that a reasonable reserve can be left in the tank when the next carrier arrives, for security of supply.
- A re-gasifying plant, drawing LNG from storage and converting it back to gas for distribution.
- A connection to the pipeline system.

Port Taranaki seems unattractive for all this, because of housing close enough for radiation from a large incident to set weatherboards on fire. Marsden Point is better on that score but probably unwise on security of supply grounds: to risk loosing both our only oil refinery and our principal gas supply in the same incident would be unwise. An offshore facility in the Firth of Thames seems a good idea, and it would be interesting to know why it is thought to raise greater environmental concerns than the two ports. Was the real reason higher costs?

An apparently better location than any of these, first suggested by the Ministry of Works (it was for liquefaction then), is near Albatross Point, just south of the Kawhia Harbour. However, development costs would be higher than a port, and perhaps higher than the Firth of Thames.

The objections and uncertainties

Far and away the best and most encouraging objection to the Contact/Genesis LNG proposal came from Keith Turner, CEO of Meridian Energy. His speech is given opposite.

Other objections, uncertainties and questions include:

- What is the price? On 5 November *The NZ Herald* reported that no price had been given but industry sources thought about \$ 9.00/GJ. On 16 November Genesis and Contact came out with \$ 6.50–7.50/GJ, then on 18 November George Hooper said that this price was lower than industry estimates and the Centre for Advanced Engineering thought — from their own studies — that it would be “more than \$ 8/GJ.” However, the press briefing put out by Contact and Genesis on 16 November says:

The pricing variables for LNG can be successfully managed through contract terms and suitable hedging arrangements:

- Long term contracts (20 years plus) assure price stability
- Price review options
- Exchange rate changes are already managed for importation of other thermal fuels (coal and oil) and by NZ exporters
- Supply would be negotiated on a caps and floors basis to hedge against price fluctuation

An intelligent Martian might conclude from all this that the price has possibly been massaged; that the estimates mean very little at this stage; that they mean even less as forecasts for the end of a 20 year contract; and that Genesis and Contact will be allowed to pass on fuel cost increases. As Hooper puts it, “Our study is

showing that the projected cost of LNG imports could be about 17% higher than from a business-as-usual case of domestic supply. So there is a 15–20% premium.”

- How are Genesis and Contact getting on with site selection (scheduled to be completed in 2004)? Have they looked beyond New Plymouth and Marsden Point? Has there been any public consultation? (If so, surely we would have heard about it?)
- What will happen if exploration in NZ finds a plentiful gas supply, after Contact and Genesis have committed to LNG? A report by the Institute of Geological and Nuclear Sciences (*NZ Herald*, 19 October 2004) drew attention to, “significant potential for North-Sea scale oil and gas fields” off Taranaki, Northland and in the East Coast Basin. If any of this undercuts LNG, will Contact and Genesis mothball their plant? Are they going to invest \$ 600 M or more without some kind of guarantee? If not, who will make that guarantee? Who can make it? Hooper again: “A premature decision to import LNG would discourage the local gas exploration industry and coal development” — just as Maui has done for 30 years.
- A gas demand and supply curve put out by Treasury suggests that non-petrochemical gas supplies will not run into scarcity until about the end of 2010, three and a half years later than the LNG proponent’s estimate (see <http://www.treasury.govt.nz/release/e3p/>). In practice it might be even later because a surplus before 2010 could be left in the ground until needed. If Treasury are being over-optimistic here, wouldn’t that be out of character?
- What about terrorism risks? They cannot be ruled out in NZ, but surely they will be substantially greater in Indonesia, or for LNG carriers passing through Indonesian waters? Australia will not be exempt either.
- How are we to manage the transition from LNG to indigenous renewables? We collectively made a mess of end-of-Maui transition, by leaving the tap full-on for too long, but at least Maui had a finite term. With gas contracts extendable indefinitely — at the right price — will an expensive gas supply contract stagger on, sucking wealth out of the local economy, until Peak Gas strikes and the last tanker is diverted elsewhere?
- Why do we get the feeling that that we are being railroaded?

The case for renewable generation

Dr Keith Turner, CEO, Meridian Energy

(An edited version of a speech to the Wellington Rotary Club on 22 November 2004. Turner was speaking very largely in response to the Contact/Genesis LNG proposal — EW)

There's a natural human tendency to think that we are in the midst of uniquely difficult or dangerous times. It's as if the old Chinese curse — may you live in interesting times — has become a permanent way of life, rather than a periodic disturbance. I've lived and breathed the New Zealand electricity industry for over 35 years, and I can assure you that it has always been an 'interesting time'. We've had the Manapouri controversy, the Clyde legislation, the 1992 dry year, the Auckland power crisis, and lots and lots of industry reorganisation. Always interesting.

Meridian Energy in 1999 were fortunate to inherit from ECNZ what I regard as the crown jewels of the NZ electricity system — the eight stations of the Waitaki chain and the country's largest hydro station at Manapouri. They are outstanding assets, producing one-third of NZ's electricity needs, and they are located in some of the most awe-inspiring scenery anywhere in the world. With that inheritance came a responsibility to manage \$ 2.0 billion of assets carefully on behalf of all New Zealanders — our owners. A responsibility to care for the unique environments we operate in, and the future electricity needs of all.

Historically, NZ's electricity demand growth has averaged about 2%/yr — about an extra 150 MW of capacity each year. Strong economic growth such as we've been experiencing recently can push demand up by 3–4%.

Energy efficiency

We can and should all be doing more to use electricity more efficiently. One of the consequences of having low prices — by international standards — is that we tend to use it without thinking too much about the cost. Perhaps the big price increases introduced by the industry over the last two years will encourage greater energy efficiency — but it's not actually my preferred method for getting the message across.

The fact is that electricity is an essential part of modern life, and when we raise prices it has a disproportionate impact on the most vulnerable members of society — the very young, the very old, people with greater health and housing concerns.

In this respect at least, electricity is similar to any other product — its price is a function of supply and demand. And in this country, over the last five years, demand has been growing much faster than supply. Supply costs have been going up. Ipso facto, prices have risen. If we want prices to stabilise, then we must make sure that supply and demand stay in tune.

Meridian plays its part on the demand side by giving our customers energy saving tips and information, and by giving away thousands of energy saving products to low income households.

Our strategic business unit, Meridian Solutions, has recently commissioned a biomass-fuelled power plant at the Winstones pulp mill at Karioi. This uses waste wood and dried pulp sludge to replace about 4000 m³/year of [the potential market for] LNG — and at the same time avoid sending to landfill about 30 000 t/yr of pulp sludge. It's innovative, it's smart, and it's sensible. We are playing our part on the supply side, too. Since 1999 we have invested more than \$ 350 M making our existing operating plant more efficient — generating an extra 800 GWh/yr without using any more water.

More generating capacity needed

As a country we need to build more power stations, and as the industry's leading company, Meridian Energy is committed to building our share of new capacity. That's why we put a lot of effort — and a lot of money — into developing the Project Aqua proposal for the Lower Waitaki river. There were nine reasons why we pulled out of Aqua, and I'd just remind you that public opposition was not one of them. In fact we believe that most of the lower Waitaki community supported the scheme.

On a happier note, we are just completing Te Apiti, the Southern Hemisphere's largest wind farm between Ashhurst and Woodville. From resource consent hearing to project completion will be less than 15 months. That is a start, but only a start, to meeting the needs of the future. The choice we face, as a country and as a company, is what type of power stations we will build. The choices we make over the next few years are going to shape the energy structure of our society for at least the next one, and possibly the next two, generations.

...and good information

So perhaps we really are living in interesting times. Times that call for cool heads and good information. Information that is not based on quirky advertising spin and designed to suit the commercial interest of one particular company — and that potentially takes us down a path to economic — and social — disaster. I know that sounds ‘scare-mongerish’ but let me explain. I was first bemused and then, frankly, angry about what some recent advertising has had to say about our electricity options. For example, about wind power:

- *Expensive electricity at most identified sites, using current technology*
- *Major cost to transport power from remote site to National Grid — large scale wind development would require significant new investment in the National Grid*
- *Visual intrusion makes it inappropriate for areas of natural beauty*
- *Highly variable. Depends on back-up being available from hydro and fossil fuel generation for times when conditions are too light or too severe to allow wind turbines to operate*
- *Community acceptance — potential noise and visual issues*

Community acceptance? When the Manawatu and Tararua districts are competing for bragging rights to Te Apiti, because they both want the tourism benefits?

Variable? Yes over a day or a week, but actually highly predictable over a year. And yes, a perfect match for hydro generation, which makes up 70% of the New Zealand electricity system. When the wind blows, we keep water in the lakes. When it doesn't blow, we generate from hydro. Perfect.

Expensive? Not the way Meridian Energy is doing it. I'm not going to give you actual numbers because they're my commercial edge, but I can tell you that Meridian's wind programme beats new coal and gas station prices by a comfortable margin.

Connection costs and visual intrusion? Yes, you've got to be a switched-on developer that understands all the economic, environmental and social implications. That's an argument for doing it right, not for running away.

I've got no argument with the need to debate our electricity future — indeed Meridian has been at

the forefront of the debate with our Electricity Future Forum roadshows and website. But it's become increasingly clear to me that there is a hidden agenda.

While this advertising has been masquerading as a responsible debate on future energy options, what it is really up to is softening us all up for an energy future that would place this country at the mercy of overseas forces, over which we would have no control. And I don't believe I'm overstating things when I say it presents a huge strategic, economic and social risk to all New Zealanders.

Renewable resources, according to this campaign, are environmentally friendly, but they're not reliable, and they may be a little pricey. Coal and gas are supposedly the cheaper options, but often come with an environmental cost.

Coal and gas provide cheaper power? That is nothing more than someone's best guess. And can New Zealand afford to just fall into the LNG option based on one company's 'best guess?'

Implications of LNG

Let's now just turn our minds to what that might mean for this country. I'm old enough to remember the really interesting times of the 1970s, when we experienced the 'oil shocks'. The impact on the lives of every New Zealander was profound. Virtually overnight the cost of transport fuel shot through the roof. Economic growth, previously hitting close to 7%, dropped like a stone, and we were powerless to do anything about it. Having built up a massive reliance — one could almost say addiction — to a cheap, imported fuel, we suffered huge social upheaval and dislocation when that fuel suddenly became very expensive. What made it expensive were major, powerful international economic and geopolitical forces over which we had no control.

This is exactly the scenario we are setting ourselves up for if we go down the imported LNG path. NZ would be a tiny, insignificant buyer in a market dominated by very big economies — China, Japan, the US.

And think about this. We had in the 1970s — as we have now — a lot of discretion about when and how to use our cars. We simply don't have that kind of discretion about electricity. We need it all the time. It's absolutely fundamental to our way of life. If you think power prices have taken a steep hike recently, it's nothing compared to the what could happen if we move towards an electricity

price based on imported fuel — and if access to that fuel is disrupted in some way. It just doesn't bear contemplation.

Not commonly known – but in 1978, when oil was a hot political issue, tankers destined for NZ were diverted to other countries willing to pay more, and with more clout internationally than us. There was a moment when NZ was on the brink of running out of oil — in other words, we were on the brink of our own man-made disaster.

The alternative is to take the easy route of burning carbon, and bugger the consequences.

Price and environment

There is a fundamental flaw in the advertising spin that says price can only come down at the expense of the environment, and vice versa.

I think that's dead wrong.

I know that there is enough wind and hydro power to provide secure supply for the next 15 years at a price well below (**well** below) coal or LNG.

I believe that NZ, of all the countries in the world, is uniquely placed to have it all — secure supply, at a fair price, with minimal environmental impact. I believe that NZ's own renewable resources can and should provide the bulk of NZ's future electricity needs for the foreseeable future.

Let me stress — NZ's own renewable resources.

We don't need to rely on anyone else to supply them. They can't be disrupted by political or economic events far from our shores. They're our own resources and they can be environmentally highly attractive. Look at the tourism around Lake Tekapo, Lake Taupo, Manapouri or even Lake Dunstan.

And that is why I am announcing today that Meridian Energy is committing itself to only generating electricity from renewable sources.

The conventional wisdom in the industry is that getting new renewable projects consented is much harder than getting new gas or coal projects consented. As our experience with Te Apiti demonstrates, that ain't necessarily so.

Meridian has shown it can to work closely with communities to consider the social, economic and environmental impacts of any development, and, together, determine the best way forward so that everybody benefits from the harnessing of these renewable resources — locally, regionally, nationally. We're not committing ourselves to renewables because we think it will be easy, and

we're not doing it to make a quick buck. We're doing it because it's the right thing for NZ.

Think about it. We are four million people clinging to a long thin piece of land in the middle of an ocean. That means we get lots of two things — wind and water. I say that we can use those two natural competitive advantages to construct for ourselves and our children a secure supply of electricity, at a fair price, with minimum environmental impact. We have the unique opportunity to power our economy and our society by combining nature's bounty with our own imagination and determination.

The alternative is to take the easy route of burning carbon, and bugger the consequences. The alternative is to invest a billion dollars in an LNG terminal and sign the country up to decades of exposure to the international fossil fuel markets.

Yes, doing renewables at scale will require commitment from New Zealanders — from all New Zealanders — to engage in mature and rational debate about the impact of specific proposals. But I am heartened by the results of a survey by the Energy Efficiency and Conservation Authority earlier this year that demonstrates New Zealanders commitment to renewables:

- New Zealanders approve of wind and hydro generation — 82% and 79% respectively.
- Wind is the preferred method of generation of 40.9%, while hydro is the preferred method of 40.7%.
- Coal is the least preferred method of generation, followed by gas.
- A third of people were strongly in favour of a wind farm being built in their area, and another third would be strongly in favour if they could not see or hear the windfarm from their house.

These figures, I believe, show that New Zealanders are up for the renewables challenge. At Meridian, so are we.

Land Transport NZ

This is the new name for a combined Transfund and Land Transport Safety Authority, from 1 December.

Web: www.landtransport.govt.nz
E-mail: jo.bloggs@landtransport.govt.nz

Russia ratifies

It is official. Russia has ratified and the Kyoto Protocol will become legally binding on 16 February 2005. Most developed nations — the US, Australia, Monaco and Liechtenstein are the only exceptions — will then be committed to reducing their emissions of carbon dioxide (CO₂).

Each 'Annexe 1' (developed) country has a target for average emissions for the five year First Commitment Period — 2008–2012 — expressed as a proportion of their emissions in the 1990 base year. Emissions included in the target are the total CO₂ equivalent of five gases: Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur hexafluoride (SF₆). (In fact HFCs and PFCs are both groups of gases)

Individual nation's targets are an average 8% reduction for the EU, Switzerland and most Central and East European states (that is, average annual emissions in 2008–2012 are to be 8% lower than 1990 emissions); and 6% for Canada, Hungary, Japan, and Poland. Russia, New Zealand, and Ukraine are to stabilise their emissions at 1990 levels, while Norway may increase emissions by up to 1% and Iceland by up to 10%. The US and Australia would have had targets of a 7% reduction and an 8% rise respectively, had they agreed to ratify.

The mood in the pro-Kyoto camp was summarised by the Executive Secretary to the United Nations Framework Convention on Climate Change (UNFCCC), Joke Waller-Hunter:

Russian ratification would ensure that the Protocol enters into force and launch an exciting new phase in the global campaign to reduce the risks of climate change. After a short celebration, we must all get down to the serious business of reducing emissions of CO₂ and other greenhouse gases.

By giving industry, local authorities and consumers incentives to take action on climate change, Russia and the 29 other industrialized countries that have joined the Protocol will set themselves on a path to greater economic efficiency. Accelerating the development of the clean technologies that will dominate the global economy of the twenty first century will earn them a competitive edge in global markets.

Waller-Hunter pointed out that, in addition to inspiring action to cut emissions, the protocol's entry into force will strengthen international co-operation through the early start-up of:

- An international 'emissions trading' regime enabling industrialised countries to buy and sell emissions credits amongst themselves; this approach will improve the efficiency and cost-effectiveness of emissions cuts.
- The 'clean development mechanism' (CDM), which allows industrialized countries to promote sustainable development by financing emissions-reduction projects in developing countries, in return for credit against their Kyoto targets.
- Co-operative projects under the system for 'joint implementation,' whereby one developed country can finance emission reductions in another developed country.
- The Kyoto Protocol Adaptation Fund, established in 2001, which will assist developing countries in protecting themselves against the negative effects of climate change.

Developing countries do not yet have specific emissions targets, but they too are committed. As Waller-Hunter points out, they will be given new assistance to do so. Countries such as China are already becoming heavily involved in major CDM projects. These are now producing rapidly increasing GHG reductions, which are extremely transparent and detailed, and thus of very high quality.

New Zealand should benefit from the protocol — at least up to 2012 — because of credits from growing trees. Convenor of the Ministerial Group on Climate Change, Pete Hodgson welcomed the announcement, saying, "Uncertainty for NZ business has now evaporated. They can be sure that energy efficiency investments will now generate a greater return. They can also be sure that the significant business opportunities that the Kyoto Protocol brings will now come to pass. In particular, NZ businesses will have opportunities that are unavailable to companies from non-ratifying nations."

However, the National Party remain unconvinced. On 4 October the Dominion Post quoted leader Don Brash as saying, "We will withdraw from the protocol if, by 2013, countries like Australia and the United States have not made binding commitments on emissions."
(So that includes Monaco and Liechtenstein — EW)

National Party Spokesperson on Forestry and Revenue, Brian Connell, said, "It may sound dramatic, but we need to start looking at the real costs of Kyoto before it's too late. A recent Castalia report estimates ratifying the Protocol will cost NZ between \$ 9 and \$ 14 billion in the first four commitment periods. And this is a conservative

estimate with costs likely to rise beyond 2027 if current technologies are preserved." □

For further information see: <http://unfccc.int>

(We wonder how Connell, or Castalia, know so much about the costs of Kyoto, when negotiations for the Second Commitment period have yet to start and the third and fourth periods remain distant dreams. Have they considered any benefits? Certainly they assume that "current technologies will be maintained." But isn't the whole idea that we change our habits and technologies?)

*A minor point was that the UNFCCC gave the US as responsible for 36% of emissions, when both EnergyWatch and some SEF members thought they had seen — and had certainly quoted — 25%. Could the difference be increasing use of 4 wheel drives? An interesting theory, but in fact a June 1998 UNFCCC leaflet gives the US contribution as 36.1% of **Annex 1 parties'** emissions. The 25% will be the proportion of total emissions. — EW*

Fifth NZ Cycling Conference Changing Lanes — cycling into the mainstream

14 & 15 October 2005, Little Theatre, Hutt City

Deadline for Abstracts: 30 April 2005

The 2005 NZ Cycling Conference is being held in the context of substantial changes in transport at a national and local level, coupled with an unprecedented increase in particularly recreational cycling. Topics include: how cycling contributes to sustainable transport and interrelated goals in health, education, environment and economic development; whether this knowledge translates into increased rates of cycling; how the engineering, planning and political communities are adapting to facilitate cycling; the effectiveness of national, regional and local cycling strategies; the influence of central government rationalisation and local government reforms; risk aversion and mass participation events; the relationship between recreational and day-to-day cycling; and cycle tourism.

For more information see:

<http://www.can.org.nz/events/2005NZCyclingConf/>

or contact: Stephen Knight, Advocacy Manager,
Bike NZ Inc, PO Box 1057, Wellington

NZ oil storage too low

New Zealand's oil supplies are on a perpetual knife edge, relying on 'daily miracles' just to get by. Former New Zealand Refinery Company commercial manager Robin Gunston says our supplies are always in crisis. "We have barely enough to meet the daily operational needs of the country. We're just shuffling it around," he said. The problem had plagued NZ for decades.

Energy Minister Pete Hodgson revealed in September that there were just 60 days of oil in reserve, a month short of the 90-day minimum standard set by the International Energy Agency as a buffer against disruptions to global oil supplies. He said the shortage was not picked up until a Ministry of Economic Development audit earlier this year. The discrepancy was put down to "unintentional double counting" by oil companies. "I'm certain we are not IEA-compliant. The further back the data goes, the dodgier it becomes," Hodgson said.

Michael Foster, a former coastal shipping co-ordinating committee secretary who was responsible for shifting fuel and maintaining stocks, said that between 1971 and 1993 the quarterly average reserve went as low as 15 days and was never more than 30 days. Almost half that reserve was in crude oil, most of which was still on ships en route from Middle Eastern countries and subject to diversion by its owners. "Stocks are often diverted by oil companies to refineries elsewhere in the world but the oil will still be counted in figures supplied to the minister," Foster said.

BP spokesman Jonathan Hill said the company had recently opened three 9000 m³ storage tanks at Port Lyttelton to keep up with demand. BP was not surprised to learn the 90-day standard was not being met, as demand for energy had grown significantly while New Zealand oil production had dropped 60%.

Oil companies are in discussion with the Government, and it is expected that the industry will be installing tanks capable of holding some 500 000 m³, at a cost of some \$ 600 M, including some \$ 200 M to fill the new tanks. □

*NZ Herald, 2 October 2004
Listener, 30 October 2004*

The Uppsala Protocol

for the management of hydrocarbon depletion

A protocol developed by the Uppsala Hydrocarbon Depletion Study Group, Uppsala University, Sweden. www.isv.uu.se/uhdsg

(This is all good stuff but is there any way of raising the chances of it happening to something sensibly greater than zero? — EW)

Whereas The passage of history has recorded an increasing pace of change, such that the demand for energy has grown rapidly over the past 200 years since the Industrial Revolution;

Whereas The required energy supply has come mainly from coal and petroleum formed but rarely in the geological past, such resources being inevitably subject to depletion;

Whereas Oil provides 90% of transport fuel, is essential to trade, and plays a critical role in agriculture, needed to feed an expanding population;

Whereas Oil is unevenly distributed on the Planet for well-understood geological reasons, with much being concentrated in five countries bordering the Persian Gulf;

Whereas All the major productive provinces had been identified with the help of advanced technology and growing geological knowledge, it being now evident that discovery reached a peak in the 1960s;

Whereas The past peak of discovery inevitably leads to a corresponding peak in production during the first decade of the twenty-first century, assuming the extrapolation of past production trends and no radical decline in demand;

Whereas The onset of the decline of this critical resource affects all aspects of modern life, such having political and geopolitical implications;

Whereas It is expedient to plan an orderly transition to the new environment, making early provisions to reduce the waste of energy, stimulate the entry of substitute energies, and extend the life of the remaining oil;

Whereas It is desirable to meet the challenges so arising in a co-operative manner, such to address related climate change concerns, economic and financial stability and the threats of conflicts for access to critical resources.

Now it is proposed that

1 A convention of nations shall be called to consider the issue with a view to agreeing an Accord with the following objectives:

- To avoid profiteering from shortage, such that oil prices may remain in reasonable relationship with production cost;
- To allow poor countries to afford their imports;
- To avoid destabilising financial flows arising from excessive oil prices;
- To encourage consumers to avoid waste;
- To stimulate the development of alternative energies.

2 Such an Accord shall having the following outline provisions:

- No country shall produce oil at above its current Depletion Rate, such being defined as annual production as a percentage of the estimated amount left to produce;
- Each importing country shall reduce its imports to match the current World Depletion Rate.

3 Detailed provisions shall be agreed with respect to the definition of categories of oil, exemptions and qualifications, and scientific procedures for the estimation of future discovery and production.

4 The signatory countries shall cooperate in providing information on their reserves, allowing full technical audit, such that the Depletion Rate shall be accurately determined.

5 Countries shall have the right to appeal their assessed Depletion Rate in the event of changed circumstances. □

Proposed by Colin J Campbell
and P Kjell Aleklett

(Note especially the first bullet point in clause 2. The temptation to solve short-term problems by over-producing will be huge, but it will make the not-so-long term problems much worse — EW)

PPP schemes have little to offer taxpayers

Alan Robb and Sue Newberry
NZ Herald, 5 November 2004

(An edited view of PPPs — Public/Private Partnerships — from the NZ Herald. See the original article for more information, and sources. — EW)

It is commonly argued that PPP schemes provide the necessary roads and other infrastructure assets more quickly and cheaply than direct taxpayer funding. This is unlikely to be true: private finance is never cheaper than government borrowing. One Australian critic of PPPs has noted that the costs of long-term government bonds is less than 6% but investors in an infrastructure company are earning nearly 20%.

Evidence from the UK includes:

- A House of Commons report into the London Underground PPP schemes concludes that the engineering companies made profits of 18–20%.
- In Durham, the developers of one hospital are receiving a return on their investment estimated at 18.5%, but the trust that operates the hospital has fewer beds than it expected and has had to reduce services to pay the private investors.
- One firm reportedly made £M 50 (\$M 130) in two years, renegotiating the loans on three hospitals.
- The apparent efficiency of private prisons is not the result of innovative management but shorter holidays, lower pay and worse pensions.

PPP deals in Australia have also been costly failures for taxpayers. Melbourne's public transport system was reorganised in 1999 and split up among four private operators. Two have pulled out and a chartered accounting firm was paid A\$M 12/yr to oversee the services abandoned by one operator. Taxpayers will be worse off by about A\$M 200 /yr.

PPP schemes are not the magic bullet their advocates claim. They do not necessarily provide infrastructure assets more cheaply than public ownership and neither do they provide better services for taxpayers.

The recent changes proposed for the Public Finance Act will increase the vulnerability of NZ taxpayers to damaging PPP deals. This is because

PPP deals are constructed as off-balance sheet financing arrangements. The effect of the changes will be to reduce parliamentary scrutiny of PPP schemes. They will remove the requirement to report the amounts owed on such schemes and the contingent liabilities associated with them.

It is clear that many of our elected representatives are unaware that these developments are privatisation by stealth. □

The authors are senior lecturers in accountancy at Canterbury University

Wake up at the back there

In September EnergyWatch offered a prize for the best list of questions begged by a quotation from Jim McLay, Chairman of the unsubtly-named pressure group NZ Council for Infrastructure Development (EW 34, page 10):

All we want to see is a good road. What better statement could there be of a simple and clear objective for road reform? and what better statement could there be of a simple and clear objective for the whole infrastructure sector. No ideological nonsense, from the left or the right; just a plain statement of need.

There were no takers so EnergyWatch's answer is:

- Is a road the best solution? How will it affect urban planning? What will it achieve, and at what cost? What external costs are there?
- What other options are there? What will they cost? Have they been costed on the same basis? What are the external costs? Is the easement included?
- Will a toll reduce or divert traffic? Will diverted traffic cause congestion elsewhere? If the toll reduced traffic, will the road still be needed?
- Who carries the risk if toll income is lower than expected? Because of unrealistic assumptions? or urban planning policy changes? or Toll NZ putting on a parallel rail service? or Peak Oil arriving within the contract period?
- Will the roading authority have the right to add bus or cycle lanes?
- What is the "simple and clear objective for the whole infrastructure sector," (if not to make a great deal of money)?
- How many of these questions can be buried under the bit about ideological nonsense? Or commercial confidentiality? □

Climate change accelerating?

European Environment Agency, 22 August 2004
The Guardian Weekly, 15 October 2004

There are worrying signs that climate change may be accelerating:

- The three hottest years recorded — 1998, 2002 and 2003 — occurred in the past six years
- In 2003 alone, Alpine glaciers shrank by 10%.
- Deadly hurricanes, floods and heatwaves.

The European Environment Agency says much more action is needed — and fast. Rising temperatures could eliminate three-quarters of the Alpine glaciers by 2050; and bring repeats of Europe's mammoth floods two years ago, and the heat wave that killed thousands and burned up crops last summer.

Global warming has been evident for years but the problem is becoming acute, Jacqueline McGlade, executive director of the Copenhagen-based agency, told AP. "What is new is the speed of change. It takes a long time to see these changes in the glaciers at the sea level, so — like big tankers turning around — they take a long time to change. But now that we see them changing direction, then it means that there are warning signals in many parts of our life."

The rate of increase of atmospheric CO₂ has apparently gone up, from a recent average of 1.5 parts per million each year (ppm/yr) to 2.08 ppm/yr in 2002 and 2.54 ppm/yr in 2003. Analysts stress that it is too early to draw long-term conclusions. Above- or below-average rises have previously been explained by natural events. When the Pacific warms up during El Niño events, CO₂ levels rise dramatically because warm oceans emit CO₂ rather than absorb it. But over the past two years there has been no El Niño.

Peter Cox, head of the Carbon Cycle Group at the Hadley Centre for Climate Change, said the increase in CO₂ was not uniform across the globe, and it looked as though something unusual had occurred in the northern hemisphere. "My guess is that there were extra forest fires in the northern hemisphere, and particularly a very hot summer in Europe," Dr Cox said. "This led to a die-back in vegetation and an increase in release of carbon from the soil, rather than more growing plants taking carbon out of the atmosphere, which is

usually the case in summer."

Cox, like other scientists, is concerned that too much might be read into two years' figures. "Five or six years on the trot would be very difficult to explain." □

Is wood the most green building material?

AScribe Newswire, 21 September 2004

A new US study concludes that wood is one of the most environmentally sensitive building materials for home construction: it uses less overall energy than other products, causes fewer air and water impacts and does a better job of carbon sequestration (that is, delaying recycling of carbon in the wood into atmospheric carbon dioxide as the wood burns or rots down.)

The US\$ 1.0 M study was prepared by the Consortium for Research on Renewable Industrial Materials, a non-profit corporation of 15 research universities. It was published in the *Journal of Forest Products* and is the first major update on this topic since a 1976 report by the National Academy of Science.

The research showed that wood framing used 17% less energy than steel construction for a typical house built in Minnesota, and 16% less energy than a house using concrete construction in Atlanta. And in these two examples, the use of wood had 26% to 31% less global warming potential.

The type of information provided in this report may be increasingly useful as consumers and government agencies try to identify construction techniques and materials that minimise environmental impacts, according to James Wilson, a professor of wood science and engineering at Oregon State University. "There's a significant consumer movement and even some voluntary standards that are interested in green, or environmentally conscious construction methods," Wilson said. "We need to have a good understanding of the overall effects that different types of construction have in such areas as energy consumption, global warming, air and water impacts, or solid waste disposal."

“California and some other states are already moving towards ‘environmentally preferable purchase’ standards, that identify the best materials to use for energy conservation, environmental protection and other issues,” Wilson said. “And it’s quite possible that some states or localities may legally require such approaches in the future for construction of public buildings.”

The study looked at the total ‘life-cycle assessment’ of different construction products and techniques, considering such issues as how materials are grown, mined, processed, produced, used and ultimately disposed of, to give a better picture of their overall impact on the environment. It considered effects on energy use, air and water emissions, global warming and other topics.

The report also suggested ways to redesign houses to lower fossil fuel use, reduce the use of excessive amounts of materials, recycle demolition wastes and other improvements.

More detail on the study can be found on the Web at: www.corrim.org

This wasn’t enough to satisfy SEF Newsgeeks. Comments included:

- Straw is a far better insulator than timber, while still locking up some carbon.
- Timber is no use for thermal mass, which is essential for good temperature control. Concrete will do the job but earth has much lower embodied energy.
- Wood is less green (despite appearances) if you shoot it full of copper chrome arsenic or other toxins to force it to survive, or turn it into ‘was-wood’ using carcinogenic formaldehyde-bearing glues.
- Natural earthen materials moderate both indoor temperatures (thermal mass), and humidity, giving them huge potential to naturally and simply moderate indoor comfort levels.
- Straw bales have extremely interesting engineering properties for the dissipation of earthquake energy, and they also do not collapse when loaded past their yield point so basically won’t fall down.

There is plenty more to learn in this area.

Climate change sceptics 'wrong'

Richard Blake, BBC, 18 November 2004

A major argument used by sceptics of global warming is flawed, a UK Met Office study in *Nature* says. This argument maintains that much recorded climate data is inherently unreliable because most weather instruments are in or near cities, which produce their own heat; so the rapid warming measured over the last century could be just a record of urbanisation.

The Met Office believes its study shows this ‘urban heat island’ idea is wrong, on the basis of analysis by Dr David Parker. He used data for the last 50 years to create two separate graphs of observed temperature, for calm and windy nights.

If the urban heat island hypothesis is correct, he says, instruments should have recorded a bigger temperature rise for calm nights than for windy ones — because wind blows excess heat away from cities and away from the measuring instruments. But there is no difference between the curves.

“It helps to answer the critics,” Dr Parker told BBC News. “There are other kinds of temperature measurements, too, which could not be influenced by urbanisation, such as warming in the oceans. Different methods of measurement can produce different rates of warming but they all point upwards.”

Dr Myles Allen, from the atmospheric physics department at Oxford University, agrees: “It’s pretty convincing,” he said. “It’s a sensible analysis which tests a prediction of the sceptical theory; and if it’s right, we should see a greater effect on calm nights. But you should never underestimate the ingenuity of the sceptics to come up with a counter-argument.”

One of the most prominent scientifically grounded sceptics is Fred Singer, president of the Science and Environmental Policy Project in Arlington, US. “Many people have tried to correct for the urban heat island effect,” he told BBC News. “I’m not sure David Parker has succeeded, but we admire his ingenuity.”

Oil price down

On 3 December it was reported that the price of Brent Crude was below US\$ 40/bbl (NZ\$ 35/litre) for the first time since late July.

Whistling in the dark

Opinion

EnergyWatch responded to Minister of Finance Dr Michael Cullen's admission that he was "not aware" of Peak Oil by sending him information: copies of our last June and September editions, containing four articles on Peak Oil. We weren't the only ones to offer briefings. Our covering letter read, in part:

Your colleague, Minister of Energy Pete Hodgson, suggests a mainstream view that the peak will come between 2021 and 2067, while taking a properly cautious approach...

Another plausible estimate puts Peak Oil an order of magnitude closer than does the Minister of Energy. The Association for the Study of Peak Oil (ASPO: see www.peakoil.net) now suggest that the peak will come in about 2006–08. A quote from their latest report is:

"A volatile epoch of recurring price shocks and consequential recessions dampening demand and price is now regarded as more likely, with terminal decline setting in and becoming self-evident by about 2010."

If there is a high probability that Peak Oil will arrive before the tolled motorways proposed for Auckland have been paid off, and a plausible possibility that it will come as Maui runs out, then I suggest that the Minister of Finance needs to know.

A reply eventually arrived from Associate Minister Trevor Mallard. We got the brushoff already reported by others: an excessively accurate and perhaps alarmingly optimistic peak year estimate of 2037, and "only history will prove who is correct."

A more constructive response must be found amongst three certainties — that Peak Oil is coming, is inherently unpredictable and will bring drastic change — and some uncomfortably high probabilities:

- Peak Oil will arrive within no more than a generation, and possibly before 2010. The current high prices may be the first market indications.
- Non-OPEC oil supplies have already peaked in all major producing areas except Africa.
- The cost of planning for Peak Oil too early will

be very much lower than the cost of planning too late. Even a short planning period will allow necessary changes to be made much more smoothly and at much lower cost.

- Inadequate planning will let in a panic rush to inappropriate and more polluting technologies.
- An essential part of any adequate plan must be flexibility, which will require an informed and united population.

Unfortunately those last two probabilities point to trouble. We have recently seen calls for petrol taxation to be cut before it is even introduced, to keep the cost of motoring 'affordable': in other words another subsidy, another step towards making the problem worse. Clearly, fighting the next election on a Peak Oil platform will be the road to political oblivion for any major party. As Chris Trotter put it (and yes, we have quoted this before):

Perhaps this is the greatest of all the illusions about the looming energy crisis: to believe that the measures required to surmount its effects will be accepted in a democracy before it is too late for them to do any good.

A considered response to Peak Oil — if there is to be one — must be a push between elections. At present such a push would be inconceivable with any election outcome other than a Labour/Green coalition, so even making the starting line is much less than certain. Perhaps we shall be more frightened by 2007.

How could policies to prepare for Peak Oil be developed? The key questions are the usual suspects: what has to be done? SWOT; priority setting and so on. And not forgetting future-proofing. The answers will often be interdependent, conflicting, messy: What modelling resources have we? How can we expand them?

A 'don't frighten the horses' political response will be only too tempting. But fortunately there is another high probability bullet-point, this time much more positive:

- New Zealand has more sustainable energy resources per head of population than almost any other country (the principal exception is likely to be Iceland).

It would be comforting to believe that a small team in some Ministry basement are quietly beavering away on all this. To take one example — bearing in mind the the state of NZ's oil storage (page 11) — do we have on the shelf a fairer and more effective petrol rationing system than carless days?

'Energy Passports' for German homes

Under EU regulations, European homeowners will be required to have their property inspected for energy efficiency, starting in 2006. German pilot programmes got underway in September.

Ulrike Leidinger, of the Consumer Centre in Aachen, has witnessed many disputes between landlords and tenants over utility costs. "After one year, [tenants] get totally upset when they receive their bill for heating costs and have to pay a lot more than they had estimated," she said.

With the introduction in Germany of a new law requiring 'energy passports' for home and apartment owners, the government is hoping to create greater transparency over potential energy costs. The legislation follows EU regulation that requires the passports in order to reduce CO₂ emissions by improving energy efficiency.

Under the regulations, due to take effect in 2006, landlords will have to present an energy passport with information about a home or apartment's energy efficiency and costs before the contract is signed by a renter or buyer. The passport is intended to give renters or buyers the information they need to determine energy costs.

The Consumer Centres in the German state of North Rhine-Westphalia are carrying out a ten city pilot program that is serving as a prototype for what will happen in 2006. Each centre will find 100 homeowners in the region willing to undergo the energy check. The inspection covers the building's frame and anything that could affect energy efficiency, such as windows, masonry, ceilings and the condition of the heating system. The result is a grade ranking for the building's energy efficiency.

Assessment prices range from € 150 (\$ 275) for a two family house in Aachen to as high as € 395 (\$ 725) in the city of Gütersloch, which is also part of the programme. However, most observers believe the prices will increase when the program is rolled out nationally in 2006, and the house owner's association predicts prices of up to € 1000 (\$ 1800).

http://www.dw-world.de/english/0,,1430_A_1302902_1_A,00.html

(Ian Shearer reports that a similar scheme already exists in Canberra, and trials have been done in Christchurch [what were the results?]. It seems to have huge potential to improve New Zealand housing and reduce

energy requirements, but it will need central and local government support. —EW)

Climate change 'tipping points'

Alex Kirby, *BBC News Online*, 27 August 2004

The world has barely begun to recognise the danger of setting off rapid and irreversible changes in some crucial natural systems, says Professor John Schellnhuber, research director of the UK's Tyndall Centre for Climate Change Research. He was speaking at the EuroScience Forum in Stockholm, at a briefing by the International Geosphere-Biosphere Programme, entitled Beyond Global Warming.

Twelve such 'hotspots' have been identified so far, areas which acted like massive regulators of the Earth's environment. If these critical regions were subjected to stress, they could trigger large-scale, rapid changes across the entire planet. But not enough was known about them to be able to predict when the limits of tolerance were reached. "We have so far completely underestimated the importance of these locations," Schellnhuber said. "What we do know is that going beyond critical thresholds in these regions could have dramatic consequences for humans and other life forms."

One example of a hotspot is the North Atlantic current, the ocean circulation pattern responsible for bringing warmer air to northern Europe. Its collapse could lead to a very large regional climate shift. Others are the West Antarctic ice sheet; the Sahara desert; the forests of the Amazon basin; and the Asian monsoon system. Schellnhuber said, "Modelling has shown that if air pollution and land use change, this could alter the albedo, the reflectivity, of the land. This in turn could weaken or even suppress the monsoon, and there is evidence that several times in the last few years it has in fact been weaker."

We should have a much better understanding of these tipping points, and do everything we can to stop short of triggering these instabilities. "That means we have to know where they are, and they've been off the radar screen for far too long."

Professor Schellnhuber urged a co-ordinated global effort to improve understanding and monitoring of Earth's 'Achilles' heels'. □

Winning the oil endgame

Rocky Mountains Institute

(This is the title of a new study by the RMI, which claims that the US can eliminate oil use in a few decades. The study has been peer-reviewed, and can be downloaded as a PDF file, from:

<http://www.oilendgame.com>

We have taken the unusual step of printing the executive summary in full [with our own headings].

Enjoy. And then read the book. — EW)

Winning the oil endgame offers a coherent strategy for ending oil dependence, starting with the United States but applicable world-wide. There are many analyses of the oil problem. This synthesis is the first roadmap of the oil solution — one led by business for profit, not dictated by government for reasons of ideology. This roadmap is independent, peer-reviewed, written for business and military leaders, and co-funded by the Pentagon. It combines innovative technologies and new business models with uncommon public policies: market-oriented without taxes, innovation-driven without mandates, not dependent on major (if any) national legislation, and designed to support, not distort, business logic.

Two centuries ago, the first industrial revolution made people a hundred times more productive, harnessed fossil energy for transport and production, and nurtured the young US economy. Then, over the past 145 years, the age of oil brought unprecedented mobility, globe-spanning military power, and amazing synthetic products.

But at what cost? Oil, which created the sinews of our strength, is now becoming an even greater source of weakness: its volatile price erodes prosperity; its vulnerabilities undermine security; its emissions destabilise climate. Moreover the quest to attain oil creates dangerous new rivalries and tarnishes America's moral standing. All these costs are rising. And their root causes — most of all, inefficient light trucks and cars — also threaten the competitiveness of US automaking and other key industrial sectors.

The next industrial revolution

The cornerstone of the next industrial revolution is therefore winning the oil endgame. And surprisingly, it will cost less to displace all of the

oil that the US now uses than it will cost to buy that oil. Oil's current market price leaves out its true costs to the economy, national security, and the environment. But even without including these now 'externalized' costs, it would still be profitable to displace oil completely over the next few decades. In fact, by 2025, the annual economic benefit of that displacement would be US\$ 130 bn gross (or US\$ 70 bn net of the displacement's costs). To achieve this does not require a revolution, but merely consolidating and accelerating trends already in place: the amount of oil the economy uses for each dollar of GDP produced, and the fuel efficiency of light vehicles, would need only to improve about three-fifths as quickly as they did in response to previous oil shocks.

Saving half the oil

Saving half the oil America uses, and substituting cheaper alternatives for the other half, requires four integrated steps:

- Double the efficiency of using oil. The US today wrings twice as much work from each barrel of oil as it did in 1975; with the latest proven efficiency technologies, it can double oil efficiency all over again. The investments needed to save each barrel of oil will cost only \$ 12 (in year 2000 \$ — NZ\$ 17.30), less than half the officially forecast \$ 26 price of that barrel in the world oil market. The most important enabling technology is ultralight vehicle design. Advanced composite or lightweight-steel materials can nearly double the efficiency of today's popular hybrid-electric cars and light trucks while improving safety and performance. The vehicle's total extra cost is repaid from fuel savings in about three years; the ultralighting is approximately free. Through emerging manufacturing techniques, such vehicles are becoming practical and profitable; the factories to produce them will also be cheaper and smaller.
- Apply creative business models and public policies to speed the profitable adoption of super-efficient light vehicles, heavy trucks and airplanes. Combined with more efficient buildings and factories, these efficient vehicles can cut the official forecast of oil use by 29% in 2025 and another 23% soon thereafter — 52% in all. Enabled by a new industrial cluster focusing on lightweight materials, such as carbon-fiber composites, such advanced-technology vehicles can revitalize these three strategic sectors and create important new industries.
- Provide another one-fourth of US oil needs by a

major domestic biofuels industry. Recent advances in biotechnology and cellulose-to-ethanol conversion can double previous techniques' yield, yet cost less in both capital and energy. Replacing fossil-fuel hydrocarbons with plant-derived carbohydrates will strengthen rural America, boost net farm income by tens of billions of dollars a year, and create more than 750 000 new jobs. Convergence between the energy, chemical, and agricultural value chains will also let versatile new classes of biomaterials replace petrochemicals.

- Use well-established, highly profitable efficiency techniques to save half the projected 2025 use of natural gas, making it again abundant and affordable, then substitute part of the saved gas for oil. If desired, the leftover saved natural gas could be used even more profitably and effectively by converting it to hydrogen, displacing most of the remaining oil use — and all of the oil use if modestly augmented by competitive renewable energy.

Creative destruction

These four shifts are fundamentally disruptive to current business models. They are what economist Joseph Schumpeter called “creative destruction,” where innovations destroy obsolete technologies, only to be overthrown in turn by ever newer, more efficient rivals. In *The Innovator's Dilemma*, Harvard Business School professor Clayton Christensen explained why industry leaders often get blindsided by disruptive innovations — technological game-changers — because they focus too much on today's most profitable customers and businesses, ignoring the needs of the future. Firms that are quick to adopt innovative technologies and business models will be the winners of the 21st century; those that deny and resist change will join the dead from the last millennium. In the 108-year history of the Dow Jones Industrial Average, only one of 12 original companies remains a corporate entity today — General Electric. The others perished or became fodder for their competitors.

Policies for the twenty-first century

What policies are needed? American companies can be among the quick leaders in the 21st century, but it will take a cohesive strategy-based transformation, bold business and military leadership, and supportive government policies at a federal or at least a state level. *Winning the Oil Endgame* charts these practical steppingstones to an oil-free America:

- Most importantly, revenue- and size-neutral ‘feebates’ can shift customer choice by combining fees on inefficient vehicles with rebates to efficient vehicles. The feebates apply separately within each vehicle-size class, so freedom of choice is unaffected. Indeed, choice is enhanced as customers start to count fuel savings over the vehicle's life, not just the first few years, and this new pattern of demand pulls superefficient but uncompromised vehicles from the drawing-board into the showroom.
- A scrap-and-replace program can lease or sell super-efficient cars to low-income Americans — on terms and with fuel bills they can afford — while scrapping clunkers. This makes personal mobility affordable to all, creates a new million-car-a-year market for the new efficiency technologies, and helps clean our cities' air.
- Military needs for agility, rapid deployment, and streamlined logistics can drive Pentagon leadership in developing key technologies.
- Implementing smart government procurement and targeted technology acquisition (the ‘Golden Carrot’) for aggregated buyers will accelerate manufacturers' conversion, while a government-sponsored billion dollar prize for success in the marketplace, the ‘Platinum Carrot,’ will speed development of even more advanced vehicles.
- To support US automakers' and suppliers' need to invest about US\$ 70 bn to make advanced technology vehicles, federal loan guarantees can help finance initial retooling where needed; the investments should earn a handsome return, with big spin-off benefits.

Similar but simpler policies — loan guarantees for buying efficient new airplanes (while scrapping inefficient parked ones), and better information for heavy truck buyers to spur market demand for doubled-efficiency trucks — can speed these oil-saving innovations from concept to market.

Other policies can hasten competitive evolution of next-generation bio-fuels and bio-materials industries, substituting durable revenues for dwindling agricultural subsidies, and encouraging practices that protect both topsoil and climate.

Beyond oil

What happens to the oil industry? The transition beyond oil is already starting to transform oil companies like Shell and BP into energy companies. Done right, this shift can profitably redeploy their skills and assets rather than lose market share. Biofuels are already becoming a new product line that leverages existing retail and

distribution infrastructure and can attract another \$ 90 bn in biofuels and bio-refining investments. By following this roadmap, the US would set the stage by 2025 for the checkmate move in the oil endgame — the optional but advantageous transition to a hydrogen economy and the complete and permanent displacement of oil as a direct fuel. Oil may, however, retain or even gain value as one of the competing sources of hydrogen.

The prize

How big is the prize? Investing US\$ 180 bn over the next decade to eliminate oil dependence and revitalize strategic industries can save US\$ 130 bn gross, or US\$ 70 bn net, every year, by 2025. This saving, equivalent to a large tax cut, can replace today's US\$ 10 bn/month oil imports with reinvestments in ourselves: US\$ 40 bn would pay farmers for biofuels, while the rest could return to our communities, businesses and children. Several million automotive and other transportation-equipment jobs now at risk can be saved, and one million net new jobs can be added across all sectors. US automotive, trucking and aircraft production can again lead the world, underpinned by 21st century advanced-materials and fuel-cell industries. A more efficient and deployable military could refocus on its core mission — protecting American citizens rather than foreign supply lines — while supporting and deploying the innovations that eliminate oil as a cause of conflict. Carbon dioxide emissions will shrink by one-fourth with no additional cost or effort. The rich-poor divide can be drastically narrowed at home by increased access to affordable personal mobility, shrinking the welfare rolls, and abroad by leapfrogging over oil-dependent development patterns. The US could treat oil-rich countries the same as countries with no oil. Being no longer suspected of seeking oil in all that it does in the world would help to restore US moral leadership and clarity of purpose.

While the US\$bn 180 investment needed is significant, the United States' economy already pays that much, with zero return, every time the oil price spikes up as it has done in 2004. (And that money goes into OPEC's coffers instead of building infrastructure at home.) Just by 2015, the early steps in this proposed transition will have saved as much oil as the US gets from the Persian Gulf. By 2040, oil imports could be gone. By 2050, the US economy should be flourishing with no oil at all.

How do we get started? Every sector of society can contribute to this national project. Astute business

leaders will align their corporate strategies and reorganize their firms and processes to turn innovation from a threat to a friend. Military leaders will speed military transformation by promptly laying its foundation in super-efficient platforms and lean logistics. Political leaders will craft policies that stimulate demand for efficient vehicles, reduce R&D and manufacturing investment risks, support the creation of secure domestic fuel supplies, and eliminate perverse subsidies and regulatory obstacles. Lastly, we, the people, must play a role — a big role — because our individual choices guide the markets, enforce accountability and create social innovation.

Conclusion

Our energy future is choice, not fate. Oil dependence is a problem we need no longer have — and it's cheaper not to. US oil dependence can be eliminated by proven and attractive technologies that create wealth, enhance choice, and strengthen common security. This could be achieved only about as far in the future as the 1973 Arab oil embargo is in the past. When the US last paid attention to oil, in 1977–85, it cut its oil use 17% while GDP grew 27%. Oil imports fell 50%, and imports from the Persian Gulf by 87%, in just eight years. That exercise of dominant market power — from the demand side — broke OPEC's ability to set world oil prices for a decade. Today we can rerun that play, only better. The obstacles are less important than the opportunities if we replace ignorance with insight, inattention with foresight, and inaction with mobilization. American business can lead the nation and the world into the post-petroleum era, a vibrant economy, and lasting security — if we just realize that we are the people we have been waiting for.

Together we can end oil dependence forever.

The next big gasfield?

NZ Oil and Gas general manager Gordon Ward says the Mangatōa gas field has a potential of 2000 PJ of gas. The presence of gas was confirmed when the Te Ranga well intersected a 140 m gas column in 1986. "It's a bit like Pohokura," said Ward. "It's got tight rocks and tight reservoir and getting sufficient flow rates is the difficulty with this particular prospect." The field was described as being in North Taranaki, but is geographically west of Te Kuiti. The northern tip is just off Albatross Point and the field extends about half way to Awakino. It is partially onshore.

Canadian clean coal

Canadian Clean Power Coalition, May 2004

An edited version of a summary report on clean coal feasibility studies

Phase I of the project comprised conceptual engineering and feasibility studies, undertaken from mid 2001 to early 2004. The objective was to determine the most appropriate technologies for demonstration. Implementation plans, preliminary designs and cost estimates were developed, recognising the geographical variability of coal. The objective was to identify a process that would produce electricity from coal in some fashion and that would also provide a relatively pure stream of carbon dioxide (CO₂) that could be captured, further processed as necessary, and subsequently used or stored. Outcomes were:

- This was the first study to assess all three available technologies for CO₂ capture.
- Emissions from coal can be reduced to levels equivalent to natural gas power generation.
- The cost of electricity with CO₂ capture was 50% higher than current rates, but lower than prior studies.
- Gasification ranked first and amine scrubbing next, even with non-optimized processes.
- The Western Canada Sedimentary Basin has vast storage capacity for CO₂.

The conclusions that the CCPC has adopted are:

- Gasification is still not a mature technology for power plant applications. Significant work remains to be undertaken to make this a competitive technology, although it is probably the most likely platform for the future if limits on CO₂ emissions are applied. Similarly, oxyfuel is not yet a mature technology. Amine scrubbing would appear to be relatively mature, one of the lowest cost alternatives, and ready to apply to

power plant applications for capturing CO₂. Initiatives are required:

- To explore and develop gasification for low ranked coals to make it more reliable and cost effective, and
- To answer scale up questions regarding amine scrubbing.
- A demonstration project will require a substantial effort from industry and government if it is to proceed and to succeed. Government participation will be required to ensure that such a project can be financed, to ensure that the necessary permitting is provided, and to provide significant funding.

Detailed studies of IGCC plants will be conducted in Phase II prior to making commitments for demonstration projects. Phase II will optimize the technologies to lower costs further and develop the right business case for the demonstration plant. It appears that a CO₂ capture project is most likely to be a greenfield project because CO₂ capture technologies are not sufficiently attractive on a retrofit project.

In summary, power generators using coal see an array of new emissions regulations approaching. There is an urgent need to understand and evaluate the ability for advanced combustion and emissions control technologies to mitigate the environmental impact of coal-derived power generation before committing the significant capital investment necessary to construction. The CCPC is one such response. The participants anticipate that the results of the studies will make a significant contribution to the understanding of the control of air emissions, including CO₂, from the generation of power from coal.

Technical and economic comparison of CO₂ abatement technologies (adapted from CPCC)

Fuel		Bituminous	Sub-bituminous	Lignite	Lignite	Lignite
Technology	Units	Gasification	Gasification	Gasification	Amine	Oxyfuel
Cost of electricity	NZ¢/kWh	12.6	11.4	15.4	13.7	17.9
CO ₂ emitted	t/MWh	0.116	0.111	0.182	0.06	0.145
CO ₂ captured	%	86	89	86	95	90
Cost of CO ₂ emissions avoided	NZ\$/t	55	60	105	65	130
Unit cost, net	NZ\$/kW	3500	4000	5200	5200	7300

Adapting the CCPC data to New Zealand

The comparison table (previous page) has been simplified, and adapted by converting costs to New Zealand dollars. However, note the following (comments mainly from Steve Goldthorpe):

- Currency conversion is risky because conditions here may be different. Perhaps the greatest risk here is coal cost, which is likely to be significantly higher in NZ. A local plant might have greater or lower costs in several areas, such as frost- or earthquake-protection.
- Costs may not include compression and sequestration. Care is needed in accounting for the energy penalty of sequestration, but it is not clear from the summary how this has been handled. The CO₂ recovery from amine scrubbing looks very optimistic.
- A key question in NZ would be where to put the sequestered CO₂: it would have to be relatively close to the power station, which in turn would have to be relatively close to the coal or lignite source. Deep aquifers seem the most likely place to look.

Complete CO₂ sequestration is not feasible. The best that can be done is about 90% CO₂ removal and disposal but, as the Canadians seem to be concluding, the economic optimum for CO₂ capture and storage from coal fired power generation is probably at around the 2/3 sequestration level.

Clearly, this is not going to happen without some very powerful drivers. Note from the table that the costs of carbon emissions avoided imply a carbon charge of \$ 55–130/t, two to five times the current cap, which would certainly be a powerful driver for a large range of alternative energy technologies. □

(How would the business community react if a sustainable energy supplier called for government subsidies for a demonstration project that was predicted to generate power at 15 ¢/kWh? — EW)

Quote

“Oil companies should fire their geologists and hire economists instead, since economists are so much better at finding oil.”

Walter Youngquist, Geologist, Eugene Oregon

The Windflow 500 kW wind turbine

Adapted from papers by
Geoff Henderson and Wernher Roding
Windflow Technology Ltd

Windflow Technology Ltd is a New Zealand company set up to manufacture grid-connected wind turbines. The main focus here is on novel features of the Windflow design, which are claimed to make the turbine technically superior.

The prototype machine is a 500 kW generator, the Windflow 500, set up in Gebbies Pass, near Christchurch. Several prototype problems have been overcome, notably a noisy gearbox, and the gearbox and turbine are now unusually quiet, meeting a sound level requirement of 30 dBA compared with a more usual 40 dBA.

With the prototype proven (there has also been a blade fatigue test programme) the next objective is to supply 104 Windflow 500 machines for the Te Rere Hau windfarm over the next three years. The Te Rere Hau farm has been awarded carbon credits currently worth \$ 5.0 M under the Government's Projects to Reduce Emissions programme.

The Windflow 500 turbine combines three technologies which are proven but non-standard for wind turbines: a torque limiting gearbox, a teetering 2-bladed rotor with pitch-teeter coupling and a synchronous generator. The result is a substantially lower tower-top mass than rival machines of similar power output (13 t compared with 20–30 t for a 500 kW machine), with correspondingly lower cost, which is critical in NZ's unsubsidised market. Despite this low mass the turbine is specifically designed for NZ's strong, turbulent winds.

The torque limiting gearbox

The torque limiting gearbox was invented by Geoff Henderson. The final drive to the generator uses an arrangement similar to the differential on a car axle. In the Windflow 500 one 'wheel' is normally fixed and all the power from the turbine ('engine') goes to the generator — the other 'wheel'. However, when the maximum generator power is exceeded the normally-fixed 'wheel' turns and absorbs the excess. This allows the whole machine to maintain a constant speed in high winds, with the output side of the gearbox, the generator and the downstream electrical systems protected against overloading.

The way this is done is that the fixed 'wheel' is a positive displacement hydraulic pump, with an outlet pressure proportional to the power produced by the turbine. The relief valve is normally closed, which keeps the pump stalled, but when the turbine exceeds the rated power the relief valve opens, allowing the pump to turn and absorb the excess power. This power simply heats hydraulic oil, which is easily cooled with a radiator.

The result is a machine which does not produce excess power in a strong gust, and can be run at constant speed. (Which is why this simplified explanation can mix up power and torque: at constant speed the one is proportional to the other) See below for an explanation of speed control below rated power, using the synchronous generator.

This arrangement reduces mechanical loading, allowing improved reliability and reduced weight and cost. A constant output speed allows the use of a synchronous generator, which is cheaper and more flexible in operation than the induction generator more usually used on a wind turbine.

Pitch-teeter coupled blades

An inherent problem with wind turbines is that the wind pushes the blades downwind (drag), as well as turning them (lift). Drag loads are large and continuously variable, due to gusts, wind shear (wind speed is lower close to the ground) and the effect of air flow around the tower. In a three-blade machine these loads can only be transferred to the low-speed shaft and the tower, but in a two-blade machine the blades can be allowed to teeter as a pair: the rotor is hinged at the hub, so that the more heavily loaded blade can move downwind, bringing the more lightly loaded blade upwind. In isolation this arrangement is unstable — a blade may hit the tower. However, by coupling teeter to pitch they can be arranged so that aerodynamic forces tend to bring them back to the neutral position. Much of the transient drag loading is then passed from one blade to the other, without loading the whole machine. This relatively simple and cost-effective solution allows good reliability with less weight and expense than a 3-bladed rotor. Not only is there a saving because there is one less blade, but the reduced fatigue loads enable further weight savings.

A further advantage of a two-blade layout is that when the wind is too strong for power generation to safely continue, the blades can be parked in the horizontal position. They are then safe against loads imposed by wind gusts from any direction, despite being lighter than conventional blades. In

contrast, a 3-blade turbine must be parked with one blade near-vertical and exposed to large wind loads, especially if the wind changes after parking. Parking for the Windflow 500 is at 30 m/s (108 km/h), compared with 25 m/s (90 km/h) for most machines.

Synchronous generator

The torque limiting gearbox allows a surprisingly stable generator speed in high winds, without large, transient, uncontrolled loads imposed on the generator and electrical system. This allows the use of a synchronous generator — standard for generation from other power sources — minimising both cost and power factor problems. With no large dynamic effects from rotor speed changes, the synchronous generator can itself be the speed control system. It simply stays in synchronisation with the 50 Hz AC grid, with electrical power output following mechanical power input:

- At wind speeds below the machine's rated output, all power is absorbed by the synchronous generator and fed into the grid, with only normal generation losses.
- At wind speeds above the machine's rated output, the torque limiting gearbox absorbs excess power, allowing the synchronous generator to continue normal operation.

An advantage of the Windflow 500 design is that the machine can be adapted to run at a power factor other than 1.0 when needed, thus offering potential to control power factor problems in local supply systems.

There are helpful animations of the teeter and torque limiting systems on the Windflow website: www.windflow.co.nz

(A point that came up in conversation with Windflow's Sheralee McDonald at the SEF Conference is: why does the Windflow 500 not have a cone-like spinner at the turbine hub, like an aircraft propellor?)

But the more interesting question is, why do other turbines have spinners? They slightly improve air flow around the nacelle but the effect on overall turbine output is vanishingly small. The answer seems to be that aircraft propellers have them, so wind turbines 'ought' to have them too. An aircraft needs a spinner because all the air flow has been generated by expending energy — with some hefty conversion losses — and small savings make a big difference.

Similarly, do conventional wind turbines have three blades because that looks nicer? —EW

Paying what we owe

People should be taxed on what they use of the earth's resources, not what they earn

James Jones, *The Guardian*
22 November 2004

The modern world has lost much of its connection with the earth. It is as serious as shoppers losing sight of their bank balance. For consumers of the earth's resources there is no check on our profligacy; we are so removed from the consequences of our actions that we live comfortably in denial. Planet Earth is not limitless.

How then shall we live and, in particular, how should those in business and industry deal and trade in the earth's resources? Taxation provides for a degree of redistribution of wealth, although national and global evidence suggests that the gap between rich and poor is growing larger. The most substantial tax revenue comes from taxing income, especially labour. The time has come to rethink fundamentally this balance. We should gradually shift from taxing labour to levying taxes on the use of original resources.

There are two reasons:

- To discipline our use of original material, which would encourage us to conserve and replenish the source.
- To stimulate labour and encourage us to be creative and innovative in our use of original material.

Current industry and business seem to be based upon using minimum labour in relation to resources used; we urgently need to invert the ratio into the minimum amount of resources used in relation to labour.

Taxation has always been a form of value-driven social engineering. Tax differentials and tax breaks affect behaviour. Changes would need to be introduced gradually, but could be neutral to the economy. Interventions would be needed to ensure that the poor and unemployed had access to the basic requirements for human flourishing.

The Joseph Rowntree Foundation has just published research on reducing the impact of green taxes and charges on low-income households. There are real concerns that green taxes could hit the poor disproportionately, but

they believe it is possible to relieve hardship. For example, all water could be metered and the first x litres per household member would be free. Thereafter water would be taxed so that those using it for car washing, large gardens or swimming pools would pay for their water according to use. This would drive down consumption while at the same time protecting the needs of low-income households.

Shifting the burden of tax from labour to resource in today's world would mean that the most successful businesses would be those which deployed labour as creatively and innovatively as possible so as to use the minimum amount of original material in their products.

Much thinking has already been done about our use of carbon and how we might reduce the amount of emissions. 'Contraction and Convergence' has been proposed to ensure a fairer use of carbon across the developed and developing worlds. The aim is to redistribute all nations' carbon credits so as to exert a more disciplined, moral and responsible use of carbon. Excessive carbon emissions by richer countries change the climate, flooding some of the poorest countries in the world. Allowing countries to trade in carbon credits is a form of taxation that disciplines and drives down the use of original resource and allows for its absorption within the capacity of the planet.

As a pastor who sees the consequences of poverty, I urge those in business to embrace an ethic of the earth and a greater sense of social responsibility. Ultimately, decisions taken will depend on moral values; we should not spend the earth and squander the resources that belong also to future generations.

www.guardian.co.uk

James Jones is Bishop of Liverpool
bishops lodge@liverpool.anglican.org

Tourism pushes up energy emissions

A study by researchers at Massey University and Landcare says that energy use for tourism has been neglected in calculating New Zealand's energy emissions. The sector uses 22–25% of all New Zealand's energy use, mostly in the form of jet fuel for international travel. Associate Professor Murray Patterson described the situation as, "an unfortunate oversight for climate change policy in particular."

The Dominion Post, 16 November 2004

More on oil supply limits

W Zittel and J Schindler

(In EnergyWatch 33 (June 2004) we published an article, Oil supply limits, on why world oil production will peak when about half of all producible oil has been produced. Now this article expands on a point we missed — that the easiest reserves are generally produced first. It is an edited version of Section 2.1 of The countdown for the peak oil production has begun, by W Zittel and J Schindler of L-B-Systemtechnik, 12 October 2004. —EW)

The different phases of oil production can be described schematically by the following pattern: In the early phase of the search for oil, the easily accessible oil fields are found and developed. With increasing experience the locations of new oil fields are detected in a more systematic way. This leads to a boom in which more and more new fields are developed, initially in the primary regions, later on all over the world. Those regions which are more difficult to access are explored and developed only when sufficient new oil can no longer be found in easily accessible regions. Nobody will look for oil without also wanting to produce it, so development of a new field usually follows soon after discovery.

In every oil province the big fields will be developed first and only afterwards the smaller ones. As soon as the first big fields of a region have passed their production peak, an increasing number of new and generally smaller fields have to be developed in order to maintain the production base, and maintaining growth becomes increasingly difficult. A race begins which can be described as follows: More and more large oil fields show declining production rates. The resulting gap has to be filled by bringing into production a larger number of smaller fields. However, these smaller fields reach their peak much faster and then contribute to the overall production decline. As a consequence, the aggregate decline becomes steeper and steeper. This decline has to be compensated for by the ever-faster connection of more and more ever-smaller fields.

So, the production pattern over time of an oil province can be characterised as follows: To increase the supply of oil will become more and more difficult, the growth rate will slow down and costs will increase until the point is reached where

industry is no longer able to bring into production a sufficient number of new fields quick enough. At that point, production will stagnate temporarily and then eventually start to decline. This pattern can be clearly seen in many oil provinces.

In the 150 year history of oil production we can identify some fundamental trends:

- The world's largest oil fields were all discovered more than 50 years ago.
- Since the 1960s, annual oil discoveries have seen a decreasing trend.
- Since 1980, annual consumption has exceeded annual new discoveries.
- Till this day more than 42 000 oil fields have been found, but the 400 largest oil fields contain more than 75% of all oil ever discovered.
- The historical maximum of oil discoveries has to be followed after some time by a maximum of oil production.

How close have we already got to the peak? This is the only exciting question remaining.

Coal power 'cheaper than wind'

Solid Energy has released a report, *Energy Options*, saying that, "Coal is best positioned to provide energy security for New Zealand at least cost." The report concedes that wind power is economic if a carbon tax is introduced in 2008, but that would raise prices by up to 20%. Even "aggressive implementation" of renewables, including wind, hydro and geothermal, would not be enough to meet electricity demand in any situation except the medium term, and low growth in electricity demand.

Meridian CEO Keith Turner disagreed, saying that wind could play a big part in meeting electricity needs, and pointed out that Solid Energy had no first-hand experience of running a power station. He did not believe a coal-fired power station could produce electricity at 6–7 ¢/kWh. Environmental standards would push this up to 8 ¢/kWh and a carbon tax would increase it again.

Meridian's 90 MW Te Apati windfarm can produce electricity for less than 6 ¢/kWh, and there are economies of scale in building bigger windfarms. Turner believes that up to 20% of NZ's electricity supply could be from wind.

The Dominion Post, 9 November 2004

MiniWhats

Emissions agreement signed

The governments of New Zealand and the Netherlands have signed an emissions trading co-operation arrangement. The arrangement builds on the two countries' common interests in the promotion of emissions trading and the New Zealand government's Projects to Reduce Emissions (PRE) programme.

SenterNovem, an agency of the Dutch Government, is about to run its fifth procurement tender round for the purchase of 34 million emissions units, to be counted against its emissions reduction targets.

NZ Government, 24 August 2004

Hydrogen from the sun

In our September issue we reported work on how plants derive energy from sunlight, by splitting water molecules. ('Flower power', EW 34, page 25) Now two Australian scientists are claiming good progress towards a similar goal, this time based on research as long ago as 1967. They predict that their research will lead to commercial materials suitable for energy production by about 2011.

In 1967 Professor Akira Fujishima and Professor Kenichi Honda, working in Japan, discovered that titanium dioxide could be used to extract hydrogen from water in a process that has become known as the Honda-Fujishima effect. Fujishima and Honda were winners of the 2004 Japan Prize for Chemical Technology for the Environment, and are thought to be front runners for the Nobel Prize in chemistry.

Research since 1967 has focused on materials. Now Professor Janusz Nowotny and Professor Charles Sorrell, researchers at the Centre for Materials Research in Energy Conversion at the University of NSW, Australia are working on photoelectrodes made of titanium dioxide ceramics. The Nowotny and Sorrell team is thought to be the most advanced in developing the cheap, light-sensitive materials that will be the basis of the technology.

Nowotny says, "Based on our research results, we know we are on the right track and with the right support we now estimate that we can deliver a new material within seven years." Sorrell says that Australia is ideally placed to take advantage of the enormous potential of this new technology: "We have abundant sunlight, huge reserves of titanium and we're close to the burgeoning energy markets

of the Asia-Pacific region. But this technology could be used anywhere in the world. It's been the dream of many people for a long time to develop it and it's exciting to know that it is now within such close reach."

Estimated costs are relatively high, at Aus\$ 19.00/GJ, but with no fuel or pollution costs, no moving parts and low or very low distribution costs that might well be attractive.

http://www.scienceagogo.com/news/20040724233754data_trunc_sys.shtml

http://www.eurekalert.org/pub_releases/2004-08/uons-vne082404.php

<http://www.smh.com.au/articles/2004/08/26/1093518009303.html>

http://www.scienceagogo.com/news/20040724233754data_trunc_sys.shtml

Better access to Ports of Auckland

Ports of Auckland plans to run a rail shuttle service to link its wharves on the Waitemata Harbour to its new 'inland port' development at Wiri. The service has been agreed with Toll NZ and the site will open in the middle of next year. It will boost capacity, reduce delays in the delivery of imports and lessen future demand on roads.

Auckland, which handles about half of all the containers shipped to and from NZ, has been losing market share to Tauranga, which opened its inland container terminal MetroPort, also in south Auckland, in 1999. MetroPort has grown into the country's third-largest container port in its own right, largely at Auckland's expense.

Auckland handled 660 000 TEUs (Twenty-foot Equivalent container Units) last year, but could lift capacity to three million TEUs/yr by reclaiming land to make space for containers, improved stacking and building more terminals such as Wiri.

NZ Herald, 22 October 2004

NZ's solar potential

Solar water heating has huge energy savings potential for households and businesses but how much this is realised depends on New Zealanders' acceptance and understanding of the solar resource. Heather Staley, Chief Executive of the Energy Efficiency and Conservation Authority (EECA) said, "In the long term solar heating is both cheaper and ... better for the environment."

Water heating consumes up to 45% of household electricity. Installation costs vary but start at about \$ 3000. Once installed, solar heating can save a household \$ 350 – \$ 450/yr. "If every household in

NZ had solar water heating it would reduce demand for electricity annually by more than the amount of electricity used by Christchurch City," said Staley.

More than 22 000 homes in New Zealand currently have solar heating. The Solar Industry Association Industry has set itself a target of 10 000 installations a year and EECA is working with the industry to help them achieve that goal. Around 1800 installations have been made in the last 12 months, an increase of around 50% on the previous year. EECA, 7 September 2004

In another report, Minister of Energy Pete Hodgson was quoted as saying that solar panels will soon be requirement on new homes, but this cannot be introduced immediately because of industry limitations. Green co-leader Jeanette Fitzsimons called for a programme of installations on public sector buildings, as a stimulus to the industry, wherever it is economic to do so. No date has been set, but Hodgson said, "Sooner or later it will become a regulatory requirement."

Meridian calls for tradable water rights

Meridian Energy has proposed overhauling the management of water resources, suggesting they become a tradable commodity. If water rights were traded, Meridian could unlock some of its vast hydro stores for other uses, notably irrigation, but depending on availability and price. The proposal is a marked shift in thinking for state-owned Meridian, which has jealously guarded the contents of its South Island hydro lakes.

Spokesman Alan Seay said Meridian had had "informal discussions" with the NZ Government about adopting the Australian system of tradable water rights. Under the Australian system, farmers could sell their water rights to one another, either regionally or interstate. Water was priced by supply and demand and could be sold either on an annual, permanent or future basis.

Seay told NZPA, "We feel that this idea of tradable water ... [would see] water flowing to where it's going to produce the greatest economic good... If we can get a better return by selling water for irrigation rather than putting it through the turbines and out to sea we'd rather do that."

In Australia, water is a scarce resource and that country's waterways and hydro infrastructure are geared towards supplying irrigators. Only 10% of Australia's electricity is hydro-generated.

Meanwhile, Australian water officials are urging New Zealand to learn from Australian mistakes in

operating a tradable water rights regime. The high demand for irrigation water has severely impacted on the environment.

NZPA / *Stuff*, 10 September 2004

NZOG hope to produce oil from Tui area by mid-2006

New Zealand Oil & Gas (NZOG) announced at the end of October that their Tui area oil fields in the offshore Taranaki basin (off Cape Egmont, about 20 km northwest of Maui A) are commercially viable. They hope to produce oil from mid-2006. A financial commitment to development of the Tui area fields should be possible by June 2005.

A development concept for the area suggested three or four subsea wells tied back to a floating production, storage and load-out facility, NZOG said in a statement to NZX.

Research had proved a probably reserve base range of 3–5 million m³ of recoverable oil in the Tui area, NZOG said in a statement to the share market. Capital costs for subsea and subsurface components of the development were expected to be in the range of NZ \$M 180–220. If an out-load facility was purchased rather than leased additional investment would be needed, NZOG said.

"Assuming the timely receipt of regulatory approvals, first oil is planned for mid 2006," NZOG said. The oil is all of high quality and is expected to flow at very good rates from the excellent quality Kapuni 'F' sand reservoir.

NZOG is a 12.5% partner in the joint venture which has been exploring the Tui area. Other partners are New Zealand Overseas Petroleum (45%), WM Petroleum (10%), AWE New Zealand (20%), and Mitsui E&P New Zealand (12.5%).

Stuff, 29 October 2004

(It looks as if NZOG hope to use the floating production facility which Shell will be withdrawing from service this summer: see Maui update, EnergyWatch 34, September 2004. This seems logical, as the find is in the same area as the Amokura and Pateke finds (reported in mid-August), each about 4 km away from Tui, so NZOG can use the same production facility on each field in turn.

— EW)

More coal over Otira

Solid Energy and Toll NZ have announced a Heads of Agreement for a 13 year contract for transport of coal from the West Coast to the Port of Lyttleton. This will allow Solid Energy to move up to 2.4 Mt/yr this year, 2.7 Mt/yr in 2005/6 and

3.8 Mt/yr from 2007/08. These increases will eventually see the current seven trains a day increased to eight. The two companies are committed to working with New Zealand Railways Corporation (the track owner) to address increasing the capacity and reliability of the line.

The agreement also provides a framework for future potential agreements for coal transport on other parts of the rail network including to the ports at Westport and Greymouth.

Solid Energy, 28 October 2004

(This is a 60% capacity increase from a 14% increase in train numbers, so the trains will be some 40% heavier. That is an impressive weight increase, and strongly suggests that heavier trains are much easier to put on than more trains, despite fairly slack headways. This must mean that the tunnel — NZ's steepest rail gradient at 3.2%, with the loaded trains going uphill — sets only the train weight limit, not the headway limit. Does the increase in train weight mean that Toll and NZR will re-electrify the tunnel and find some electric locomotives? — EW)

Meridian on wind farms

Meridian is considering single wind farms that could be almost as big as the abandoned Project Aqua, but has declined to say where such farms might be. "For the next few years we see enough wind power, small hydro and geothermal — there is more than enough energy to meet NZ's needs," said CEO Dr Keith Turner. By 2010 there could be another six windfarms the size of the 55 turbine wind farm at Te Apiti, which was built in just a yr. Wind power costs are 'economic' at Te Apiti, at just under 6 ¢/kWh, compared with coal-fired stations at close to 8 ¢/kWh.

The Dominion Post, 5 November 2004

Lignite power from Southland?

Solid Energy have proposed a two Gigawatt, two billion dollar, lignite-powered power station for Southland. It is described as 'on the cards', and could be operational by 2012. Solid Energy chief executive Don Elder said the region had about 15 billion tonnes of lignite reserves, enough to power an international size 2000 MW power station for at least 1000 years.

The company's focus is on establishing a power station as part of a national strategy. Transmission lines would have to be developed to carry the electricity north. Solid Energy would own and operate the lignite mine but it was likely an international company would build and operate the power station.

About 20 potential sites in Southland could be suitable, but the final spot would be determined by its proximity to its main customer — the smelter — a cooling water source and the lignite mine.

NZPA, 24 September 2004

Awhitu wind farm appeal RMA decision

Genesis Energy will appeal the decision of Franklin District Council to decline resource consent to build the 19 MW Awhitu windfarm near Waiuku, Auckland. Genesis Energy Chief Executive Murray Jackson says the company has a growth policy for its renewable generation portfolio, including wind, and believes it has strong grounds for an appeal in the Environment Court. "The Awhitu windfarm proposal comprises 19 turbines... Several years' evaluation has shown the proposed wind farm site has a very good wind resource and minimal environmental impact."

Genesis Energy Ltd, 27 September 2004

Track laying in Auckland

The first stretch of new rail-track for the Western rail line was laid in early September, as part of the ongoing double tracking project. The Auckland Regional Council is managing the construction project on behalf of the Crown, to double track the rail line between Mt Eden and Morningside. This will improve train service reliability and capacity, by allowing trains to travel in both directions at the same time.

The Chair of the Passenger Transport Committee, Councillor Catherine Harland, says the new track will be laid in stages from Mt Eden Station to Morningside. "While construction is underway services will be impacted, but when complete, the double tracking will have a long-awaited, positive impact on the reliability of Western Line services... We are making good progress toward completion of this first stage in early 2005. Some regular weekday train services will be replaced by buses.

Auckland Regional Council, 9 September 2004

Transit NZ's first toll road

Transit NZ (now Land Transport NZ) has finally found what it says is the strong community support it needs to build its first tolled highway. The board has decided the \$M 300 Auckland Northern Motorway extension from Orewa to Puhoi should be a toll road, after household and workplace surveys found greater support than from a general call for submissions.

Transit will present its findings to Transport Minister Pete Hodgson by early December, for his

decision on whether it can raise about \$M 145 from a 35-year Government loan, repayable from inflation-adjusted tolls starting at \$ 1.80 for cars and \$ 3.60 for trucks. Transit will also apply to Transfund for the rest of the project finance, from the Government's National Land Transport Fund of fuel taxes, road user charges, and motor registration and licensing fees. Work on the 7 km extension could start this summer.

A Transit consultant's analysis of face-to-face surveys by market-researchers, of 1140 people living, working or studying near the planned motorway said these showed "a high level of support" for building it as a toll road. A household survey of 1035 people was supplemented by a smaller poll of people who travel to the area for work. The new Land Transport Management Act requires the Minister to be satisfied there is, "a high degree of support from affected communities," for any tolled road to be approved.

Almost two-thirds of those surveyed supported tolls to varying degrees, but only 32% were strongly for tolls.

NZ Herald, 9 September 2004

More oil reserve downgrades?

Shell have audited over half of their international oil reserves using new procedures, following downgrades at the beginning of the year. They warned in early November that the results, "suggest that reductions to Shell's... proved reserves are likely to be appropriate."

Guardian Weekly, 5 November 2004

Cook Strait cable problems

Grid operator Transpower has found a fault in one of the three Cook Strait power cables that will reduce capacity for at least six months. The capacity reduction is from 1040 MW to 886 MW, or about 15%. The cost of repairs could be "millions."

The disruption comes just five months after an electronic problem in the link's control system caused it to trip out.

NZ Herald, 8 October 2004

Slow zones in London

The City of London is reversing a decision last March, and will be introducing 30 km/h zones. Speed limits are likely to be strictly enforced and backed with chicanes, cobbled surfaces and tough fines. The changes comes after cycling barrister Ralph Smyth launched a campaign to put cyclists at the heart of transport planning in the capital,

and won a landmark High Court victory that has forced the Corporation of the City of London to rethink. A change in London is expected to send a strong signal to other UK cities.

One of the side-effects of the congestion charge has been a massive increase in the number of cyclists. There has been an increase of 30% going into the congestion charge zone over the past couple of years, and, at times, it seems cyclists are invading the capital. However, in terms of extra facilities, progress has been slow. Although miles of cycle lanes have been built, in many cases they are poorly sited and hardly protect cyclists at all.

eCAN

Te Apiti windfarm completed

Rigging of the 55th and final turbine of the 90 MW Te Apiti windfarm is complete and the whole windfarm should be fully commissioned by the end of October. It has been fully consented and constructed in little more than a year.

Meridian Energy, 18 October 2004

Government electricity governance policy statement published

On the same day as the Electricity and Gas Industries Bill was passed, the government released a Government Policy Statement (GPS) on electricity.

Energy Minister Pete Hodgson said, "This government recognises the importance of a properly managed electricity market to the economy and consumers. The market was failing to govern itself. That is why this government created the Electricity Commission. This Bill increases the scope of the Commission to encompass security of supply, consumer protection, competition, demand management, energy efficiency, conservation and the development of distributed generation as well as involving it in the planning of transmission upgrades."

While the Electricity Commission will have responsibility for much of the day to day and longer terms operation of the market, the government remains responsible and accountable for setting its direction through government policy statements.

The GPS on electricity governance is available on the Ministry of Economic Development's website: <http://www.med.govt.nz/ers/electric/governance-gps/>

NZ Government 14 October 2004

Logs to go by rail

Transfund is to subsidise rail transport of logs to Wellington's CentrePort, from Wanganui, Marton and Masterton. Subsidies will be for three years, after which it is expected that the service will be commercial. Log traffic is at present about a million cubic metres a year, but is expected to double in five years and reach 3.0 million m³/yr in the mid 2020s. The expected reduction in road traffic is about 5500 trucks in the first year, 7500 in the second and 9500 in the third.

The Dominion Post, 20 November 2004

(This is only about 12% of total traffic in the third year, so road traffic in three years will grow by 'only' about 48%, instead of a projected 60%.

However, a possible development — already trialled — which could improve this substantially is special open-sided containers to carry logs, which could be loaded at the railhead depots and then be handled as containers — with substantially reduced handling costs at each change of mode — through to the final overseas destination. The containers could then be collapsed for return, taking up much less space. — EW

Road tolls 'essential'

Traffic congestion will not be cut until New Zealand cities have leaders brave enough to bring in London-type toll charges, a leading British transport adviser says. Professor David Begg, Chairman of the UK Commission for Integrated Transport, was speaking at the Sustainable Land Transport Conference, held in Wellington in November.

Begg said that building more roads brought only temporary relief, while good public transport alone did not discourage people from using their cars. "Politicians and transport planners alike... will not find an infrastructure solution to congestion," he said. A combination of carrot and stick measures is needed — along with a leader brave enough to push thorough unpopular policies. "We have been here before, with compulsory wearing of seat belts and tough drink-driving laws," Begg said.

(We tentatively suggest that there may be a 'third way' here — provide semi-segregated space for public transport, with signals priority, to ensure that motor traffic congestion causes only minimal delay to public transport. This has been partially done in London — and is a reason why tolls have worked so well — and much more fully in cities such as Heidelberg, Freiburg and Zürich — EW)

Pohokura go-ahead

It's 'all on' for the billion dollar development of Taranaki's Pohokura gasfield, located immediately offshore from the Motunui methanol plant. In mid-October, Associate Energy Minister Harry Duynhoven announced the granting of a mining permit that allows the field's owners to go ahead. "The way is now clear for construction to commence," said Shell NZ exploration and production manager Ajit Bansal. Shell companies hold a 48% share in the field, and the field operator is Shell Todd Oil Services. General manager Paul Zealand said the first major contract for the development project would be signed "early next week." "This project will involve five major construction and drilling contracts, and we expect them all to be awarded within the next few weeks," he said.

Duynhoven said, "Pohokura has been a critical component of NZ's energy forecasting for some time, and I am delighted to see this project now proceeding. While Pohokura is not a complete solution to our energy needs, it has an important role to play in our wider strategy for investment in exploration in NZ."

First production is scheduled for mid-2006. Initial production of gas is expected to be about 50 PJ/yr, representing roughly 25% of NZ's total gas production. The field should initially produce three million barrels of condensate a year (15 l/s).

NZPA, 19 October 2004

More EECA funding for solar thermal

The Energy Efficiency and Conservation Authority (EECA) announced in November the launch of a revised incentive scheme for the solar water heating market. Under the scheme, an ongoing Government initiative, money can be borrowed on an interest free basis to pay for the purchase and installation of a system.

Solar water heating has huge potential to reduce electricity demand, but that depends on New Zealanders' awareness of solar as a viable option for households and businesses said Heather Staley, Chief Executive of EECA. "Water heating represents up to half of a household's power bill, and the installation of a solar water heating system can cut these costs by up to 75%."

More than 22 000 NZ homes now have solar heating. EECA is working with the Solar Industry Association to find innovative ways to increase this number. "It is encouraging that in the last 12 months approximately 1700 new solar water heating systems have been installed in New

Zealand homes. This is an increase of 21% on the previous year," said Staley.

www.solarindustries.org.nz
www.solarsmarter.org.nz
EECA, 18 November 2004

memorandum of understanding in November.

"What we have done is a breakthrough for energy development and conservation in NZ," Logan said. "We have negotiated an agreement that spells out our activities and obligations over the next

Points from ASPO

The Association for the Study of Peak Oil (ASPO) Newsletter 45 (September 2004, available at www.peakoil.net) makes some interesting points:

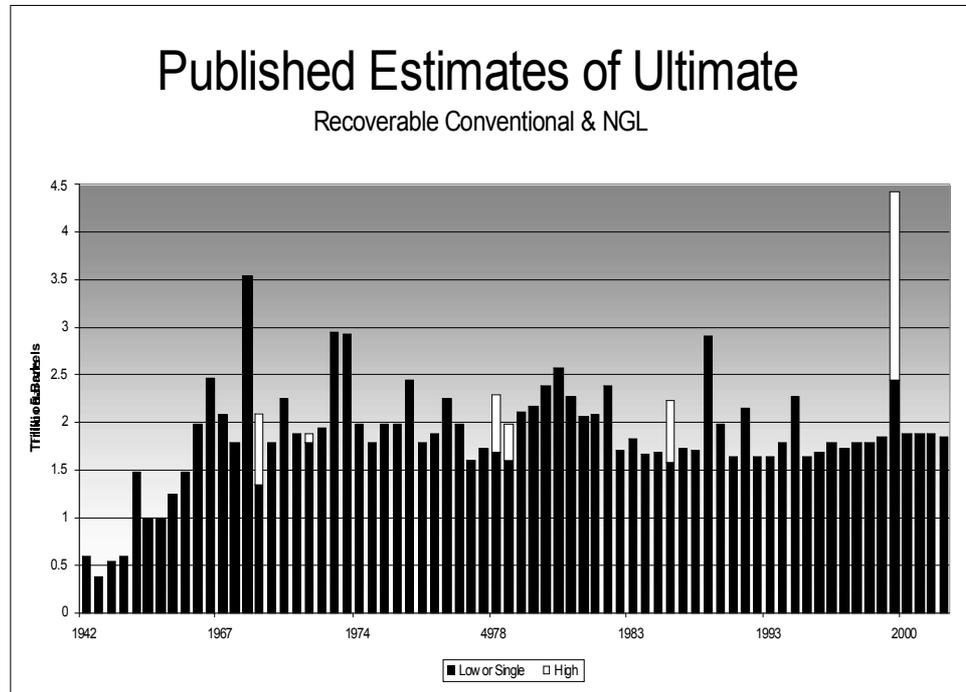
- Reported OPEC reserves are suggested to be overstated by 300 Gbbl (50 km³), or roughly a sixth of ultimately recoverable conventional reserves (including oil already produced).
- World-wide discoveries in the last decade have averaged 7.4 Gbbl/yr, or less than 30% of current demand (range 8–50%).
- A bar chart of some 70 estimates of ultimately recoverable conventional oil and natural gas liquids (made since 1942 — see the figure on this page), shows a general trend of estimates rising from roughly 0.5 trillion barrels (Tbbl: 1 Tbbl is equivalent to some 160 km³) in 1942 to stabilise at about 2.0 Tbbl in the period 1965–1980, then fall slowly to about 1.8 Tbbl today. The average of all estimates is 1.93 Tbbl.

Outliers are to be expected, especially in the earlier years, but a 1999 report is exceptional, with a low estimate of about 2.4 Tbbl and a high estimate of some 4.4 Tbbl.

(This will be the estimate that Dr Cullen is relying on: see page 16. — EW)

Transmission lines on DoC land

An agreement to allow environmentally-responsible electricity infrastructure development on public conservation land has been reached between the Department of Conservation and national electricity grid operator Transpower. DoC director-general Hugh Logan and Transpower chief executive Dr Ralph Craven signed a national



decade. There is huge public interest in the future of the energy sector in NZ, and what this agreement does is to ensure protection of conservation values on DoC-managed land, while allowing Transpower to get on with their job."

Transpower is planning to spend around \$ 1.5 bn on upgrading its network. Craven said this would include the construction of major new transmission lines. "The existing grid meets NZ's present needs, but looking to the future significant investment is needed to ensure a secure electricity supply. A significant portion of the national grid runs across public conservation land. Transpower is committed to working with DoC to ensure that transmission line upgrades and the construction of new lines are undertaken in a way which seeks to minimise the environmental impact." The agreement covers:

- A code of practice for Transpower workers accessing and operating on public conservation land to ensure protection of conservation values.
- Agreement on a consent application process under the Conservation and Resource Management Acts for line upgrades and construction of new lines, such as a new 400 kV line from Whakamaru to Otahuhu.

- Native tree trimming agreement.
- Easement concession for Transpower to secure tenure over existing and new lines.

Department of Conservation, 3 November, 2004

SEF Conference

The SEF Conference was held on 19–20 November at Rutherford House, Wellington. The SEF AGM was held on the Saturday (copy enclosed for members). Numbers were substantially up on last year, especially for the *Sustainable Energy* session (the new Government discussion document).

We have not included any summary in EnergyWatch because we expect the conference proceedings to be available very soon, on CD.

Toll and Fonterra confirm rail transport deal

In mid-November Fonterra and Toll NZ confirmed a 20 year deal for the transport of dairy products from the Waikato area. The deal would make rail, “the primary mode of transporting dairy products from the Waikato region.” A \$ 25 M freight centre will be developed at Te Rapa in Hamilton. Hamilton City Council has approved an ‘outline plan of works’ on 18 ha of industrial land.

Fonterra logistics general manager Nigel Jones said the agreement. “reflects Fonterra’s increased confidence in the country’s rail network since Toll took over rail operations and the Government acquired the tracks.” Fonterra will link freight operations at its Te Awamutu, Morrinsville, Waitoa, Hautapu, Waharoa, Lichfield and Tirau manufacturing sites by rail to the new freight village.

The deal would eventually cut about 45 000 truck movements (*each year?* – EW) from Waikato roads and the main highways between the Waikato, Auckland, and Tauranga, Jones said. Toll NZ chief executive David Jackson said the agreement was typical of the partnerships Toll was looking for. “It is an opportunity to co-invest capital in a long-term project that delivers value to stakeholders and will also have a significant influence on the efficiency and growth of rail in NZ,” he said.

• *Stuff*, 12 November 2004



(Sorry, we are out of Christmas Trees – but enjoy the break anyway! –EW)

EnergyWatch

Permission is given for individuals and educational or not-for-profit organisations to reproduce material published here, provided that the author and EnergyWatch are acknowledged.

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.

Publication is normally early in March, June, September and December, and material is posted on the SEF website (www.sef.org.nz) as a PDF file, three months after publication.

SEF membership

Memberships are for twelve months and include four copies of EnergyWatch.

Membership rates, including GST, are:

Unwaged / student	\$	27.00
Individual	\$	45.00
Library	\$	56.25
Corporate	\$	225.00

Mail the form below, with your payment or order, to The Sustainable Energy Forum Inc, P O Box 11 152, Wellington.

A GST invoice or receipt will be sent on demand.

Name: _____

Organisation: _____

Address: _____

Phone: _____ H/W

E-mail: _____

Membership type _____

Amount enclosed: \$ _____