EnergyWatch

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"Facilitating the use of energy for economic, environmental and social sustainability'

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Implementing sustainable energy targets in New Zealand

John Blakeley

The 2003 SEF Conference with the above title was recently held at UNITEC Institute of Technology in Mt Albert, Auckland (on 15-16 November).

The National Energy Efficiency and Conservation Strategy (NEECS) targets for implementing sustainable energy by 2012 are for:

- A 20% improvement in energy efficiency
- A 30 PJ increase in consumer energy from renewable resources.

In reviewing progress towards the targets, it appears that there are considerable difficulties in assessing what progress actually has been made in the first year (2001/02) in which these targets have been in place.

In the case of energy efficiency, factorisation is needed to take into account economic growth, modal change, weather variation (average temperature), and technical (fleet) change. It does become very difficult to compare one year with the next without taking such factors fully into account. Technical change is assumed to be a good proxy for measuring overall energy efficiency change. (In this context, 'fleet' means all built items including houses, appliances, machinery and motor vehicles).

Based on the data collected to date, EECA is hopeful that we are on track for a linear path towards achieving the target by 2012, but it is really too early yet to tell for sure. It is noted that fleet change may not always be positive. For example, as the motor vehicle fleet is updated we may be getting more energy-efficient engines, but if we are in fact replacing small cars with SUVs, then the net effect on national fuel consumption will be negative!

In the case of renewable energy, during the first year of NEECS (2001/2) rainfall-adjusted renewable energy increased by 2.2 PJ which is a 7.3% increase towards the 30 PJ target in 2012. However the impact of variation of annual rainfall on hydro-electric generation can overshadow changes in the production of other forms of renewable energy in a particular year because hydro is still the dominant (65%) means of electricity generation in New Zealand. In absolute terms renewable energy production actually decreased during the 2001 calendar year (a so-called 'dry year'), due to low rainfall restricting hydro use, but rainfall-adjusted renewable energy production increased. Generation from biogas, landfill gas, wind and solar energy all grew in 2001 but energy production from geothermal, industrial waste and wood waste all declined.

In summary, monitoring of progress during the first year of the NEECS indicates that New Zealand may be on track to meet the targets by 2012 of 20% improvement in energy efficiency and a 30 PJ increase in consumer energy from renewable sources. The problem is that to obtain progress figures it is necessary to adjust the energy consumption figures for annual temperature variation and other factors, and to rainfall-adjust the renewable generation annual figures.

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Implementing sustainable energy targets in NZ

(continued from page 1)

It may be two or three years before we have a clear indication from the data as to whether or not we are in fact likely to meet the targets, by which time it may be getting a bit late to take sufficient action to get back on track to achieve the targets by 2012.

My own personal view is that without substantially more "hands on" intervention by the government to encourage both energy efficiency and renewable energy generation, we are unlikely to meet the targets. In the case of renewable energy generation, it was noted at the recent SEF Conference that internationally, every country which is achieving success in encouraging significantly increasing "new renewable" energy generation is providing financial incentives or regulatory requirements to make this possible, and our own government has stedfastly declined to do this so far.

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SEF Conference Report

The 2003 Conference of The Sustainable Energy Forum was held at the UNITEC Carrington complex on 15–16 November. It was attended by about 35 people, including Green Co-leader Jeanette Fitzsimons.

Grateful thanks to EECA and UNITEC for making it all possible.

Thanks too to all involved, and especially the conference organisers and all presenters and 'discussers' whose ideas are given here without acknowledgement. That will come in the Conference Proceedings, to be published on CD early next year.

SEF Convenor John Blakeley opened the conference with a paper setting the scene:

- World-wide, we currently burn about four litres of oil for each litre discovered.
- Peak Oil is beginning to enter consciousness of decision-makers, both in NZ and world-wide.
- Whirinaki reserve generation power station — and others to come — is not an intelligent use of resources: better management of the electricity resource would have made more of a difference.
- Who is in charge? The Minister? The new Electricity Commission? Mad Max's invisible hand? or Dr Patrick Strange perhaps?
- If hydro storage is only enough for about 8 weeks, and the low-rain period in a typical 'dry year' is 12–14 weeks, how come nobody has a clear responsibility to make sure the lakes are full in late summer?
- Under these conditions, is it any surprise that perverse market incentives creep in? Or that we see other perverse effects, such as delayed investment?

A selection of the many good points made in other presentations and discussion is given below. These points are randomised for browsing, rather than grouped by subject or presentation. Or cut them out and rearrange them any way you like:

- If Kyoto fails it will change policies but not the overall drive to reduced emissions.
- Expect climate surprises.
- Spend the serious money on renewable energy.
- The Electricity Commission need to be aware of perverse effects — especially delayed investment — and consider demand as well as supply.
- The Ministry of Economic Development (MED) still see very little take-up of wind generation before 2025
- Could this be because MED are limiting themselves to sites where the wind run is already established?
- When gas peaks it doesn't fade like oil: it falls off a cliff.
- Value energy for what it can do, not what it costs to supply.
- What if the balance of payment deficit is eliminated by not importing oil?
- Look at the end of Maui gas as an opportunity, for wind, solar and the wall of wood.
- Negotiated Greenhouse Agreements are themselves a barrier, especially for small firms.
- Climate change is instability more than temperature change, and changes may not be incremental.
  (Thus invalidating an assumption of the Kyoto Protocol).
- On MED projections we are increasingly dependent on importing unsustainable — and perhaps unavailable — fossil fuels.
- The data hangs together: over the last 15 000 years, wind speeds in Venezuela correlate with Greenland ice cores.
- There may not be a win-win solution.
- Melting the arctic ice will change the albedo of the polar regions and complete the melting.
- Accountants like MED energy projections because they are official.
  (And the accountants can't be blamed if MED are wrong).
- Go for the Learning Economy of Scale : do it and get better at it.
- Should we provide mandatory energy efficiency information for house sales, as in ACT?
- In NZ we can substantially improve energy efficiency per unit of GDP by closing some industries.

- Beware of behavioural changes: buy a heat pump for efficiency, but then use it for cooling...
- Too much melting may turn off the thermohaline effects that drive the Gulf Stream (excess melt > more fresh water in the sea > less salt > less density change with evaporation > no extra-dense water sinking off Greenland), making NW Europe as cold as Canada.
  But not cold enough to overwhelm the average temperature rise.
- Avoided energy use is inherently unmeasurable: the best you can do is hope it will show up somewhere in reduced energy use.
- Making a 100 kW fuel cell stack uses 1 kg of platinum.
- Transport energy flow needs to be measured well-to-wheel, not tank-to-wheel.
  (Let alone carburettor-to-clutch)
- Emissions from NZ vehicles (largely PM_{10}) kill 200 people a year.
- We should be able to get PV roofs on most new buildings from about 2020.
- What is industry's ability to reduce demand by savings?
- Validate energy supply models by making each fuel in turn very expensive, to check the effects.
- There will be no major growth in renewables without government intervention.
- Social benefits of energy efficiency include improved health (home insulation); and new employment opportunities, especially rural.
- Business-as-usual will double emissions by 2045.
- Emissions trading is a possibility only if a market is established and prices are reliably below $ 25/t (the NZ Government's proposed cap price).
- We are hamstrung for data.
- We need to embrace 'strong' sustainability: the economy is part of society, which is part of the environment: the environment is more important than either or oth of the other conierations.
- In the 1970s the price of oil rose to the cost of coal liquefaction, but that cost is now US$ 50-–100 a barrel (€ 260–530/m^3). Yet MED now base their projections to 2025 on $ 35 /bbl.
  (At least this is an improvement on $ 22/bbl)
- Reduce electricity transmission loses (typically 10%): generate nearby where possible.
- If you project tragedy you get tragedies, if you project opportunity you get opportunities.
- Abrupt climate change is conceivable and should be factored in; half the total warming since the last ice age was in less than 10 years.
- Second-hand Japanese imports tend to have fewer emissions than same-age vehicles bought new in NZ.
- By next March, two petrol-electric hybrid cars will be available in NZ: Toyota Prius (4.4 l/100 km) and Honda Civic (4.9 l/100 km).
  But the diesel Citroen C3 gives 4.3 l/100 km!
- We can get at least 11 Ml of bio-ethanol from whey. But why not cut out the cow and go straight from grass to ethanol?
- Very large energy savings are economic for all-new systems, if we can get them right first time: Lighting, heating and cooling — 90%; Appliances — 75%; Motors — 40%.
- We can get about 5% of diesel from tallow. Biodiesel is fully biodegradable (fish food).
- Some biodiesel in all buses is cheaper and gives lower emissions than all-biodiesel in some buses.
- Diesel hybrid cars capable of running on neat biodiesel (B100) should be available in about 2 years and will be a very good option.
- Scientific opinon on climate change is not split 50/50, as is often presented. The split is more like:

No problems	5–10%
Problems	80–90%
Big problems	5-10%

The SEF AGM was also held, and a copy of the minutes and reports is (hopefully) inserted in member's copies of this edition of EnergyWatch.

Peak Oil in a decade?

World oil and gas supplies will peak soon after 2010 and become increasingly scarce thereafter, causing world-wide economic havoc unless societies have adopted alternatives to fossil fuels, Swedish scientists predict. Geologists at the University of Uppsala in Sweden say that conventional forecasts of a peak in 2050 are off-base because oil and gas supplies are 80% smaller than widely believed.

New Scientist, 2 October 2003

Climate-friendly projects response

Office of the Minister of Energy, 30 October 2003

A total of 45 project proponents have submitted bids for the four million emission units of 'carbon credits' (equivalent to 4 x 10^6 tonnes of CO_2) being offered in the first tender round for Projects to Reduce Emissions.

"This hugely positive response shows that a healthy number of businesses, both public and private, are keen to reduce emissions of greenhouse gases and be rewarded for it," says Pete Hodgson. "The high number of bids and the variety and innovation they involve means we will be able to choose the very best projects on offer. This is good for NZ and good for business."

The projects include wind farms, hydro and geothermal electricity projects, proposals for generating electricity from landfill gas, a range of bio-fuel and bio-energy projects and schemes for waste treatment. Most bids are for projects that will generate or reduce the demand for electricity.

"On first reading, many of these projects will meet the Government's objective of making NZ's electricity supply more secure and contribute to the target for renewable energy. They are an important step in taking NZ towards a clean, green and sustainable energy future."

The New Zealand Climate Change Office is evaluating the tenders and will make a set of recommendations to an independent assessment panel. To be eligible, projects must deliver a minimum reduction in emissions during the first commitment period of the Kyoto Protocol (2008-2012); go beyond business-as-usual; and achieve measurable reductions in greenhouse gas emissions that would not have happened otherwise.

If the pool of four million emission units is oversubscribed, priority will be given to projects that will contribute most to electricity security in the near future. Successful projects will be decided by early December and the first project agreements between project owners and the Government are expected to be finalised before Christmas. Others will be completed early in the New Year.

Unflued gas heaters

From discussion on SEF News

About a third of New Zealand. households have unflued heaters — usually LPG. They are cheap to buy and reasonably cheap to run. An advantage for some users is that they still work when the power is cut off. They are especially popular in rental homes, where the tenants have no incentive to insulate. But LPG heaters can be dangerous, mainly because the combustion products stay in the room. Their problems include:

- The carbon dioxide (CO_2) produced by combustion (3 molecules of CO_2 from burning one molecule of propane, one of the two main components of LPG) can easily rise to 1000 ppm, making the room feel very stuffy. CO_2 begins to affect breathing at 3000–4000 ppm.
- Some carbon may burn to carbon monoxide (CO) instead of CO_2. This incomplete combustion is indicated by a yellow/orange flame instead of the usual blue, and is often caused by dust or clothing blocking air intakes. Carbon monoxide is very toxic: 800 ppm causes unconsciousness in about 2 hours. Early symptoms include blue fingernails and a headache. This toxicity is part of the basis for calls to ban such heaters; that unconsciousness very quickly leads to death.
- Much of the water produced by combustion condenses (4 molecules of water from burning one molecule of propane). Damp rooms contribute to asthma and poor health generally (and may not be good for the building either). BRANZ surveys show that a household with an LPG heater is more than twice as likely as as an average house to have a dehumidifier. An alternative is fresh air ventilation through a heat exchanger, but this needs to be built into the house and is not cheap — of the order of $ 1800, plus installation.

The NZ Energy Safety Service says:

> *Portable gas heaters such as LPG cabinet heaters and unflued space heaters need special care. Always keep a window open when these heaters are in use. Never use them in a bathroom, bedroom or confined space.*

However, 'confined space' is not defined. Leaving the window open creates drafts and lets out the heat, so the advice is often ignored.

Unflued gas heaters are also a fire risk — another justification for banning them. Risk factors include drying clothes too close to the heater; children playing around it, and poor maintenance.

Eating fossil fuels

Dale Allen Pfeiffer

(This article is abstracted from From The Wilderness Publications, and presents a terrifying picture of the possible consequences of Peak Oil. The full article is available at: www.fromthewilderness.com/members/100303_eating_oil.html — EW)

Until the last century, all food energy was derived from the sun through photosynthesis. You ate plants, or animals that fed on plants. To increase production, you had to increase the area under cultivation. The Green Revolution of the 1950s and 1960s industrialised agriculture. In 35 years world grain production increased by 250%. The extra food came from fossil fuels, in the form of fertilisers, pesticides and hydrocarbon-fueled irrigation. The Green Revolution increased the energy flow to agriculture by an average of 50 times the energy input of traditional agriculture.

In the US, 1500 litres of oil equivalent are now used annually to feed each American *(That's twice as much as most people drink — EW).* Agricultural energy consumption is broken down as follows:

Manufacture of inorganic fertiliser	31%
Operation of field machinery	19%
Transportation	16%
Irrigation	13%
Raising livestock (not including livestock feed)	8%
Crop drying	5%
Pesticide production	5%
Other	3%

In a very real sense, we are eating more and more fossil fuels.

In 1994, David Pimentel and Mario Giampietro derived an overall figure of 10 Joules of fossil fuel to produce one Joule of food delivered to US consumers. Plainly, as fossil fuel production begins to decline, there will be less energy available for food production.

Soil, cropland and water

Modern intensive agriculture is unsustainable. It has augmented soil erosion, polluted and overdrawn groundwater and surface water, and even caused public health problems. Soil erosion, overtaxed cropland and water resource overdraft in turn lead to even greater use of fossil fuels.

In a natural environment, topsoil is built up by decaying plant matter and weathering rock, and protected from erosion by growing plants. Former prairie lands, the bread basket of the US, have lost half their topsoil after farming for about 100 years. The remaining topsoil is depleted of nutrients, and eroding at 30 times the natural formation rate. Much of it is little more than a sponge, into which we must pour hydrocarbon-based fertilisers in order to produce crops. Every year in the US, around 12 000 km^2 of cropland are lost to erosion, salinization, water logging and urbanisation.

Modern agriculture also strains water resources. Producing 1 kg of maize requires 1400 kg of water. There is an overdraft from many water resources: the Colorado River is diverted to a trickle, and the Ogallala aquifer, that supplies water to much of the southern and central plains states, will become unproductive in a matter of decades.

The use of hydrocarbon-based pesticides in the US has increased 33-fold in 20 years, yet each year we lose more crops to pests. This is the result of the abandonment of traditional crop rotation practices. Nearly half of US corn land is grown continuously as a monoculture. The results is more corn pests, needing the use of more pesticides.

US consumption and population

The average American consumes almost a tonne of food a year, one third higher than the world average. Some 30% of it comes from animal sources, including dairy products.

The US population is projected to double by 2050. As the population expands, an estimated 0.4 ha of land will be lost for each additional person. Currently, there is 0.7 ha of farmland available to grow food for each US citizen. On present trends, by 2050 this will decrease to 0.25 ha/person, half the area needed to maintain current dietary standards using current methods.

Presently, only two nations are major exporters of grain: the US and Canada. By 2025, it is expected that the US will cease to be a food exporter. Millions of people around the world could starve to death without US food exports.

There are some things we can do. Streamlining agriculture to get rid of losses, waste and mismanagement might halve the energy inputs for food production. In place of fossil fuel-based fertilisers, we could utilise livestock manures that are now wasted. Perhaps the most effective measure would be to eliminate all meat from our diet.

Pimentel and Giampietro postulate that a

sustainable food system requires that four conditions be met:

- Environmentally sound agricultural technologies are implemented.
- Renewable energy technologies are put into place.
- Major increases in energy efficiency.
- Population size and consumption are compatible with maintaining the stability of environmental processes.

If the first three conditions are met, the authors place the maximum US population for a sustainable economy at 200 million, or two thirds of present population — but present population growth is 1.1%/yr.

None of this research considers the impact of declining fossil fuel production. The current peaking of global oil production (and subsequent decline of production), along with the peak of North American natural gas production will very likely precipitate this agricultural crisis much sooner than expected.

Three choices

Considering the utter necessity of population reduction, there are three obvious choices:

- Be aware of our dilemma and consciously choose not to increase population. This would be the most welcome of our three options, but it flies in the face of our biological imperative to procreate, the refusal of the Religious Right to consider issues of population management, and a strong business lobby to hold down the cost of labour by immigration.
- Force population cuts through government regulations. Is there any need to say how distasteful this would be?
- A die-off. This offers an unspeakable picture of suffering and death, but is what will happen if we do not consciously choose otherwise.

Does our present lifestyle mean so much to us that we would subject ourselves and our children to this fast approaching tragedy simply for a few more years of conspicuous consumption?

(Could there be some connection between these stark choices and the curent publicity about New Zealand losing land to foreigh ownership? — EW)

The end of the oil age

The Economist, 23 October 2003

(An edited version of an article whose source is as important as its content — EW)

"The stone age did not end for lack of stone, and the oil age will end long before the world runs out of oil." This intriguing prediction is from Sheikh Zaki Yamani, and his words are rich in irony. Yamani first came to the world's attention as Saudi Arabia's oil minister during the Arab oil embargo of the US, which began three decades ago and whose effects altered the course of modern economic and political history. Coming from such a source, the prediction — one assumes — can hardly be a case of wishful thinking.

Finally, advances in technology are beginning to offer a way for economies, especially those of the developed world, to diversify their energy supplies and reduce their demand for petroleum, thus loosening the grip of oil and the countries that produce it.

Hydrogen fuel cells and other ways of storing and distributing energy are no longer a distant dream. Switching to these new methods will not be easy, or cheap, especially in transport, but with the right policies it can be made both possible and economically advantageous. Unfortunately, many of the rich world's governments — and above all the US government — are reluctant to adopt measures that would speed the day when the Saudis' worst fears come true.

The € 6 trillion heist

If treating the West's addiction to oil will be costly, is it really worth doing? To be sure. Petro-addiction imposes mighty costs of its own.

First, there is the political risk of relying on the Organisation of Petroleum Exporting Countries (OPEC). Oil still has a near-monopoly hold on transport. If the supply is cut off even for a few days, modern economies come to a halt. And geology has granted two-thirds of the world's proven oil reserves to Saudi Arabia and four of its neighbours. Because of this concentration of supply, the risk of a disruption to oil flows will continue to be a threat, and may even rise.

That points to a second sort of cost. According to one American government estimate, OPEC has managed to transfer a staggering € 6 trillion from US consumers to producers over the past three decades, by keeping the oil price above its true

market-clearing level. That estimate does not include all manner of subsidies doled out to the fossil-fuel industry, ranging from cheap access to oil on government land to the ongoing American military presence in the Middle East.

The final disguised cost of oil is the damage it does to the environment and human health. Unlike power plants, which are few in number and so easier to regulate, cars are ubiquitous and much more difficult to control. The transport sector is a principal source of global emissions of greenhouse gases.

Reducing oil dependence

The only long-term solution to this connected set of problems is to reduce the world's reliance on oil. Achieving this once seemed pie-in-the-sky. No longer. Hydrogen fuel cells are at last becoming a viable alternative. These run cleanly for as long as hydrogen is supplied, and might power anything in or around your home — notably your car. Hydrogen is a fuel that, like electricity, can be made from a variety of sources: fossil fuels such as coal and natural gas, renewable, even nuclear power. Every big car maker now has a fuel-cell programme, and every big oil firm is busy investigating how best to feed these new cars their hydrogen.

Another alternative likely to become available in a few years is bio-ethanol. Many cars (quite a few of them in the US) already run on a mixture of petrol and ethanol. The problem here is cost. At the moment, the ethanol has to be heavily subsidised. But that might alter when biotechnology delivers new enzymes that can make ethanol efficiently from just about any sort of plant material. Then, the only limit will be how much plant material is available.

All in good time

Such changes will not occur overnight. It will take a decade or two before either fuel cells or bio-ethanol make a significant dent in the oil economy. Still, they represent the first serious challenges to petrol in a century. If hydrogen were made from renewable energy (or if the CO_2 generated by making it from fossil fuels were sequestered underground), then the cars and power plants of the future would release no local pollution or greenhouse gases. Because bio-ethanol is made from plants, it merely borrows carbon from the atmosphere and cannot add to global warming. What is more, because hydrogen can be made in a geographically distributed fashion, by any producer anywhere, no OPEC cartel or would-be successor to it could ever manipulate the supplies or the price. There need never be another war over energy.

It all sounds very fine. What then is the best way to speed things up? Unfortunately, not through the approach currently advocated by President George Bush and America's Congress, which this week has been haggling over a new energy bill.

Time for change

America's leaders are still concerning themselves almost exclusively with increasing the supply of oil, rather than with curbing the demand for it while increasing the supply of alternatives. Some encouragement for new technologies is proposed, but it will have little effect: bigger subsidies for research are unlikely to spur innovation in industries with hundreds of billions of dollars in fossil-fuel assets.

The best way to curb the demand for oil and promote innovation in oil alternatives is to tell the world's energy markets that the externalities of oil consumption — security considerations and environmental issues alike — really will influence policy from now on. And the way to do that is to impose a gradually rising gasoline tax.

By introducing a small but steadily rising tax on petrol, America would do far more to encourage innovation and improve energy security than all the drilling in Alaska's wilderness. Crucially, this need not be, and should not be, a matter of raising taxes in the aggregate. The proceeds from a gasoline tax ought to be used to finance cuts in other taxes — this, surely, is the way to present them to a sceptical electorate.

Judging by the debate going on in Washington, a policy of this kind is a distant prospect. That is a great shame. Still, the pace of innovation already under way means that Sheikh Yamani's erstwhile colleagues in the oil cartel might themselves be wise to invest some of their money in the alternatives. One day, these new energy technologies will toss the OPEC cartel in the dustbin of history. It cannot happen soon enough.

(New Zealand's isolation means that the taxation proposed by The Economist could be applied here without difficulty, and our very high transport energy use means that our economy would benefit more than most — EW)

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London's congestion charge — six months on

(An edited version of the summary of the Transport for London (TfL) report 'Six months on.' The full report can be downloaded at: http://www.tfl.gov.uk/tfl/cc_intro.shtml — EW)

The congestion charging scheme directly tackles four key transport priorities for London: reducing congestion; improving bus services; improving journey time reliability for car users; and making the distribution of goods and services more reliable, sustainable and efficient. It has also raised significant funds to improve London's transport system.

Key Findings

The report concludes that:

- Congestion in the zone has dropped by around 30% — at the high end of TfL's expectations — and congestion is now lower than at any stage since the mid-1980s.
- The number of motor vehicles entering the zone during charging hours has dropped by 16%, with 50 000 fewer cars/day being used in the charging zone. Most of the displaced drivers have switched to other modes, or now bypass the central area. Only 4000 fewer people are coming to the charging zone each day
- Car journeys to and from the charging zone are quicker and more reliable — car journey times have decreased by an average 14% and reliability has improved by an average of 30%.
- Public transport is coping well with the increased number of passengers. Bus operations are now more reliable, with excess waiting time at stops reduced by a third, and lost kilometres due to traffic delays cut by 60%.
- No significant traffic displacement around the zone has been observed. Meaasured changes are in the range ±7%.
- Provisional data suggests a 20% reduction in crashes within the zone. Concerns about increases in two-wheeled vehicle crashes (particularly motorbikes) seem to be unfounded.
- The various payment systems are working satisfactorily.
- Call centre enquiries have fallen from an average of 167 000 calls/week to 70 000.
- Since the start of charging, penalty charge notices (PCNs) have been issued at an average rate of over 100 000/month. Payment rates have steadily increased, and 61% of those issued in August were paid by the end of September.
- Although the net revenues from the scheme are less than anticipated, some €M 100 in net revenues will be raised in 2003–04 and €M 110 –140 in future years, for reinvestment in further transport improvements.
- The public remain supportive of the scheme.

Economic impact

Concerns about the impact of charging economic activity appear to have been misplaced. Fewer people are now coming into central London for a variety of reasons. The 'Footfall Index', a measure of people visiting retail centres, indicates a 7% year-on-year decline within the charging zone, and that retail activity in central London during the first half of 2003 was notably lower than the equivalent period in 2002. However, since 85-90% of people coming into central London travel by public transport, the relative impact of reduced car users is minimal. Reduced traffic delays, improved journey time reliability, reduced waiting time at bus stops, and lower fuel consumption resulting from congestion charging all have economic benefits.

Improvements to operations

Most aspects of paying the charge have been satisfactory for most people, but TfL's monitoring highlighted some concerns. In August, changes were made to TfL's contract with Capita, who agreed to provide an enhanced service by the end of March 2004. This re-negotiation was not unexpected given the new, innovative and unique nature of the scheme. Indeed, the original contract envisaged substantial changes would be made through a change control process and a six monthly review of the performance regime.

Enquiry numbers through the call centre are now about 40% of calls in the first weeks of operation, due to increased public awareness of the scheme and reduced use of the call centre for payments.

London's success

Less congestion and fewer vehicles have eased the strain of travelling around central London leading to improved quality of life for those who live in, work in, or visit central London.

London's congestion charging scheme, whilst having a few teething problems, is tackling the Mayor's key transport priorities and helping improve London and its environment. TfL will continue to monitor its impacts closely to ensure that these benefits are maintained.

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Canterbury Sustainability Expo 2004

Christchurch, New Zealand

31 January – 1 February 2004

Explore renewable energy and sustainable options:

- Energy efficient building design and new housing;
- Solar electric PV, solar hot water and wind energy systems;
- Composting toilets, waste water systems, grey water uses;
- Efficient insulation and glazing;
- Cooking appliances' information;
- Alternative transport technologies;
- Permaculture.
- Education: speakers, demonstrations, working displays.

Contact Organiser: John Veix
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Ph: 64 274 576 527
E-mail:john@gosolar.co.nz
Web: www.gosolar.co.nz click on Expo 2004

Emission tests for car WoF

Cars will have to pass emission tests to get Warrants of Fitness from 2006, the Government has announced. Associate Transport Minister Judith Tizard said new transport rules will bring in exhaust testing as part of car inspections. Pre-used imported vehicles will also have to pass emissions standards as part of pre-registration tests. Tizard said the details on what standards would be applied had yet to be decided.

Russia keeps everyone guessing on Kyoto

Brian Fallow, NZ Herald, 6 October 2003

(See: http://www.nzherald.co.nz/storydisplay.cfm?reportID=57030 for the full article — EW)

Russian dithering over Kyoto is keeping much of the NZ Government's climate change policy up in the air, and corporate planning with it. Central to the policy is a carbon tax, planned for 2007, but it will be adopted only if the protocol is in force and without Russia that treaty will fall over.

The Climate Change Office has applications for negotiated greenhouse agreements. *(See page 5 — EW)* Uncertainty about whether Kyoto will get up clearly affects the value of those credits.

Kyoto will be binding only if it is ratified by countries responsible for at least 55% of 1990 developed-country emissions. It has been ratified by almost all of Europe, Japan, Canada and New Zealand, collectively accounting for 44.2% of the required total. But the United States (36.2%) and Australia (2.1%) have said they will not ratify, leaving Russia's 17.2% as the deciding factor.

Equivocal comments by President Vladimir Putin, addressing a world climate change conference in Moscow at the end of September, have shaken the expectation that Russia will ratify because not to do so — in the words of Energy Minister Pete Hodgson — would be to set light to a very large cheque. Russia's emissions have dropped by nearly a third since 1990. This gap is likely to make Russia the dominant seller of carbon credits. But Russia is a major oil and gas exporter, and that creates an influential anti-Kyoto constituency, arguing that weaning the world off fossil fuels is not in Russia's longer-term interests. While Russia seeks to discover through negotiations with the Europeans what signing up to Kyoto is worth, the Kyoto-dependent elements of climate change policy here will remain in doubt.

The NZ Government is set to impose a carbon tax in 2007, if Kyoto comes into force. The rate will depend on the international price of carbon credits, subject to a cap of $ 25/t of CO_2. That would add about 6c a litre to the price of petrol, but the actual rate may be lower. Econometric modelling by the Australian Bureau of Agricultural and Resource Economics this year concluded that the strategy

that would maximise the net present value of Russian carbon credits would result in a carbon price of around €11/t or about 5c/l on petrol.

If Kyoto falls over, will large corporates lose interest in Negotiated Greenhouse Agreements (NGAs)? Not necessarily, says Martin Harvey, of the Climate Change Office. Most of the firms contemplating NGAs are looking to the longer term. They see climate change and emissions management as an issue, and moving to world's best practice in emissions is valuable in any case. "They see this as a reasonable risk management strategy regardless of what happens to Kyoto."

Infrastructure investment company Infratil has urged the Government to bring in a carbon tax early, arguing that uncertainty is having a chilling effect on investment in renewable and thermal generation alike. "We think CO_2 pricing is real and and is here to stay with or without the Kyoto Protocol," Infratil's Bruce Harker said. "We would like them to get on with it, starting at a low level and ramping it up." Infratil says that without a carbon tax, NZ is heading for a coal-fired future; but with a tax of $ 15/t of CO_2 wholesale electricity prices would rise from less than 6.0 c/kWh now to the 6.7–7.0 c/kWh range, at which wind power and some further hydro generation would become viable. Harker says that without a carbon tax there is a risk of a worst-of-both-worlds outcome where investment uncertainty means neither coal nor renewable get developed.

(Infratil is not disinterested; it has about a one third share in 400 MW of small-scale hydro generation and a wind farm)

Help Wanted

Survey of PV installations in NZ

The NZ Photovoltaic Association would like to gather information about existing or planned photovoltaic (PV) installations in New Zealand, on or off the grid. This will assist in compiling a comprehensive database of installations.

If you know about any existing PV installations or have installed a PV system of any kind, please complete the survey online:

http://www.photovoltaic.org.nz

You do not need to answer all of the questions. We welcome any information you can provide.

NZPVA

US doubles LNG imports

From the newsletter of the US Office of Energy Efficiency and Renewable Energy, spotted by Nigel Isaacs

US imports of liquefied natural gas (LNG) in the first half of 2003 were more than double imports in the first half of 2002. DoE's quarterly report found that the US imported a total of 5.7 billion m^3 (5.7 km^3) of LNG during the first half of 2003, and 6.5 km^3 in the whole of 2002.

The increase reflects a new emphasis on ways to meet natural gas demand. Although natural gas can be brought to the continental US from Alaska, Canada, and Mexico by pipeline, overseas sources must be converted to LNG for shipping. LNG imports are currently coming from Algeria, Nigeria, and Trinidad.

See 'Summary Reports' at:
http://www.fe.doe.gov/programs/gasregulation/analyses/analyses.html

Recent US contracts

Major US energy companies continue to announce agreements for future supply of LNG. Two agreements signed in October are:

- A 20-year contract to import LNG from Nigeria at a rate of about 3.3 km^3 /yr, by BG LNG Services.
- A 25-year contract to import LNG from Qatar at a rate of about 20 km^3 /yr, by ExxonMobil, starting in 2008 or 2009.
  (That's a single contract for three times the current rate of delivery — EW)

Security and environmental concerns still make it difficult for LNG importers to build new import terminals. One answer is to build terminals in Mexico and import to the US by pipeline; another is to build a floating terminal offshore.

LNG in NZ

In mid-October, Contact and Genesis announced an alliance to explore the development of an LNG terminal. The press statement says we face the prospect of a primary energy 'gap' from around 2008–2010, with only small new gas fields being developed, and continued demand growth. At least they expect to see growth in renewables, but, "it is far from clear that these sources alone will be enough to fill the gap. To fill any remaining energy

deficit, NZ faces two choices: coal or LNG".

On the likely costs of LNG, SEF member Rob Bishop reports:

> *I was at a conference in the US* [in October], *and a reasonably large (US$M 20/yr) gas purchaser said they had just signed a long-term contract at US$ 10/thousand ft³, which is basically equivalent to a GJ. (Others at the conference were amazed that they could get a long-term contract)*

That is about € 8.50/GJ, or NZ$ 17/GJ: around 8 times the cost of Maui gas, and 20% higher than the upper range given by Matthew Simmons as recently as August (NZ$ 8/5–13.50/GJ, EW 30, September 2003, page 4).

But still we see pieces such as the Dominion Post (31 October 2003), quoting Harvey Weake of Methanex as saying:

> *Experts are saying that to achieve 2.5% economic growth, NZ will need 150 MW more power every year. The Government is aiming for 4.5% growth, which means we'll need 300 MW more power each year.*

Electricity Commission appointed

NZ Government, 14 September 2003

Energy Minister Pete Hodgson has announced the chairman and members of the new Electricity Commission.

Roy Hemmingway from Oregon, USA will chair the Commission. He brings extensive experience in the regulatory management of electricity and other utilities. His most recent position was chair of the Oregon Public Utility Commission. His achievements included policy development for a competitive electricity market establishing agencies to encourage energy efficiency and renewable resource investments. Hemmingway has also worked as an energy consultant. He has a law degree.

David Close is a former Christchurch City Councillor and, until recently, a director of Transpower. He has a sound knowledge of the electricity industry and extensive experience as a local body politician and as a board member of commercial, voluntary, Maori and charitable organisations.

Douglas Dell trained as an engineer and has worked in the electricity industry throughout his career. His experience includes pricing, infrastructure development, marketing and operational management. He is currently an energy consultant, based in Auckland.

Peter Harris is a former CTU economist with an extensive background in research, analysis and advocacy. He has been involved in national and international trade issues. His most recent appointment was as economic advisor to Finance Minister Michael Cullen.

Graham Pinnell is a professional engineer and a farmer. He has a strong understanding of electricity industry governance, having been a consumer nominee on a number of electricity industry bodies.

Christine Southey has until recently been a director and partner in a consulting firm specialising in the energy sector. She has a comprehensive knowledge of the regulatory and contractual arrangements governing the sector, acquired through her involvement in a number of key industry projects. Before her consulting role Southey was a partner in a national law firm, where her practice focused on the energy sector and competition law.

Electricity Commission dilemmas

SEF Life Member Molly Melhuish points out a comment by Tony Baldwin, who was chair of the Officials' Committee on Energy Policy for many years. His conclusion is:

> *The key risk now is that industry is neither a market nor centrally planned, but pretends to be both. The Government's new structure is a strange hybrid in which boundaries of risk and responsibility are obscure. The outcome is likely to be in increase in waste. Gaming will grow. Electricity prices will rise more than they need to. Investment in new supply is likely to be inefficient. Overall, the economy and the environment will face higher costs. In short, the Major Users' decision to push for Government intervention will prove to be short-sighted.*
>
> *NZ's electricity industry stands at a cross-roads and the Government's new sign post has not one but several arrows, each pointing in different directions.*

The reality, of course, is that all roads in electricity now lead to the Government.

The full piece is at:
http://www.nzherald.co.nz/business/businessstorydisplay.cfm?storyID=3525276&thesection=business&thesubsection=dialogue&thesecondsubsection=

NZ Herald, 25 September 2003

Wind, hydro and reserve generation

From the SEF discussion group

(A key point to recognise here is that an intermittent energy source can still be useful —EW)

Wind turbines are a sustainable way to eke out water storage for hydroelectricity. 'Hydro-firming' is the term, but treating the wind resource as 'negative demand' might be an easier concept for the non-expert.

But as usual, it is not quite as simple as that:

- Power from a wind farm is more stable than from a single turbine, simply because a gust or lull cannot hit all turbines at the same time. Multiple wind farms are more stable again, for much the same reasons.
- The combination of reasonably stable supply and acceptably accurate weather forecasting make wind power a reliable supply source in the short term; say 4 – 24 hours, the period typically used to match supply and demand.
- Wind power is much less reliable in the medium term — up to a month or two — because wind speeds are difficult or impossible to forecast over such a long period.
- Wind power becomes more reliable in the longer term — say three months or more — because the forecasting problem becomes a matter of statistics. Annual variability is about ±10% for wind and ±15% for hydro at the 1:20 year level.
- There is some evidence that winds tend to be stronger in dry years. They tend to be associated with El Ñino years which bring lower rainfall with higher wind speeds and longer runs from the southwest.
- Two limitations on using wind power for hydro-firming are that it might not be used early enough (see below), and that reserving it for dry years would be a poor use of a resource with high capital and low running costs.

An important part of the dry year problem is deciding when to start using the alternatives. The market responds only slowly to falling inflows to the hydro lakes in the late summer or early autumn. Those inflows are inherently 'lumpy' and there is a natural tendency to expect that it will 'come right next week.' Combine this with perverse incentives to allow prices to rise, and market failure is almost preordained.

On the other hand, keeping the hydro lakes too full is good for security but bad for both profits and sustainability.

(We suggest that there are two more points here for the Elecrtricity Commission:

- *Some serious data analysis is needed on the reliability of any increased wind run in a dry year.*
- *Bids into the electricty market must be accepted late enough for a wind energy bid to be based on a good quality weather forecast. —EW)*

Pink thositive

One SEF News comment was:

...and total wind generation for the foreseeable future will be small anyway, relative to hydro.

Well, it depends what you mean by foreseeable future, and how determined you are to get there.

Wind provides 0.6% of total supply at present: If this is expanded at 30%/yr (the current international growth rate) starting after, say, a 3 year lead time, we can reach 40% of total current generation by 2020. Obviously these numbers are simplistic, but they do illustrate how quickly we could respond. If the pessimists are even half right about Peak Oil, and the optimists are even a quarter right about NZ's wind potential, this is just the kind of thinking we need.

(Statement of interest: the editor holds shares in Windflow Technology —EW)

Demand-side exchange launched

Vector & EECA, 30 September 2003

Vector has launched NZ's first national demand-side energy exchange. Vector and the Energy Efficiency and Conservation Authority (EECA) have also announced a partnership to promote the use of the system and increase awareness of demand-side management options available to businesses.

Heather Staley, CEO of EECA, says exchanges enable large to medium electricity consumers to participate more actively in the market and will play a key role in meeting NZ's electricity needs. "To keep NZ competitive with the rest of the world we have to think beyond traditional supply-side solutions."

Vector's project manager, Duncan Head, says the exchange provides an internet-based forum for buyers and sellers. "The exchange enables energy customers, who have the flexibility to reduce or shift energy consumption for short periods (discretionary load), to sell it to buyers, who then benefit from reduced demand at specific times. This essentially creates a market for interruptability." Head says the demand-side exchange means the energy industry and large energy users can take advantage of the system to help manage risks such as wholesale price volatility, transmission and line congestion charges and dry years. It also provides asset owners with an opportunity to further optimise their existing infrastructure, "so it's basically a win-win situation for all involved."

EECA is offering financial assistance to customers who are able to effectively participate in an exchange. "Developing the customers understanding of the opportunities presented by an exchange and ensuring they have the technology required is an important step in enabling them to participate, said Staley.

The exchange is open to the industry and any large energy consumer. It has already facilitated three transactions this winter and is expected to evolve as its users needs grow.

Solving noise problems in Windflow's prototype

Windflow Technology Ltd have shut down their Gebbies Pass turbine for modifications aimed at further reducing sound levels. "The prototype is operating more efficiently than we had predicted," said Windflow CEO, Geoff Henderson. "So we are confident that it is a commercially competitive source of electricity. However, its sound emissions have also been higher than predicted."

Windflow agreed to an unusually low noise level of 30 decibels (dBA), to overcome site-specific objections under certain wind conditions. McQueen's Valley is sheltered in most wind conditions and particularly quiet. The District Council's usual requirement is 40 dBA and the wind turbine is emitting about 35 dBA. By comparison a modern household refrigerator emits about 44 dBA.

"These are not high sound levels," said Henderson, "they simply stand out because of the low frequency and the very low night-time sound levels. The company undertook not to allow the prototype to operate for more than three months if the sound levels exceeded 30 dBA level. That period is up, and the company has decided to stop running the turbine, except for sound level testing purposes, until the remaining modifications have been completed." They have made several modifications and reduced sound levels in some locations, but not sufficiently at the head of McQueen's Valley. The tower ringing reported initially, caused by a gearbox vibration, was dealt with in September. Windflow are now working through two more possibilities:

- Redesigning the generator cooling duct to reduce the sound level of the generator fan.
- Investigating the possibility that the blades themselves are picking up the gearbox vibration structurally. If so the solution will be to inject foam into the blades.

Henderson said, "We are confident that either or both of these solutions, in combination with the other measures we have implemented to reduce gearbox noise, will bring us within the 30 dBA level. We will start up again once testing has proved to our satisfaction that the 30 dBA level has been achieved."

More information: www.windflow.co.nz

Windflow Technology, 10 November 2003

Getting there — on foot, by cycle

This is the title of a new NZ Transport draft strategy, supporting walking and cycling. Submissions close on 17 December, and supportive submissions will be helpful: the mechanised end of the road lobby aren't going to like this one.

Green MP Mike Ward says that the strategy has been created in recognition that cycling and walking are commonly used by all New Zealanders. The general aim is to increase the use of walking and cycling as transport modes and to ensure a land transport system that works for everyone. To achieve this the government has highlighted the need for:

- Strengthening the foundation for effective action for walking and cycling.
- Making our communities and transport networks more friendly to pedestrians and cyclists.
- Encouraging the choice of walking and cycling for day to day transport.
- Improving safety and security for those who walk and cycle.

Cycling Advocates' Network chair Jane Dawson said, "This is about giving people more choice about how they travel. For many journeys, the bicycle is an ideal way to get around. We congratulate the Minister of Transport, Paul Swain, for recognising the positive contribution that cycling can make to the health of New Zealanders and to our environment."

However, Dawson draws attention to the lack of any implementation plan included in the Strategy. She points out that the Australians and the Brits both set themselves a goal of doubling cycle use. "We would like to see ambitious goals set by the NZ Strategy, as well as a concrete commitment by Government to fund future implementation." she said.

The strategy can be ordered by phone (04) 498 0649 or is on the web at: http://www.transport.govt.nz/business/land/getting-there.shtml

Submissions close 17 December

New legislation for electricity and gas industries

NZ Government, 28 October 2003

The Electricity and Gas Industries Bill will set the legal framework for the next phase in the development of NZ's electricity and gas industries, says Energy Minister Pete Hodgson. "The Bill puts in place all the decisions made by the Government this year on electricity supply security and the governance of the electricity and gas industries."

"The electricity and gas sectors are critical to NZ's economic growth. We face continuing challenges to ensure security of supply in both sectors at the best possible prices. These include the depletion of the Maui gas field, our vulnerability to dry hydro years and growth in demand for electricity. At the same time we aim to make continuing progress towards a sustainable energy future. This Bill is a key part of the Government's response to these challenges."

"The Government's objectives for both electricity and gas are to have energy delivered to consumers in a safe, efficient, fair, reliable and environmentally sustainable way. This Bill will enable further changes to be made to the electricity and gas sectors to take us further towards that goal."

Summary of the main provisions

The Electricity and Gas Industries Bill amends the:

- Electricity Act 1992
- Gas Act 1992
- Electricity Industry Reform Act 1998
- Commerce Act 1986
- Crown Minerals Act 1991.

The amendments made to each of these acts are outlined below.

The Electricity Act 1992

The Bill makes amendments to reflect the establishment of the Electricity Commission including:

- Updating the specific outcomes the Government wants the Electricity Commission to achieve, including in relation to security of supply;

- Clarifying that the Commission's functions include promoting efficient use of electricity;
- Removing all references to and obligations on industry self-governing bodies.

Provides additional regulatory powers relating to consumer protection including:

- Setting minimum terms and conditions for contracts with domestic consumers, including provision of information on bills;
- Promoting retail competition, for example through customer switching protocols or provisions for retailers' use of meters;
- Requiring all electricity distributors and retailers to participate in a complaints resolution scheme (such as the Electricity Complaints Commission) approved by the Electricity Commission

Provides a 'toolbox' of regulation-making powers relating to improving security of supply. The Government does not expect all these powers to be used, and it expects the Commission to achieve its objectives primarily through information provision and contracting, but regulation-making powers are provided for use as required covering the following matters:

- Securing reserve energy as a backstop for very dry years and in the event of other supply disruptions, including setting quantities and operating parameters for use of reserve energy to minimise impacts on the ordinary market;
- Requiring disclosure of information on a range of issues such as hydro lake levels and inflows, plant availability and thermal fuel stockpiles;
- Providing for generators to hold reserve fuels and plant capacity;
- Providing for generators to offer by tender minimum volumes of wholesale contracts or hedges (including terms and conditions of those contracts excluding price), and to post buy and sell prices for contracts;
- Providing for buyers of wholesale electricity to have minimum levels of hedge and contract cover.

Provides for regulation-making powers to set minimum terms and conditions for retailers to purchase surplus electricity from distributed generation units owned by domestic consumers;

Provides for increased regulatory certainty, by limiting the Minister's powers in various ways, such as:

- Precluding the Minister recommending regulations unless the Electricity Commission has first made a recommendation;
- Limiting the Minster's powers to amend the recommendations of the Commission;
- Deleting the requirement on the Commission to consult the Minister prior to making recommendations;
- Deleting the prohibition on a court finding a regulation is invalid because of inadequate consultation (although a grace period of six months is provided to avoid unnecessary regulatory uncertainty);
- Deleting the ability of the Minister to impose accountability requirements on industry self-governance bodies.

Amends the powers to levy industry participants so that it includes the costs of providing reserve energy and also the funds advanced by Transpower to finance the development of rules relating to transmission services;

Provides for continuation of Transpower's transitional pricing methodology until 31/12/2004.

The Electricity Industry Reform Act 1998

The Bill provides exemptions to allow lines businesses to own generation up to 25 MW or 10% of their maximum demand, and for any reserve energy contracted to the Electricity Commission;

Provides that lines companies may own generation up to the new limits at any location (current legislation requires any exempt generation to be connected to the local line owner's network).

The Commerce Act 1986

The Bill amends the Commerce Act to clarify the interface between the functions and powers of the Commerce Commission and Electricity Commission in relation to controls on electricity distribution companies:

- All Commerce Act powers relating to Transpower's pricing methodology are repealed, and the Commerce Commission may not set quality standards for Transpower or pricing methodologies for lines businesses (the Electricity Commission will hold these responsibilities);
- The Commerce Commission will be required to take into account electricity governance regulations before exercising any of its 'price' control powers on electricity lines businesses in relation to quality standards for Transpower,

pricing methodologies for lines businesses, and levies payable.

Provides for the transfer to the Electricity Commission, by Order in Council, all the powers of the Commerce Commission in respect of the control regime for electricity lines. These powers can be transferred either for Transpower or all distribution businesses only after 31 December 2005 and if certain tests are met.

The Gas Act 1992

The Bill contains powers to expand, by Order in Council, the functions of the Electricity Commission to govern gas as well, and that it be renamed the Energy Commission;

Provides regulation and rule making powers for use if the gas industry fails to deliver on certain issues or if the self-regulatory governance model seriously fails, with the conditions that:

- Regulations or rules relating to the wholesale gas market, processing facilities, transmission and distribution matters may only be made if the Energy Commission is established;
- Other regulation and rule making powers, particularly relating to consumer retail issues, including complaints resolution, can be exercised whether or not the Energy Commission is established.

The Crown Minerals Act 1991

The Bill provides regulation-making powers to require disclosure by permit holders of accurate, detailed and timely information relating to gas and oil reserves and production, with the aim of improving investment decisions and enhancing security of gas and electricity supply (gas is used extensively for electricity generation).

That's one way of powering them

Berlin's reconstructed Lehrter railway station has 1870 m^2 of solar panels on the train shed roof, with a capacity of 189 kWp. The system cost €M 3.7 (NZ$ 7.0 million).

Renewable Energy World, 9-10/2003

Large or small scale? Supply or demand sides?

A thought experiment used as a reality check in electricity supply and demand

(From the SEF News discussion group, expanding on a thread started by Gerry Coates — EW)

This 'thought experiment' considers the possibility that energy efficiency measures may be a more cost-effective response than new generation capacity, to any or all of three electricity supply problems:

- Megawatt supply: demand for capacity.
- Gigawatt supply: demand for energy.
- Dry year reserve: both MW (standby plants) and GWh ('fuel,' including all renewable energy sources).

Further information can be found in the SEF discussion paper *Sustainable energy development for NZ* (EnergyWatch 29 or www.sef.org.nz).

This article considers four simple cases: two each on the demand and supply sides:

- Lighting: Four compact fluorescent lamps are provided free to each household.
- Hot water: All 'domestic' electric hot water cylinders, whether in houses or commercial premises, are insulated, again without charge.
- Project Aqua: Information is from www.projectaqua.co.nz .
- The Whirinaki dry year reserve station: Information is from Government press releases.

Who pays for the supply-side cases is beside the point at this stage: the intention here is to make a reality check on Government policy, not a proposal. The question that **does** matter is:

> *Is either or both of the hypothetical demand-side measures a more cost-effective solution than the real supply-side solutions chosen, to one or more of the electricity supply problems outlined above?*

If the demand-side options are more cost effective than supply-side options, then adopting them will benefit the economy. If they are not adopted in the real world, then market failures are evident. If the gains are substantial, then the market failure is also substantial.

Clearly, costs and benefits have to be reasonably accurate if a reality check is to be plausible. To do this we have drawn on the expertise of the SEF News group, and especially Norman Smith and Steve Goldthorpe. However, there two limits to the need for plausibility:

- Numbers of lamps or tank kits matter very little because they affect costs and benefits equally.
- The accuracy of costs and savings is less critical if the demand-side advantage is very large.

Project ranking

The comparison methods used for ranking the chosen projects are:

- Project cost savings to householders, expressed as first year rate of return (FYRR) and using an assumed retail power cost of $ 0.15/kWh.
- Project cost savings to generators, expressed as first year rate of return and using an assumed wholesale power cost of $ 0.035/kWh.
- Project capital costs of providing capacity, as either Megawatts (supply side) of 'Negawatts' (demand side), both expressed as $/kW.
- Project capital costs to Government, for buying dry-year reserve, expressed as $/kW. The methods considered are funding Whirinaki, or reducing dry year (in fact all years) demand through demand-side measures.

Actual capacity of supply projects has been reduced by 10% to allow for transmission losses. This brings them onto the same basis as the demand-side projects, by making the comparisons at the retail end of the energy supply chain.

It would be unreasonable to claim all of these benefits for any single project, and that is not the intention. However, a good project is likely to give a good result on more than one of these methods.

Lighting

Four compact fluorescent lamps are provided free to each household.

Number of households = 1.36 x 10^6

Number of free lamps/ household = 4
(20 W, equivalent to 100 W incandescent)

Saving/household (maximum demand)
= (100 - 20) x 4 W = 320 W

Annual energy savings/household
= 320 W x 3.5 hr/day x 360 days
x (say) 0.4 use factor = 160 kWh
(Not all lamps will be used, and not all lamps used will be placed in the most effective locations, because of shading issues etc. The 40% use factor allows for 80% of lamps being installed in a reasonably effective location, and the installed lamps being used for an average of half the theoretical hours — not always needed, family not at home, etc)

Cost @ $10.00 / lamp, including distribution
= 40 $/house = 55 $M total

National benefits:

- Installed 'capacity' = 1.36 x 10^6
x 320 W x 0.4 use factor= 170 MW
- Energy availability/year
= 1.36 x 10^6 x 160 kWh = 220 GWh

Cost savings:

- Household FYRR
= 160 kWh/yr x $ 0.15/kWh = 24 $/yr
= $ 24 x 100 / $ 40 = 60 % FYRR
- Generator's FYRR
= 220 x 10^6 kWh/yr x $ 0.035/kWh
= 7.7 $/yr x$10^6$
= $ 7.7 x 10^6 x 100 / $ 55 x 10^6 = 14 %FYRR
- Capital cost of providing Negawatts
= $ 55 x 10^6 /170 000 kW = 320 $/kW
- Dry year 'capacity' contribution 320 $/kW

Water heating

Cylinder insulating blankets are provided and installed, free, for each 'domestic' electric hot water cylinder, whether in a home or commercial premises. The calculations are summarised.

Number of suitable tanks = say 1.3 x 10^6
(Not all houses will have suitable systems, but some houses have more than one tank and many commercial systems will be suitable)

Annual energy savings/tank
= say at least 400 kWh/yr
(Savings depend on tank size, age, temperature setting etc: estimates for average conditions and R 1.1 insulation are 170 kWh/yr for 'A' grade, 525 kWh/yr for 'C' grade and 620 kWh/yr for older tanks, all plus pipe lagging savings of around 170 kwh/yr)

Cost /household including installation
Kit cost $ 50, installation $ 20 = 70 $

Cost = 1.3 x 10^6 x 70 = 90 $M

National benefits:

- Installed 'capacity' = 1.3 x 10^6
x 2 kW x say 0.2 use factor = 520 MW
(More tank heating elements will tend to be on at peak water draw-off times, but even then use

factors will be low. Temperature maintenance heating will be at random intervals)

- Energy availability/year
  = 1.3 x 10^6 x 400 kWh = 520 GWh/yr

Cost savings:

- Household FYRR = 60 $/yr
  = 85 % FYRR
- Generator's FYRR = 18 $/yr x$10^6$
  = 20 %FYRR
- Capital cost of Negawatts 170 $/kW
- No dry year capacity contribution as much of the load is disconnected at peak hours

Project Aqua

(Capacity and energy figures include a 10% allowance for transmission losses)

Cost	1.0	$ bn
Capacity (including 10% losses) =	470	MW
Energy available — av yr, incl loss	2700	GWh
Energy available — very dry year, incl loss =	1800	GWh

Benefits

- Household FYRR = 0
  (Difficult to quantify but limited to influencing the market price of electricity, and unlikely to reduce domestic costs much)
- Generator's FYRR = 9 %
- Capital cost = 2100 $/kW
- Dry year capacity cost = 2100 $/kW

Whirinaki

- Dry year capacity cost = 1070 $/kW

Project comparison

The table opposite summaries the project benefits, using each of the four methods chosen.

Summarising these results:

- For householders the first year rate of return (FYRR) of the demand-side projects is very good. The low take-up of such projects is itself a market failure.
- For generators the FYRR of the demand-side projects is also good — better than Project Aqua.
- The capital cost of 'Negawatts' — demand-side projects — is an order of magnitude lower than the cost of supply-side Megawatts.
- The capital costs of dry-year reserve stations can be avoided, at a cost substntially lower than Whirinaki, if sufficient demand-side savings can be found. If demand-side measures were chosen as a dry year measure the Government would still need dry-year generation reserves, but could avoid capital costs by contracting for existing stations to be maintained as reserve.

	CF lamps	Tank insul'n	Project Aqua	Whiri-naki
Householders FYRR, %	60	85	–	–
Generator's FYRR, %	14	20	9	–
Capacity cost $/kW	320	170	2100	–
Dry year reserve cost, $/kW	320	–	2100	1070

However, there are still demand-side advantages not captured by this comparison:

- For GWh comparisons, supply-side projects operating costs are ignored.
- Demand-side projects have additional non-energy benefits, such as employment for large numbers of lower skilled people; financial benefits to householders (even in the real world, where they pay the installation costs); and the regional economics benefits of retaining the 'energy dollars' in a local economy. Home insulation projects may also have substantial health benefits.

The conclusion of this simple reality check on policy is as expected from overseas studies. The NZ electricity system has focussed almost exclusively on supply side responses to growth, with the result that energy efficiency is now a far better 'buy.' Energy efficiency projects can reduce the cost of meeting increased demand by an order of magnitude.

And yet this huge advantage is invisible to the market — and the Government. Clearly a case for the Electricity Commission, but is it within their terms of reference?

MiniWhats

The Aussies are greenies (1)

The NSW Government has unveiled mandatory energy and water saving targets for all new homes built in NSW from July 2004.

New homes and units must achieve a 40% reduction in water consumption and an initial 25% cut in greenhouse gas emissions, rising to 40% two years later. Premier Bob Carr said the water reduction target could be met by installing efficient shower heads, dual flush toilets and a rainwater tank.

The cut in greenhouse gas emissions could be met through the installation of an energy efficient hot water system, energy and utilities minister Frank Sartor said. "We have to do this, we have to make this city more sustainable, not just throw money at grand capital works schemes," said Sartor. He said 45 000 dwellings were built in NSW each year.

The targets were endorsed by leading builder Jim Masterton and Total Environment Centre director Jeff Angel. "We're finally putting behind us the boutique showcases we've seen for decades and we're going to start mainstreaming environmental sustainability in Sydney which is currently a water and energy guzzling suburbia of immense proportions," Angel told reporters.

AAP, 18 September 2003

The Aussies are greenies (2)

In mid-October, the Minister for Infrastructure and Planning announced in Parliament that the development application for Redbank II Power Station was refused. It is the first time in Australia that planning approval for a power station has been refused on the basis of its projected greenhouse gas emissions. The proposal was to construct and operate a power station near Singleton that would burn both coal and coal 'tailings' — the residual material generated from coal mining. The proposed technology is the same as that in use at Redbank I, a plant which was the subject of an unsuccessful appeal by Greenpeace in 1994. The EPA provided advice to DIPNR (Department of Infrastructure, Planning and Natural Resources) regarding the environmental implications of the power station, noting that the plant:

- Would be significantly more greenhouse intensive (22% higher) than existing NSW power stations (built 20-30 years ago);
- Would significantly increase greenhouse gas emissions in NSW and run counter to government efforts to reduce energy sector greenhouse emissions;
- Would have limited capacity to meet rising peak energy demand since the plant is baseload and not peaking; and
- Would not be a viable means of addressing coal waste on a meaningful scale.

DIPNR's assessment report concluded that other environmental issues (air, water, noise) had been satisfactorily addressed and that the key factor in the decision was the proposed plant's greenhouse implications. The Minister's grounds for refusal were:

- The adverse impacts from greenhouse gas emissions from the proposal as submitted;
- The applicant has failed to secure appropriate greenhouse gas offset measures with reasonable certainty;
- The proposal as submitted is not in the public interest.

The proponent has announced that it intends to appeal.

Steve Goldthorpe, from an Oz contact

Travel behaviour change trials

Two programmes will encourage people in Christchurch to walk, cycle and use public transport and carpooling more often. The programmes, funded by Transfund and called 'Go Smarter — Business Travel Plans' and 'Go Smarter — Household Travel Plans,' are being run by Environment Canterbury. Overseas experience has found such programmes have achieved about 10–15% of participants changing travel behaviour.

The Business Travel Plan project is an education and support programme to promote more efficient commuter travel by working with three employers: Canterbury Polytechnic Institute of Technology; Environment Canterbury and Montgomery Watson Harza NZ. The programme promotes carpooling, walking and cycling, and the use of public transport.

The Household Travel Plan is also an education and support programme, designed to promote more efficient travel for residents of a selected part of Christchurch.

Transfund considered these programmes could be effective in encouraging people to rely less on their cars, thus assisting to relieve traffic congestion. It viewed these programmes as an opportunity for

research on travel behaviour programmes in a New Zealand context.

Transfund News, September 2003

(The important point here is that Transfund are now interested in this kind of thing — EW)

Dry Year Generation

Orion NZ, the lines company serving the Christchurch area has announced that it is to install up to 35 MW of diesel powered generation plant around Christchurch to assist with the government's call for extra dry-year generation capacity.

"This amount of capacity represented about 5% of the maximum winter load experienced by the Orion network, and also about 5% of the government's immediate requirements to provide extra power generation in the event of a dry year reducing the output of existing hydro electric stations," said Roger Sutton, Orion's CEO.

The power plants will be high efficiency, low emission packaged diesel generator sets with up to eight units located at three industrial sites around Christchurch; at Belfast, Bromley and a third location yet to be determined, with an overall capacity of approximately 10 MW at each site.

The generators will normally only run for short periods during daylight hours in winter, to assist in meeting short term peaking loading on the network, usually caused by space heating on cold winter days. When hydro inflows become critically low the generation plant will be operated for extended periods.

The generators can be easily relocated in emergencies. Another big advantage in local embedded generation within the Orion network is the potential to reduce transmission and distribution losses, particular in times of overall energy shortage.

Orion NZ, 3 October 2003

No combing

SEF News contributor Michael Lawley found an interesting clause in Meridian's supply contract:

7.3 You may not, without our prior written consent, generate electricity or allow electricity to be generated on your premises. Any such consent will be subject to any conditions we or the lines company may require including conditions relating to any legal or industry requirements.

Oh dear: no welding sets (unless mains powered); no portable generators to drive power tools at the back of the farm; no hybrid cars, bicycles with generator-powered lighting, or conventional cars for that matter; no solar-powered outside lights, calculators or torches. Even combing your hair, or allowing your dentist to place dissimilar metals in your mouth, could be interpreted as a breach of your contract with Meridian.

More seriously, if you don't want to go completely off-line, using your own generator, wind or hydro turbine or PV cells is at Meridian's whim, even if you do not feed any excess into their system.

Of course, Meridian have every right to ensure that grid-connected consumer power systems are safe, including the safety of their own linesmen when Meridian's power is off, but this clause goes far too far. It should be specifically limited to grid-connected power generation, the conditions should be freely available, and any extra connection charges should be transparent and reasonable.

	Note to Meridian:	Please fix
cc	Electricity Commission:	Please check

Ethanol-blended petrol

In September, EECA announced that the Government's decision not to apply excise tax to ethanol blended into petrol removes the last barrier to the sale of ethanol-blended petrol in NZ. Ethanol can now be blended with petrol, up to a maximum of 10%, and sold in NZ service stations. The fuel will be free of excise tax for two years.

EECA Chief Executive Heather Staley said, "If ethanol-blended petrol goes on sale at the same price as ordinary petrol New Zealanders can make an environmental choice with no impact on their wallet. The ethanol will be from renewable sources — making it the first renewable transport fuel to go on sale in NZ"

However, the Motor Industry Association claimed that makers do not approve of fuel blends, which could be damaging to cars. National Party Energy spokesman Gerry Brownlee estimated the tax savings to be worth up to $M 3/yr and challenged the Government to produce evidence to back its arguments for giving the oil industry a tax carrot.

Whirinaki confirmed for new reserve electricity generation plant

The Government is proceeding with plans to build a new 155 MW power plant at Whirinaki, Hawkes Bay, Energy Minister Pete Hodgson has confirmed. Investigations in the South Island had not produced an option that allowed for completion before next winter.

There would have been advantages to siting this plant in the South Island, but the higher priority is to have it available to generate electricity next winter. Hodgson said, "Using the Whirinaki site we expect to have the plant ready to generate by the end of May 2004 and possibly earlier. This will be a valuable improvement to the security of supply."

The new oil-fired plant will provide reserve generation for use during very dry periods when hydro lake inflows are abnormally low. It will also provide reserve generation should there be a major breakdown in another generating plant.

The Whirinaki site is owned by Contact Energy, which is contracted to manage construction and operation of the plant. Site work is due to begin in October, generators and turbines are due on site before Christmas and commissioning and testing are scheduled for March and April next year. The plant will cost about $150 million to build and the cost will be recovered through a levy on the industry. This equates to less than $5 a year for the average household.

NZ Government, 25 September 2003

(We wonder if the Auditor General — or perhaps the new Electricity Commission — may have something to say about the transparency of these tenders? — EW)

Visual impact assessment of wind farms in South Australia

A community preferences survey has been made of the likely visual impact of wind-farms in South Australia, and a predictive model developed.

Photographs were used, with and without wind-farm photomontages. The survey has a confidence interval of $\pm$0.5 for a given rating on a 1–10 scale.

The presence of a wind farm has greatest impact for highly rated scenes. A wind farm's visual impact on distant scenes was found to be as much as in close proximity.

Inland scenes rated much lower than coastal scenes. While the wind farm decreased the rating of the higher rated scenes, for lower rated scenes it actually enhanced ratings. This effect was neutral at a rating of 5.1. Contrary to expectations, the visual impact of the wind farm in inland scenes increases with distance.

Dr Andrew Lothian, alothian@senet.com.au

You can't tax it until you can measure it (And maybe not then)

Methane experts from both sides of the Tasman have been exploring the latest in greenhouse gas measuring technology. AgResearch analytical chemist Dr Mike Tavendale and a researcher from CSIRO in Perth have been awarded fuding from the NZ Royal Society, to enable CSIRO technical staff to spend a month at AgResearch Grasslands in Palmerston North to explore aspects of measuring methane.

Trace gas technology is used, based on gas collection and analysis equipment in conjunction with an inert gas marker released in accurately known amounts in the rumen. Applications of this methodology for grazing sheep and cattle have been jointly developed by AgResearch and NIWA.

"The Australians hope to get more successful methane measurement systems in place, and we'll understand better how the system works and what we can do to improve our own methane measurement and inventory from this," Tavendale says.

(And on the fiscal side, the Fart Tax row has subsided into some sort of a draw, with the Government scaling down it's need estimates and farmers paying indirectly — EW)

Urgent need for an energy strategy

A new report from the Centre for Advanced Engineering (CAE) warns that New Zealand faces increased dependence on volatile global oil markets unless a robust, nationally-agreed strategy is developed, to ensure long-term supply of local primary energy sources. The security of sources enjoyed for the last 30 years — since the discovery of the Maui gas field — has meant access to energy has been taken for granted, says CAE executive director Dr George Hooper.

"The transition from Maui gas to alternative solutions will need to be managed assertively if New Zealand is to avoid energy shortfalls that would be potentially crippling to this country."

The report, *New Zealand's energy future — a sustainable energy supply after Maui*, sets out the country's current primary energy supply situation, and discusses the likely influences on future supply.

Maui gas currently meets almost a quarter of NZ's energy supply. Other sources include geothermal, coal, other natural gas supplies, oil, and hydro. "Yet despite plentiful primary energy sources, NZ remains vulnerable to the risks of shortages of consumer energy including electricity and transport fuels. It also risks increased dependency on imported fuels with the consequent higher costs to consumers,' Hooper says. "After 20 years of neglect, NZ is now at a crossroad not dissimilar to

the one it faced in the 1970s. Issues of energy supply and demand are interrelated and we must deal with them holistically, rather than dealing with the parts.

"There is no silver bullet," Hooper says. "Industry and government must work together to examine the long term alternatives and solutions and agree on a strategy to secure NZ's energy future.

CAE, 24 August 2003

Now the lawyers are in on the act!

Professionals and company directors should beware the risks of climate change, an environmental lawyer warns. These include temperature increases, sea level rise and increased frequency and intensity of extreme weather events, as well as changing regulatory, social and economic expectations.

Phillips Fox climate change partner, Helen Atkins, says that while the implications of climate change are much talked about, few business people have integrated this information into day-to-day decision making. The risk for company directors and professionals is that they will become liable for losses suffered as a result.

One area where this issue will really bite is waterfront property. Title boundaries on the waterfront are often defined by the high tide mark, so owners of low-lying waterfront land could see it washed away. If this does occur, they are likely to look to recover their losses from those involved in their decision to purchase the property.

Atkins points out that climate change is a cross cutting issue with implications for every sector of the economy. Business people need to be aware of the likely changes to the physical, regulatory and economic environment, and treat these like any other commercial risk.

Internationally there is growing recognition of climate change as a business issue. A recent report prepared for the Carbon Disclosure Project (a coalition of institutional investors representing more than US$ 4.0 trillion in assets) identifies a series of business risks raised by climate change.

The CDP report notes, "The financial impacts of climate change extend well beyond the obvious, emissions-intensive sectors. Companies in the financial services, transportation, semiconductor, telecoms, electronic equipment, food, agriculture, and tourism sectors among others are also affected." (The full text of the report is available at www.cdproject.net).

"It is a case of being alert, but not alarmed," says Atkins. The CDP report contains some good news for businesses that are prepared to do the work. It concludes that:

> *Managing the financial risks of climate change does not necessarily impose a net cost on companies. Success stories can be identified in virtually every industry sector we examined; substantial commercial opportunities are also being created and captured on the upside.*

Phillip Fox, 26 August 2003

Pedalmedics

St John Ambulance staff have unveiled their new life-saving machine — a mountain bike. The ambulance officers using them are known as 'pedalmedics.' The 9 pedalmedics are trained to use the bikes at events where large crowds gathered, and an ambulance isn't practical such as Round the Bays, concerts, cycling competitions and in rough, rural terrain.

The bikes are kitted out with the same equipment as an ambulance, including oxygen bottles and masks, first aid kits, splints and a defibrillator.

CAN/North Shore Times Advertiser

German renewable law under revision

Germany's Renewable Energy Law is up for revision. The draft amendment has targets of 12.5% of all power from renewable by 2010, 20% by 2020 and 50% by 2050. The feed-in tariff for PV is likely to be raised to € 0.59 kWh (NZ$ 1.15/KWh), with € 0.091/kWh (NZ$ 0.17/kWh) for offshore wind turbines.

Schleswig-Holstien has a target of half its power from wind by 2011.

Renewable Energy World, 9-10/2003

Solid Energy enters renewable fuels market

Coal producer Solid Energy has purchased Pellet Fuels NZ Ltd, and created a new company, Solid Energy Renewable Fuels Ltd, trading under the brand name of 'Nature's Flame.' It is committed to growing the wood pellet market for home heating and industrial energy, as well as exploring and developing further innovative, biomass energy solutions.

Pellet fuel burners run at half the cost of LPG and electric heaters. They produce emissions comparable to that of LPG heaters, well within the emissions standards proposed in Environment Canterbury's Draft Regional Air Plan.

The company collects waste wood and sawdust from South Island timber mills, which is dried and compressed into pellets at a factory in Rolleston,

near Christchurch. Around 2000 t of wood pellets are produced annually and the factory has the capacity to increase to 10 000 t/yr. Wood pellets are sold to households in 20 kg bags and delivered direct to industrial users.

World-wide the production of biomass wood pellets is big business. Sweden uses around 1.3 Mt of pellets a year (23 PJ) - equivalent to three times the NZ household gas market, or half our total household electricity use.

Solid Energy

(We wonder where Solid Energy got their figures from — see the next item — and whether this purchase has been cleared by the Commerce Commission? — EW)

Pellets in Europe

Pellets are much more widely used in Europe: 660 000 t/yr in Sweden; 400 000 t/yr in Denmark; 90 000 t/yr in Germany and 200 000 t/yr in Austria. Industrial boilers of up to 100 MW are pellet-fired, and even domestic customers receive bulk deliveries.

Renewable Energy World, 9–12 2003

Biodiesel breakthrough

Germany now leads the world in biodiesel production, with over a million tonnes produced each year. Pure biodiesel is sold through regular filling stations, and many vehicle manufacturers have approved it for use in their engines. It is used interchangeably with conventional diesel fuel by many drivers, who then end up with a blend — of unpredictable proportions — in their tank. As biodiesel burns in a different way from conventional diesel, this can mean that the engine may not work at its optimum setting.

Now German research institute FAL reports that it has been working with Volkswagen to produce a fuel-sensor that can differentiate between biodiesel and regular diesel in the tank, and set engine timing to the appropriate fuel blend. This helps optimise the environmental benefits of the biodiesel in terms of emissions reduction and fuel efficiency. FAL say this offers a breakthrough for the future of biodiesel on the fuel market. According to Werner Korbitz of the Austrian Biofuels Institute, the sensor takes advantage of the flexibility of modern electronic fuel injection technology for optimum engine timing, and works for any blend between pure fossil diesel and pure biodiesel.

The major Italian biodiesel manufacturer Novaol has announced the extension of its Uvorno biodiesel plant. A new, €M 7.0 continuous production line is due to start up in June 2004, and will double the capacity of the plant. Novaol and Cereol were acquired last year by BUNGE, which claims to be the world's largest oilseed-crushing company, which had had no biodiesel activity until then. Claudio RoChietta, CEO of Novaol, is confident that the Italian market is ready to reach the 2% biodiesel market share target as defined by the recent European Biofuels Directive.

Renewable Energy World, 9-10/2003