EnergyWatch

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Change in the wind

After nine months in power, this government's sustainable energy outlook is moving from fingers-crossed to hopeful, encouraging and even very encouraging. The EECA Act and the commitment to ratifying the Kyoto Protocol were covered in our last issue. In this issue we cover:

- Prime Minister Helen Clark's speech to the *Redesigning Resources* conference, setting out a wide-ranging agenda on page 2
- Less positively, Molly Melhuish's paper from the SEF conference, outlining the tangle of contracts, contacts and culture to be cut out before electricity reform is effective. See page 4
- The recommendations of the Caygill Inquiry, presented with some comment by others—and at least half a cheer—on page 8
- A report on the SEF conference, and Ralph Sims' missing paper, starting on page 10
- Some encouraging slants on sustainability from a transport forum run by Wellington Regional Council, on page 15
- A report on the EECA cycling conference at Massey, another encouraging sign of change, on page 17
- A summary of the environmental performance indicators proposed by MfE, on page 19
- Amory Lovins' visit to New Zealand. (Sorry, EnergyWatch is full: try the September edition)

So what has been achieved? Well, more-or-less nothing actually. It is too much to expect on-the-ground results so soon, especially when following a government committed to 'more market' as the only necessary or possible remedy for every real or imagined ill. But it is quite another to mistake intentions, expectations and plans for 'real' action. Greater efforts are needed now if the government's very laudable aims are to be met, such as:

- A focus on the long-term. New technologies such as windfarms or hypercars need the spadework done now if they are to be effective by the start of the Kyoto commitment period.
- A 'think resources' campaign aimed at both individuals and businesses, focusing on attitudes to the squandering of resources.
- A close look at what can be salvaged from the wreck of the Maui Contract, and the balance of payments blowout that must follow.
- A broad interpretation of the recommendations of the Caygill Inquiry when draughting legislation, to favour embedded generation: see the commentary on page 9.
- Buy Annette King a bicycle, not a Beetle.

SEF Conference

The French phone system seemed to wreck Ralph Sims' teleconference presentation to the SEF conference, on the World Renewable Energy Conference; a test run from the UK was fine. His presentation-that-never-was is in shortened form on page 11, and will be in the conference proceedings in full.
Our apologies to conference delegates and especially the link's sponsor, WEL Energy.

New directions for New Zealand

An edited version of Prime Minister Helen Clark's speech to the *Redesigning Resources Conference*, Christchurch 26/6/2000

The written work on the natural capitalism concept which is central to this conference provides many insights. Within our country there are corporates, government agencies, and local government councils committed to a sustainable future: The Warehouse, committed to a goal of zero waste to landfill; Christchurch City, committed to the same goal by 2020; and Landcare Research, which has incorporated the concepts of natural capitalism into not only its own operations, but into its science as well.

I particularly applaud the leadership given by the NZ Business Council for Sustainable Development, which has committed itself to the triple bottom line of economic, environmental, and social sustainability. The Council is working for:

- A healthy and diverse economy which adapts to change, provides long term security and recognises social and ecological limits;
- A healthy and diverse ecological system which continually performs life-sustaining functions and provides other resources; and
- A social foundation which provides health, fosters participation, respects cultural diversity, is equitable, and considers the needs of future generations.

I have set out the Council's goals in detail because they are entirely consistent with our goals for the future of our country. I cannot overstate how excited I was to find in the corporate sector a group willing to stand up for a vision for our future which combines the economic, the environmental, and the social. My challenge today is to groups across these three often compartmentalised sectors to buy into that integrated vision.

We have had very useful contact with the Council, and with countless individual companies. I am frankly disappointed with the politicised attacks on this mainstream social democratic government by some business elements, but that will not stop us engaging with the vast majority of NZ business, large and small, which does not want to spend its precious time and energy fighting the government for no good reason.

We have set up a joint central–local government forum to take forward our shared vision for local economic development, social cohesion, and environmental sustainability—that triple bottom line again. We have a deep commitment to civil society and to participation by it in addressing the challenges the country faces.

In this year's Budget we announced the steps we were taking to build a more sustainable economy and society and to sustain our environment. Let me focus briefly on each of these areas.

The Economy

Through investing significantly more in education, science and research, we are working to speed our transition away from a low value, commodity-based economy to higher value enterprise driven by knowledge, skill, and technology. That's why we are lowering the costs of tertiary education. That's why we have increased funding for science, research and technology by 10% or $M 43. Half of that extra funding will go out to the private sector in grants to back smart ideas for new products and services. There is also greatly increased funding for basic research which has the potential long term to create new areas of potential for business.

And surely one of the growth areas of business in NZ today and for our exports is in the area of applying smart solutions to business, like those being trialed in our progressive companies, cities, and research institutes today.

These challenges are huge—and the biggest of them is meeting our international commitments under the Kyoto Protocol on climate change.

We have established a Ministry of Economic Development, required to promote sustainable development which meets the needs of the present generation without compromising the ability of future generations to meet their own needs. The Ministry and an associated agency, Industry New Zealand, have $M 330 over four years for their programmes. They will be able to back new innovative companies with early stage financing, and support the development and promotion of sustainable economic strategies in the regions. They will have industry specialists and grants to work with and support New Zealand companies with growth potential as yet untapped. They will work with Trade New Zealand to attract smart

investment which contributes to development of an enhanced skills and technology base.

Addressing the Environmental Challenges

These challenges are huge—and the biggest of them is meeting our international commitments under the Kyoto Protocol, which we want to ratify by the time of the Rio Plus Ten Conference in mid-2002. That means that we must stabilise our greenhouse gas emissions at 1990 levels, on average, over the period 2008-2012. Unfortunately that is easier said than done. The latest information we have suggests that New Zealand's gross CO_2 emissions have risen 19.2% since 1990, up from the 14% growth between 1990 and 1998, and an average annual growth of 2%.

Energy efficiency in New Zealand is poor, so improving it must be one of the first steps in containing emissions. The Energy Efficiency and Conservation Authority, EECA, has been set up as a Crown entity with an enduring role to promote energy efficiency and renewable energy across all sectors of the economy. It also empowers regulations to implement product energy efficiency standards and labeling, as well as the disclosure of energy efficiency statistics. It has been given a $M 3.0 funding boost.

The Act also mandates development of a National Energy Efficiency and Conservation Strategy. The draft Strategy will be prepared by 1 April 2001, through a transparent process and consultation. It will focus on meeting energy efficiency policies through practical objectives and targets. I urge you all to seize the chance to shape the energy future of New Zealand by having your say on the Strategy.

The government has set a clear goal for the environmental research it funds through its vote for Research, Science and Technology. It is to: *increase knowledge of the environment and of the biological, physical, social, economic, and cultural factors that affect it in order to establish and maintain a healthy environment which sustains nature and people.* $M 84 is going towards that goal in 2000/01. Over time the research should contribute to achieving:

- Increased knowledge and awareness of the state of New Zealand's ecosystems;
- Increased understanding of the global biophysical environment;
- Improved quality of human environments by enhancing the capacity to use and manage ecosystems efficiently and effectively;
- Sustainable management of the productive sector's environment.

All New Zealanders know of the steps the new government has taken to stop the extraction of native timber from Crown owned forests. The decision embroiled us in an unpleasant debate with some West Coast interests. But the outcome, we believe, is a win for New Zealand and for the Coast. Those great forests are preserved for posterity, for future recreational use, and for their intrinsic values, and the West Coast gets a fresh start for truly sustainable development with a large regional development fund.

Closing the Gaps

New Zealand has had faster growth in inequality in the past fifteen years than any other country in the developed world. That inequality has had a unique and unfortunate dimension. There has been a growing disparity between the life chances of Maori and other New Zealanders, and Pacific peoples and other New Zealanders. It is simply not tolerable to our government to see tangata whenua consigned permanently to the status of disadvantaged citizens in their own land. That's why earlier this year we set up a special cabinet committee to work on closing the gaps.

As a nation we can commit to that triple bottom line—and be the better for it.

Conclusion

I have set out the government's broad vision for a sustainable future, and the steps we are taking to build that future. What we are doing complements the work of business, local government, the social and community sector, and environmentalists to the same end. I am excited by the case studies at home and as outlined in Natural Capitalism to redesign resource use. And I am inspired by the efforts of that growing number of New Zealand businesses who recognise that a healthy society and environment are good for business—not bad. Across the sectors and in government we need to be forming strong partnerships for sustainability. We want win:win results which deliver a stronger economy, a fairer society, and a high quality environment. As a nation we can commit to that triple bottom line—and be the better for it.

Newsroom

The task ahead

Molly Melhuish

An edited version of an address to the Sustainable Energy Forum Annual Conference, University of Otago, 9 July 2000

After 15 years of energy restructuring in New Zealand, there is enough evidence to judge it an economic, environmental and social failure. To continue is not an option. But to change direction will require discriminating decision-making, implemented with an iron will. Decision-making must be informed by understanding of the full range of outcomes from various options—from do-nothing to policy initiatives meeting chosen objectives.

Sound evidence and logical reasoning will not be the main drivers. The intertwined issues of technology and economics should provide great opportunities but are not doing so. Even the global imperative of climate change is only creating equal and opposite resistance. Unless we create change in the merged commercial and political interests which put impossible barriers in the way of sustainability, business as usual will continue.

For small business and residential customers, the promise of deregulation is an empty one.

In the words of a study by the American Public Power Association, "for small business and residential customers, the promise of deregulation is an empty one. There will be winners, of course. Those with good reason to expect to be winners have lobbied hard for deregulation. If we measure society's good by either the 'economic efficiency' of the economist or by the well-being of the average small business or residential customer, however, deregulation will leave society worse off."

Is this sad judgement also true here? What are the driving forces behind our uniquely deregulated and mean-spirited energy sector? I shall conclude that lower prices to small consumers was an empty promise. Energy is being wasted more than ever, leading to degradation of our primary energy resources and the environment. The appearance of cheap energy is being maintained only by running down our resources.

Advocates of sustainability will need to aim far, far *lower* than we have done to date. The best of all worlds is not possible, nor are big-bang policies and programmes appropriate. I believe the most effective strategy is incremental change in a number of key areas, guided by people with real understanding of the issues, and strong leadership.

The tasks ahead for SEF are:

- To gain a real understanding of what was happening as NZ was led into its present style of unsustainable energy development;
- To consider our bottom lines: principles for creating change without impossible lobbying by vested interests, and priorities for action;
- To persuade the Minister of Energy and the Prime Minister that they want to be part of our solution, not part of the problem.

The evidence

In 1998 I evaluated the outcomes of NZ's economic and energy restructuring, for Helio International. I concluded that they have been very adverse—yet that there is room for optimism that our natural wealth of renewable resources, our traditions and our resourcefulness may still enable us to turn towards long-term sustainability.

The adverse trends have continued:

- Greenhouse gas emissions from the electricity sector increased by 34% last year;
- Three new combined cycle power plants are being run at base load, while at times surplus hydro energy is being spilled to waste;
- Investment in regional-scale wind generation was expanding steadily until government mandated the split of power companies last year; now investment has all but ceased;
- Most businesses and power company programmes supplying residential energy efficiency are only sustained by subsidies from the Energy Saver Fund;
- Fixed charges on domestic power bills are rising and retailers say this must continue; New fees are being charged which apply most frequently to low-income consumers;
- Increased fixed charges for gas supply to households have led Consumer Institute to

recommend disconnecting from natural gas;

- Disconnection for non-payment of power bills has been blamed for several house fires; we suspect that some homelessness is driven by disconnections also.

Greenhouse gas emissions from the electricity sector increased by 34% last year.

With the turn of the millennium, more specific and authoritative evaluations are coming in apace. Here I mention three, from different perspectives. The first echoes the statement of the American Public Power Association in startling detail.

Economic

"It is unlikely that the [NZ Electricity] market is efficient, though no-one actually knows for sure." This submission, by Dr John Small to the Electricity Inquiry, notes that there has never been an efficiency audit of the market, even though its guiding principles feature the criterion of economic efficiency, and the Market Surveillance Committee has access the data needed. Dr Small concludes that Genesis Power and Contact Energy, the two firms that refused access to their data, see auditing as a threat: "their profits may fall if efficiency monitoring achieves its goal of making the NZEM place more emphasis on efficiency." Such an audit seems almost certain to document what is openly acknowledged—that fuel is being burnt in power stations while hydro energy is spilling to waste. This is an environmental as well as an economic tragedy, because of the CO_2 emissions and the waste of natural gas.

Legal

We have a champagne lifestyle on a beer income

From a different perspective comes a legal analysis of the outcomes of the 1998 electricity restructuring legislation in terms of its avowed purpose—to reduce domestic power prices. Daniel Kalderimis, in a research paper for Victoria University, says that legislation removed the inherent protection domestic consumers had in its community ownership of power distribution and retailing, which "could not fleece its customers other than by being inefficient… The government was well aware of this structural advantage but somehow managed to twist it into a reason why trusts should be removed." Kalderimis quotes a cabinet paper: "Trusts which own retail businesses are able to out-compete new entrant retailers… Trust ownership can cause less retail competition than would otherwise occur." He notes, "the real flaw of trust ownership was not that trusts were anti-competitive—they were super-competitive. The government was just hopelessly biased against them."

In the end, there are always some consumers who are not worth competing for. Dr Small's submission remarks on this, and says a mechanism is needed to define and fund a 'supplier of last resort' for high cost, low value customers. The legal study concludes, "the ownership split was a staggering mistake. The government's reasoning was based on inconclusive evidence, inadequate research and contained major logical flaws."

Statistical

A third perspective comes from an International Energy Agency (IEA) study commissioned by EECA, comparing NZ's energy use with 13 other IEA countries. Despite differences in climate, geography, housing, and manufacturing and other output, NZ's energy demand per capita and per unit of GDP is not very far from those of the other countries. But the more we disaggregate the data from different sectors of the economy, the more our differences become apparent. Averaging conceals the most important information.

Our economy is energy-intensive because of raw materials processing —especially aluminium, steel, pulp and paper, and petrochemicals. Transport energy demand per capita is high because of high car ownership, long distances travelled (for passengers and freight), and high air travel. Our houses are big by IEA standards, and occupancy is relatively low; hence one would expect high home heating bills. This is not the case, because our houses are cold! If our economy recovers there may be a surge in home heating bills. Indeed the study concludes that we have a "champagne lifestyle on a beer income." The IEA remarked that "NZ's understanding of its energy use is among the worst in the IEA: there are huge holes in the data from the manufacturing sector, and problems with the consistency of transport data." The amalgamation of aluminium smelting energy use with iron and steel makes comparisons with other countries impossible, as does the amalgamation of pulp and paper with printing, rubber manufacture and some other sectors. There are major unexplained trends in household space heating—a sudden drop in 1992 (which may be from a

combination of hydro shortage and benefit cuts). You don't learn much until you disaggregate, but commercial constraints makes that difficult. Comalco has acted as an island of overseas privilege within New Zealand's physical and legal boundaries, tying up 1/7 of our electricity until 2020, delivered at half the wholesale price, with extraordinary and costly provisions for security of supply. Other foreign islands within our own country are the Maui Contracts and the Mobil Synthetic Gasoline plant.

New possibilities—the challenge for EECA

The Energy Efficiency and Conservation Authority (EECA), under its new Act, will be the key to moving New Zealand towards a more sustainable path: the underlying geographic and cultural factors may make it possible for NZ to be the first fully developed country that actually achieves long-term sustainability while improving the standard of living of its people.

The National Energy Efficiency and Conservation Strategy (NEECS) offers the challenge of creating new policies supported by a new culture. EECA will have to decide whether to see the energy industry as an abstract economic construct, or as a real part of the economy. It will need to decide whether to perpetuate the data-free analysis and logic-by-cliché of the last 15 years, or to disclose real information. It will need to address the legal, contractual, and cultural constraints that are driving supply-side energy decision-making. And it will need to create a strategy that works within the realities of today's dominance by a tiny group of political heavyweights—a strategy that 'doesn't scare business' yet moves incrementally towards a more sustainable future. To aim towards the best-possible-world would only ensure that the arrow falls way short of the mark.

Not since the 1973 Maui Contract have our energy policy makers faced such a challenge. The contract contained strong safeguards of the public interest, allowing government scientists to evaluate the reservoir engineering data, but in 1988 the Ombudsman reluctantly decided that commercial secrecy took priority over the public interest. The Ministry of Energy called off the scientific evaluation of gas reserves, and we now take the company's word for how long Maui will last. Thus it is 'corporate culture' rather than actual legal or contractual constraint that destroyed the public policy appraisal of NZ's premium fuel, natural gas. How will the new EECA board deal with this corporate culture?

The NEECS needs to find a way to assess the impact of the Maui and Comalco contracts on the sustainability of NZ's energy sector. It will need a combination of graceful diplomacy and iron willpower to negotiate, between Government and the energy interests, what information from these and all the other energy businesses is required to support public policy in the energy sector.

Challenges to government

This challenge is all the more demanding now that the Minister of Energy has released the report of the Electricity Inquiry. Unfortunately it is a prime example of data-free analysis. Where data exist they are contradictory. For example the Inquiry issues paper claims that the retail sector contributes 10% to the typical household power bill, whereas the final Report gives that figure as 22%. A commissioned paper supporting the latter figure claims that the wholesale electricity price has been essentially constant at 4.1 c/kWh from 1996 to 2000, in contradiction to almost every other evaluation, including a documented paper from Ernst & Young quoted by Orion. This Report must be recognised as part of the problem.

The most important question on the wholesale electricity market is not efficiency, but whether a 'market' is at all capable of supplying the joint services of electricity kilowatt hours; distribution over networks; quality of supply; and service. The present NZEM arrangements maintain only a facade. Behind it lies a gargantuan network of secret bilateral contracts and old-boys'-club agreements, either documented or implicit. These have trussed up the supplies and security of electricity for the sake of favoured market segments—exactly as predicted by the American Public Power Association. Self-regulation will not undo this appalling situation; it needs legislation.

In order to invent a market, a costly new retail function had to be created. What value can this retailing function add, and to whom does this value accrue? Economics calls for cost-reflective pricing, which rewards the consumer for saving energy when it is costly, and offers energy cheap when it would otherwise be wasted. Government shows no commitment to workable pricing for these objectives; the rhetoric is still swallowed whole. Deregulation produces only price discrimination. A new governance structure for this 'non-market' is part of the problem, again, not part of the solution.

New capacity is the only area where competition makes any sense. But with the present situation all that will be built is the cheapest capacity available, to run on premium fuels. Yet all the environment

can afford is investment in renewable energy and energy efficiency. Only central government can sort out this sham.

Economies of scope must replace the classic engineering practice of economy-of-scale. This means integrating energy production and distribution with other essential services including water, soil and waste management, applied at each scale from individual consumers to nationally significant projects. I have called this the Fractal Strategy for infrastructure, because similar structures and systems will be echoed at each hierarchical level—like the leaflets in a fern frond. A fractal branching system is in fact the most efficient way of distributing resources around any physical—or biological—system.

Local authorities will be the key to integrating infrastructure below the national level—through district and regional plans and bylaws. Structural solutions must be replaced by standards and bylaws, and land use planning that reduces hazards while providing amenity and biodiversity.

At the household level, integrating services includes separating rubbish at source and burning clean garden prunings and other appropriate wastes (also bones, for their phosphate content). It includes recycling roof runoff and grey water. It includes transport by foot and bicycle for short journeys, and carpooling for longer ones—local authorities' role in ensuring safe routes is critical.

It is the person at the end of the switch that makes the difference!

For larger users, there is cogeneration in industry and commercial buildings, and industrial parks which trade heat and materials amongst each other. At local and regional authority level, we have integration of water and waste disposal with energy forests, and biogas from landfill and sewage treatment. We have disposal of storm water through planted filter beds. Locally appropriate building bylaws and standards are a key issue for sustainability.

Challenges to you and me

In the end, it is people—as individuals, family groups, community groups and opinion-makers—who will lead New Zealand onto a new path towards sustainable development. It is the person at the end of the switch that makes the difference!

The Prime Minister shows a true top-down commitment to sustainable development (page 2). This is one of the most important drivers of change—a point made repeatedly by Amory Lovins. What is needed is moves on many fronts to address the problems created by commercial and political considerations. Cultural change is necessary, and possible. The EECA Act gives exactly the right framework for such moves.

EECA Board Appointments

Energy Minister Pete Hodgson has announced six appointments to the board of the Energy Efficiency and Conservation Authority (EECA). All are for three months (from 4 July 2000) and all but one are roll-overs of existing appointments. Hodgson said there had been a good response to the public call for nominations for members of the new Authority and there was scope for bringing on new members in the next three months. "I've opted for short-term appointments and a minimum number of board members because I want to have a good look at all the names that have come forward. This interim board enables the new agency to get started, as it has important things to do."

The new appointment is Judy Bischoff, a farmer and permaculture expert in Waiuku, South Auckland, an environmental consultant, and a director of EnviroWaste Services Ltd.

The rolled over appointments are:

- Giff Davidson (Chair), past president of the New Zealand Institute of International Affairs, past chairman of the New Zealand Chamber of Commerce and past president of the Wellington Chamber of Commerce.
- Mike Underhill (Deputy Chair), Hamilton, chief executive of WEL Energy Group.
- Richard Thompson, Wanganui, president of the Ecologic Foundation (formerly the Maruia Society) and an environmental consultant.
- Susan Paterson, Auckland, board member of Transpower and Tower Health Ltd and past president of the NZ Strategic Management Society.
- Bill Smith, Auckland, general manager of Tasman Insulation New Zealand Limited.

Newsroom

Electricity Inquiry report released

On 13 June 2000, Minister of Energy Pete Hodgson released the report of the Ministerial Inquiry into the Electricity Industry. "The Government will now carefully consider all the panel's recommendations. I expect to be able to announce decisions within the next six to seven weeks. Legislation is likely, and I expect to introduce this in October," Hodgson said.

Copies of the Report are available:

- At www.electricityinquiry.govt.nz (no charge)

- From Pronto Group, Vogel Building, 8 Aitken Street, Wellington (PO Box 12-309, Thorndon; phone (04) 499-9806) at $ 27.00 / copy.

A summary of the report's recommendations is:

Wholesale market

a) The governance framework for the physical wholesale market should be strengthened and made mandatory, with mechanisms to ensure that:
- the views of all stakeholders, including consumers, are taken into account;
- competition is enhanced wherever possible, and where it isn't possible, that outcomes mirror those that would arise if the market were competitive; and
- demand side participation is enhanced;

b) The current governance bodies (NZEM , MARIA and MACQs) should be replaced by a new single market structure with the following key features:
- the board of the structure should be elected by stakeholders and comprise a majority of members independent of the industry;
- membership of this structure should be compulsory for generators, distributors, retailers and Transpower;
- the structure should operate under Government-agreed guiding principles and include robust mechanisms for self-regulation; and
- service provision to the market should be contestable;

c) The Government should invite the industry to put these new arrangements in place within 12 months; if industry participants fail to commit to the required work, the Government should then legislate for regulatory powers to put the structure in place;

d) Once the new structure is in place, adoption of a real time wholesale market should be progressed as a priority;

e) The market system operator should publish projections of system adequacy;

Transmission

f) Transpower's principal objectives should be to achieve a reasonable and transparent balance between a fair return to the taxpayer and energy policy objectives (including efficiency);

g) Transpower's specific objectives should include:
- providing services agreed with users;
- making its services contestable wherever possible;
- pricing its services in line with principles determined by the Government, and, subject to those principles, according to a pricing methodology determined by the market on the basis of user-pays wherever possible;
- pricing of new and replacement investment to provide:
  - grid users with strong incentives to identify least-cost investment options, including energy efficiency and demand management options; and
  - clear location signals;
- allocating sunk costs in a way that minimises distortions to the use of new and existing grid assets;

h) Transmission charges should be enforceable on the same basis as other market rules;

i) Transpower should be required to ensure that minimum standards to deal with grid constraints are met;

Distribution

j) The Commerce Commission should:
- be responsible for the content and enforcement of the information disclosure regulations and analysis of line company performance;
- require recalculation of asset values and mandate future asset valuation methodologies;
- be empowered to impose price control on individual distribution companies (and Transpower) for a maximum of five years; and
- be given responsibility for developing criteria

and thresholds upon which price control should be imposed;

k) The Commerce Act should be amended to permit the imposition of CPI-x price control;

l) Distribution companies that are majority owned by trusts and local bodies should be required to have their statements of corporate intent modelled on Transpower's;

m) Distribution companies that are majority owned by trusts should be subject to the Local Government Official Information Act, the Public Finance Act and the Ombudsman Act;

Retail

n) Protocols for switching consumers should be enforced by the new market board;

o) The Government should invite the industry to establish an Electricity Ombudsman Scheme to apply to retail and distribution companies, including provision for the application of fines on companies and compensation for consumers;

p) The Government should allow the industry six months to establish the Scheme, after which the Government should look for other options to ensure that the industry has an appropriate focus;

q) Use of system agreements that take account of retailers, interests should be developed by the industry;

r) Arrangements should be introduced for consumers whose retailer becomes insolvent to be supplied by the 'incumbent' retailer;

s) The Government should require retailers to supply pre-paid meters at reasonable cost;

Energy efficiency/sustainability and the environment

t) Fixed charges should comprise no more than about 25% of the typical household's electricity bill;

u) The Energy Efficiency and Conservation Authority should monitor fixed charges and refer the matter to the Commerce Commission if this percentage is exceeded; and

v) Transmission charges should be amended to promote co-generation.

Newsroom

Commentary on the report of the electricity inquiry

Our main commentary on the report of the Ministerial Inquiry into the Electricity Industry is in Molly Melhuish's paper, presented to the SEF conference and printed on page 4.

There was a reported comment from David Caygill, at the Conference, that co-generation in recommendation (v) should have included embedded generation.

Newsroom staff reporter Patric Lane quotes inquiry head David Caygill as saying that the recommendations in the report would address concerns about unreasonable profiteering and cost structures in the electricity industry, but that if the recommendations were adopted prices would not necessarily fall, but future prices would be lower than they otherwise would be.

Mr Caygill said in the period since the industry was deregulated, customers who wanted to switch companies had not been well served at all, though the situation had improved with the introduction of rules to address the problem by the industry earlier this year.

He said compared to other countries we have relatively cheap electricity, though the issue was not whether we should be complacent but whether we can do better.

National Energy spokesperson Pansy Wong said that the need for a political compromise had robbed New Zealand consumers of the chance to pay less for their electricity. "The refusal to do anything about prices is a worry because it sends the message to the monopolistic sectors of the electricity industry that the current price level is acceptable when it should be lower."

EnergyWatch

When the Forum took over EnergyWatch we intended to put out 'at least' four copies a year. Now—at last—we are on the way to exceeding this minimum; yet another indication of change. We have standardised our issue dates as March, June, September and December, and now this July/August issue is an 'extra'. The next issue should be in September.

SEF Conference Report

The Sustainable Energy Forum Conference was held in Dunedin on 8-9 July 2000. These summary points are based on notes by John Blakeley.

- In 1998 domestic transport accounted for 45.5% of New Zealand's energy - derived CO_2 emissions, already the highest proportion in the OECD (the average is about 30%).

- CO_2 emissions in the domestic transport sector were up 32.5% from 1990-99. If this trend was to continue, New Zealand's domestic transport energy use will be about 80% higher in 2020 than in 1998, and will by then account for about 52% of total energy use.

- CO_2 emissions from thermal electricity generation increased by 53.8% from 1990-99 and accounted for 20% of total energy emissions in 1999, compared with 15% in 1990.

- The 'take or pay' agreement for Maui gas encourages users to take as much gas as possible as the field begins to run down, which is likely to increase still further CO_2 emissions from thermal electricity generation.

- In March and April this year, two gas industry leaders stated that New Zealand has gas reserves of less then eight years at current demand. Since then, the Pohukara gas field has been stated to have reserves equivalent to meeting 3-6 years of current demand. Despite this, Natural Gas Corporation and TransAlta are planning a new gas-fired power station of up to 400 MW coming on line within three to five years.

- New Zealand has large reserves of coal but use for electricity generation will put very significant pressures on the NZ industry and its supporting infrastructure. Significant new mine development could be required, potentially at higher cost than imports. Thus a sizeable amount of future coal demand is likely to be sourced internationally.

- A February 2000 government report stated that coal is favoured ahead of other electricity generating plant for new capacity requirements around 2015 and 2020. If New Zealand is going to meet its commitments under the Kyoto Protocol, official thinking implied by the above statement will have to change, (especially as requirements under the Protocol in the second five year period are likely to be tighter then in the first), because of the high CO_2 emissions per unit of electricity generated from coal.

- Geothermal energy for electricity generation is expected to more than double between 1998 and 2020 but because of the very low conversion efficiency, this will only give a 260 MW increase in generating capacity. Direct use of geothermal energy is a far more efficient use of the resource than for electricity generation.

- Only a very modest increase in hydro-electric generating capacity is expected between 1998 and 2020.

- Other renewables are unlikely to make a significant contribution to New Zealand's electricity generation capacity before 2010:
  - — Although one substantial wind farm has been built near Palmerston North , others are unlikely to soon follow because such projects are not quite able to economically compete yet with other sources of electricity generation.
  - — Photovoltaic energy is rapidly reducing in cost but unlikely to be competitive for electricity generation before 2010, except for remote locations.
  - — Biomass for electricity generation is also unlikely to be competitive before 2010 where the cost of producing the energy crop has to be taken into account.
  - — Economic electricity generation from tidal power and wave power would appear to be much further into the future (beyond 2020).

- If the 'default option' as Maui gas is no longer available for electricity generation (around 2010) is to replace it with coal, then this will have very serious implications for New Zealand meeting its Kyoto Protocol commitments .

- To reach its target under the Kyoto Protocol from 2008-2012, New Zealand will have to reduce its 'business as usual' greenhouse gas emissions by approximately 34 million tonnes of CO_2 equivalent: a 9% decrease on forecast business-as-usual emissions for 2008. However, this gives an 'overly rosy picture' of what will be required to meet this commitment. This is because the assumed reductions of the other two dominant greenhouse gases (methane and nitrous oxide) are essentially fixed at business as usual predictions and therefore to achieve a 9% overall decrease, it is necessary to achieve a 26% decrease in CO_2 emissions compared with business as usual, if New Zealand is not going to rely on carbon sinks or international

emissions trading to meet the commitments required under the Kyoto Protocol.

- Average electricity use (around the clock) in a 1000 m² house is 2 kW: 38% of this is used for water heating and 36% for space heating. It makes no sense from an energy efficiency viewpoint to use high grade electricity to produce low grade heat for water and space heating.

- New Zealand's electricity industry has an $bn 8 annual revenue, but due to inefficiencies and wastage in generation, distribution and end use, around $bn 6 of this is being wasted and only $bn 2 is providing a useful product.

- COP-6 at The Hague in November 2000 may not agree to give credits for carbon sequestration (carbon sinks). The powerful European grouping had now agreed to support international emissions trading but were still very much opposed to these credits.

Public Forum

The public forum on "Energy Policy for the 21st Century—Making it Happen", involved a panel of politicians from various parties plus David Caygill, Molly Melhuish and two Otago University energy-management students. The consensus view which emerged is that in New Zealand:

- At the level of the individual citizen, decision making on personal energy use takes very little if any account of wise use of resources and environmental considerations.

- In the business sector, energy decision making is little better (as evidenced by the present squandering of New Zealand's limited resources of natural gas).

Perhaps the situation can be partially corrected by providing both individual citizens and corporate organisations with appropriate market signals, but the public forum agreed that the problem goes deeper than this. It was said that New Zealanders have become *energy junkies,* necessitating an *attitudinal change* which will require strong government leadership (and major publicity campaigns similar to those mounted against smoking, and drinking and driving).

Brighton Rocks to the World Renewable Energy Congress

Ralph E H Sims SEF Convener, Director, Centre for Energy Research, Massey University, Palmerston North.

This report of the Congress was to have been presented through a live video conference link to delegates at the SEF Conference in Dunedin on 8-9 July. A test run the day before from England was fine, but on the day, the telephone system at the author's hotel let us down. So much for the French Connection!
This is a lightly edited transcript of the planned presentation with apologies to delegates and WEL Energy.

Introduction

Renewable energy is finally making an impact on the world's energy industries, judging by the interest in the 6th World Renewable Energy Congress (WREC), held from 1 – 7 July, 2000 in Brighton, UK. There were over 800 delegates from 94 countries with almost 400 papers presented (and available from Pergamon Press).

New Zealand's small contingent consisted of the author, presenting an invited paper on *Opportunities for renewable energy in rural communities of New Zealand,* and Henry Skates, from the Centre for Building Performance Research, Victoria University who co-authored a paper with past colleagues from the University of Ulster on *Technologies for Sustainable Buildings;* and with Russell Maunder and George Baird, a second paper on *A heat retaining direct gain window system for light weight construction.* Australia had 15 representatives including Martin Green (PV expert from the University of New South Wales), Martin Walsh (Manager, Renewable Energy Development, Australian Greenhouse Office), David Eiszele (Managing Director, Western Power), and Candy Broad, (Minister for Energy and Resources, Victoria).

There were 8 parallel sessions, on wind; PV; solar thermal; biomass; low energy architecture; energy materials; water power; and policy issues, as well as a special session on the Clean Development Mechanism of the Kyoto Protocol. A Millennium Debate on whether the Kyoto Protocol is a significant step towards the global use of renewable energy was disappointing, even though speakers included Jeremy Leggett. (His recently

released book *Carbon War* is an essential read, even though it is somewhat depressing to learn just how little progress has been achieved since 1990).

Renewable Energy 2000 – Exhibition

A highlight was the associated trade exhibition, with over 100 stands of manufacturers, research organisations, and energy companies such as Shell International Renewable. There was also a series of presentations given by the exhibitors. It was said in the opening plenary session that the global renewable energy market will be worth NZ$ 11 billion over the next five years, and the optimism evident in the trade exhibition confirmed that the market is already buoyant.

Products on display included biomass pelleters and burners, power conversion equipment, cogeneration systems, Stirling engines, pyrolytic biofuels, gas engines, energy monitoring systems, inverters, solar water heaters, architectural services, wave energy converters, marine current turbines, thin film photovoltaics and even steam engines. It was interesting to see parts of the fossil fuel industry diversifying into renewables. For example Seacore, a specialist marine construction contractor with large diameter drilling capabilities and jack-up plant operation usually employed in oil platforms, seeking new business from providing monopile foundations for off-shore wind installations and marine current turbines.

One stand exemplified just how far the industry has progressed. Three insurance companies (Royal and Sun Alliance, Willis, and Lilley Grant Rush) have joined forces to provide insurance cover products especially for renewable energy projects. This cover includes:

It was interesting to see parts of the fossil fuel industry diversifying into renewables

- Equipment damaged or delayed whilst in transit;
- Risks during construction including contractors' all risks, loss of revenue from delays, and public and product liability;
- Risks during operation including lightning, fire, loss of revenue during turbine repair, failure of power supplies to customers etc;
- Reinstatement cover after damage or loss, with inflation provision;
- Marine impact for wind turbines when built off-shore or on harbour walls;
- Damage from tidal wave or anchor drag;
- Full employers' liability; and
- Breakdown cover where manufacturers' warranties have expired.

The cover is for wind, waste-to-energy, landfill gas, solar and hydro installations at this stage and is expected to expand as the industry matures.

Latest technologies

Wind power now boasts over 14 000 MW installed worldwide, with projects worth more than NZ$bn 7.0. The claimed annual rate of growth is greater than that for personal computers and equivalent to that for mobile phones (and judging by the number that rang during speakers' presentations this must be pretty high. One plenary speaker was even interrupted during his presentation by his own mobile phone!).

Many of the photovoltaics presentations were on monitoring of actual applications, such as a 3 MW plant in Italy, now in its 5th year of operation. Other papers covered developments such as a new design of solar lantern for developing countries to replace kerosene lamps, exhibited by the Intermediate Technology Development Group.

Solar thermal papers covered collector technology; water heater designs, with emphasis on evacuated tubular heat pipe systems; high temperature solar thermal electricity generation; forecasting of techno-economic power generation in arid climates; water desalination; ice manufacturing using absorption chillers; and solar cookers. Several papers showed the benefits from simulating solar thermal systems using local climatic data and that orientation conventions may be inappropriate for certain local conditions, building orientations and load patterns.

In the low energy architecture sessions it was claimed that half of all the energy used in the developed world is for the construction and servicing of buildings. Themes covered during the six sessions were on future visions, energy in the cities, daylighting, low energy architectural design and comfort and ventilation. The long lasting problem of the continued divergence between the approaches of engineers and architects to the design process in relation to energy use was also discussed.

The material science section included papers on solar collector surfaces and designs, window glazing products, glass specifically designed for PV panels, and smart windows—automatically controlled to maximise the solar gain in cooler climates or to reduce it in warmer climates. A newer concept is vacuum windows, where the thermal resistance is equivalent to an opaque wall but with light transmission and solar gain.

The biomass section was poorly represented, probably because of the very successful World Biomass Congress held in Spain three weeks earlier. Nevertheless, several success stories were presented including landfill gas, anaerobic digestion, biodiesel and chicken litter projects. Three chicken litter power stations (12, 13 and 27 MW) are now being operated successfully in the UK by Fibrowatt, with others being developed in Italy and elsewhere. The eagerly awaited Yorkshire Arbre 10 MW wood gasification project was presented as being near completion, and 1100 ha of short rotation willow crops have been contracted with local farmers over a 15 year period, to give fuelwood supply security. Interestingly, international trading of biomass has already started: for example, Croatia now exports sawdust briquettes to Austria and Sweden is importing energy wood chips from West Canada.

Small hydro applications were part of the water power sessions, but perhaps of greater interest was the number of papers and exhibitions on wave power (both on- and off-shore devices) and ocean currents. The most advanced concept, soon to be evaluated off the Devonshire coast using a 300 kW machine, is a below-surface turbine with six times the energy capture per m^2 of rotor area as for wind. (The Vortec wind developer here in New Zealand is contemplating a similar concept which, due to its diffuser, may be even more efficient). A water depth of 10-25 m is required with a stream flow velocity of 2-4 m/s. The major difficulties are in anchoring such a device which may be subjected to a 200 t thrust. Maintenance in such strong currents is extremely difficult for divers, and yawing the system as the tide turns is not easy. These problems have been solved—in theory—by installing a pair of two-way Wells turbines, on an underwater mast, one on either side. They can be hydraulically raised above sea level for maintenance. And of course the obvious question —what about the fish?—is not a real issue: it is just like walking through a revolving door.

Policy Issues

This was the most popular of the parallel sessions, endorsing the view that technology is not the barrier to further uptake of renewables. The World Energy Assessment report prepared by the United Nations Development Programme (UNDP) is to be released in September. This is a significant document providing information and analytical background with summaries that will be essential reading for decision makers. A third of humanity cannot afford basic commercial energy and this is deemed critical to human well-being. A preview quoted, "If these developing countries are smart enough to adopt modern efficient technologies and leapfrog the wasteful and destructive stages in the energy development process as followed by the industrialised countries, they could provide the services they need using less energy".

Gerald Doucet, Secretary-General of the World Energy Council (WEC) presented a summary of the WEC report *Energy for Tomorrow's World – Action Plan,* released in May. It argues that market liberalisation is good for renewable energy uptake; predicts that full fossil fuel accounting is coming; and supports the concept of distributed power supplies, as being evaluated in New Zealand by IRL and Massey University. However, it appears to be written mainly by members of the 'Carbon Club' who give renewables an unfair coverage. For example all conversion efficiencies for renewables were taken to be a very low 33%! We need more renewables people on the WEC to counter the bias.

The UK's replacement policy for the Non-Fossil Fuel Obligation (NFFO) were discussed in detail. The UK policy is based on setting targets for power generation levels for each renewable energy technology (including off-shore wind) and imposing a climate change levy on electricity consumers (with renewables being exempted as common sense finally prevailed).

Kyoto received considerable debate, with Craig Windram from E3 Consultants in Brisbane arguing it is more a trade agreement than just environmental. He stated it has failed to accelerate the uptake of renewables at anything like the extent required, with global energy projections showing that CO_2 emissions are likely to be 70% *above* 1990 levels by 2020. The Clean Development Mechanism (CDM) (which encourages developed countries to invest in energy projects based in developing countries) received a lot of interest. The aim is to foster financial partnerships that link access to affordable commercial energy in developing countries with low greenhouse gas emitting technologies. Suitable projects for CDM will be site-specific and will need approval, though it is not yet known by whom. Making CDM a successful mechanism will need additional funding of NZ$bn 5-10 /year, over and above the

current NZ$bn 50 / year in overseas development assistance.

Potential trade in carbon emissions is anticipated to be worth NZ$bn 48 / year to the traders alone—by way of commission—so the whole process is rapidly gaining momentum *(unless the EC sinks it at COP-6; see the conference report on page 11—EW)*. Good projects are already being sought, but most bankers have no understanding of the concept as yet. The 'bankability' of a project is still low, as outlined by a senior partner from Ernst and Young.

In Summary

The benefits of renewable energy appear to be better appreciated now than when the first World Renewable Energy Congress was held in 1990 but there is still much work to do in education, promotion and development. The developing countries are not lagging far behind. India is manufacturing and exporting wind turbines, and also targeting 13 000 MW of biomass-fired generating plant by 2010. The technologies are becoming more competitive with fossil fuels as efficiencies improve and installed costs fall with greater experience.

There is a need for developing countries to have wider access to reliable and affordable modern energy services, (not least those provided by renewable energy sources) to promote sustainable development. Developments in emissions trading and CDM should help accelerate this process.

A highlight was the address by John Gummer, Secretary of Energy for the British government under John Major. He spoke eloquently for 20 minutes, without notes. His message was that renewable energy uptake is not fast enough to mitigate climate change, and actions following Kyoto are half-hearted. Gummer urged delegates to be arrogant in pushing their beliefs, so for those readers who have yet to be convinced, renewable energy is the only way to go!

The next WREC event will be held in Cologne in July 2002. Fuel cells and hydrogen are to be added to the list of technical sessions. Hopefully by that time there will be even more significant advances in renewables and increased projects in place, probably encouraged by carbon trading, the CDM, and public demand. Maybe there will be so much to report on New Zealand's progress that our delegates will out-number those from Australia.

Transport Forum in Wellington

Wellington Regional Council ran a transport forum in March. In this article we quote from the overheads put up by three participants, all focusing on sustainability and transport policy:

Dr Morgan Williams
Parliamentary Commissioner for the Environment

Our society's demands for mobility, and the dominance of road transport, is the single biggest cause of environmental degradation in our towns and cities.

A conceptual hierarchy for reducing the environmental effects of transport:

1 Reduce the need to travel.

2 Chose a low-impact means of travel.

3 Chose a low-impact propulsion system.

4 Improve the efficiency of propulsion.

> "Whenever a new Washington metro station opens, its proximity boosts real estate values by 10% for blocks around, encouraging further private development."
> "Globally car accidents are the fifth—and will soon be the third—largest cause of death. If automobility were disease, vast international resources would be brought bear to cure it."
> *Paul Hawken, Natural Capitalism, 1999*

Drive home the messages:

- Mobility demands are a direct consequence of our land use patterns, business models and lifestyles.
- Personal mobility is very highly valued.
- Meeting mobility needs, and managing demands, requires extraordinary integration of many parameters.
- The dominance of road transport has major environmental effects.
- The lack of a national land transport strategy impedes optimal development of more sustainable mobility.

- The RMA alone will not protect the environment from the effects of road transport.
- Many little and not-so-little barriers to improving the mix of mobility options.
- Limited research on many aspects: little analysis of the level and use of discount rates.
- More transparent pricing of mobility options is essential—but it will not ultimately manage demand.
- Major opportunities for more innovation in the policies, technologies and systems of mobility.
- Maintaining mobility, while improving the sustainability of our societies, necessitates city and business redesign.

Derek Scrafton
Transport Systems Centre, University of South Australia

Five transport issues of lasting significance:

- Transport planning and decision making will become more complex. This is a challenge and an opportunity, but it is not a task for the faint-hearted.
- Good data and rigorous analysis will be needed more than ever—this at a time when respect for research and analysis is low, confidentiality is used as an excuse for avoiding disclosure of essential data, and hyperbole is used more often than facts.
- The growth of stronger and more active regional governments has to be accompanied by leadership an example, and the planning and service delivery responsibilities have to be complemented by a funding base.
- The role of the private sector in transport will expand from infrastructure and operations to research, planning and finance. Partnerships and consortia are already important.
- Education and training for transport needs first to be preserved, then strengthened, not an easy call given the cuts to education budgets in many countries.

Prof Tony May
University of Leeds UK

A new deal for transport:

- Better places to live.
- Better buses and trains.
- More sustainable freight transport.
- Better protection for the environment.
- Better safety and security.
- A more inclusive society.
- Everyone doing their bit.

Five key objectives:

- Protecting the environment.
- Improving safety.
- Contributing to an efficient economy.
- Promoting accessibility for all.
- Achieving integration.

Growing wholesale electricity market

The New Zealand wholesale electricity market (NZEM) has welcomed a new market participant. Tuaropaki Power Company Limited is the first Maori-owned power station to join the market.

Tuaropaki Power Company is wholly owned by the Tuaropaki Trust, which administers the land where the geothermal power station is situated for seven Mokai hapu. The Tuaropaki station is located west of Taupo and has a 58 MW capacity.

"We have the largest privately developed and owned geothermal project in New Zealand," said Pat Brown of the Tuaropaki Trust. "Tuaropaki is big enough to sustain a town of up to 30 000 people and is run for the benefit of Maori. Joining NZEM is another step in developing our resources." Newsroom

NZ Cycling Symposium Making Cycling Viable

This conference was organised by EECA, and held at Massey University, Palmerston North, on 14-15 July. About 160 people attended, and they were not just cyclists: Local authority engineers and safety officers; Planners and policymakers; Health professionals cyclists; Transit NZ and LTSA staff; the Ministry of Transport, and above all, Steve Maharey, local MP and high-ranking cabinet minister, standing in for Minister of Transport Mark Goshe. This attendance highlighted the importance that is starting to be placed on cycling as a viable alternative form of transport in future.

EECA's Acting Chief Executive, Bill Brander, said "For EECA, cycling is seen as an important contribution to the National Energy Efficiency and Conservation Strategy. The development of facilities for cyclists and major cycling strategies in Britain and Australia is something that we must factor into our strategy and plans for the future."

The conference was opened by the MP for Palmerston North and keen mountain biker, Steve Maharey. Principal speakers included John Grimshaw, chief executive of Sustrans in the UK, who built more than 400 km of traffic-free cycle route in Britain, largely on disused railways, before bidding successfully in 1995 for the £M 45.5 (NZ$M 130) project towards the first phase of the 16 000 km National Cycle Network. The first phase launch this year attracted nearly 500 000 cyclists.

Another principal speaker was Dr Mayer Hillman, author of the landmark British Medical Association report *Cycling: Towards Health and Safety*, published in 1992. Hillman's study looked at the benefits to health from cycling and compared that with the risks of riding. It showed that the health benefits outweighed the risks by 20 to 1.

The mood was upbeat, with some 40 papers presented, but an update on Dutch progress—from Velo Mondial, held in Amsterdam three weeks earlier—showed just how far New Zealand has to go. In the Netherlands, everything has been done, or almost so. Nearly all roads—urban and rural—have cycling facilities, forming a continuous network, with very narrow meshes. The difference is so strong that Nigel Perry, writing from Amsterdam, drew attention to New Zealand myths about Dutch cycling:

- *There is something inherent in Dutch genes which makes them choose bicycles for transport.*
  Cycle use has not always been high in the Netherlands. What the government did was see the problems of mass car ownership developing and, do something about it.

- *Holland is flat and good for cycling.*
  Flat country brings semi-permanent headwinds (especially on the top of dykes) with no downhill runs.

- *The weather is good.*
  The Dutch say that it rains twice a week: from Monday to Wednesday and from Thursday to Sunday.

So why do they cycle?

- Cycling is seen as normal transport and given its fair share of the road:

- Cycle parking is provided at destinations.

- Cycling is recognised as healthy and good for kids, who are encouraged to ride.

- Cycling is seen as a healthy family recreation and facilities are provided—like cycle routes through woods.

- The Government has gone out if its way to promote cycling for the benefit of all.

In the wrap-up session, the Symposium made the following recommendations to make cycling viable in New Zealand, based on the two days of information and discussion:

- Government engages with the cycling community in developing its long term, sustainable transport strategy.

- The Ministry of Transport develop a separate national cycle strategy linked with the national transport strategy.

- All roads have, as a minimum design standard, safe provision for cyclists.

- The Ministry of Transport identifies suitable funding processes for on-road and dedicated cycle facilities.

- The cycle industry develop a levy used to promote cycling.

- The government recognises the health, environment, economic, safety and social

benefits of greater cycling.

- Local government recognises the overall benefits to their communities of greater cycling.
- Individuals and organisations wishing to show their support for cycling join the Cycle Advocates' Network.
- Central and local government recognises and improves communication with New Zealand's existing pool of cycling expertise and research capability.
- Where central and local government rely on voluntary sector cycle groups for cycling expertise, a fee for service is provided.

Using Wellington's wind

Researchers in Wellington are making the most of New Zealand's wind in a study which looks at improving the economic viability of windfarming. PB Power expects that their research will increase the number of wind farms developed in New Zealand. Research leader Paul van Lieshout said the aim is to encourage the efficient use of New Zealand's renewable energy resources.

Part of the research is looking at long-term and short-term wind forecasting. "New Zealand's high wind speeds create unique challenges for wind farm developers and wind turbine manufacturers. One area is high wind-speed shutdowns, where the wind turbine stops, then waits until the average wind speed falls below a set threshold, before restarting," said van Lieshout. "These shutdowns have not been previously taken into account and have considerable effects when assessing the long-term commercial viability of a wind power project, which requires accurately predicting the amount of electricity that will be produced."

Potential wind turbine sites in New Zealand are windier than the majority of overseas sites. European wind farms may experience high wind speed shutdowns only once a year while we expect several shutdowns a month. "However we have achieved notable goals towards improving wind farm viability in New Zealand by improving the forecasting of wind and long term wind energy predictions, so that investors can have a better idea of the energy prediction over the project's life," said van Lieshout. FRST

UK energy use needs radical change

The Royal Commission on Environmental Pollution calls for a 60% cut in CO_2 emissions in 50 years

The UK Royal Commission on Environmental Pollution has called for a "complete transformation in the UK's use of energy" in what it called one of the most important reports in its 30-year history. It urged the UK to plan for a 60% cut in the CO_2 produced by burning fossil fuels over the next 50 years, as an essential part of the global response to climate change. "We cannot expect other nations to do their part in countering this threat—least of all if they are much less wealthy—unless we demonstrate we are really serious about it," said Sir Tom Blundell, commission chairman.

Michael Meacher, environment minister, said he accepted the report's call for further action on global warming. But he stressed it was important not to force the pace of change faster than the public was ready to accept. The target of a 60% cut by 2050 was "not real politics, globally, at this time." The commission cast doubt on the likelihood of achieving the government's stated goal of a 20% reduction in emissions from 1990 levels by 2010, despite being on target to meet the 12.5% cut required under the legally-binding Kyoto Protocol.

The report also called for an expansion of renewable energy, where the UK is lagging behind several European neighbours, and said large improvements in the energy efficiency of industry, households and motorists were needed. The government's climate change levy, a tax on the industrial use of energy, should be replaced by a tax on fuels that emitted carbon dioxide. The commission said that the emission cuts would involve difficult choices. For example, keeping energy consumption at current levels would require energy crops covering 15% of farmland, 200 large offshore windfarms, onshore windfarms covering 1% of the land, a tidal barrage across the Severn estuary, photovoltaic cells on most buildings and 46 new nuclear power stations.

Financial Times

Environmental performance indicators released by MfE

The Ministry for the Environment have released proposed indicators for the environmental effects of energy. The document is open for comments until 25 August 2000.

The e-mail address is: indicators@mfe.govt.nz

The consultation document runs to 100-odd pages but the proposed indicators can be summarised reasonably easily:

Pressure indicators

Indicators of the pressure put on the environment by energy use.

E1: Total primary energy supply (TPES) by energy type per year.
Calculated using TPES =
indigenous production of energy
+ imports of energy
– exports of energy
– stock changes
– energy used in international transport.
Energy types considered are Coal (net); Imported oil and oil products; Indigenous oil (net); Gas; Hydro; Geothermal; and Other renewables.

E2: Total consumer energy (TCE) by energy type by sector per year.
The energy types considered are as above. Sectors are Agriculture; Industry; Commercial; Domestic; and Transport.

E3: TCE/TPES as a percentage per year.
A measurement of energy losses during conversion, transmission and distribution.

E4: Non-renewable primary energy supply as a proportion of TPES.

E5: National average efficiency of thermal electricity generation (MWh/PJ).
A noted limitation of this indicator is that it does not account for the heat output captured in co-generation facilities.

E6: Avoidable spillage in the hydro-electricity system (GWH) per year.
Avoidable spillage excludes spillage needed to maintain lake levels at levels required by resource consents. A statistical approach is proposed, using several decades of historical data to distinguish what is and is not avoidable. Trends over several years are expected to be more informative that the value in any particular year.

E7: Transport sector energy use (PJ) per vehicle km travelled per year.
Other transport indicators are included in E1, E2 and E3, and in the state and response indicators.

E8: Commercial sector energy use per employee per year (GJ/employee).

E9: Residential energy use per household (GJ/household).
These will be mainly indicators of energy efficiency in commercial and residential buildings.

E10: Industrial sector energy use / industrial GDP (PJ/$M).
Constant dollars will be used: 1992 is the base year in the example given.

State and response indicators

Indicators of the effects of pressure on the environment, and organised responses to that pressure (from MfE Table 6.1).

Indicators marked by a • are Stage 1 and can be introduced quickly; indicators marked with a — are Stage 2 and are to be introduced later, usually because of measurement difficulties:

Climate change
- Total NZ greenhouse gas emissions
- Background levels of greenhouse gases (CO_2, CH_4 and NO_2).

Air Quality
- Particulate matter (PM_{10})
- CO
- NO_2
- SO_2
- Ground level ozone (O_3)

— Benzene
— Particulate matter ($PM_{2.5}$)
— Visibility.

Freshwater
- Temperature
- Clarity
- Dissolved oxygen

— Occurrence of native fish: giant kokipu and red-finned bully
— Macroinvertebrates
— Riparian condition

— Wetland condition and extent
— Water abstraction.

Marine
- Confirmed marine spills by type, source and location
- Percentage season beaches or coastal areas not suitable for contact recreation or shellfish gathering

— Toxic and ecotoxic contaminants in shellfish and sediments.

Waste
- Quantity of hazardous waste accepted at landfills, exported, hazardous waste treatment facilities or wastewater treatment facilities.

Land
— Acidity or alkalinity of soil
— pH soil test.

Urban amenity
- Yet to be developed.

Maori indicators

Maori indicators are still to be developed, but relevant indicators which the EPI programme may wish to consider include:
— Restrictions on river flows, for example (hydroelectricity generation and eel passage)
— Water extraction sites
— Noise
— Sensory pollution (smell, noise, visibility)
— Discharges in areas of cultural significance
— Air quality (especially visibility)
— Water quality (especially clarity, colour and siltation)
— Changes in water temperature
— Changes in water levels (surface and sub-surface waters)
— Health effects (especially air-quality effects on Maori health arising from dust, NO_X, CO, O_3 etc)
— Changes in biodiversity (especially in mahinga kai such as eel, kai moana).

Mini–Whats

Wellington's trolley buses

The Regional Council has just renewed it's contract with Stagecoach for Trolleybus services. The contract runs through until the end of 2004. Some work will be done over that period to determine the future of the Trolleybus service in Wellington because major maintenance of the overhead will be necessary by then.

Sustainable Transport Network Newsletter

Himalayan Hydropower

A potential of 10 GW of small-scale hydro has been estimated for India, most of it from the Himalayan and sub-Himalayan regions. Development of small-scale hydro in hilly areas will combat poverty and enhance quality of life by providing good quality lighting, which makes homes and villages safer, more productive environments, and makes studying easier at night. Over-exploitation of firewood has caused depletion of forest, resulting in landslides, soil erosion and environmental degradation. Small-scale hydro reduces dependence on forest and fuel products to meet energy needs, through the use of low wattage cookers. A three year project to develop project assessment software should be competed this year.

ICE Research Focus

Wave Power

Development work on wave power has restarted in the UK. Wave energy potential can be up to 100 kW/m of wave front—all you have to do is harness it. Three current projects are:
- A Wavegen 500 kW turbo generator on Islay, in the Hebrides, using an oscillating water column to pump air past the turbine. The turbine blades feather to get unidirectional rotation from bidirectional air flow. The devices is fixed on an exposed coast, but a floating version is under development.
- A wave energy converter developed by Ocean Power Delivery, also in Islay, using water movement within a 12 m 'sausage' to drive turbines.
- An 80 m barge developed by Sweden's Seapower International, self-positioning to form an offshore 'beach' to drive an air turbine.

Electrical Technology

Power bicycle

An electric bicycle developed by Powerbyke in the UK is a 'traditional' machine *(which usually means 'heavy'—EW)* fitted with a 150 W hub motor and a lead acid battery. Claimed range is 32 km, or up to 40 km on a flat surfaces with no hills. Maximum speed is 24 km/h and total weight is 'less than' 40 kg. Electrical Technology

Forum Membership

Memberships are for the year ending 30 June and include at least four copies of EnergyWatch. Membership rates, including GST, are:

Unwaged/student	$	22.50
Individual or Library	$	45.00
Small corporate (less than 50 staff)	$	250.00
Large corporate (more than 50 staff)	$	900.00

Overseas rates: use Australian dollars for Austalian subscriptions, US dollars elsewhere.

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