

ENERGY WATCH

The Newsletter of the Sustainable Energy Forum - PO Box 11 152, Wellington, Phone/Fax: 04 3842755

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

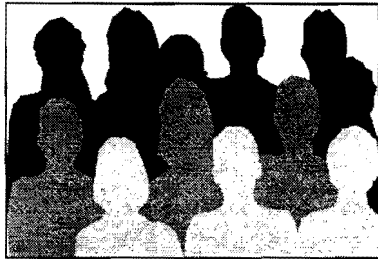
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Issue 5, June 1996

SEF CONFERENCE

Mary Dillon

The 1996 conference in Tauranga has come and gone and has been judged generally, to be a great success.



Participants all seemed to appreciate the range of speakers, the workshops, field trips and the hospitality. The conference dinner highlight was Chris

Powell's performance on Baycourt's very fine old Wurlitzer organ.

The presence of the conference in Tauranga provided the incentive for Tauranga District Council to move towards adopting sustainability as the overarching principle for its Strategic Planning exercise just about to commence.

The Strategic Plan, along with the District Plan, will provide Tauranga District with blueprints for resource management, resource development, economic development and social development for the next several decades.

Feed-back from the workshops at the conference was rather more brief than the committee anticipated, so this edition of EnergyWatch should remedy that situation.

The conference proceedings are still being assembled and they will be sent out to participants as soon as they are complete. Extra copies will be available. The conference committee places on record its sincere thanks to Neil Mander of Auckland, who undertakes the huge task of recording the conference process and assembling it in written form.

Preparation needs to begin now for the next conference, hopefully in Auckland where SEF needs to expand its presence.

WOGOCOP DUE

The Working Group on CO₂ Policy (WOGOCOP) report is expected to be released in July for public discussion. The implications of its recommendations could, at least, spark public debate on energy policy, and possibly even influence significant change.

The Working Group is a joint private-public sector group consisting of Bill Falconer, Keith Turner, Ken Shirley and Guy Salmon with officials from the Ministries of Environment, Commerce, Treasury and Forestry.

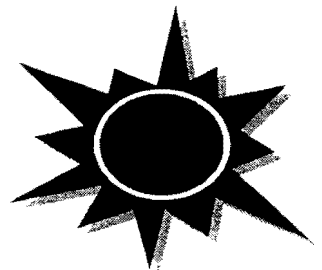
The group has been established to examine alternative measures in achieving the Government's CO₂ objectives. The Government has stated that if NZ is not on target to meet its CO₂ commitments by mid 1997, then the Government would consider introducing mandatory measures.

WOGOCOP has been examining both a Carbon Tax and a Tradeable Emission Permits system, and may recommend a hybrid of the two. This would raise significant questions. Firstly, the level of the tax, since a

large tax would be needed to induce significant change. In addition, the distribution of permits (such as who would be given what level of permit initially). Finally, the use of the 'tax' collected. For example, will it be targeted back into promoting energy efficiency and renewable energy?

The discussion document was originally planned to be released in early February, which has now slipped to July. The consultations will take place over a period of 3 to 4 months. However, under its terms of reference, the group is expected to "consult widely, taking into account the views of all interested parties".

Options running from a mailout to a 'roadshow' are possible in explaining the issues in the document. However, with the pre-election run up now underway it seems unlikely that any decisions will be taken in 1996.



MINUTES FROM THE SEF ANNUAL GENERAL MEETING

Held at the Baycourt Complex, Tauranga on 28 March 1996 at 19.30

Present: Mohammad Afzal, Mark Bachels, Keith Dawber, Pamela Dawber, Brian Farrell, Neil Mander, Heidi Mardon, Molly Melhuish, Ken Piddington (chair), Peter Pinder, Dai Redshaw, Diana Shand, Ralph Sims, Wayne Taitoko, Arthur Williamson, Fiona Weightman, Kerry Wood (minutes), Jack Woodward and 9 other members.

Apology: Mary Dillon

The Meeting opened at 19.40 Proposer, seconder

1. Ken Piddington welcomed attenders to the meeting. It was noted that Mark Hannagan has had to resign from the committee. Jim Ritchie has also been unable to continue, Wayne Taitoko has been suggested.

2. Agreed that the inaugural meeting minutes, on 31 March 1996, be accepted. Brian Farrell, Jack Woodward

3. Ken Piddington gave a Convener's Report. Priorities identified were replacement of the present temporary manager (Kerry Wood, standing in for Fiona Weightman), continuing production of EnergyWatch, and fund raising. Something close to \$ 20 000 of funding has been identified.

In answer to questions:

- About 400 copies of EnergyWatch are printed.
- Putting EnergyWatch on a WWW page has not been investigated. Projects are being undertaken (such as Molly's wood burning study) as resources are available, but funding remains a major limitation.
- We have insisted that sponsors of EnergyWatch do not buy editorial influence or space.
- Sponsorship of printing costs by copying firms has not been investigated but will be tried.
- Agreed that the report be received. Neil Mander, Mark Bachels

4. Fiona Weightman presented a financial report up to 31 January (10 months). A 12 month statement is not possible because the conference took place before the end of the financial year but it will be posted to members.

In answer to questions:

- We have so far been considered as political and not eligible for charitable status, but sponsorship for a particular purpose (EnergyWatch) would in any case attract GST.
- The government's Task Force Green project has been investigated, but they are looking for project-based work. EnergyWatch could be project, but it has also been found that TUG people tend to need a lot of support.
- Agreed that the report be received. Arthur Williamson, Dai Redshaw

5. -It was explained that the first Management Committee has agreed to serve for different lengths of term, so as to establish a rotation of three or four members elected at each AGM. The agreed terms were:

1 Year: Mark Hannagan James Ritchie, Heidi Mardon

2 Years: Mark Bachels, Kerry Wood, Mary Dillon

3 Years: Molly Melhuish, Ken Piddington, Jack Woodward

-Nominations for the 1996 Management Committee (Replacing Mark, James and Heidi) were Brian Farrell (Peter, Jack) (committee only) Fiona Weightman (Heidi, Brian) Wayne Taitoko (Molly, Mark).

-Agreed that nominations be closed (Peter Pinder, Neil Mander)

-Those three declared elected, and welcomed.

6. -Nominations for convener and co-convener Ken, Molly, Mark (Wayne, Ralph Sims)

-Agreed that nominations be closed (Peter Pinder, Neil Mander)

-Those three declared elected, and welcomed.

7. -It was suggested that SEF get an article into the AA magazine, possibly on the lines of 'we thought ahead' on unleaded petrol damaging engine components.

-It was agreed that AA members at the conference draft a letter.

The Meeting closed at 21.02.



SEF TAURANGA CONFERENCE WORKSHOP SUMMARIES

March 1996

Kerry Wood

INTRODUCTION

During the Tauranga Conference, several workshops raised a series of questions and issues. Four of these questions were chosen by the committee for the political panel. These questions as well as summaries of the workshops are presented below by subject area rather than workshop title. There was a heavy emphasis on transport issues, largely because there were more transport workshops than any others.

QUESTIONS FOR THE POLITICAL PANEL

One of the main purposes of the workshops was to develop questions to be put to the panel of politicians at a later session. The questions put to the political panel were:

- 1 Does your party support the allocation of funds to ensure;
 - (a) that the community and iwi groups can achieve sustainable energy outcomes at the local level?
 - (b) that they have the resources to make submissions and appear at RMA hearings to this end?
 - (c) that transfers are made from inefficient users to efficient users of all forms of energy?
 - (d) that your grandchildren will be able to meet 20 % of their needs from new forms of renewable energy, using the opportunity created by the depletion of Maui?
- 2 Would you establish a separate Ministry of Energy mandate to ensure;
 - (a) integration of all aspects of government energy policy-making?
 - (b) inclusion of all environmental, social and other external costs (on a life cycle basis) in any cost-benefit calculations?
 - (c) open access to all relevant information by private and public stakeholders?
- 3 In recovering the costs of land transport;
 - (a) do you believe all users should pay full costs which they impose, even if these are very high?
 - (b) do you agree that long-term infrastructure costs would be lower if Transfund allocated revenue to more sustainable urban transport, eg a passenger transport interchange?
 - (c) would you impose a carbon tax and what would you use the additional revenue for?
- 4 What are three changes in your personal lifestyle which you have made, or are prepared to make, in order to achieve sustainable resource use?

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NEW FACES AT SEF



I would like to welcome Andrew Beer to the Sustainable Energy Forum as the new SEF manager. Andrew will be replacing the present temporary manager, Kerry Wood and can be reached at SEF, PO Box 11-152, Wellington, phone/fax: 04 3842755. E-mail sefi@actrix.gen.nz

EnergyWatch has a new editor visiting from Canada. Laura Tomat will be working with SEF on the next two issues of EnergyWatch. Laura can be reached at 07 347 5343. E-mail: tomatl@fri.cri.nz or c/o SEF. Letters to the Editor on articles that appear in EnergyWatch or on issues of sustainable energy are always welcomed. Please ensure any correspondence is signed and clearly states a wish to be published. The Editor reserves the right to withhold or edit correspondence due to space limitations or suitability.

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Workshop summaries presented by subject area:

1. COMMUNITY ENERGY

**What will you do, through your political, community or corporate connections, for SEF following your commitment to sustainability?*

Other Questions

- *What will you do in the next three months to encourage energy efficiency and reduce energy use in communities?
- *How are you going to fund community education in sustainability?
- *How will you modify current economic policy to encourage sustainability?
- *How are we to restrict unsustainable economic growth?
- *What 3 things do you personally do in your community to live sustainability?

Issues/Ideas

- *Health-energy link
- *Cost of energy efficiency
- *Community action groups - participation
- *Community resources: Water/rain, land/food, time/energy
- *What resources do communities have already? What do they need?
- *City farm - environmental education - Council supported
- *Redefinition of "progress"

SEF Work

- *Provide trustworthy technical information to empower people
- *Influence the prime movers; supporting access to information and networking
- *Provide expertise to facilitate community input
- *Corporate support
- *Influencing present producers - 'natural step'

2. ENERGY POLICY

**Would your government form a dedicated energy ministry operating under a clear set of directives to be followed for all energy issues, recognising the complexities involved?*

**What would your government spend a fiscally neutral or revenue raising carbon tax on, to stimulate sustainable energy future?*

Other Questions

- *How would you include external costs?
- *What are the pathways towards a sustainable energy future?
- *Will your party agree to remove all market barriers to a sustainable energy future?
- *Given the need for a carbon tax or equivalent charges to meet international carbon dioxide obligations, how would your party spend the revenue to stimulate sustainable energy?

Issues

- *Pricing
- *Role of energy efficiency
- *Long term views (horizon - ownership issues)
- *Tied to population growth or control
- *Knowledge of choices available
- *Environmental costs
- *National resource accounting
- *Social costs
- *Resource Management Act needs to develop energy policy (Section 32 'analysis' - look at all the other alternatives)
- *Influencing all stakeholders
- *Ministry of Energy in a dedicated provider form
- *Education on energy use
- *'Flow chart' of energy projects needed; similar to RMA flowcharts?

- *Data collection and archiving
- *Pricing policy, especially with regard for small users: differential pricing?
- *Inclusion of environmental costs and all externalities
- *Remove inconsistencies between policies at different levels
- *Encourage metering to make energy use obvious
- *Dealing with risks and uncertainties in non-traditional renewables
- *Incentives/rebates to conserve, reduce fixed costs
- *Economic viability: must develop financial arrangements where new technology is financed through savings
- *Scrutiny of current situation - where do we want to be at different points (years) of transition? Targets and pathways needed.
- *Reward for doing the right thing: incentives for energy efficient alternatives.
- *Details in electricity sector are complex and are still being sorted out
- *Obligatory electricity metering
- *Mechanisms to encourage solar panels for hot water

Problem Areas

- *Current shortfalls
- *There are compelling reasons as to why government should take a greater role
- *How to 'make it happen'? What is the government's role?
- *Carbon tax
- *How to balance competing demands - how to implement
- *Injecting environment
- *Integration at all levels of government and individuals
- *Market driven policies or regulation?

What is happening?

- *Carbon dioxide working group
- *Land Transport Pricing Study
- *Deregulation of energy sector: electricity and gas
- *Heightened public awareness of energy (environmental?) choices
- *Energy policy will likely have to become more formal
- *Resource Management Act? Ozone Legislation?

3. IWI WORKSHOP

If iwi are to manage assets returned in land settlements sustainably two key actions are needed:

- *Full disclosure of potential risks such as contaminated sites and geological instability
- *Funding to ensure Iwi have the ability to take advice to optimise sustainable development

**Where do you stand on this?*

4. RENEWABLE ENERGY

Issues

- *Changing political climate - MMP 'Green votes'
- *Need to inform and change public attitudes
- *Abundant sources of wind, water, sun, land for crops
- *Difficult to develop economies of scale in NZ
- *Problems of transporting energy over large areas
- *RMA: balance of effects against benefits, needs an energy statement
- *Present low price of electricity and uncertain future prices
- *International obligations on climate
- *Funding of high capital costs
- *Maui gas running out
- *Need for original NZ research
- *Exploit possibilities of technology and knowledge
- *Need for industry co-operation
- *Other benefits (chemicals from biomass etc.)
- *Improving waste problems
- *Need for transport fuels
- *Risks and uncertainties of development and new processes



Workshops looked at what SEF could do if given \$100 000 for 1996/7 to spend on renewables

- *Sustainable energy scenarios for New Zealand
- *Programme to model NZ energy futures (possibly to change inputs and see changed outputs)
- *Energy conservation/efficiency from renewables (interface between renewable energy generation and market)
- *Investigate the effect of uncertainty of electricity prices and impact on renewable energy
- *Energy future scenario: a coherent view needed (equivalent to the industry-funded Energy Foundation)
- *Independent database of manufacturers, products and costs
- *Computer library - NZ orientated. Note the value of picking up, learning from and linking into overseas information
- *ERDC reports relocated
- *Focus on children (eg precious joules)
- *Interactive software for primary schools
- *Lay persons information sheets
- *WWW page - link to other pages
- *Conference/demonstration of renewable energy technologies for local or international investors, students, etc.
- *Trade show
- *Mobile working display/truck
- *Kick start associations/networks office, meetings, lobbying, eg. wind
- *Vocational training competition for a small bio system
- *Review CNG case - lessons to be learnt?
- *WOGOCOP
- *Kick-starting: Link between commercial interests and government (eg. in USA) providing 50 % each to launch pilot plants etc.
- *Video for politicians on energy and carbon dioxide
- *Need to focus on sponsors, target audience and a few specific targets - a future for our grandchildren
- *Seek government money for credible market research

Renewable Energy Events Information

Converttech pilot plant opens - Christchurch, May
Bio-energy Network NZ meeting - May
EC triennial wind conference - Sweden, June
Wairarapa Wind Farm commissioned - July
Geothermal seminar - Taupo, July/Aug
Baring Head Wind Farm appeal - Sept
IEA wind meeting - Wellington, Oct
ANZSES meeting - Dunedin
Solar car race - October
1997 CEMIC conference on sustainability - Rotorua

5. TRANSPORT AND THE ENVIRONMENT

- *How would you amend the RMA to integrate land use and transport planning?*
- *How do we reconcile annual funding basics with long term infrastructure effects? For example, would you support Transfund making allocations to 'catalyst' projects such as a passenger transport interchange?*
- *How can extra income from inefficient energy users be best used to make it easier for efficient users (eg MJ/person/km or MJ/tonne/km)?*
- *Should transport users pay full environmental costs of over \$1.0 billion per year?*



Other Questions

- *What specific actions will you take to encourage sustainable energy in communities?
- *How acceptable is road pricing, parking charges etc?
- *Would you support restoring the excise tax on diesel, to encourage increased diesel fuel efficiency and increased use of CNG, LPG and other alternative fuels?
- *Should all roads be toll roads?
- *Would your party support a law change to allow private toll roads to be built?
- *Would your party support pricing if it hits low income earners hard?
- *Would you put standards in place for vehicle fuels and emissions?
- *At what spatial scale should the problems be tackled?

- *Will full cost pricing increase energy efficiency in transport?
- *How can revenue best be used to help solve the problems?
- *If prices are extremely high, will you impose them? What will you do with the money?
- *If we don't alter behaviour towards sustainability, what next?

Issues - General

- *We shall have to live differently
- *Pricing is not a substitute for a comprehensive policy
- *International obligations on climate
- *Sharing of information, looking for common ideas, goals for renewables
- *A common funding pool and funding criteria are needed for all land transport
- *Common sense/reality check test on new proposals
- *Elimination of economic distortion between modes
- *Rates expenditure on roading and urban transport
- *Support for cyclists, pedestrians and passenger transport. These are the most sustainable modes but they are too easily ignored
- *New Benefit/Cost or other comparison criteria are needed. Points to be considered include: Community cohesion; Ecological Reserve conservation; Emergencies; Energy Sustainability; Environmental externalities; Greenhouse gas emissions; Health; Landscape; Local pollution; Loss of agricultural land; Lost productivity (crashes, health); Mobility for all; Noise; Safety of non-users; Severance; Value of existing infrastructure; Value of existing land uses
- *Split between central and local/regional funding
- *Should standards set modal split goals?
- *Short and long term effects may be different
- *Funding is annual, problems are long term
- *Distinction between charging for access and charging for use
- *Capital charges must be equitable between modes
- *Information must be adequate but need not be perfect - moving in the right direction is enough
- *Look at charges on inputs as well as outputs
- *Tax inputs, outputs or both?
- *Some external costs fed back to users through improved passenger transport
- *Full costs faces by user, education about fixed costs

Issues - Reducing Environmental Impact

- *Full cost recovery in a way that bites?
- *Inducing necessary behavioural change
- *Costs should reflect use
- *Standards needed for Emissions, Fuel efficiency, Safety, Air and water quality, Soil quality
- *Financial contributions under the RMA
- *Import duty on vehicles and tyres etc, reflecting disposal costs. Lower duty on vehicles designed for recycling - eg aluminium bodies
- *Moment by moment emission monitoring
- *Pricing as education - social engineering to wean off cars. use petrol prices and electronic road pricing
- *Emission controls are feasible under the RMA (s108 [9]) - no one had tried. A 'feebate' could be used to get old cars off the road.
- *Vehicle-free developments from scratch

Issues - Social Equity

- *Access is important for all the community - not just drivers
- *Social equity and public attitudes
- *Low payment for access to system, high payment for use
- *No congestion charge if no congestion, signal clearly and in advance (if/when practical to do so)
- *What do we do with the money? need to reflect the needs of users who switch from car use
- *Need clear policy on rural roading
- *Carrots needed as well as sticks
- *Access in rural areas, congestion and pollution in urban areas
- *Kick-start government investment in innovative public transport such as door-to-door service
- *Vehicle-free urban developments from scratch, greening/road narrowing in existing areas

Issues - Funding

- *Charges should reflect actual costs
- *Pricing barriers to sustainable transport, especially capital charges
- *Distinguish between local and national costs
- *Full polluter pays for some things (eg. emissions). Use proxies where transaction costs are high
- *Distinguish between local congestion and externality issues, and cost recovery on the network
- *Variations in taxation between fuels should reflect their relative merits

Pricing Mechanisms

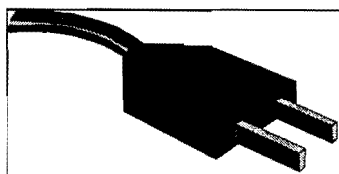
- *Inclusion of environmental costs and all externalities
- *Excise tax could include 'feebates' to increase the cost savings from more sustainable vehicles
- *Vehicle licensing: Connection and use charges could be made, in the same way as for electricity or phones: paying separately for availability (fixed) and use
- *Differential registration on fuel efficiency
- *Road User Charges- full cost recovery including health issues
- *Tolls - special cases only because of high transaction costs
- *Parking charges - including charges for privately owned parking spaces and 'coupon parking'
- *Distinction between urban and rural charging
- *Excise tax on diesel to reflect - as a minimum - non-transport external costs
- *Petrol tax
- *Emission charges under the RMA
- *National emission controls
- *Local congestion pricing
- *Incentives for car pooling
- *Parking charges; the current requirement is to provide off-street parking but this is leading to over-provision
- *Transport or energy 'reserves' on new development (the RMA allows this)

Sustainable Energy Tariff

Molly Melhuish

POWER FOR OUR FUTURE

The electricity industry is on the brink of massive change, driven by the new wholesale electricity market. New technology and new tariffs will be offered to small as well as large users.



The benefits of these changes could be largely captured in profits to shareholders. They could be handed out to consumers in the form of cheaper power. Benefits could also be seen in reduced environmental impacts of electricity generation and use.

The changes are now being driven by the electricity supply industry, under commercial incentives. There is a need for public-interest issues to be introduced into this industry planning.

THE CHANGES:

Electricity wholesale prices change each day according to the amount of rainfall and whether power stations or transmission lines are all available.

From October, wholesale prices will no longer be capped as they are now at around 15¢/kW (the cost of oil-fired generation). They could rise to several dollars per kW. This will put huge risks onto the local power companies which sell to retail customers. Power companies will have incentives to cut our hot water off when spot prices are high - not because of shortages, but simply to save money.

Technology developments in metering allow these price changes to be conveyed not only to the large industrial users, but to medium size users; and soon to householders.

Improved technology on consumer premises will allow consumers to: shift their electricity use by the hour; substitute alternative energy forms; and avoid using electricity at high-priced times.

EFFECTS: DAY-NIGHT DIFFERENTIAL

One effect of daily pricing has already occurred. Wholesale prices during the midnight hours used to be 2¢/kW lower than in daytime and evening.

CONTINUED ON PAGE 9

This price differential has suddenly disappeared completely. The differential was set by ECNZ as a pricing strategy to encourage extra generation at night, and for power companies to sell night storage heaters.

Today there is a surplus of hydroelectricity, and generators are not spending any more on fuel to supply daytime peaks than they do midnight to 7am. Today's market pricing has no provision for ECNZ's pricing strategy.

Computerised scheduling of power stations has led to more efficient use of hydro energy. This savings of fossil fuel generation show the benefits of the competitive wholesale market.

Most power companies offer day-night tariffs, with a differential of 4¢/kW or more. This helps them sell night storage heaters, extra-large hot water cylinders, and reflects the pricing trend set up by ECNZ. However, power companies may now reduce or even eliminate the day-night tariff.

EFFECTS: DELAYING NEW POWER STATIONS.

The increased efficient use of hydro energy will undoubtedly delay the need for a new power station. This raises major issues in regulation since new power stations are needed for security of supply during dry years or if a power station (or transmission line) fails suddenly.

To build a power station like Whirinaki and keep it idle in case it might be needed costs 1.5 to 2¢/kW for every kW being 'protected'. It is arguable that the commercial and industrial consumers need this security, not domestic consumers.

EFFECTS: INTERRUPTIBLE SUPPLY

The most interesting effect of daily pricing is yet to come. Local power companies should contract consumers to switch off when prices are high, use electricity when prices are low and use new technologies.

Big consumers will contract interruptible supply. Small users and householders would have a choice of tariffs: discounts for non-essential load switch off; or security of supply at a higher price.

Meter technology, allowing consumers to respond to real-time prices, is being developed rapidly.

HOW WILL BENEFITS OF WHOLESALE MARKET CHANGES BE SHARED?

As an example, changes in the electricity industry benefit shareholders who reinvest the profits in

their business; consumers then get more services at the same costs.

The consequences: more electro-technology in heavy industry and service industries such as hotels and restaurants; more air-conditioning in Auckland; more electric heating everywhere.

INCORPORATING PUBLIC INTERESTS

The first critical need is for the development of the wholesale electricity market to be monitored by environmental and consumer interests.

Currently, the wholesale market is being designed by members of the Electricity Market Company (EMCO), generators, retailers, major electricity users and energy traders. These people have strictly commercial objectives.

Small and medium sized consumers are excluded from the design process and the environment isn't even considered.

There are two basic approaches for incorporating public policy objectives: ownership and regulation. EMCO is owned by ECNZ, Trans Power, and the Electricity Supply Association. The first two are owned by central government, and all the local power companies (except one) are partly owned by publicly elected bodies. The owners could ensure the market gives good results for consumers and the environment.

The other major task is to design mechanisms to translate wholesale market signals into retail tariffs, and supporting programmes. Retail tariffs are being designed for householders and small business customers which will allow them to respond to real-time price signals and invest in equipment to store energy without loss of service. The tariff will reward reduction in electricity use. Other tariffs will be designed for people who require a particularly secure supply of electricity.

VISION - MOVING TOWARDS A SUSTAINABLE ELECTRICITY INDUSTRY

Cycles have appeared in the New Zealand electricity industry: shortages; investment; surplus; new industry to mop up surpluses; and so on.

The new competitive wholesale market has the potential to break that cycle. But if designed by only part of the industry, it will meet only their needs. If environmental safeguards are not built in from the beginning, the incentives will be bad for the environment.

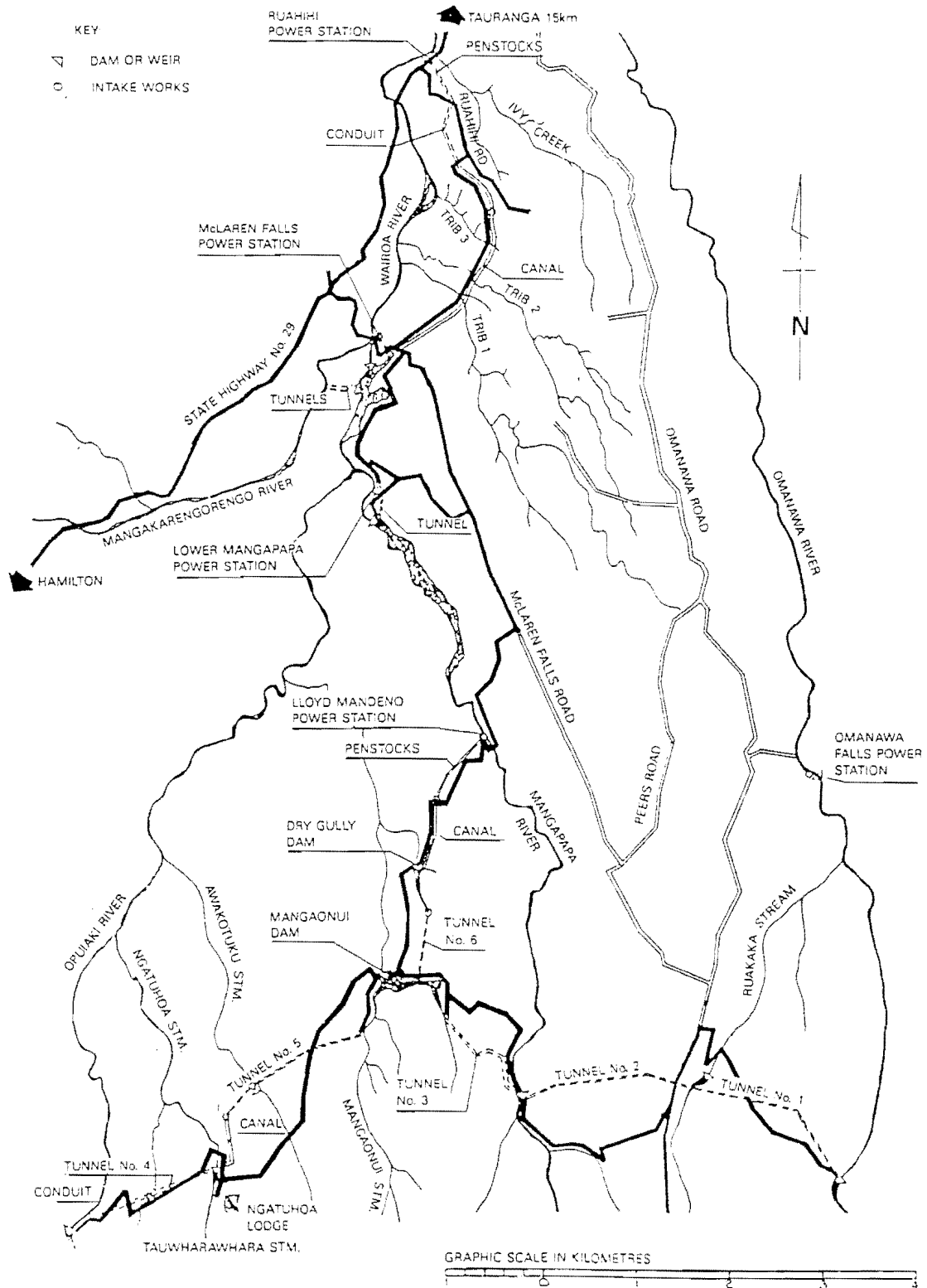
If the Forum's vision, "facilitating the use of energy for economic, environmental and social sustainability" is pursued, the wholesale electricity market can be a benefit to all sectors.

Thank You!

A Sincere Thank You to the Forest Research Institute for their in-kind contributions and support in this issue of EnergyWatch.

KAIMAI HYDROPOWER - WAIROA RIVER HYDRO ELECTRIC SCHEME

Bill Cassidy (Tauranga Electricity Ltd.)



KAIMAI SMALL HYDRO FIELD VISIT

Bill Cassidy

The Wairoa river hydro electric scheme consists of four hydropower stations.

The **Lloyd Mandeno Station** (15,000kW, 151.5m head) is situated on the west bank of the Mangapapa River, a tributary of the Wairoa River.

By a series of low weirs and tunnels the waters of the Omanawa River, the Ruakaka Stream and the Mangapapa River are diverted westward to Lake Mangaonui. The Waitaia Stream feeds directly into the lake which is the principal ponding reservoir for the power station. It has an area of 8.1 ha and an operating range of 2.5m.

A system of tunnels diverts the Opuiki River, the Tauwharawhara Stream, the Ngatuhua Stream and the Awakotuku Stream eastwards to the lake.

The tunnels are: Omanawa (1875m); Ruakaka (1919m); Mangapapa (1243m); Opuiki (1264m); Ngatuhua (1703m); and Managaonui (792m)

Water flow from the lake into the canal, through the Managaonui tunnel, is regulated to maintain a constant water level and hence, a constant head on the machines. The transition from canal to penstocks is at the forebay which structure incorporates screens, a screen cleaner and gates to isolate water flow.

The Upper section of the penstock line is concrete pipe while the lower section, where pressures are higher, is of steel. The diameters of the pipes vary from 1.83m to 1.3m and the total length is 823m.

Within the station there are two sets of turbines and generators. Each one produces 7,500kW at 11,000volts. The rated speed is 750 r.p.m. and each set uses 6.1 cu.m./sec. at full load. The energy output is approximately 70 million kWh per annum.

The **Lower Mangapapa Station** comprises a concrete arch dam constructed across a gorge in the Mangapapa River 4km downstream from Lloyd Mandeno Station.

The dam is 26m in height and the impounding reservoir extends upstream to the upper station.

Water is conveyed from the reservoir through a tunnel (3m in diameter and 400m in length).

The steel penstock, adjacent to the station, bifurcates to supply two horizontal turbines which drive a centrally located 6,000kW induction generator. The combined output of the turbines is 6 250 kW at a head of 32.8m at 375 r.p.m. and a water consumption of 21.5 cu.m./sec. The energy produced is approximately 18 million kWh per annum.

The **Ruahihi Power Station** is serviced by Lake McLaren and the canal which links the reservoir and the station. Lake McLaren was formed by constructing a concrete dam across the Mangapapa River which provided the head to operate the McLaren Falls Power Station. Lake McLaren extends upstream to the lower Mangapapa Station.

Water from the reservoir passes through a canal inlet structure, which incorporates a radial gate, into the canal which is 3,500m in length. The depth of water is 6m and the width at normal operating is 30m. Velocities are up to 0.9m/sec depending on machine demand and water levels in the canal.

The transition from canal to penstocks is a forebay which again comprises screens, screen cleaner and control gates. Downstream of the forebay there is a 600m section of twin (2.3m diameter) concrete pipes, followed by steel pipes, to the power house.

The power house is situated adjacent to State Highway 29 and between the highway and the Wairoa River.

The two generating sets in this station will produce 20,000kW at 84.6m head of water on the turbines.

It is estimated that 70,000,000kWh will be produced per annum.

McLaren Falls Station is used during periods of high power demand to reduce peak loading on the national system. In times of high water yield it is used to supplement the production of unit energy.

The **Transmission System** from the power station is at 33dV by overhead line to Wairoa Switchyard.

Transmission from Wairoa Switchyard is by three 33kV single circuit lines to Greerton Switchyard. This interconnects with the New Zealand Electricity Tauranga Substation and distributes at 33kV to the Tauranga City.

BIOENERGY TECHNOLOGIES CONFERENCE



George Hooper (FRI)

A conference on the Applications of Bioenergy Technology to New Zealand was held during March in Rotorua, organised by the New Zealand Forest Research Institute and the Energy Efficiency Conservation Authority. The conference attracted some 100 participants from both New Zealand and overseas including a number of international visitors attending a scheduled IEA Bioenergy Systems Task Force meeting hosted by the FRI.

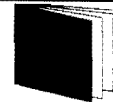
Despite the examples of viable technologies for extracting energy from wood waste, landfill gases, purpose-grown crops and other biomass sources, the supply costs relating to using bioenergy are still seen as being much greater than those for utilising conventional fossil fuels. In particular the current low Maui gas price mitigates against the uptake of bioenergy in New

Zealand. The view of conference participants was that there should be some way of incorporating the social and environmental advantages of biofuels into the pricing structure of energy in this country as is the case elsewhere.

Bioenergy is not new. More than 5% of New Zealand's current energy needs are met by biomass sources; firewood, cogeneration and process heat from waste materials in the forest industry, collection and harnessing of landfill gases, and the production of biogas. The most obvious message coming from the conference was that these sources could become a much larger part of this country's total energy mix. The conference was an important first step in raising the profile of Bioenergy and bringing together the range of skills and interests required to advance the commercial deployment of the technologies.

OPINION

BOOK REVIEW



"Sustainable Energy: Options for New Zealand"

by Keith Dawber and Dai Redshaw

University of Otago Press, 1996, \$24.95, 110pp.

Andrew Beer (SEF)

Keith Dawber and Dai Redshaw have produced an excellent and comprehensive introduction to sustainable energy issues in New Zealand. The book contains a detailed discussion of the range of sustainable energy options open to New Zealand and provides a wealth of practical examples.

The book is aimed at the general reader as well as senior secondary school students and is packed with illustrations and examples. The need for sustainable energy in New Zealand is clearly stated, not only from a point of view of conserving scarce resources, but also for environmental reasons and reducing dependency on imported fuels.

The book is highly readable and largely succeeds in 'demystifying' sustainable energy without making too many compromises in terms of scientific accuracy, although some assumptions could be questionable. For example, in the discussion of the relative merits of dams and wind turbines, statements such as 'if we assume capacity factors of the dam and wind turbines were similar' and 'wind turbines and dams have similar refurbishment needs'.

One of the best features of the book is the inclusion of summary boxes, which contain clear explanations of specific issues. These relate closely to the

text of the facing page and are a useful refresher for any energy professional who has become a bit rusty on the fundamental physics and chemistry of their field.

Sustainable energy purists might be surprised to find the authors include nuclear, hydro and geothermal power, in their treatise. However, while the personal views of the authors shine through in their discussions of energy options, they manage to steer clear of the debate over renewable versus sustainable energy sources.

The book's strengths lie in the description of the science of sustainable energy and certain flaws are evident when the text moves towards the discussion of policy development. The section on transport dwells heavily on the 'technical fix' options and largely neglects the range of non-technical options that will form part of a sustainable transport policy, such as lifestyle changes and urban design. Similarly, the discussions of carbon taxes and progressive pricing lack the clarity of the scientific summaries.

The final chapter 'Strategies for the Future' inevitably has difficulties in providing a clear direction for sustainable energy policy. However, as the authors themselves state, the move towards a sustainable energy future is 'up to all of us'. For those of us who wish to take part in achieving that aim, this book provides an excellent starting point.

MoT LAND TRANSPORT PRICING STUDY - SUMMARY UPDATE

Kerry Wood

The Ministry of Transport (MoT) is holding a major public discussion on the economics of New Zealand's roads. People are being asked to recognise the real costs and consider whether revised charges for these costs might lead to a more rational use of resources. A summary paper was produced for the Tauranga Conference. The following is an update summary, now that all main papers have been published. Submissions now close on 31 August 1996.

Capital spent on roads is effectively written off on the day it is spent; there is no capital charge for infrastructure. If a charge was introduced it would amount to \$M980 to \$M2,350 per year, with a mid-range estimate of \$M1,650. If land values are ignored (on the same basis as for rail) the new funding needed is about \$M1,435 per yr.

Environmental damage caused by road use is very difficult to cost. The MoT has these figures as an estimate:

	Lowest Estimate \$M per year	Best Estimate \$M per year	Highest Estimate \$M per year
Noise	230	290	2650
Local air quality	-	700	-
Greenhouse gases	25	290	580
Water quality	35	100	170

Environmental problems not quantified in the study include severance (difficulty, danger and unpleasantness in crossing the road) and disposal of vehicles, oil, tyres etc. The report describes the figures as very preliminary and cautions against simple totalling of figures, which may lead to double counting. Totalling the best estimates give an environmental pollution cost of around \$M1,380 or \$M1,200, with an allowance for some double counting. Some of this cost would be transferred to road users by regulation, for example by requiring catalytic converters.

The cost of crashes is estimated at about \$M550 per year for accident prevention, and \$M3,400 per year for social costs. What proportion of social costs are external to road users is not known. A recent OECD report quoted by MoT assumes 30 % or \$M1000 per year in New Zealand.

It is now possible to compare today's budget with a possible future budget by taking the MoT's 'best estimate' figures, bearing in mind that some of the figures are alarmingly crude: Today's Budget:

Income from road users	\$Millions	Roading and related expenditure	\$Millions
Petrol taxation, road user charges and registration	1205	TNZ - State highways	309
Rates	265	TNZ - Local roads	234
		Local Authorities - Local roads	265
		Administration	25
		Transfer to consolidated fund	637
Total	1470	Total	1470

Tomorrow's Possible Budget: Roothing New Zealand Inc:

Income	\$Million	Expenditure	\$Million
Petrol taxation, road user charges and registration	1205	TNZ - State highways	309
Additional tax to cover: Local authorities roading costs	265	TNZ - Local roads	234
Additional tax to cover: Return on capital (excluding land)	1435	Local authority	265
Additional tax to cover: Social costs (deaths, injuries etc)	1000	Administration	25
Additional taxation to cover: Environmental costs	1200	Transfers consolidated fund for:	1435
		-Return on capital (excluding land)	
Additional tax to cover: transfer to consolidated fund	637	-Social costs (deaths, injuries etc)	1000
		-Environmental costs	1200
Total	4468	Total	4468

If these figures are anywhere near correct, road charges will have to increase threefold before they reflect costs. A change of this magnitude will need some kind of phase-in and a three-fold increase in charges would take:

Annual rate of increase (%)	5	7.5	10
Time to achieve a 3-fold growth (years)	22	15	11

A reality will bring massive increases in the costs borne directly by road users, although the true cost of road use will not change. There will be equally large consequential changes, offsetting costs presently hidden elsewhere in the economy, as the additional funding is applied either directly or through reasonable proxies. Possible areas for additional support will be: ACC; CHES; Local authorities; Social Welfare; Public transport; Low income earners. Possible areas for reduction of existing taxation: GST; Income tax; Industry grants to minimise transport needs. Road users, central and local government and other stakeholders will be involved in a major debate on how these costs are to be measured and what corrections are needed.