

EnergyWatch

The Journal of the Sustainable Energy Forum Inc.

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

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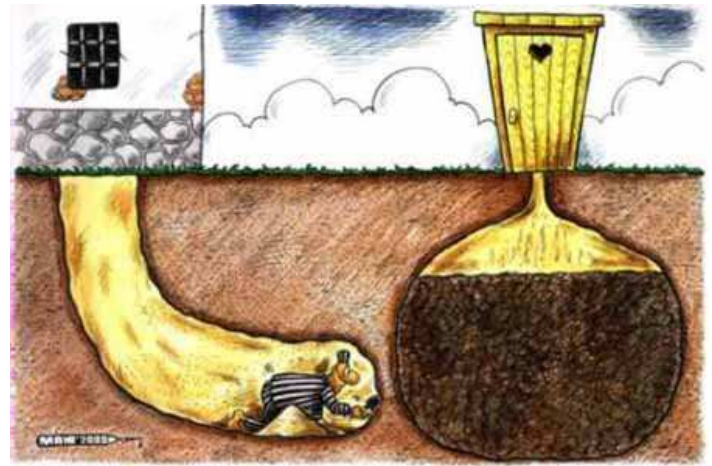
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WHEN YOU ARE IN A HOLE – STOP DIGGING

It is time for a stock take on New Zealand's Energy Policies

In three months' time New Zealand will have a new Government. That administrative executive will be given the responsibility to guide our energy scene through the next three years and to define the framework for a sustainable way forward beyond then. Whatever the political complexion of that new Government, it will need all the help it can get to identify the problem areas with our current energy governance and to redirect actions to address those problems. This issue of EW is intended to contribute to that process.



In this issue of EnergyWatch ten issues are discussed that illustrate the way in which the current policy directions are not facilitating the use of energy for economic, environmental and social sustainability.

A perennial issue in this regard is the competitive electricity market. For the last 20 years, since the reforms of the 1990's there have been on-going endeavours to make the free-market model fit the New Zealand situation. Not that the market has been free to act as a market should to keep prices down. The electricity industry rules have become ever more complex; understood only by the market players. Those rules, intended to tame the rampant commercial imperatives of corporate behaviour, have failed to do so.

Enough is enough. Now is the time for NZ to accept that, whether or not the market model works in principle, it is not serving our country well. Moves towards fundamental reform in electricity governance are long overdue. We have a great diversity of sources of electricity. We have a great diversity of demands for electricity, both spatially and sectorally. New technologies are on the verge of opening up grow-your-own distributed generation outside of the control of the market players (http://blog.rmi.org/blog/2014_05_22_owning_your_own_power_plant). Electric vehicles are on the verge of shifting transport energy demands from liquid fuels to electricity. A new paradigm is needed to serve our 21st century needs. But we are stuck in a hole and should be asking; "How can we stop digging?"

A key barrier to entertaining any serious talk of a new paradigm in the electricity sector is the incestuous relationship of the market players, facilitated by a revolving door between the players and the referees that sustains the business-as-usual electricity market game.

Molly Melhuish defines the term “Crony Capitalism” and presents evidence from the electricity sector to support the thesis that partial privatisation has not provided the promised stimulus to capital markets, but makes share price manipulation the new name of the game.

As a supplement to Molly’s analysis, an article by Frank Wolak from the NZ Herald is reproduced in this issue. Professor Wolak accepts the existing market model and explains that it can only serve the immediate needs of the hapless electricity consumer by strong independent regulation.

Kerry Wood provides a summary of the road and rail transport issues that he addressed in more detail in EW 71.

Frank Pool shares his insights into the way NZ’s emission trading scheme, by focusing on trading rather than emissions, compounds those complexities to confound real progress in climate benefits.

Ian Baxter explains how barriers to solar hot water heating have become endemic in New Zealand.

Molly Melhuish identifies how domestic wood burning has been systematically marginalised as a source of home heating.

Susan Krumdieck reflects on the perilous state of suburban developments in NZ that sprawl out of control pursuing last century’s unsustainable car-centered quarter-acre. She presents a strategic analysis of how innovative thinking and new re-development products will be essential to low-energy transition of cities.

Ian Shearer reports from Scotland on the potential for smart grids and networks to transform the way that electricity systems work

and the barriers that need to be removed to make that happen in NZ.

I take a look at the consequences of light-handed regulation of the oil and gas industry, which is digging ever deeper holes to feed the global addiction for liquid fuels.

As usual we finish with an update on the oil price, which shows the impact of unrest in the Middle East.

This issue of EnergyWatch begins by acknowledging the life and work of Ken Piddington who died recently. Ken was a founding member of SEF and a visionary in those early years when the words “sustainable” and “energy” were seldom in the same sentence. We also mark the passing of long standing SEF member Peter Pinder.

Steve Goldthorpe, Editor

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Obituaries

Ken Piddington

Ken was instrumental in establishing SEF. His sudden death in a road accident, on the way from Wellington to his beloved eco-house in Ohakune, was tragic.



He was a true gentleman who made a remarkable contribution over several decades to a broad range of sustainability and conservation issues; sustainable energy being an important one.

Ken was the first convenor of SEF, which was incorporated in 1995. Its precursor activities gently steered by Ken were described as follows in the first issue of SEF's EnergyWatch: -

"It is almost two years since a large group of people involved in energy issues gathered at Heretaunga near Wellington. The theme of the Conference was "Sustainable Energy for New Zealand: How Do We Make It Happen?"

"In 1993, we were able to attract community and environmental groups, people in major industry, local government and tertiary institutions, as well as officials from the Ministries of Commerce and the Environment and other experts." www.energywatch.org.nz/issues/EW1_7_1995.pdf

Our membership continues to represent a broad spectrum of views on energy.

"The Heretaunga Seminar quickly reached consensus that (a) A transition to sustainable patterns of energy production and use in New Zealand was desirable immediately on both economic and environmental grounds and (b) A national energy policy was needed to fill a yawning gap in the Resource Management Act. In April 1994, a decision was made to set up the Forum, with a strong emphasis on equity as a dimension of sustainability. There should be social criteria for sustainable energy, because in modern society energy = welfare."

Ken was particularly skilled in understanding, and telling us, how government policies worked, and helping us focus on what was achievable. His comments at conferences showed his rock-solid commitment to principle – that the economy is just a sub-set of the environment, rather than the converse. No, we weren't making much impact on government policy, but we all persisted.

At Ken's memorial service, we learned how much wider Ken's experience had been, and how he gained and honed his skills.

Witi Ihemaera, was one of Ken's early protégés in MFA, from his early European trade negotiation days, and gave an extraordinary account of their times together - in many cities - Brussels, Washington, - and the debates and discussions they had.

Ken had chosen Shonagh Kenderdine as the lead lawyer when he was the Commissioner for the Environment. Her eulogy was as moving, in a different way, as Witi Ihemaera's was. Ken's skill in understanding and conveying what matters in resource development led to the wording of the purpose statement of the Environment Act - sustainable management of natural and physical resources. Everywhere his facility with language - and with languages especially Maori - led to the legal changes which set NZ apart from other countries in offering environmental protection.

A mighty tree has fallen. His legacy lives on.

Peter Pinder

Many SEF members will also have fond memories of Peter Pinder who died peacefully recently in a rest home in Maungaturoto.

Peter has worked for NZED and had a life-long interest in sustainable energy matters. He walked-the-talk, living a frugal life. In his later years he would think nothing of hitch-hiking the length of NZ to attend SEF events

FAILED CRONY CAPITALIST ELECTRICITY 'MARKET'

By Molly Melhuish

Crony capitalism describes an economy in which business success depends on close relationships between business people and government officials.



Evidence of it in the NZ electricity market is: -

- New Zealand's electricity system is not a true market, as retail prices keep going up while demand falls;
- NZ's largest consumer, the Tiwai point aluminium smelter survives only with Government subsidy. If it closed, wholesale prices would collapse;
- A small set of insiders has created a thousand-page electricity market rulebook, with rules designed to maximise profits, suppress new entrants, and reject inputs from independent consumer or sustainable energy submissions; and
- The revolving door moves the cronies between their roles as company directors, CEOs, regulators, politicians, departmental officials, and above all, a small group of "approved" consultancy firms, masterminded by the NZ Institute for Economic Research.

The winners from this bizarre non-market are shareholders of the profit-maximising companies, and Government through ever-increasing taxes and dividends from ever-rising power prices. The losers are not only small consumers, but sustainable energy itself.

Can a complete restructure along the lines of the Labour-Greens Single Buyer proposal fix it? Professor Frank Wolak thinks not. He would keep the market but change its purpose. He would design regulation to protect consumers from economic harm, and make companies squirm under a vice-grip of disclosure and regulation.

Wolak's is the American model, designed to force prices to reflect costs. It falls down because the real action is in the courts, where the companies have all the information and can afford the best lawyers. The purpose of the regulators, to protect consumers, is swamped by legalities skewed towards corporate interests. In New Zealand the Commerce Commission adopted a light-handed version of this model when it decided to price-regulate monopoly utilities. It soon found itself in an American-style legal swamp. Some \$700 million per year, more than what the Labour-Greens proposal promises, is now at stake in a 3-year court battle over the weighted average cost of capital for power lines.

In regulating the generator-retailers, New Zealand has taken the European approach. We start with overarching principles, and consult all and sundry parties to apply them. But the principles are shrouded in obscure language and meaningless mathematics devoid of quantified facts (or with numbers pulled out of a hat and then calculated to four significant figures). I know this, having been on advisory groups and working parties since the mid-90s, until I cracked the code and became a pariah. The Electricity Authority ignores submissions from domestic consumers, and even ridiculed submitters by name in one of its "reports" on residential power prices. There is now an effective monopoly on policy advice, by what is effectively a cartel of big business interests able to suppress all "competitive" policy initiatives.

Translated into plain words, the main principles behind the Electricity Authority's code are: -

- Residential prices must keep rising – if not to make new power stations economic, then to deliver the dividends that shareholders demand;
- Monopoly profits create long-term benefits for consumers, even if consumers want lower prices;
- Investors need protection from ill-founded lobbying by consumers;

- Price discrimination is efficient, charging the most captive consumers the highest prices;
- If residential prices were to fall, then taxes would have to rise to maintain the Government tax take – rising power prices are a tax by a different name; and
- Social impacts of price rises, and environmental impacts of expansion of power infrastructure, are taken care of by other government agencies, not the Electricity Authority.

Consumers are voting with their feet. Those who can afford it are insulating, buying efficient appliances, and even self-generating with photovoltaic panels. Those who can't are simply cutting down electricity use, getting cold and damp, taking it out on their families and reducing their productivity, and filling hospital beds. These are externalities, of no concern to the regulator. The result is the beginning of a death spiral – prices rising to maintain shareholders' expectations, whilst demand is falling from consumer resistance.

The outcomes from the asset sales confirm the Government's purpose. All the hype about retiring debt, funding schools and hospitals and promoting capital markets was empty rhetoric, as asset sales went ahead despite their alleged benefits being eroded on every side. The real purpose of asset sales was simply to lock in Government support for rising retail electricity prices and other regulation promoting maximizing of profits.

Share values tracked statements about power prices rather than company performance or growth potential. The fall in share prices of both Mighty River Power and Meridian was stabilised in December 2013, when Bill English said the regulatory regime would be placed under internal scrutiny to check whether "regulatory settings were up to standard". Meridian shares began to rise immediately after Genesis went public in January with its intent to raise prices by about 3%, though only half of that increase

reflected the energy component of the price. A rise in all three share values followed the report that Government was leaning on SOEs to improve their financial performance, to help Government finances to get back into surplus.

Lew Evans, of Victoria University's Institute for Competition and Regulation, confirmed the link between power prices and Government's fiscal position. He said that the Labour-Greens proposal would take revenue from Government as owner of generators and recipient of taxes, and also from private owners, by lowering dividends. It would therefore raise taxes to pay householders for electricity consumption.

A report from Infometrics to Business NZ, based on a general equilibrium analysis of the Labour-Greens proposal, was even more explicit:

Much of the potential gain to residential consumers [from the Labour-Greens proposal] is lost to higher personal taxes. Personal tax rates rise in order to prevent deterioration in the fiscal balance caused by lower dividends and tax receipts from the electricity industry.

This is supported by a study of 92 publicly traded EU utilities, showing that partial, not full privatization boosts economic and financial performance. Professor C. Cambini, in a seminar at Victoria University, concluded: -

The larger the Government ownership stake, the higher the market value of regulated firms. Politicians can interfere with legally but not genuinely independent regulators to obtain favourable decisions and extract economic rents. ... State-controlled firms have significantly higher target dividend ratios than fully privatized, privately controlled firms in EU energy [utilities].

So much for the rhetoric that Government does not influence electricity regulation! Government and businesses are joined at the hip.

This is crony capitalism writ large.

Molly Melhuish

(References are available from the author)

If high power price rises are a tax by another name, then what would you call the share of excessive profits that goes into the pockets of the private sector shareholders?

TIGHT ELECTRICITY REGULATION - ONLY SENSIBLE OPTION

Frank Wolak – NZ Herald April 22nd 2014

There is not a lot to like about residential electricity prices in New Zealand.

According to data from the Ministry of Economic Development, average residential retail electricity prices have almost doubled since 2000. This had led to calls for drastic reforms of the industry to better serve the interests of New Zealanders.

This desire to "reboot" the electricity supply industry is understandable, but it is almost certainly not the best course of action. As a participant in many electricity industry restructuring processes around the world, one important lesson that I have learned is that all reforms start with significant unintended defects that can only be eliminated through a rigorous ongoing analysis of market outcomes and targeted regulatory reforms.

Many features of the current industry structure are consistent with international best-practice and a number of positive changes have been implemented since I completed my report for the Commerce Commission in 2009.

Continuing these efforts to identify and fix flaws in the existing market is likely to provide greater long-term benefits than undertaking a major restructuring of the industry.

By saying this, I do not want to imply that only minor changes are needed. Significant changes in how the industry operates and the government regulates it are necessary to ensure that consumers realise the full benefits they were promised from restructuring.

A major step in the reform process is to establish a regulator for the industry with a statutory mandate to protect electricity consumers from economic harm.

For many years, New Zealanders touted the government's unique "light-handed" approach to regulation of its infrastructure industries. This

always seemed to me to be a contradiction in terms because effective regulation as practiced in North America and Europe is anything but light-handed.

It is often the case that the regulator collects data from market participants that they do not want to provide or sets a price or terms of service that adversely impacts the profits of the firm. These actions are typically taken because of the regulator's statutory mandate to protect electricity consumers from economic harm.

There are a number of legal rights that a regulator must have.

First, the regulator must have the ability to request any information from market participants necessary to carry out its statutory mandate, receive this information in a timely manner, and have the authority to impose financial penalties on market participants that fail to provide the requested information in a timely manner.

The regulator should also be allowed to require that all of the firms that it regulates prepare balance sheets and income statements using a standardised accounting system designed by the regulator. These accounting systems will allow the regulator to carry out the very important task of setting prices for monopoly services such as transmission access and distribution network access.

The regulator should be required to set prospectively the price of these monopoly services to allow the firm the opportunity to recover the prudently incurred cost of providing these services.

This does not mean that the firm is guaranteed full cost recovery regardless of how it incurs these costs. Because its price is prospectively set by the regulator, the firm's revenues are independent of any actions it takes, so it has the opportunity to recover these costs if it incurs them in a manner consistent with what the

regulator deemed to be reasonable when the price was set.

The final right of the regulator is to set the market rules governing the operation of the wholesale and retail markets.

Rather than allowing market participants to determine the terms and conditions governing participation in these markets, the regulator must set these market rules to protect the electricity consumers from economic harm. Market participants and other interested parties can provide input to this process, but ultimately the regulator must set these market rules because of the enormous impact they have on wholesale and retail electricity prices paid by consumers.

An essential feature of this redesigned regulatory process is an ongoing market monitoring process where the regulator uses data compiled from market participants and data submitted to and produced by the market operator to undertake market performance analyses. Although this market monitoring process is extremely data and human resource intensive, it is necessary for the regulator to anticipate significant market performance problems and take action to ensure a small problem does not become a large problem that harms consumers.

Another role of the regulator is to provide transparent information to customers on the components of retail electricity prices. Each retailer should provide the same standardised breakdown of a consumer's monthly bill into separate charges for use of the transmission network, use of the distribution network, purchase of wholesale electricity, and electricity retailing services. The prices for use of the transmission and distribution networks are monopoly services and should therefore be set by the regulator as described above. Providing this information will allow customers to find the best deals for the competitively provided components - wholesale electricity and electricity retailing services.

A number of New Zealand commentators have argued that the country is too small to afford an international best-practice regulatory oversight process. The events of the past 15 years provide strong evidence that the cost of not having a rigorous world-class regulatory process for the electricity supply industry is extremely high.

Frank Wolak is director of the Programme on Energy and Sustainable Development and Holbrook working professor of commodity price studies with the department of economics, Stanford University, California.

ESR CLIMATE CHANGE INFORMATION SHEETS

The Engineers for Social Responsibility in association with SEF are publishing a series of information papers on Climate Change topics, which can be accessed and downloaded as .pdf files from <http://www.sef.org.nz/climatechange.html> The first 9 papers are: -

Climate Change and Global Warming Risks and Responses

Climate Change – Living in a Warmer World

The Carbon Cycle - towards becoming carbon neutral

The Importance of Methane

Climate Change and Primary Industry

New Zealand Energy Security & Climate Change

Global Climate Change from a Pacific Islands' Perspective

Climate Change and Human Health

Ethical Issues and Climate Change

ROAD TRANSPORT

By Kerry Wood

Climate change and energy price and scarcity are the most pressing issue of our times—a clear and present danger—but New Zealand’s transport policy is running amok in the wrong direction.

About 44% of fossil fuel emissions in New Zealand are from road transport. Traffic growth has slowed or reversed, apparently responding to both price and wider social effects, with similar effects in other countries. In the US the oil consumption trend (all uses) is 1.5%/year down.

Transport policy has a strong focus on disastrously uneconomic Roads of National Significance (RoNS). Funding for local roads and walking, cycling and public transport is capped, often at ridiculously low levels, while rail is expected to self-fund recovery from asset-stripping. Funding for Auckland’s CBD Loop will come from central government, but when?

Benefit-cost ratios for roading projects have been declining for years. They were at least 5.0 (benefits five times costs) in the 1990s, but are often below 1.0 (a loss) today. The big benefit-cost ratios are now in cycle facilities, which have massive public health benefits, but are seldom funded or even studied.

Roads and RoNS

Ministers now have a hand on the road-funding tiller. The ‘statutorily independent’ NZTA must now ‘give effect’ to the Government Policy Statement on transport, which is updated every three years.

New road-building projects are now given a ‘low’, ‘medium’ or ‘high’ score for each of three factors; economic efficiency, strategic fit and effectiveness. An uneconomic road gets a ‘low’ for economic efficiency, but a RoNS project gets a ‘high’ for strategic fit, effectively by Cabinet fiat. The deciding factor is effectiveness, which gets a ‘high’ as an effective solution to the stated problem (Cabinet fiat), and the project goes ahead.

Benefit-cost ratios and ‘wider economic benefits’ are just play-acting. Effectiveness and strategic fit are what matters, and the NZTA decides what they mean.¹

With no effective measure of value-for-money, the opportunity costs of roads is going crazy. The money would be much better spent elsewhere, but this is easily ignored because there are no balance sheets for public roads in New Zealand.

One reason for building Wellington’s Northern Corridor RoNS is to provide for a 50% increase in freight volumes in 2007–17, yet the national freight traffic index only grew by 3% in 2005–12.

Ministers are assuming that transport is essential to the economy (correct), more transport is better still (maybe), only roads are worth supporting (wrong) and business-as-usual can go on for ever (wrong again).

Time savings

Discarding the evaluation process because it understates benefits is the height of folly when the process itself tends to overstate benefits. One weakness of benefit-cost ratios is that a series of small projects looks better than a single big one.

The biggest benefit is time-savings, but in practice they mostly disappear in ‘triple convergence’ (50–100% in as little as 3 years). Triple convergence is in the NZTA manual but not a requirement, and consultants benefit from a record of approved projects.

Existing trips tend to fill up new road capacity in three ways:

- From other routes, transferring to a faster route.
- From other modes. Driving may become more attractive because walking or public transport are more difficult or dangerous.

¹ See Michael Pickford’s paper in Policy Quarterly, <http://iqps.victoria.ac.nz/publications/files/30aaf9a4518.pdf>

Road ‘improvements’ often disadvantage public transport: for example by consistently missing traffic signals set to give a ‘green wave.’

- From other times of day. If the peak is less congested drivers take less care in avoiding it. Morning-peak traffic may be as slow as ever but over more quickly: it starts a little later. So what is the economic benefit of another few minutes in bed?

These effects tend to be bi-directional. If an urban road is permanently closed there is little or no economic effect. There are winners and losers, just as when a road is built, but no overall change.

Other evaluation problems

Just as troubling as travel times is the Downs-Thomson paradox: the quality of peak-hour travel by car tends to equal that of public transport. Congestion slows car commuters until the ‘utility’ of rail is as good as road. Speeding up passenger rail services relieves road congestion on a parallel road. Buses and light rail can work the same trick if they run on exclusive routes, but the calculations are never done that way.

The NZTA forecasts spending \$1.9 billion for the Waikato Expressway (Bombay–Cambridge), as a through-route for trucks. However, half of all container freight through the port of Tauranga goes by rail, and doubling the capacity of the Hamilton–Taruanga line cost \$25 million. Again, the calculations are never done that way.

The only New Zealand study of the full costs of cars, trucks and trains was by the Ministry of Transport (2005, using 2001 data). A copy is on the SEF website. (www.sef.org.nz/papers_archive.html)

The standout figure on the roads was \$30 billion for users own costs, at least 85% of the total. There are wide uncertainties but comparative figures indicate that truck operators paid 56% of their true costs, including capital charges and externalities such as noise and pollution. Cars paid 65% and rail freight paid 77%.

Widespread criticism was inevitable but no critic put up a detailed alternative.

Solutions and policies

Solutions need to recognise these factors:

- Very few roads are or have ever been just for cars or just for transport;
- Motor vehicle users may pay less than half their full external costs;
- Some trips by car have external costs greater than their internal benefits;
- Cycling is often too dangerous without special provision;
- Public transport is often too slow without special provision;
- Reallocating road space to walking, cycling and public transport almost always improves safety, sustainability and passenger-carrying capacity, and often commerce;
- Perceived costs matter. Reallocating vehicle registration costs to fuel or distance charges reduces vehicle-kilometres;
- Triple convergence is bi-directional. Reducing capacity rarely causes gridlock and often has no overall economic effect;
- The average trip length in light motor vehicles is only 9 kilometres.

Policy options include:

- Think about who controls the NZTA Project Evaluation Manual and the web of explicit and implicit assumptions it contains;
- Seek to allocate costs and charges more effectively, across all transport modes;
- Ensure that quick, pleasant and safe alternatives to car use can flourish;
- Develop new ways of funding and managing transport;
- Make road and rail freight funding and evaluation as closely comparable as possible;
- Ensure that transport funding gives the best value for money, regardless of source; and
- Ensure that local authorities can prioritise the various claims on their road space. *KW*

RAIL AND SEA TRANSPORT

By **Kerry Wood**

Rail, ferries and coastal shipping in New Zealand were neglected by central government for a long time, until the Labour government returned KiwiRail to state ownership. Now the National government has recognised that New Zealand needs KiwiRail. It has option value. Full credit to both, but there is more to do.



It is dawning on Treasury that climate change may be a problem, which is why government has recognised the option value of rail.

The reality may be much worse than Treasury thinks. A recent presentation by Steven Kopits, of oil investment company Douglas-Westwood,² is grim. Kopits confirms that conventional oil peaked in 2005 and supply growth since then is entirely from unconventional oil. Prices are rising as China buys the oil it needs (China can pay more than the OECD because it uses oil more efficiently). Douglas-Westwood are projecting Brent crude at US\$140/barrel by 2020.

Road freight is dominant, carrying 70% of freight tonne-kilometres, while rail and coastal shipping carry 15% each.³ But road uses much more energy than other freight modes (see table).

Note that the figure for future diesel locomotives is based on modern locomotives with higher axle loadings, and the tare:gross weight advantages of modern wagons with higher axle loadings.

²See <http://energypolicy.columbia.edu/events-calendar/global-oil-market-forecasting-main-approaches-key-drivers>

³ 2006/07 figures, the latest on the Ministry of Transport website.

Freight relative energy efficiency

| Freight mode | Energy efficiency (line-haul truck = 100%) | Road truck gross weight or Rail axle load, (tons) |
|-----------------------|--|---|
| Road | | |
| Line-haul truck | 100 | 44 |
| Line-haul truck | ~90 | 53 |
| Rail | | |
| Existing diesel | 22 | 18 |
| Future diesel | 16 | ~25 (see note) |
| Existing electric | 6 | 18 |
| Coastal shipping (EU) | 7 | - |

The catch is that higher axle loadings need heavier rails.

KiwiRail

KiwiRail has proved its value for freight on the Auckland–Tauranga route, and half of all freight through the port of Tauranga now goes by rail. The government has agreed that faster freight on the Auckland–Christchurch route is the next objective. KiwiRail has also made a success of upgrading commuter rail, first in Wellington and now Auckland.

KiwiRail now needs a realistic turnaround plan, to escape from the effects of asset-stripping. A great many KiwiRail deficiencies have been ‘solved’ by reducing the speed limit, but slow trains lose customers. Rail replacement is below 1% a year (far below any reasonable catch-up

rate) and track maintenance is a losing battle if the rails or sleepers are worn out, or the drainage neglected.

Two important decisions are already having far-reaching effects: desperately-needed new locomotives and wagons are arriving in quantity. However, funding to speed up the Auckland–Christchurch route is still missing, as are major decisions such as axle loadings and rail ferry replacement.

Coastal shipping

Coastal shipping usually excludes the Inter-island ferries. Pacifica Shipping operates two vessels serving eight local ports, carrying general cargo and up to about 650 20-foot containers. Most container ships make multiple port calls in New Zealand and may carry containers between New Zealand ports. This is an uneasy compromise between requiring New Zealand-manned coastal shipping and the realities of the shipping trade.

Another shipping reality is larger container ships calling at fewer ports, and the industry has already signaled most container ships calling at only one port in each island. Which ports will be decided in foreign boardrooms, but Tauranga and Lyttelton seem to be favourites.

Another complicating reality is ‘inland ports’. Tauranga has one in South Auckland, and accepts container delivery and pick up at either ‘real’ or ‘inland’ port, with no discrimination between them. Local shippers save money because they need only make a local trip. The port company saves on costly waterfront space for freight handling and—also important—has containers arrive at a known time in a known order. A similar setup is Fonterra’s main export warehouse at Te Rapa, for delivery by rail to either Auckland or Tauranga.

Several port companies now have inland ports, and Tauranga has recently bought land for an

inland port at Rolleston, south of Christchurch and well into the Lyttelton hinterland. It is war out there.

Larger container ships need better facilities, more storage space for containers and deeper channels: they still want a 20 hour turnaround. More space is often impractical at the port, and traffic congestion makes road transport inadequate. The difficulties of sorting delayed containers means that the link from an inland port effectively has to be rail.

KiwiRail has a future if it can make the transition from hand-to-mouth make-do and maintenance, to a profitable freight operator. The problem is finding enough capital, which has to come from government and is not yet forthcoming.

A possible KiwiRail upgrade plan was outlined in EnergyWatch 71.

Transport policy needs

A 2008 IPENZ study commented:

We consider that there is no absolute right way to distribute capital costs to users, and that there should be consistent treatment of capital cost allocation within the modes of road, rail and sea to avoid inadvertently favouring one mode. This also raises the issue of the current public funding allocation criteria which favour incremental development and have difficulty in determining the optimal allocation of funding to modes. (IPENZ, 2008. Transport: engineering the way forward)

Many countries are investing heavily in rail and rail electrification, including small countries such as Israel and Ireland. However, very few countries can match New Zealand’s advantage of near-sustainable electricity.

It is time for new thinking.

Kerry Wood

NZ EMISSION TRADING SCHEME – FIXING NZ’S NEUTERED CARBON PRICE

By Frank Pool

The NZ Emission Trading Scheme announced in September 2007 and supported by all major political parties had three very positive features:-



- (1) It put obligations on emissions of all six Kyoto Protocol GHGs;
- (2) It put obligations on all economic sectors;
- (3) There was no free GHG allocation for electricity generators and domestic fossil fuel miners and suppliers⁴.

Emission Intensive and Trade Exposed firms got a partial free allocation for their direct emissions and the indirect electricity emissions - a real-political-world feature of all GHG control schemes.

The ETS was a belated NZ measure to reduce GHG emissions, which had been an “aspirational” (i.e. passionate talking and no real action) NZ political “target” since 1989. In 2002 NZ ratified the Kyoto Protocol after an extensive officials work programme and consultation. This was followed by 5 years of the government talking loudly and passionately about sustainability, talking very quietly about a carbon tax, not talking at all about actually reducing GHG emissions, and deferring any real

⁴ A Negotiated Greenhouse Gas Agreement already covered the Marsden Point Oil Refinery, otherwise it would have been negatively trade exposed to other refineries in other countries without GHG reduction pressures.

action to 2007 (i.e. doing a NIMTO – Not in my Term of Office). But ultimately that turkey (a Carbon Tax) did not fly politically.

However, the NZ ETS also had two massive flaws from the very beginning – its **emissions trading** title – and its focus on “least cost” GHG reductions for NZ rather than on NZ actually mandating or funding any significant and/or real GHG reduction measures. The NZ ETS used the same language as the EU ETS, but did not share the EU ETS desire to actually lead to significant domestic GHG reductions.

From its inception the NZ ETS was seen by **all** key National and **all** key Labor Party politicians and **all** key Treasury-MFE-MED et al bureaucrats (aka the “Government”) as being all about “least cost” emissions reductions. The public focus was on **emissions trading**, where everyone involved could get rich by trading “carbon credits”, whatever they were. The internal “Government” focus was on claiming GHG credit for the surge in new forestry plantings that was occurring anyway, with some purchase of international carbon credits (“least cost” again). There was also a fundamental schizophrenia that the NZ ETS was publicly supposed to put a price on carbon/GHG emissions, but internally within the “Government” it was not going to be allowed to make any negative measurable impact on that holy grail of NZ public policy, endless compounding economic “growth”. So the NZ ETS was publicly supposed to put a price on carbon but privately was not supposed to raise any costs in the holy NZ economy – a schizophrenia that is of course impossible by definition.

The Greens sort of supported the ETS on the basis that it was the only carbon price/control option that could realistically politically get over the line and be implemented in NZ.

It was quite clear from the beginning that the “Government’s” idea was that the NZ ETS was all that was required. The “Government’s” ideas

did not include spending any significant money or doing anything much different on public transport, or actively making major reductions in vehicle fuel economy, or not building new roads, or reducing urban sprawl, or financially supporting the planting of new forests, or reducing the GHG impacts of dairy intensification. The ETS rationale was that the “Government” could continue to posture and pontificate internationally, but would not need to actually do anything really different from Business as Usual (BAU) while NZ Inc. would still somehow reduce its GHG emissions at no real cost to the taxpayer or to the Holy NZ Economy. It was explicitly expected that NZ Inc. would quietly make a tidy profit from the international sale of NZ reforestation credits that were expected to come from ongoing exotic forest planting without the need for any further government action or, heaven forbid, funding. This sounded too good to be true - and it was.

Without getting lost in the various Labour/National Machiavellian machinations to keep the NZ GHG emission price low since 2007, GHG/carbon emission units (NZU - New Zealand Units) are currently worth around NZ\$5/tonne CO₂e. A major loophole, of allowing nearly zero cost Ukrainian “hot air” units to be used in NZ, is belatedly being closed. If the “Government” left the ETS alone, the price would probably rise to NZ\$10/ tonne CO₂e in 2015 and a steady rise thereafter. Of course, any incoming National or Labour Government will surely tinker again with the ETS to keep prices low to protect the Holy NZ Economy.

The painfully developed existing NZ ETS architecture is technically sound, and enables NZ to comply with international GHG emission reporting and registry requirements.

But the NZ ETS cannot remain relevant for much longer without some ‘real beef’ of a serious carbon price. The Government could simply auction off NZ Units. This would be a useful new tax to reduce other taxes, or recycle

money into “green energy” investments, or provide welfare payments. These are political questions, and good luck to those who want to argue this. But this revenue raising/use/recycling argument is tangential to the primary need for NZ to have a serious and rising price on carbon/GHG emissions.

Alternatively, one can be purist and argue to throw out the entire NZ ETS architecture and introduce a carbon tax (which was developed from 2002 and finally whimpered to an end and was abandoned in 2006). A carbon tax would be theoretically more pure to some, but it would suck up many years of political “green” oxygen and the result would be little different to a slightly tweaked NZ ETS. As Deng Xiao Ping said "I don't care if a cat is white or black, as long as it catches mice" - and China ended up with the world's 2nd largest economy. In real world political terms, the NZ ETS is real here and now and will be quicker and easier to fix than it would be to develop and introduce a whole new carbon tax regime.

We have known for 25 years that the price of carbon/GHG emissions needs to rise to around USD100/tonne CO₂e to drive the technologies like carbon sequestration for thermal power stations that are needed internationally to achieve the major global GHG reductions that 99.9% of climate scientists say we need.

NZ\$5/tonne CO₂e is better than nothing, but it is not enough to seriously drive the necessary GHG reduction changes needed in NZ. The original NZ ETS capped carbon/GHG price of NZ\$25/tonne CO₂e would be a good start. The Holy NZ Economy would survive. Some sectors would gain and some would lose. That is life and capitalism. The NZ economy would continue. Get over it.

After 25 years, it's time we finally get serious about making actual GHG reductions in NZ.

Frank Pool

PROPER SUPPORT REQUIRED FOR SOLAR HOT WATER HEATING

By Ian Baxter

The rate of solar water heating uptake by New Zealand consumers and industry is very low. The 2,000⁵ installations per annum compare poorly with the 24,000⁷ new dwellings constructed per annum. While take up remains this low, we are squandering an opportunity to prepare our building stock for a future where energy costs are higher. We are also missing out on taking concrete action towards meeting the government's greenhouse gas emissions target of a 50% reduction from 1990 levels by 2050. For buildings being constructed with a lifetime of 50 years or more we need to be taking action now. Using a high-grade energy source such as gas or electricity for low temperature energy tasks such as water and space heating simply wastes these resources. New Zealand will need this electricity for transport as fossil fuels become more expensive and their use is constrained by climate change effects.

Solar water heating is proven worldwide:

- Solar water heating is a very mature technology: 70 million square metres was installed worldwide in 2011, equalling 50 GWth. By the end of 2011 there was a total of 247 GWth installed¹;
- Solar water heating is a suitable technology for New Zealand houses and apartments. An average house roof top of 150 square metres collects 220 MWh per year, more than 20 times the average house energy use²;
- Solar water heaters produce as much renewable energy worldwide as wind power.
- China now produces around 90% of global solar water heaters (IEA Solar Heat Worldwide 2011);
- China has a similar range of climates to New Zealand, so Chinese systems very applicable to New Zealand. China is targeting 210 GWth by 2020⁴; and

- Good quality and affordable solar water heaters from China are available to import into New Zealand.

What is stopping the wider adoption of solar water heaters in New Zealand?

- Technical barriers have largely been resolved⁶. A number of other barriers to the increased uptake of solar water heaters in New Zealand have been identified^{5,6};
- Cost barriers, high upfront costs and smaller installations means there is a very long payback time;
- Lack of consumer financial acumen means few people understand the trade-off between higher capital costs and zero or very low operating costs;
- Lack of metering information related to electric hot-water heating can hide the cost to consumers;
- The conservative nature of the building industry;
- The inability for users to capture the benefits. Houses fitted with solar water heaters are not valued more highly than those fitted with electric or gas water heaters;
- No incentives for residential landlords to invest;
- External costs of greenhouse gas emissions from gas and electric hot water heaters are not factored into their energy price;
- Lack of public awareness about the technology and its advantages both generally and in the building industry;
- Expensive, time consuming and/or difficult building consent processes;
- Water heating costs are too small a proportion of total household expenditure to warrant consideration of alternative methods;
- Most plumbers require additional training to install solar water heating systems; and
- Simplistic and misleading articles by the Parliamentary Commissioner for the

Environment, the Ministry of Economic Development and Consumer magazine.

The building consent issues are partly a historical legacy. Traditional flat plate thermo-siphon tanks on roof systems work fine but are expensive and the weight of the hot water tank on the roof can cause structural problems, and hence building consent issues. Evacuated tube systems account for over 80% of new solar water heaters worldwide (IEA Solar Heat Worldwide 2011). The minimal extra weight on a roof with pumped heat pipe evacuated tube systems means that simplified building consents can be implemented across New Zealand.

Many of the remaining barriers can be overcome simply by increasing the volume of installations. Costs in New Zealand would decrease, reducing by 20% when the cumulative capacity doubles³.

One option to encourage uptake would be to introduce either a solar obligation or a renewable energy obligation for domestic water heating. This would require a percentage, usually between 50%-70% of domestic hot water heating, to be met from solar or renewable energy sources. Several European countries, including Northern European countries such as Ireland and Germany, have either implemented or are considering implementing solar obligations or renewable energy obligations for water and/or space heating. These apply to new buildings or buildings undergoing significant renovation. Israel and Spain have mandated solar water heaters for new residential buildings and this has been highly effective in increasing the penetration. Today, 85% of Israel's households use solar water heaters. These solar water heaters save 1,600 GWh of electricity each year and Israel is the largest per capita user of solar energy in the world⁹.

Solar obligations have enhanced voluntary take up, that is take up over and above the minimum requirement, or take up by sectors outside those obligated⁸. Solar obligations have two very significant advantages. They require only minimal public expenditure (for compliance

monitoring and standards setting). They apply to all residential buildings. At present landlords have very little incentive to install solar water heating as they pay the cost of the installation and the tenants get the benefits of reduced energy costs. These solar obligations have a very small impact on the overall cost of the building, estimated at ~0.5%⁸.

Solar water heating technology is proven and is seeing a huge increase in take up internationally. By not addressing the barriers to greater New Zealand take up we are ignoring a renewable energy source that could make a significant contribution to household energy needs and meeting our greenhouse gas reduction targets. New Zealand needs to focus on addressing real solar water heating market barriers, not untargeted solar water heating subsidies as have been used in the past. Many countries are introducing solar obligations for domestic solar water heating. There is no reason why New Zealand could not also. *Ian Baxter*

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REGULATORS IN DENIAL OF THE EXISTENCE OF CLEAN WOOD BURNING SYSTEMS

By Molly Melhuish

Solid fuels, mostly firewood, supplied 56% of all home heating energy in the early 2000s, compared to only 32% from electricity, according to the Household Energy End-use Project. Household electricity demand had grown very rapidly until the 1973 oil crisis forced austerity measures; it dropped abruptly then levelled out at a level close to today's. In the mid to late 70s sharp increases in electricity prices and Government research led to a new market for clean "double-burning" wood stoves, far more efficient than the earlier open fires, convector fires or potbelly stoves.

"Clean burning" was not clean enough for smoggy Christchurch, so Environment Canterbury launched policies in the 2000s to control its air pollution. First they banned open fires, then they banned all wood burners in new houses. Now there is a requirement to remove wood burners more than 15 years old. This amounts to a counter-revolution, a revival of all-electric houses.

Clean household wood burning ticks all the boxes for sustainable, affordable household energy. It is carbon-zero except for a bit of transport energy for harvest and delivery. It provides energy at peak times, reducing transmission losses. Firewood can be stored for years, so more can be used in dry years when electricity is costly. It makes the household resilient to blackouts, which are probably increasing in frequency as storms increase in number and strength. Most important to consumers, wood is the cheapest of all space heating options, even using purchased wood, and better again as half NZ's firewood is gathered free. Finally, wood burners require far less maintenance than heat pumps or gas heating systems.

Yet Government policies are suppressing household wood burning, and promoting heat

pumps to replace them. Government's "warm home clean heat" subsidies offered heating options including both heat pumps and wood burners – but Government dropped the heating subsidies in 2011, and ECan now promotes heat pumps but not clean wood burners.

Ecan's new draft Air Plan, just released for consultation, would extend the wood burning restrictions to the entire urban areas of all Canterbury districts, not just the present clean air zones. It would ban wood burners in all new homes, saying modern homes are so well insulated they don't need much heating. And the plan will forbid burning wood of more than 25% moisture content – even though with care poorly seasoned wood can be burned cleanly in modern log burners.

The National Environmental Standard for Air Quality mirrors ECan's policies. It lists "compliant wood burners" but recognises that these emit far more smoke in real life than they do in the elaborate and costly tests. Yet the National Air Quality Compliance Strategy does not allow for emissions control of existing wood burners and even open fires – even though smoke control in open fires in bars and restaurants has been proven effective – and even recovers extra heat for dishwashing. The strategy is in denial of existing and proven methods of smoke control.

Health impact studies that support the national air quality standard count the health effects of smoke pollution – but fail to count the health implications of cold damp houses. So today rising power prices mean houses are even colder, and ever more hospital emergency services and beds are filled.

A "new" design down-draft wood burner (actually more than a hundred years old) could make wood burner bans unnecessary. You load firewood into a fuel hopper and shut the lid. Its remarkable clean burning performance is

inherent in the design; i.e. the primary air is introduced to a grate at the bottom, and the flames burn downwards. As the fuel drops down towards the burning zone the resins and moisture are released, passing over the burning charcoal to create a hydrogen-rich gas that burns up all the smoke particles. Even green wood burns cleanly, though it gives out much less heat than seasoned wood. Additional equipment can recapture the heat of condensation, along with the tiny amount of remaining inorganic ash. A down-draft burner was demonstrated to Environment Canterbury in 2002; it had barely measurable smoke emissions.

Now, 12 years later, no such burners have been approved by the Ministry for the Environment because the test method requires you to load new firewood directly onto the embers. The resins and moisture cool the flame, and the smoke goes right up the flue. You'd have to get an individual resource consent to install a down-draft burner in an urban area. The new draft air plan denies that ultra-clean burners other than pellet burners even exist. Yet ECan has been shown several smokeless down-draft burners this year.

New Zealand's policy towards wood burning is in stark contrast to policies in Europe, especially in Austria, Germany and Sweden, where wood burning in all its forms, log, chip, and pellet and at all scales, from major power generators down to the domestic, - has been embraced as a sensible, renewable, clean, and responsible form of energy. Many hundreds of different wood burning devices are approved to clean air standards every bit as stringent as our own, yet much more enlightened and encouraging of innovation and development. The key differences in the European approach are: -

- Authorities and industry have worked together to create the clean air standards and equipment to meet those standards;
- More than 30 countries have adopted the Austrian standard EN303-5 for all small solid fuel appliances;

- Industry has often taken the lead with the development of new levels of performance long before the legislation has caught up;
- The European testing methodologies deliver wood burning appliances that perform in real life pretty much as they do on the test bed, unlike our own which have failed miserably;
- A major and growing market exists all across Europe for all forms of wood and the equipment to grow, harvest, process, transport, and use it. European householders now use over 6 million tonnes of pellets, and the market is still growing. Thousands of sustainable jobs now ride on environmentally responsible wood energy; and
- The US regulatory authorities are so impressed by the European approach to cooperative and inspirational legislation that they are poised to follow suit.

By comparison, EECA has done nothing to remove barriers to efficient, affordable wood burning. Indeed they have created barriers of their own to other end-use renewable energy, saying solar water heat and solar PV are uneconomic and should not be recognized in energy efficiency and conservation strategy. Ministry for the Environment has devolved responsibility for wood burner testing standards to ECan, which has so far perpetuated all the faults of the present standard. Government's renewable energy strategy ignores the huge resources of fuel from forestry arisings and landscaping wastes.

All agencies of government are combining to make all-electric houses the only answer. Goodbye resilience, hello more electricity sales and higher peak demands. This is not a separate issue from the crony capitalism so clearly evident in the electricity sector. It's all part of the system where regulation supports government's strategy of maximising profits, to collect ever more taxes and dividends from rising prices in the energy sector.

Molly Melhuish

TRANSITION OF THE CITY

Urban Form Metabolism, Product Development and Profit

By Professor Susan Krumdieck

Department of Mechanical Engineering,
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Nobody really believes that unchecked suburban sprawl creates the optimal social, economic or environmental forms for human settlement.



Low density residential development, separated from other land uses, with accessibility limited to personal vehicles is not sustainable, particularly due to total dependence on oil. There is no substitute fuel, vehicle technology or public transport system that can keep the suburban settlement pattern working as oil production declines. The questions addressed in this article are *what* existing urban areas will transition to, *how* they will transition, and *who* will do the work?

Urban Form Metabolism

Think of the metabolism of a city like a complex systems of living things. No biologist would say that one species is “better” than another, but the prevailing theory holds that all life forms are adapted to their environment and the ebbs and flows of available food and water. Humans also adapt to use available resources, and we are much faster adapters than other species.

A person’s metabolism is a function of their genetics, environment, life history and their current diet and activity levels. Clearly, there are patterns of diet and activity levels for people that are healthy and others that are not. We can observe the state of health of a person, via characteristics like excess body fat, inflammation of joints, weakness of muscles, poor circulation, and disease. Medical practitioners tell us that if we can improve our lifestyles and nutrition, we will feel better, lower

our risks of disease, and increase our ability to enjoy life. The metabolism of a city is likewise essential to the healthy function of a complex human social system. Sprawl, monolithic land use and unfettered vehicle use are the underlying causes of unhealthy urban metabolism. Big new homes, comfortable cars and high speeds are great, but – too much of a good thing has negative results.

The usual discussion of sustainable cities involves holding up examples of the mode share of cycling in Copenhagen, Bus Rapid Transit in Bogata, the metro systems in Tokyo or Paris, etc. An obese office worker with a junk food habit might not be helped by being told about the fitness of Ritchie McCaw or Irene van Dyke. Each city has its own unique characteristics and history, and its own ability to change. We can examine data for commuting drive times, energy use per capita, or mode shares of vehicles vs active modes, but these are symptoms, not the causes of poor metabolism. Travel behaviour is also symptomatic of an unhealthy urban form rather than being the actual cause of problems.

My research group has been researching diagnostic measures of the urban metabolism and the adaptive capacity for each particular city. One important tool relates geographical data to vehicle kilometres travelled, and analyses multi-mode and low energy accessibility to a range of activities from each residence. Goods movements, particularly food, was the subject of a recent PhD thesis. At this early stage in the development of the field of urban transition, it is clear that the modern city is a result of human adaptation to abundant, low cost fuel and vehicles. In terms of urban metabolism, sprawl around a city is akin to obesity. The diverse and interconnected elements of healthy cities are usually lacking in new green-field subdivisions, the new suburbs often come with big box retail that drags down the main street, and it is a long drive into the older part of the city where things are happening. From early analysis of the data, it appears that it isn’t the fact that a city got

bigger or even that the new developments were low density that degrades the urban metabolism. The monolithic nature of the sprawl development, the long distances to schools, work and shopping, and the percentage of the land dedicated to personal vehicle travel are the main factors that degrade the urban metabolism and limit the adaptive capacity. The most important thing that can be done about urban sprawl right now is to not build any more sprawl or motorways to existing sprawl.

Product Development

The green-field suburbs are easy to build, the product is well known to potential customers and the developers usually make a good return on their investments. Subdivisions outside the city were new products, developed after World War II to meet a booming demand for middle class housing for a growing population in a time of shifting work from agriculture to cities and to accommodate new social ideas about modernity and progress. In the last decades there have been some notable brown-field re-developments of industrial areas with higher density apartments or row-houses. A popular product is repurposed historical buildings into “loft” apartments. Some brown-field projects have reflected New Urbanist ideas of walkable neighbourhoods with some ground-level restaurants and transit-oriented developments. However, it is often a lower-risk prospect for developers to simply build large apartment buildings and use some creative marketing to tap into the latent demand for walkable urban living near transit and vibrant streets. Properties on established urban streets have demonstrated market appeal and profitability. Wouldn't we all like to own an apartment in Haight-Ashbury, Greenwich Village or The Terrace? The new product challenge for property developers is to figure out how to deliver *grey-field* re-development products to the market. Grey-field re-development is the conversion of an old suburban area, in a strategic location within the overall city, into a vibrant high-street with a

diverse mix of residential, retail, entertainment, service and commercial properties, and to integrate it into the emerging texture of a low-oil future city. The strategic location would be an area where property values are low due to poor condition of old houses, and would have to have established city services and good connections to industrial and other employment and schools. The biggest hurdle in developing this new grey-field re-development product would be the process of garnering the buy-in of the existing property owners in the area.

Profits

Every structure in the city was built with the expectation of positive return on investment. The transition of the obese city with poor circulation, and weak structure and connectivity into an oil-lean, highly efficient city will have to be done at a profit. The re-development of last century's sprawl into a strong and vibrant city of the future will be driven by commercial opportunity. However, this new product will require an innovation in property development planning and management. A non-profit trust, similar to the New Zealand Historic Places Trust would work with the wide range of stakeholders and utilize the cutting edge urban metabolism mapping and design tools to prospect for the prime re-development areas of the city, within the context of the long-term transition. The trust would be run as a social business with the main clients being the consortium of land and property owners, and the social and cultural benefit with a 100 year outlook. The new business would work to achieve the multiple objectives of affordable housing, employment, environment, highest standard construction and architecture. The greatest innovation needed at this time is the development of the business model for transition away from the existing oil-intensive and oil-dependent urban metabolism. Check out the progress of “*From the Ground Up*” on the website: www.aemslab.org.nz , the “Rebuild Christchurch” page.

Susan Krumdieck

THE FUTURE ROLE FOR SMART GRIDS AND NETWORKS IN OUR ELECTRICITY SYSTEM

By Ian Shearer

In EW70 I outlined the small trial of a smart grid on Orkney that had helped open the door for the installation of the first New Zealand made, Windflow turbine on to the Orkney network. These smart network features will be a part of the new Windflow turbines installed this summer on Orkney, Hebrides and in northern Scotland. This article looks at the advantages offered by smart grid systems, and their potential for introduction in New Zealand.



Those of you that follow energy issues closely will know that the ‘blogosphere’ is alive with articles on the need to create a new electricity utility business models to reduce energy costs, improve environmental outcomes, provide pricing structures that reward efficiency, facilitate finance initiatives that will integrate local power generation (like rooftop solar), and allow us to better understand and control our energy use.

Worldwide, the electricity market is changing rapidly and fundamentally, and most industry participants don’t recognise where it is going. Consumer products that integrate electricity production, security, and networking, breakthroughs in economies-of-scale and new battery and real-time communication technologies are disruptive elements that will help blow away the current industry.

The potential benefits from an integrated smart electricity networks are large. Smart networks will change the way we generate and use electricity, facilitate new forms of generation and most importantly, bring customers into the equation with their ability to control demand and

help balance the system and minimise costs for end users.

To gain these benefits, we need to change the roles and responsibilities of all the parties involved in the electricity system and this will require significant changes and leadership from companies plus central and local government.

A smart grid will offer benefits and opportunities for consumers, businesses, network operators and the wider energy industry, and facilitate our transition to a low carbon economy. A smart network will:

- Reduce costs through optimization of network assets;
- Facilitate the use of smart meters and smart appliances, plus automated demand-side responses;
- Enable consumers and communities to have greater control over their electricity use;
- Support green-economic growth and jobs;
- Increase energy security and integration of low carbon technologies; and
- facilitate identification of network problems more quickly at a local level.

Smart grids are essentially about collecting and using data, being more informed, and looking for better value.

- Smart meters are the usual starting point, but they must not be dumb-smart meters that will block future developments;
- Data management systems at appropriate scales to facilitate local demand and peak reductions (or to switch on load if there is excessive renewable generation available);
- Demand reductions are no longer just for large customers; there is a role for amalgamating impacts from many small customers;

- Not many customers can adjust to working with 10 min data – automated responses are essential;
- The social aspects of how customers behave are essential to balance different load profiles on the network;
- It is also about how the network behaves – balancing flows including reverse flows (distributed generation and from network batteries) and dynamic load ratings of cables, lines and transformers;
- There is a new focus on network equipment condition monitoring, and fault on-set analysis, telling the operators what is working (and what is not); but
- There are also limits that need to be adjusted - customers may, or may not, want to know at 3am that the network computer knows that their fridge has stopped working.

Many aspects required for implementation of smart grids and networks are missing from our present electricity industry. To gain these

benefits the following changes need to be included in a new structure for the electricity industry. We need: -

- A government to help develop a vision and strategic direction for the future electricity industry system that maximizes benefits for the community;
- A regulatory and commercial framework that will facilitate and support the deployment of smart technologies and new commercial practices and protect the interests of end users;
- Education so consumers can understand the benefits from smart meters, smart appliances and measures to facilitate the shifting demand;
- Opportunities to develop jobs and investments in research and development and manufacturing as appropriate; and
- The development of system and product standards to facilitate and not block agreed changes.

Ian Shearer

DRILL! BABY DRILL! WITH LIGHT-HANDED REGULATION OF OIL AND GAS

By Steve Goldthorpe

The enthusiasm in the current New Zealand energy policy setting for encouraging exploration for, and exploitation of, new oil and gas resources is reminiscent of the Drill! Baby Drill! slogans of the right-wing US Tea Party.



The principle of sensible and safe exploration and exploitation of NZ resources to meet NZ needs would be reasonable, but in the context of globalized oil and gas industry such a parochial approach in NZ is not possible.

In New Zealand, as in most of the rest of the world, the prospects of finding more low-hanging-fruit in easily-accessed on-shore oil and gas resources is unlikely. The type of low-cost oil and gas resources, on which the oil province of Taranaki was built in the last century, are unlikely to be replicated elsewhere else in NZ.

Deepwater oil prospecting

Up in my home region of Northland there was euphoria in the local press when it was announced that the Reinga Basin was to be opened up for oil exploration. There were claims that the oil industry coming to Northland would transform our economy to that of Taranaki. However, that whole Reinga Basin area is well off the West coast of Northland in water up to 2000 metres

deep and up to 500 km off shore, which is not Beverly Hillbilly country.

Exploration and exploitation of off-shore oil in such places requires very deep pockets owned only by the multinational oil corporations. Giant drilling rigs are in high demand for deep ocean exploration so they require a strong inducement to come down to the South Pacific.

Since the oil industry is all about risk and return the multinationals are going to want a high return for the high risk of funding deep ocean exploration in this remote corner of the world, so royalties have to be modest. They are also going to want a difficult job made as easy as possible. Hence the NZ Government was obliged to rush through anti-protest legislation to be able to reassure the oil drillers that their high cost rigs would not be delayed in their mission.

In the event that commercially attractive quantities of hydrocarbons are found the stakes in the risk and reward game increase greatly.

Production platforms these days are much more sophisticated than they were when the Maui field was exploited 35 years ago. Back then all the recovered fluid was piped ashore for processing in Taranaki. These days a production platform can accommodate separation processes to split the recovered fluid into natural gas, LPG, light oil and heavy oil. These raw products can then be shipped off the rig into tankers for the international market place, avoiding the need for sub-sea pipelines to bring the products ashore.

That scenario would not be good news for the Northland economy. Without land based operations the local jobs would disappear. Even marine services could be provided more sensibly from New Plymouth than from Whangarei.

Indeed, the whole exploration and exploitation operation could be carried out over the horizon so that tourists in Northland would be completely unaware that anything was going on – unless, of course there was a big blowout. Then Northlanders would be very aware of the existence of major off-shore oil operations.

Of course, the chance of a major disaster, like the Deepwater Horizon disaster, is very low. According to the Minister of Energy Simon Bridges it might be a 0.05% risk. (There are many Northlanders who would buy a lotto ticket with a 1 in 2000 chance of a big win.) Furthermore, the oil industry resources in the Tasman Sea to deal with a big spill are very meagre compared with the resources in the Gulf of Mexico that were on hand to deal with the problem there. Regardless of the hope that “she’ll-be-right”, any risk with no return does not seem like a good deal for Northland.

Light Handed Regulation

Another way in which the difficult and complicated task of exploiting oil and gas resources can be made easier is for regulations to be flexible and light handed. Every well is different, so rules that are reasonable in one place would be seen to be unreasonable in different circumstances.

Furthermore the circumstances can change in unpredictable ways over time. Consent conditions that might be thought to be reasonable before starting operations might be found unworkable later. That is a problem with the way the RMA works. Delays to renegotiate consents could be very costly.

To encourage oil companies to invest New Zealand needs to be able to offer a light handed regulatory regime and a weakened RMA process. Unfortunately, the consequent self-regulation approach minimizes the environmental protection that NZ is afforded.

Greenhouse Gas Emissions

The Greenhouse Gas (GHG) combustion emission factors of the refined market fuels for CO₂ are well defined. However, there are also substantial pre-combustion GHG emissions from the production of refined fuel, including CO₂ from the use of energy in extraction processing and transport and also fugitive emissions of methane and CO₂.

Whilst highly variable, these pre-combustion emissions can be 10% of combustion emissions for oil and 20% for gas when those fuels are obtained from conventional sources. The GHG “backpack” carried by unconventionally sourced fuels can be significantly higher.

Comparing a natural gas combined cycles with pulverised coal power stations it is common knowledge that the CO₂ emissions the gas turbine exhaust and about half of those from the coal boiler chimney. However, when pre-combustion emissions are taken into account that advantage is reduced and may even be eliminated in extreme cases if methane emissions are assessed over a 20-year time frame.

Pre-combustion emission are not easy to measure. When fugitive emissions from oil and gas activities do not present a hazard they are seldom measured; and so not reported. Light-handed regulators use the data they are given and assume that the absence data means that there is no emission. There is systemic under-reporting of fugitive emission from oil and gas in NZ.

In 2009 USEPA changed its methodology to an activity factor basis. The assessment of fugitive emissions from oil and gas doubled. The resulting furore resulted in improved reporting and also, importantly, in reduced emissions.

Summary

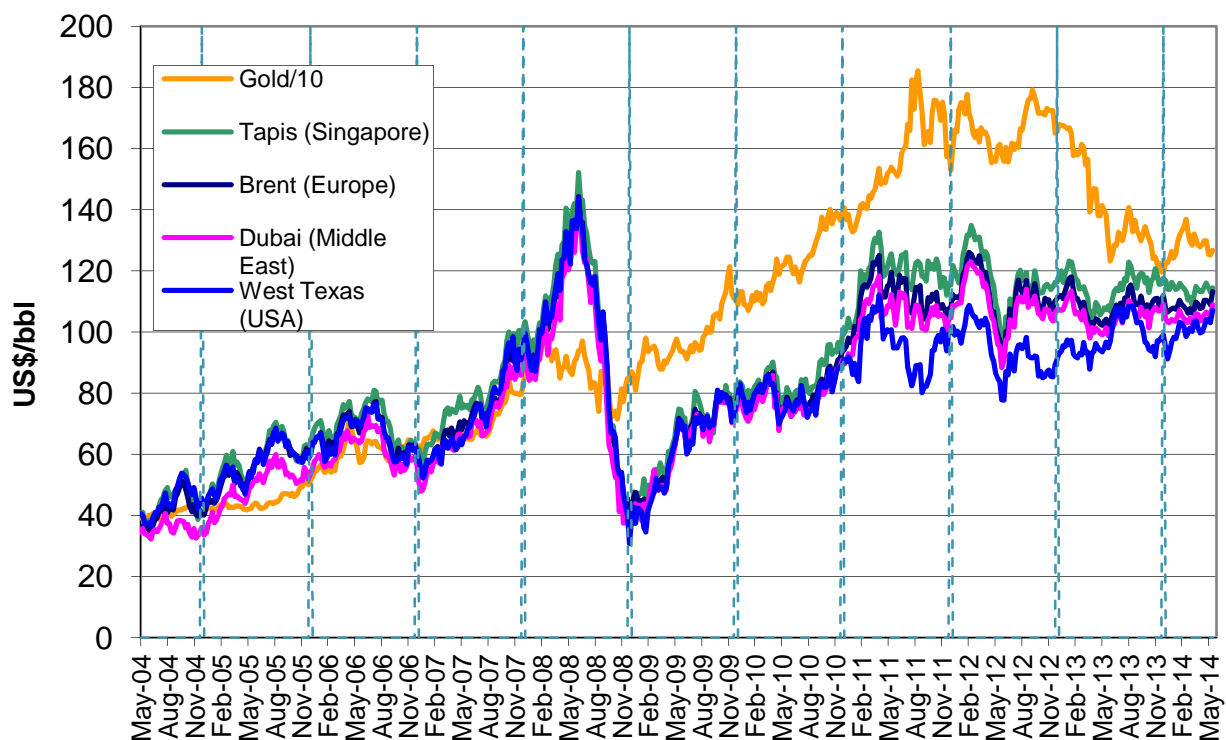
The Drill! Baby Drill! policy with light-handed regulation results in some downsides for NZ: -

- Risks to the tourist industry
- Modest royalty payments
- Local risk with no local return
- Weakened environmental legislation
- Hidden GHG liabilities

From a global perspective, oil demand is increasing whilst oil supply is diminishing. The chart below shows how a bit of bother in the Middle East results in an immediate upturn in the oil price. That is what Peak Oil looks like.

The strategy of welcoming oil prospectors onto our shores with open arms seems shortsighted. In a seller’s market it is wiser to play hard to get. If we have what they want we should hold on to it whilst the price goes up. *Steve Goldthorpe*

Neil’s Oil Price Chart



Join our sustainable energy news & discussion group

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

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Some busy people using a work address prefer to use the Rules function in their email software to automatically save SEFnews emails to a separate folder for later reading. If you do not want a Yahoo ID, the administrator <admin@sef.org.nz> can select the ‘daily-digest’ option for you.

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Publication is now quarterly, and EnergyWatch is posted on the SEF website (www.energywatch.org.nz) as a PDF file, shortly after individual distribution to SEF members.

Contributions Welcomed

Readers are invited to submit material for consideration for publication.

Contributions can be either in the form of Letters to the Editor or short articles addressing any energy-related matter (and especially on any topics which have recently been covered in EnergyWatch or SEFnews).

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

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