



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

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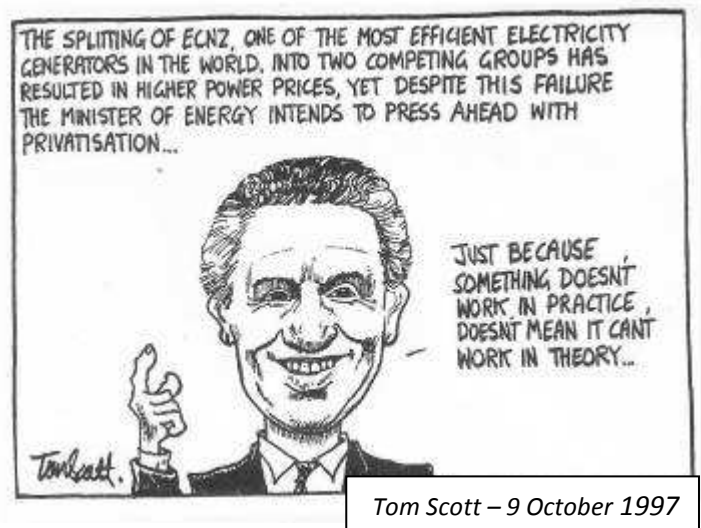
Editor: Steve Goldthorpe

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EDITORIAL

PPP = Perilous Partial Privatisation?

When trawling through the SEF archives, I came across this classic Tom Scott cartoon from the days of the Max Bradford reforms of the electricity sector in 1997. It seems to me that the current proposals to transition from the State Owned Enterprise (SOE) model to mixed ownership model of Private Public Partnership (PPP) for running our electricity services is one further step down a questionable path.



Tom Scott – 9 October 1997

Is Tom Scott's satirical observation still relevant today? To explore the implications of the Government's partial privatisation agenda, I posed the following question to SEF members:

"Can partial privatisation of electricity companies improve the sustainability of the electricity system in NZ?" This issue includes responses from a few SEF members to this question.

One of the issues that concern me is the dropping of the social responsibility clause from the proposed electricity industry regulations. Under the present rules, the SOEs have a statutory obligation to care for the provision of an essential service the people of New Zealand. That obligation would not be imposed on the private partners. The rationale is that a social obligation is unnecessary because it is good business practice to develop strong relationships with customers. However, is it not also good business practice is to stop trading with customers who can't pay their bills?

Furthermore, a strong supportive relationship between suppliers and customers, as the primary means for achieving the objective of social sustainability in essential electricity supply at a household level, is compromised by the "What's my number?" campaign, which exhorts domestic customers to abandon that relationship and to switch to another supplier who might be offering a cheaper deal at the time.

A chart on page 5 shows that domestic electricity prices have increased in real terms by about 5% every year for the last decade and all the signals are that price rises in excess of inflation will be a characteristic of the domestic electricity scene for the foreseeable future as ever increasing loads are placed on the fully loaded transmissions and distribution infrastructure. What can the hapless householder do about the increasingly large proportion of disposable income that will get swallowed by the electricity meter?

A discussion on SEFnews has focussed around Jevon's paradox, which can be stated as *"technological progress that increases the efficiency with which a resource is used tends to increase (rather than decrease) the rate of consumption of that resource."* This truism indicates that we can't look to technological advances to solve the electricity supply problem.

Could an answer lie in us being helped to learn to live with less? For example, my domestic electricity supply has a 63 amp circuit breaker. So my family could, in principle, draw that much current 24 hours per day and I would not know about it until I get a huge bill a month or more later. My standard system gives me access to electricity worth \$38K/year at today's prices.

Perhaps a socially responsible supplier might help customers in difficulties with a combination of low amperage circuit breakers and pre-payment meters rather than disconnection. Would that be a good business practice in the privatised competitive market environment?

Frank Pool concludes that an outcome of the impending asset sales might be energy efficiency becoming more economic, but that is the only silver lining seen in the gathering clouds.

Last month I had the opportunity to attend a workshop in the USA about emissions from natural gas operations. I had the opportunity to ask a few questions and learn more about fracking. I came back with more questions than answers. In this issue I share some thoughts about where fracking is used; why it has become a game-changer; how it works; what are the potential downsides and who could control it.

The office of the Parliamentary Commissioner for the Environment has been challenged to investigate the application and oversight of fracking technology in the New Zealand context. The advanced developments and expertise in fracking technology come principally from the USA, where they are subject to American Petroleum Institute standards. It will be most

interesting to see whether the PCE's office concludes that procedures can be devised for ensuring good environmental protection if fracking is widely exploited in New Zealand.

This issue of EnergyWatch also includes updates from CANA, NZCEC, AWATEA, and BANZ, and a review of the international climate change negotiations. I am grateful for all these contributions to EnergyWatch. As always, I will welcome further contributions, feedback and suggestions for issues to be explored.

As usual, EnergyWatch wraps up with an update on the oil price trends – ever upwards?

Steve Goldthorpe, Editor

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PARTIAL PRIVATISATION AND ENERGY SUSTAINABILITY

AN ANSWER TO THE WRONG QUESTION

By Frank Pool

Grid supplied electricity is more or less a natural monopoly from the end user-consumer perspective.



You can pretend otherwise with changing suppliers, but the electrons still are billed at the same meter and they come down the same wire from generation stations, which are all more or less paid the same price. It is effectively impossible to justify more than one set of electricity grid high voltage transmission and medium-low voltage distribution lines being economically possible even in really dense and large urban areas (which no NZ city has), let alone in the near empty countryside of New Zealand industrial farming. And near universal grid electricity supply is a prerequisite for modern living; witness the recent realisation that “modern energy” access is a powerful anti-poverty tool that is an implicit part of the UN MDGs (Millennium Development Goals) that was never explicitly stated and is now being added. The UN General Assembly has named 2012 as the International Year of Sustainable Energy for All.

So the first question then is, if there are only going to be one set of high-medium-low voltage electricity lines linking the various hydro-geothermal-wind-natural gas-coal electricity generation stations to household-commercial-industrial-farming electricity meters, how is this all to be arranged? There are traditionally three choices: -

1. A government agency deals with the electricity generation and high voltage electricity generation side. Local council-municipal owned entities deal with the medium-low voltage distribution lines, meter reading and retailing. In NZ this was

the NZED-ESA (NZ Electricity Dept; Electricity Supply Authority) model until Rogernomics arrived in the mid-1980s. The trade-offs between reliability of supply and extra capital cost, and the social dimension of electricity supply and affordability was handled internally by the public entities involved. The perceived problem was that the systems involved were allegedly over-engineered, and there were real problems with choices of what new generation to build becoming political (with spectacular cost overruns like the Muldoon mandated Clyde high dam, and lesser known lemons like Marsden B and the original diesel fired Whirinaki plant), and residential electricity supply was too cheap (because residential users are voters) and commercial and, to some extent, industrial users paid too much (because they didn't vote).

2. Private entities get a concession to supply grid electricity to a defined area, and a utilities commission sits on top of them to make sure they only build new capacity as required and earn a reasonable but not excessive nice predictable rate of return on these allowable assets. This is the US investor owned utility and (critically also) serious public utility commission model. This was never seriously considered for NZ
3. An electricity market model is developed where the contestable (open to competition) part of the electricity system operates in a market established by the government and the natural monopoly (transmission and distribution lines) parts of the system are seriously regulated to prevent excessive monopoly behaviour. This requires Government to set the rules¹, a strong

¹Markets are social constructs in which the players, if left to their own devices, will naturally develop a monopoly.

Government-established and independent real authority to police the system, to facilitate competition where there can reasonably be competition (generation and retailing), and to avoid monopoly behaviour where there is a natural monopoly (wires and metering).

So what did NZ do?

We sort of bought into the argument that model (1) did not work, and we got bamboozled that it was economically “inefficient” - and with lots of lobbying by various self-interested players and legends in their own lunchtime experts, that we should unbundle the system (Transpower and local lines companies) and get “competition”. Model (2) was never seriously considered, so we thought we were going to model (3), but we never developed the strong and independent government established authority to seriously police the system. When we got someone who tried to do this (Roy Hemmingway) strong lobbying by self-interested players and a weak and out of his depth Minister (Parker) meant his (Hemmingway’s) contract was not renewed – what a surprise!

So now we have 4½ electricity “gen-tailers”, an insider-captured so-called regulator, a pretend “electricity market”, an idiotic government funded campaign to get people to switch retailers, as though this will somehow fix a system that can never work from its lack of design and lack of real policing, and the opposite bad features of the “problems” that popular and self-interested mythology said we had with the old model (1). So now we have residential electricity tariffs that are double that of industry and getting even more unequal, new hydro that is essentially impossible to build, transmission and distribution lines that are old and overloaded, meters owned and read by god-knows-which alphabet-soup corporate owned by god-knows-who, and a joke insider-captured “regulator”.

Selling off 49% of the three Government owned “gen-tailers” that earn a healthy return on

“assets” to displace low cost government debt is then somehow supposed to make sense. It’s just more of the same smoke and mirrors and George Orwell “1984” style double speak and outright lies that we have had for nearly 30 years.

But expensive residential grid electricity means that solar water heaters are already economic. And we are more than half way to residential PV being economic for homeowners without subsidies (and yes a FIT is a (cross) subsidy). So what we really need is mandatory residential net-metering, an effective SWH support program, and a real regulator before 49% of government owned gen-tailers are sold. But don’t hold your breath as both National and Labour have proven themselves totally incapable of understanding the basics as above and are totally sold on the shambles we have now. All we can hope for is that the Greens, and maybe Winnie too, can get their heads around the total mess that we have now, and that they will have the backbone to get back to some simple basics of why monopolies need to be regulated by a real public-interest focussed, independent regulator, and why lobbyists will always find a seductive reason why their paymaster should get special treatment.

Of course, selling 49% of the three government owned gen-tailers without first addressing the lack of a real neutral referee will only lead to higher electricity prices for those without good (i.e. well-paid) lobbyists. So retail prices will continue to increase faster than commercial or industrial electricity prices. And higher residential electricity prices will lead to more energy efficiency being economic.

Pity about the social (sustainability) dimension; but then the people who can’t afford to pay their electricity bills don’t vote National anyway.

Frank Pool

<p>STOP PRESS - 591 submissions have been lodged with the Finance and Expenditure Select Committee. A random sample were all strongly opposed to the Government’s SOE asset sales</p>
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THE IMPLICATIONS OF PARTIAL ASSET SALES FOR SUSTAINABLE ENERGY IN NEW ZEALAND

By Molly Melhuish

New Zealand has a high and growing percentage of renewable energy generation. Wind and geothermal power proposals that are already consented would increase expected renewable generation by about 11,000 GWh per year over and above the 40,000 GWh generated in 2010.



Electricity prices are now high enough to make all this renewable energy commercially viable now or in the near future – the stations will be built as soon as demand grows to give them a market.

However, all this renewable energy investment does not make New Zealand's energy increasingly sustainable.

Sustainability requires far more than a high percentage of renewable generation. It requires

- investment in energy efficiency as well as new generation
- increasing use of small-scale renewable resources such as firewood and rooftop solar, to add diversity
- end-use energy to be increasingly tailored to thermodynamic energy quality
- access of end-users to impartial advice
- consumers to face the true costs, including environmental costs, of their energy use
- genuine choice for consumers, between convenience and cost of energy services
- finance or subsidy for investment that promotes sustainability.

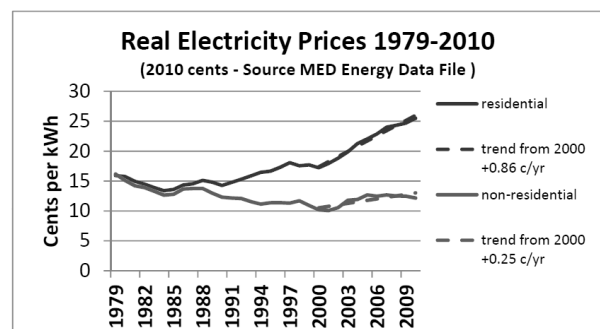
Above all, sustainability requires New Zealand's non-renewable resources to be managed to meet the needs of New Zealand people and businesses, not cashed in for short-term gain.

The electricity market does not have sustainability objectives – these were removed by legislation in 2010. No country other than New Zealand regulates electricity according to pure market principles. Our regulation rejects any consideration of externalities, or the benefits of diversity, or any social impacts of the pure market.

The new Electricity Authority has interpreted its objective, “long-term benefit of consumers” to include:

- Protection of investors from ill-founded lobbying (from consumers?)
- Exclusion of externalities from cost-benefit analyses, which underpin all decisions – climate change is specifically excluded from consideration.
- Aggregation of residential consumers with all other consumers, into a pricing system that maximizes profitable sales by charging captive consumers the highest prices, and discounting to competitive consumers.

The pricing principle, as expressed by the Authority, is that prices are to signal the economic costs of supply by being subsidy-free, that is, equal or greater than incremental costs (from existing power stations) and less than or equal to standalone costs (from new power stations).



This graph of real electricity prices shows the outcome of this pricing principle. It is self-evident that residential consumers are paying the

rising standalone costs, and large consumers are negotiating prices down to incremental costs.

This pure market pricing began in 1991, when ECNZ said prices would have to rise gradually until they fully reflect the cost of new generation. They did not say that large consumers would escape the price rises.

The wholesale electricity market works in a similar way. The market price each half hour is set at the highest price offered. Even though the cost of every other generator is lower, they are all paid at the high market price. This gap between market price and actual cost creates large “windfall profits” (properly called market rents) whenever expensive generation is required.

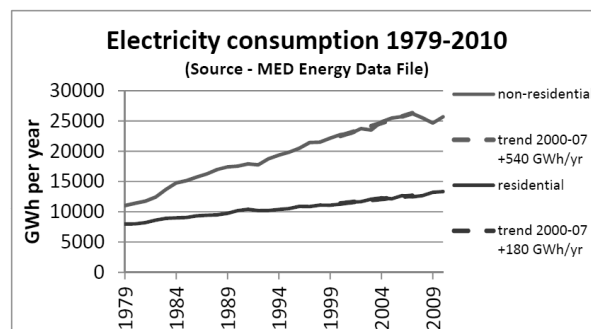
Some people describe the electricity market as “a license to print money.” As a book on utility privatisation says more soberly: - “*Monopolies create rents that are fought over*”. The advice of *Deep Throat* is particularly relevant: “*Follow the money!*” Who gets the rents is crucial to the question of whether the present market promotes sustainable energy.

Wholesale market rents make costly new generation commercially viable. Company asset values increase both when prices rise and when new power stations are actually built. As values increase, prices are raised to restore the desired rate of return.

Some of the market rents are re-invested in new generation, but much of the rent is available to meet the many expectations of the large corporates, including salaries and bonuses, building the company image, and investing in businesses other than their core requirement to meet New Zealand electricity demand.

Retail market rents are clearly being captured by the large commercial and industrial consumers, especially the energy-intensive industries. Their low prices make energy efficiency investments uneconomic to them, yet that is where the lowest-cost investments in energy efficiency are found. Their demand was increasing at 540

GWh per year before the recession, compared to residential growth of 180 GWh per year. Thus residential prices are rising to pay for new power stations for large consumers.



From a public policy perspective, the best use of those market rents would be to re-invest them into whatever energy options provide New Zealand’s energy requirements, both electricity and fuels, at the lowest economic cost, including environmental and social externalities. That perspective was embodied in legislation by Labour after 2000, but neither the industry nor the regulator took any notice, and the provisions were repealed in 2010.

The usual response to the above analysis is that the electricity markets are not monopolies. The answer is crucially important: the companies that trade on the wholesale market effectively have monopoly control over the regulator. The regulator has excluded domestic consumers from its most important advisory groups, and rejected almost all their submissions. The 2010 law shifts decision-making from the Minister to the regulator.

Electricity market participants became a cartel in 2002 when the Commerce Commission decided that electricity regulation would exclude consideration of alternative fuels and energy efficiency. That enabled the industry to set up barriers to competition from cheaper or more sustainable alternatives.

The proposed part-privatisation almost fulfils the original ECNZ vision – deregulate, then privatize, fully.

Even part-privatisation would lock in wealth transfers from domestic consumers to the

industry. Companies will pursue all profitable sales, market rents and electricity asset values will continue to increase, and the prospect of buying back any regulatory control from the cartel will almost vanish.

Companies that offer more sustainable alternatives, outside the cartel, will be further starved of capital. Suppression of alternatives is already making consumers increasingly captive to electricity.

These impacts on sustainable energy businesses and residential consumers will far, far outweigh

any fiscal benefit of selling shares in state-owned electricity generator-retailers.

The electricity industry takes \$6 billion per year in revenue, exactly half of that from domestic consumers. A \$6 billion fiscal benefit from one-off asset sales seems small in comparison to the distortion of energy markets by regulation biased towards the interests of electricity industry participants.

It's like burning the front door to feed the fire – unsustainable. *Molly Melhuish*

SANITY OR PSYCHOSIS?

By Dave McArthur

Sanity or psychosis and psychopathy? That is our choice. If we are to sustain our sanity, then it is essential we New Zealanders retain 100% ownership of Meridian



Energy, Genesis Energy and Mighty River Power. The short era of cheap mineral oil has passed and, if we fail to embrace alternative sources of wealth, we are now at high risk of catastrophic social collapse. In this context, these national assets assume unprecedented importance and become critical to our survival as a civilised society.

The global banker oligarchy and their NZ agents such as our Treasury deny this reality. They severely undervalue both mineral oil and these assets. Consequently they publicly prescribe and price for sale these precious assets at their nuts, bolts, wires and transformers value.

The truth is these assets are primarily information systems that define how we design and use our dwellings and appliances, communicate, travel, use our landscape and, in general, form our culture. The vast wealth potential of their information can sustain us - or bankrupt and destroy us.

These wonderful assets did not miraculously materialise in the 1980s, as is now commonly

believed. Past generations made considerable sacrifices to bequeath freehold on future generations one of the most intelligent electrical grid systems in the world. Already our generation has destroyed much of that inheritance. In so doing we have destroyed vital elements of our superannuation.

The recent history of past partial privatisations (Capital Power, Hutt Mana Energy Trust etc.) is very clear: the asset is immediately restructured to serve the short-term interests of the minority private owners. Already the current SOE regime imposes unsustainable imperatives and profound secrecy surrounding operations that is antithetical to both democracy and energy efficiency practice. Already this regime effectively disenfranchises us and reduces each of us to being a mere tradable commodity.

The proposed partial privatisation destroys the last vestige of democracy and puts New Zealanders at high risk of debt, poverty, waste and pollution. Movies such as “*The Corporation*” and “*Enron –the Smartest Guys in the Room*”, the derivatives trading catastrophe in 2008 and the current “quantitative easing” make it very clear that the proposed ownership structure of these precious assets is dangerously psychotic.

Surely this is not what we want for our children?

NEWS FROM COAL ACTION NETWORK AOTEAROA

Tim Jones

Since the Keep the Coal in the Hole Summer Festival, held near Matura in January (see <http://noccoalsummerfest.org.nz/>) the campaign against new and expanded coal-mining in New Zealand (including lignite mining) has gone nationwide.



There are now anti-coal action groups or regular meetings in Auckland, Whanganui, Wellington, Christchurch, Dunedin, and Southland, and the beginnings of groups in other regional centres. While these are independent from the Coal Action Network Aotearoa, CANA is supporting them with information and other resources.

And there is no shortage of coal-related issues to work on: not just the campaign against Solid Energy's plans for a massive expansion of lignite mining in Southland, but also campaigns against other coal-mining proposals.

The Government has continued its unwavering support for as much as possible of the country to be opened up for coal mining and other forms of fossil fuel extraction. The architects of one such proposal were the focus of a protest in Wellington on 21 March.

Bathurst Resources opening protest

John Key decided that opening the new Wellington headquarters of the Australian mining company that plans to open a massive new coalmine on the Denniston plateau is the sort of thing a New Zealand Prime Minister ought to do. A whole lot of people turned up outside the venue to tell him, in no uncertain terms, that it wasn't.

A coalition of groups including Coal Action Network Aotearoa organised the protest (see

<http://coalactionnetworkaotearoa.wordpress.com/2012/03/15/show-john-key-your-opposition-to-coal-mining-on-conservation-land-2/>)

and groups including CANA, Forest and Bird, 350.org and Generation Zero were represented, as were the Green Party with several MPs, the Labour Party and the Mana Party.

According to our headcount, 230 people came along. I was impressed by the energy of the crowd, and by their ability to keep that energy level up for 90 minutes in the case of most people, and over 2 hours for those who stayed right to the end to farewell Mr Key in the style we had welcomed him (about 30 of us). We had a range of excellent speakers from Forest and Bird, CANA, the Green Party, 350.org (and apologies to other groups I may have missed out) and some well-led and determined chanting.

Bathurst were sufficiently spooked to try to paint themselves in the media as the "good" coalminers, in contrast to the wicked, lignite-mining Solid Energy:

<http://www.stuff.co.nz/business/industries/6608335/Bathurst-Resources-won-t-mine-lignite>.

Bathurst didn't choose to mention the close ties they already have with Solid Energy in other areas.

Getting Involved

If you would like to go on the Coal Action Network Aotearoa mailing list, or would like to be put in touch with a group working on the issue in your region, please contact coalactionnetwork@gmail.com

If social media is your thing, you can also join our Facebook group at <http://www.facebook.com/#!/groups/218300434877031/>

or follow us on Twitter at <https://twitter.com/#!/coalaction>

Follow our blog and get regular updates at <http://coalactionnetworkaotearoa.wordpress.com/>

SUPPORT DECLINING FOR BIOFUELS IN NEW ZEALAND

By John Blakeley

In a recent statement, Brian Cox, Executive Officer of the Bioenergy Association of New Zealand (BANZ), noted that the current support scheme for biodiesel expires on 30 June 2012 and that an excise tax exemption for ethanol is due for review this year as well.

Mr Cox said that it is unacceptable that the biofuels industry is left in limbo not knowing the outcome of these schemes. He said “Our members are unable to make investment decisions or execute forward contracts”

Mr Cox noted that because of this ongoing uncertainty, sales of biofuels are already beginning to slip. He said “BANZ is aware of a number of fleet owners who are keen to make a commitment to liquid biofuels, but are unable to because of the uncertainty surrounding the future of the industry in New Zealand.”

He said that New Zealand has had a real chance, with the adoption of biofuels, to make an impact on reducing its greenhouse gas emissions, especially in the transport fleet, and this needs to be retained and, if anything, supported more.

Only 3–4 years ago, biofuels were seen as a great hope for New Zealand’s energy future in reducing both greenhouse gas emissions and fuel imports from overseas, but it seems that this is no longer the case.

Keith Snowden, Convenor of the BANZ Liquid Biofuels Interest Group said that the current government support for biofuels (which includes biodiesel and bioethanol) assists the New Zealand biofuel manufacturing industry to make biofuels accessible to vehicle users. He said “Since 2007, biofuels have been adopted as a great alternative by tens of thousands of Kiwi motorists as a way to reduce greenhouse gas emissions. The end of the support for biofuels would mean the death of biofuels and New Zealand should not allow this to happen. It would also send a signal to the whole renewable energy community that the government is not serious about initiatives to support climate change and other environmental measures.”

References: Sustainable Success – Latest News and Views from the Sustainable Business Network, March 2012.; www.greenfleet.org.nz

WHAT IS IN A NAME?

I had a call from a local resident concerning the consumer payout from our Northpower Consumer Trust, which is community-owned. Like many community-owned lines companies their actual costs are significantly less than their income from the lines charge that are levied on consumers according to the rules of the electricity market game. Therefore, every 6 months a refund is made to the consumers. The latest refund was \$95 to each average consumer, which was passed through the various electricity retailing companies as a deduction from the bottom line (inc. GST) electricity bill, making it hard for consumers to work out exactly what their electricity actually costs. Some retailers called that refund a “Trust Dividend” or “Trust Distribution”, which was not a problem for my caller - but would off-grid community residents get a dividend from the trust that they co-own?

Some retailers, and Northpower, get around that issue by referring to the \$95 handout as a “Line Charge Holiday”, which prompted my caller to ask “What about the 15% GST?”. The line charges are specific charges that are explicitly exclusive of GST. Therefore, if a \$95 reduction in line charges is being refunded, he argues, quite correctly, that it should be deducted from the charges made on the electricity bill **before** GST is added. He argues that if we are being given back \$95 worth of line charges then we should also be given back the \$14.25 that we have previously paid in GST on those charges. This conversation left me puzzling - who has got my \$14.25? Why so complicated? *Steve Goldthorpe*

FRACKING 101 – WHERE? WHY? HOW? WHAT? WHO?

By Steve Goldthorpe

In my investigations and discussions concerning of the process of hydraulic fracturing (fracking), I have come up with some answers and more questions. I share my findings and thoughts; additional to those in EW63.



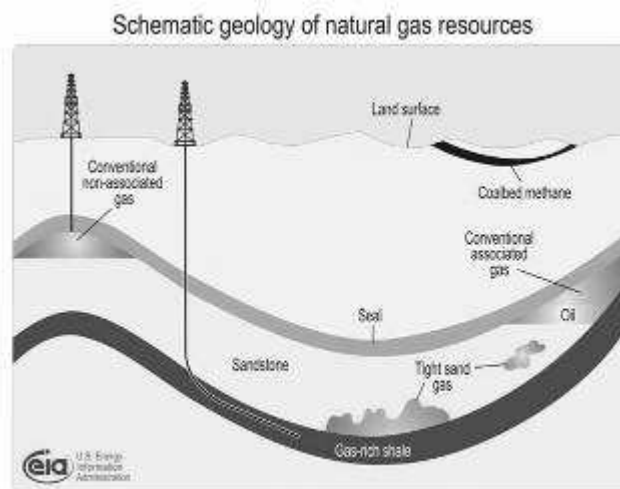
Where is fracking used?

The technique of hydraulic fracturing is used to increase the rate of production of hydrocarbons from wells; to make oil and/or gas production viable when it would otherwise be uneconomic. The technique is currently used in three distinctly different situations, as shown opposite.

Coal bed methane (CBM) is methane adsorbed onto coal, which is a cause of major hazards when coal is mined underground (as in the Pike River disaster). Techniques for degassing coal prior to mining for safety reasons have evolved more recently into the use of fracking to recover essentially pure methane as a fuel product (CBM) from coal seams; including those that are uneconomic to mine. Gassy coal seams are often within aquifers that are actual or potential sources of drinking water. CBM operations are therefore a common source of reports of water contamination due to fracking.

Tight sand formations containing conventional oil and gas accumulations in which the rate of production declines to be sub-economic are sometimes fracked. The use of fracking in such situations has been known for many decades and has evidently been used in some of the tight sand resources in Taranaki to boost oil and gas production. In former times, when light oils were plentiful a diesel-like hydrocarbon may have been used as the fracking fluid. That practice, which may have given rise to emissions of benzene etc. is now seldom used and fracking with hydrocarbon liquids is banned or voluntarily discontinued in some jurisdictions.

Gas and oil rich shale formations, which are the source rocks underlying conventional oil and gas fields, are the target for very extensive unconventional oil and gas resources. Due to the very deep locations of these shale resources, drilling vertical holes to access small areas of shale is generally uneconomic. However, the new technology of Measurement While Drilling (MWD) allows directional drilling along shale formations, which has opened them up to production of much more gas and some oil.



Why is fracking expanding so rapidly?

It is well known that the rate of discovery and development of new conventional oil and gas fields is inadequate to meet growing global demand - the phenomenon known as Peak Oil.

Accessing the source hydrocarbon shales underlying those conventional fields (into which oil and gas has historically migrated from the lower shale) potentially opens up vast additional hydrocarbon resources, mostly natural gas.

In the USA, the capability to access shale gas using directional drilling and fracking has transformed the energy scene. Instead of having a declining natural gas resource the US gas availability is now increasing, particularly for power generation, and the US is now on track to become a net exporter of gas. The other new technology of Liquefied Natural Gas (LNG) will enable the US to export natural gas; notably to Europe. The production of any hydrocarbon

liquids from shale also greatly benefits the US oil supply. Accordingly, the US oil and gas industry is strongly defensive of these new enabling technologies, and promotes them.

How does fracking fluid work?

Water at high pressure opens up fractures in the formation to let the hydrocarbons flow into the well. However, when the water is subsequently pumped out, the fracture would close up. So sand particles (a proppant) are added to the water to prop the fractures open. However, sand would settle out of the water as it is pumped into the system. So a gelling agent is added to the water to keep the sand in suspension whilst it is pumped in. However, the sand needs to separate from the gel when it is in the fractures. So a gel-breaker, such as an acid is added to the fracking fluid recipe. However, the timing of the gel-breaking needs to be delayed. So the gel breaker is encapsulated in soluble capsules or other time release chemical devices. Fracking fluid design is complex, evolving and proprietary.

A typical shale fracking job in a horizontal well a few kilometers long will require several million gallons of clean water to make up the fracking fluid, of which about one third is returned to the surface as flow-back fluid. That waste fluid will contain the residues of the gel and gel breaker system, possibly mixed with saline groundwater and hydrocarbons from the shale. It is very difficult to clean that water, particularly removal of dissolved salts, to provide clean water for making the precisely controlled fracking fluid.

The optimum fracking fluid recipe depends on the specific conditions and materials encountered down the hole and requires great expertise, knowledge and skill, making its formulation more of an art than a science. Furthermore, the fluid returning up the hole, or migrating underground, includes materials picked up from the formations fractured. Hence the answer to the question

“What is in the fracking fluid flow back?” is

“Well....It all depends”

What could go wrong?

The essential barrier between all the well operations and the surrounding formations, aquifers, and ultimately the atmosphere is the well casing, which comprises steel tubes set in cement. From the surface to the first solid rock a large diameter tube is cemented in as the foundation for the blowout preventer etc. Within that, an intermediate tube is cemented into place down to below the lowest potable aquifer. Within that, a final well casing is cemented in down to the end in the target formation (maybe - see www.Packersplus.com). The integrity of the complete well assembly is vital.

If the well integrity is incomplete or becomes compromised then there is potential for gases or liquids to leak into the surrounding formations and aquifers; and potentially to the surface.

The understanding by the on-site crew of what is actually happening underground is limited by the sparse data that can be gleaned from the operations. Where the models used to interpret data assume that leaks don't happen, then the results say that leaks don't happen. If you then don't look for small leaks you won't find them.

When operating a multi-million dollar drilling and fracking operation, time is critical. There is a strong incentive not to look for problems.

At the end of the day, understanding of the underground situation is essentially educated guesswork. It is impossible to send a man down the hole to investigate what is actually happening, or to excavate the site after the event.

Who could oversee fracking in NZ?

The decisions of the choice of materials and processes evolve during the drilling operations, as site-specific information is acquired. It is difficult to imagine how a fracking operation might be consented under the RMA when the information required for making an accurate assessment of environmental effects is simply unknown before the project starts.

Would an expert independent inspectorate, with the power to shut down an operation, be able to police well integrity over the life of a well?

THE CURRENT OF MARINE ENERGY ACTIVITY CONTINUES TO FLOW IN NZ

With the 6th Annual Conference organized by the Aotearoa Wave and Tidal Energy Association only days away, now is a good time to review the status of marine energy in New Zealand.



There are at least seven active projects in New Zealand at present and at least 3 Ph.D. research projects on various aspects of marine energy. Perhaps the best-known project is the **Crest Energy** project to install up to 200 tidal current turbines in the outer part of the Kaipara Harbour. Crest Energy was granted consents in 2011 for the project and the company has been working quietly since then. Todd Energy increased its stake in the project in 2011 and is now the majority owner of Crest Energy.

Wave Energy Technology – New Zealand (WET-NZ), a consortium research project between Industrial Research Limited and Power Projects Limited, tested its third device in the last quarter of 2011. This ½-scale 20 kW device is presently being refurbished and tested prior to deployment off the south coast of Wellington in June this year. WET-NZ is also advancing its project in Oregon. Permit applications for the proposed site have just been submitted and the Oregon device (also ½-scale) is due to be built and deployed by October this year.

Tangaroa Energy submitted a consent application to deploy a prototype wave device, based upon the Norwegian Langlee Wave Power design to Environment Southland last year. The chosen site is just east of Oban on Stewart Island.

Chatham Islands Marine Energy (CHIME) gained consent in 2010 to install a 220 kW coast-attached wave device at Point Durham on the SW coast of the main Chatham Island. CHIME has been negotiating with the local energy trust to integrate the proposed production with the existing generation (2 wind turbines and 3 diesel generators).

Parnell Community Leisure Management (PCLM) plans to deploy 2 or 3 small vertical axis turbines under an existing bridge in Auckland to provide power and heating for the well-known Parnell Baths.

These 5 projects are all recipients of funding from the Marine Energy Deployment Fund, which closed in October 2011. WET-NZ, Tangaroa Energy and PCLM all received funds in the 4th and final round of funding, whilst Crest Energy gave up its funding, as it was unable to keep to the original schedule.

Energy Pacifica continues to develop its tidal current project in Tory Channel. Lastly, **Neptune Power**, the first company to get consent to deploy a tidal current device, off the Wellington coast, continues to develop a turbine concept of its own design. No date has been given for when this device might be built and deployed.

A consortium of interested parties submitted a proposal to the Minister of Science and Innovation to establish an **NZ Marine Energy Testing Centre** off the Wellington coast. Suitably encouraged, the consortium has begun to prepare a detailed business plan for the centre.

Readers interested in hearing more of these projects can register to attend the AWATEA conference “Blue Energy: from International Vision to Reality”, which will be held at Te Papa in Wellington on 19-20 April. The final programme and a registration form are available on the AWATEA website, www.awatea.org.nz. This year the conference will coincide with the visit of a UK–NZ Marine Energy Mission, which is bringing people from 12 companies, which are active in marine energy in the UK. These include representatives from the European Marine Energy Centre, where at least 10 different wave and tidal current devices are under test, and Marine Current Turbines, whose 1.2 MW tidal turbine has now been operational for over 2 years.

*John Huckerby, CEO,
Aotearoa Wave And Tidal Energy Association*

GETTING BIOECONOMY INCLUDED WITHIN THE GOVERNMENT'S ECONOMIC GROWTH AGENDA

Brian Cox
Executive Officer,
Bioenergy Association
of New Zealand



New Zealand is now moving into the era of the bioeconomy.

Pre 19th century communities extensively used charcoal. The 19th century was the era of coal. The 20th century was the petroleum era. While living in an economy that has become dependent on petroleum based products for transport, plastic products and many other goods we need to look at how we can replace these goods as supplies of conventional oil and gas decline.

New Zealand is fortunate in having large amounts of biomass much of which is currently wasted. The biomass can be used to produce biofuels and bio chemicals for the production of bioproducts. These can all be replacements for petroleum based products.

In 2010 a NZ Bioenergy Strategy was developed by the forestry based industry organisations led by the Bioenergy Association of New Zealand (BANZ). The Strategy set out a vision that by 2040 25% of our consumer energy could come from bioenergy. This included 30% of our transport fuel coming from biofuels, but excluded export of bioenergy products, and the extraction of biochemicals. Analysis by BERL last year indicated that implementation of the Bioenergy Strategy could produce an economic value to New Zealand Inc. in excess of \$6billion.

The Bioenergy Strategy is based on the foundation provided by our current heat market where biomass is often used as the boiler fuel. Wood fuel is predominantly sourced from wood processing residues, while forest harvest residues are generally wasted.

Very little wood fuel currently comes from purpose grown woody or herbaceous plants. The market for wood fuel is evolving and in some areas wood fuel is actively traded – the higher quality biomass going to the production of wood pellets or engineered wood products such as MDF, while lower quality biomass is used as a boiler fuel.

The development for an efficient and wider wood fuel market is important as this biomass is also the feedstock that can be used for the production of transport biofuels, and beyond that for the extraction of biochemicals for the production of bioproducts.

In March the forestry sector released its 10 year Forestry and Wood Products Industry Strategic Action Plan, which endorses the goal for the extraction of additional revenue from forestry via the use of bioenergy and extraction of biochemicals.

On the demand side the Government makes extensive reference to bioenergy in the NZ Energy Strategies and the aviation sector has set a goal of using biojet fuel within a decade.

Internationally biotechnologies for the production of transport biofuels and the extraction of biochemicals are at the demonstration stage of technology development and within 5-10 years should be fully commercial.

To bring all the parts of this jigsaw together we now need to see greater discussion on the importance of moving to the bioeconomy as a replacement for coal and petroleum. We need to be encouraging Government to be including biofuels and bioproducts within their Economic Growth Agenda.

BANZ

DOUBTS OVER FUTURE INTERNATIONAL CLIMATE CHANGE NEGOTIATIONS

By John Blakeley

It was reported in the New Zealand Herald (12 January) that the “Doomsday clock” had been adjusted one minute closer to



midnight - because of increasing nuclear tensions, refusal to engage in global action on climate change, and a growing tendency to reject science when it comes to major world concerns.

Apart from the nuclear tensions, the other two reasons given are a fair assessment of the present situation in regard to international climate change negotiations.

Recent concerns are -

- In early December, the annual UN Climate Summit held in Durban, South Africa, effectively deferred until 2020, taking action to legally limit global greenhouse gas emissions.
- In mid-December, Canada announced that it was withdrawing from the Kyoto Protocol, becoming the first country to do so. By leaving now, Canada will avoid a finding of non-compliance at the end of the first commitment period in December 2012, thus avoiding pressure to either make good its commitment, or buy emissions credits worth billions of dollars.

No one country or group of countries can take effective action against climate change on their own. For example, the European Union bloc has now agreed at Durban to cut its man-made greenhouse gas emissions by at least 20 per cent by 2020. But this bloc now accounts for just 11 per cent of such emissions and these reductions are being negated by increased emissions from rapidly growing developing countries such as

China and India, both growing at a rate of more than 9% annually in emissions output.

In the lead-up to the Durban Conference, Canada, Japan and Russia all said that they would not accept any additional commitments outside the present Kyoto agreement.

But the biggest problem of all is the USA, historically the world’s largest emitter until recently overtaken by China, opting out of signing the Kyoto Protocol. This meant that the agreement has become lop-sided with the lion’s share of the greenhouse gas reduction commitments being made by the European Union countries, with less enthusiastic support from a number of other developed countries, including Australia and New Zealand.

Developing countries, including China and India, are not required by the Kyoto Protocol to make any legally binding commitment to reduce greenhouse gas emissions during the period ending in December 2012. These countries are now responsible for 58 percent of global greenhouse gas emissions.

And the USA now appears to have its hands tied by domestic opposition to any legally binding international action on climate change, with the whole of the Republican Party being opposed to this.

The Durban Conference almost reached deadlock until a last-minute face saving compromise was found.

The outcome was an agreement that a new legal treaty would be drawn up to replace the Kyoto Protocol. The European Union countries then managed to put together a coalition with developing countries. Many of these countries fear global warming’s impending effects.

It was agreed that work on this new treaty will begin “with urgency” in the first half of 2012, and it will be signed no later than 2015 and come into effect no later than 2020.

In return for support by the developing countries on initiating this new treaty, the European Union agreed to an extension of the existing Kyoto Protocol with effect from January 2013 but only applying to countries signing the original Kyoto agreement (including Australia and New Zealand). The USA plus China, India and other developing countries are therefore not subject to any legally binding agreement to restrict greenhouse gas emissions until 2020, at the earliest.

The “big three” of the USA, China and India are now collectively responsible for 46 per cent of the world’s man-made greenhouse gas emissions.

Unless penalty provisions are inserted in this new treaty, which China and India would almost

certainly not allow, it is difficult to imagine it having any greater force than the existing Kyoto Protocol, which has recently allowed Canada to withdraw without any penalty.

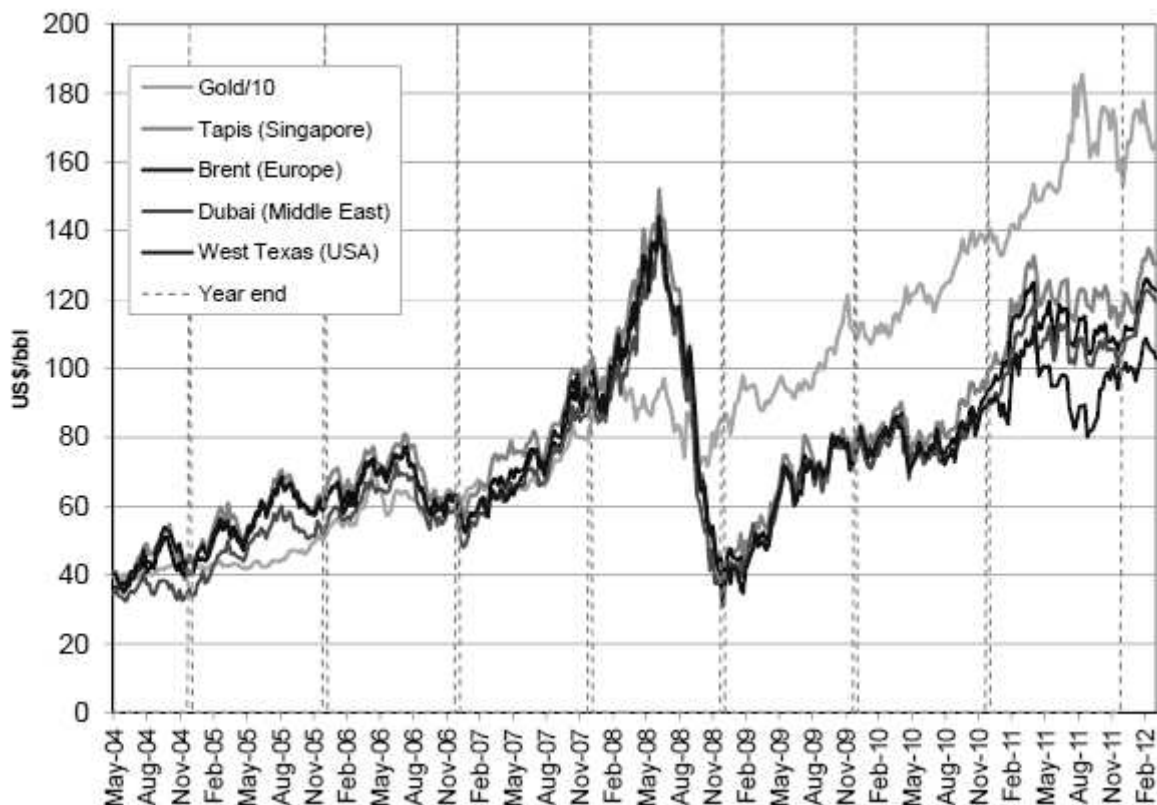
The chance of a binding international agreement being reached to take effect by 2020 appears to be slim.

Therefore further action to combat climate change may have to be taken by individual countries or groups of countries, rather than deferring decisions until international agreement can be reached.

John Blakely is a Programme Leader in the Department of Civil Engineering at Unitec Institute of Technology.

Neil’s Oil Price Chart

This chart compiled by Neil Mander, tracks a basket of oil prices in comparison with the gold price. Oil prices are from the NZ Herald for Brent (UK North Sea), Dubai (Middle East), Tapis (Singapore) and West Texas (USA). The year-on-year rise in average oil prices seems to have abated somewhat from over 30% per year over the last three years to about 15% per annum over the last quarter.



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 and views as it happens. The discussion by the group of sustainable energy “experts” who have joined the service offers an interesting perspective.

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For climate change news, join the Climate Defence Network email news group: climatedefence-subscribe@yahoogroups.com

EnergyWatch

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Publication is now bi-monthly, and EnergyWatch is posted on the SEF website (www.energywatch.org.nz) as a PDF file, two months after distribution to SEF members.

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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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