EnergyWatch

The Journal of the Sustainable Energy Forum Inc.

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

Published by: - The Sustainable Energy Forum Incorporated, PO Box 11-152, Wellington 6142
Email: -info@sef.org.nz Web: - www.sef.org.nz; and www.energywatch.org.nz

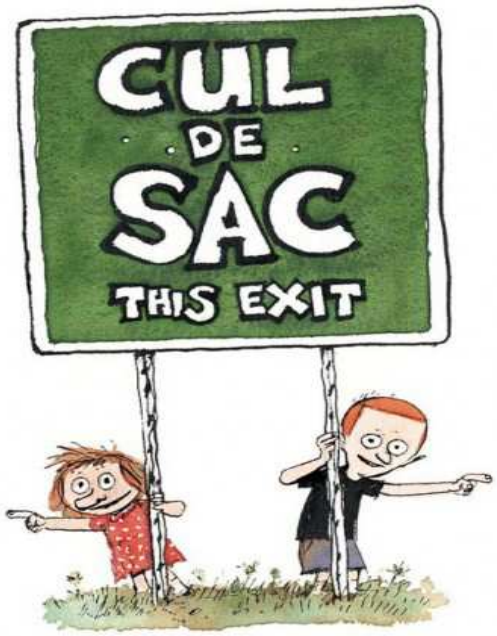
The Sustainable Energy Forum Inc. was registered as a charitable entity under the Charities Act 2005 on 30th June 2008. Its registration number is CC36438.

Issue 68, March 2012

Editor: Steve Goldthorpe
ISSN 1173-5449 (print) ISSN 1179-4054 (online)

EDITORIAL

CROSS ROADS OR CUL-DE-SAC?



Last month The National Energy Research Institute (NERI) organised a national Energy Conference in Te Papa, Wellington with the title ***Energy at the Cross Roads***. Over two days a wide array of speakers described and discussed numerous ways in which the energy policy direction of New Zealand could and should move in a more sustainable direction.

However, the Government departments' perspectives, the views of the energy industry players and the rationale for the business-as-usual pathway on which NZ is being taken, were conspicuous by their absence from the debate

The keynote address from Dr Janet Stephenson painted a clear picture of the dire state of our energy culture in New Zealand and explored the multi-faceted actions that must be taken to make the necessary fundamental changes to that culture. Regrettably, she was preaching to the converted. I commend her paper at - http://www.neri.org.nz/assets/Conference-2013-Keynote-address-from-JS.pdf.

There seems to be a growing gulf between the supply-focussed energy controllers marching down the road towards the goal of an energy cornucopia for our little South Pacific islands and the naysayers seeking a better way to meet the needs of future generations. The communication across that gulf seems to have deteriorated from conversation to rhetoric.

Putting to one side for a moment the question of Climate Change consequences, recent events raise a question mark over the strategy of resource exploitation with advanced technologies as a route to future energy security and prosperity for New Zealand. Petrobras' investigation of deep oil prospects off the East Coast has resulted in them giving up their exploration permits. The plans for TAG oil with the Apache Corporation to explore for oil and gas in the east of North Island have shifted into a lower gear, with no immediate plans for fracking, with the withdrawal of Apache from the joint venture. And the Solid Energy debacle has scuppered the vision of making NZ self sufficient in diesel from lignite.

Rather than NZ's energy policy direction being "at the crossroads" maybe it is now "up a cul-de-sac".

This issue of Energy Watch is long overdue, for which I apologise to regular readers. There has been a good deal of flux on the energy scene recently and also my consultancy workload has increased. However, I hope that this issue provides a useful snapshot of where we are at.

This issue starts with a reflective piece on my visit last year to the birthplace of the Kyoto Protocol 20 years later. After the great expectations when the KP was created, it is disappointing to see carbon capture and storage (CCS) still largely on the drawing board and the enabling pricing of carbon being ineffective.

From my personal background of three generations working for the coal industry it is a sad to see the trouble that Solid Energy has got itself into. I struggle to see how it can be so hard to make money from digging up the high quality coal resource on the West Coast and shipping it to Asian customers needing its exceptional properties. This issue of EW includes a commentary by Forest and Bird presenting the perspective of one of the anti-coal groups.

Another cause for celebration by the naysayers is the decision by Petrobras to walk away from their oil prospecting activities in the Raukumara Basin. According to the Dominion Post the reason was simply that the first survey can did not hold enough promise for them.

As conventional oil becomes harder to obtain. Ever more adventurous ideas are explored. Like, wouldn't it be amazing if petrol could be made from air and water? Such a concept is being seriously promoted by Air Fuel Synthesis in the UK. Unfortunately, some applied thermodynamics soon finds its flaws.

Stepping outside the NZ context to look at energy issues elsewhere, a European Energy Review article is included on concepts for long distance energy transport as gas via the South Stream pipeline and as electricity from the Desertec concept. It is interesting to consider that yet again, the focus is exclusively on the supply side of the energy equation.

One of the issues that have kept me busy is the question of fracking for shale gas and the Greenhouse consequences of that. A detailed report that I have written on that topic is available via the IEAGHG website. A summary is included in thus issue of EW.

My findings are broadly in line with those of the Parliamentary Commissioner for the Environment (PCE) in her interim fracking report released at the end of last year. Fracking is an enabling technology which can potentially be used carefully and responsibly with minimal adverse effects, but extensive monitoring and enforceable regulation needs to be developed to assist with giving the industry a social licence to operate. I look forward to seeing the PCE's final recommendations later this year.

In the context of the consequences of the rapid uptake of the twin enabling technologies of directional drilling and fracking in the USA, a symptom of exploitation overtaking the supporting infrastructure is the flaring of unsalable gas which becomes a nuisance instead of a valuable energy resource.

In a postscript there is a frank view of the NZ energy scene, and as usual EW wraps up with the an updated report of oil price movements

Steve Goldthorpe, Editor

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Kyoto – 20 years on

Conference impressions by Steve Goldthorpe

At the end of last year I attended the 11th International Conference of Greenhouse Gas Control Technologies held at the imposing[1] conference centre in Kyoto, where the name of that historic Japanese city was forever linked with the idea of taking action on Climate Change 20 years ago.

The theme of the conference was "CCS: Ready to Move Forward". It was a huge conference with over 1200 delegates, 11 keynote speeches, over 300 oral presentations and over 600 poster presentations. Anyone who is involved in the world of Carbon Capture and Storage (the CCS community) was represented there.

The claim that CCS technology is ready for use was demonstrated indisputably via numerous projects around the world, supported by a wealth of research. The various steps of the complex CCS processes are being refined, and it was clear that no stone has been left unturned in looking for technological or environmental show-stoppers and, whilst some lines of investigation have hit the wall, there are many technically viable CCS options in the store ready to be taken down from the shelf and utilized.

Put simply, CCS, (formerly known as Carbon Sequestration) involves capturing CO_2 from a fossil fuel power station or industrial scale plant and injecting it underground. There were endless discussions of the relative merits of the many different ways of achieving that purpose.

[1] The huge main conference hall with its striking futuristic hexagonal architecture was evidently used a film set for the Klingon space ship in the Star Trek movies.

However, an issue that was conspicuous for me by its absence from the conference was any discussion of methane emissions as a significant greenhouse gas. In the context of a conference on Greenhouse Gas Control Technologies, this omission of the second most important Greenhouse gas was curious. It seems that over the bi-annual conference series the focus has narrowed down to essentially just CCS.

The cost of Carbon Capture and Storage is concentrated in the Capture component, but the main research frontiers are focused on the Storage component. Injecting CO_2 into deep geological formations is established technology, as is widely practiced by the oil industry for Enhanced Oil Recovery (EOR). Many conference papers explored aspects of extending that expertise and learning to the bulk permanent storage of CO_2 deep underground. In particular the potential for leakage of CO_2 from geological storage was addressed in many papers. The concern with CO_2 leakage is not, as might be expected, a safety issue, but rather that any loss of containment and dispersing of the stored CO_2, would defeat the primary purpose of CCS, which is to avoid CO_2 discharges into the atmosphere.

A most interesting section of the conference addressed the question of public perception of CCS. Surveys and studies identified a deep and sometimes irrational antagonism in the community towards CCS. In particular, in the densely populated parts of Western Europe it is becoming almost impossible to consider projects involving on-shore deep geological storage of CO_2 due to public opposition. The CCS community is perplexed by such antagonism and is struggling to find where the boundary lies between education and propaganda in order to try to bring the global community on-board with what they believe CCS has to offer the world.

Compared with the first international conference on greenhouse gas control technologies, at which I presented a paper on assessment of CCS schemes in Amsterdam 20 years earlier, the

presence of representatives of "big oil" on the current conference circuit was remarkable. In addition to having substantial practical expertise to contribute, the oil industry creates a demand for CO_2 for enhanced oil recovery and hence a vested interest in developing the elements of the CCS process technology, with scant regard for the bottom line objective of climate protection.

This tension was highlighted for me by a question that followed the presentation by a young Chinese researcher of the results of her study of point sources of CO_2 in Southern China and potential geologic storage locations and hence the arrangement of a CO_2 pipeline network. The question came with an American voice asking if she had also considered the locations of oil fields in the region that might require CO_2 for EOR and thus provide a revenue stream to help finance real projects. The short term thinking behind this question was symptomatic of the trend emanating from the USA to translate the CCS concept into CCUS; i.e. Carbon Capture, Utilisation and Storage to appease those who consider captured CO_2 as a resource to be exploited rather than as waste to be disposed of safely as a cost of doing business.

The location of the 12th International Conference on Greenhouse Gas control technologies in 2014 is going to be in Austin, Texas. Doubtless the link between CCS and EOR is destined to become even stronger. At present oil companies pay about US$40 for a tonne for CO_2 for EOR, giving a typical yield in the region of 2.5 barrels. At that, the net carbon going into the ground is about equal to the net carbon coming out of the ground, so the produced oil could be argued to be carbon neutral. The resulting depleted wells would have the capacity to accept additional tonnages of CO_2 without corresponding oil production thus providing net storage, but there would need to be funding to finance utilization of that proven storage capacity. It will be interesting to see how such arguments evolve at the next GHGT conference hosted in the home of the "Big Oil" community.

I observed a spectrum of philosophical approaches to the topic of CCS amongst the conference delegates. At one end was this pragmatic approach, which focused on activities that provide an economic return in today's situation. The other end of the spectrum was epitomized by presentations identifying the critical role of CCS in achieving limitation of global temperature rise to no more the 2^oC. These assessments, based largely on IPCC data, identified the role of CCS as an important contributor alongside fuel substitution, renewable energy, energy efficiency and demand reduction in achieving that climate objective.

Notwithstanding the wider debate over whether CCS is "good" or "bad", there was an inevitable acceptance by the conference that the widespread application of CCS won't happen until the economic driver gets up to US$50-100 per tonne of CO_2. With internationally traded carbon prices currently an order of magnitude less than that level, the principal reason why large scale CCS projects are not progressing is obvious.

There was talk at the conference of the "Valley of Death" for the CCS community arising from this economic reality. However, there was also a sense of optimism that the political tide might be turning towards recognition of the essential contribution that CCS can make towards long term CO_2 emission control. In particular, the demise of the nuclear industry following the Fukushima disaster led to recognition of the long term role for fossil fuels with CCS to meet global energy demands, alongside renewables.

It was salutary to compare the present day status of CCS with the vision and optimism 20 years earlier at the first International conference where there was the real expectation was that CCS would have become routine long before now. It was particularly poignant to consider that situation in the very place where the optimism of the birth of the Kyoto Protocol had been celebrated 20 years earlier.

Steve Goldthorpe

Another day, another nail (in coal's coffin)

By Jay Harkness, Forest & Bird

Until recently, Solid Energy appeared to be the one of the prize jewels in the portfolio of state assets that the Government intended to sell. Now the company seems set to become a huge, slowly-dying albatross around taxpayer's necks.

Here at Forest & Bird we don't like the idea of dying albatross, metaphoric or otherwise. If Solid Energy were to go under, more than a thousand people would lose their jobs; more jobs again would be lost amongst those companies that contract to Solid Energy.

The Government is blaming Solid Energy's investment in 'alternative fuels' as being a key reason why the company is failing – hardly the whole story.

In this context, the term 'alternative fuels' is misleading. Few of these 'alternatives' offered any kind of solution to the fact that all fossil-fuels contribute to climate change.

One of these projects involved setting fire to underground coal seams in the Waikato, and then trying to collect the gas that leaked from the mini-hell created below. *(See articles on Undergound Coal Gasification in EW 64 and 57)*

Solid Energy's other foray into 'alternative fuels' was a leap back to the 1940s, when the Germans were turning brown coal (the lowest quality coal there is, if that's not an oxymoron) into diesel. Solid Energy also planned to create fertiliser, and briquettes**, out of its Southland lignite. It intended to spend five billion doing so.

The company did invest in turning wood waste into fuel for domestic wood burners. And it did invest in bio fuels. But when the National Government scuppered the law that would have one day required all petrol and diesel to contain a small percentage of bio-fuel, the bottom fell out of that market.

The global recognition of CO_2 as being a dangerous pollutant is not why Solid Energy is in trouble – though it would have only been a matter of time. The company is failing for several reasons, including the high New Zealand dollar, and the worldwide slump in demand for coal, as triggered by the GFC. But any company that relies on selling fossil fuels has no long-term future.

It has been increasingly looking as though Bathurst Resources' plans to dig an open-cast coking coal mine on the pristine, publically-owned Denniston Plateau, also has no future (the analysis Forest & Bird commissioned some time ago showed definitively that that was the case). Solid Energy has scaled back operations at its nearby Stockton coking coal mine, because of a fall in demand (coking coal is used to make steel), and that mine is already well-established.

Now there is yet another nail in coal's coffin – and hopefully that of Bathurst's aspirations. New Zealand Steel has just signed a contract with a company called Carbonscape, which will provide the company's Glenbrook steel mill with trial quantities of bio-char, a carbon-neutral alternative to coking coal. Carbonscape has cleverly developing the technology to essentially microwave forestry waste, effectively speeding up the geological clock by millions of years, so avoiding the need to dig up the likes of unspoilt conservation land for a product that will release CO_2 when burnt. The process even uses waste heat to generate the electricity needed to power it. Carbonscape says that it's quite feasible to scale up the production process from pilot scale to industrial quantities …it just now needs the capital to do that.

Jay Harkness

*** A lignite briquetting plant is being built at Mataura (See EW 64) to get a run on the board, but it is now having technical difficulties. Ed*

Petrobras pulls out of NZ

Dominion Post 4th Dec 2012.

Brazilian oil giant Petrobras has pulled out of NZ, but the Government is hoping another company will pick up from where it left off. The Brazilian state-run energy company has handed back its prospecting licences, Prime Minister John Key confirmed this morning.

The world's third-biggest oil company with sales of close to $150 billion a year, Petrobras had planned to invest $300m over the next three years in exploration and production.

The decision was seen by Greenpeace as a *"victory for Kiwis opposed to risky deep sea drilling"*, but Minister Christopher Finlayson was hopeful another company will take up the prospect. *"Other companies who are much more involved in frontier exploration may pick up those permits and we hope they do,"* he said. *"We know that there are opportunities to explore out there and we've got companies interested."*

Petrobras, however, is not. *"I've met with them and they've said pretty clearly that it's technical reasons and based on prospectivity, meaning that they didn't find enough to keep them sort of on the string, so they want to regroup in Brazil,"* Finlayson said.

Petrobras had carried out 2D seismic surveys before deciding to discontinue its exploration in the area. Before drilling, 3D and then 4D seismic surveying would be needed.

Finlayson said. *"It's not until you can drill an exploration well that you know for sure that oil is down there."* He said Petrobras' decision was not influenced by opposition.

A campaign by East Cape iwi Te Whanau a Apanui, Greenpeace and other groups against Petrobras' exploration of the Raukumara Basin started early last year. "The likelihood of oil from a deep sea blowout washing onto the beautiful beaches and coastline of the East Cape and Bay of Plenty just went down by 100 per cent," says Greenpeace Climate Campaigner Simon Boxer of the Petrobras decision.

Petrobras is struggling with rising inflation in Brazil and has to import gasoline to meet demand because it lacks refinery capacity. It is reported to be considering selling off assets in Africa and the US and recently withdrew from a huge ethanol pipeline project.

The news is a blow to the Government's aim to grow the oil and gas sector. In August, Texan oil company Anadarko announced delays to their plans to deep-sea drill off the coast until summer 2013.

The Green Party also welcomed Petrobras' decision to give up plans to carry out what the Greens called "risky" deep sea oil drilling in NZ. The Green Party said it shows the Government's plans for deep sea drilling are collapsing.

"The Government's deep sea drilling plans have so far failed, and it's just as well. Petroleum development, including deep sea drilling, is the wrong focus for our economy," said Green Party energy spokesperson Gareth Hughes.

Earlier this year, the joint Greenpeace-iwi bid to quash the East Coast exploration permit was thrown out by the High Court.

Finance minister Bill English shrugged off the loss – saying *"There are others who are interested. The Government has invested a bit of time and money making sure that oil and gas exploration is attractive....The companies are always making their decisions in terms of quite big shifts in world energy markets - with the extensive shale gas finds in the US for instance."*

Bill English admitted New Zealand's oil and gas reserves are a challenge to get to. He said *"It's not as easy as some other resources around the world, but their decisions will be affected as much by world energy markets as by anything about New Zealand."* *Abridged*

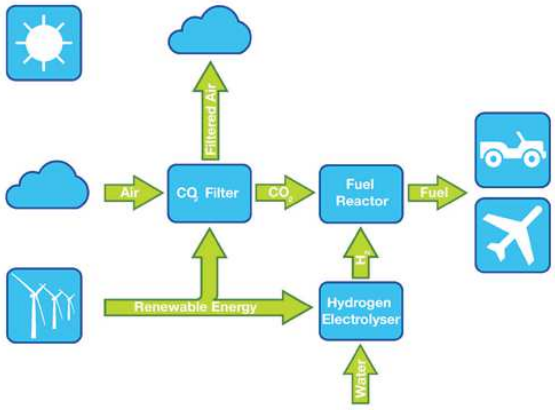
All that glitters is not gold

A commentary on Air Fuel Synthesis

By Steve Goldthorpe

Background: IMechE Press release: UK engineers create petrol from air (http://www.imeche.org/news/archives/12-10-15/UK_engineers_create_petrol_from_air.aspx**)**

The proponents of the Air Fuel Synthesis process claim to have developed and integrated all the steps required to produce petrol or jet fuel from CO_2 separated from air and electrolytic hydrogen. A proof of concept plant has been built and has produced 5 litres of petrol.



Air Fuel Synthesis Process

The AFS process, which provides carbon-neutral sustainable fuel alternatives to fossil fuels, is driven by renewable energy. Thus the overall process of carbon dioxide capture, fuel production and fuel combustion is carbon-neutral and is already a commercially-viable alternative fuel source for specialist fuel markets such as motorsports. (*www.airfuelsynthesis.com*)

BEST CASE ENERGY ANALYSIS

Fuel Reactor

$$CO_2 + 3.1\ H_2 \rightarrow CH_{2.2} + 2H_2O$$

(i.e. 0 kJ/gmol CO_2 + 880 kJ H_2 → 682 kJ $CH_{2.2}$ + 0 kJ H_2O + 198 kJ loss per gmol CO_2)

The conversion of hydrogen energy into liquid fuel energy in the fuel reactor has a theoretical energy conversion efficiency of 77% (682/880). Taking real process efficiency into account the practical energy yield would likely be no greater than 70%.

CO_2 Filter

Air is blown into a tower containing a mist of sodium hydroxide which reacts with the carbon dioxide in the air, forming sodium carbonate. Electricity is then passed through the sodium carbonate to release the CO_2.
(*www.airfuelsynthesis.com*)

$$Na_2CO_3 + H_2O + 105\ kJ/gmole \rightarrow 2NaOH + CO_2$$

(Based on free energies of formation)

The electrolytic decomposition of sodium carbonate is novel. The auxiliary power requirement is likely to be at least 10% of theoretical. So the minimum energy requirement of the "CO_2 filter" > 116 kJ/gmol of CO_2.

Hydrogen Electrolyser

The energy efficiency of electricity to hydrogen in a commercial electrolyser is typically 70%. So the overall energy efficiency of conversion of electricity to petrol is:-

(880*<0.7) / (880/0.7 + >116) = <45%.
(Fuel reactor electrolyser CO_2 filter)

An internal combustion engine has a typical energy efficiency of about 20% and an electric motor has a typical energy conversion efficiency of about 90%.

Efficiency comparison on an electricity to wheel basis:- (<45% * 20%) / 90% = <10%

Therefore a vehicle fuelled with petrol from the Air Fuel Synthesis process would consume at least ten times more renewable electricity than an equivalent electric vehicle.

Without a clear technical benefit and rationale for the process, the economics are irrelevant.

A tale of two energy visions

European Energy Review

One is about Gazprom's great new pipeline project South Stream. The other about the great Desertec project that is aimed at bringing solar power from North Africa to Europe.

South Stream is of course Moscow's prestige-ridden undertaking to retain its dominant position on the (Eastern) European gas market by bypassing the pipelines of Ukraine and squeezing out potential alternative supplies from Azerbaijan and elsewhere. After many years of technical preparations and extensive gas diplomacy, Gazprom has now made a positive final investment decision. On 7 December, South Stream was officially launched at the Black Sea resort town of Anapa in Russia.

A (strategic) victory for Moscow? Yes, vis-a-vis Kiev and "Brussels" (in the battle for the "Southern Corridor"), it certainly is. But does South Stream also make sense from a wider economic, gas market perspective? According to Matthew Hulbert, energy security expert and EER's lead analyst, the answer to that question is a resounding No! He argues that South Stream tells a tale of two Gazproms: Gazprom as a regional winner – and global loser.

In Matthew's view, South Stream is an attempt by Moscow to hold on to the "old" European market structure and long-term oil-indexed contracts. But it is an attempt that is bound to fail. Gazprom CEO Alexei Miller and Russian President Vladimir Putin, the two men to whom South Stream will be an enduring legacy, are blind to the way the global gas market is going, writes Matthew. The real action in the global gas market, he says, is in LNG, in unconventional gas and in Asia – all areas where Gazprom is conspicuously failing.

The tale of Desertec is a very different one indeed. Desertec is not only meant as a blueprint to provide Europe with renewable energy from North African deserts – as is often thought – but is also intended to help develop that region's indigenous renewable energy sources. Surely an appealing idea – but how realistic is it?

Well, interestingly, enthusiasm for renewable energy in the Middle East and North Africa (MENA) is growing. More than that: many MENA countries are wholeheartedly embracing the pursuit of solar (and wind) energy, including Morocco, Saudi Arabia and Algeria. Indeed, Algeria recently took out a fascinating full-page ad in the Financial Times (on 22 November) which proclaimed in a large headline that Algeria is "CREATING THE PATH BEYOND OIL" and presenting the country's "AMBITIOUS NEW RENEWABLE ENERGY PROGRAM".

Surely an upbeat message for Desertec. But rather surprisingly, the big bottlenecks for Desertec and the accompanying Desertec Industrial Initiative (DII) now lie in Europe rather than in North Africa. A report from DII's annual conference in Berlin, notes that two important backers of Desertec (Bosch and Siemens) quit, Spain does not want to invest in reinforcing its electricity grids, and generally in the EU support for renewable energy is wavering. As one shareholder of DII said: "What worries me is not the political situation in MENA, but rather that in Europe."

No "final investment decision" yet for Desertec, then, but the project is still moving ahead.

Although South Stream and Desertec are two totally different schemes, they do have one thing in common. They are both grand visions to develop a major source of external energy supplies for Europe. Whether those two visions are compatible or to what extent they compete with each other – that is a question for some other time. *Karel Beckman*

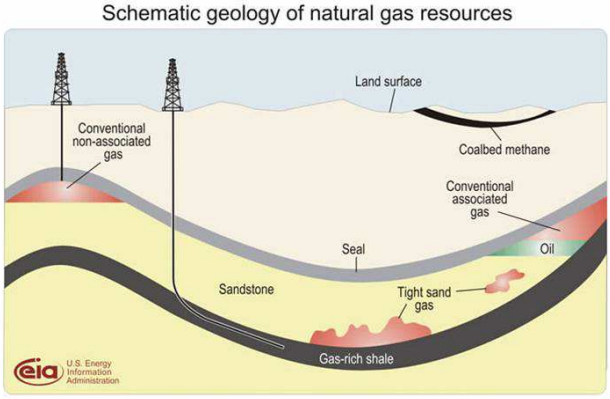
Overseas energy issues can provide a useful perspective for considering our local issues. *Editor*

Greenhouse Gas Emissions from Shale Gas

From IEAGHG newsletter

Shale gas is the common term given to methane gas that is extracted from shale formations, which are a geological source of the methane. It is a type of unconventional gas (as opposed to conventional natural gas fields, which are accumulations of methane released from the source formations and trapped elsewhere and historically more readily accessible). Developments in directional drilling and rock-fracturing with fluids have made shale gas economically viable, and extraction is growing rapidly in several locations around the world, especially the USA. Other countries are developing or investigating their shale gas resource potential. IEAGHG has recently undertaken an analytical review of the greenhouse gas emissions from shale gas production.

Schematic geology of natural gas resources



This review has identified that there is a dearth of representative public domain data on the natural gas industry in general and on the shale gas industry in particular, with conflicting claims of appropriate assumptions. To assist with understanding the issues, a model has been developed for carrying out Full Fuel Cycle (FFC) analyses and a methodology has been developed to accommodate uncertainty. This model has been populated with default assumptions and illustrative data.

This issue is set against an on-going background of disagreement between environmentalists, academics and the shale gas industry, particularly in the USA. Some disagreement is focused on incidents of adverse impacts on groundwater quality and community amenity attributed to hydraulic fracturing (fracking). There are some jurisdictions, in the USA and elsewhere, that have imposed a moratorium on the use of that enabling technology pending a better general understanding of the associated environmental issues.

Although fracking for shale gas production is the focus of this study, the wider issues involved in comparing the FFC emissions from coal and gas fired power generation apply also to conventional gas production. The recent upsurge in the global use of natural gas, particularly in the USA, has given rise to increases in Liquefied Natural Gas (LNG) transportation of gas, the application of carbon capture and storage (CCS) to gas fired power generation and concerns about the global warming potential of methane. These wider issues are considered in this report.

The only significant difference identified between shale gas production and conventional gas production from a GHG perspective arises from the additional emissions associated with the fracking process at the well-site. Those additional emissions comprise methane as natural gas losses from the returning fracking fluid and CO_2 from the additional use of diesel in drilling and pumping equipment with lesser effects attributable to the liquid unloading process.

The migration underground of gas from wells that have a loss of well integrity, resulting in methane discharges to air, is difficult to quantify and is seldom monitored. A small contribution due to migration of gas from both conventional gas wells and shale gas wells is included in the default assumptions. However, emission of migrating gas at a higher rate that would not present a local environmental or safety issue could be a major contribution to the greenhouse gas footprint. The possible contribution from

gas migration is the largest component of the uncertainty assessments that have been modelled.

The other precombustion GHG emissions associated with natural gas supply to power stations; i.e. processing losses and transmission losses, as well as the combustion emissions, are independent of the technology used to produce the gas at the well site or the geological origins of the gas.

The IEA World Energy Outlook states *"We estimate that shale gas produced to proper standards of environmental responsibility has slightly higher "well to burner" emissions than conventional gas."* The analysis in this study quantifies that elevation in overall GHG emissions attributable to fracked shale gas as 2.7%.

The 1:2 GHG advantage of gas over coal for base load power generation is partly offset when precombustion GHG emissions are taken into account. When the gas is sourced from shale with fracking, that GHG advantage of gas over coal would be reduced to 1:1.77, based on the default assumptions detailed in the report.

There is major variability and uncertainty in the assessment of precombustion emissions. Under a worst case combination of circumstances and assumptions, including a global warming potential (GWP) over 20 years, the GHG advantage of gas over coal for power generation might be completely lost. One example is the use of gas from the Natuna gas field, which contains 71% CO_2. Another example would involve the use of a high GWP factor combined with transport of gas as LNG and about 4% of production lost as fugitive emissions at a shale gas well site.

Precombustion emissions also adversely impact the benefit of adding CCS to power plants, because precombustion emissions cannot be captured. In the case of a gas fired based load power station, the installation of 90% CCS would yield an overall reduction in FFC GHG emissions of about 70%.

It is hoped that as shale gas continues to be increasingly developed, this review will contribute to the understanding of the associated greenhouse gas emissions, so the consequences can be quantified and ways to reduce emissions further can be developed.

This Technical Review report was prepared by Steve Goldthorpe and is available via on the IEAGHG website* as 'Shale Gas Greenhouse Gas Review', IEAGHG Report 2013/TR1. Steve Goldthorpe and edited by Tim Dixon

* WWW.IEAGHG.org. Available on request to New Zealanders and generally available on line after 6 months.

The PCE's Fracking Report

The long-awaited result of the investigation by the Parliamentary Commissioner for the Environment (PCE) into hydraulic fracturing (fracking) was published last November as an interim report. Whilst it did not recommend a moratorium on the use of the technology, as had been hoped for by some, neither did it give fracking a clean bill of health.

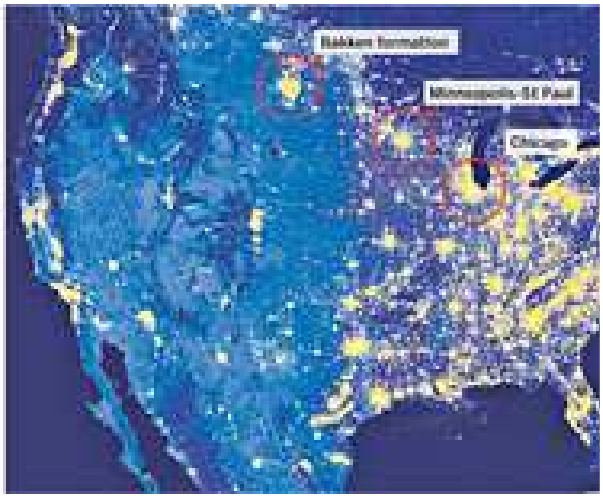
Concerns about creating tiny earthquakes in a tectonically active region were considered minor in the absence of existing stress in an active fault. Fracking or waste water injection could relieve the stress in a fault but significant surface effects are considered highly unlikely.

Contamination of groundwater with chemicals or materials mobilised underground is considered to be a matter of concern best dealt with by best practice guidelines, monitoring and regulation.

The PCE concluded *"When fracking is done well the chance and severity of environmental damage are small compared to some other economic activities. On the other hand, when it is done badly the risks are higher."* Thus the PCE sees good management and enforceable regulation as of paramount importance in creating a social licence to operate. Her final report is due by the end of this year.

Editor

Flares take shine off shale boom



America's oil boom is now so big it is visible from space. In night-time satellite images North Dakota's Bakken shale, the oilfield that has transformed US production in the past five years, shines almost as brightly as Chicago. The lights are flare stacks: towers burning off natural gas from oil wells 24 hours a day.

Modern production techniques have unlocked abundant supplies of gas, driving US prices down to just $3.40/MMBtu compared to a peak in 2008 of over $13. That means gas found in oilfields is often seen as a nuisance to be disposed of rather than as a useful resource. *FT*

Postscript

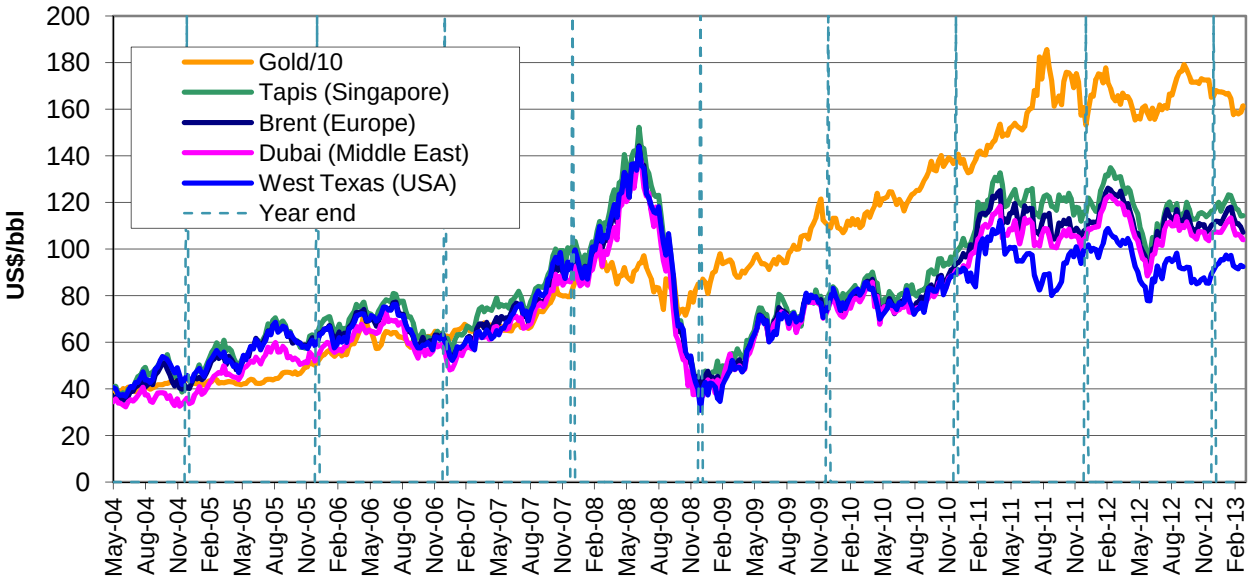
From his perspective working as an energy advisor in Turkey, Frank sent the following feedback about the otherworldly nature of the Government and energy industry focus in NZ.

"It's like they live in a smug self- contained parallel universe where there is no need for any real NZ action on climate change mitigation. If they ignore oil still being at (only) around US$110/bbl with a depressed developed world economy (the oil price would be higher if the developed world economy ever improved, but it can't improve even at a "low" UD$110 /bbl) then they can build more roads on the national credit card of temporary (permanent) deficit spending and asset sales and continue to wait for the current cargo cult of offshore-deepwater-oil-yet-to-be-discovered to provide the oil for the cars for the next 50 years that the new roads will be used for. Reality will have something to say about this, and reality always wins in the long run."

Frank Pool

Neil's Oil Price Chart

This chart compiled by Neil Mander, tracks a basket of oil prices in comparison with the gold price. The last two years data show that a pseudo-stable non-US oil price of $110/bbl has become the new normal.



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.

Non-members are invited to join the SEFnews email news service for a trial. To do this send a blank email to: <SEFnews-subscribe@yahoogroups.com>. To help us stop spammers, non-members need to supply a name and contact details, and a brief statement of their interest and/or involvement in sustainable energy issues, before their trial is approved.

As with all Yahoo groups, SEFnews emails can be received "individually" (as they are sent) or as a "daily digest" (grouped into one email per day). If you have a Yahoo ID you can also switch emails on and off, or read the news on the web – a handy option for travelling Kiwis. YahooGroups saves all of our text emails for later reference, and there is a search function so that you can review the thousands already stored over the last 6 years.

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.

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.

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.

SEF membership

Memberships are for twelve months and include four copies of EnergyWatch. Membership rates are:

Low income/student	$30
Individual	$50
Overseas	$60
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