

ESR-SEF Conference: Responding to Oil Depletion and Climate Change 26 July 2008

The conference, which was the ESR's 20th annual conference, was organised jointly by Engineers for Social Responsibility and the Sustainable Energy Forum. It was hosted by the School of the Built Environment, Unitec, and held at Oakridge House, Unitec, Mt Albert, Auckland.

The aim of the conference was to address the likely consequences of depleting resources of oil and climate change, and how society might adapt to a very different future.

This report lists some of the key messages in each presentation. It then outlines the main findings of the conference at the end of the day.

Session 1

Following a "Whakawatea" welcome by Gerry Coates, Professor Thomas Neitzert, ESR President, gave the opening address. He pointed out that Denmark, with a similar population, is producing 20% of its electricity from wind power. GDP is rising, but energy use is not. Why not us? Leadership is missing in NZ at present on these issues, and we are not making enough use of the technologies currently available.

Simon Tegg *Setting the Scene – Oil Consumption and Depletion*

Simon is studying towards a Masters in Environmental Sciences at Victoria University. He has taken a keen interest in energy and oil depletion issues for a number of years.

- World liquid fuel production is currently approximately 82M million barrels per day (crude oil, natural gas liquids plus other liquids).
- New oil reserve discoveries peaked in 1960-70 decade and have fallen each decade since.
- The various forecasts of future production vary, but have been reducing in recent years. Total production may be at or near peak. It may plateau for a few years or rise slightly then fall.
- Simon has combined some forecasts he has some confidence in to produce a future range. This shows potential reduction compared with 2008 of 1-10% in 2014 and 13-25% in 2020.
- Consumption in many oil producing nations is rising rapidly reducing surplus available for export, e.g. Saudi Arabia.
- Also political instability in others can affect production, e.g. Nigeria.
- The ratio of energy returned to energy invested is much lower for alternative fuels than conventional oil. Simon considers that the minimum for an industrial/consumer society is between 5:1 and 8:1. Brazilian ethanol meets this. Canadian oil sands have a ratio of about 5:1.

Richard Hurn *Land Transport NZ Research*

Richard, a Principal Advisor, reported briefly on current research commissioned by Land Transport NZ, namely:

- Research on the demand for oil, consumer response to price and actions that local authorities can take (McCormick Rankin Cagney),
- Research into how to make sure that local authorities have the tools to better allocate road space; into retrofitting the transport system to better move people (and goods), using examples of actions being taken (ViaStrada).

He also undertook a study tour of Portland, Vancouver and Seattle – cities that are seeking to become more liveable and more resilient. They are aggressively retrofitting themselves away from dependence on travel by car while still growing their economies. Portland and Vancouver in particular have been unwavering in the focus on reducing vehicle kilometres travelled while accommodating freight movement.

Garry Law *International Progress on Kyoto*

Garry Law is a civil engineer who held several senior management positions prior to setting up his own consulting practice. He is a Director of the Environmental Defence Society and attended two UN conferences on climate change in the early 2000s as part of an NZ Government delegation.

- UN Framework Convention on Climate Change (UNFCCC), agreed in 1992,
- In UNFCCC developed countries agreed to go first. And:
 - to cap their emissions at 1990 levels (failed)
 - to adopt policies and measures limiting emissions and enhancing sinks (ineffective)
- Kyoto Protocol agreed in 1997 and entered in force in 2005. First commitment period is 2008-2012 (CP1). At end of this period commitments expire – a CP2 is needed. Fundamentals included:
 - Developed countries committed to achieve reductions during CP1 compared to 1990,
 - IPCC second assessment report global warming potentials locked in,
 - Forestry and land use changes from 1990 were to be accounted for as emissions/sinks,
 - Developed countries committed to achieve emissions reductions during CP1; to phase out market imperfections, tax incentives, subsidies etc; and to assist developing countries,
 - Market mechanisms were encouraged,
 - The Clean Development Mechanism (CDM) allows projects in countries without CP1 targets to be credited with and sell carbon emission units saved – an important tool.
- However, deeper cuts are needed very soon. There are not enough to avoid climate change.
- The USA has failed to ratify Kyoto protocol and has not set national targets.
- The market for Kyoto compliant carbon credits is relatively weak.
- Kyoto will fail to meet its reduction targets for developed countries.
- Shipping and aviation sectors have done nothing.
- Successes are:
 - Emissions are less than they would have been,
 - Fundamentals of carbon accounting and trading have been put in place,
 - Agreed system of sanctions for parties not meeting obligations,
- Media now treat climate change as an issue needing solutions.
- Climate change science is now treated as mainstream.
- The pace of work on technology has picked up.
- The Stern Report noted that the cost of inaction is higher than the cost of action.

- India and China are now increasingly important emitters but continue to resist accepting responsibility for action unless the USA moves first and vice versa.
- There are several private and State initiatives in USA.
- Many businesses have been setting reduction targets with some going for carbon neutrality.
- Developed countries have been proposing reduction targets and gateways for themselves, but with no sanctions for failure.
- Forest clearance has continued apace in developing countries.
- There has been a boom in biofuel, but going along with increased food prices.
- The EU is considering tax on goods at entry from non-commitment countries on basis of entrained emissions.
- There is some interest in possibility of sector agreements, e.g. cement.
- China has built one large conventional coal electricity generating plant a month over last 4 years.
- The Bali 2007 conference agreed to a roadmap for progressing CP2. The outcome may not get into force by 2013. CP1 could be rolled over, but only for a short period.
- There are several important issues for NZ, e.g. methane, international transport emissions, (over-)reliance on forest sinks, accounting for wood exports.
- Alternative – individual/group actions.

Steve Goldthorpe *A Period of Consequences*

Steve Goldthorpe is an Energy Analyst. His short presentation related to future energy generation in NZ.

- Decisions on future electricity and energy supply are at a critical point. Decisions in near future will have major long term consequences.
- The NZ Energy Strategy is based on 90% renewable generation by 2025.
- But there is an alternative strong body of opinion that NZ should take a business-as-usual approach. This would use a mix of technologies, mostly coal and gas fired generation technologies. The renewables approach relies on hydro, geothermal and wind generation. It would give 39% more electricity generation capacity by 2025 over 2006.
- The mixed technology scenario includes building a gas fired power station and 3 new coal-fired power plants and would give 34% more capacity by 2025 compared with 2007.
- Steve looked to 2050 assuming a 1.6% pa growth rate in electricity demand, excluding the effect of electric vehicles. He then added in the potential extra demands from electric vehicles assuming 1% of fleet are EVs in 2015 increasing to 60% by 2050.
- His analysis indicates that the greenhouse intensity of the NZ power generation sector, currently about 200kgCO₂/MWh would increase to about 350kgCO₂/MWh by 2050 under the mixed technology scenario, whereas it would reduce to less than 20kgCO₂/MWh in 2050 under the renewables scenario.
- “A consequence of following the Mixed Technology pathway is that a strong international message would be sent that New Zealand intends to abandon its international obligations with regard to Climate Change.”
- Under the Mixed Technology electricity supply strategy new Zealand would:
 - effectively be abandoning its international climate change obligations,
 - probably get locked into competing for imports of globally scarce LPG,
 - become increasingly exposed to international energy prices for coal, oil and gas.
- However the Renewables pathway would also present difficulties. These are:

- technical challenges,
- increasing pressure to modify energy consumption expectations,
- the environmental intrusiveness of renewable electricity generation is likely to be significantly greater as the resources are more dispersed.

Session 2

Chair: Jack Woodward.

John Blakeley *Energy, Climate Change and Carbon Neutrality*

John Blakeley was Convenor of SEF from 2000-2006 and has been editor of EnergyWatch, SEF's magazine, since mid-2005. He is a civil engineer with considerable experience in geotechnical engineering and senior roles in tertiary education institutions. He is a Past-President of IPENZ.

- In 2006 NZ's greenhouse gas emissions were 77.9M tonnes CO₂ equivalent, an increase of 26% over 1990.
- Under Kyoto committed to keep emissions over 2008-2012 at 1990 levels or buy carbon credits to cover increase.
- Overall increase since 1990 is an average of 1.4% a year. At this rate year 2020 emissions would exceed 1990 emissions by 52%. In 2012 when CP1 period expires NZ will commence any future commitment period staring down from an "emissions cliff" as emissions are likely to be 30% over 1990 level.
- Agricultural sector produces 48% of NZ's GHG emissions (31.5% methane from ruminant animals).
- Transport contributed to 19% of total emissions (16.4% road transport), an increase of 64% since 1990. Electricity generation comprised 11%. It has increased by 138% since 1990, partly due to increased coal fired generation. The other energy sector emissions add up to 14%, giving a total of 44%.
- Globally GHG emissions are increasing at 3% a year (source: coal fired power stations and motor vehicles).
- By end of 2012 the proposed Emissions Trading Scheme (ETS) will involve large transfers of wealth, but may only reduce CO₂ emissions by 2% (short term costs fall on small businesses and individuals).
- What can we do to reduce emissions by 2012? Answer- A maximum reduction of 9.6%. While not enough this is almost 5 times the reduction from the ETS.
- A carbon tax would be a much less expensive and more effective means of reducing emissions than the ETS.
- Looking post 2012, most developing countries are not convinced that emissions reduction targets should apply to them.
- Regarding an NZ goal of carbon neutrality, much of our emissions are generated by the agricultural sector. Does/should carbon neutrality only apply to the energy sector?
- Meaningful progress would require some tough fundamental decisions. Steps announced so far are very modest, e.g. 2% biofuel content of petrol and diesel by 2012.
- Unexpected consequences – the grain required to fill a Range Rover's petrol tank could feed a person for a year.
- John considers that carbon neutrality in the transport sector would require the whole fleet to be electric vehicles powered from renewable energy sources.

- Second generation biofuels are a number of years away from commercial development.
- We need a conservation ethic – make do with less, and some targets to limit NZ’s GHG emissions in the near future.
- We need to phase out economic growth to achieve to reduce GHG emissions sufficiently and move to renewable energy. That does mean we will reduce our quality of life.

Arthur Williamson *The Energetics of Carbon Capture*

Arthur Williamson became professor of Chemical Engineering at Canterbury University in 1974. After early retirement he built his own solar water heating equipment company. He is past Chairman of the Solar Industries Association.

- Economic analysis assumes that there is an “away” and that “we can always find some more”. However, the atmosphere has limited capacity to absorb carbon dioxide without consequential effects on the climate, and we are unable to find new oil sources at the rate we are using the already discovered oil.
- What about using lignite as a way out? Can we not use lignite to generate electricity then capture the CO₂ and put it away?
- Lignite produces more CO₂ per unit of energy than Maui gas or fuel oil. In addition a lignite fired power station is less efficient than a power station burning natural gas.
- Carbon capture and sequestration (CCS) incorporated into a power station fuelled by natural gas would require 11-12% more fuel. However, a lignite-fuelled power station with CCS would require an increase of 55-78% in the amount of lignite required. These figures do not include the energy to transport the CO₂ and to put it away (underground).
- No plant with CCS has actually been built, but informed guesses indicate an additional cost equal to the cost of the basic power plant. Estimates of the final cost of electricity generated from coal stations with CCS range up to twice the cost of power stations without CCS.
- On top of this a place still has to be found where the CO₂ can be safely and permanently dumped.

Archer Davis *Planning Issues for Transport in the face of Energy Depletion*

Archer Davis is a civil engineer with a 30 year career in managing local government services and a strong interest in energy depletion. He is currently Group Manager Transport Strategy and Planning at North Shore City Council.

- Planning involves long lead times and reference to the past – how do you deal with a discontinuity like peak oil? Tendency to denial, hoping problem can be solved by new discoveries or technology allowing business as usual.
- A continuous and permanent decline in availability will require changes in priority – less travel, more use of alternatives to the single occupant car, substitutes for travel, electric/hybrid vehicles, mass transit, higher land use densities – a shift from giving priority to the movement of cars and the reduction in peak period congestion.
- As oil supply reduces, competition for the remaining resource will increase, leading to greater volatility in prices. Government to government cash or barter deals may further reduce supply to “weak” countries and hence increase costs. Reduction in supply may in reality be more variable and steeper as a result. There is the need to start planning 10 years in advance = now or very soon.

- Mechanisms such as a Fuel Retail Management System may be appropriate during the descent.
- Increased fuel costs produce some reduction in travel (elasticity - 15%) but the greater impact of increased energy costs is reduction in consumers discretionary spend and hence economic activity.
- Worldwide energy use increases as GDP increases. This suggests a decline in GDP if energy use declines unless the two can be decoupled.
- A new transport hierarchy includes focus on public transport and carpools/vanpools, walking, cycling motorcycles/scooters; freight management; higher land use densities; conversion of traffic lanes to bus/light rail/trolleys etc.
- Portland, Oregon plan to reduce consumption by 50% over 25 years. Many other cities have similar initiatives.

Sean Miller & Adrienne Puckey then gave a short presentation on their publication entitled “A Brief Introduction to Climate Change and Peak Oil for New Zealanders”, 2008, and handed out copies to those present. They have produced the publication on their own initiative and have waived copyright to encourage wide distribution.

Session 3

Chair: John Peet

Tim Jones *National Responses linking Energy, Transport and Emissions*

Tim has Been Convenor of the SEF since 2006 and is a member of the Government’s Vehicle Energy and Renewables Group. He has a BSc and BA and is a writer, editor and communicator.

- NZ transport is 99% dependent on oil.
- In 2008 domestic oil production = 70% of that imported, but most is exported.
- Domestic transport emissions rose 64% between 1990 and 2006.
- There was a 19% increase in state highway construction funding in 2008/09. Government is committed to “completing the Auckland roading network” as they see building roads as gathering votes.
- Oil exploration in Great South Basin is likely to restart in 2010 or 2011.
- NZES “in-principle” target “to halve domestic emissions per capita by 2040”. NZES gives peak oil only limited attention.
- There is strong reliance on electric cars to meet the target.
- NZEES seen as a better document but is the responsibility of EECA which has less clout than the MED.
- Oil Emergency Resource Strategy are only designed to cope with a 90 day disruption in supply.
- A NZ Strategy Update due in August. Hopefully this will reflect increased awareness by officials that the oil issue cannot be ignored.
- MED 2009 Energy Outlook includes a high oil price scenario.
- Vehicle Energy and Renewables Group currently focusing on electric vehicles (encourage use through parking incentives?)
- There are 40M electric bicycles in China.

- Little action a national level to reduce emissions.
- There is a risk of knee jerk reactions, e.g. lowering fuel tax, Southland lignite conversion

At the national level there is:

- Awareness of climate change widespread, but no significant action.
- Limited awareness at national level of implications of oil depletion for food, trade, tourism etc.
- Increasing awareness of effect of oil depletion on transport.
- Action or inaction, productive or counterproductive?

Cameron Pitches *The Campaign for Better Transport*

Cameron Pitches has been Convenor of the Campaign for Better Transport since 2002 and is a software developer.

- Campaign for Better Transport wants to see the focus on moving people not cars, reducing car dependency, reducing reliance on imported fossil fuels, and reducing emissions and pollution.
- Campaigned for the reopening of the Onehunga Branch Line.
- Supports a rail line to Auckland International Airport.
- Campaigned for rail to be accommodated in Transit NZ's plans for the Manukau Harbour Crossing.
- Considers that current cost benefit analysis in NZ is flawed as it encourages road investments and does not take bigger picture into account.

Session 4

Chair: John Blakeley

James Samuel *Transition Towns*

James Samuel has been facilitating Transition Town workshops alongside Richard Heinberg in Taupo and has been working to build community resilience on Waiheke Island for the last 4 years.

- Transition town assumptions include:
 - Life with dramatically lower energy consumption is inevitable, and it is better to plan for it,
 - Our settlements and communities presently lack the resilience to enable them to weather the severe energy shocks that will accompany peak oil,
 - We have to act collectively, and we have to act know,
 - By unleashing the collective genius of those around us to creatively and proactively design our energy descent, we can build ways of living that are more connected, more enriching and that recognise the biological limits of our planet.
- Transition Towns principles include a positive vision of the future; building resilience; and developing credible and appropriate solutions.
- They have developed an email group; a wiki; and a social networking site. Also undertake TT training.
- Over 40 towns in NZ are involved.
- Several projects are underway in Waiheke including preparing and planting a community orchard, and community transport plans (electrically assisted bicycles, car share schemes, dial-ride using vans with on-board GPS).

Summing up and Conclusions by Tim Jones, SEF Convenor

- The conference has demonstrated
 - a considerable unanimity of purpose,
 - a firm desire for a more resilient society,
 - determination that action must happen,
 - and frustration at the lack of action.
- We need to develop pathways, targets and gateways,
- We need to determine best way of engaging with New Zealand as a nation, with regional and local authorities, with major industries etc,
- We must engage with people with different interests,
- How do we get the message across?
- How do we motivate people to take useful and meaningful action?
- A huge task lies ahead. Go ahead and do it!

Concluding Statement

The conference was a resounding success. Those present accepted the urgent changes we need to be talking about, the mix of cold hard facts that we as a society find hard to face up to, **but also** the hope for the future in the examples of local action in New Zealand communities on sustainable towns, and examples from abroad. Those present at the conference were deeply concerned at the lack of urgent action by the Government and the inertia of most political parties on rising oil prices, peak oil, and climate change. The conference therefore agreed the following statement, in the hope of helping raise government and community awareness, and to help build a consensus for change.

1. This conference is concerned at the potential for serious and long-term disruption of the New Zealand economy and society from rising oil prices and climate change.
2. The conference accepts that the potential threat of climate change is now widely recognised and many people are being increasingly motivated to take action to mitigate its effects, though effective action by governments is slow. However the future threat to our way of life posed by depleting oil supplies and rising prices is still barely recognised and acknowledged by officialdom and most political parties in New Zealand.
3. The need to take action to prepare for future oil shortages and much higher prices is now urgent, as this will have a major and ongoing impact on our country over the coming decade and beyond. In contrast, early climate change impacts on New Zealand (though not necessarily elsewhere) are likely to be less serious.
4. The conference accepts, on the basis of international oil industry evidence available and provided at this conference, the seriousness of oil supply, price and security issues, and the likelihood of oil scarcity within the coming decade, as well as the need to reduce climate change gas emissions from transport.

5. The conference is aware of a number of ways in which the solutions to make our communities more resilient to diminishing oil supplies and rising prices already exist, and we encourage the Government to support these measures.
6. The conference believes that there is a need to investigate and facilitate the scope for autonomous action by communities, and local government and regional authorities, to develop longer-term solutions for these issues. This could be a priority task for the new government elected at the end of this year and assisted through a participatory exercise by a commission with full authority to conduct its own inquiries.
7. In the run-up to the general election, the conference calls on all political parties in New Zealand to explicitly outline how they will proactively govern to take full account of future oil depletion and climate change issues, focusing on the following:
 - Volatile and rising oil prices, and future oil supply, security and price issues.
 - The impact that these will have on the New Zealand economy and society
 - The actions needed now to help safeguard the future of New Zealand economy and society
 - How such actions will support reductions in New Zealand's climate change gas emissions from transport
 - Supporting the transition of New Zealand's towns and cities, and rural communities

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