



# EnergyWatch

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## EDITORIAL

### Demand-Side Management is Essential

In this issue (page 10) it is reported that the Orion electricity network, in co-operation with seven other Upper South Island Networks, has successfully implemented New Zealand's first regional electricity load management controller.

The controller, through co-ordination of eight load management systems, makes more efficient use of ripple control (hot water cylinder control).

The load controller project is a two-year trial scheduled to end in April 2011, but the early success of the trial indicates that operation of the controller is likely to continue beyond the scheduled trial period.

During the trial, peak load in the Upper South Island is estimated to have been reduced by about 30 megawatts.

This project appears to be a shining light in an otherwise somewhat dismal picture of the electricity ripple control load management system in New Zealand being allowed to run down over the last twenty years or so, from a system which used to be one of the best demand-side management systems internationally.

Commenting on the above in a SEF News posting on 16 September, SEF Member Murray Ellis said the following:

*"The country has become split over ripple control. It is used routinely to suppress peaks (and hence peak/off peak prices) in the northern part of the South Island (but not much elsewhere).*

*As a result, there was a long period during this winter in which the North Island prices spiked once and often twice a day, 5 days a week, to*



Energy Watch Editor John Blakeley

*levels of \$1/kWh and up. It has been a middling to wet winter and yet Whirinaki has constantly been used at peak demand. A total waste of fuel but the industry has no interest in taking the blindingly obvious measure".*

And in commenting on the SEF Submission (dated 16 September) on the Ministerial Review of the Electricity Market, Murray said:

*In 4a you ask about why ripple control is not used more. I don't suggest changing what you have written but there is a simple reason for this. Reducing peak load does not provide any competitive benefit to any retailer. Thanks to the deemed profile system, the cost savings are spread pro-rata over all retailers. Only the*

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*consumer would finish up benefiting. Putting it a different way, the companies that do not use ripple control can free-ride on any that do. That the full cost of Whirinaki does not get felt in the wholesale market makes things worse. In other words, you are right. There is something fundamentally wrong".*

The above SEF submission notes that if our ripple control system was still working as well nationally today as it used to, the load management system would have much better controlled the price spikes which occurred over

the winter of 2009, by shedding more hot water load, instead of starting up the Whirinaki Power Station.

As recently as 3 September 2009, it was noted that Whirinaki again started burning diesel fuel, instead of more load being shed around the country from water heaters.

To anybody who believes in the principles of sustainability, it is sheer lunacy that we are sometimes burning diesel fuel at Whirinaki, which is very expensive and with high carbon dioxide emissions, rather than better using the ripple control system to shed more load.

Is there something fundamentally wrong with the electricity market that this has been allowed to happen, and that around many parts of the country, the ripple control system has been allowed to run down in recent years?

*John Blakeley*

*The SEF Submission on the Ministerial Review of the Electricity Market can be viewed at [www.sef.org.nz](http://www.sef.org.nz)*

## A "Watered-Down" ETS

After a number of public consultation meetings held around the country in July this year, the Government announced that its target for greenhouse gas emissions is a reduction of between 10% and 20% below 1990 levels by the year 2020.

This target was severely criticised by some environmental groups which had been actively campaigning for a reduction target of 40% below 1990 levels. The target now announced is to be taken to the international climate change negotiations to be held in Copenhagen in December.

At the same time, the Government has been busy trying to find a way to get its proposed Emissions Trading Scheme (ETS), which is designed to replace the earlier ETS developed by the previous Labour Government, through Parliament and passed into law before the Copenhagen conference.

Recently it seemed that a “grand coalition” between National and Labour to agree on a modified version of the Labour Government’s ETS might just be possible. Almost everybody seemed to agree that an ETS for which there is a broad consensus of agreement would be better for the economy, the environment and the country.

National had said that the previous Labour-led Government’s ETS is “too harsh” but to provide policy stability for the future it wanted to try and negotiate agreement of a modified version with Labour.

Suddenly the grand coalition idea with Labour was ditched on 14 September and National now wants to agree with the Maori Party on a much watered-down version of Labour’s ETS.

This agreement between National and the Maori Party is potentially unstable and is only certain up to the select committee stage, so the chances of National passing its proposed ETS through Parliament in its present proposed form would appear to be problematic?

National’s present proposed ETS, supported by the Maori Party, has been broadly condemned in many quarters. The NZ Business Council for Sustainable Development has said that it is likely to continue uncertainty for business. Jeanette Fitzsimons of the Green Party has said that it will damage the country’s clean and green image and encourage big polluters to produce more and pollute more. One financial commentator has even said that the Government is destroying the ETS.

**However, of greater concern is the present complete lack of any sort of plan by the present Government as to how its emissions reduction target by 2020 might be achieved in practice.** During the select committee hearings on the ETS, it seemed that many MPs believed that an ETS on its own could enable New Zealand to meet its emissions reduction targets by 2020.

But this present proposed ETS is so watered-down that it is unlikely to reduce greenhouse gas emissions, at least in the short term. It won’t provide an incentive to polluters to change their ways and become more innovative, and it won’t

encourage consumers to become more energy efficient.

**Even a much more effective ETS would be unlikely on its own to significantly reduce greenhouse gas emissions unless it was part of a co-ordinated set of policy measures to achieve that objective.**

A particular example is lack of alignment between the present Government’s transport policies and its climate change policies. A number of recent Government policy announcements on transport seem to be at odds with its objective of reducing greenhouse gas emissions in the transport sector.

Transport is a particularly important sector in considering how New Zealand might decrease its greenhouse gas emissions. Domestic transport greenhouse gas emissions have increased 64% between 1990 and 2006, and now constitute approximately 20% of New Zealand’s total greenhouse gas emissions.

Taking into account that nearly 50% of our greenhouse gas emissions at present come from the agriculture sector, where it will be difficult to reduce emissions without a corresponding decrease in agricultural production, then it seems that at least 40% of New Zealand’s greenhouse gas reduction target is likely to have to come from the transport sector.

As an example of how climate change and transport policies are not aligned, it was recently announced that the estimate for widening Auckland’s Northwestern Motorway between St Lukes and Westgate as well as building a combined surface-tunnel link through Waterview, was likely to reach \$2.2 billion, while at the same time, the \$1 billion of funding available for Auckland’s rail electrification was being constrained as a result of dumping the regional fuel tax, meaning that electric trains may be delayed until 2013 and the 140 railcars originally proposed by the Auckland Regional Transport Authority may be reduced to around 100 slightly longer units..

Other Auckland motorway projects soon to get under way or already under construction

include, hundreds of millions of dollars for both the duplication of the Mangere Bridge and motorway extensions through to Manukau City, and the motorway tunnel under Victoria Park in the central city is now committed for construction

Clearly a transport policy which will build motorways to encourage the use of more private cars, increasing carbon dioxide emissions and causing less passengers to use the electrified rail transport, is at odds with the Government's stated target of reducing our greenhouse gas emissions. **This raises questions about how serious the Government is about its stated intention to reduce these emissions.**

*John Blakeley*

**STOP PRESS:** The new ETS was passed into law on Wednesday 26 November by a slim majority of 63 votes to 58, and supported by the National Party, the Maori Party, and United Future's Peter Dunne.

### **And What About "Peak Oil"?**

It seems that an emasculated ETS is National's main strategy to reduce our greenhouse gas emissions by 2020, whereas what in fact is needed is an integrated set of complementary policy measures to achieve this target. And such a set of policy measures must include appropriate transport policies.

However, what is being completely ignored at present is the potential reduction in the world's available oil supplies. This is the "elephant in the living room" which may yet lead to greenhouse gas emissions targets being achieved by 2020, but at great cost to the world's economic and political stability.

If you mention the words "Peak Oil" to most politicians, their eyes just glaze over and they will not listen any further. So you have to use words like "the near inevitable steep oil price increases once the World recovers from economic recession" and even then, it is difficult to get many politicians to pay attention.

This situation is not unique to New Zealand.

Politicians around the world have short-term interests, namely elections to win and naturally prefer to support the optimists, because few people want to hear the bad news about oil, especially when there is no easy solution.

Many governments are now more aware that the days of cheap and easy oil are over, but few governments are yet prepared to admit to being aware of the difficulties which we may soon face in oil supply.

In a little publicised statement in August 2009, the International Energy Agency (IEA) in Paris stated that in a first-ever assessment of the world's major oil fields, the IEA concluded that the global energy system was at a crossroads and that consumption of oil was "patently unsustainable" with expected future demand far outstripping supply.

This first detailed assessment of more than 800 oil fields in the world, covering three-quarters of global reserves, has found that most of the biggest fields have already peaked and that the rate of decline in oil production from them is running at nearly twice the amount calculated just two years ago. (The IEA estimates that the decline in oil production in existing fields is now running at 6.7 percent a year compared to the 3.7 percent decline it had estimated in 2007, which it now acknowledges to be wrong).

**The IEA report warned that oil production has already peaked in non-Opec countries and that the era of cheap oil has come to an end.**

Using the above IEA figure of a decline of 6.7 percent a year, then production from existing oil fields would go from 126% of 1990 levels in 2008 down to 55% of 1990 levels in 2020. This will mean that if global oil production is to remain at anywhere near existing levels, there will need to be extensive investment in the exploration and development of new oil fields.

The market power of oil-producing countries that hold substantial reserves of oil - mainly in the Middle East - will grow as the oil crisis begins to grip after 2010. This market power of these very few oil-producing countries will

increase greatly. They already have about a 40% share of the world's oil markets and this will increase strongly in the future.

My conclusion is that New Zealand might meet its greenhouse gas emissions reduction target in 2020 by default due to the scarcity and cost of oil by then, but our transport policies must now be brought into alignment with climate change policies.

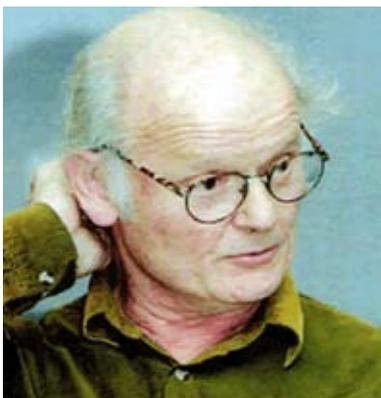
In particular we do not need to be spending billions of dollars on building motorways to increase their capacity, which may not be necessary if oil consumption must be substantially reduced within the next ten years.

*John Blakeley*

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## Obituary: Dr Peter Read

SEF members who knew Peter Read will be saddened to learn of his passing on 24 November in a Brussels hotel when he was on a trip to Europe.



He was heading towards the Copenhagen COP 15 talks after a few days in London. He told me when we last met the week before he left NZ, he had just been informed that he had only a few months to live. But those who know him would not be surprised that he decided to head to Europe anyway. Nor would they be surprised that the day he died he gave a lecture on biomass for CO<sub>2</sub> uptake, from a wheel chair, to the COMPETE meeting (Energy for Africa see [www.compete-bioafrica.net](http://www.compete-bioafrica.net)). This was one of his main objectives in heading to Europe. Mission accomplished!

Peter had an engineering degree (nuclear!), had worked in Whitehall as a government official, and then did his PhD at the London School of Economics. Few people have such a broad, multi-disciplinary background, and coupled

with his social dimensions (for example, he established a commune in the UK in the 1970s that is still going strong), and his sense of humour, he was unique.

Soon after arriving at Massey University's Economics Department in about 1980, he joined the Save Manapouri action group, camping out in a Minister's doorway for a day or two until he was heard. Some time in the 1990s he became a born-again biomass supporter, writing a book and numerous papers. He was involved as a contributing author with the IPCC Assessment Reports, concerned about the possibility of abrupt climate change, and more recently had an active interest in bio-char as a mitigation solution to climate change. This interest has resulted in the NZ Bio-char Research Centre being established at Massey.

His strength to laterally think was astounding; his weakness perhaps being that his mind would often race on faster than his mouth could communicate his thoughts. I recall some years ago driving up to Rotorua from Palmerston North with Peter for a meeting with the Board of Carter Holt Harvey. We were a little late and Peter entered the meeting with his shirt hanging out, his long hair somewhat unkempt, and his jacket collar twisted. As he began his presentation on bioenergy opportunities, I was sitting next to a Board member who leaned over to ask me "Who is this boffin?". I replied, "Don't take any notice of his appearance, just listen to his message" and a successful meeting resulted.

The world needs people like Peter Read. His passing will be a great loss to the climate change community, and I know many of his friends within SEF will agree that he has made a significant contribution to the mitigation debate. Let us hope that his innovative messages will continue to be heard and understood by policy makers around the world. His untiring efforts will then have made a difference.

He is survived by Lesley, his wife of many years, and their three children.

*Ralph Sims*

# SEF FEEDBACK

## From Paris with Love

In the first of a series of ‘updates’, Nigel Jollands, Head of the Energy Efficiency Unit at the International Energy Agency (IEA) provides some brief ‘intelligence’ on Energy Efficiency policy initiatives at the IEA and developments on the international stage.

These articles have been a long time coming. When I first took up the post at the IEA I was determined to ensure I was a conduit back to New Zealand of the latest in energy efficiency policy from the international stage. It has now been 2 ½ years - so, better late than never. What I will try to do is to give you a regular overview of those energy efficiency policy issues that are currently on the agenda at the IEA.

At the IEA Secretariat we are focusing our efforts on a number of gaps and challenges in the energy efficiency policy space:

- The need to capitalise on the current “energy efficiency hits prime time” opportunity;
- The challenge to ensure words translate into action;
- The challenge to energy efficiency posed by energy efficiency policy development and implementation in a lot of countries being the purview of relatively junior government departments, and the fact that the energy efficiency policy is often spread over many departments;
- The lack of attention to energy efficiency governance issues;
- The lack of technical capacity needed to develop and deliver energy efficiency policy.

I will cover the first four below and leave the technical capacity issue for another day.

## Energy Efficiency Still on Prime Time - At Least at the Political Level

There is still no doubt about it. Energy efficiency hit prime time with politicians in 2007,

and for most of the world that hasn’t changed - despite the drop in world oil prices and changes in government. The reasons for this are clear:

- Decision makers are now more desperate than ever to address climate change;
- Countries like Japan and blocs like the EU continue to have pressing energy security concerns (the European winter looms and a gas supply issue is very much on politician’s agenda);
- The recent financial crisis has meant that energy efficiency programmes that create jobs have received a lot of attention.

It’s no wonder then that the G8 continue to ramp up their diplomatic language relating to energy efficiency. In 2008 they committed to ‘maximise implementation’ of a set of 25 energy efficiency recommendations we prepared for the G8 - and being rolled out to IEA member countries.

Speaking of prime time - as part of the IEA’s work to help countries promote energy efficiency, the IEA has prepared 2 videos - one promoting the IEA’s 25 energy efficiency recommendations (see below), the other a public service announcement targeted at CNN (watch this space).

## Are Words being Translated into Deeds?

That is exactly the focus of a forthcoming book the IEA will be releasing in late October “Implementing energy efficiency policy: are IEA countries on track?” In this book we evaluate progress by all member countries (including New Zealand) with implementing the IEA 25 energy efficiency policy recommendations. See: [http://www.iea.org/textbase/papers/2008/cd\\_energy\\_efficiency\\_policy/index\\_EnergyEfficiencyPolicy\\_2008.pdf](http://www.iea.org/textbase/papers/2008/cd_energy_efficiency_policy/index_EnergyEfficiencyPolicy_2008.pdf).

As far as I know, this is the first time the IEA has followed up on its recommendations to ‘audit’ their level of implementation.

The good news is that there appears to be a huge push in many countries to implement energy efficiency policies. The EU Directives are now being vigorously implemented and transposed (translated into national policies and regulations) across the whole of the EU (see <http://www.euractiv.com/en/energy-efficiency>).

The US is investing billions on energy efficiency rescue packages (see <http://www.energy.gov/recovery/> and <http://www.ens-newswire.com/ens/mar2009/2009-03-13-091.asp>)

The bad news...well, you'll have to read the book.

## Engaging Senior Policy Makers in Energy Efficiency

You might have heard of the International Partnership for Energy Efficiency Cooperation (IPEEC). This is a new body championed by the EU, Japan and the US aimed at engaging senior decision makers in energy efficiency. IPEEC is set up as an IEA Implementing Agreement and will have a secretariat hosted by the IEA. Any government can be a member of IPEEC, including non-IEA member countries. To be honest, it is still very early days for IPEEC, so who knows if it will succeed.

## Energy Efficiency and Governance

The IEA is about to launch a new project funded by the European Bank for Reconstruction and Development (EBRD) and the Inter American Development Bank (IDB). The project addresses one reason for energy efficiency policies not delivering their full potential benefits. **That is, the fact that energy efficiency policy design tends to focus on the micro-sales issues (e.g. the level of energy efficiency of a refrigerator) at the expense of the broader systematic 'governance' issues.** I contend that the energy efficiency potential within an economy will not be maximised without understanding the complete governance framework - the central mechanism for marshalling drivers within the public and private sectors of an economy - and ensuring that it is aligned towards energy efficiency.

Here is an extract from my ECEEE paper:

*"The temptation for energy efficiency policy makers to focus on micro-level issues is understandable since energy-savings resources are widely dispersed amongst a large number of individual actors in society and the barriers (and hence the policy measures) are very specific to particular sectors of the economy. These micro-level energy efficiency policies have been extremely successful within their sphere of influence. However there are large gaps in policy coverage which can only be understood and addressed by governments considering the broader governance system issues. Indeed, we contend that an appropriate energy efficiency governance framework is the sine qua non for successfully addressing the energy efficiency gap. Furthermore, our experience and literature reviews suggest that policy practitioners have paid too little attention to understanding and establishing effective energy efficiency governance frameworks."*

For more information see the paper at [http://www.eceee.org/conference\\_proceedings/eceee/2009/panel\\_1/1.086/](http://www.eceee.org/conference_proceedings/eceee/2009/panel_1/1.086/)

So that is it for my first instalment from Paris. Please feel free to contact me on [Nigel.Jollands@iea.org](mailto:Nigel.Jollands@iea.org) if you have any questions - but if I don't respond right away, it's because I am either down the road to have a croissant with Ralph Sims, or drowning in too many emails...  
Received 5/9/09

*Nigel Jollands*

Note: Ralph Sims has since returned to NZ.

## Calls for Transport Policy Rethink

In an open letter to the NZ Minister of Transport dated 25 August 2009, SEF called for a transport policy rethink in the light of the International Energy Agency's latest oil supply warnings.

The letter noted that since coming to office, the Government has embarked on a land transport policy which strongly favours road transport,

and in particular private road transport, for both vehicles and freight. This approach has been reflected in a reallocation of funding away from less oil-dependent transport modes.

In its briefing paper to the incoming Government of December 2008, SEF pointed out that in an era of concern about both rising oil prices and climate change, transport policy should instead be focused on increasing the resilience of the transport system and decreasing its reliance on non-renewable fossil energy sources.

This requires increased investment in rail freight (particularly electrified rail, where feasible), rail and road public transport, active modes such as walking and cycling, and a comprehensive and effective sea freight strategy.

So far the Government has chosen not to follow this advice. In August 2009 however, two developments have occurred which should cause a rethink.

## 1. The IEA Predicts a Future Oil Supply Crunch

The International Energy Agency (IEA) has usually taken an optimistic view of world oil supplies, but its view has become considerably more pessimistic over the past two years.

To illustrate the scale of the problem, the IEA now estimates that 64 million barrels per day (bpd) of gross new oil production capacity needs to be installed between 2007 and 2030 – six times the current production capacity of Saudi Arabia – to meet both demand growth and to offset decline.

The IEA Chief Economics, Dr Fatih Birol said

*“many governments are now more and more aware that at least the day of cheap and easy oil is over..... however I’m not very optimistic about governments being aware of the difficulties we may face in the oil supply”.*

**Editor’s Note:** The IEA report also identifies a steep downturn in oil sector investment in exploration and production facilities for new oil fields since the present global economic crisis began about two years ago.

## 2. The NZ Government Sets Greenhouse Gas Emissions Reduction Targets

The Government has now adopted a greenhouse gas emissions responsibility target for the year 2020 of between 10% and 20% reduction on 1990 levels, to take to the December 2009 climate change negotiations at Copenhagen.

Domestic transport greenhouse gas emissions increased 64% between 1990 and 2006, and constitute approximately 20% of NZ’s total greenhouse gas emissions. A transport policy which concentrates on increased provision for private motor vehicles will see transport emissions continue to rise over the period to 2020, given that electric vehicles are forecast to form only a very limited part of the NZ private vehicle fleet by 2020.

**Both local and international research shows that building new roads to relieve congestion simply results in further congestion.**

## Conclusion

Thus NZ is faced with a combination of further steep oil price rises, and the need to sharply reduce greenhouse gas emissions from transport. In the light of these issues, the Government should rethink its present approach to current and future transport policies.

*The full text of the SEF Open Letter can be viewed at [www.sef.org.nz](http://www.sef.org.nz).*

**Editor’s Note:** The above open letter indicates that at the moment, there is a complete “disconnect” between the Government’s transport policies and its climate change policies.

**STOP PRESS:** At the SEF AGM held in Wellington on Friday 6 November, Doug Clover was elected SEF Convenor to succeed Tim Jones who has been Convenor for the last three years 2006 to 2009

# ENERGY EFFICIENCY

## Government Quietly Axes NEECS

In its issue of 23 September 2009, the NZ Energy and Environment Business Week noted that the Minister of Energy, Gerry Brownlee has “quietly canned” the previous Labour-led government’s National Energy Efficiency and Conservation Strategy (NEECS).

This strategy was two years old and three years in the making (during which time widespread consultation took place seeking input from interested parties). It was a guiding document, particularly for the Energy Efficiency and Conservation Authority (EECA).

The announcement by the Minister was made in mid-August 2009 and without a press statement. It appears not to have been previously signalled, except to the extent that one of Gerry Brownlee’s first acts as Minister of Energy was to countermand Labour’s plan to make energy efficient lightbulbs mandatory.

Commenting on the above, Labour’s energy spokesperson Charles Chauvel said on 29 September “in the same week that Prime Minister, John Key told the world that his government leads a New Zealand committed to green values, it has been reported that his Energy Minister, Gerry Brownlee, has formally axed an important strand of this country’s response to growing environmental problems”.

Mr Chauvel went on to say “Gerry Brownlee’s axing of the National Energy Efficiency and Conservation Strategy in August without his office even issuing a statement is hardly an example of open government. What is he afraid?”

“Perhaps he thought that no one would notice that National now has no co-ordinated strategy in place, to assist New Zealanders to save energy and cut their bills while minimising the impact on the environment. It demonstrates an appalling lack of leadership”.

Commenting on the above in SEF News (30 September), Alan Thatcher said

*A couple of weeks ago I was discussing National Party policy with my 88 year old mother (who can be quite astute at times) and she asked me quite simply “Why would they want to make NZ less energy efficient?” And I thought that it was a very good question. Perhaps SEF should write to Gerry Brownlee and ask him?*

One conclusion would be that the Minister’s decision was made on purely ideological grounds.

## Streetlight Power Savings

The Electricity Commission (EC) has implemented electricity savings schemes over the last five years that have saved the country \$317 million. The schemes have included spending \$20 million on subsidising the installation of 5 million compact fluorescent lightbulbs (CFLs) throughout the country.

The energy conservation role of the EC is now likely to be transferred to EECA after a Ministerial Review of the Electricity Sector. However, the EC’s conservation work now complements the work of EECA which is concentrating on the home insulation scheme. The EC is now preparing to launch an efficient street lighting campaign. NZ has 330,000 street lights and they cost local councils and the Land Transport Agency about \$30 million in energy costs annually to operate.

In December, the EC will launch an online calculator for councils to work out the cost of relacing old bulbs with CFLs. In domestic use, the efficient bulbs typically pay for themselves within 6 months in electricity savings and the bulbs last eight years. There is also a maintenance cost saving on the CFLs needing to be replaced much less frequently. Local Authorities have been slow to install new bulbs because of lack of information.

The EC is also running one-day seminars for street lighting providers and these had proved to be popular. Reference: NZ Herald, 24/11/09

# ELECTRICITY MATTERS

## Upper South Island Load Control Project

Central Canterbury electricity network Orion, in co-operation with seven other Upper South Island (USI) networks, has successfully implemented New Zealand's first regional load management controller.

The controller has been developed to monitor the load on USI networks in real time, and through co-ordination of eight load management systems, makes more efficient use of ripple control (hot water cylinder control).

The USI controller maintains USI peak load at acceptable levels by co-operatively controlling hot water cylinders - while ensuring that customers' hot water service is not jeopardised. Participating electricity networks are Orion, Alpine Energy, Electricity Ashburton, MainPower, Network Tasman, Buller Electricity, Westpower and Marlborough Lines.

Orion Network Business Development and Planning Manager Glenn Coates says the USI load controller project is a two-year trial scheduled to end in April 2011. "However, the early success of the trial indicates that operation of the USI controller is likely to continue beyond the scheduled trial period".

During the trial, peak load in the Upper South Island is estimated to have reduced by about 30MW. This is an encouraging result which could delay expensive transmission investment by one to two years, meaning lower transmission costs for distribution networks and downward pressure on electricity prices for customers.

On the coldest days in winter when load is high, the USI transmission grid operates close to full capacity. To meet load growth in the short term, Transpower proposes to continue to implement relatively small and low cost upgrades to the grid. In the medium term, the grid operator proposes to install a more costly (about \$200m) transmission line.

### Editor's Note

Information presented in EnergyWatch has been obtained from a wide variety of sources. Details of particular sources of information can be obtained from the Editor upon request.

*"The early success of the USI load controller indicates that at less than a third of the cost, we can significantly reduce peak load. Because the controller reduces peak demand during transmission constraints, there is also downward pressure on the USI spot price,"* Mr Coates says.

To further increase the benefits of co-ordinated USI load management, Orion envisages that the USI load controller will grow to include peak period signalling for embedded generation and major customers.

"To achieve efficient electricity delivery outcomes, greater transparency of real time grid and network constraints with cost-reflective pricing must be available to our customers. The USI controller provides a regional platform that can bring these aspects together in a co-ordinated way".

Orion News Release, 17/9/09

## Consent Rejected for Project Hayes

On Friday 6 November it was announced that the Environment Court had refused consent to Meridian Energy for Project Hayes, which would have been New Zealand's largest wind farm.

The 630MW wind farm in Central Otago was planned to be large enough to provide electricity to every home in the South Island. The first stage would produce about 150MW, with Meridian building more turbines as demand increased.

However the project was opposed by local residents and some high-profile New Zealanders with links to the area, who wanted to protect the tussock-clad ranges from 160m-high wind turbines and 12m-wide access roads. In all, eleven parties opposed the project.

The Environment Court hearing began in May 2008 and concluded in February 2009. Meridian originally obtained resource consents for the project in 2006 and 2007, but an appeal was subsequently taken to the Environment Court.

In its decision, the Environment Court stressed that visual impact of the wind turbines on the outstanding landscape including the Lammermoor Range, 70km northwest of Dunedin. The Court also questioned whether sufficient consideration had been given to alternative sites.

Meridian Energy said that it was disappointed. It had spent about \$10 million on planning and preliminary work for the project, which would ultimately have had 176 turbines and cost \$2 billion. It had 15 days to decide whether to lodge an appeal, but that may only be on matters of law.

The chief executive of the NZ Wind Energy Association, Fraser Clark, said that the decision could set a worrying precedent for other proposed wind farms given the weight which the Court placed on an “outstanding landscape”.

Mr Clark said that it would also be difficult for power companies to present a fully accurate picture of what alternatives there were to a particular wind farm project, especially if they did not know details of the plans of rival companies. Also a great deal of extra work will be required in fully documenting alternative projects for comparison.

**STOP PRESS:** Meridian Energy is to appeal the decision on Project Hayes to the High Court. It is likely that Meridian will win the appeal, and that the Environment Court will then have to reconsider its decision, and the project may be back on again.

## Market Fails to Deliver

Britain is beginning to have doubts as to whether liberalised energy markets are the way to deliver reductions in carbon dioxide emissions.

Climate change concerns, a looming shortage of electricity, and worries about the risks of relying on imported energy (natural gas) are causing

many to doubt whether Britain’s liberalised energy markets are up to the job.

The British Government has set a greenhouse gas emissions target which calls for an 80 percent reduction, relative to 1990, of greenhouse gas emissions by 2050. This calls for an emissions reduction of 2 to 3% annually, whereas currently they are dropping at an average annual rate of under 1%.

Consumers are not buying enough energy efficiency appliances or insulating their houses, car makers are failing to reduce the emissions of their products and electricity companies still prefer fossil fuels to greener alternatives.

A dose of re-regulation is being prescribed including compulsory emissions caps for new cars, **feed-in tariffs to help green-electricity producers**, and a state-enforced carbon price to encourage nuclear power stations and “clean” coal power stations.

At present Britain’s investments in power stations are made on purely commercial grounds. Half a dozen big firms compete to sell power to consumers. Price controls are unheard of and state ownership is confined to a couple of old and deteriorating nuclear power stations.

But despite generous subsidies being offered, Britain generates far less electricity from renewable energy sources as a proportion of the total, than most of its European neighbours.

Yet firms are leaving rather late all this required building of new power stations. Energy watchers are increasingly concerned about possible blackouts as power stations close and are not replaced.

Ministers are beginning to specify how many nuclear power stations and wind turbines they want built. The Government has “tweaked” the planning system to allow it to over-rule local objections to new power stations, and a new Infrastructure Planning Commission is supposed to take a more directive approach to major building projects.

# CLIMATE CHANGE/GLOBAL WARMING

## Copenhagen Decision is Vital

British Prime Minister, Gordon Brown, at a recent meeting of ministers from 17 major economies held in London to discuss the climate change talks in Copenhagen in December, warned that countries were not moving fast enough to reach an agreement.

What is at stake is a global deal to cut carbon dioxide emissions from:

- electricity generation.
- industry
- transport, and
- deforestation

which, all governments now accept, are causing the atmosphere to heat up, with potential disastrous consequences.

**But while all countries now recognise the problem, they have very different views about their role in the solution.**

At Copenhagen, the argument will be essentially about how the effort and expense should be shared between nations. If that can be agreed, a deal will be done. If it can't, the world is in for trouble.

In the simplest terms, two sides have to come together to do a deal - the rich, mainly western countries of the developed world; and the poorer (but rapidly growing) countries of the developing world, led by China and India.

The argument is about responsibility and fairness, and it turns on the fact that most of the man-made carbon dioxide in the atmosphere now (and which will remain in the atmosphere for a century or more) has been emitted by the rich countries, having been put there since the industrial revolution 200 or so years ago.

But most of the additional carbon dioxide which goes into the atmosphere in the future, will be put there by the developing nations who are now embarked on a period of unprecedented economic growth, mostly powered by burning

coal, with the principal purpose of drawing their peoples out of poverty.

Throughout the 20<sup>th</sup> century, the USA was the world's biggest emitter of carbon dioxide. But in the last two years, China has overtaken it, having doubled its carbon dioxide emissions in the last decade, and they will continue to grow.

So you can argue that China with India, Brazil, Indonesia and their fellow developing economies, are making the problem worse - and they are. But also, the USA with Britain, Germany, France and other rich countries, started the problem in the first place, and are also worsening the problem every day.

So what are the implications for responsibility and fairness? The principal one is that the rich West has to lead the way in cutting carbon dioxide emissions.

This has been recognised by all sides since the first global warming treaty, the UN framework Convention on Climate Change, was signed at the Earth Summit in Rio de Janeiro in 1992. The treaty said that the international community had "common but differentiated responsibilities".

This principle was put into effect in 1997 in the Kyoto Protocol to that global warming treaty.

Under the Kyoto agreement, the rich industrialised countries agreed to cut their man-made carbon dioxide emissions by fixed amounts by 2012, but the developing nations were not required to make any cuts at all.

Since then, although most of the rich countries accepted the Kyoto agreement, the US Congress would not ratify the treaty, as many US politicians felt that it was giving a "free ride" to countries such as China who were economic competitors. President George W Bush withdrew the US from the Kyoto agreement in 2001.

Also, the carbon dioxide emissions of China and India and other developing nations have expanded in a way that no one had imagined

in 1997, and they will represent 90 percent of all future emissions growth. If unchecked, they will derail all other efforts to control climate change.

So the situation now is:

- China and India and other developing nations will now have to make emissions reductions themselves, or the USA will not join in any new treaty, and
- If these emissions reductions are not now made, the fight to limit atmospheric carbon dioxide concentrations, and thus future global temperature rises, will be lost.

At Copenhagen, the rich countries will have to make clear commitments to cut their own carbon dioxide emissions significantly by 2020, and will have to agree on huge financial help to the poorer nations to continue their growth in a low carbon-emissions-way.

For their part, the developing nations will have to agree on some sort of numerical target to cut their own carbon dioxide emissions, although they see an imposition of targets on their as an attempt by Western competitors to hold back their economic growth. All sides will have to do things which are demanding.

Might the talks fail? The European Union is signed up to tough emissions cuts and backs a big financial help package to developing countries. Even countries such as Japan and Australia, formerly laggards, have started towards setting serious carbon dioxide emissions targets.

**It is the position of the USA which is now crucial. President Obama has to offer something substantial in Copenhagen in December in terms of US domestic action on greenhouse gas emissions.**

But the bill which will define US climate change policy is stuck in their Senate and will not go through until Mr Obama's health insurance package is dealt with, which may not be in time for Copenhagen.

**STOP PRESS:** President Obama will now take a promised target to Copenhagen of reducing greenhouse gas emissions by only about 4 percent below 1990 levels.

## Copenhagen's Inconvenient Truth

In an article in the journal *Foreign Affairs* (September/October 2009 issue), Michael A Levi notes that in December, diplomats from nearly 200 countries will gather in Copenhagen to negotiate a successor to the 1997 Kyoto Protocol, which for the first time bound wealthy countries to specific cuts in greenhouse gas emissions.

Most of those emissions come from burning fossil fuels - coal, oil and natural gas - for energy; from deforestation; and from the agriculture sector. They must be cut deeply in the coming decades if the world is to control the risks of dangerous climate change.

The odds of signing a comprehensive treaty in December are vanishingly small. And even reaching such a deal the following year would be an extraordinary challenge, given the domestic political constraints in Washington and other capitals that make such an agreement difficult to negotiate and ratify.

Many US lawmakers want absolute near-term emissions caps from China and India, but those countries will not sign up for anything of the sort for at least another decade. And before they consider a deal of any kind, Chinese and Indian negotiators are demanding that developed countries commit to cutting their greenhouse gas emissions by over 40 percent below 1990 levels by 2020. But none of the world's wealthiest countries will even come close to meeting this goal.

Meanwhile, China, together with other developing countries, is also asking the wealthy countries to commit as much as 1 percent of their collective GDP - more than \$300 billion annually - to a fund that would help the rest of the world reduce its emissions and adapt to climate change. But western politicians will not

be willing to send anything near this amount of money to their economic competitors in order to secure a deal.

The aim of a deal in Copenhagen should be to reinforce developed countries' emissions cuts and link developing countries' actions on climate change to objectives in other areas - such as economic growth, security and air quality - that leaders of those countries already care about.

If instead, negotiators focus on fighting various governments' most entrenched positions, they may leave the world with nothing at all.

### **Possible Solutions**

Americans accustomed to thinking about climate diplomacy within the framework of the Kyoto Protocol, may assume that the obvious next step is to translate reduction goals into emissions caps, put them into a treaty, and establish a system for global carbon trading. But this would be problematic for three reasons.

**First**, negotiators from developing countries would insist on much less stringent caps than whatever they thought they could meet. Higher caps would give them a "cushion" by maximising the odds of them remaining in compliance even if their domestic policies for cutting emissions failed. Likewise, these loose caps would protect them if their economies shifted in unexpected ways that increased their emissions, as happened in China in the early part of this decade and could happen in India in the future

**Second**, even if a developing country meets its agreed emissions cap, other nations would, in the near term, have little way of verifying this since most developing countries, including China and India, lack the capacity to robustly monitor the entire emissions of their economies.

**Third**, even if the problems of excessively high caps and poor verification could be solved, simple caps would have little value on their own. **Canada is a case in point as it will soon exceed its Kyoto limit by about 30 percent, yet it will face no penalty for doing so, because the Kyoto parties never agreed on any meaningful punishments.**

The USA and other countries have essentially no way to hold countries such as China and India to emissions caps, short of using punitive trade sanctions or other blunt instruments. Obsessing narrowly in Copenhagen over legally binding near-term caps for developing countries is therefore a waste of time.

The solution to all three problems is to focus on specific policies and measures that would control emissions in the biggest developing countries and on providing assistance and incentives to increase the odds that those efforts will succeed.

Such "bottom-up" initiatives could include, among other things:

- Requiring efficient technology in heavy industry.
- Subsidising renewable energy.
- Investing in clean-coal technology.
- Improving the monitoring and enforcement of building codes.
- Implementing economic development plans that provide alternatives to deforestation.

### **Nicholas Stern on Copenhagen**

The United Nations climate change conference, to be held in Copenhagen in December, should provide the climax to two years of international negotiations over a new global treaty aimed at addressing the causes and consequences of greenhouse-gas emissions.

A global deal on climate change is urgently needed. Concentrations of carbon dioxide and other greenhouse gases in the atmosphere have reached 435 parts per million (ppm) of carbon dioxide-equivalent, compared with about 280ppm before industrialisation in the 19<sup>th</sup> century.

**(Editor's Note:** These figures include other greenhouse gases and are not just for CO<sub>2</sub> alone).

If we continue with business-as-usual emissions from activities such as burning fossil fuels and cutting down forests, concentrations could

reach 750ppm by the end of the century. Should that happen, the probable rise in global average temperature relative to pre-industrial times, will be 5 degrees Celsius or more.

It has been more than 30 million years since the earth's temperature was that high. The human species, which has been around for no more than 200,000 years, would have to deal with a more hostile physical environment than it has ever experienced.

Developing countries recognise and are angered by the inequity of the current situation. Current greenhouse-gas levels are largely due to industrialisation in the developed world since the 19<sup>th</sup> century. Yet developing countries are the most vulnerable to the consequences of climate change, which threaten the economic growth that is necessary to overcome poverty. At the same time, emissions cannot be reduced at the extent required without the central contribution of the developing world.

Climate change and poverty, the two defining challenges of this century, must be tackled together. If we fail on one, we will fail on the other. The task facing the world is to meet the environment's "carbon constraints" while creating the growth necessary to raise living standards for the poor.

To avoid the severe risks that would result from a rise in global average temperature of more than 2 degrees, we must get atmospheric concentrations back below 450ppm. This will require a cut in annual global emissions from about 50 gigatonnes of carbon dioxide-equivalent today to below 35 gigatonnes in 2030, and less than 20 gigatonnes by 2050.

Today, per capita annual emissions in the European Union are 12 tonnes, and 23.6 tonnes in the US, compared to 6 tonnes for China and 1.7 tonnes for India. As the projections for 2050 suggest that the world's population will then be about 9 billion, annual per capita emissions must be reduced to about 2 tonnes, on average, if the global annual total is to be less than 20 gigatonnes.

Most developed countries are targeting reductions in annual emissions of at least 80 per cent - relative to levels in 1990 - by 2050. If they are to convince developing countries that the 2050 goal is credible, they must be both ambitious and realistic about the domestic political challenges they face in adopting and implementing demanding targets for 2020, 2030 and 2040.

Developing countries need substantial help and support from rich nations to implement their plans for low-carbon economic growth, and to adapt to the effects of climate change that are now inevitable over the next few decades. Developed countries should also provide strong support for measures to halt deforestation in developing countries, and for reducing emissions substantially, quickly and at reasonable cost.

Based on recent estimates of the developing world's extra requests as a result of climate change, rich countries should be providing annual financial support - in addition to existing foreign-aid commitments - of about US\$100 billion for adaptation and US\$100 billion for mitigation by the early 2020s. Some of the latter can come through the carbon market. Rich countries must also demonstrate that low-carbon growth is possible by investing in new technologies, which should be shared with developing countries to boost their mitigation efforts.

We are already seeing extraordinary innovation by the private sector, which will drive the transition towards a low-carbon global economy. Investments in energy efficiency and low carbon technologies could also pull the global economy out of its economic slowdown over the next couple of years.

More importantly, in driving the transition to low-carbon growth, these technologies could create the most dynamic and innovative period in economic history, surpassing that of the introduction of railways, electricity grids or the internet.

There is no real alternative. High-carbon growth is doomed, crippled by high prices for

fossil fuels and killed off by the hostile physical environment than climate change will create. Low-carbon growth will be more energy-secure, cleaner, quieter, safer and more bio-diverse.

We should learn from the financial crisis that, if risks are ignored, the eventual consequences are inevitably worse. If we do not start to combat the flow of greenhouse-gas emissions now, the stock in the atmosphere will continue to grow, making future action more difficult and costly. Other public expenditure can be postponed, but delaying climate-change measures is a high-risk, high-cost option.

Climate change poses a profound threat to our economic future, while low-carbon growth promises decades of increased prosperity. The choice in Copenhagen will be stark, and the stakes could not be higher. We know what we must do, and we can do it.

Nicholas Stern is chair of the Grantham Research Institute on Climate Change and the Environment. He was formerly head of the British Government Economic Service and chief economist at the World Bank (notes updated 13/10/09).

## Greenhouse Emissions Decline in Wake of Recession

Little good can be said about the worst economic slump since the 1930's, but it has produced at least one piece of positive news - the downturn will make it a bit easier to slow the rise in emissions responsible for climate change.

As a result of the economic slump, global emissions of carbon dioxide, the main greenhouse gas, are expected to **decline** by 3 percent in 2009 compared with 2008, the steepest drop in 45 years according to figures compiled by the International Energy Agency (IEA). This compares with an average **growth** of 3 percent a year over the last decade.

The IEA made a prediction in a report in early October (on global greenhouse gas emissions) that because of slower economic growth, its previous estimate of how much greenhouse gas emissions will be produced in 2020 would be reduced by 5 percent.

But the IEA also warned against complacency, stressing that reaching a deal in climate talks to be held in Copenhagen in December 2009 is crucial to limiting the rise in global temperatures.

Another reason for cautious optimism, the report said, is that China will be able to slow down the growth of its emissions much faster than commonly assumed, because of its rising investment in wind and nuclear energy, and more meaningful cuts in carbon dioxide emissions.

But avoiding some of the worst consequences will still require significant and rapid investments in clean technology, and more meaningful cuts in carbon dioxide emissions, the report said.

The report outlines how governments can achieve additional cuts through energy efficiency and investments in clean technologies. The goal is to keep global temperatures from rising by more than 3.6 degrees Fahrenheit (2 degrees C). Meeting that target will require reducing emissions by 23 percent in 2030 compared with what they would otherwise be, the IEA said.

The cost of making the necessary changes would be US\$10 trillion from 2010 to 2030, the IEA said, but lower spending on energy bills would offset much or all of that investment. Every year of delay, however, would add US\$500 billion to the necessary investments.

While calling for deep cuts in emissions, the report acknowledges that profound transformation in energy usage would be necessary to achieve the cuts.

In the transportation sector, for example, which is dominated by fossil fuels, 60 percent of worldwide car sales by 2030 would have to be either hybrids, plug-in hybrids or electric vehicles to meet the IEA's goals.

# FUELS

## Will Hydrogen Remain a “Future Fuel?”

In an article in *Energy World* (April 2009), David Strahan questions the slow pace of the introduction of the hydrogen-based energy economy.

At the turn of the millennium, hydrogen was said to be the “next best thing”, promising a future of infinite clean energy and deliverance from climate change, and enthusiasts confidently predicted the breakthrough was just 5-10 years away.

Now, almost ten years later, despite ever-worsening news on global warming and the looming threat of Peak Oil, the hydrogen economy seems as distant as ever.

Real products are now inching closer to the market. Honda claims to be the first company with a fuel cell car, the FCX Clarity. But the company will make only 200 of these cars over three years, leasing them to customers at US\$600 per month.

Enthusiasts claim the remaining hurdles are not so much technical as financial, and that mass production will bring costs down dramatically. But so far, the fuel cell has remained stubbornly expensive.

Bringing down costs still presents big challenges, including the following:

### Scarcity of Platinum

Hydrogen fuel cells rely on expensive metal catalysts like platinum which are in short supply. Global car production in 2007 was around 71 million, and even if the amount of platinum required per vehicle could be reduced from around 100 grams at present to 20 grams, a wholesale shift to hydrogen fuel cell cars would still need 1420 tonnes of platinum per year, six times current production. At that rate the world’s resources of platinum-group metals would be gone in 70 years.

## Production of Hydrogen

For the hydrogen economy to happen, industry must come up with clean ways of producing it.

Most hydrogen is currently made in refineries by heating natural gas with steam in the presence of a catalyst, but this usually relies on energy from fossil fuels and can generate carbon dioxide as a by-product.

Because of this, the climate-change-benefits of fuel cell vehicles are scarcely better than those of petrol-electric hybrid vehicles. To make hydrogen cleanly and in bulk, will almost certainly mean using renewable energy to electrolyse water, although this process is costly and energy intensive.

## Efficiency of Energy Use

Nobody has yet solved the problem of the inefficiency of the whole hydrogen fuel chain when using electrolysis. From electrolysis to compression of the hydrogen for use, and inefficiencies in the fuel cell itself, means that only 24% of the energy used to make the fuel does useful work at the road.

By contrast, battery-powered electric vehicles and plug-in hybrids with no electrolysis or compressor to worry about, use 69% of the original energy. Cars running on hydrogen would need nearly three times the energy of those running directly on electricity.

To meet climate change objectives, the developed world needs to completely decarbonise electricity generation by 2050, so it cannot afford to throw away two-thirds of the primary energy in turning it into hydrogen.

A UK Department of Transport study found that if the UK were to switch to battery-electric vehicles, electricity demand would rise by just 16%, whereas switching to hydrogen fuel cell cars would need a jump of more than double that if the hydrogen is obtained by electrolysis. And the electric car is easily capable of regenerative braking, whereas the fuel cell car isn’t.”

## Conclusion

For all the research into hydrogen, fuel cells remain dependent on platinum, and hydrogen generation is still very energy-inefficient.

Meanwhile battery technologies for electric cars and plug-in hybrids are developing rapidly and continue to attract big investment.

Which will succeed - the hydrogen fuel cell car or the battery electric car? The jury may not be out for very much longer.

## Crude Oil Prices

The chart (Figure 1) prepared by Neil Mander shows the information for the year 18 October 2008 to 24 October 2009 for oil and gold prices.

Prices are in US\$ per barrel, and are taken from the Business Section of the NZ Herald each Saturday.

The crude oil prices are for oil from four different areas:

- Brent = North Sea
- Dubai = Middle East
- Tapis = Singapore
- West Texas Int = USA

New Zealand's main supply is from Dubai and is usually at the cheaper end of the spread.

The price of gold in US\$ per fine ounce, divided by 10 is also shown.

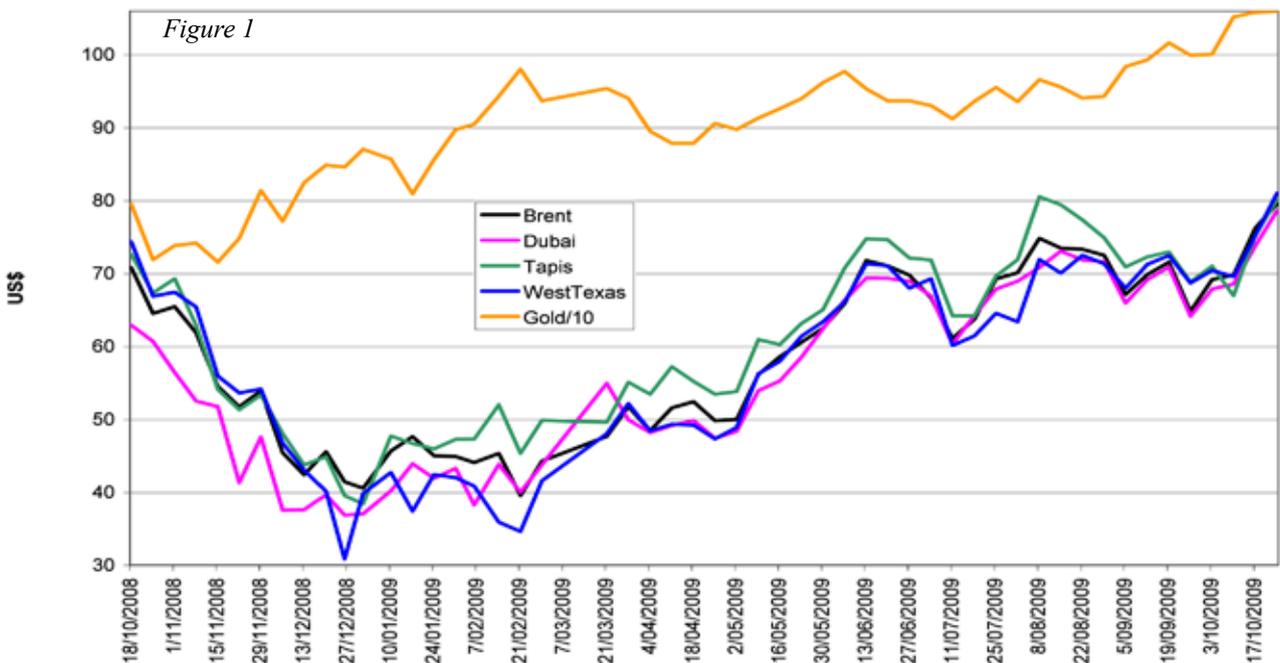
Until December the oil price was falling from its high of US\$147 per barrel in mid-July 2008 to below US\$40 in December. From January 2009, it then rose steadily until June when it hovered around US\$70 until early October, and since then it jumped up to around US\$80, but it was back to US\$77 in early to mid-November.

Neil notes that journalistic comment about the recent rise in the oil price seems to indicate it is a good thing, indicating economic confidence etc, but he questions whether it is good for the economies of countries which are heavily dependent on importing oil.

## Opec Keeps Crude Oil Flowing

With oil prices about where Opec wants them to be, and a modest economic upturn in the offing, the oil cartel, Opec, wasn't likely to "tighten the taps" when its leaders met in Vienna, Austria in early September.

The price of oil has been hovering around US\$70 for several months and with returning economic growth to support demand, analyst



thinks that Opec may have to rein in its production targets.

Several Opec countries including Algeria, Kuwait, Libya, Qatar and the United Arab Emirates have signalled that they are happy with their current combined output quota of just under 25 million barrels per day (bpd).

Saudi Arabia, Opec's number one oil producer and most influential member has said that US\$75 per day is a fair price for both consumers and producers - a level that would allow for continued investments in the oil sector without undermining efforts at global economic recovery.

Opec meets more than one third of the world's demand which the International Energy Agency (IEA) put at around 86 million bpd average for the 2008 year although this dropped down to around 84 million bpd earlier in 2009 during the economic recession before rising again.

In its latest outlook, Opec predicts that the economic downturn has taken such a big bite out of world demand for crude oil that it could take as much as four years to recover to 2008 levels. (The International Energy Agency has since predicted that this could now happen by the end of 2010 - see following article).

Oil stockpiles are increasing despite the Opec production cuts earlier in 2009. One oil industry analyst thinks that Opec may have to rein in its combined crude oil output by March 2010, but for now oil prices "have settled into a range that the market can sustain".

Crude oil prices have taken a wild ride over the past two years. They peaked at US\$147 per barrel in July 2008 then plunged to close to US\$30 in February 2009 before settling into their current range of about US\$70 to US\$80 per barrel.

## Oil Demand Increasing Again

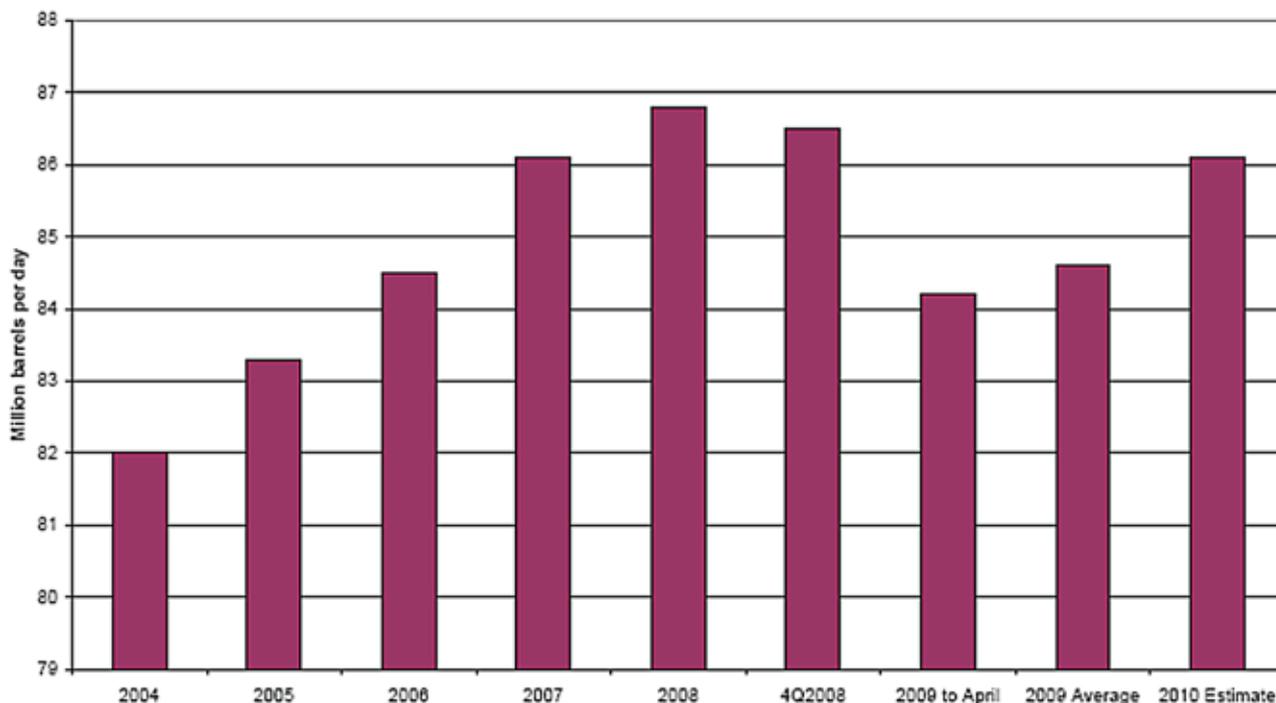
As reported in EnergyWatch in June 2009 (Issue 53, page 23) oil production was expected to be down to an estimated average 84.18 million barrels per day (bpd) during 2009.

However, the International Energy Agency (IEA) now says that world oil demand will rise by a better-than-expected rate by the end of this year and in 2010 as economic activity picks up.

In June it was reported that Opec countries still have another 700,000 bpd to take out of production to meet their agreed targets. Instead of doing this, in September Opec's eleven quota-

Figure 2

Average Daily World Oil Consumption



bound members produced about 1.6 million bpd above their production target of 24.845 million bpd, as Opec members pump more crude oil to try and capitalise on higher prices, leaving the world market currently with more than enough supply to satisfy the greater demand.

The IEA now says that 2009 world oil demand is expected to average 84.6 million bpd. Crude oil consumption in 2010 - led by emerging markets like China - is forecast to grow to 86.1 million bpd as shown on Figure 2 on the previous page.

As recently as April 2009 people were talking about a "Post Peak" oil supply situation. Publicity for a four-part seminar series held at Victoria University of Wellington stated

"A key turning point may have passed us by. World crude oil production may never exceed the record set in July 2008 (86.8 million bpd), setting up a bumpy ride down for the century's remainder".

These latest IEA predictions as reported above now suggest that the above scenario is becoming increasingly unlikely, at least in the immediate future.

In its recently released World Energy Outlook - 2009 (see following article), the IEA Reference Scenario shows oil demand recovering in 2010, reaching 88 million bpd in 2015, and then 105 million bpd in 2030.

## **IEA World Energy Outlook**

### **The Reference Scenario**

Although, as one of the consequences of the financial crisis, global energy use is set to fall in 2009, WEO-2009 projects that it will soon resume its upward trend if government's policies don't change.

In their Reference Scenario, energy demand increases by 40% between now and 2030, reaching 16.8 billion tonnes of oil equivalent.

Projected global demand is lower than in last year's report, reflecting the impact of the

economic crisis and of new government policies introduced over the past year.

Fossil fuels continue to dominate the energy mix, accounting for more than three-quarters of the incremental demand. Non-OECD countries account for over 90% of this increase, and China and India alone for over half.

In addition to increasing susceptibility to energy price spikes, the Reference Scenario projects a consistently high level of spending on oil and gas imports which would represent a substantial burden on import-dependent consumers. China overtakes the US around 2025 to become the world's biggest spender on oil and gas imports.

The energy poverty challenge also remains unresolved with 1.3 billion people still without electricity in 2030 from 1.5 billion today; though universal access could be achieved with investment of only \$35 billion per year in the period 2008-2030.

### **Containing Climate Change**

WEO-2009 demonstrates that containing climate change is possible, but will require a profound transformation of the energy sector.

A 450 Scenario sets out an aggressive timetable of actions needed to limit the long-term concentration of greenhouse gases in the atmosphere to 450 parts per million of carbon dioxide equivalent, and to keep the global temperature rise to around 2 degrees C above pre-industrial levels.

To achieve this scenario, fossil-fuel demand would need to peak by 2020, and energy-related carbon dioxide emissions to fall to 26.4 gigatonnes in 2030 from 28.8 gigatonnes in 2007.

Only by mitigation action in all sectors can the 450 Scenario be turned into reality. Energy efficiency is the biggest contributor, accounting for half of the total abatement by 2030.

Low-carbon energy technologies also play a crucial role: around 60% of global electricity production comes from such technologies by 2030.

This is made up of:

- Renewables 37%
- Nuclear 18%
- Plants fitted with carbon capture & storage 5%

Further, a dramatic shift occurs in car sales, with hybrids, plug-in hybrids and electric vehicles representing about 60% of car sales in 2030, from around 1% today.

## Comparing the Scenarios

Compared to the Reference Scenario, cumulative incremental investment of US\$10.5 trillion is needed globally in the 450 Scenario in low-carbon energy technologies and energy efficiency by 2030. In addition to avoiding severe climate change, the cost is largely offset by economic, health and energy-security benefits.

Energy bills in transport, buildings and industry alone are reduced by US\$3.6 trillion globally over the period 2010 - 2030.

The challenge for climate change agreement negotiators is to agree on instruments that will give the right incentives to ensure that the necessary investments are made, and on mechanisms to finance these investments in non-OECD countries.

In the 450 Scenario, in OECD countries the carbon price reaches US\$50 per tonne of CO<sub>2</sub> in 2020 and US\$110 per tonne in 2030.

## Higher Oil Prices

WEO-2009 also identifies higher oil prices, coupled with a downturn in oil sector investment, as a serious threat to the world economy, just as it is beginning to recover.

As a result of the financial crisis, investment in upstream oil and gas has already been cut by over US\$90 billion this year compared with 2008.

While oil demand has dropped sharply over the past year, in the Reference Scenario it starts recovering in 2010, reaching 88 million barrels per day (bpd) in 2015; and then 105 million bpd in 2030.

Calling for increased investment in fossil-fuel supply is not inconsistent with the need to a

low-carbon energy pathway. Even in the 450 Scenario, Opec oil production still increases substantially in the period to 2030, boosting those countries' revenues in real terms to four times their level in the previous 23 year period.

## The Importance of Natural Gas

Whatever climate policies are introduced, natural gas is set to continue to play a bridging role in meeting the world's sustainable energy needs. In the Reference Scenario, gas demand rises by 41% from 3.0 trillion cubic metres (tcm) in 2007 to 4.3 tcm in 2030. Gas demand also continues to expand in the 450 Scenario but is 17% lower in 2030 than in the Reference Scenario thanks to more efficient use, lower electricity demand and increased switching to non-fossil energy sources.

The recent rapid development of unconventional gas resources - notably shale gas - in North America has transformed the gas-market outlook. Unconventional gas is unquestionably a game-changer in North America, with potentially significant implications for the rest of the world.

The share of unconventional gas in total US gas output jumped from 44% in 2005 to around 50% in 2008 and, in the Reference Scenario, is projected to rise to almost 60% in 2030.

Press Release from the IEA, 10 November 2009.

## Comments on the Above

In a comment in SEF News (12 November) Nigel Williams has noted that in their Reference Scenario, the IEA has global energy demand increasing by 40% between now and 2030, and reaching 16.8 billion tonnes of oil equivalent.

The IEA has already said that to sustain global oil production at present levels will require discovery of another Saudi Arabia (in terms of oil reserves), and to get anywhere meeting the global demand, will need four new Saudi-size oil fields on line within the next 20 years.

In fact 40% growth in global oil demand by 2030 is only a modest 1.7% per annum (and frankly implausible when we consider China and India).

Yet when combined with the potential 6.7% per annum decline in supply from existing oil fields estimated recently by the IEA, the divergence between global oil supply and demand will become apparent very quickly.

So the IEA is “hanging its hat” on the hope that the world will get serious about climate change and in the process, reduce its dependence on oil. Slim chance!

It’s a shame that WEO-2009 didn’t take the chance to say, simply, that oil is running out and to “cop the consequences” now. We will only be angrier when we find out later!

WEO-2009 also says “calling for increased investment in fossil-fuel supply is not inconsistent with the move to a low-carbon energy pathway”.

That of course is bizarre because it is true! If we spend more on getting the remaining oil out of the ground now, then we will simply run out of oil sooner. That will indeed facilitate our move to a low-carbon pathway!

*Nigel Williams*

## **Oil Figures Distorted by US Pressure?**

An article in the Guardian (UK) newspaper on 9 November states that a “whistleblower” at the International Energy Agency (IEA) says that the world is much closer to running out of oil than official estimates admit, and that the IEA has been deliberately underplaying a looming shortage for fear of triggering panic buying. This senior person claims that the USA has played an influential role in encouraging the IEA to underplay the rate of decline for existing oil fields while overplaying the chances of finding new oil reserves.

In particular, the allegations question the prediction of the IEA’s just-released World Energy Outlook - 2009 (in its Reference Scenario) that oil production can be raised from its present level of around 84 million barrels per day (bpd) to 105 million bpd in 2030 (see

page 20 of this issue of EnergyWatch). External critics have frequently argued that this cannot be substantiated by firm evidence and say that the world has already passed its peak in oil production.

The IEA in 2005 was predicting oil supplies could rise as high as 120 million bpd by 2030, although it was forced to reduce this gradually to 116 million bpd and then a year ago to 105 million bpd. Many inside the IEA organisation believe that maintaining oil production even at 90 to 95 million bpd would be impossible, but there are fears that panic buying could spread in the financial markets if the figures were brought down further below 105 million bpd in 2030.

A second senior IEA source who has now left the organisation said that it was “imperative not to anger the Americans” but the fact is that there is not as much oil available in the world in future as had been predicted by the IEA. “We have already entered the peak oil zone and I think that the situation is really bad”.

The British Government (and others) always uses the IEA statistics rather than its own, to argue that there is little threat to long-term oil supplies. John Hemming, the MP who chairs the all-party parliamentary group on peak oil and gas, said that the revelations confirmed his suspicions that the IEA underplayed how quickly the world was running out of oil and this had profound implications for British government energy policy. He said that he had also been contacted by some IEA officials unhappy with the lack of independent scepticism over its predictions. “Reliance on IEA reports has been used to justify claims that oil and gas supplies will not peak until 2030. It is clear now that this will not be the case and that the IEA figures cannot be relied upon” said Hemming.

*“This all gives an importance to the Copenhagen (climate change) talks and an urgent need for the UK to move faster towards a more sustainable (lower carbon) economy if it is to avoid severe economic dislocation”* Hemming added.

# VEHICLES/TRANSPORT

## Will Hybrids or Electric Cars save the Environment?

Talk by Peter Kammler to ESR Auckland on Thursday 15 October 2009

Engineers are trained to create order out of chaos. There are so many types of cars said to be more environmentally friendly that it pays to have a closer look.

One problem is that our opinions and actions are shaped by both lobby groups and poor journalism. Often the good, investigative, journalists are hired by the industry lobby groups. Politicians then will do what the lobbyists say and where they think they can score votes. Government decisions have very little to do with what is the best economic decision. It is all very much to do with image.

Let us go back to basics:

A car is a means of transport to get you from A to B, dry and in reasonable comfort. Why then, don't we all drive small cars? Cars have become symbols of status and success. Over the years, cars have become faster and faster while the actual speed driven has reduced, due to road congestion.

Some decades back, German car manufacturers agreed to limit the top speed to 250 km/h, and to desist from advertising the maximum speed. Promptly, acceleration became the new yardstick. Never mind that even in a car that accelerates from 0 to 100 in six seconds, one has to wait for a passing lane to overtake a truck. All the high performance, and the general complexity of our cars, are both going far beyond what is reasonable. It has to be paid for in a large load on the environment. So, now, a third yardstick is being established: the environmental impact of a car – which unfortunately seems to be limited to comparing fuel consumption.

We have the hybrid Toyota Prius for people who want to be seen as environmentally friendly but



*Peter Kammler*

do they really know just how environmentally friendly their car really is – or is not? At the Oscar prize giving, some celebrities drive hybrid cars because they want to be *seen* to have concern for the environment. Never mind their private jets and heated swimming pools.

One hundred years ago, Ferdinand Porsche presented a petrol-electric car, a hybrid. Siemens had a horseless carriage with an electric motor. Now petrol-electric hybrids and battery-electric cars are gaining favour but there is a catch: A study done in the US, called Dust to Dust examines the total energy use of a car, including all energy used in the production process. The result is surprising: Hybrids are using up to three times more energy per mile than a small conventional car, simply because the production energy going into the hybrid components is so high. (<http://cnwmmr.com/nss-folder/automotiveenergy/>)

What are our options? Here are a few facts:

- Diesels are more frugal than petrol engines, because they work with a higher compression ratio. For the same reason they are not as smooth as a petrol engine. Car companies now try to combine the advantages of both: The Diesotto engine. The petrol ignites by itself under high

pressure. The engines do run, but they are very rough, and the self-ignition does not work at all revs.

- Diesel fuel is cheaper than petrol but there is a certain ratio of production required at the refinery. Once the demand for diesel rises beyond this ratio it will get scarce and lose its price advantage.

- Biofuels have taken up space where food crops should be grown. It is claimed that the plants for a tank of biofuel could have fed a person for a year. Making biofuel from organic waste materials such as sewage sludge – perhaps with the help of genetically modified algae or bacteria - is the next step, but there will never be enough biofuel to run our cars. Nevertheless, the fuel would be welcome.

- A battery to store the same amount of energy as a tank of petrol would weigh twenty times as much.

- Electric motors are far less complicated than a petrol engine. They have only two bearings, and only one moving part which does not change direction two hundred times a second. There are no metal parts chafing against each other. They deliver huge torque right from the start, and they can be overloaded for a short time without harm. They have one huge drawback though: They run on electricity.

- To get reasonable acceleration and power output from a petrol engine, it has to run at high revolutions. Then, a supercharger or compressor is needed to push enough air into the cylinders. A combustion engine has to run between 800 and about 6000 rpm. To get a reasonable efficiency, a whole host of things are needed: variable valve timing, variable ignition timing, variable turbine blades in the supercharger.

- In hybrid cars the idea is to recover the energy normally turned into waste heat when braking. However, a battery is only one way of several to store energy. A rubber band, a flywheel, or compressed air are other ways to do it.

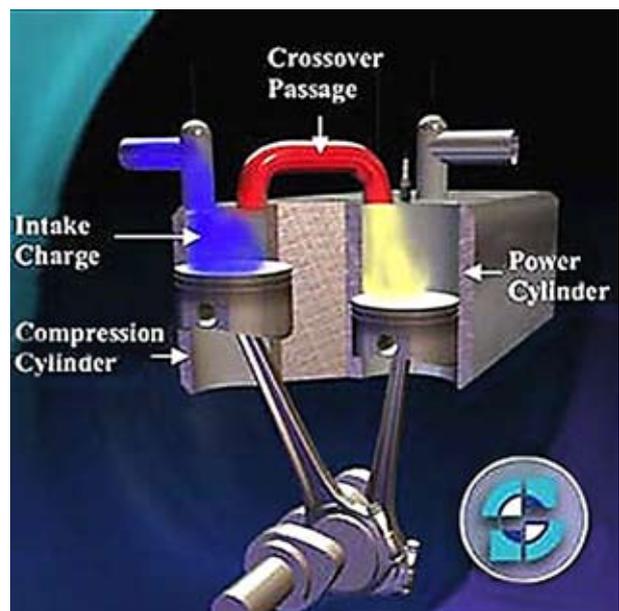
- In a hybrid car the electric motor assists with acceleration and hence reduces the size needed for the petrol engine.

- In a mild hybrid the flywheel is replaced by the electric generator/motor. The unit is only about two inches wide, and fits neatly into the space. This setup also allows a start-stop function: The engine is switched off at stop, and automatically starts up when the foot is taken off the brake pedal. This is very quiet because there are no rattling gears involved.

- In a Mercedes S class, the extra cost for the hybrid is about \$18,000. It takes 300,000 km before this extra cost is recovered from fuel savings (at NZ prices). But it is not only money where the savings are elusive. There is also additional energy needed to produce the hybrid components. The upshot is: If you can't get your extra money back it's likely you won't get the extra production energy back either. Hybrid cars are OK but rather for image than the environment.

- Using compressed air to store energy might be an option for the future, and car companies are busy working on systems to have electromagnetic valves instead of valves operated by camshafts. One could then use the engine as a compressor to decelerate the car, and start and accelerate the car again with compressed air.

- The Scuderi Engine is a split-cycle design that divides the four strokes of a conventional combustion cycle over two paired cylinders: one intake/compression cylinder and one



*Scuderi Engine*

power/exhaust cylinder. By firing after top-dead centre, it produces highly efficient, cleaner combustion with one cylinder and compressed air in the other. Fitting a tank for compressed air between the cylinders would turn this engine into a hybrid without the excessive weight of a battery.

- To achieve a 100km range, an electric car would need batteries worth about NZ\$20,000.
- Where does the electricity for charging come from? In New Zealand we have a good energy mix but this is not what charges the batteries of electric cars. Here is why: Renewable energy sources have high up-front costs but running costs are very low because the fuel is free. Therefore these sources are used first. Any additional demand, such as from thousands of electric cars has to be met by fossil fuel stations. Even if the demand at the time is met by hydro, the water storage will be diminished, prompting a fossil fuel station to be run later.
- The electric motor is highly efficient (about 85%). However, counting the losses in the power station, transmission losses, and the losses in the battery, the efficiency turns to custard.
- Battery-electric cars are very expensive and have a low range. They need to be subsidised, usually by both the government and the car manufacturer. The situation might change in the future with development of lighter and more efficient batteries.
- To get around the limited range, one can use a petrol or diesel engine to charge the battery as it gets low. The engine is very simple, running at a fixed speed. Since there is only a wire connection between the engine and the battery, the engine could go anywhere in the car, saving space. Gearbox, drive shafts, differential, stub axles, all gone! Electric motors could be within the wheel rims. It would impair the road holding and suspension, but in a city car this can be tolerated.

### **Conclusion**

By the looks of it, the internal combustion engine has quite some life in it still. Improving

the efficiency can come from measures other than the propulsion:

- Reducing weight, using low-resistance tyres, having a smooth underbody, doing away with spoilers (they just create drag).
- A cold engine uses twice as much fuel. In Berlin city buses are plugged into a system that keeps the sump oil warm over night. Volkswagen developed a heat retention system a few years back, a bit like a thermos for the cooling water. A warm engine also suffers less wear and tear, thus saving production energy because the car lasts longer.
- Above all, we should reduce the size of the engines, and the size of the cars.

*Peter Kammler*

## **Buyers Move to Smaller Cars**

A few months ago the industry mood at major motor shows was all about the struggle to survive. Recently (mid-September) at the Frankfurt Motor Show, the industry gave a sigh of relief, confident that the worst was over, but painfully aware that there would be no return to business as usual any time soon.

The sense of relief is understandable. After the collapse in sales and savage production cutbacks that took place in nearly every big car market nine months ago - with the huge exception of China - volumes have started to rise as inventories are cautiously rebuilt.

Balance sheets appear to have been stabilised if not repaired. There is even a good chance that in the final quarter of this year, some of the big carmakers will return to (very modest) profits, while others will do so next year.

Credit, the life blood of the industry is flowing again, although somewhat anaemically. Particularly in Europe, government-sponsored scrappage schemes have brought buyers back into the market. And manufacturers are now enjoying reduced costs, partly from lower raw-material prices and partly because they have laid off workers.

What has NOT happened is any substantial reduction in capacity, particularly in Europe where factories are capable of producing 4 million more cars than the market can take, even in a good year. Not long ago it was widely assumed that the economic downturn would be sharp enough to take out more than one big car maker but governments have done their utmost to stop that happening.

Although cuts at General Motors and Chrysler have removed some (but not enough) excess capacity in America, not a single car factory in Europe has closed so far. That is one reason why the carmakers assembled at Frankfurt believe that the normal cyclical rebound in profitability may not happen this time. There are plenty of other reasons as follows.

One worry is the effect of withdrawing scrapping incentives. These have propped up new car demand this year, especially in Germany. Car company bosses fear that production volumes could slide next year unless “normal” new car buyers - well off people and companies - return to the market.

Although the scrappage schemes have kept factories going, most of the action has been geared towards cheap, small vehicles which are less profitable for carmakers. They have thus weakened the “mix” - the balance of small and large vehicles sold - and reduced profit margins. A permanent shift towards smaller cars would devastate industry profits.

One big reason to expect such a shift is **removal of the very cheap lease finance** that manufacturers have relied on to stoke demand for their more costly cars, especially in America, Germany and Britain. Credit is unlikely to be so easily available again.

A second threat to the mix, especially for the German premium carmakers is **demographic change**. It is predicted that by 2020, 40% of new car buyers in developed markets will be aged over 60, compared with less than 30% today. Although the “affluent elderly” like premium brands, especially Mercedes, they tend to want cheaper, smaller cars. Being mostly retired,

they are generally buying a car with their own rather than with a company’s money. “Empty nesters” do not need much carrying capacity.

Also over 65 year olds drive 45% fewer kilometres than the average, which means that their cars last longer. Together with the growing durability of modern cars, it is estimated that underlying sales in developed markets could fall as much as 30%. For growth of sales in big powerful prestige cars, manufacturers will have to rely on emerging markets.

A third threat to the mix is the **ratchetting up of emissions legislation for new cars** in almost every imported car market as governments struggle to meet ambitious carbon-reduction targets. This seems certain to reverse the trend in recent years towards heavier and more bloated vehicles. It is also forcing manufacturers to invest abnormal amounts to develop clean technologies in the hope that their bigger vehicles can be made more socially acceptable and escape penal taxation.

The executives gathered in Frankfurt were aware that threats to the mix, and therefore profits, are long-term and structural rather than short-term and cyclical. They also acknowledge that the industry will have to wean itself from the habit of using bigger cars to subsidise smaller ones, and start to find a way to start building downsized vehicles that make money. Part of the answer is to adopt low-cost manufacturing techniques and not to load cheap cars with unnecessary technology.

At the same time, the industry must tackle the problem of overcapacity in mature markets. That may be easier once economies have emerged from recession and unemployment is not quite so high on the political agenda. More than anything, overcapacity undermines pricing power.

The car making industry may feel that it has come through a “near-death experience” in better shape than it hoped at the beginning of the year. But a return to health will take a lot longer.

**Editor's Note:** As noted in EnergyWatch Issue 54, August 2009, page 24, car makers will sell about 9.7 million new cars and light trucks in the USA during 2009 - a huge reduction from sales of 16.2 million as recently as 2007 and 13.2 million in 2008. US sales held above 16 million vehicles a year consistently from 1999 to 2005.

Later in 2009, US car and light truck sales had increased again to an annualised rate in October of 10.45 million units, and total sales for the 2009 year are now expected to be just above 10 million. Forecasts for 2010 are for US sales of about 11.0 million units.

A consequence of this fall in US sales is that China and Western Europe have displaced the USA as the world's largest market for new car and light truck sales. New sales in Western Europe could reach 13.3 million in 2009, only slightly down on the 2008 figure of 13.6 million.

Total global car and light truck production is now around 70 million units annually.

## **NZ New Vehicle Sales Fall**

Sales in NZ of new cars and light commercial vehicles for the year ending 31 December 2009 are likely to be down 35 percent compared with the 2008 calendar year to around 65000 units.

The forecast for the 2010 year is for a growth of about 5 or 6 percent on the 2009 figures.

Compared to the month of October 2008, new car sales in October 2009 were down 26 percent, light commercial vehicles were down 34 percent and heavy commercial vehicles were down 40 percent.

## **NZ Drivers not so Green**

An international survey of attitudes to motoring shows that NZ drivers put prestige and status ahead of the environment. It is another blow to NZ's environmentally-aware reputation abroad, following an article in the UK's Guardian newspaper accusing NZ of "greenwashing" and of not making a serious commitment to reducing global warming.

The survey of 14,000 people in 20 countries showed that New Zealanders feel a strong attachment to their vehicles and are relatively unenthusiastic about "green cars" such as petrol-electric hybrids.

Findings released EECA also show that

- More than half of us say that we can't do without our cars.
- 40% of New Zealanders would prefer their "dream car" over a "green car" (the global average was 31%)
- 26% of New Zealanders are "too lazy" to walk, cycle or use public transport.
- 22% of New Zealanders like to drive fast

Reference: Sunday Star-Times, 22/11/09

The researchers identified four car personality types

- Enthusiasts (6% of NZers). These people would choose a dream car if money was no object.
- Rationalists (53% of NZers). These people are most likely to say that they can't live without their car because it is their means of getting from A to B.
- Apologists (25% of NZers). These people can't imagine life without their cars, not because they are emotionally attached to them or like to drive fast (they don't), but because cars make their life easier.
- Begrudgers (15% of NZers). They have and use vehicles but resent the way cars dominate society, feeling that prices should be higher to discourage car ownership.

Source: EECA

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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).

Material can be sent to the SEF Office, PO Box 11-152, Wellington 6142, or by email to [editor@sef.org.nz](mailto:editor@sef.org.nz), or by directly contacting the Editor, John Blakeley, care of Department of Civil Engineering, Unitec New Zealand, Private Bag 92-025, Auckland 1142.

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