



EnergyWatch

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

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Email: info@sef.org.nz

Web: www.sef.org.nz www.energywatch.org.nz

Editor: John Blakeley

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Editorial

Biofuels, Hydrogen, or Batteries?

There are increasing calls for NZ to set itself on a path towards sustainable transport energy - but how will this best be achieved?

Biofuels

A recent report by the Royal Society of New Zealand's energy panel recommended that fossil fuels be phased out over the next 14 years in favour of biofuels. It claims that NZ has more than 1 million hectares of marginal land suitable for energy farming available in the North Island and more than 2 million hectares in the South Island with 1 million hectares being able to produce 3-4 billion litres of bioethanol per year. But how difficult to access is this land for tending to and harvesting the crops or trees? And how much energy will be required to get the biomass out to a suitable processing site?

There remain many question marks over whether this is an appropriate course of action. The conversion of wood to ethanol as suggested in the report is not yet a fully commercial process. Conversion of crops to energy is fully commercial but there are considerable doubts over the energy efficiency of the conversion processes when biofuels are used in transport. So from an energy efficiency point of view, it may not be a desirable solution. The energy used in farming, harvesting and transporting an energy crop can be a very substantial fraction of the energy in the fuel produced.

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Also, internationally there is considerable concern about the greater use of food crops for biofuels, including soybeans, corn and maize, because of impact on food prices especially for the world's 2 billion poorest people, and also about the amount of productive agricultural land required for growing these crops. Also, if biofuels are imported to NZ, they should not be obtained from countries where rainforests are being cleared to create new agricultural land for this purpose.

All the above questions need credible answers before biofuels can be seen as a solution to NZ's transport energy needs.

Biofuels are further discussed on pages 28-30 of this issue.

Hydrogen

Billions of dollars are currently being invested in research around the world towards the goal of making hydrogen "the sustainable fuel of the future." But hydrogen is an energy carrier, not an energy source.

The most economical means of producing hydrogen at the present time is from fossil fuels by a variety of industrial processes with significant amounts of greenhouse gases being produced.

A more expensive means of producing hydrogen is by means of electrolysis using large amounts of electricity and water. If the electricity comes from thermal generation, there will be significant amounts of greenhouse gases involved in producing the hydrogen.

If the electricity comes from a renewable source (wind, hydro) then very little if any greenhouse gases will be produced but it may not be the most efficient "environmentally friendly" means of providing transport energy. Scientists at the European Fuel Cell Forum say that only 25 percent of the electrical energy produced from generation at the turbine is available to move a hydrogen vehicle, whereas if that electricity is distributed via the grid and used to charge batteries, then only about 10 percent of the energy is lost.

If the electricity comes from nuclear power generation then the greenhouse gas emissions involved may be quite low, but it opens up a whole new set of environmental and other issues to be debated.

Large quantities of electricity will be involved. Kruger et al (2003) made a preliminary assessment that in NZ, if all the required hydrogen was produced by electrolysis and the rate of uptake of hydrogen fuel cell vehicles was such that by 2050 nearly all of our vehicles are powered by hydrogen, then the additional electricity load per annum (pa) may be around 35 terrawatt hours (TWh). This would be in addition to the estimated growth in electricity demand in other sectors of the economy from the present 40TWh pa to around 90TWh pa, giving a combined figure of 125TWh pa or about 3.1 times the present electricity demand figure.

Other major challenges would have to be overcome if hydrogen is to become our principal transportation fuel by 2050, including reducing the price of the fuel cell vehicles down to a competitive level, and the expensive provision of the necessary infrastructure for both production and delivery of the hydrogen.

Blakeley and Leaver (2004) described a study with an assumed starting point of 10,000 hydrogen fuel cell vehicles in NZ in 2010 (now highly unlikely) and looked at growth rates of 10% pa, 20% pa and 30% pa through to 2050. The study showed that the contribution to reducing fossil fuel dependence will be very small at any of these growth rates until about 2030.

Beyond 2030, it would require a continuing growth rate of 30% pa in order that almost the entire fleet of fossil-fuel-driven internal combustion engines could be retired by 2050.

A growth rate of 30% pa between 2010 and 2050 would be very difficult to achieve in practice unless and until:

- hydrogen fuel cell vehicles have become very economically competitive with fossil-fuel-driven vehicles

- the necessary hydrogen servicing infrastructure is all in place; and/or
- severe limitations occur in the international availability of fossil fuels for transport purposes.

Battery-Electric Vehicles

In the 1990's it was thought that battery-powered electric vehicles could be the solution to motor vehicle pollution problems in cities but the expected break-through in battery technology did not eventuate. In the US, the State of California attempted to impose minimum production targets for "zero emission vehicles" to commence from 1998, against strong opposition from the US auto industry. Eventually the target became voluntary before being abandoned completely, and very few such vehicles were ever produced, and many of those that were produced were crushed to prevent their use for spare parts.

Gradually during the late 1990's and early 2000's the focus of attention shifted towards hydrogen fuel cell vehicles as being the eventual solution, with a large emphasis on research.

However just recently it appears that the pendulum may be swinging back again towards the battery-electric vehicle. There has also been considerable talk over the last two years about the "plug in hybrid" being more versatile than pure battery-electric vehicles.

A dozen or more models of plug-in hybrids are now being sold in small numbers in several countries. And General Motors (GM) has just unveiled a prototype plug-in hybrid car called the Chevrolet Volt at the Detroit motor show, ten years after GM cancelled its plans for a battery-powered car, the EV1, prompting other big manufacturers to do the same. (See p30 of this issue).

Recent developments in rechargeable lithium-ion battery technology show considerable promise, this technology being derived from highly efficient laptop computer batteries. A key factor will be the cost and longevity of the lithium-ion car batteries about which little is known as yet.

Seminar on Energy Policy

Joint SEF/EFNZ Event:

One-Day Seminar on Government Energy Policy

Friday 16 February

Victoria University of Wellington

Venue Lecture Theatre 1

Law School 23 Lambton Quay

Cost (GST Inclusive): \$123.75 for SEF members/\$191.25 for non-members

The Sustainable Energy Forum and the Energy Federation of New Zealand are holding a joint one-day seminar which will focus on the draft NZ Energy Strategy and related documents. Speakers will discuss both the overall strategy and specific aspects, including stationary energy (electricity/heat) and transport. There will be plenty of time for discussion.

The registration form and further venue and programme details will be made available via SEF News and the SEF website

In the past, battery-electric car motors have remained uncompetitive with the internal combustion engine because of their limited range before requiring recharging, their cost and the limited life of the batteries, and the weight of batteries required for a reasonable range.

However such battery facilities could be considered part of a national strategy to increase the level of distributed electricity storage capacity and thereby increase the take-up of renewable generation that might otherwise be lost. The use of time-of-day pricing signals provided through

the internet would provide car owners the opportunity to buy power at cheap rates (usually at night) and sell power back to the system during peak periods (usually during office hours when electric cars are conveniently parked together in central city lots near load centres).

Providing sufficient electricity for battery-electric vehicles is not nearly as great a challenge as it is for hydrogen vehicles when the hydrogen is produced by electrolysis. Only about 30 percent as much electricity will be required because of the much greater efficiency of conversion of electrical energy to move the vehicle. Hence if our whole vehicle fleet became battery-electric by 2050, perhaps we would need around 10TWh pa of electricity, about one quarter of our present electricity demand figure and 10 percent of the likely NZ electricity demand in 2050.

Conclusion

All three of the above options to move NZ towards sustainable transport energy have serious challenges to overcome. What we do in NZ will be very much determined by what happens internationally and I will be awaiting future developments with great interest.

John Blakeley

References: Kruger, P., Blakeley, J.P. and Leaver, J.D. (2003). Energy resources for developing large-scale hydrogen fuel production in New Zealand. Proceedings of the 14th Annual Meeting, National Hydrogen Association (CD Rom ed.), 4-6 March, Washington DC.

Blakeley, J P, and Leaver J D (2004). Key factors in the introduction of hydrogen as the sustainable fuel of the future. Proceedings of the International Conference on Sustainability Engineering and Science, 7-9 July, Auckland. www.nzses.org.nz

Errata

In the previous issue (EnergyWatch 42, pg 12) the figure “40%” was accidentally deleted in the second column above the diagram in the printed version. The last sentence should read “New coal fired power station efficiency is 40%.”

The error has been corrected in the electronic version of EnergyWatch 42, now available at both the SEF and the EnergyWatch websites.

Mike Underhill Returns to EECA

Mike Underhill has been appointed as the new Chief Executive of the Energy Efficiency and Conservation Authority (EECA). This news has been welcomed by SEF members, as it should provide the shot in the arm that EECA needs to ensure that energy efficiency and sustainable energy have more relevance for NZers. SEF wishes him well in his new role.

Mr Underhill is currently the Chief Executive of WEL Networks, the Waikato-based electricity distribution company, and was earlier Chief Executive of the EnergyDirect Corporation, in Lower Hutt. He was also the previous chairman of the EECA Board, and he has more than 35 years experience in the energy industry.

A Disconnect?

There appears to be a “disconnect” between the draft NZ Energy Strategy (released by the Government on 11 December 2006) and the long term vision expressed by the Prime Minister, Helen Clark, at the NZ Labour Party Conference in Rotorua in late October for NZ to become a world leader in sustainability.

She said that she eventually wanted NZ to become “carbon neutral”, a goal very much more ambitious than that set by the Kyoto Protocol.

Speaking on Radio NZ’s Nine to Noon programme on Tuesday 12 December, financial commentator Rod Oram said that, he had been startled by Helen Clark’s carbon neutral statement at the Labour Party Conference, as although he knows of her interest in this topic, she had never previously spoken about it publicly, or is it evident in Government policy.

Rod Oram said that if NZ is to go carbon neutral, then the draft NZES is hardly a first step towards that goal.

The programme host, Kathryn Ryan, noted that the draft NZES had obviously been under preparation for some considerable time and

asked him whether it had already been made out-of-date by the Prime Minister's carbon neutral statement?

Oram replied that this was not the case, because the draft NZES has been produced by Government officials as a discussion document on the official policy of the Government.

A SEF view is that Helen Clark is now showing real leadership on the climate change issue and that the officials who created the draft NZES cannot be expected to reflect such leadership without further direction.

Hybrid Cars "Myth"?

In a letter to the NZ Listener (30/12/06), Dr Garth Harris states that there is a "myth" that hybrid cars are more fuel efficient than conventional cars and he notes that when driven at fairly constant speed on the open road, a hybrid has approximately the same fuel-efficiency as a conventional car of the same engine size driven over the same route at the same speed.

Dr Harris notes that in those circumstances, it is the petrol engine, not the electric motor, that is delivering virtually all the motive power but for stop-start city driving, the hybrid is indeed more fuel-efficient.

He says that if the hybrid is a plug-in model, which has to be charged at night from the electricity grid, one has to consider the efficiency of electricity production - for example, from fossil fuels, where the efficiency can be as low as 35% (which is still somewhat better than the internal combustion engine).

He notes that most drivers should be able to achieve significant energy and cost savings by downsizing their vehicle, driving at lower speeds, at more constant speeds, through good vehicle maintenance, and using alternatives, including public transport.

He also states that for a greater net reduction of carbon dioxide, it will be necessary to use renewable fuels and asks "Can New Zealand

afford to produce comparatively low-value transport fuels instead of high-value products such as cheese, meat and paper?" However, he says that some "renewable" fuels can be produced from waste products.

EnergyWatch Comments:

1. The recent RSNZ report (referred to on page 1) has recommended the rapid development of a home-grown biofuel industry, but it is careful to note that the crops should be grown on marginal land rather than good productive farmland.

2. If the plug-in hybrid obtains its electricity to charge the batteries at night from a renewable source (hydro or wind), efficiency can be as much as 90% or higher.

3. In both the last two EnergyWise rallies driven mainly in open road conditions, the Supreme Award has gone to a hybrid car (see note below) This suggests that hybrids do have some advantage, even on long journeys?

EnergyWise Rally Results:

In the 2004 EnergyWise Rally over a distance of 1619 km around the North Island, the Supreme Award was won by Chris Amon driving a Toyota Prius hybrid with a fuel consumption figure of 4.02 litres/100 km (70.3 mpg). Second place overall was a dead heat between another Toyota Prius hybrid and a conventionally powered Daihatsu Charade, both recording 4.39 litres/100 km (64.4 mpg).

In the 2006 EnergyWise Rally over a distance of 1624 km from Auckland to Wellington and return, the Supreme Award was won by Helen and Glenn Johnston driving a Honda Civic hybrid using less than 77 litres of petrol, which equates to about 4.74 litres/100 km (59.6 mpg).

(It appears that the Toyota Prius hybrid did not compete in the 2006 event).

The different courses used may mean that fuel consumption comparisons between the two events are not valid.

John Blakeley

DSM and Smart Meters

Demand Side Management

It is intended to include a feature on the demand side management (DSM) of electricity in the next issue of EnergyWatch.

An important issue which has recently arisen in NZ in relation to the topic of time-of-day pricing and intelligent metering of electricity is that it looks like the large generator-retailers are already committing themselves to large investments in meters that may do little to promote DSM.

This could stifle the active participation of electricity consumers in price-responsive demand. It may meet the wishes of retailers to lower risks to electricity suppliers but prevent consumers from reducing their own power bills significantly through DSM.

Below is a brief article elaborating on this and a summary of an article by Paul Adams of the Baltimore Sun newspaper which gives a good introduction to the subjects of smart meters and DSM for householders.

Smart Meters

Stop Press: Smart meters: happening now in New Zealand, but will retailers control use of the technology?

Arc Innovation, wholly owned by Meridian Energy, has announced a programme to install 110,000 smart meters in Christchurch over the next two years, beginning in January. According to the information provided at an industry conference in November, the meters will be “non-half-hourly compliant” apparently meaning that they will only record the consumption of each consumer for each half-hour and enable information to be transmitted back to the generator-retailer. If this is the case then meters will not be able to reconcile time-of-day demand on the wholesale market.

Therefore they will only support pricing offers from the retailers, rather than actually letting consumers decide when to purchase or sell electricity to effect savings. Thus the meters may not help achieve the aims of the Government’s draft energy strategy to enable demand side management to compete in the NZ electricity market.

Now Genesis, Contact Energy and Mighty River Power have put out an RFI (Request for Information) to co-ordinate installation of smart meters for 1,200,000 customers. This is essentially a proposal for a roll-out of meters throughout the country, so it would seem essential to have a public input into whether they will be fully half hour compliant, and whether they will enable householders to observe and limit their peak as well as half-hourly energy demand.

The issue that should concern NZ Regulators is one of governance - who decides what technology will be installed, at what cost and in what way the benefits will be shared between customer, retailer, and other parties, and who should pay for the very large investment costs that are required? Arc Innovation says its Christchurch programme will cost \$100m over about 10 years based on a pilot programme in Central Hawkes Bay. The costs of the larger programme to replace all meters in NZ could well be in excess of a billion dollars.

Such pre-emptive action by generators to decide how “intelligent” meters should be, ought to concern organisations such as Grey Power, Consumers Institute and Electricity Trusts. Their members may end up paying higher costs to cover meters that do not realise the potential to provide them direct benefits.

An article describing such programmes and potential benefits has recently been posted on SEF News: Because of its importance and timeliness, we provide a summary version below.

Article by Paul Adams

Smart meters can generate ways to save on electricity. Baltimore Gas and Electricity (BGE) a utility in the USA is testing devices which would reward less use of electricity.

Imagine an electricity meter that can automatically turn household appliances off when wholesale electricity gets too expensive and - with enough of them in use - possibly reduce the need for new power plants.

These are potential benefits of so-called smart meters, which are fast becoming the darling of the utility industry as US state and federal regulators push power providers to cut energy costs. Utilities are turning to the devices as they struggle to meet demand, which in some areas is expected to outpace construction of new power plants and transmission lines. The meters average about US\$100 or more per household to install, but advocates insist that consumers will save much more than that in power costs over the long run.

BGE will join the movement this year as it begins testing meters that, among other things, could save customers money by rewarding them for using less power during times of peak demand, such as on hot summer afternoons. The technology works in part by making it possible for utilities to measure a customer's power use on an hourly basis without the need for meter readers.

Many experts say the trend reflects a growing realisation among utilities and policymakers that cutting demand might be a faster and more effective way to bolster the nation's ageing power grid than building new plants. It also represents a seismic change in thinking for utilities, which have historically seen their profits linked to how much electricity they sell.

Though critics worry that utilities are pouring billions of dollars into technology that would be better spent on conservation, most agree that benefits are to be gained from smart meters.

Currently, most residential customers pay the same electricity rate day after day no matter

when energy is used, even though the true price of power can change drastically throughout the day and the year.

A key feature of smart meters is the ability to record a customer's energy usage hourly and then send that data back to the utility over low-voltage power lines or through wireless transmission.

Once smart meters are installed, a utility could use the data to offer customers different rates for using power at different times of day. That would allow utilities to greatly expand and enhance their existing "time-of-use" programmes, which could help consumers save on electricity costs.

The financial incentive is designed to encourage customers to reduce demand when energy is needed the most. Most industrial customers already use such an approach, often employing energy consultants to tell them when to curtail usage to achieve the greatest savings. Currently, too few residential households enrol in the time-of-use programmes to have a major impact on the power grid. But with residential rates soaring, utility officials say they believe more homeowners will be willing to sign up for such programmes.

Some regulators see a day when time-of-use rates will be the norm rather than the exception. For example, Pacific Gas and Electric Co. in California has begun installing 10.3 million smart electric and gas meters in every home in its service territory. The effort will cost \$2.2 billion over 20 years and be funded by ratepayers.

The movement got a boost in the USA from the Energy Policy Act of 2005, which ordered states to investigate the potential implementation of such "demand response" programmes. Those studies are under way in Maryland and elsewhere.

Done right, proponents say, demand response programmes can shave as much as 10 percent to 15 percent off customers' bills by rewarding them for shifting certain tasks - such as washing

dishes or doing laundry - to early morning or evening hours. State and federal regulators say the potential for savings might be greatest in the Mid-Atlantic coast area, where a shortage of transmission lines can send wholesale power prices soaring during a heat wave. Wholesale power that might normally sell for US\$60 to \$100 per megawatt within PJM Interconnection (which manages the power grid for Maryland, 12 other states and the District of Columbia), can briefly climb to more than US\$1,000 on exceedingly hot days.

Experts say lowering demand even a few percent or less at critical times means some power producers don't have to turn on their most expensive natural gas and oil generators to meet demand. Such "peaking" plants often operate fewer than 100 hours a year but can have a disproportionate effect on the wholesale price of electricity.

However, critics note that shifting power usage to different times of the day will not reduce - and might even enhance - the need for base load coal and nuclear plants, which come with environmental costs.

But proponents counter that customers who turn down their air conditioner or pool pump for a few hours during the hottest part of the day are using less energy even if they turn it back on at night, when it's cooler. In addition, smart meters force consumers to pay more attention to how and when they use energy. Once they see the potential for savings, many consumers find ways to use less.

Smart meters offer other benefits, such as making it possible for utilities to automatically tell which customers are without power instead of having to knock on doors or wait for them to report a problem. Such information shortens the time it takes to make repairs.

The meters also can be linked with other devices, such as "smart" thermostats, which come equipped with displays that, among other things, can be programmed to tell a homeowner how much energy he or she is using and at what price. In exchange for rebates, customers could

allow their utility to remotely raise the setting on their thermostats on a few hot days each year.

Over the long term, other devices could be added that remotely control individual appliances, telling them to temporarily shut down during times of high energy demand. Industry officials envisage a day when many new appliances will be equipped with standardised computer chips allowing them to be controlled remotely, with smart meters acting as a sort of control hub.

Utilities in the US have historically been slow to adopt demand response and conservation initiatives because in most states the utilities' profits are linked to how much electricity they sell. State regulators estimate that a 1 percent decline in energy use can cut profits for a distribution utility - such as BGE - by as much as 5 percent to 10 percent.

But Maryland and a growing number of other states are moving to "decouple", or sever, the relationship between profits and electricity sales, allowing utilities to earn a consistent rate of return even if customers use less electricity.

The move towards smart meters won't come cheap. Pacific Gas and Electric customers, for example, will see a temporary rate increase of 1 percent with the installation of smart meters, but many industry experts and consultants say that the meters generally pay for themselves in five to seven years.

Reference: McClatchy-Tribune Business News, 7/1/07. Summarised from a SEF News posting by John Irving, 13/1/07

The NZ Situation

Discussion on SEF News in early January raised some interesting issues about the use of smart meters in the specific NZ situation, the question being asked as to whether or not load shifting is going to be more than a secondary effect in an electricity system with a majority of renewable generation (hydro, wind and geothermal)?

It was pointed out that in the present hydro-dominated NZ electricity system, the marginal average cost throughout the day still depends most on whether it is a wet or dry year."

Government Energy Policy

Participation Welcome

The draft NZ Energy Strategy and the draft NZ Energy Efficiency and Conservation Strategy are important to NZ's energy future and are both open to submissions at present, with the closing date in each case being Friday 30 March 2007.

SEF will be preparing a submission on both these documents and has opened an email discussion group to assist in this purpose.

SEF members are most welcome to join this discussion group and those who would like to be involved in drafting the SEF response to the draft NZES and draft NZEECS can join that discussion group by sending a blank email to SEFneecs-nzes-subscribe@yahoo.com

The Draft NZ Energy Strategy

Under the title "Powering our Future", the draft NZES was released on Monday 11 December, proposing that as much new electricity generation as possible should be renewable.

In releasing the document the Energy and Climate Change Minister, David Parker, said that the energy strategy aims to ensure that NZ develops a sustainable and affordable energy system which minimises greenhouse gas emissions, and which will give NZ an enduring competitive advantage over other countries.

Mr Parker said "There is a lot which the Government is already doing to encourage renewable generation, to lower emissions and to improve energy efficiency, but the draft strategy and other studies make it clear that more needs to be done."

"We are now developing a series of long-term programmes which will make a significant difference to energy security and greenhouse gas emissions. Central to this is the NZES and the aim that new electricity generation should be renewable, except to the extent necessary to maintain security of supply."

Mr Parker said "Promoting renewable energy is central to NZ's future. The New Zealand Energy Outlook to 2030 predicts oil use to increase by 35 per cent and energy-related greenhouse gas emissions to rise 30 per cent, if we do not change the way we produce and use energy."

"NZ is in the fortunate position of being able to produce large amounts of low-emissions electricity from renewable resources, such as hydro and wind, which are plentiful and cheap by world standards."

"These proposals could make a significant difference to NZ's energy security and levels of emissions, and put us on a path to carbon neutrality. They are crucial to transforming our economy, and to NZ's identity as a clean, green nation."

Complementing the draft NZES are two additional discussion papers. One is on the longer-term options for addressing greenhouse gas emissions across all sectors of the economy beyond 2012, and the other proposes transitional measures to encourage renewable energy and/or limit greenhouse gas emissions in the electricity and industrial energy sector as part of moving to the longer-term policy.

"To reduce greenhouse gas emissions, NZ is likely to need a combination of voluntary, price-based and regulatory measures, some targeted towards individual sectors of the economy and some for the economy as a whole," Mr Parker said.

"Strong input and buy-in from all sectors is required to finalise and then implement this strategy, and I welcome rigorous debate on this important issue."

The closing date for submissions on the draft NZES is 30 March 2007.

Reference: Government media statement, 11/12/06.

Frequently Asked Questions

1. What is the purpose of the draft NZES?

The draft NZES to 2050 considers NZ's future energy system, and identifies opportunities for securing that future.

2. What are the highlights?

- Establishment of an expert group to consider implications of higher levels of biofuels and the introduction of plug-in electric vehicles
- Measures to improve the efficiency of the vehicle fleet, through mandatory labelling of fuel efficiency at the point of sale and introducing technology standards
- Support for the introduction of renewable fuels as substitutes for petrol and diesel
- Increase competition in the electricity market by reducing restrictions on generation and retailing by lines companies
- Options for internalising the cost of fossil fuel emissions in the electricity sector to those who produce them
- A proposed requirement for major electricity generators to prepare triple bottom line reporting, including greenhouse gas emission inventories
- Regulations to facilitate distributed generation
- Consideration of a mechanism to consider RMA consent applications for wind and geothermal electricity generation projects in groups, to better compare national benefits and environmental impacts
- Lowering the discount rate used by the Government in working out the cost-benefit analysis for energy efficiency projects, to reflect the value of long-term energy savings

- Establishing a contestable fund to support the early deployment of marine-based electricity generation such as wave or tidal, worth \$8 million over four years.

3. Why develop a NZES?

We need to ensure NZ has a secure and affordable energy supply in the future. By setting clear policy direction and priorities for the energy sector, the Government can provide more regulatory stability and confidence to industry players, investors and consumers, and facilitate the transition to a more sustainable energy future.

4. Why to 2050?

The inherently long lead times for making significant changes in the production and use of energy mean that decisions made, or avoided, in the next few years, will have effects for decades.

5. What does the Government see for NZ's energy future?

The Government wants to work towards a "reliable and resilient system, delivering New Zealand sustainable, low emissions energy."

6. How does the Government intend to achieve this?

The Government will focus on policies, strategies and initiatives that support the following six high-level objectives:

- a. Providing clear direction on the future of NZ's energy system
- b. Maintaining high levels of security of energy supply, and reliability at competitive prices
- c. Maximising how efficiently we use our energy to safeguard affordability, economic productivity and our environment
- d. Maximising the proportion of energy that comes from our abundant renewable energy resources
- e. Reducing our greenhouse gas emissions

- f. Promoting environmentally sustainable technologies

7. What is the Government proposing to do?

Part two of the draft energy strategy outlines a draft action plan across six broad areas:

- a. Creating a resilient, low carbon transport system
- b. Maintaining security of electricity supply
- c. Transitioning to low emissions power and heat
- e. Using energy more efficiently
- f. Encouraging sustainable technologies and innovation
- g. Promoting affordability and well-being.

Each section contains a series of proposals set out for discussion and consultation, alongside information on work already under way by the Government.

8. How can we achieve a resilient low carbon transport system?

The draft strategy proposes four priority areas for action, with a focus on reducing greenhouse gases. They include developing and adopting alternative renewable fuels such as biofuels or by introducing electric cars, improving the fuel efficiency of vehicles on New Zealand's roads, using more efficient modes of transport, and ensuring a secure and diverse supply of transport fuels.

9. How is the Government proposing to manage security of electricity supply?

The Government's proposed actions build on several initiatives to encourage competition and investment in transmission and distribution networks, and a move to more diverse gas supplies.

10. How would NZ transition to a low emissions power and heat system?

Actions proposed by the Government to limit

greenhouse gas emissions from electricity generation and industrial heat and power include - price incentives for investors in new low emissions energy sources; establishing a working group of electricity generators to develop triple bottom line reporting and an inventory of greenhouse gas emissions; encouraging more people to use solar water heating; consideration of resource consent processes for wind and geothermal electricity generation projects; and breaking down barriers that are preventing the uptake of low emissions technologies, such as distributed generation.

11. How could energy efficiency be improved?

The Government's policies, objectives, targets and means for energy efficiency, energy conservation and use of renewable energy are set out in the replacement NZ Energy Efficiency and Conservation Strategy, which is a subset of the draft energy strategy and is being consulted on at the same time.

12. What will be done to promote sustainable technologies and innovation?

Proposed actions include establishing working groups to provide leadership in priority energy innovation areas such as geothermal, marine energy, biofuels and carbon capture and storage.

13. How will affordability and well-being benefits be promoted?

The Government is inviting feedback on this area through the consultation on the NZ Energy Efficiency and Conservation Strategy. The Government is also considering varying the lower fixed charge tariff option, to take account of regional climate variations that impact on heating costs, and taking a stronger role in supporting the development of sustainable and improved urban form and transport infrastructure.

14. What is the future for coal in this strategy?

Coal and lignite represent important long-term energy supplies. If carbon capture and storage proves technically viable and economic in the future, these fuel sources will become an attractive resource for a range of uses in the future.

15. What is the potential for reducing greenhouse gas emissions in the energy sector - is carbon neutrality feasible?

This strategy shows how NZ can advance towards carbon neutrality. There are several pathways available to achieve significant reductions in greenhouse gas emissions over the long term, but all will require focus on energy efficiency, and advances in new vehicle and electricity generation technologies and their uptake.

16. What is the purpose of the Transitional Measures discussion paper?

It forms part of the draft NZES. The Government is seeking feedback on what we should be doing in NZ's stationary energy sector in the near-term to move us towards the long-term goal of having a low emissions energy sector. It presents a number of options including, emissions trading, a carbon charge, renewable obligations, incentives, project based measures, regulatory options and voluntary measures.

17. What is the purpose of the Post 2012 discussion document?

It is designed to draw out discussion on what policy measures would be preferred in NZ after 2012 to reduce its emissions and to protect and enhance its forest carbon sinks. It is crucial to consider future policies now.

18. What options are being considered in the Post-2012 discussion document?

A number of options look to increase the coverage of climate change policies across the economy post-2012. The document specifically assesses two price-based measures (emissions trading and greenhouse gas charges); directive regulations (such as under the Resource Management Act or Electricity Act); and emission reduction agreements. With regard to emissions trading, the paper assesses cap and trade, base line and credit, and offsets trading models.

19. How to input into these papers?

The closing date for written submissions is 30 March 2007.

Reference: Government media statement, 11/12/06.

Initial Responses to the Draft NZES

A small selection of initial responses to the draft NZES are given below.

The Print Media

The New Zealand Herald said in an editorial that the Government's new energy plan points the way ahead. If an energy strategy is to gain widespread support, it must combine principle with a strong dose of pragmatism. There is no point setting off on high-minded tangents that place the country on a potentially fraught course.

For all the willingness to embrace environmental responsibility in the shape of renewable energy sources, there is a proviso that security of electricity supply remains a paramount concern.

Equally, it is recognised that NZ's response to climate change should not outpace progress in other parts of the world. In sum, there is an over-riding direction that, applied correctly and without undue delay, comprises a sensible means of catering for NZ's energy needs, and global concerns, as the era of Maui gas comes to an end.

The draft NZES and accompanying discussion documents state a preference for wind, geothermal and hydro power as sources of electricity at the expense of coal, liquefied natural gas and nuclear energy, which are considered too costly.

The use of these renewables will see a redressing of a situation that has seen fossil fuels supply an increasing proportion of electricity over the past 25 years.

There are varied views on the cost and potential of wind power, in particular, and how much might be added to electricity bills. But, as Maui gas becomes rarer, the proposed direction is immeasurably preferable to using liquefied natural gas (LNG) to fuel power stations. The price of LNG is tied to the international oil market. Dependence on that market for electricity generation would leave this

country hostage to pricing and exchange rate vicissitudes.

The Government is also eyeing the potential for tidal power. This interest in a new technology does not involve a huge cost, but nor should it when it amounts to an attempt to “pick a winner”.

Hopefully, on that score, the Government will not ignore the possibility of modern clean technology clearing the way for the exploitation of abundant South Island brown coal resources.

The editorial concludes by saying that the Government having indicated that it now favours a carbon emission trading system to encourage clean energy, is charting much the same course as the National Party’s “blue green” policy. Such broad agreement suggests that the adoption of a long-term view in the national interest is within reach.

Reference: NZ Herald, 13/12/06

Industry

The discussion papers say the effect of any transitional (pre-2012) measures on electricity prices should be gradual. While investors in new generation should face a price on emissions, owners of existing fossil-fuel based generators should follow a transitional path to facing the full cost of emissions.

Tom Campbell, Chief Executive of Rio Tinto Aluminium (the former Comalco) said that while David Parker was right that this is the direction in which the world is moving, NZ has to be careful not to get ahead of its trading partners, in particular Australia and the US.

“And the reality is that just about every European country has taken measures to protect their large emitters. In the UK there is a system for exemption from the climate change levy through negotiated greenhouse agreements almost the same as those which were being negotiated here.”

Rio Tinto globally favoured emissions trading but “we get uneasy when they talk about a

national scheme in NZ. I don’t think it is large enough.”

Campbell said “If we are going to optimise renewables, it is essential to develop the best sites and not just the ones that are easiest to get consents for. That’s key. Otherwise we will end up with second-rate renewables.”

Murray Jackson, Chief Executive of Genesis Energy sees the strategy as a continuation of Government policy favouring gas over coal and renewables over both of them.

But Jackson believes that officials are over-estimating the amount of renewable energy, especially wind, that would be cheaper than natural gas combined-cycle plants at current gas prices and without a price on emissions.

David Baldwin, Chief Executive of Contact Energy said that his company’s view of how much wind power could be generated for what price, indicated prices starting higher and increasing more rapidly than the draft NZES envisaged.

He said that Contact’s planned 400MW gas-fired plant, Otahuhu C, remains a viable project despite the Government’s preference for renewable energy. The Government objective of maintaining a secure energy supply ensured that gas-fired plants would remain an important part of the nation’s generating portfolio.

Gas-fired plants also complemented intermittent renewable sources such as wind farms. Otahuhu C could also meet the energy strategy objectives of reducing greenhouse gas emissions because it would displace less environmentally friendly plants such as the original Huntly power station.

He said “The question of security of supply is the reason that you cannot ignore the possibility that additional gas capacity will be needed” (but he does not mention the issue of future availability of gas supplies beyond about 2015).

Baldwin said Contact accepted that the world was entering a carbon-constrained era and that a price on carbon was inevitable, but called on the Government to establish a carbon trading

market sooner rather than later, “Not only would this increase investment capacity across the economy, but would also encourage the market to provide innovative solutions which we need to reduce all emissions.”

Baldwin said he supported changes allowing power network companies to generate unlimited energy outside their network catchments and to double the amount of energy they produced inside those catchments.

Reference: NZ Herald, 12/12/06

Local Government

Waitakere City, one of the few employers to subsidise staff who catch trains or buses to work has called for the Government to waive fringe benefit taxes against incentives to use public transport.

City Development Committee Chairman, **Penny Hulse**, said “You have to wonder why that constitutes a fringe benefit when there is a community benefit from taking cars off the road.”

Statistics NZ figures for the day of the census, 7 March 2006, show the following means of employees getting to work:

Drive self to work	58.6 percent
Passenger in vehicle	4.6 percent
Bus	3.0 percent
Train	1.0 percent
Motorcycle	1.0 percent
Bicycle	1.9 percent
Other forms of transport	0.7 percent
Walk or jog	5.3 percent

Workers driving company cars rose slightly to 10.7 percent compared with 9.5 percent in 2001.

The figures disclose challenges for the Government in meeting goals set in the draft NZES aimed at curbing a threatened 35 percent growth in transport pollution by 2030.

Waitakere City is one of 23 large employers working on staff travel plans with help from the Auckland Regional Transport Authority.

But the census figures suggest a need for many more employers to start weighing up the hefty costs of providing staff with company cars and parking spaces which also attract fringe benefit taxes - against incentives for alternative ways of getting to work.

A spokesman for Climate Change Minister, David Parker, who is driving the Government’s energy strategy acknowledged that the census figures showed a need to continue efforts towards good public transport.

But although the Government is spending \$301 million on public transport this year, Auckland Regional Council transport policy chairman, **Joel Crayford** said that was only enough to keep treading water against the amount spent providing new roads for cheap imported cars.

Reference: NZ Herald, 21/12/06 and Statistics NZ Information Line

Editor’s Notes:

1. The number of registered vehicles on NZ roads has trebled since 1960. At the end of 2005, there were 2,671,375 cars registered and 486,843 trucks. We have more cars per person than most other countries. In recent years the biggest single factor in the explosion of vehicle numbers was the decision in 1986 to start the mass importation of second hand vehicles. We also use our cars more than we need to - 92% of our trips which we take are by car and 60% of our car journeys are for trips of less than 5kms.

2. From Statistics NZ information, the balance of the figures in the above table is - work from home 8.3%; did not go to work today 10.3%; and not identifiable or not stated 5.3%. An interesting observation here is that twice as many people work from home as go to work by bus or train although it is likely that many of those people will use a motor vehicle for their home-based work (e.g. farmers and many self employed).

Energy Federation (EFNZ)

EFNZ has advocated the need for an encompassing NZ Energy Strategy for some time and welcomes the launch of the draft

NZES. Its members look forward to working with the Government to achieve a sustainable energy future for NZ.

Energy is vitally important to NZ's economic growth and the well being of New Zealanders. We need to ensure NZ's future energy supply while at the same time managing energy intensity and greenhouse gas emissions.

The Chair of the Federation, **Dr Robert Whitney**, cautioned that there would be many challenges ahead. The key challenge will be to turn the laudable goals of the draft NZES into working policies and programmes, able to achieve the targets outlined.

“The EFNZ considers that the release of the draft NZES is an important part of progress towards promoting and achieving the sustainable development and use of energy resources in NZ.”

Reference: Media Release by EFNZ, 11/12/06

SEF Member, Molly Melhuish

Molly Melhuish, Convenor of the SEF Electricity Working Group said that an analysis should start with energy demand rather than supply, and seek the most sustainable ways of providing for, or reducing energy requirements.

Wood Burning: The need to take a full overview of the sustainability issues was highlighted by the failure of any of the draft NZES documents to suggest any action points on wood burning for home or industrial (other than forestry) heating. Even the Parliamentary Commissioner for the Environment's recent report on Local Energy suggested a minor role only for wood burning. Yet home wood burning is a very significant energy source, and its replacement by electric heating due to clean air legislation is helping to drive a rapid increase in electricity demand. Almost half the growth in NZ electricity consumption from 2000 to 2005 came from the residential sector. Probably well over half the increase in MW demand comes from household lighting and space heating, because peak demands occur on winter evenings

(with only rare exceptions where irrigation or air conditioning cause summer peaks). It is therefore safe to say that household electricity consumption is the biggest driver of new investment in power stations and transmission and distribution networks. Wood could also readily replace coal in industrial burners.

Economic Issues: Investment in energy efficiency in buildings, and particularly domestic buildings, is a particularly high priority. Location and design of new residential and industrial development, with associated roads and public transport, will have profound impact on long-term energy supply requirements. Transport systems, buildings, electricity networks and (to a lesser extent) power stations last for many decades or even centuries, so it is investment rather than short-term issues that should drive the major energy decisions.

Environmental Issues: The most critical environmental issue affected by energy decision-making is global, the emission of CO₂ and other greenhouse gases. Local environmental issues include pollution from energy use; especially particulates and volatile organics from solid fuel heating in homes, and from motor vehicles. The other major local issue is amenity, especially in regard to wind farms and hydroelectric development, and transmission lines.

Social Issues: Affordability of energy for both householders and business enterprises is a major social issue. Residential electricity price rises since 2000 have averaged 5.5% real each year. Businesses that compete internationally have received government assistance to reduce CO₂ emissions, and expect major policy concessions. Some low-income householders are offered assistance or even free installation of home insulation - with replacement of log burners in smog-prone areas. Fairness is also a social issue - for example high-cost rural electricity customers are generally charged the same electricity tariffs as urban consumers, though costs of supply are higher. Much consultation and policy work is needed to balance equity with cost-effectiveness.

Making Choices: We agree fully with the statement from the draft NZES “As we make choices about New Zealand’s future energy system, we need to weigh up a number of important considerations. In particular, we need to consider what impact our choices will have on energy security and greenhouse gas emissions. We also need to consider whether our choices will impact on the affordability of our energy in the context of future technologies and likely availability of fuel supplies.”

Draft NZES Proposed Actions for Electricity Sector: The proposed actions in the draft NZES put most emphasis on security of supply. They address greenhouse gas emissions mainly through energy efficiency and the preference for renewable energy. Affordability to business is assured by the only gradual increase in carbon charges. Low income consumers in cold districts will be helped by providing for a more generous low-fixed-charge regime for cold districts.

Two new generators have been barely mentioned - 40-50MW open cycle gas turbines at Huntly and Southdown near Auckland. They require no government support, as they met fully commercial criteria, designed to meet growing peak demands in winter and summer, apparently mainly from heat pumps and commercial air conditioning (irrigation summer peaks are almost entirely in the South Island). A continuation of this trend would support up to ten new open-cycle gas or diesel fired power stations.

New Zealand’s biggest potential renewable energy source in the near future is not wind but woody biomass, which the draft NZES appears to encourage only in forest industries. But support for more efficient wood burning by householders could displace more than half the load growth now being provided for by open cycle gas turbines.

The draft NZES barely mentions electricity distribution networks, though they have more than twice the asset value of the transmission network, and need to be upgraded to supply

smart metering. Barriers to “smart network upgrades” are very important. The draft NZES mentions demand side management favourably, but offers no action points to overcome the barriers, the most important of which is the flat tariffs which prevent consumers gaining benefit from actions by them that could reduce required investment in generation, networks, and primary energy supply.

Alternative Scenario - Early action to combat climate change: Because most electricity investment to date has been in centralised generation and transmission, the priority today should be to invest in energy efficiency and locally sourced energy. Under current and announced policies, these have the potential to displace over 15,000 GWh per year of electricity from large power stations within two or three decades. Because almost all locally sourced energy is carbon-neutral, a policy of early action to combat climate change would increase their potential greatly, allowing us to contemplate a carbon-zero stationary energy economy by 2030 or even before.

Local energy systems could offer various benefits beyond energy, including warmer and healthier houses, reduction of air pollution from home heating, improved security of electricity supply, reduction of pollution from sewage and farm wastes, water and soil conservation from replacing erodible pasture by trees, and of course the local jobs and economic development that keep money in the region. Evidence gathered by the Parliamentary Commissioner for the Environment points to a compelling argument for government intervention to enable the many benefits of local energy systems to be realised.

Residential energy demand is the most neglected yet most important area in which local energy should be developed. Total annual electricity demand grew by 3383GWh from 2000 to 2005; residential demand providing half that growth at 1676GWh. Building standards for new houses and retrofits of insulation and heating appliances could reduce growth and therefore the need to build new power supply capacity. Efficient appliances ranging from

compact fluorescent lights to wood burners are worthwhile investments now recognised in some regions with subsidies.

The potential for energy efficiency, and substitution of electricity by renewable energy, is huge. Just two sectors, pulp and paper and commercial buildings, actually reduced their demand from 2000 to 2006 by almost as many GWh/year as the residential sector increased.

If householders who commit to reduce peak or energy demand were rewarded with lower annual power bills, their actions could reduce fossil fuel generation and defer investment in power stations and electricity networks. But tariffs that reward price-responsive demand would challenge the high spot prices now seen in dry years and at peak times. This has real fiscal implications to Government, because it would reduce the high dividends now being paid to Government by state-owned retailer-generators. And the most important energy efficiency retrofits are unaffordable to the householders that need them most. An “interest free” loan scheme for domestic energy efficiency work needs to be developed – similar to the interest free loans for solar water heating.

Both tariff development and wise investment by householders would require accessible and trusted advisory services, and reliable tradesmen to install retrofits, and an electricity market that allowed rewards for price-responsive demand. It would also require research and development of efficient automatic wood-burning, and development of appropriate local sources of firewood, wood chips, pellets and firelogs.

Barriers: One major barrier to local energy developments is the cost of capital to small business enterprises, or householders, compared to the loans available to major energy companies. Builders of speculative houses have incentives to minimise first-costs, not long-term costs. Rental accommodation is increasing - the landlord who invests in energy efficiency sees little benefit from reduced power bills.

Business risks are important. Local energy suppliers face high risks from volatility of the

energy prices which they aim to supply or to displace, so they cannot guarantee financial benefits. Wood pellets, for example, could be priced low initially but in some countries pellet prices have approached electricity or oil prices once sufficient customers have purchased pellet burners.

Lack of trusted information on all energy efficiency and energy supply options is a serious barrier to consumers. Government “measures” required to support local energy include information, regulation to ensure competitive markets, and at times economic measures to restore balance in costs and risks of small-scale renewable energy and energy efficiency investments.

Reference: Email from Molly Melhuish, 13/1/07.

ECO

The draft NZES is a major step forward and shows that coal is not a viable part of the NZ energy picture.

Cath Wallace, Co-Chair of the Environment and Conservation Organisation of NZ (ECO) said “On existing prices, NZ’s whole expected expansion of electricity demand to 2012 of 1400MW of electricity could be met from renewable sources.”

“This message from officials is the same as that from the market: the news that Solid Energy has shelved its proposal for a 350MW Buller coal-fired power station for lack of interest from investors.”

Cath Wallace said “We can’t wait until 2012 to have a comprehensive price on carbon. The Government has got to move faster than these documents suggest.”

“The vast weight of international opinion is that the world has only 10 years to reduce greenhouse gas emissions. We can’t wait till 2012 - that would mean that 6 of our 10 years would be gone before policies start to become effective.”

ECO says that the measures relating to electricity for the near-term are welcome, but

much broader measures are needed. Economic incentives and regulatory measures are needed in 2007, not 2012.

“The draft NZES proposes movement on many fronts to better position NZ from 2012. What is disappointing is the limited nature of the proposed measures for the near-term - but the proposed use of price signals and incentives to conserve power and encourage distributed power generation are very welcome.”

“The Government is clear that coal and lignite are not viable or suitable for power generation in the medium term. It also makes it clear that carbon capture and storage cannot be relied on and is not feasible for at least 20 years.”

Reference: Media Release by ECO, 11/12/06

Financial Commentator:

Speaking on Radio NZ's "Nine to Noon" programme on 12 December, Financial Commentator, Rod Oram, noted that a crucial step is to now put a price on carbon. This would not be a big step - say adding 5 to 6 cents to the price of a litre of petrol for a carbon price of NZ\$15 to \$20 per tonne of carbon dioxide. Without such a price, it is very difficult to plan ahead and he would argue that it would be much more effective to put a carbon price across all sectors and do it in steps (rather than to focus initially just on the "stationary energy" sector as proposed in the draft NZES).

He was startled by the Prime Minister's "carbon neutral" statement at the Labour Party Conference in late October as although he knows of her interest in this topic, she never speaks about it publicly or is it evident in policy. If NZ is to go carbon neutral, then this draft NZES is "hardly a first step towards that goal" - it will need a bigger piece of architecture in place.

There are some "good bits" in the draft NZES - e.g. long-term frameworks, speed up biofuels, speeding up RMA processes for wind/hydro, fuel efficiency standards for motor vehicles - NZ is the only OECD country with no fuel efficiency standards - but overall, the package is not compelling enough.

He is concerned about the "incredible rush" to get such a large piece of legislation through Parliament and there will be very little public discussion period, what with the Christmas period between now and March.

Reference: www.radionz.co.nz/ninetonoon, 12/12/2006

EnergyWatch Comments:

A SEF view is that Helen Clark is showing real leadership on the climate change issue, and in saying that NZ could become a world leader on sustainability and this could be made a matter of national identity. Officials who created the draft NZES cannot be expected to show such leadership - it is up to SEF and other non-government organisations to support the carbon neutral agenda with all its associated benefits for NZ.

The Draft NZEECS

Release of the Discussion Document

The document entitled "Draft New Zealand Energy Efficiency and Conservation Strategy: Making it Happen" was launched on Thursday 14 December 2006 for public discussion as an "Action plan to maximise energy efficiency and renewable energy in NZ."

It proposes detailed actions to achieve energy savings in sectors such as houses, products, industry and vehicles.

In a Foreword to this document, Jeanette Fitzsimons, Government Spokesperson for Energy Efficiency and Conservation, noted that an earlier request for input had showed a lot of support for greater energy efficiency and faster development of renewables, as long as this did not put at risk security of supply.

However she noted that both these goals can work together. For example, energy efficiency and load management take the pressure off peak hour electricity supply and help keep the lights on.

Conceding that the previous National Energy Efficiency and Conservation Strategy (NEECS)

had not achieved the desired result, (see background note below on previous targets), Ms Fitzsimons said “We learned from the last 5-year strategy that we will succeed only if the whole community supports the goals and everyone takes responsibility for their part of the plan”.

She stated “I believe that awareness of climate change and rising oil prices make it easier to agree on a plan that centres on sustainability - energy efficiency, renewable sources of energy and smarter attitudes and behaviour”.

She concluded that this is not yet a workable action plan and it can only be that when it has input from the people and their commitment to make it work. Written submissions on the draft strategy are invited and must be received by 30 March 2007.

The final strategy is due out by the end of June 2007.

In a media statement accompanying the release of the document, Ms Fitzsimons says that we need this strategy because if we do nothing, demand for electricity in NZ is predicted to increase by 40% and fuel by 35% by 2030 - less than 25 years away, meaning that NZ's contribution to worldwide climate change will be so much greater.

Targets and actions are proposed in the following areas:

- Better products - using less energy and saving more money
- Healthy homes - more comfortable with less energy
- Smarter commercial buildings - more productive work environments
- Increased energy productivity in industry
- Sustainable agriculture - efficient with low carbon farms, orchards and vineyards
- Further on a full tank (motor vehicles)
- Efficient freight movement

- Introducing renewable transport fuels
- Living and working - better mobility, lifestyles and communities
- Smart electricity networks - getting the most from our electricity sector
- Clean electricity and heat - more energy from renewable sources
- Government leading the way - partnership and innovation.

The draft strategy names those organisations responsible for making sure the targets are achieved.

In each area there is a “lead agency” that carries overall responsibility for delivery, monitoring and reporting. In some areas there are supporting agencies that are responsible for operational delivery of particular aspects of the programme.

Reference: beehive.govt.nz media release 14/12/06.

Background Note on Previous NEECS Targets

Appendix 2 of the document contains some interesting information on previous NEECS targets. It notes that the original NEECS introduced in 2001 laid some important foundations by removing barriers to the uptake of energy efficiency and renewable energy.

The original strategy had two national targets to be achieved by 2012, an eleven year period:

- A 20% improvement in economy-wide energy efficiency (i.e. a required improvement of a little under 2% per year).
- Increasing NZ's renewable energy supply to provide a further 30 petajoules (PJ) per year of consumer energy.

The reality was that very little progress had been made over the first five years of NEECS towards meeting the first NEECS target.

The document states “for the slightly longer period of 2001 to 2005, NZ’s energy efficiency performance improved to 0.74%. Initial analysis indicates that improvements have come from the transport sector, largely driven by oil prices”.

If my interpretation of this statement is correct, it means an increase in NZ’s economy-wide energy efficiency improvement of less than 0.2% per year for that four year period.

Appendix 2 concludes “Reaching the current NZ target of a 20% improvement in energy efficiency by 2012 would now require an annual improvement closer to 2.5%”.

It is therefore perhaps not surprising that the new draft NZEECS proposes specific sector targets, rather than a target for economy-wide energy efficiency.

Appendix 2 also notes the annual energy efficiency performance of some other countries as follows in terms of annual energy efficiency gains (aefg):

Canada	1990-2004	1.0% aefg
Ireland	1990-2002	0.9% aefg
EU	1990-2002	0.8% aefg
USA	1985-2002	0.6% aefg

If NZ could even match these aefg’s made by other countries, then this would have a significant effect over the next 24 years in relation to the “business as usual” forecast of 40% increased electricity demand and 35% increased fuel demand by 2030.

With regard to the second NEECS target, Appendix 2 says that there has been progress in the area of renewable energy, with approximately 13PJ more supplied in 2005 than in 2001. About 8PJ of this is new generation or upgrades to the efficiency of existing generation.

The rest (5PJ) can be attributed to an adjustment in the biomass numbers and variations in rainfall, which affected the contribution from hydro-electricity. (Presumably this means that 2001 was a relatively “dry year” in our hydro-electric system and that 2005 was a relatively “wet year”).

Appendix 2 concludes “Given this rate of improvement, it is possible that the target of an additional 30PJ per year by 2012 could have been reached. However, the overall percentage of renewable energy is decreasing because growth in energy demand has been met mainly by fossil fuels”.

A five-year review of NEECS was carried out as required under the Energy Efficiency and Conservation Act. The review was conducted and involved a stock-take of progress across the strategy’s action plans, an assessment of the current situation, a scan of international best practice, and a broad evaluation of the potential for improvements.

The results of this review were published in a Situation Assessment Report, and in March 2006, the Minister of Energy announced his decision to replace the strategy, leading to the preparation of the draft NZEECS.

(It is noted that the wording of the above Act will have to be changed if the Minister wants the strategy to be called the NZEECS rather than the NEECS as described in the Act).

John Blakeley

Views Sought

The draft NZEECS document asks readers to comment on a number of questions, including the following-

- Do you have suggestions for prioritising actions within each sector?
- Has accountability for actions been assigned to the right agencies?
- Do you consider that the proposed approach towards setting targets and performance indicators is appropriate?
- How can local government and non-government agencies work with central government to improve the uptake of energy efficiency and renewable energy?
- What contribution do you think non-government organisations and business organisations

can make to improve energy efficiency and enhance the uptake of renewables?

– Is the emphasis right on improving technical efficiency versus influencing and modifying NZ'ers energy purchase and use behaviour?

– What role do you see, if any, for energy conserving behaviour to reduce energy use and carbon emissions?

– Do you think NZ needs one renewable energy target or specific sector targets?

New Solar Water Heating Initiatives

A month before the release of the draft NZES and draft NZEECS it was announced that the Government is investing \$15.5 million to increase the use of solar water heating in NZ.

The programme will run for 5.5 years with the \$15.5 million being allocated for the first 3.5 years. Funding levels for the final two years will be decided after a review in 2009.

The programme includes:

- Providing independent information to help consumers decide
- Motivate demand through promotion
- Improving quality and cost-effectiveness by working with the industry
- Providing financial assistance to home owners
- Putting more solar water heating systems into Government buildings
- Encouraging new ideas through an innovation fund.

Government spokesperson on Energy Efficiency and Conservation, Jeanette Fitzsimons said that the initial goal is to double the number of solar water heating systems being installed. This will

see approximately 15,000 to 20,000 systems installed by 2010. Assuming this electricity would have otherwise been supplied by coal or gas-fired power stations, the estimated carbon dioxide savings are equivalent to getting 5,000 to 7,000 cars off the road.

Energy and Climate Change Minister, David Parker, says that the Government has developed this programme as part of its broad approach to providing energy efficiency and renewable forms of energy in the home as well as reducing greenhouse gas emissions.

The finance assistance available from the Government for purchasing solar water heating systems will increase from \$300 to \$500 from February 2007. This is provided in the form of a contribution to the cost of interest on a loan.

Access to the increased finance assistance will be subject to systems meeting criteria on energy performance and cost effectiveness.

From May 2007 there will also be assistance for new home builders. Details are still being finalised.

Reference: Government Media Statement as posted on SEF News, 23/11/06.

Submission Assistance

SEF members are encouraged to make their own submissions on the package of critical documents released by the Government just before Christmas.

As SEF gathers together its collective ideas on the content of the documents, members will be offered starting points for their own submissions.

You are also encouraged to share your particular thoughts and comments on your speciality area(s) with other members via SEF News (or the specific SEF NEECS-NZES discussion group).

Climate Change/Global Warming

Doubts on Carbon Neutral Vision

Writing in the N.Z. Herald, John Armstrong said that at the Labour Party Conference held in Rotorua at the end of October, the Prime Minister, Helen Clark seemed to be “out-greening the Greens” with her talk of NZ becoming a world leader in sustainability by aiming to be “carbon neutral” and “truly sustainable.”

“Carbon neutrality” is a very large leap. It would require that for every bit of carbon dioxide that ends up as greenhouse gas, an equivalent amount is extracted from the atmosphere and absorbed or buried. This goes way beyond the Kyoto Protocol which by 2012, requires NZ to cut emissions back to 1990 levels. Instead greenhouse gas emissions are now running at more than 20 percent above 1990 levels - and growing.

He noted that although Helen Clark’s speech talked of NZ becoming carbon neutral, she was careful to say that was an “aim.” Since the speech, she has further described the target of zero net emissions as “aspirational”, saying “It’s not magic wand territory.” One way forward may be to set benchmarks for progress towards carbon neutrality, with some sectors of the economy moving towards the goal faster than others.

Armstrong noted the increasing vogue overseas for companies to become “carbon neutral” shows market pressures are starting to force producers to “green” themselves. The “food miles” fuss which has seen NZ exports flown into the European market under fire is a further wake-up call for the agricultural sector here.

He concluded that the only really effective way of meeting climate change objectives is to put a price on the use of carbon. Labour has been talking of introducing an emissions trading scheme after 2012 which would require

polluters to buy permits - something also floated by National.

Reference: NZ Herald, 4/11/06

Methane Emissions Not Included?

In a subsequent article, John Armstrong said that it seems the Prime Minister’s bold plan to make NZ “carbon neutral” is somewhat less ambitious than it was originally thought to be and at some stage the Government was going to have to bridge the credibility gap between the Prime Minister’s aspirational goal and what is actually achievable. That point came with the release of the Government’s draft energy strategy with Climate Change Minister, David Parker being challenged to explain what he understands “carbon neutrality” to actually mean.

His definition restricts carbon neutrality to carbon dioxide emissions. That might be acceptable if New Zealand was like most other countries which have signed up to the Kyoto Protocol on climate change and the great bulk of its greenhouse gas emissions were carbon dioxide-based.

Armstrong noted that New Zealand is an exception. Nearly half of this country’s emissions come from methane produced in the stomach of ruminant farm animals. When the Prime Minister grabbed the political initiative in October by suggesting New Zealand could become carbon neutral, most people, assumed she was talking about total emissions, methane included.

That is because “carbon neutrality” is widely defined as meaning zero net emissions of “carbon dioxide equivalents.” Those include carbon dioxide, methane, nitrous oxide, and other gases like fluorocarbons. To be carbon neutral requires that for every tonne of carbon dioxide equivalents that end up in the atmosphere as greenhouse gases, an equivalent amount must

be extracted from the atmosphere either through being absorbed by trees or buried underground.

Speaking against a backdrop of solar panels, miniature wind turbines and electric-powered scooters, Mr Parker seemed to argue that because carbon dioxide emissions worldwide are primarily to blame for global warming, New Zealand should concentrate on reducing its carbon dioxide emissions. He also argued that because the technology to stop cows belching methane has yet to be invented, it would be unfair to expect the agricultural sector to cut its emissions at the same rate as other sectors.

Armstrong said that the net result is the Government has narrowed the aim of carbon neutrality to concentrating on cutting emissions in the energy sector which, if transport is included, accounts for some 42 percent of all greenhouse gas emissions.

Reference: NZ Herald, 12/12/06

Editor's note:

As reported in EnergyWatch (Issue 41, pg 10), the four sectors of the NZ economy where most of the greenhouse gas emissions come from are agriculture, energy, industrial processes and waste. The Climate Change Office states that in 2002, 49.2 percent of the total greenhouse gas emissions came from the agricultural sector and 42.8 percent came from the energy sector. Emissions from the industrial processes and waste sectors are very much smaller, comprising 4.7 percent and 3.2 percent respectively of all of NZ's greenhouse gas emissions in 2002.

Carrot not Stick Vital for Forests

In an editorial the NZ Herald notes that officials have warned that deforestation could double the extent to which NZ falls short of its target under the Kyoto Protocol, creating a potential liability of hundreds of millions of dollars by 2012.

As a result of a trend of switching land from forest to pastoral farming, it was estimated that

7000ha of forest felled last year would not be replanted – 18 percent of the area harvested – while only 6000ha of new forest was planted.

The Government's response is their draft land use strategy. It is said to mix incentives with penalties.

One of the proposals would see forest owners fined if they cut down trees and did not replant the land. Government officials have suggested \$13,000 a hectare would be enough to stop conversion to pasture. Also a flat charge would be proposed on any agricultural emissions created when land was converted from forestry to agriculture.

Such measures have a simplistic approach to a complex issue. But they disregard the fact that deforestation reflects, in part, the strong prices being realised over the past few years for dairy products and meat, and the weak market for forest products.

The editorial suggests that the Government's emphasis should therefore be on incentives. These include the owners of new forests getting some recognition of the value their trees create through a tradeable permit regime.

Reference: NZ Herald, 19/12/06

California to Cap Greenhouse Gases

California is to become the first state in the USA to impose a cap on greenhouse gases under a landmark deal by Governor Arnold Schwarzenegger.

The Governor has reached agreement on a bill aimed at reducing California's carbon dioxide, and other greenhouse gas emissions by 25 percent by 2020.

The bill authorises the California Air Resources Board to begin measuring carbon dioxide and other greenhouse gases. Once a tally is taken, regulators will set limits for each facility and industry, to take effect from January 2012.

Reference: NZ Energy and Environment Business Week, 6/9/06

The thing about real life turning points is that you can only be certain that you have passed one some time after the fact, but 2006 felt like the year when we reached the global tipping point on the issue of climate change.

There is still a great deal of denial, especially in North America, and there were no dramatic new global agreements. But nevertheless, the avalanche of new data confirming the scale and speed of climate change, suggests that the debate is shortly going to move from the hypothetical realm to the world of real politics.

This does not mean that new global agreements will be forthcoming in the next year or so. In the US no basic change of policy at the federal level is likely until President Bush leaves the White House in about two years' time.

But when the Republican Governor of California, Arnold Schwarzenegger, signed a bill in August committing the most populous state in the US to get back down to 1990 greenhouse gas emissions levels by 2020, it was clear that resistance in the US was starting to crack.

And once the US starts taking the issue seriously, dramatic things could happen quite quickly.

Reference: Article by Gwynne Dyer in the NZ Herald, 21/12/06

US Court Case on Global Warming

The case *Massachusetts v the Environmental Protection Agency (EPA)* begins in the US Supreme Court on 29 November. The central issue is whether or not carbon dioxide is a pollutant and whether the Bush Administration should regulate carbon dioxide emissions to combat global warming.

The legal debate is whether the EPA is shirking its responsibility under the Clean Air Act to set emission standards for "any air pollutant" from motor vehicles which could cause, or contribute to, air pollution. And "which may reasonably be anticipated to endanger public health or welfare."

The EPA says that greenhouse gases are outside its responsibility. The State of Massachusetts, eleven other states, the cities of New York City, Baltimore and Washington DC, American Samoa (a Pacific territory threatened by the rising ocean) and a long list of co-petitioners argue that what comes out of vehicle exhausts, including carbon dioxide, methane and nitrous oxide – are air pollutants.

Environmentalists point out that the US is responsible for 25 percent of global man-made carbon dioxide emissions and has refused to sign the Kyoto Protocol. If the EPA had to recognise carbon dioxide as a pollutant, then it could require more fuel efficiency and less emissions in the US transport fleet.

This fleet accounts for about a third of the US's carbon dioxide emissions, so regulation would make a significant difference to global warming say the environmentalists. A ruling that carbon dioxide is a pollutant would also pave the way for regulating greenhouse gas emissions from electricity generation plants.

A group of scientists say the EPA and lower court rulings have misrepresented scientific findings. Their brief says a consensus of scientists working on climate change holds that greenhouse gases from mobile and other human-created sources "have already had an effect on the earth's climate and are changing the earth's climate in ways that are significantly increasing the risk of adverse impacts on public welfare."

Their brief acknowledges there is no such thing as absolute certainty in climate science, but that is not an excuse for failing to take action when there is a threat of serious damage.

The scientists arguing against regulation are a group of climate change sceptics. Their submission is prepared by the Competitive Enterprise Institute (CEI), a Washington-based conservative think tank. Their brief to the court says that "substantial scientific uncertainties" around climate risks abound, predicted increases in temperature from climate models are overestimated, and forecast damage from

sea-level rise or health risks from heat waves are exaggerated.

Oil giant ExxonMobil has funded organisations associated with their sceptical stance. Their funding of research was challenged in July by Britain's science academy, the Royal Society, which charged the world's largest oil company with funding "organisations that have been misinforming the public about the science of climate change."

In September ExxonMobil said it was reviewing its funding of groups that deny global warming's dangers. The oil company, which had given the CEI US\$270,000 last year, says so far it has donated no money to the institute this year. The CEI ran ads on US television in May pushing the benefits of carbon dioxide with the catchphrase: "Carbon dioxide: They call it pollution. We call it life."

The agency, supported by Michigan and nine other states, the US auto industry and other manufacturers, has long maintained it has no authority under the Clean Air Act to regulate. And the Act's mechanisms are ill-suited to greenhouse gas emissions.

The EPA's foreign policy argument has prompted former Secretary of State, Madeleine Albright, to get involved. She is concerned about the EPA's assertion that regulation of motor-vehicle greenhouse gas emissions could "weaken US efforts to persuade key developing countries to reduce the greenhouse gas intensity of their economies." Albright says withholding domestic regulation to ensure the US Government can bargain with other nations over greenhouse gases is wrong, and is at odds with Government policy which does not endorse the use of such leverage.

The Supreme Court case will address whether the US Administration's decision to rely on voluntary measures to combat climate change are legal under federal clean-air laws. A decision in favour of the EPA could throw into question plans by California and 10 other states to force carmakers to reduce emissions by improving vehicle fuel consumption.

While much of the argument focuses on legal definitions and scientific evidence, there are also signs of a moral imperative at work. The Conference of Mayors, representing more than 1100 US cities, stresses the need to take precautionary action – especially when lives are at stake. The brief also emphasises the responsibility of municipal authorities to promote the welfare of their citizens.

The outcome of the case will not be known for some months, but the political wind seems to be shifting in favour of firmer action to counter climate change.

Reference: NZ Herald 18/11/06

US Administration Changes its View?

In a landmark decision, the Bush Administration has concluded that global warming is endangering the existence of the polar bear – an admission which could force the US Government to act to curb the emission of greenhouse gases.

In a sharp reversal of its previous position, the Government has decided that these iconic creatures should be listed as "threatened" under the Endangered Species Act because of the widespread melting of the Arctic sea ice – the bears' prime habitat.

The decision by the Department of the Interior has huge implications which go beyond the survival of the polar bear.

Campaigners said the decision provided the bear with new protection and opened the way for widespread legal action to force the Bush Administration, which has rejected the Kyoto Treaty, to limit emissions of carbon dioxide and other warming gases.

"I think this is a watershed decision", said Kassie Siegel of the Centre for Biological Diversity, one of the three groups which petitioned the Department to act.

Continues page 31

Fuel Availability and Cost

Vulnerability of US Oil Supplies

In the previous issue (EnergyWatch 42, pp 15-16) it was stated that within its own borders, the USA has only enough oil reserves to cover four years of required supply at the current rate of consumption. Also that the US presently imports just over half of its crude oil requirements so the consumption rate of its own oil is such that without discovery of new domestic oil fields which can be brought into operation within about eight years, the USA will run out of its own oil by around 2015.

The same issue also noted (pg 18) that only about 25 percent of known world oil reserves are open to the Western major oil companies today, down from 85 percent in the 1960's. So most of the available oil supplies are coming from countries which are unfriendly towards the USA, if not openly hostile to its policies. It is therefore not surprising that from time to time, President George W Bush tells the American people that they must become less dependent on imports of foreign oil.

In response to this article, SEF member Stephan Heubeck has pointed out to me that in the December 2006 issue (Newsletter No. 72) of the Association for the Study of Peak Oil and Gas (ASPO), it is stated that the USA currently relies on 66 percent petroleum imports to satisfy its total demand which is now running at around 23 million barrels per day (more than the 20.5 million barrels per day suggested in EnergyWatch 42).

The SPO Newsletter also states that 86 percent of all regular oil which will ever be produced in Canada and the US (excluding heavy crude oil, or oil derived from oil shales or tar sands), has already been extracted from the ground.

Stephan also notes that more frightening than this is the fact that the natural gas figures for the USA and Canada in this ASPO Newsletter

suggest that natural gas supplies in that region are going to drop to one third of current output by 2020.

Stephan comments that one could wish that people planning LNG import terminals for NZ are aware of these figures and the likely consequences for the future international LNG market.

The ASPO Newsletter also states that the recent US foreign policy seems to have been dedicated to securing control of foreign supplies of oil, but it offers at best no more than a short-term palliative, as the oil production in the rest of the world also heads into decline, mirroring the experience of natural depletion already well demonstrated in North America itself.

John Blakeley

US Oil Dependency an Election Issue

In early November, during the final days of campaigning in the US mid-term elections, President George W Bush was citing oil as a reason to stay in Iraq.

He suggested that if the US pulled troops out prematurely and surrendered the country to insurgents, it would effectively hand over Iraq's considerable petroleum reserves to terrorists who would use this as a weapon against other countries.

At one rally the President said "You can imagine a world in which these extremists and radicals got control of energy resources". He said that extremists controlling Iraq would use energy as economic blackmail and try to pressure the USA to abandon its alliance with Israel.

At a stop in Missouri on the Friday before the election, he suggested that such radicals would be able to pull millions of barrels of oil off the market, driving the price up to \$300 or \$400 a barrel.

During the run-up to the invasion of Iraq, President Bush and his aides sternly dismissed suggestions that the war was all about oil. When questioned about the President's recent statements during the mid-term election campaign, White House spokesman Tony Fratto said that the President's latest argument does not reflect a real shift "We're still not saying that we went into Iraq for oil. That's not true" he said. But a US pullout now would let Iraq radicals use oil as a weapon.

Reference: Washington Post, 5/11/06, as reported in ASPO Newsletter No. 72 – December 2006

Oil Prices Steadier in 2007?

During 2006 the international oil price started the year at around US\$58 per barrel and rose steadily to a high of nearly US\$79 on 8 August and then fell again to just below US\$60 by early October, before rising to around US\$63 near the year's end.

By comparison, oil prices are expected to be steadier in 2007. Deutsche Bank, Germany's largest bank in mid-December cut its forecast of oil prices in the first quarter of 2007 from an average of US\$70 to an average of US\$66. They also believe that prices may fall later in the year and are still forecasting an average price for the 2007 year of US\$62 a barrel.

Economic growth in the USA, the world's largest energy consumer may slow next year because of lower consumer spending and rising unemployment, Deutsche Bank said.

That will cut demand for petrol as motorists make fewer journeys. A warmer-than-usual winter in the US which is now in progress might also cut demand for heating fuel made from crude oil.

Crude oil in New York was at a two-week high of US\$63.43 a barrel in mid-December after the Organisation of Petroleum Exporting Countries (OPEC) agreed to cut oil production for the second time in three months.

Reference: NZ Herald, 19/12/06

Oil prices dropped in late December as mild weather in the USA reduced demand for winter fuel. This reversed earlier rises driven by worries that Iran might disrupt oil flows in response to agreed UN sanctions.

Meteorologists said that temperatures in the US northeast had averaged 5 to 8 degrees C above normal over the long Christmas holiday weekend. As a result, US heating oil demand was expected to be 23 percent below normal for the week.

The market had earlier risen to a high for the week of US\$63.20 a barrel for US crude oil after the UN Security Council agreed to impose sanctions on Iran's trade in nuclear material and technology.

In response, Iran's oil minister was quoted as saying that Iran will use any weapon to defend itself. In the past he has said that Iran would rather not play the "oil card".

Subsequently the price for US crude oil has dropped back to US\$61.10 a barrel, after the market received news of the drop in demand for heating oil.

Reference: NZ Herald, 28/12/06

- But Fall Suddenly

Oil prices fell by nearly 9 percent over two days during the first week of 2007.

This price decrease which took place on 3 and 4 January was the biggest two-day percentage drop since December 2004. The market then recovered slightly to remain just above US\$55, its lowest level since June 2005.

The price drop reflected concern amongst traders over growing US fuel inventories and unusually mild weather in the US, which is the world's largest heating oil market.

The global oil markets have been undermined by warm weather in the US Northeast, as the US National Weather Service said that heating oil demand for the week would be about 33 percent below normal.

Deutsche Bank said that for the first time since 2002, during 2007 there is likely to be more growth in oil supply from non-OPEC countries than global oil demand growth.

Reference: Reuters as reported in NZ Herald, 5/1/07 and 6/1/07.

EU Dependence on Russian Oil and Gas

As noted previously in EnergyWatch (Issue 39 pp8-9 and Issue 40 pp 1-2), major EU countries are becoming increasingly dependent on Russia for their energy needs in oil and gas.

Put simply, Europe is addicted to Russia's oil and gas supplies. If Russia turned off the gas in winter, Europe would freeze.

This realisation of dependence was evident in the initial British reaction to the recent slow-motion murder of Alexander Litvinenko – leaving a corpse so radioactive that there may never be a full post-mortem.

Initially the British Government's reaction to this murder appeared to indicate a vested interest in not doing anything to thoroughly investigate this murder on British soil to avoid upsetting the Russian Government.

It was only when widespread public concern in Britain became evident as a result of the publicity about the case, that a thorough investigation was conducted into the circumstances of the murder.

Reference: Article from the Independent published in NZ Herald, 28/12/06

The Real Scoop on Biofuels

By Brian Tokar

You can hardly open up a major newspaper or national magazine these days without encountering the latest hype about biofuels and how they are going to save oil, reduce pollution and prevent climate change.

Venture capitalists are investing millions in new biofuel production, whether in the form of ethanol, mainly derived from corn in the US today; or biodiesel, mainly from soybeans and canola seed. There are increased subsidies to agribusiness and tax credits to refineries for the purpose of encouraging biofuel production.

Some 40 new ethanol plants are currently under construction in the US, aiming towards a 30 percent increase in domestic production.

Several well-respected analysts have raised serious concerns about this rapid diversion of food crops towards the production of fuel for automobiles. WorldWatch Institute Founder, Lester Brown, long concerned about the sustainability of world food supplies, says that fuel producers are already competing with food processors in the world's grain markets.

"Cars, not people, will claim most of the increase in grain production this year" reports Brown a serious concern in a world where the grain required to make enough ethanol to fill a SUV tank is enough to feed a person for a whole year.

Others have dismissed the "ethanol gold rush" as nothing more than subsidised burning of food to run automobiles.

The "biofuel rush" is having a significant impact worldwide as well. Brazil, often touted as the most impressive biofuel success story, is using half of its annual sugarcane crop to provide 40 percent of its auto fuel, while accelerating deforestation to grow more sugarcane and soybeans.

Malaysian and Indonesian rainforests are being bulldozed for palm oil plantations in order to serve the booming European market for biodiesel.

Are these reasonable tradeoffs for a troubled planet, or merely another corporate push for profits?

Two recent studies aim to document the full consequences of the new biofuel economy and realistically assess its impact on fuel use, greenhouse gases and agricultural lands:

- One study, originating from the University of Minnesota, is moderately hopeful in the first two areas but offers a strong caution on land use.
- The other study, from Cornell University and the University of California Berkeley, concludes that every US domestic biofuel source - those currently in use as well as those under development - produce less energy than is consumed in growing and processing the crops.

The Minnesota researchers attempted a full life cycle analysis of the production of ethanol from corn and biodiesel from soy. Their paper concluded that ethanol production offers a modest net energy gain of 25 percent over oil, resulting in a 12 percent less greenhouse gases than an equivalent amount of gasoline. The numbers for biodiesel are more promising, with a 93 percent net energy gain and a 41 percent reduction in greenhouse gases.

The most serious impact is on land use. The Minnesota paper reports that in 2005, 14 percent of the US corn harvest was used to produce 3.9 billion gallons of ethanol, equivalent to 1.7 percent of current gasoline usage. About 1.5 percent of the soy harvest produced 68 million gallons of biodiesel, equivalent to less than 0.1 percent of gasoline usage.

This means that if all of the country's corn harvest was used to make ethanol, it would displace 12 percent of the US gasoline use; and all of the soybeans harvest would displace about 6 percent of US diesel use. But if the energy used in producing these biofuels is taken into account, the picture becomes worse still - the entire soy and corn crops combined would really displace only less than 3 percent of current gasoline and diesel use.

The Cornell study is even more sceptical and found that on balance, making ethanol from corn requires 29 percent more fossil fuel than the net energy produced, and biodiesel from soy results in a net energy loss of 27 percent.

Other crops touted as solutions to the apparent diseconomy of current methods offer even worse results. Switchgrass, for example, can grow in marginal land and presumably won't compete with food production, but it requires 45 percent more energy to harvest and process than the energy value of the fuel that is produced. Wood biomass requires 57 percent more energy than it produces, and sunflowers require more than twice as much energy than is available in the fuel that is produced.

"There is just no energy benefit of using plant biomass for liquid fuel" said David Pimental in the Cornell University press statement. "These strategies are not sustainable".

Even Brazilian sugarcane, touted as the world's model for conversion from fossil fuels to sustainable "green energy", has its downside:-

- The energy yield appears to be beyond question: it is claimed that ethanol from sugarcane may produce as much as eight times as much energy as it takes to grow and process. But a recent World Wildlife Fund report for the International Energy Agency raises serious questions about this approach to future energy independence.
- It turns out that 80 percent of Brazil's increased greenhouse gas emissions come not from cars but from deforestation - the loss of embedded carbon dioxide when forests are cut down and burned.
- A hectare of land may save 13 tonnes of carbon dioxide if it is used to grow sugarcane (for ethanol). But the same hectare can absorb 20 tonnes of carbon dioxide if it remains forested.
- If sugarcane and soy plantations continue to spur deforestation, both in the Amazon and in Brazil's Atlantic coastal forests, any climate change advantage is more than outweighed by the loss of the forest.

Conclusion

- Biofuels may still prove advantageous in some local applications, such as farmers using

crop wastes to fuel their farms, and running cars on waste oil which is otherwise thrown away by restaurants.

- But as a solution to long-term energy needs on a national or international scale, the costs appear to far outweigh the benefits.
- The solution lies in technologies and lifestyle changes that can significantly reduce energy use and consumption, something that energy analysts like Amory Lovins have been advocating for some thirty years.
- From the 1970's through the 1990's, the US economy significantly decreased its energy intensity, steadily lowering the amount of energy required to produce a typical dollar of GDP. Other industrial countries have gone far beyond the US in this respect.
- But no one has figured out how to make a fortune out of conservation and efficiency. The latest biofuel hype once again affirms that the needs of the planet and of a genuinely sustainable society, are in fundamental conflict with the demands of wealth and profit.

Reference: ww4report.com, 15/12/06. Summarised from that article. Brian Tokar directs the Biotechnology Project at Vermont's Institute for Social Ecology.

Electric Cars

US Plug-In Hybrids

In January, General Motors (GM) unveiled its new Chevrolet Volt prototype electric vehicle at the Detroit motor show. Ten years ago, GM cancelled its plans for a battery-powered car, the EV1, prompting other big manufacturers to do the same.

Now that, after all, GM seems intent on making a mass-market electric vehicle, it will surely tow other big car makers along with it. GM's new vehicle, a plug-in hybrid, will incorporate a petrol engine and a battery that can be recharged from the mains.

Increasingly eco-conscious drivers will relish the chance to pick from an ever-growing range of greener vehicles. But opinion is divided among the world's big car companies about whether the market is ready for an influx of alternative-energy vehicles.

Reference: NZ Herald, 11/1/07

Ford is also considering the development of plug-in hybrid vehicles in an effort to provide alternative energy sources. The biggest barrier is the battery. Plug-in hybrids use a battery which can be recharged at electrical outlets as their main source of energy.

Battery development is key to the next generation of hybrids as carmakers seek ways to lower the cost of batteries and increase their power and storage capacity.

Ford's statement came shortly after GM revived its once-failed idea of a mass-market electric car, unveiling a car called the Chevrolet Volt, designed to use little or no petrol. However, Ford consider that plug-in hybrids will be more expensive than other vehicles and in the USA, people were not likely to buy them without big tax breaks.

The Volt is designed to run for 65 km on pure electric power (enough for most commuter journeys?)

Like Ford, GM said that the main delay in production was the development of the batteries. GM's programme relies on lithium-ion battery technology that the Ford spokesperson called "cost, weight and package prohibitive".

Reference: NZ Herald, 20/1/07

Electric Performance Car

The Tesla Roadster is now at the working prototype stage and ready for limited production. With the backing of the influential heads of PayPal and Google, it will be manufactured by Silicon Valley's first auto company.

It looks like a Lotus Elise which is no surprise given its Lotus design genes, and reportedly

accelerates from 0 to 97 km/hr in just 4 seconds, which puts it amongst some fairly exotic machinery. It is powered by a 248 bhp (182 kW) electric motor using the energy of 6831 lithium-ion batteries, giving it a range of 400 km and its electricity cost is between just 1 and 2 cents (US) per kilometre.

Using a conversion that translates electricity to petrol efficiency, this equates around 1.75 litres/100 km in petrol consumption (160 mpg). So this roadster is more than twice as efficient as hybrid cars and is one of the greenest vehicles available, and one of the quietest. Against regular sports cars, it is said to be six times as efficient and produces one tenth as much pollution.

The company was founded in 2003 by an electrical engineer whose previous company specialised in optimising the efficiency of rechargeable batteries. He sold that company and between jobs, decided to buy a sports car but wanted something that was economical to run. He soon learned that performance and fuel efficiency are mutually exclusive, but knew that electric power could combine acceleration and efficiency. The problem was that nobody was making an electric sports car at the time because of heavy and inefficient battery packs.

So he decided to make his own sports car. He turned to computer engineers, who were versed in highly efficient laptop batteries and adopted lithium-ion technology.

Tesla Motors is named after the Serb who developed the AC induction motor, and was founded in 2003. The three-phase, four pole AC induction motor used in the car produces around 80 percent more power than a comparable electric motor in GM's EV1, thanks to a high efficiency rotor. This component is made of brazed copper which is said to be more conductive than the conventional aluminium item.

The rest of the engineering is being outsourced to independent suppliers. The plan was to build something that looked like a real sports car and NOT an electric vehicle of the 1990's. (EnergyWatch notes that some of the electric vehicle prototypes developed in the 1990's

looked rather like "Noddy cars"! Lotus Cars won the design proposal and it was decided to use its personnel and facilities to assemble the new vehicle in the UK.

The prototype was developed over three years using carbon fibre technology for light weight (evidently under 1150 kg), which contributes to its turn of speed. An onboard computer ensures traction control as the motor spins to 13500 rpm, enabling it to reach 113 km/hr in first gear, which meant that only two forward gears plus reverse were needed.

The sleek roadster, a two-seater with aerodynamic contours, can evidently manage 400 km on a single electric charge. Replenishing the battery pack takes about 3.5 hours.

Pricing will be firmly in the sports car rather than the super car class, and at roughly US\$100,000 (NZ\$140,000), the cost will include a home-based battery charging system. Deliveries of the Tesla Roadster are expected to begin in about one year's time. The first production run of 100 units is already pre-sold, and the next 100 units are on sale at the moment.

Reference: NZ Autocar, October 2006

Continued from page 25

US Administration Changes its View

"Even the Bush Administration can no longer deny the science. This is a victory for the polar bear, and all wildlife threatened by global warming. This is the beginning of a sea change in the way this country addresses global warming."

Reference: NZ Herald, 29/12/06

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EnergyWatch

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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).

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