



The Sustainable Energy Forum Inc.

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Transport, Oil and Climate Change: Agenda 2008

Executive Summary

New Zealand's transport system is facing the twin challenges of climate change and depleting oil supplies. This document lays out a set of policy responses that the Sustainable Energy Forum believes political parties should take in response to these challenges, lists the principles of a low-carbon transport system for New Zealand, and explains how these principles can be put into practice.

Key policy recommendations include:

- Establish a high-level task force, working in conjunction with civil society groups, business interests and other stakeholders, to assess the effects on New Zealand of world oil production reaching its maximum level and subsequently declining and propose measures to prepare for these effects.
- Instruct Treasury to review its methods for forecasting oil prices in the short and medium term to take account of the potential effects of declining global oil supply.
- Investigate the introduction of a quota that reduces the amount of oil consumed in New Zealand by a set amount each year.
- Initiate a programme to build up New Zealand's capacity to manufacture critical oil-dependent products, and to increase our onshore stocks of such products.
- Expand Government funding for research on climate change mitigation to encompass research on New Zealand's response to oil depletion as well.

The principles of a resilient, low-carbon transport system for New Zealand are:

1. Reduce the demand for motorised transport.
2. Where motorised transport is needed, ensure that there are alternatives to road transport, especially the use of low-occupancy private vehicles.
3. Provide transport energy in ways which have a low net emissions profile and use the minimum possible quantity of fossil fuels.
4. Where fossil fuels are being used for transport, use them as efficiently as possible and facilitate the transition to renewable alternatives.

Introduction

Two major world issues that have profound implications for New Zealand are converging. One is climate change, and the other is the increasing mismatch between the world demand for oil and the world production of oil. Regarded as fringe issues only a few years ago, both issues are now at the core of transport, energy and economic policy. As the 2008 election approaches, political parties will need to articulate well-thought-out responses on both issues. This paper outlines the issues and suggests what those responses should be.

There is increasing evidence that human-induced climate change is proceeding at or beyond the most pessimistic rates modelled by the Intergovernmental Panel on Climate Change, reflecting the fact that greenhouse gas emissions have been rising more rapidly than predicted,ⁱ and that the ability of some natural systems to absorb these increased emissions is beginning to decline.ⁱⁱ For example, the IPCC has recently removed the upper limit from its projections of sea level rise during this century.ⁱⁱⁱ

Spurred on by such concerns, the scale and scope of the international political response to climate change continues to increase. The decision of the newly-elected Australian Labor government to ratify the Kyoto Protocol, and to become actively involved in the post-Kyoto climate change negotiations, further strengthens the consensus that effective, concerted international action on climate change is urgently needed.

New Zealand's geography buffers us to some extent from the severe climate effects which countries such as Australia are already experiencing, but our major urban populations are exposed to even a slight rise in sea level. Furthermore, our present economy depends heavily on our agricultural export and tourism industries, and both are highly vulnerable to the increasing international recognition that our "clean and green" image is just that — an image, not the reality.

Meanwhile, world conventional oil production has barely increased since 2005, and production of "unconventional" oil, though increasing slowly, is not increasing at a rate sufficient to keep pace with rapidly rising world oil demand.^{iv} This disparity between production and demand is the fundamental cause of the steep increase in world oil prices, which topped the US \$100 per barrel mark in January 2008. The International Energy Agency projects a 4% decline in production from existing oil fields,^v and in its *Medium-Term Oil Market Report*, July 2007, foresees the supply situation tightening:

Despite four years of high oil prices, this report sees increasing market tightness beyond 2010, with OPEC spare capacity declining to minimal levels by 2012.

There are several reasons why it won't be easy to increase world oil production, even if there is sufficient oil left in the ground to permit net production increases. First, if the IEA estimate of a 4% per annum decline in production from existing oil fields is correct, this means that 3.2 million barrels per day of new production must be found

each year just to keep production levels stable. Second, there is a shortage of drilling rigs and other equipment to get at the remaining oil, which tends to be in smaller fields that are harder to access. Third, production from “unconventional” oil sources such as the Alberta oil sands has not met projections, and it does not appear that reserves of such sources are sufficient to make up the shortfall in production that will result from declining production of conventional oil — nor are gas supplies sufficient to allow significant substitution of gas for oil. And fourth, oil exporting countries are using increasing proportions of their oil within their own borders, meaning that there is less available for export.

It is not yet clear whether the recent levelling off of oil production represents the arrival of the all-time peak in world oil production. Most projections put the peak somewhere in the period 2008-2015. Whenever the precise date of the peak, and whether there will be a sharp single peak or an “undulating plateau” before production begins to decline, the implications for New Zealand are serious.

Implications for New Zealand

New Zealand is a maritime trading nation a long distance from our main markets that is almost totally dependent on imported oil for transport. This makes us very vulnerable to the effects of climate change and oil depletion. Oil makes up almost 50% of our national energy consumption. The effect of declining oil production on an unprepared economy and society will be severe. The most obvious sector that will be affected is transport, but almost every aspect of our economy and society has developed on the back of cheap oil and the myriad of products derived from it:

- Tourism to and from New Zealand leads to very high levels of greenhouse gas emissions and is highly dependent on the availability of cheap aviation fuel.
- Modern international trade depends upon cheap aviation and shipping.
- Manufacturing and electricity generation depend upon imported components.
- Crucially, much of our current agricultural production depends on machinery, pesticides, and the application of fertiliser, all of which are dependent on oil — as is the distribution of the food our farms produce. The environmental impact of New Zealand’s agricultural production and trade is coming under increasing scrutiny.
- Our banking and financial systems depends on the stability of all these sectors.
- Our cities, towns, and services have all been designed around transport systems based on cheap motorised transport, none more so than Auckland. Many things which we currently take for granted, such as driving to the supermarket to buy food, or driving the children to and from school, will become much more problematic as the price of oil continues to increase and its supply becomes increasingly uncertain.

The Government Response

The Government, and most political parties, now acknowledge New Zealand’s vulnerability to the effects of climate change. In contrast, the Government has continued to downplay New Zealand’s vulnerability to disruptions to world oil production, and the effects of increasing demand during a time of ongoing depletion. This is shown by the perfunctory section on these issues in the *New Zealand Energy Strategy*.^{vi} The Government’s expectation is that, as oil prices rise, alternatives to oil will become economically viable, and our economy and society will be able to make a

seamless transition. This viewpoint ignores three key factors:

- a) The central role of oil in our society and the fact that no currently available alternative can rival the energy density of oil or the production quantities necessary to meet demand and offset oil depletion.
- b) The inability of the market to provide a consistent and accurate picture of the future of oil production.
- c) The huge amount of sunken investment in equipment (e.g. heating in large buildings, vehicles, industrial plant, etc.) that will continue to require supplies of oil for two decades and beyond.

Despite the Government's professed commitment to action on climate change, it has continued to support and provide funding for large-scale road building programmes. Such programmes lead to increase greenhouse emissions from transport and increase our dependence on uncertain supplies of fossil fuels. These investments are commonly justified by the claim that they will decrease traffic congestion, but two recent studies continue to support the conclusion that road construction designed to reduce congestion actually induces new traffic and actually increases congestion.^{vii}

There are pressing reasons for New Zealand to do more, and act faster, to both mitigate climate change and adapt to its consequences. It is just as pressing to start work now to mitigate the economic and social effects arising from the forthcoming peak and subsequent decline of world oil production.

It is important that policies in these two areas are coordinated. While many proposals, such as those below, have the capacity to address both issues, some proposals for New Zealand to attempt to address declining oil production, such as converting Southland lignite to liquid fuels, would have severely adverse consequences for New Zealand's greenhouse gas emissions as well as their adverse impact on the local environment.

Finally, good policy-making depends on good information. There are still many areas in which New Zealand lacks adequate information or adequate modelling capacity to make good policy decisions in the areas of climate change and oil depletion. For example, the Treasury has persistently underestimated future oil prices in its six-monthly budget updates. Nevertheless, it continues to use oil futures as the basis for oil price forecasting, despite growing empirical evidence that oil futures provide a poor forecast of actual future prices.^{viii}

Planning for a low-carbon future: policy proposals

1. **Establish a high-level task force**, working in conjunction with civil society groups, business interests and other stakeholders, to assess the effects on New Zealand of world oil production reaching its maximum level and subsequently declining, and propose measures to prepare for these effects.

Terms of reference:

- Review all aspects of New Zealand economic and social life, including but not limited to transport, agriculture, international and domestic trade, the financial system, tourism, foreign policy, and the environment.
- Make recommendations for Government and community implementation.

- Build on the work that is already being done at regional and local level by ICLEI (Communities for Climate Protection), by groups such as Sustainable Dunedin City, and by the Transition Towns movement which has recently been formed in New Zealand.^{ix}
 - Consider the infrastructure changes that are needed to make New Zealand more resilient in the face of the need to reduce dependence on oil and other fossil fuels.
2. Instruct Treasury to:
 - Review its methods for forecasting oil prices in the short and medium term to take account of the potential effects of declining global oil supply.
 - Submit these forecasting methods to public scrutiny.
 - Model a range of oil price and supply scenarios to increase the validity of its advice to the Government on oil price trends and their consequences.^x
 3. Investigate the introduction of a quota that reduces the amount of oil consumed in New Zealand by a set amount each year. The investigation should analyse whether this should best be implemented by the use of a direct quota or of tradeable oil consumption permits. Such a quota can be linked to tradeable greenhouse gas emission permits. One way of implementing such a quota is outlined in Appendix 1.^{xi}
 4. Initiate a programme to build up New Zealand's capacity to manufacture critical oil-dependent products, and to increase our onshore stocks of such products.
 5. Expand Government funding for research on climate change mitigation so that it encompasses research on New Zealand's response to oil depletion as well.^{xii}
 6. Join, and if necessary initiate, international efforts to manage a peaceful transition to the post-cheap-oil era. The first step should be to link up with the studies and strategic thinking already initiated by the Federal authorities in Australia.^{xiii}
 7. Integrate New Zealand's response to Peak Oil with its response to human-induced climate change, and in particular New Zealand's commitments under the Kyoto Protocol and successor international agreements.^{xiv}

Principles for a low-carbon transport system

Four principles should be used to guide the transition to a resilient, low-carbon transport system:

1. Reduce the demand for motorised transport.
2. Where motorised transport is needed, ensure that there are alternatives to road transport, especially the use of low-occupancy private vehicles.
3. Provide transport energy in ways which have a low net emissions profile and use the minimum possible quantity of fossil fuels.
4. Where fossil fuels are being used for transport, use them as efficiently as possible and facilitate the transition to renewable alternatives.

These principles form a hierarchy, and reflect the hierarchy developed by the Transport and Environment Select Committee report in 1998, namely: 1. reduce the

need to travel; 2. switch to more environmentally preferable modes; 3. switch propulsion methods; 4. improve efficiencies of modes.

Implementing the Transport Principles

1. Reduce the demand for motorised transport, by:
 - improving urban design to minimise travel distances and facilitate safe walking and cycling, including the provision of walkways and cycleways.
 - charging users the real costs of transport, including external costs.
 - promoting walking and cycling for both their transport and health benefits.
 - providing institutional, social, regulatory and possibly tax support for teleworking/working from home.

Note: The scope of urban design procedures to reduce transport demand, and promote sustainable transport, is wide. Among significant measures are the development of urban villages (of greater density, designed around walking and cycling rather than private passenger vehicles, and linked by efficient and reliable public transport systems), the development of more dispersed services so that trips to reach them do not have to be either lengthy or motorised, and urban planning to make walking more direct. Decisions in both urban and rural areas on issues such as school and hospital closures and school zoning also need to take their effect on transport demand into account.

Recent New Zealand research^{xv} shows that there is latent demand for walking and cycling which is not being met. The Government has a number of strategies designed to promote walking and cycling, but to date these have been poorly integrated – in particular, those addressing the issue from the transport side aren't integrated with those addressing it from the public health side. A whole-of-government approach to this is recommended, so that resources are allocated efficiently. It is important that promotion of walking and cycling, as well as infrastructure, is addressed.

Telework/telecommuting is another area which offers potentially substantial emissions reduction and resilience benefits at comparatively low cost, but which is hindered in New Zealand by falling between two stools: it affects transport, but tends to be treated as a labour market issue.

Minimising the length of trips and even the need for travel is critical to creating a sustainable transport system. Doing so reduces congestion, emissions, and could lead to long-term savings in the capital cost of all transport-related infrastructure.

2. Where motorised transport is needed, encourage alternatives to road transport, especially the use of low-occupancy private vehicles, by:
 - Changing the present funding rules that favour road building over other transport modes.
 - Evaluating all proposals for new transport infrastructure against a set of criteria which take into account national as well as local environmental effects (including GHG emissions), effects on the reliance of the transport system, and public health effects.
 - Creating a New Zealand Freight Strategy which directs investment towards the lowest-net-emissions methods of moving particular items of freight. It should draw on the results of the Ministry of Transport's *Surface Transport Costs and*

Charges (STCC) study (March 2005), which estimated that cars pay 64% of their total costs, including externalities and allocated fixed charges, trucks pay 56% and rail users pay 77%. Implementing the recommendations of this study progressively between now and 2015 would be an excellent starting point.

- Removing the institutional, financial and infrastructural barriers which are currently preventing an increase in the movement of freight by rail.
- Providing funding for public transport services to meet existing and future demand. This funding should be spent not just on improving the number and extent of services, but also on improving the quality and useability of services. Criteria here include access, waiting times, transit and transfer times, timekeeping, and providing real-time information to travellers.
- Putting urban planning provisions in place to ensure that housing developments are transit-friendly.
- Using social marketing to encourage behavioural change in individuals' personal decisions on transport mode use.

3. Provide transport energy in ways which have a low net emissions profile and use the minimum possible quantity of fossil fuels, by:

- Electrifying transport wherever possible, where this can be done in ways that reduce net emissions and that can be provided for by the electricity generation, transmission and distribution system. Priorities for electrification include urban public transport (road and rail), the more heavily-used rail freight lines and electric vehicles — both plug-in hybrids and fully electric vehicles.
- Replacing fossil fuels with biofuels, where this can be done in ways that reduce net emissions and that meet environmental standards (which should ensure, for example, that we do not import biofuels which have been produced on land cleared from tropical rainforests) and ensure that land is managed sustainably.
- Further researching and piloting the growing and harvesting of biofuels as part of biotic greenhouse gas management strategies which make use of the natural carbon cycle in managing net GHG emissions.^{xvi}

Note: Measures to reduce private vehicle use and promote transport mode-shifting can be introduced quickly and have a substantial impact, whereas the major impact of developments in vehicle and fuel technologies will be over the longer term. Freight transport is also reducible. Charging real costs will encourage shippers to re-optimize their supply chains, favouring warehousing over 'just-in-time' or local manufacture over centralised production; giving a price advantage to local contractors; and encouraging wider use of energy-efficient transport modes.

4. Where fossil fuels are being used for transport, use them as efficiently as possible and facilitate the transition to renewable alternatives, by:

- using a mixture of regulation and incentives to reward the fuel-efficient use of efficient internal combustion vehicles.
- using a mixture of regulations, incentives and information provision to encourage and reward the importation, purchase and retention of fuel-efficient vehicles.
- providing disincentives for multiple car ownership by one household.

- educating drivers in vehicle maintenance and driving techniques which enhance fuel economy.
- implementing price-based measures to discourage car use in urban centres (e.g. congestion charging), and using the proceeds to enhance the provision of alternative modes.

Note: As for Principles 1 and 2, measures in this area can be implemented with a lead time of one to a few years.

About the Sustainable Energy Forum

The objective of SEF is to “facilitate the use of energy for economic, environmental and social sustainability”. SEF is a group of individuals and companies interested in promoting information and supporting action which will help move New Zealand toward a sustainable energy future. SEF has a membership around 170 ranging from staff in major energy companies to students and retired people. Many members are active in small-scale sustainable energy supply and energy efficiency businesses. See <http://www.sef.org.nz> for further information and membership.

Appendix 1: A Proposal to Restrict Fossil Fuel Consumption

The proposal

The most direct way to reduce the consumption of fossil fuels is to allow less of them to be sold. Dr Susan Krumdieck of the Department of Mechanical Engineering at Canterbury University proposes that the following limitations be put on fossil fuels (Year 1 is the year of introduction):

Government quota on oil and finished petrol product imports:

Year 1 imports will be capped at 90% of 2005 level. (It appears that this would be roughly a 7% reduction from 2007)

Year 2 imports will be capped at 80% of 2005 level.

Government quota on coal sales (including both domestic and export sales):

Year 1 coal sales will be capped at 90% of 2005 level.

Year 2 coal sales will be capped at 80% of 2005 level.

These quotas would continue to reduce over time. SEF believes that this proposal warrants serious investigation. Clearly, a business-as-usual or incremental approach will not provide the sharp reductions in carbon consumption that are urgently needed..

Areas to be investigated further

- Are the proposed reduction levels considered achievable? If not, what reduction levels are achievable?
- What unintended consequences might result from such a scheme?
- Could such a scheme best be implemented by a system of tradeable individual carbon permits?
- Could a change in the taxation system, to raise consumption and environmental taxes and lower labour and company taxes, achieve the same ends? If so, would it be a better means of achieving these ends?

Endnotes

ⁱ See <http://www.csiro.au/news/ps2im.html>

ⁱⁱ See <http://www.realclimate.org/index.php/archives/2007/11/is-the-ocean-carbon-sink-sinking/>

ⁱⁱⁱ See, for example, <http://environment.newscientist.com/channel/earth/dn11083-sea-level-rise-outpacing-key-predictions.html>. In releasing its Synthesis Report in November 2007, the IPCC removed the upper limit it had placed, as recently as February 2007, on its projections of sea-level rise during this century.

^{iv} See the analysis at <http://www.theoil Drum.com/node/3001>, based on US Energy Information Agency figures listed and updated at <http://www.eia.doe.gov/emeu/ipsr/supply.html>

^v See International Energy Agency, *Medium-Term Oil Market Report*, July 2007

^{vi} See p. 47

^{vii} An earlier study which reached this conclusion was Standing Advisory Committee on Trunk Road Assessment (SACTRA), "Trunk Roads and the Generation of Traffic", HMSO, London, 1994. For the two recent studies, see http://www.sightline.org/research/energy/res_pubs/analysis-ghg-roads, which focuses on highway-widening projects, and the New Zealand paper "The Paradox of Congestion", available from the Institution of Professional Engineers of New Zealand (IPENZ) site, <http://www.ipenz.org.nz/ipenztg/conf07/images/technicalpapers/M1%20DF%20Paradox%20of%20congestion.pdf>

^{viii} See <http://www.frbsf.org/publications/economics/letter/2005/el2005-38.html> for a discussion of the deficiencies of using futures alone to predict oil prices

^{ix} For ICLEI, see <http://www.iclei.org/index.php?id=3920>. For Sustainable Dunedin City, see <http://www.sustainabledunedin.org.nz/>. For Transition Towns, see <http://www.transitiontowns.org.nz/>.

^x It is encouraging to see that Treasury now recognises that there may be deficiencies in its oil price forecasting method, as noted at <http://www.treasury.govt.nz/budget/forecasts/hyefu2007/23.htm>

^{xi} For more detailed discussions of policy options in this area, see <http://www.nzses.auckland.ac.nz/conference/2007/papers/KRUMDIECK-Strategic%20Analysis%20Adaptation%20Assessment.pdf>

^{xii} The Government has recently taken some worthwhile steps to boost University research on climate change mitigation and adaptation issues, such as the establishment of two professorships at Massey University to research the use of biochar in boosting New Zealand soil carbon uptake and retention.

^{xiii} For information on the Australian Senate Inquiry into Australia's future oil supply and alternative transport fuels, see http://www.aph.gov.au/SENATE/committee/rrat_ctte/oil_supply/

^{xiv} One proposed international approach to oil depletion is the Oil Depletion Protocol at <http://www.oildepletionprotocol.org/>

^{xv} Described in Carolyn O'Fallon, "Walking & Cycling in NZ & the Draft NEECS", available at <http://www.energyfed.org.nz/CO'Fallon.pdf>, cited 15 March 2007

^{xvi} As outlined in Peter Read, "Climate and Energy: Today Problem with a Today Solution", available at <http://www.energyfed.org.nz/PRead2.pdf>, and his Editorial Essay in *Climatic Change*, "Biosphere Carbon Stock Management", available at <http://www.springerlink.com/content/rt798740226381q8/fulltext.pdf>