ENERGY, CLIMATE CHANGE AND CARBON NEUTRALITY

John Blakeley,
Dist FIPENZ, FIEAust, MICE, MRSNZ
Programme Director and Research Fellow
School of the Built Environment, Unitec New Zealand.

Presented to: Engineers for Social Responsibility/Sustainable Energy Forum

Joint Conference,
Auckland
26 July 2008

Contents of Presentation

A. NZ's Present GHG Emissions Situation (up to the end of the 2006 calendar year).
B. Sector Contributions to NZ's GHG Emissions Profile.
C. International Comparisons.
D. Looking to the Near Future (2012).
E. NZ's Proposed Emissions Trading Scheme.
F. Reaching an Agreement to Replace the Kyoto Protocol (from 2013).
G. Carbon Neutrality – What Do We Mean?
H. Some Conclusions.
I. A Different Vision for the Future.

A. New Zealand's Present GHG Emissions Situation (Up to End of 2006 Calendar Year)

Reference: April 2008 Overview Publication from the Ministry for the Environment (MfE).

1. NZ's total GHG emissions in 2006 were 77.9 million tonnes of CO_2 equivalent.

2. This is an increase of 16 million tonnes (26%) over the 1990 level of 61.9 million tonnes.

3. Under the Kyoto Protocol, NZ is committed to keeping emissions at the 1990 level on average over the five-year period 1 January 2008 – 31 December 2012 or purchasing carbon credits to cover the increase (after allowing for forestry sink credits).

4. The increase between 2005 and 2006 was 0.7 million tonnes of CO_2 equivalent (from 77.2 million to 77.9 million tonnes) which is just under 1%.

A. New Zealand's Present GHG Emissions Situation (Up to End of 2006 Calendar Year) (Cont'd):

5. However the increase between 2004 and 2005 was 2.1 million tonnes (75.1 to 77.2 million tonnes) from 21.9% to 24.7% above 1990 levels, an increase of 2.8%.

6. This large change in annual increase is believed to be a "statistical blip". The overall rate of increase since 1990 has averaged around 1.4% per year.

7. Also, it has been a relatively steady rate of annual increase since 1990.

A. New Zealand's Present GHG Emissions Situation (Up to End of 2006 Calendar Year) (Cont'd):

8. Annual energy sector emissions increases actually reduced slightly in 2004 (a normal year for hydro electricity generation) whereas 2005 was a "dry winter" with more fossil fuels being used to generate electricity. Also more coal was used at Huntly rather than natural gas.

9. The year 2006 was a normal year again for hydro electricity generation and this can perhaps partly explain the "statistical blip" (but of course 2008 has been a "dry winter" again with a lot of very expensive diesel fuel being burned at the Government's peak load thermal power station at Whirinaki).

A. New Zealand's Present GHG Emissions Situation (Up to End of 2006 Calendar Year) (Cont'd):

10. Overall, the assumption is made in this paper that the annual rate of increase of NZ's GHG emissions will continue to be around 1.4% per annum unless there is a significant change in the pattern of energy usage and/or other GHG emitting activity (especially agriculture).

11. If this average rate of increase is projected forward the GHG emissions above the 1990 level would double (from 26% to 52%) within the next 14 years from 2006 i.e. by 2020.

A. New Zealand's Present GHG Emissions Situation (Up to End of 2006 Calendar Year) (Cont'd):

12. Clearly unless something very dramatic happens, there is no way NZ can get it's GHG emissions back to 1990 levels. Even to hold then at 2006 levels in the long term would be a major achievement. To manage to reduce GHG emissions back towards 1990 levels may be a near-impossible task unless there are very significant changes in the lifestyles of New Zealanders?

13. Geoff Bertram and Simon Terry in their report for the Sustainability Council have recently said that if the present increasing GHG emissions trend continues, that when the present Kyoto Protocol commitment period expires at the end of 2012, New Zealand will commence any future commitment period staring down from the top of an "emissions cliff".

B. Sector Contributions to NZ's GHG Emissions Profile

Reference: April 2008 Overview Publication from the MfE.

Agriculture Sector	48%
Energy Sector	44%
Industrial Processes Sector	5%
Waste Sector	2%
Solvents and other Products	0.05%

Note: In other developed countries, agricultural emissions are typically about 12% of national emissions.

1. Agriculture is still NZ's largest emitting sector with its combined methane and nitrous oxide emissions making up **48%** of the total. Agricultural emissions were up by 16% on 1990 levels.

2. Transport was the next largest contributor with **19%** of total emissions. Transport emissions have increased by 64% since 1990.

B. Sector Contributions to NZ's GHG Emissions Profile (Cont'd)

3. Electricity generation and space heating comprised **11%** of total emissions in 2006. Emissions from this sector showed the largest increase of 138% since 1990, partly because of the increased use of coal-fired generation.

4. Other energy sector emissions (including industrial energy) comprised **14%** of total emissions.

5. Industrial processes account for **5%**. Emissions from this sector have increased by 24% from 1990 levels.

6. The waste sector accounted for only **2%**, being the only one to register a fall (of 26%) since 1990, mainly due to improved solid waste management practices.

B. Sector Contributions to NZ's GHG Emissions Profile (Cont'd)

Sector	%Total Emissions	% Increase since 1990
Agriculture	48	+ 16
Transport	19	+ 64
Electricity & Heating	11	+ 138
Other Energy (incl. Industry)	14	--
Industrial Processes	5	+ 24
Waste	2	- 26
Solvents	0.1	--

B. Sector Contributions to NZ's GHG Emissions Profile (Cont'd)

Largest single source of emissions for 2006

	%
Methane from ruminant animals	31.5
Road Transport (mainly carbon dioxide)	16.4
Other Transport (mainly carbon dioxide) (domestic rail, sea and air)	2.0
Electricity generation and heating (mainly carbon dioxide but small amounts of methane and nitrous oxide)	11.0
Nitrous oxide from agriculture (mainly from fertiliser)	17.5
Other sources (including industrial and other sectors)	21.0
	100.0

C. International Comparisons

The average NZ rate of increase of 1.4% per annum (2006 figure of 0.9%) can be compared with:

1. Figures released in April 2008 show that greenhouse gas emissions in both the EU and the US fell during 2006. US emissions were down by 1.3% and EU emissions by 0.3%, whereas in 2005, US emissions rose by 0.6% and EU emissions fell by 0.4%.

2. Globally, greenhouse gas emissions are rising at about 3% per annum, mainly due to rapid economic grown in China and India. This is fuelling a rapid increase in demand for energy from high carbon-dioxide-emitting coal-fired power stations, and also from a rapid increase in motor vehicle numbers.

D. Looking to the Near Future (2012)

1. Geoff Bertram and Simon Terry in a recent Sustainability Council report (April 2008) concluded that by the end of 2012, the proposed Emissions Trading Scheme (ETS) will involve large transfers of wealth but will only reduce NZ's GHG emissions by 2% (partly because of the large exemptions being applied to agriculture and major industry, extending as far ahead as 2030).

2. There has as yet been no clear analysis by NZ officialdom as to by exactly how much the ETS will reduce NZ's GHG emissions, but 2% by 2012 is probably a best guess at this stage.

3. A figure greater than 2% would probably require significant changes in human behaviour patterns, and less exemptions for major emitting industries.

D. Looking to the Near Future (2012) (Cont'd)

4. Under "business as usual" NZ's GHG emissions, already at 26% above 1990 levels in 2006, and assuming a continuing 1.4% annual increase may average 30% above 1990 levels over the five-year Kyoto Commitment period (2008/2012 inclusive)

5. This is the "emissions cliff" which Bertram and Terry say that we may be staring down from the top of at the end of 2012 and at the start of any new emissions reduction commitment period starting in 2013.

6. What might be achieved between now and the end of 2012 by a determined and courageous Government, willing to put effective policies in place to cause GHG emissions reduction to occur?

D. Looking to the Near Future (2012) (Cont'd)

7. The following is a rough estimate of what might be possible by the end of 2012.

	Likely Target
(a) Agricultural	
- Methane from ruminant animals (without causing a significant drop in NZ's living standards and assuming no research breakthroughs)	Nil Reduction
- Nitrous oxide from agriculture (mainly from fertiliser)	20% Reduction
(b) Energy and Other	
- Road and other transport (including less distance travelled annually, smaller vehicle sizes, more economical engines and a brake on new and secondhand vehicle imports to stop the fleet from growing)	10% Reduction

D. Looking to the Near Future (2012) (Cont'd)

(b) Energy and Other (Cont'd)

- Electricity generation and heating (taking into account that we already have nearly 70% renewable generation, including geothermal).	20% Reduction
- Other energy sources, including industrial processes.	10% Reduction

D. Looking to the Near Future (2012) (Cont'd)

8. What would be the overall impact of this?

Agriculture		
- Methane 31.5% x nil =	Nil	
- Nitrous Oxide 17.5% x 20% =	3.5%	
		3.5%
Energy and Other		
- Road and other transport 18.4% x 10%=	1.8%	
- Electricity generation and heating 11.0% x 20%=	2.2%	
- Other sources including industrial processes 21% x 10% =	2.1%	
		6.1%
Total potential saving by 2012		9.6%

D. Looking to the Near Future (2012) (Cont'd)

9. By the end of 2012, this would still only reduce our overall GHG emissions increase from around 30% to just over 20% above 1990 levels.

10. However if an overall reduction of around 10% was achieved by 2012, this would still be five times as much as is likely to be achieved by the ETS!

E. NZ's Proposed Emissions Trading Scheme

1. Purchasing carbon credits can be seen as a way of absolving our collective consciences of guilt for the behaviours of a consuming society, rather like purchasing indulgences for the forgiveness of sins in the Middle Ages.

2. Western countries are increasing seeing carbon trading as the way for societies to continue "business as usual" rather than adopting new policies to reduce consumption and "making do with less".

E. NZ's Proposed Emissions Trading Scheme (Cont'd)

3. The reason that the ETS is only likely to cause a 2% reduction in GHG emissions reductions by the end of 2012 is that although it is intended to put a price on "carbon" emissions, this is likely to lead people to only very minor long-term decreases in consumption and GHG emissions. This is because people adjust to paying higher prices and then carry on with their same habits of consumption.

4. The ETS is a very cumbersome and expensive way of putting a price on "carbon emissions". A carbon tax would be a much less expensive but more effective way of achieving the same result. Many people who actively opposed the Government's proposed carbon tax can now see that it would be a better alternative, but unfortunately by now the Government seem to be committed to introducing an ETS.

F. Reaching an Agreement to Replace the Kyoto Protocol (from 2013).

Reference: EnergyWatch Issue 49 – July 2008

- A widely accepted view is that after the present Kyoto Protocol agreement expires at the end of 2012 there will be increasingly tougher measures implemented internationally to combat global warming, with tighter controls on greenhouse gas emissions being progressively applied.

- In reality this maybe far from what is likely to happen.

- The chances of the existing Kyoto agreement being tightened and extended for even a few more years after 2012 are virtually nil, because the emissions reduction requirements within the agreement involve too few countries producing only a fraction of the world's greenhouse gas emissions.

F. Reaching an Agreement to Replace the Kyoto Protocol (from 2013) (Cont'd)

- A replacement agreement will be required from 2013 because the existing signatory countries are most unlikely to agree to any extension unless major developing countries – code for China and India – are committed to making significant emissions reductions as well.

- It is futile to expect those major developing countries to undertake any kind of economic sacrifice to reduce emissions which cause climate change while the largest and wealthiest emitting country, the USA, remains outside the agreement.

F. Reaching an Agreement to Replace the Kyoto Protocol (from 2013) (Cont'd)

- At present there appears to be a "Mexican standoff" developing between the USA on the one hand and China and India on the other, with neither side being willing to become committed to any binding emissions reduction targets unless the other side does so first.

- Most developing countries are still far from convinced that any new emissions reduction targets should apply to them, even though they are very critical of the slow pace of the ongoing negotiations.

- What will happen if no future international agreement is in sight as 2013 approaches? There might just be a possibility of a rollover of the existing Kyoto agreement for a year or two while another attempt is made to sort things out, but it is unlikely that such a rollover would be agreed to except as a very short-term holding arrangement.

G. Carbon Neutrality – What Do We Mean?

- Prime Minister's speech 13/2/07 (Annual Statement to Parliament).
- NZ's future is dependent on long term sustainable strategies for our economy, society, environmental, culture and way of life.
- Now the quest for sustainability has taken on a new urgency because of the scale of the environmental challenge which the world faces.
- Without a commitment to greater sustainability, in our resource use, and way of life, we risk not only damaging our own environment, but also exposing our economy to significant risks.
- She believes that NZ can aim to be the first nation to be truly sustainable.
- She believes that NZ can aspire to be carbon neutral in our economy and way of life.

G. Carbon Neutrality – What Do We Mean? (Cont'd)

Response by Rod Oram – Financial and Business Commentator.

- The PM was wise not to set a deadline to carbon neutrality because this is a journey to a distant goal.

- Over the next couple of decades we can reduce our output of carbon dioxide and other GHG such as methane, and we can partially absorb the gases we do emit with forest sinks and other forms of offsets.

- But almost half our GHG emissions are generated by the agricultural sector, methane from animals being the biggest contributor to that (plus nitrous oxide from fertilisers).

G. Carbon Neutrality – What Do We Mean? (Cont'd)

- The steps announced so far such as requiring biofuels to account for 3.4% of the energy content of petrol and diesel by 2012(now reduced to 2.0%) are incredibly modest.

- Meaningful progress will require making some very tough, fundamental decisions such as pricing the use of carbon across the economy, capping emissions and enabling a large-scale carbon market to develop.

G. Carbon Neutrality – What Do We Mean? (Cont'd)

John Armstrong – Political Commentator, NZ Herald.

- Carbon neutrality is a very large leap. It would require that for every bit of man-made 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.

- The only really effective way of reaching climate change objectives is to put a price on the use of carbon.

- Climate Change Minister, David Parker, was challenged to say what he understood carbon neutrality to actually mean and come up with a definition which seemed to exclude methane "because the technology to stop cows belching methane has yet to be invented".

G. Carbon Neutrality – What Do We Mean? (Cont'd)

- It seems that the government has narrowed the aim of carbon neutrality to concentrating on cutting emissions in the energy sector which, if transport is included, now accounts for 44% of GHG emissions.

- However the government does seem to be deliberately vague as to whether or not methane is included in their "carbon neutral" definition

G. Carbon Neutrality – What Do We Mean? (Cont'd)

NZ Listener Editorial 15/3/08

- NZ's carbon-emissions profile is very different from that of most other OECD nations. Our economy is heavily dependent on agriculture, which is the source of half of our emissions.

- The major emitters in other developed countries tend to be in the energy and transport sectors, giving them better options for using different technologies to lower their emissions.

G. Carbon Neutrality – What Do We Mean? (Cont'd)

- NZ Listener Editorial 15/3/08 (Cont'd)

- NZ produces 0.2% of the world's greenhouse-gas emissions. There is no question we need to do our share as part of the global effort to reduce those emissions, because collective action requires the involvement of small players as well as larger ones.

- However, there is nothing to be gained by excessive zeal. There is no need to bandy "carbon neutrality" around as if Kyoto targets are piffling. They are not. They are going to be extremely difficult to meet without radical action.

G. Carbon Neutrality – What Do We Mean? (Cont'd)

NZ Listener Editorial 15/3/08 (Cont'd)

- If NZ cuts back on farming and the economy suffers just so our carbon emissions can be dramatically reduced, the rest of the world is not going to care, let alone applaud. But it will certainly matter to us.

- The "aspiration of carbon-neutrality" was a poll-driven phrase typical of politicians feeling pressured by headlines and focus groups into making responses that may be unworkable and have unexpected consequences.

- For example, an attempt by the US to reduce its dependence on fossil fuels, has led to fodder and food crops being replaced by subsidised biofuel crops, decreasing the amount of food available in the world and contributing significantly to its cost. A recent report showed that the grain required to fill a Range Rover's petrol tank could feed a person for a year.

G. Carbon Neutrality – What Do We Mean? (Cont'd)

My Comments

- In order to achieve carbon neutrality in the transport sector, we would need the whole transport fleet to be electric vehicles powered from renewable energy sources. All electricity generation would have to be from renewable energy sources.

- Hydrogen powered vehicles are but a distant possibility on a mass scale, and to be carbon neutral, the energy to produce the hydrogen would have to come from renewable sources.

G. Carbon Neutrality – What Do We Mean? (Cont'd)

My Comments

- Biofuels are most unlikely to achieve carbon neutrality because of the amount of energy required in the production of the biofuel. "Second generation" biofuels are more promising but are still a number of years away from commercial development.

- A long term aspirational goal is not binding on anyone now. Labour may promote carbon neutrality as a target with no time frame and National may promote a 50% reduction in GHG emissions by 2050, but these targets are not only "*Not in my term of office*" but also "*Not in my lifetime*" as far as most politicians today are concerned.

H. Some Conclusions

1. Whatever is done now, NZ is likely to well exceed its GHG emissions target during the first five-year commitment period of the Kyoto Protocol.

2. By themselves technology solutions including energy efficiency and “clean technologies” will not provide a solution to limiting GHG emissions. A “conservation ethic” will also be required, both in NZ and internationally. People will have to be prepared to “make do with less”.

3. The Kyoto Protocol is likely to be dead at the end of 2012 and a firm and binding international agreement on limiting GHG emissions from 2013 onwards is going to be very difficult to achieve.

H. Some Conclusions (Cont'd)

4. By 2012, the proposed Emissions Trading Scheme may only reduce NZ's GHG emissions level by 2%. On the other hand a determined and courageous effort by the Government to reduce GHG emissions levels might reduce these emissions by 10% by 2012.

5. Carbon neutrality is a journey to a very distant (if not impossible) goal. What is required now is some defined targets to limit New Zealand's GHG emissions in the near-term future.

I. A Different Vision for the Future

Reference: "Pacific Ecologist" June 2008

- This latest issue looks at the problem of a dysfunctional global economic system with its imperative for continual economic growth.

- Can we reduce GHG emissions sufficiently and move to renewable energy, while the world economy continues to grow through the 21st century as planned?

- Can responding adequately to global warming be done in any consumer society?

I. A Different Vision for the Future (Cont'd)

- Several articles in this issue demonstrate clearly in different ways why we must phase out economic growth. This is a tough challenge for politicians and voters.

- Richard Heinburg says (page 5) "for the worst case scenario of develop, all that is required is for world leaders to continue with current policies".