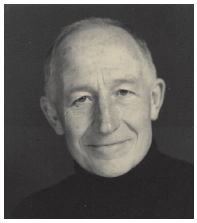
CLIMATE CHANGE AND PEAK OIL
An integrated strategy for Australia

Don't blow it – good planets are hard to find. –Time



Climate change and peak oil are inextricably linked, reports **IAN T DUNLOP**, distinguished chair of the Australian National Wildlife Collection Foundation and former oil, gas and coal industry executive. Rapid agreement, and implementation of measures to prepare for peak oil and to stabilise atmospheric carbon concentrations are urgently needed. Integrated policies, at global and national levels will provide a coherent response to both issues. Reductions of Australia's emissions of around 90% by 2050, based on equity principles and setting up a system of Tradeable Energy Quotas, and an Oil Depletion Protocol imply fundamental change from current practice altering the lifestyle of the entire community. This article is a summary of his paper, *Climate Change and Peak Oil: An Integrated Policy Response for Australia*.

The core of this strategy is built around the concepts of contraction and convergence developed by Aubrey Meyer, The Global Commons Institute, London, UK (www.gci.org.uk), and Tradeable Energy Quotas (TEQs), developed by David Fleming, The Lean Economy Connection, London, UK (www.teqs.net). The reason for this is they are the simplest, most equitable and practical economic and regulatory options being considered to address the looming convergence of climate change and resource shortages, particularly peak oil. Colin Campbell was responsible for the development of the Oil Depletion Protocol. My thanks to them for persevering with this essential work.

Recent reports confirm what has been evident for many years. Carbon emissions from human activity are leading to increased atmospheric carbon concentrations. This is very likely to be causing major climate change, particularly temperature increases, which will become dangerous and potentially catastrophic if carbon concentrations are allowed to continue rising. The evidence is sufficiently clear that urgent precautionary measures should be taken to reduce human carbon emissions to avoid dangerous consequences. The cost of doing nothing far outweighs the cost of action to mitigate and adapt to climate change.

There is a high probability peak global oil production will be reached within the next 5 years. Oil does not run out, but is the point at which further expansion of oil production becomes impossible because new production is fully offset by decline of existing production, irrespective of oil price. It may take the form of a sharp peak, from which oil availability declines rapidly, or it may be an undulating plateau spread over a number of years if, for example, oil demand drops as a result of climate change impact. Climate change and peak oil are inextricably linked. Each one is a major issue in its own right, but their convergence has received minimal attention, which is unfortunate as this is likely to have far greater impact than the sum of the individual parts. Policy must ensure that solutions to the one reinforce, and do not conflict with solutions to the other. Globally and nationally there must now be rapid agreement, and implementation of measures to stabilise atmospheric carbon concentrations by reducing emissions substantially and to prepare for peak oil. Contrary to current Australian government policy, this will require the establishment of binding targets and compliance provisions to measure policy effectiveness. Further, in the interests of global security, it implies a preparedness to cede national sovereignty to supra-national agreements and organizations.

There is a high probability peak global oil production will be reached within the next 5 years

Whilst the Stern Review states stabilisation at 450ppm CO_2e is already almost out of reach, it also acknowledges there is a high price to delay and significant dangers in the 450–550ppm range. Additionally, the most recent IPCC evidence, highlighting the emergence of non-

linear climatic responses, strongly suggests the target for maximum global atmospheric carbon concentration should be 450ppm CO_2e. This implies we have barely 10 years before that maximum is reached, probably somewhat less. It is proposed 450ppm CO_2e be adopted as the maximum acceptable global atmospheric carbon concentration and the target for global climate change policy. This implies a mean global temperature increase, relative to pre-industrial times, of 2°C (range 1–3.7°C). Of this, 0.7°C has already occurred and a further 0.6°C is inevitable as the climate has not yet fully responded to historic emissions.

The developed world, having created the bulk of the problem, has a moral obligation to take the lead, but the developing world, in its own interests, must rapidly join in seeking solutions. This poses a fundamental question of global equity. It's morally indefensible and unrealistic to expect the developed world can continue to emit at current levels, with the developing world absorbing the bulk of the climatic impact and being asked to constrain its own growth. The simplest, most equitable and practical solution is:

- a contraction of global emissions in toto, and
- a convergence over time toward equal emissions per capita globally.

Contraction – a global carbon budget

This maximum CO_2e concentration provides the basis for determining an annual global carbon emissions budget. Analysis indicates that achieving 450ppm CO_2e will require the annual global emissions budget to *contract* from 8 gigatonnes carbon (GTC) at present to 3.5 GTC by 2050, a reduction of 55%. Periodic review should be provided, so the global budget can be adjusted if scientific evidence of climate change dictates it become more, or less, stringent.

Convergence – a national carbon budget

The annual global budget must then be allocated amongst nations equitably to establish national carbon budgets. The simplest, most equitable means of doing this is to *converge* linearly from today's unequal per capita carbon emissions to equal per capita emissions globally by a fixed date to be negotiated. If that date is set at 2040, the implications for contraction and convergence of emission reductions from 2005 to 2050 are shown, indicatively, in the box.

Reductions of emissions in Australia of around 90% by 2050 imply fundamental change from current practice

Current piecemeal government policy is totally inadequate to meet the challenges of climate change.

Stabilising global atmospheric carbon concentration at 450ppm CO_2e by contraction and convergence[18]

Country	Emissions	2005	2025	2050	% Change 2005–25	% Change 2005–50
USA	per capita	4.85	1.95	0.37	−60	−92
	Total	1.45	0.70	0.14	−52	−90
Australia	per capita	4.57	1.90	0.37	−59	−92
	Total	0.091	0.044	0.009	−52	−90
W. Europe	per capita	2.06	1.18	0.37	−43	−82
	Total	0.85	0.48	0.15	−44	−82
World	per capita	1.23	0.85	0.37	−31	−69
	Total	7.91	6.69	3.55	−15	−55
China	per capita	0.66	0.62	0.37	−6	−43
	Total	0.86	0.89	0.53	+4	−38
India	per capita	0.40	0.55	0.37	+39	−6
	Total	0.43	0.76	0.55	+74	+28

Per capita emissions – metric tonnes carbon per capita. Total emissions – gigatonnes carbon. Population estimates – UN 2003 median projections to 2050.
(indicative figures only)

Emissions trading is now, reluctantly, under discussion but is only one component of the comprehensive policy required. Peak oil is barely on the agenda, although it may be the issue which has the greatest impact in the short-term. A comprehensive, integrated policy, at both global and national level will provide a coherent response to both issues.

- Stabilise global atmospheric carbon concentrations at 450ppm CO_2e by contracting annual global carbon emissions from 8GTC today to 3.5 GTC by 2050
- Allocate equitably the contraction task between nations by converging linearly from today's unequal per capita emissions to equal per capita emissions globally by a date to be negotiated, say 2040. Australian emissions would have to reduce by 50% by 2025 and 90% by 2050
- Use a modified Kyoto Protocol to provide the framework for the contraction and convergence process, and for international emissions trading;
- Meet the national carbon reduction budget by a system of Tradeable Energy Quotas (TEQs) within Australia
- Negotiate a global Oil Depletion Protocol to allocate available oil equitably between nations, determining national oil descent budgets and providing for international trading
- Allocate oil domestically via a similar TEQ concept to emissions reduction. TEQs are also applicable to the management of scarce water resources.

This integrated policy would minimise costs and smooth the transition as equitably as possible. However, there is a real danger, given the extent of change required, that global and national leaders, along with the populace, become fixated by pessimism and paralysis, moving directly from denial to despair. An alternative view is that we now have a unique opportunity to set humanity on a new course, built on sustainable principles.

Reductions of emissions in Australia of around 90% by 2050 imply fundamental change from current practice. Change of this dimension to be successful, must have widespread community, business and government support. It must become a cause to which everyone is committed.

Many schemes have been proposed to achieve emissions reductions, ranging from carbon or fuel taxation to emissions trading of various forms. There is general agreement that trading mechanisms, rather than taxation, provide the most efficient, least cost solution to emissions reduction and a number of alternatives have been developed. For example: AGO National Emissions Trading Discussion Papers (1999); McKibbin/Wilcoxen Hybrid Blueprint (1997–2006); National Emissions Trading Taskforce Discussion Paper (2006). Valuable experience is being gained from observing the operation of the EU Emissions Trading System (ETS) since its implementation in February 2005. Various corporations are gaining experience from operating their own internal emissions trading schemes.

Binding emission reduction targets needed

Each scheme has pros and cons and, with sufficient political will, each could work. However they all suffer from two fundamental flaws. First, in the absence of binding emission reduction targets, trading of itself will not result in emission reductions, as is evident from experience with the EU ETS. Reductions will only occur when mandatory targets are set; this requires political will or, preferably, for the scheme to be established independent of the political process.

Second, they tend to focus only on major emitters

(e.g. stationary energy such as power stations) and do not cover the full gamut of emission sources, on the grounds that to do so would be too costly. In so doing, they divorce the community from direct involvement in the emissions reduction process, which is a major disadvantage given the extent of behavioural change needed. This is a particular disadvantage as many of the profitable or low-cost emission reduction opportunities are measures that must be taken on the energy demand , as opposed to the energy supply, side at the household or individual level. Perhaps most important, these schemes are exposed to the risk of political backsliding at any time.

Debate over emissions trading is still focused on process rather than desired outcome in terms of emissions reduction. When reduction targets are considered, thinking is in the 30–50% range instead of the 90% now required. This may have been appropriate had action been taken in the 1990s, but no longer.

An alternative to the above, which incorporates their benefits but addresses their flaws is the concept of Tradeable Energy Quotas (TEQs). TEQs, unlike the other mechanisms, are also applicable to the management of shortages such as water and peak oil.

Tradeable energy quotas – a summary

TEQs are an electronic system for rationing carbon-emitting energy, and promoting sustainable alternatives, which involves every energy-user and energy-provider in a national economy. There are two reasons why they might be required:

- Climate change – to reduce greenhouse gas emissions from fossil-fuel use;
- Resource supply – to maintain a fair distribution of a scarce commodity, such as oil when peak oil eventuates (or water during drought).

In the case of climate change, TEQs are applied within the framework of the annual national carbon budget allocated under the contraction and convergence process outlined above. For Australia, the annual budget will reduce year by year to achieve the overall 90% reduction by 2050. In effect we descend an emissions staircase in a controlled manner, whilst making the transition to a sustainable low-carbon economy.

TEQs are defined in terms of *carbon units*, that is one kilogram of carbon dioxide, representing the carbon emissions produced by use of the energy itself, plus the combustion of the other fuels that were used in its extraction, refining, generation and transport. All energy and fuel carry carbon rating in this way. Other greenhouse gases such as nitrous oxide and methane, are rated in CO_2-equivalent terms – the number of kilograms of CO_2 that produce the same global warming effect.

At the outset, a TEQ registrar is established. This is a computer database which holds individual carbon accounts for all participants in the scheme, similar to credit-card accounts. The number of TEQ units issued and credited to these accounts initially is set equal to emission levels from current energy use, derived from the national budget for that year (after adjusting for non-energy emissions). The number on issue will then be reduced year-by-year in line with the national budget.

To allocate TEQ units, the proportion of energy consumed directly by households, for example fuel and electricity, is first assessed. Typically this might be around 35% of total energy usage. TEQ units representing this share of all emissions are then issued free to all adults on an *equal per capita basis* (Children's energy usage would be handled through the child's allowance process). The remaining share, 65%, would be issued through a tender process to all other users – companies, small businesses, public bodies/government, voluntary sector.

When energy-users make purchases of energy or fuel, they surrender units to the energy retailer, accessing their TEQ account. The retailer then surrenders TEQ units when buying energy from the wholesaler. Finally the primary provider surrenders units back to the TEQ registrar when it pumps, mines or imports fuel. This closes the loop on what is, in effect, a "carbon added", as opposed to a "value-added" system.

There is embodied energy in every good and service we buy, and all uses of energy are covered by TEQs. Thus no consumer purchase is excluded from the scheme.

When any purchaser no longer has TEQ units to offer at the point of sale, units have to be purchased on the market, the cost of the units being added to the cost of the energy purchased. If you use less than your quota of units, you can sell the surplus. If you need more, you buy them.

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Every week an additional number of units is issued, equivalent to one week's supply, so at any time there is full year's supply in circulation. Allocation is made as above.

The government receives revenue from the tender and a trading margin is earned by the market-makers who quote bid and offer prices. TEQs are bought and sold on the secondary market. Purchases and sales of units are made via the existing financial services infrastructure. The scheme can be largely automated using existing technology.

Emission assessment and rating procedures can be readily developed from the emissions databases and expertise already established by the Australian Greenhouse Office (AGO).

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The annual budget is set by an Emissions Policy Committee, with a mandate to achieve the national carbon budget determined by the contraction and convergence process. It operates independent of government, much as the Reserve Bank sets interest rates.

To provide directional certainty for long-term investment decision-making, the committee will maintain a rolling 20-year budget comprising three periods:

- A 5-year binding commitment, which cannot be revised except by *force majeure*
- A 5-year intention, which is inflexible but which can be revised for sound, stated reasons at an annual review
- A 10-year forecast, which is a robust guideline

The government is itself bound by the scheme. Its role is to live within it and assist, with appropriate directional policies, the rest of the community to do likewise. The scheme is thus insulated from the political process, and the government is relieved of the political need to defend the emissions reduction budget.

The transition to a low-carbon economy will be extremely challenging. It will only be achieved if there is joint common purpose and motivation across the nation. The beauty of the TEQ approach is that it creates that common purpose as everyone, and every organization, has an incentive to reduce emissions, and encourage others to do likewise. The price of units is ultimately under the control of the people who use them, since the faster they are able to reduce their demand for units, the lower the price.

Structural change to stave off dangerous climate change

It also will lead to intelligent structural change, as the community demand short-term political expediency be set aside and sensible long-term policies be implemented to achieve the national emissions budget and stave off the dangerous impact of climate change. The need for additional regulation and command and control systems is minimised. The technology to establish a TEQ system is already in existence in the financial services and banking sectors, and it would build on much of the work already undertaken by the Australian Greenhouse Office (AGO) and others in developing greenhouse gas metrics, monitoring systems etc. Accordingly a TEQ system could be established rapidly, within say 12–18 months. Thus the process becomes a positive, collective experience for the community to restructure and rebuild the economy on sustainable principles.

TEQ places responsibility where it belongs, with the individual citizen. Schemes which take place in the remote bureaucratic uplands, where citizens are hectored and told what to do, or where arms are twisted by taxation, are far less likely to inspire willing and inventive cooperation. Implicit in the TEQ concept is the imperative of keeping the scheme simple. There should be no exemptions for carbon-intensive or export industries and the like, for example such as the recent deal between the NSW Government and BlueScope Steel. Experience in implementing the GST demonstrated that allowing such special pleading immeasurably complicates the concept, leading to great inefficiency and confusion. In this case it would also lead to inequity as the community-at-large would have to absorb a larger emission reduction burden.

The Kyoto Protocol

The Kyoto Protocol should be recognised as the primary vehicle to tackle climate change at the global level. Australia should immediately ratify the Protocol and initiate discussions to incorporate the 450ppm CO_2e maximum atmospheric global carbon concentration and the contraction and convergence principles, as outlined, as the global basis for addressing climate change, managing and allocating global emissions. This should form the framework for Phase 2 of the Protocol. Phase 2 should be initiated as soon as possible, and not await completion of Phase 1 in 2012. Phase 1 was a compromise which will not deliver substantive emission reductions and needs to be superseded without delay.

The flexibility built into the Kyoto arrangements allows the TEQ concept to be used as the Australian process for managing the national emissions budget. Negotiating global agreement to restructure Kyoto in this way will be a major undertaking, albeit the passage

may be eased by increasing evidence dangerous climate change is looming. Australia should take a leadership role in negotiating a global agreement.

Directional incentives

The TEQ system covers energy use. However 30% of Australian carbon emissions come from non-energy use, for example land-clearing, agriculture and waste. Regulatory arrangements are needed to ensure these activities also contribute to emissions reduction. Fossil-fuel industries continue to benefit from an enormous subsidy by virtue of the cost of carbon not being incorporated into their cost structure. As a result energy investment decisions have been distorted for decades – part of the "greatest and widest-ranging market failure ever seen" to quote the *Stern Review*. That will change under the market-based carbon-pricing policy proposed.

Peak oil

The policy outlined above for climate change is appropriate for managing the peaking of global oil supply with the following variations:

Oil depletion protocol

The equivalent of the Kyoto Protocol and the Contraction and Convergence mechanisms would be an Oil Depletion Protocol, agreed globally, the intent being:

- to reduce global dependency on oil, given that peak of physical oil availability is being reached and remaining oil reserves are steadily depleting.
- to conserve oil for premium use
- to avoid profiteering from shortages, such that oil prices may remain in reasonable relationship with production cost
- to allow poor countries to afford their imports
- to avoid de-stabilising financial flows arising from excessive oil prices
- to encourage consumers to avoid waste.
- to stimulate the development of alternative energies
- to assist the transition to a low-carbon economy without conflict.
- to contribute to reducing carbon emissions, working in tandem with the Kyoto Protocol initiatives.

Oil in this context is "conventional oil," excluding non-conventional oil like tar sands, oil shales and oil from coal conversion, which have detrimental environmental consequences. The protocol operates as follows:

- An Oil Depletion Rate is established, globally and nationally
- Each country has a finite endowment of oil comprising current recoverable oil reserves in existing oilfields plus discoveries yet to be identified
- Reserves are calculated under industry standards;
- Discoveries can be reasonably estimated based on extrapolation of historic trends
- The depletion rate is defined as the amount currently being produced annually, either globally or nationally, divided by the current oil reserves plus discoveries, as a percentage
- The world depletion rate at present is around 2.6% p.a., the U.S. depletion rate is around 5% p.a., the Australian depletion rate is around 2.6% p.a.
- The world and every nation would undertake to reduce their oil consumption annually by at least the world depletion rate;
- No country would produce oil at above its present depletion rate
- No country would import oil at above the world depletion rate.

The Protocol would result in an annual, national oil-descent budget akin to the national emissions budget. But in this case there is less focus on global equity via a convergence process where, for example, developing countries might expand consumption as developed countries contract, as the intent is to wean all consumers off oil as an increasingly scarce commodity, hasten the transition to alternatives and avoid locking in new oil-dependent infrastructure.

Meeting the oil descent budget

Having formulated the oil descent budget, it would then be implemented nationally using the TEQ system as the vehicle. In this case, rather than constraining an over-abundant commodity, carbon emissions, the system rations a scarce commodity, oil. The TEQ unit would be defined in terms of one oil unit – for example, I litre of petrol or 1 litre of fuel oil, or some combination related to the product market. An annual distribution would be determined as before, then allocated between individuals, gratis on an *equal per-capita basis*, and to industry, government etc. by tender.

Trading would occur as before, dictated by individual needs. The annual oil descent budget sets out a clear transition path to a low-carbon economy, as guidance for long-term investment decision-making. The oil TEQ system could be administered using similar electronic and administrative infrastructure to the emissions TEQ. Ideally the two would operate simultaneously in a self-reinforcing manner. Again, the system should be kept simple, with no exemptions entertained.

International oil trading

While the TEQ system would handle domestic trading, international trading arrangements nation-to-nation would be provided as part of the Oil Depletion Protocol, akin to the international emissions trading concept part of the Kyoto Protocol. This would allow nations with quotas in excess of their needs to sell to those needing additional quota, in the process easing global inequity by transferring wealth from the developed to the developing world.

Smoothes transition to low carbon economy

This integrated policy would minimise costs and smooth the transition as equitably as possible. The transition to a low-carbon economy, stabilising atmospheric carbon concentrations and managing the declining availability of oil, will fundamentally alter the lifestyle of the entire community. It will only be achieved if there is strong leadership and wholehearted commitment to achieve these objectives. To build this commitment will require extensive community awareness programmes. Rather than a problem, it is a unique opportunity to set humanity on a new course, built on sustainable principles.

These changes will fundamentally alter the lifestyle of the entire community. While policy should endeavour to minimise costs and smooth the transition to a low-carbon economy equitably, there will undoubtedly be pain, but the pain of not taking action will be considerably greater. In these circumstances, it is not possible to maintain industry competitiveness and economic growth as currently constituted and we should not pretend otherwise. Conventional growth is a large part of the problem. We must move to a new paradigm of a sustainable economy, which requires large structural change. But whilst some industries decline, greater opportunities open up. Change can be achieved rapidly given the right impetus. Accordingly, consensus building, while not underplaying the extent of the challenge ahead, must focus on the positive and the opportunities it presents.

Above all, visionary, principled, long-term leadership is needed from government, the community and business. Short-term political or corporate expediency is no longer acceptable; bipartisan cooperation is essential. Action is required in the next 6–12 months, not in the 3–5 years favoured in political debate. PE

The above article is a summary of the report, *Climate Change and Peak Oil: An Integrated Policy Response for Australia* by Ian T Dunlop, published in March 2007. Dunlop is distinguished chair of the Australian National Wildlife Collection Foundation; formerly a senior international oil, gas and coal industry executive. He chaired the Australian Coal Association in 1987–88, chaired the Australian Greenhouse Office Experts Group on Emissions Trading from 1998–2000 and was CEO of the Australian Institute of Company Directors from 1997–2001. He has a particular interest in the inter-action of corporate governance, corporate responsibility and sustainability. An engineer by qualification, he holds an MA (Mechanical Sciences) degree from the University of Cambridge, is a Fellow of the Australian Institute of Company Directors, the Australasian Institute of Mining and Metallurgy, and the Energy Institute (UK), and a Member of the Society of Petroleum Engineers of AIME (USA). Full report available at: www.aspo-australia.org.au/References/Bruce/ITD-Climate-Policy-0307.pdf

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