

The Commons revisited: The tragedy continues

Bob Lloyd*

Physics Department, Otago University, PO Box 56, Dunedin, Dunedin, Otago, New Zealand

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Abstract

Garrett Hardin's classic paper "*Tragedy of the Commons*" published in *Science* in 1968 struck a chord with scientists and non-scientists alike and has continued to provide a key reference point to how a number of "*Commons*"-related problems can be viewed. Hardin's paper will be in view of both anthropogenic global warming and peak oil and some of the solutions he posed for the "population problem" applied to the post-peak era. Possible solutions are compared with the Kyoto Protocol for global warming and the Rimini Protocol for peak oil. A carbon-indexed, universal tax on non-renewable energy resources 'Unitax' is mooted as a longer-term possibility to overcoming both global warming and the financing of post-peak oil problems. Alas, the process of dealing with global warming and peak oil seems to be falling into the "no technical solution" category that Hardin identified for population.

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1. The Commons revisited

Garrett Hardin's "*Tragedy of the Commons*", published nearly 40 years ago in *Science* (Hardin, 1968), struck a chord with scientists and non-scientists alike and has continued to provide a key reference point to how a number of *Commons*-related problems can be viewed. This paper will look at oil depletion and anthropogenic global warming as two closely linked global problems that can be viewed as tragedies of the *Commons*. While the idea of a *Commons* in terms of the non-own-able atmosphere, as a sink for greenhouse gas and pollution in general is somewhat synonymous with the traditional common grazing fields used as the example in Hardin's paper, the idea of energy resources, and oil reserves in particular, as a common heritage for mankind is not quite as straightforward, although there is a basic ethical argument that all the Earth's mineral resources should be counted as a common resource to enable the world to make a transition to renewable energy forms. The two problems are closely linked because the main source of CO₂-induced anthro-

pogenic global warming has been due to the burning of crude oil, in addition to coal and natural gas.

For those that are not familiar with the "*Tragedy of the Commons*" it should be explained that the paper was put forward as an attempt to show that long-term growth in a finite world is impossible and that unless some rather drastic steps are taken, the world ecosystem will be in some considerable difficulties in the not too distant future. This is of course not a new theme; the Club of Rome was inaugurated in the same year, 1968, as Hardin's paper was published; with their first report appearing 4 years later as "The Limits to Growth" (Meadows et al., 1972). This, now well-known report, together with the 20- and 30-year updates also suggested that the problems of resource allocation, pollution and population growth would become serious for the world during the mid-21st century and that overshoot was near impossible to avoid (Meadows et al., 1992, 2004).¹

Bartlett (2004) has similarly suggested for several decades that Humankind's greatest downfall has been its

*Tel.: +64 03 479 0964.

E-mail address: boblloyd@physics.otago.ac.nz

¹Meadows et al. (2004) suggested that the time of the Johannesburg conference in 2002 (Rio plus 10) that global society was: "almost paralysed by a variety of ideological and economic disputes, by the efforts of those pursuing their narrow national, corporate or individual self interests".

inability to understand the consequences of growth and the exponential function in particular. These and other such doomsday expositions have largely fallen on deaf ears, however, in the economic free market expansionary climate over the latter part of the 20th century, and as living conditions in the developed countries at least, have mostly improved.

The classic *Tragedy of the Commons* is easy to define: imagine a common grazing area used by 10 farmers; each farmer grazes 10 sheep on the *Commons*. What is the extra benefit to the farmer of increasing his holding to 11 sheep; obviously 10% accrued directly to the farmer's wealth? What is the net "benefit" to the *Commons* by being over grazed by one animal, obviously minus 1%. The tragedy occurs of course when all farmers increase their holdings to increase their personal wealth and the *Commons* is ruined. For the global *Commons*, the players are not individual farmers but a large number of nation states at various stages of development and with their own specific needs and agendas, plus an assortment of non-government entities largely free from national supervision. With this increase in complexity, Hardin argues that the steps taken to deal with the world *Commons* need not be technically based, as the key problem areas are probably not those that can be solved with purely technical solutions.

Hardin used the "population problem" as the exemplar in this category of problems with no technical solution. Unfortunately, in terms of this particular example, his suggestion that no cultural group on earth has solved the population problem (as of 1968) is now, in 2007, not true and there are several prosperous nations that have zero or even declining national populations, although immigration complicates this balance. It is also true, however, that the solution to the population problem, that of increasing incomes leading to decreasing fertility, has been one of the main accelerants in the other problem, that of providing energy resources. This again shows that Jeremy Bentham's two variables *good* (read as energy) and *population* cannot be simultaneously maximised. The maximum good for the maximum population thesis of Bentham is also attacked as not viable in Hardin's (1968) paper. Increasing incomes is not the only cause of decreasing fertility, but most rich nations have much lower population growth rates than poorer nations (Meadows et al., 2004).

To reach a solution to the population problem, Hardin (1968) suggested that the invisible hand of free market economics must be discarded and replaced with a social arrangement of "mutual coercion mutually agreed upon". He also suggested that the use of social coercion in the form of propaganda to bear on personal conscience would be self-defeating and more likely to lead to psychologically dysfunctional individuals, than to actually solve the population problem. Here he cites Darwin's theory of evolution to prove that in the long term, those adhering to a voluntary restraint in population growth would just be out-populated by those not adhering. The matter of appealing to conscience to solve environmental and

resource-constraint problems will be discussed later, as it is particularly relevant to the present discussion. Hardin also discussed in his 1968 paper how our concepts of morality, conscience, freedom and governance are related to how we should deal with *Commons*-related problems; this discussion is now becoming more urgent.

It is not just population that is the problem but the availability of natural resources per capita, compared to how fast we are using the natural resources per capita. These two indices neatly encapsulate the variables: population, resources and time into easily understandable numbers (Meadows et al., 1992).

2. Corporations in the *Commons*

What Hardin did not fully articulate, in his 1968 paper, was the role of modern corporations in the tragedy. Corporations have even less incentive than private individuals to keep the *Commons* in order; in fact they have a (legal) clear line of responsibility to their shareholders alone and have continuously resisted government and international efforts to regulate the *Commons* in terms of alleviating pollution and establishing sustainable environmental management, including equitable resource allocation.

Friedman (1970) is the well-known advocate of the doctrine that "the social responsibility of business is to increase its profits" and although others including Kolstad (2007) have recently argued that this view is unethical there is not a lot of evidence to suggest that it is not the status quo. Defenders of corporate attitudes to the environment suggest that in recent times social and media pressure have made corporations take on social responsibility (Hill, 2006) but Kolstad argues that the corporate social responsibility (CSR) that does exist within some corporations is there for one purpose only, that of maximising profits. The companies are just adapting their strategies to ensure maximum return for the shareholder (Kolstad, 2007). This view is supported by evidence that in poor countries where the environment is not regulated, or valued as highly, then CSR has been found to be correspondingly lower (Gouldson, 2006). Porter and Kramer on the other hand, writing in the Harvard Business Review, in a lengthy article praising the corporate sector for their social responsibility, show that the Friedman doctrine is alive and well by claiming that:

The most important thing a corporation can do for society, and for any community, is contribute to a prosperous economy. (Porter and Kramer, 2002)²

²This "trickle down" pronouncement is then followed by a stern word of rebuke on government interference: "Governments and NGOs often forget this basic truth. When developing countries distort rules and incentives for business, for example, they penalize productive companies. Such countries are doomed to poverty, low wages, and selling off their natural resources. Corporations have the know-how and resources to change this state of affairs, not only in the developing world but also in

This intent of course closely follows Freidman, who argued much earlier that corporations are not the competent players to act on behalf of either society or the environment and that this role is best left to the democratically elected governments. But as Sharon (Beder (2006) has documented in “Suiting Themselves”, the power arising from the large accumulation of capital and concentration of vested interest in large corporations has meant that the role of corporations in formulating national and international laws and policies has risen over the last half of the 20th century. Beder goes as far to suggest that the decision-making processes in governments by the start of the 21st century have become subsidiary to the decisions made in corporate boardrooms. She claims in terms of Trans-National Corporations (TNCs) that by the beginning of this century: “The rise of corporate power and the increasing importance accorded to markets means that TNCs are eclipsing the nation state as the driving force behind policy making.” (Beder, 2006).³

Additional empirical evidence to suggest that poor corporate environmental performance is linked to increased political interference in government regulatory matters is given in a study of 119 US firms from environmentally sensitive industries for the 2001–2002 election cycle by Cho et al. (2006). These authors found: “a significant negative relationship between firm political spending and environmental performance.” And that “This finding supports the conjecture that environmental disclosure and political spending are complementary strategic tactics that firms use to manage environmental public policy pressure” (Cho et al., 2006).

Beder similarly suggests that the concentrated economic and political power accruing to modern corporations brings into doubt the very possibility of democratic government.

The idea that governments should protect citizens against the excesses of free enterprise has been replaced with the idea that governments should protect business activities against the excesses of democratic regulation. (Beder, 2006)⁴

(footnote continued)

economically disadvantaged communities in advanced economies” (Porter and Kramer, 2002).

³Scherer et al agree with this synopsis and they further suggest that: “Interestingly, many economists do not regard the nation state’s loss of regulatory capacity as a problem for the classical liberal model of business and society. Instead, they take the competition between location and regulation as an opportunity to limit the influence of the state, to cut back on overregulation, and to stress market forces”. (Scherer et al., 2006). But: “assumptions of this nature ignore that functional competition requires “rules of the game” that are enforceable by an arbitrator”. (Scherer et al., 2006). If the state is usurped or manipulated, however, who is to be the (independent) arbitrator?.

⁴At best, economist David Pearce (2006) notes that governments: “Instead of maximising a social welfare function, as postulated in the [economics] textbook design, what is maximised is a political welfare function, one in which the ‘welfare’ of special interests and lobby groups is represented, along with more general public welfare”.

According to Beder, the rise of corporate power has not been by chance but a well-orchestrated strategy, taking place during the latter half of the last century, which has involved a complex network of trade organisations, business councils, think tanks and focussed lobby groups. And enormous sums of money devoted to directed educational materials and blatant propaganda. This re-education programme has been carried out by the marketing and public relations wings of corporations to achieve two goals, market growth and the entrenchment of a free market policy framework, including a reduction in government regulation (the so-called Washington Consensus as referenced in Beder, 2006). This manipulation of our collective minds, Beder and others suggest, has led to both the developed world and the developing world generally accepting free markets and economic growth as non-negotiable axioms. Big business is good for the economy and what is good for the economy is good for society (Friedman, 1970).

A simple empirical test of the power embodied in large corporations compared with the power in governments can be gained by looking at the gross earnings of the largest corporations compared with national GDPs of all but the largest countries in the world.

Thus, with profit as the central motive, it is clear that the *Commons* is in far more danger from large corporations than from individuals, unless there is either adequate government regulation or substantial public outcry. And with profit as the central motive there is every incentive for large corporations to lobby to downgrade or remove the possibility of state regulation (see Porter and Kramer (2002) above) and for active public relations strategies to be put in place to change public opinion with regard to energy policy and environmental matters. Both types of intervention have been most apparent in the case of the tobacco industry (see later). In addition to these more general moves to achieve greater profits by the corporate world there is the other central move towards market growth, because only growth can promise increasing profits which shareholders demand. Along with the free market paradigm, unabated economic growth has also become axiomatic to most government bureaucracies.

3. Conspiracy in the *Commons*

Conspiracy has always been something you allege of your opposition, not something you yourself take part in. Since 911, it has been made out to be an even more dirty word by the mass media, it has been made to conjure images of terrorism and armed men in a cave plotting to overthrow governments. Yet the use of conspiracy by nation states has been extensively documented by any number of historians, and shown to have led to wars, insurrections and land and resource acquisitions across national boundaries for millennia (see, for example, conspiracies to claim Middle East oil reserves (Engdahl, 2004)). Large corporations during the 21st century now

command financial, legal, communications, information, manpower and other physical resources exceeding that of all but the largest states; it is thus inconceivable that they should not formally conspire to further their goal of greater profits. Conspiracy in the tobacco industry is now well documented, with a large public research base on the complicity of the larger cigarette companies misleading the public and responsible for many deaths and wide-ranging health problems.⁵ It is unlikely that the tobacco industry breeds a certain amoral kind of corporate person and that such behaviour is not abnormal in the corporate world.

4. Affluence in the *Commons*

A recent article in a marketing industry journal 'Strategic Directions' told the reader:

Ask most CEOs what their biggest challenge is in the current business environment it is highly likely that they will give you a one-word answer: growth. If you grow your business you add shareholder value, increase revenues and ultimately increase profits. (Anon, 2006)

Growth has become so accepted as an axiom that it has become almost impossible to challenge or to suggest that it may have detrimental consequences. One result of the acceptance of growth as an axiom particularly of the corporate world has been the spread of what Clive Hamilton refers to as "affluenza", an affliction occurring throughout the developed world and now emerging in parts of the developing world as well (Hamilton and Denniss, 2005).⁶

Affluenza, Hamilton claims, is the economics of unfettered consumption, of generation of waste for monetary gain. Affluenza can be potently addictive as it works in the same general direction as basic human needs and desires. These basic needs and desires can be easily transformed into greed by targeted marketing. And the marketing, we have seen from Beder's, (2006) analysis, has been carefully orchestrated in a campaign that has been in place since at least the Second World War.

In "Growth Fetish", Hamilton (2003) argues for political "downshifting" as a solution to affluenza. Downshifting involves voluntarily opting out of excessive consumerism, choosing to have more leisure and more

time with children and more meaningful work. Hamilton gives statistics to show that a significant proportion of the population of some developed countries including Australia and the US have chosen downshifting. In terms of decreasing energy consumption and reducing one's ecological footprint, the significant aspect of downshifting is accepting a lower income (see later).

Reducing consumption, however, is anathema to business interests and thus counter arguments have been put forth to suggest that both the environment and economic growth can simultaneously occur. Rebekah Young from the World Business Council for Sustainable Development (WBCSD), for instance, gives a market-based solution to enable continued market growth in a sustainable manner. "Business needs to come up with a more inspirational vision for sustainable development one that is not about producing less but producing better, not consuming less but consuming differently; not about limits to growth but about sustainable growth and not about improving the environment alone but about improving the quality of life" (Young, 2006).

This statement is one of the nicest examples of spin doctoring that I have come across. The trouble is that if we produce better, that is more consumer items with increased energy and resource efficiency, the products will be in more demand and with wealthier people it will mean more energy and more resources used, not less. The "rebound effect" for energy efficiency is real and has been clearly documented recently by Herring (2006). Consuming "differently" is a difficult one to pin down, may be it means consuming less energy-efficient products. But people do not do that, as wealth increases they buy bigger houses, cars, boats and go on more frequent overseas trips (see later). And as for sustainable growth, well that just cannot happen, it is mathematically impossible to sustain an increase in any tangible product over the long term. Sustainable economic growth is an oxymoron.

One of the key steps to achieve this inspirational vision, Young suggests, is to make the market work for everyone:

Poverty is one of the single largest barriers to sustainability through the market, with almost half the world's population struggling to live on less than two dollars a day. These people have little or no access to the market to improve their quality of life. And: A way to reduce poverty significantly is through continuous and broad-based market expansion that creates enterprises and supports sustainable livelihoods. (Young, 2006)

Continuous expansion and never-ending growth just cannot work in a finite world; something must give. In terms of energy resources and mineral resources at least the poor are not a problem; it is the rich that are using resources and commodities. Subsistence agricultural communities are almost by definition considerably more sustainable than industrialised communities. There seems to be an Orwellian "doublethink" occurring with sustainable economic growth where many people truly believe that

⁵For instance, these authors note that: "The marketing of low-tar cigarettes as low-risk cigarettes has misled smokers and contributed to the marked rise in sales for low-tar brands over the past 30 years. The results of this study show how the intent of the tobacco industry to market a known dangerous product as "healthier" translated into increases in advertising, which ultimately led to the market domination of low-tar cigarettes." (Reed et al., 2006).

⁶The term affluenza was first used in the US and popularised by De Graff et al. (2001). Hamilton defines affluenza as the "unsustainable addiction to economic growth" and further argues that: "growth fetishism and affluenza can cause severe damage to some of the things that really do affect our wellbeing- our health, our personal relationships, our communities and the natural environment". (Hamilton and Denniss, 2005).

both sustainability and economic growth can occur simultaneously.

On the environment front, Hamilton (2003) suggests that despite great gains in the efficiency of various technologies, resource consumption is still increasing unabated and waste production and environmental degradation are doing likewise. This line of thinking is of course parallel to that presented much earlier in the Club of Rome reports. Dennis Meadows (2006a) one of the original co-authors of the 1972 report and the later reports, claimed recently at annual conference of the Association for the Study of Peak Oil (ASPO, Pisa, Italy) that the earlier predictions in “Limits to Growth” were in all likelihood optimistic and that resource constraints, population growth together with global warming are set to overwhelm governments in the first half of the 21st century. Meadows (2006b) did not give specific solutions such as downshifting but suggested that any solution will not be found within our current economic paradigm.

The most important result of the fact that most people of the developed nations of the world (and the richer people of developing nations) have contracted affluenza, is that it is causing the earth to sneeze; for the earth to be affected by a fever that may, in true Gaia form, move it to eject the agents causing the affliction: i.e. us. James Lovelock (2006), the originator of the Gaia hypothesis as a living organism, recently has given similar forecasts for the future, as suggested by the Club of Rome reports and has particularly stressed the extreme problems that global warming will cause.

It can thus be surmised that the social coercion, referred to by Hardin, has in fact been successfully taken on board in the form of propaganda, by the global marketing industry. Those of us in rich countries now cannot think otherwise but to consume in ever-increasing amounts and to think that it is normal to do so. We also now cannot think outside the dogma of free market economics. In addition, the developing countries are urgently trying to follow suit.

5. Conscience in the Commons

Hardin goes into some detail to prove that appeals to conscience to solve the tragedy of the Commons is self-eliminating and can have pathogenic consequences over both the long and short term. He was alluding to social coercion in the form of propaganda to incite guilt for disturbing the Commons, the sort of moral argument that chastises people for overpopulating, for over consuming and generally for using more than their “fair” share of the Commons (Hardin, 1968).

This type of moral argument is one of the main methods used by opponents of environmental degradation and ever-increasing consumption, to counteract the influence of the marketing industry. An important question then is: Can this appeal to moral goodness work? Or will it be too small, too insignificant to matter or possibly also result in

dysfunctional behaviour as suggested by Hardin. Certainly the marketing industry, with many billions of dollars at its disposal per annum, is in a much stronger position to put a “never ending growth” message to the majority of those of us with disposable wealth, than those who are opposed to this belief.

And in terms of economic inequality on earth, for every convert “downshifting” (in Hamilton’s jargon) in developed nations, to reduce individual ecological footprints, many more individuals in developing countries are trying urgently to move the other way. Once we take into account the perspective of developing countries, it makes the moral appeal to conserve, downshift, or abstain from producing children or generally doing the right thing for the world, unlikely to produce a collective result, for the same reasons detailed by Hardin with respect to population. Thus, while such undertakings constitute a morally defensible position from a rich-country perspective they are unlikely to actually produce a favourable result on a global front. If half of the original 10 farmers in the classic Commons scenario were close to death from starvation they would not be swayed by any greater good argument. Not if the alternative to immediate gain and a quick food supply was death. Thus, unless we find a way to prevent the poorer developing countries from developing (also indefensible) they will not easily come on board any collective appeal to reduce either their resource consumption or their emissions of CO₂.

And in the developed countries any appeal to goodwill will only work with a proportion of the population. Downshifting will produce, in all likelihood, a feel-good but marginalised class of individuals that will both become irrelevant, and exacerbate the divide between the rich and the poor. The rich in the developed world will just run their SUVs a little longer, while those of moral conscience walk or ride bicycles. This effect in terms of resources would be the equivalent of the abstainers being out-populated by the fecund (Hardin, 1968).

Additionally, the social and economic arrangement of life in developed countries, which has been so purposefully designed to run on ever-increasing supplies of cheap fossil fuel, cannot easily change direction even if there was any personal moral will to change.

Thus, while reducing consumption in developed countries may buy us some time and make some of us feel good, it is unlikely to solve the longer-term resource allocation problem, the climate change problem and the more general sustainability of civilisation problem.

6. Coercion in the Commons

No wonder Hardin’s reference to coercion was guardedly made and in fact he laboured the point of having mutual agreement, referencing Hegel’s oft-quoted dictum of “freedom being the recognition of necessity” to justify transferring personal freedom to the greater need of the state. Unfortunately, this dictum needs to be treated even more

carefully than Hardin did so, as it could be argued that it was used to justify considerable coercive excesses by some of Hegel's politically inclined successors and opponents alike. The key word here is necessity. Necessity does not need to become the necessity to keep a particular ideology or group of interests in power. And the power of corporations in the 21st century, as outlined by Beder (2006), indeed brings into doubt the very possibility of any form of real democracy and without a democracy, any mutual agreement will be very difficult to articulate or put in place.

In terms of practical ways forward, Hardin suggests mutually acceptable coercion at a very modest and practical level. In particular, he gives taxation, parking fees and fines as means of changing personal behaviour for the necessity of the well-being of the whole of society (Hardin, 1968). Beder (2006) on the other hand would argue that many such current regulations that exist are now in place for the wellbeing of corporations and the free market economy. There is now, however, a sense that simple economic tools such as those favoured by Hardin are old fashioned and that more free-market-oriented tools would produce better, that is market-optimised, results. Here I am referring to the appearance of trading schemes, carbon credits, market development mechanisms and the like. These will be discussed later when looking at the Kyoto Protocol. Clearly the free market dogma is all imposing and current solutions are only envisaged by the existing establishment within the imposed economic framework.

7. Global warming and peak oil

Oil is a tangible, finite, energy resource that is being depleted. The depletion will, in the absence of any viable alternatives, certainly affect the ability of future generations to aspire to the sorts of lifestyles that are prevalent in the developed countries today.

Global warming is caused by various gasses, primarily CO₂, that are being emptied into the atmosphere. The resulting anthropogenic global warming will in all likelihood compromise ecosystems on earth sufficiently to make life difficult for future generations and contribute to species extinctions.

In the matter of peak oil, we have a common pool of energy that is being consumed by a few at the expense of future generations. In the matter of anthropogenic climate change, we have a common sink that is being systematically polluted, mainly by the same people who are consuming the energy resources.

The arguments to suggest that global warming will be a significant problem for the existence of life on earth have been discussed extensively elsewhere and will not be repeated. The fourth IPCC assessment report is now out and it places nearly certain (95%) probability that humans are causing climate change (IPCC, 2007). The peak oil position is also gaining acceptance by all but the most

entrenched interests. That popular opinion on both issues is not nearly so unanimous can be credited to the pro free market lobby groups, associated think tanks and direct corporate interests.

It would be nice to conceive of a utopian world that got things right from the beginning. For the world to have recognised the “real” value of the world's fixed resources, particularly energy resources, as common resources for mankind when they were first discovered and put in place a long-term plan for the utilisation of these resources as a stepping stone to long-term sustainability. But the history of resource extraction has been the opposite, one of fervent private ownership and exploitation, symbiotic with 20th century corporatism. For oil, Engdahl (2004) suggests: “no other element has shaped the history of the past 100 years so much as the fight to secure and control the world's reserves of petroleum”.

He documents in detail the intrigue based around “the grand game” whereby the resource base has been used to shape empires and build corporations, for whoever controls the world's oil resources controls the world's trading currency. This game is of course still being played out today, albeit influenced by sometimes different players.

In terms of the earth's resources in general it has, however, not been generally recognised that energy is different from other resources, in that energy cannot be made, and that it cannot be extracted at lower and lower concentrations, as can minerals. The concept of energy returned on energy invested (EROIE) has been known by science since the first law of thermodynamics was mooted in the 18th century by Rudolph Clausius, but the low price of coal and then the very low price of oil over of the last two centuries has marginalised energy to become just another resource, a commodity to be traded on the stock exchange along with orange juice, pork bellies and platinum. That it takes energy resources to produce energy resources may be obvious to anyone dealing with energy accounting, but it has been (and still is) obscured to those with a financial accountant's perspective.

That there has been a strong symbiotic relationship between the growth promoted by the corporate sector and the growth fetish among the general population is now not in doubt. It is this relationship which has produced the feedback that has seen oil being consumed at exponential rates throughout the 20th and now the 21st century. Oil consumption, like the encompassing affluence it represents, is a potent addictive agent as again there is direct feedback between consumption and GDP and between consumption and personal gratification.

Oil consumption doubled roughly every 10 years during the last century up until the oil crisis of the 1970s, and then consumption slowed to a doubling time of 20 years. We used the first 250 billion barrels by 1970, the next 250 billion barrels by 1980 and a total of 1000 billion barrels within the first few years of the 21st century. With a growth rate of around 3.5% (until 2005), we are still running at a hypothetical doubling time of 20 years but we only ever

had somewhere between 2000 billion barrels and 3000 billion barrels of conventional liquids ever extractable, the lower estimate according to the ASPO (Campbell, 1975) and the larger estimate according to the United States Geological Survey (USGS, 2000).⁷

So here we are, somewhere between no doubling time (that is, we are there) and one half a doubling time before the peak of oil production (or between one and one and half doubling times to its final demise—at current rates of growth and unrestrained supply), and we yet have no plan for the orderly transition to alternatives (the Rimini protocol will be discussed below). It is realised of course that once near the peak such doubling times cannot occur and that down the right-hand side of the peak, the times will instead be halving times. But in terms of lead time, it is a tragedy that we have left ourselves so little leeway. It is even more of a tragedy when we realise that Hubbert came to this same conclusion some 50 years ago, when we had between four and five doubling times left. The Club of Rome reports came out between two and three doubling times before the peak and ASPO was formed with less than one doubling time left. While there is still a lot of arguing over the exact numbers with regard to exactly how much oil is left, even the super optimists, wringing every barrel out of tar sands and oil shale, suggesting numbers as high as 4000 billion barrels of ultimately recoverable liquids would only increase the leeway by one doubling time, from the more believable ASPO position! The retreat to unconventional sources of liquid fuels, such as the oil shales and tar sands and the technically possible conversion of coal to liquids, increases the available liquid fuels but due to the energy overhead of the conversion processes, the emissions of CO₂ would increase dramatically, again illustrating the close links between the two problems of peak oil and climate change confronted in this paper.

It is even worse than not having a plan; however, the free market thinking that so dominates our very existence is suggesting that we should disbelieve the resource numbers from geology, we should disbelieve the first law of thermodynamics from physics and rush headlong into a future of tragic depletion and long-term climate change. Economists are putting forward the view the scientists will save us with new technology and scientists think that economics has worked in the past, so economics will save us in the future.

In a nutshell, the diagnosis of the ultimate problem is simple; cheap oil and personal greed has enabled corporations to afflict people with affluenza, and affluenza together with population growth is causing resource depletion and anthropogenic global warming. Solutions relying on mutually acceptable coercion suffer from the difficulty of

obtaining any form of mutual acceptance by the people of the world in a situation where world governments are becoming subservient to the free market paradigm and specifically to large corporations.

From the above analysis is not difficult then to agree with Hardin that *Commons*-related problems such as global warming and resource depletion may have no technical solution, in a similar manner to the population problem he discussed. Global warming and resource depletion are both causally linked to economic development. We cannot deny economic development to the poor on obvious moral grounds. The business and corporate sector also want economic growth because it satisfies their owners' and shareholders' demands. The rich similarly want economic growth because it gives them even more wealth. All evidence, however, suggests that economic development leads to increased resource consumption.

8. Solutions

If we are faced with a seemingly impossible situation (i.e. no solution exists), any solution that we can suggest, even if the chances of success are perceived as small, must rationally be attempted. It is clear, at least, that looking for a solution to the two problems of depleting oil resources and global warming cannot be accomplished within the current economic paradigm as this paradigm has caused the problems in the first place.

In economic terms, the pollution problem, in this case CO₂ causing global warming, is usually treated as an externality, which, according to economists, can be remedied by suitable economic instruments. The resource constraint problem is not thought as important by economists, as they think that resource depletion will easily be solved by existing free market forces. That is, higher prices will reduce consumption enabling substitutable products (more efficient vehicles, coal to liquids, bio-fuels, etc.) to come to the rescue.

The classic economic and policy instruments available to reduce atmospheric emissions include government-imposed regulations, fines and taxation. With the move to a deregulated economy and free markets, as detailed above, newer instruments include various tradable permits, allowances and certificates. The latter can be created by governments, but the values attached to each are found by market forces, purportedly to achieve the most economically efficient outcome.

Economists call the first set of government-imposed instruments, Pigouvian after Pigou (1932) who published a classic paper in 1932 favouring this approach and the second Coasean named after Coase (1960) who similarly favoured market-based trading mechanisms. The Pigouvian approach raises revenue, works directly on the price demand curve and has relatively low transaction costs. The disadvantages are that the levels of fines and taxes have to be second guessed by governments and adjusted according to whether they work or not (i.e. if and by how much CO₂

⁷Note that the USGS in 2000 issued three estimates, a high probability estimate of 2452 billion barrels, a mean estimate of 3345 billion barrels and a low probability estimate of 4443 billion barrels. It has been the mean estimate that has been most often used by Governments to formulate future oil supply scenarios.

levels are reduced). They are also intensely disliked by corporations as they are viewed as intrusive and likely to slow economic (and hence corporate) growth. Coasean mechanisms on the other hand take the guesswork out of government hands and place the price setting in the market. The transaction costs, however, can be high and the whole process is often managed by banks and trading agents (and thus corporations) with only an often small supervisory role by governments.⁸ Most such mechanisms place the trading component firmly in the hands of the emitting corporations but there have been some schemes suggested whereby emission certificates are placed directly in the consumer's hands (i.e. personal CO₂ emission rights or tradable energy quotas).⁹

As we have seen it is not just the corporate world that sees the market as the holy grail, Choi also comments that: “Economists generally have a hidden bias for market-based approaches because they tend to think that these approaches entail less cost than “command and control” regulation”. But: “the success of market based approaches hinges on highly sophisticated monitoring capacity and a threat of enforcement strong enough to prevent regulated firms from cheating on their performance” (Choi, 2005).

That is strong government oversight. But governments are constrained by their need to appease the corporate sector, as both Pearce and Beder have suggested. When referencing climate change policy in the UK, Pearce (2006) writes: “Special interests and lobbies have had a major influence on policy design. There has been a retreat from tackling the most serious growth of carbon emissions in the transport sector because of the fuel duty protests and, now, the high price of crude oil as well. In some respects, the world energy market is doing what governments have found so difficult, i.e. raising the price of energy”.

But the revenue from the high oil prices is presently not going towards finding a solution for the twin problems but mainly either to corporate sectors intent on preventing

serious action or to government revenue for improving transport systems (roads, airports, etc.), thus exacerbating the imminent tragedy.

9. Carbon tax

Direct carbon taxes are much simpler in operation than market-based systems, but they do require governments to set and enforce them. There is an extensive literature on firstly whether carbon taxes will work and their efficiency compared to market-based solutions (see above) and secondly on the impact of such taxes on the economy including different sectors of the economy, particularly the disadvantaged. From a political perspective, Choi (2005) notes that there is not much support for a carbon tax.

This is the same dilemma discussed earlier, the move to the new free market is acting as a barrier to possible solution paths; nevertheless, if such a tax could be introduced the effects on the disadvantaged needs to be known. That is, whether the tax will be progressive (selectively beneficial towards the disadvantaged) or regressive (selectively non-beneficial towards the disadvantaged). On this issue the jury seems out with a roughly equal number of studies suggesting both ends of the spectrum.

Price is always a pretty good coercive force, however, and price will, in all likelihood be able to “solve” the resource consumption problem, but unfortunately within a time frame whereby the resources will be denied to future generations. Whether price can similarly “solve” the emissions problem is more doubtful, as discussed below, but if current trends are anything to go by, the price of resources and the cost of emissions will be anything but mutually agreed upon and it is unlikely that the proceeds of any taxation on these will be mutually beneficial, within current policy frameworks.

So much for searching for the national-based solutions, the paper will now briefly examine existing internationally mooted solutions including the Kyoto Protocol for global warming and then the less well-known Rimini Protocol for oil depletion.

10. The Kyoto Protocol

The Kyoto Protocol entered into force on 16 February 2005 after a protracted series of international negotiations, which started as early as the UN Rio Framework convention in 1992. The protocol's defining feature is that it has mandatory targets on greenhouse gas emissions for the world's leading economies, which have accepted it. Each country, which has signed the convention, has agreed to limit emissions to a set amount ranging from –8% to +10% such that the basket of countries will achieve a reduction of at least 5% below 1990 levels in the first commitment period 2008–2012. Without including developing countries in the mix, it is a small start. To achieve even these reductions the Kyoto process adopted a number

⁸Choi also suggests, however, that there has been no hard evidence to suggest that an emission trading scheme actually works. To show this he documents the oft-repeated success story of emissions trading: that of SO₂ reductions in the US, as probably being attributed to the low-cost availability of low sulphur coal rather than the free market mechanisms. In fact, the history of SO₂ emissions in the electric power sector in the US illustrates the failure of both trading and regulatory measures in the face of corporate power. Here government imposed regulations to reduce SO₂ emissions allowances were subverted by industry-sponsored “grandfathering” clauses which allowed plants older than the regulations to be exempted. As a result, no new coal fired power stations have been built in the US since that date; although many have been extensively modified (Choi, 2005).

⁹Tradable energy quotas (TECs) as promoted by David Fleming, 2007) are an excellent idea whereby each person in a country is allocated a tradable energy allowance that is recorded electronically as a weekly ration. The difficulty with this idea, as with personal carbon allowances, is that it is likely that they would be too egalitarian to be accepted by existing vested corporate interests and would be unlikely to be implemented until the control of Government policy is retrieved from the hands of large corporations (see the difficulties with a carbon tax, as related by Choi (2005), below).

of flexibility mechanisms, which will allow individual countries to essentially trade their commitments to achieve, what is thought by the framers, to be the least cost outcome. The key flexibility mechanism is carbon trading whereby permits for emissions can be put on an international market. Here we see the introduction of the free market paradigm that wants to take regulatory control away from governments and place it in the hands of the market, automatically guided of course by the invisible hand. In addition, the protocol considerably complicated the accounting situation by allowing sinks to be included in the mix, where carbon can be sequestered by planting biomass. Biomass forests are problematic in the long term as a sink as they can be cut down and turned into CO₂ easily either by burning or by rotting.

The inherent contradiction in using the tradable flexibility mechanisms is that it is the very same free market deregulated approach that has been argued to cause affluenza, the consequent depletion of fixed resources and global warming and that same approach is now being asked to provide the framework for the solution. This cannot work. Even some current economic thinking has come to realise that: “If there are pre-existing distortionary taxes in the economy, the price effect of market based instruments may amplify the distortions” (Bye and Nyborg, 2003).

If the system is faulty you cannot solve the problem using the same methods that created the faulty system.

11. The Rimini Protocol

The Rimini Protocol has been mooted by the ASPO, in particular the chairman of ASPO Colin Campbell, as a solution to the oil depletion problem (Rimini, 2003). This solution is an example of the classic method of solving a *Commons* problem, in the spirit of Hardin’s mutual coercion, by suggesting that all countries mutually agree to a reduction in consumption. We all voluntarily agree to pull some of our sheep out of the *Commons* and let it recover. In energy terms, recover could be translated as allowing time for finding new sustainable energy resources.

The specific aims of the Rimini Protocol are to avoid profiteering from shortage, such that world oil prices may remain in reasonable relationship with production cost; allow poor countries to afford their imports; to avoid destabilising financial flows arising from excessive oil prices; encourage consumers to avoid waste and to stimulate the development of alternative energies.

And to accomplish the above:

- (a) No country shall produce oil at above its current Depletion Rate, such being defined as annual production as a percentage of the estimated amount left to produce.
- (b) Each importing country shall reduce its imports to match the current World Depletion Rate, deducting any indigenous production (Rimini, 2003).

The aims of the Rimini Protocol are admirable but the protocol’s suggestion that that the price of oil should remain “in reasonable relationship to the production costs”: that is low, is not likely to work, as a low oil price has been responsible for much of the profligate consumption of this resource to date. The economic value of oil in terms of an energy resource for mankind is far above the production cost and the transition to a sustainable energy economy may require resources far and above those that could be provided by a low oil price. Low prices will also not discourage waste and provide a pool of funding for alternatives. Part of the present problem in fact has been that the cost of oil has been historically so low compared to its physical ability to do work. The energy extensive infrastructure, the cities, the suburbs, etc. that we have developed has been possible because of low oil prices.

12. A high oil price

To solve the depletion problem along the lines suggested by Hardin, we need a high oil price but with a suitably arranged consumption tax, so that the proceeds might be more equitably distributed.

But fuel is already taxed nationally (more in some countries less in others); won’t such a tax just add an extra layer on what is becoming an already highly priced product with the potential to cause further financial hardship? Yes, but we don’t have to think in terms of the present labour/wage-based taxation structure and could easily arrange a structure that would be fiscally neutral. And to arrange for the proceeds going to actually trying to solve the problem rather than going, mainly, into national government coffers for “other things”. Many governments direct a good proportion of their nationally generated petrol and diesel taxes to upgrading roads and transport infrastructure in general, tragically exacerbating the situation. In terms of a new taxation structure, some of the amount collected could be directed to solving the problem, which is researching renewable alternatives, and used to alleviate the hardship of increased oil prices affecting the poor in developing countries.

The present situation, in which positive feedback has led to exponential growth in oil consumption, has been exacerbated by the fact that the current proceeds from oil go to the very people who have a vested interest in maintaining and reinforcing the fossil-fuelled energy-intensive status quo, not for finding a long-term sustainable energy future. As Beder (2006) documents, much of the vast financial resources accumulating to oil companies and other large corporations have been directed to usurping control of the internal policies of many governments of the world and not the other way around. Oil revenue and availability is certainly heightening geopolitical tensions and, as the situation of increasingly localised financial control of oil money flows, will quickly become worse as oil prices move upwards under the present tightening of supply versus demand.

Importantly, oil, as an addiction, has led to a consumer population that may increasingly accept social (and other)

controls in order to continue satisfying the addiction. Drug pushers of the more conventional breed typically sweeten their prospective clientele with low-priced products until the point of no return is reached and then they hike the price. In terms of oil prices, the world has had something in excess of a century of sweetening.

13. Thinking outside the square: a new carbon indexed, energy taxation structure

If we are to mutually agree on a coercive solution, we need to not be under the influence of an addictive substance. Giving up one's freedom in recognition of necessity need not include the necessity of continuing with the addiction, but with the necessity of finding (and funding) a sustainable future. It is clear from the above analysis that both Hardin and Meadows are right, there is no technical solution to the twin problems of oil depletion and global warming that can be defined within present economic and political thinking. We have to think outside the square. Two ultimate problems emerge from the proximate problems of peak oil and anthropogenic climate change. The ultimate problems are firstly how to reclaim governments and get them to govern for the people and not for corporations? Without this condition there can be no mutually agreed coercion. The second is how to reconfigure the world economy to properly account for the proximate problems? That is, how to put in place mutually accepted coercion that might actually work.

One such solution to the latter may be a complete change to our labour/income-based taxation system, a single taxation system based on a consensus estimate on the amount of the fuel left for extraction and indexed to the carbon content of the fuel. Such a tax would work as a carbon tax, but not just a carbon tax (one among many taxes), the carbon-indexed energy tax, as the primary revenue-earning mechanism for all governments.

14. Unitax

The idea of moving to taxation based primarily on energy is not new; it was acclaimed as the social invention of the year in 1990 (in the UK) as *Unitax* (Bradbury, 1994) and has been strongly promoted more recently by energy policy experts Malcolm Slesser and Jane King. *Unitax* is a single form of energy taxation that has been promulgated by its supporters to be the only form of taxation needed, obviating the need for any other taxes on labour and goods (Slesser and King, 2002). The rationale for this revolutionary change is that it is energy that is in short supply in the contemporary world and not labour.

In terms of labour, Slesser and King (2002) suggest: "Why tax that which is abundant and surplus when the other key input to the economy, energy is finite dwindling and polluting?"¹⁰

As mentioned, the tax level could be made fiscally neutral in that the total revenue to governments could be arranged to be commensurate with existing revenues, plus a surcharge used to do some of the things mentioned by the Rimini Protocol i.e. foster renewable energy and offset hardship that would be incurred by developing countries that would be faced with high oil prices. The new taxation would have to be phased in over a number of years with income tax reducing and the energy tax increasing in proportion. Energy and products with high energy/carbon content would be very expensive and we would have to readjust to make the appropriate decisions on how to allocate our much higher take home salaries. It is important to see that all of these personal allocation choices would move in the direction of solving the twin problems, reducing energy use and improving the environment. Corporate decision making would be forced to follow suit. In terms of equity, fuel poverty in disadvantaged sectors of the community would be an issue but to keep energy prices low to solve this problem is counter-productive as has been argued elsewhere (Lloyd, 2006). Equity provision both domestically and internationally would be much better served by targeted subsidies than cheap fuel prices.

Taxing energy is attractive; it will bring the importance of energy in the economy to the forefront where it needs to be, it will fix anomalies in our existing tax on fuels, particularly in terms of international air transport being tax free. It will fix the disorder, which exists in our existing food transport system, making it cheaper to buy milk in Europe shipped from NZ. It will automatically account for the energy efficiency differences in various countries by making product costs higher if energy efficiency is lower. It will incur the appropriate costs for fertilisers in agriculture, making organic composts more attractive and thus restoring soils to greater long-term productivity. It will make waste less attractive as the energy content of the waste will be costly and finally it will bring some relief to that pervasive affliction affluenza.

15. Energy, resources and wealth

Our present labour-based taxation system just cannot cope with the problems in front of us. With our present taxation system if I was to act perfectly responsibly, according to the norms of conservationists, and use

(footnote continued)

labour potentially discourage employment. In relation to the environment, the taxes are placed on 'bad things', i.e. pollution, and their strength is that they make the polluting activity less appealing". Clinch et al. also suggest that there will need to be a gradual phasing in of environmental taxes to allay concerns the taxes will impact on the economy in general, they also remark (as documented earlier) that: "The most energy-intensive companies are the ones who will be hardest hit, but also tend to be important to the economy and politicians are reluctant to jeopardize their position or employment numbers. As pointed out previously, these companies also tend to be the loudest voice in the business confederations and sector bodies".

¹⁰Or Clinch et al (2006): "When the taxes are raised on 'good things' this discourages the good things from taking place. For example, taxes on

minimal household energy, ride a bicycle, recycle my waste and do all the other “right things”, but use my earnings at some time to buy a moderately expensive painting, all would be undone. Because the artist or seller I bought the painting from could use the proceeds to purchase several round the world air tickets at currently very low prices (because international aviation fuel is not taxed) and be responsible for consuming several tens of barrels of crude oil and many tonnes of CO₂ emissions. We cannot easily separate our individual energy expenditures from the rest of the economy. Additionally, unless I am very careful by placing my savings in “green” investments even money sitting in the bank will be lent for energy-intensive economic activity, activity that accumulates energy costs at roughly the rate measured by the country’s national energy intensity.

The lowest energy consumption (in kWh) that a person in any country can be nominally attributed to consuming can be calculated by taking the money earned (not spent: unless the savings are placed in “green” investments) by the person per year, multiplied by that year’s energy intensity (in kWh/\$) for the country. For example, in NZ, the energy intensity per person for 2005 was 1.4 kWh/\$ (Energy Data File, 2006), where the energy used is the primary energy (740 PJ in 2005 when the population was 4 million and the per capita income was NZ\$36,000). If only non-renewable energy inputs are considered, the rate comes down to a round 1.0 kWh per NZ\$. In comparison NZ\$1 spent on electrical energy in that same year would have been responsible for 5.5 kWh of electrical energy (12.8 kWh of primary energy or 6.0 kWh of primary energy excluding renewable contributions), for petrol around 7 kWh and air travel over 10 kWh (all primary energy). A more accurate estimate of energy incurred per \$ spent can be obtained from an income and expenditure survey to enable direct energy expenditure to be included. For instance, in NZ, the expenditure on direct energy items, including international travel, is shown below (Fig. 1).

Note that energy for international travel is usually not included completely in national energy statistics as part of the fuel may originate elsewhere. The paragraph above also does not show the energy incurred by the government when it spends our tax dollars, but it does give a pretty good idea of increasing energy consumption with income, including the high use of energy for international travel by the higher-income groups (Household Economic Survey, 2004). Savings in commercial banks are leveraged at 10:1 in NZ (Reserve Bank of NZ, 2006), which generate profits for the bank of 1.5% (on total assets) and the profits to the borrower of around 7% (national average 2006), meaning that \$1 in the bank would incur energy costs to the country of approximately 1.2 kWh per annum, or close to the rate inferred from the national energy intensity (Reserve Bank of NZ, 2006). A similar picture of increasing energy consumption (and thus CO₂ emissions) with increasing wealth can be obtained for other countries, with the corollary being that it is the wealthy that are killing the planet, not the poor.

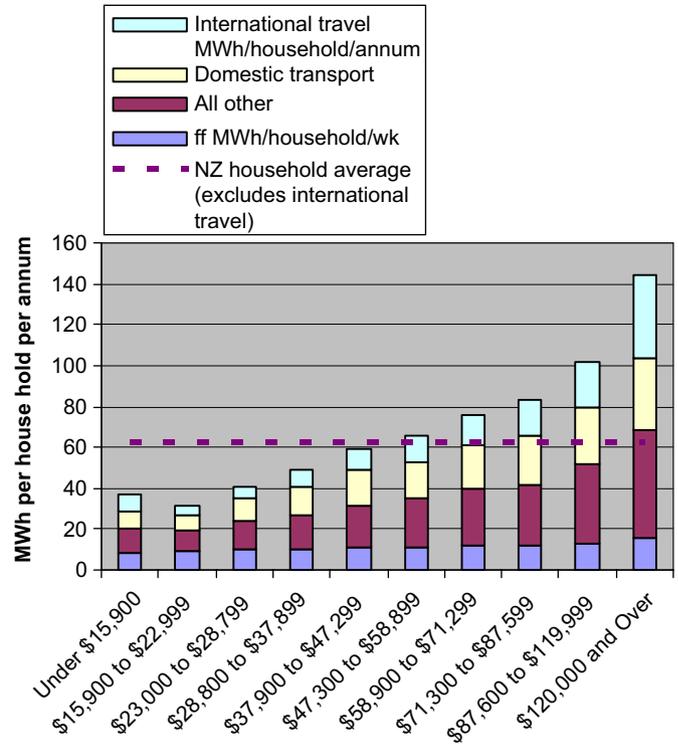


Fig. 1. Fossil fuel energy use as a function of income in NZ. Household energy incurred (fossil fuel only) versus household income. Data from the NZ 2004 Household economic survey (Statistics NZ) and the Energy Data File 2005 MED.

It can thus be seen that it is personal (and corporate) wealth that is responsible for energy and resource use and that a reduction in energy consumption is most easily obtained by reducing wealth. But this of course is currently an unacceptable solution both from a political stance and according to current economic thinking. The analysis makes good the idea of “downshifting” to reduce personal energy consumption, but downshifting in developed countries fails as a long-term solution to the tragedy of the *Commons* for reasons outlined earlier. Making energy and carbon expensive is a simple way to ensure that a person does not individually have to oversee every financial transaction for its energy content (and CO₂ emissions exposure) if they want to ameliorate global warming and conserve finite resources.

A tax, if it is to achieve the dual goals of accounting for resource depletion and global warming, should be indexed to a combination of the pollution cost and to the relative abundance of the resource. Such an indexed tax would then penalise nuclear energy based on the estimated economically recoverable reserves of uranium and the cost of safeguarding and storing the spent radioactive waste and fossil fuels on the carbon content of the fuel and the estimated economically recoverable reserves of the fuel.

Energy from renewable energy sources would be tax free as was the case for Unitax.

Certainly the *Unitax* concept is simple and would make financial transaction costs in general considerably less

cumbersome, as a good deal of present world economic activity is spent on accounting fees for various taxation purposes. And herein lies at least part of the probable opposition to such a system. Some of the success of the Marrakech accords to implement Kyoto, may have been due to the financial community seeing considerable “benefits” accruing from the quite onerous transaction costs that will be needed for compliance. For such reasons, and because the difference between our current taxation system and *Unitax* is so great, the concept to date has not gone much further than the drawing board. As Slesser and King (2002) note: “The very idea of taxing energy draws an instantaneous hostile reaction not dissimilar to that when heroin is withheld from an addict. It is an apt analogy. We are hooked on energy”.

But this situation may change in the light of a real energy crisis that seriously threatens the global financial system. Energy will hopefully then be seen as the literal driving mechanism for all activity, and taxed accordingly.

There are some problems with *Unitax*, however, that will need to be attended to. Probably the greatest long-term difficulty would be that as the tax works its way into the economy, fossil-fuelled energy consumption will drop, thus reducing the tax intake and meaning that even higher rates will have to be imposed to keep governments solvent. Eventually, as renewable energy sources take over completely, the tax would have to be phased out to be replaced by an alternate consumption tax based on whatever happens to be the most severely threatened resource at the time (e.g. water, soils and/or specific minerals). But by then it will be a happy difficulty to have to solve, as the two problems of fossil fuel depletion and global warming will have been mitigated. In the shorter term, there may be some problems with income distribution, especially tax relief for the poor and providing sufficient tax on the very wealthy. The poor will need to be energy subsidised as they will bear the brunt of adjustments that will be needed as global warming and resource depletion take hold. The salaries of the very rich may need to be reduced further than that accomplished by the energy/environment tax, so that the problem of corporate salaries becoming so vastly out of step with public servant salaries and politicians lead, as they have already done, to corporations taking over from governments in running states. While corporations are in control, no mutually agreed coercion (by the peoples of the world) is possible. In general, however, the tax will affect the wealthy preferentially because they are more likely to be responsible for high energy use, as shown in the NZ example.

In addition to implementing a new taxation structure, if we are to become serious about global warming and resource depletion, the whole free market paradigm would need to be dismantled. Marketing in particular needs to be regulated by governments to include such aims as keeping the planet intact, our bodies healthy and our minds free from addictive substances. The Earth needs a public relations wing. We need feedback that reinforces sustainability without suggesting that economic development can

proceed forever. Advertising needs to be better regulated. A good example in this regard are the restrictions belatedly put on the cigarette companies in recent times, one of the few successful campaigns by governments against large corporations. When it was finally scientifically proven and accepted that smoking was bad for health and a drain on national health budgets, restrictions have been placed in many countries on advertising and warnings placed on the product. It is not too far fetched to think of a time when such restrictions will be needed to be placed on, for instance, automobile advertising, and cars fuelled by petroleum labelled with warnings such as: this product could endanger the health of the planet and produce cyclones and famines on Earth.

16. Conclusions

Whatever the future may hold and whatever alternative scenario becomes reality, our best option, in the short term, may be to plan for an uncertain future and ensure suitable mutually acceptable coercive policies, and importantly, a mutually acceptable political process is in place that can cope with events as they unfold. The process, and having control of the process in the hands of government representing people, not corporations, needs to be emphasised. If we cannot come up with a plan then at least try for a meta-plan. As the tragedy unfolds, the novelist Neil Gunn’s words from his foreword to *The Green Isle of the Great Deep* (quoted in Slesser and King, 2002) seem apt:

The revolving earth pitted with its tragedies, cried in a far voice from the middle of space; you cannot leave me to the politicians [ruled by corporations]. It cannot be left to them; not solely to them. You have to bring in the wise men. My insert in brackets.

And as an after word: of necessity the wise men shall not include growth-orientated, free market, economists.

References

- Anon, 2006. Making the most of growth opportunities: strategies for success. *Strategic Direction* 22 (8), 26–29.
- Bartlett, A., 2004. “The Essential Exponential! For the Future of Our Planet” by Albert A. Bartlett, with Robert G. Fuller, Vicki L. Plano Clark, John A. Rogers. Centre for Science, Mathematics and Computer Education, University of Nebraska-Lincoln, Lincoln, USA, 302pp, ISBN:0-9758973-0-6.
- Beder, S., 2006. *Suiting Themselves: How Corporations Drive the Global Agenda*. Earthscan, London.
- Bradbury, F., 1994. The resource economics proposition. Resource Use Institute, Institute for Social Inventions, 1990 award made jointly to Malcolm Slesser and Farel Bradbury, the original architect of *Unitax*.
- Bye, B., Nyborg, K., 2003. Are differentiated carbon taxes inefficient? A general equilibrium analysis. *The Energy Journal* 24 (2).
- Campbell, C., 1975. Association for the Study of Peak Oil Newsletter. No. 75, March.
- Cho, C.H., Patten, D.M., Roberts, R.W., 2006. Corporate political strategy: an examination of the relation between political expenditures, environmental performance, and environmental disclosure. *Journal of Business Ethics* 67, 139–154.

- Choi, I., 2005. Global climate change and the use of economic approaches: the ideal design features of domestic greenhouse gas emissions trading with an analysis of the European Union's CO₂ Trading Directive and Climate Stewardship Act. *Natural Resources Journal* 45, 865–952.
- Clinch, J.P., Dunne, L., Dresner, S., 2006. Environmental and wider implications of political impediments to environmental tax reform. *Energy Policy* 34, 960–970.
- Coase, R.H., 1960. The problem of social cost. *Journal of Law and Economics* 3 (1), 1–44.
- De Graff, J., Wann, D., Naylor, T.H., 2001. *Affluenza: The all Consuming Epidemic*. Berrett-Koehler Publishers Inc., San Francisco.
- Energy Data File, 2006. Ministry of Economic Development, NZ Government, September.
- Engdahl, W., 2004. *A Century of War: Anglo-American Oil Politics and the New World Order*, revised ed. Pluto Press, London.
- Fleming, D., 2007. *Energy and the Common Purpose—Descending the Energy Staircase with Tradable Energy Quotas (TEQs)*, second ed. The Lean Economy Connection, London, January.
- Friedman, M., 1970. *The New York Times Magazine*, September 13.
- Gouldson, A., 2006. Do firms adopt lower standards in poorer areas? Corporate social responsibility and environmental justice in the EU and the US. *Area* 38 (4), 402–412.
- Hamilton, C., 2003. *Growth Fetish*. Allen & Unwin, Australia.
- Hamilton, C., Denniss, R., 2005. *Affluenza—When Too Much is Never Enough*. Allen & Unwin, Crows Nest, Australia.
- Hardin, G., 1968. Tragedy of the commons. *Science* 162, 1243–1248.
- Herring, H., 2006. Energy efficiency—a critical view. *Energy* 31, 10–20.
- Hill, R., 2006. Corporate social responsibility and informal law: how multi-national corporations are defining their own standards of conduct. *Managerial Law* 48 (6), 518–520.
- IPCC, 2007. *Fourth Assessment Report Executive Summary*.
- Kolstad, I., 2007. Why firms should not always maximize profits. *Journal of Business Ethics*, in press, doi:10.1007/S10551-006-9262-7.
- Lloyd, C.R., 2006. Energy poverty in NZ. *Social Policy Journal of New Zealand* 27.
- Lovelock, J., 2006. *The Revenge of Gaia: Earth's Climate Crisis and the Fate of Humanity*. Basic Books, UK.
- Meadows, D., 2006a. Peak oil and the limits to growth. ASPO paper, Pisa, Italy. Downloaded from <http://www.aspoitalia.net/images/stories/aspo5presentations/Meadows_ASPO5.pdf>.
- Meadows D., 2006b. Pers. comm.
- Meadows, D.H., Meadows, D.L., Randers, J., Behrens III, W.W., 1972. *Limits to Growth*. Universe Books, New York.
- Meadows, D.H., Meadows, D.L., Randers, J., 1992. *Beyond the Limits*. Chelsea Green.
- Meadows, D.H., Meadows, D.L., Randers, J., 2004. *Limits to Growth: The 30 Year Update*. Chelsea Green.
- Pearce, D., 2006. The political economy of an energy tax: the United Kingdom's climate change levy. *Energy Economics* 28, 149–158.
- Pigou, A.C., 1932. *The Economics of Welfare*, fourth ed. Macmillan and Co., London, pp. 172–203.
- Porter, M.E., Kramer, M.R., 2002. The competitive advantage of corporate philanthropy. *Harvard Business Review*.
- Reed, M.B., Anderson, C.M., Burns, D.M., 2006. The temporal relationship between advertising and sales of low-tar cigarettes. *Tobacco Control* 15, 436–441.
- Reserve Bank of NZ, 2006. *Financial Stability Report*, November.
- Rimini Protocol, 2003. As proposed at the 2003 Pio Manzu Conference, <<http://www.peakoil.ie/protocol>>.
- Scherer, A.G., Palazzo, G., Baumann, D., 2006. Global rules and private actors: towards a new role of the transnational corporation in global governance. *Business Ethics Quarterly* 16 (4), 505–532.
- Slessor, M., King, J., 2002. *Not by Money Alone*. Jon Carpenter Publishing, Oxfordshire, UK.
- Statistics NZ, 2004. *Household Economic Survey Statistics*, NZ.
- USGS, 2000. *World Petroleum Assessment*. US Department of the Interior, US Geological Survey Digital Data Series—DDS-60, US Government, USA.
- Young, R., 2006. Sustainability: from rhetoric to reality through markets. *Journal of Cleaner Production* 14, 1443–1447.