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ECOLOGICAL ENERGY SECURITY IN AN ADVERSARIAL SOCIETY: AUSTRALIAN GOVERNMENT POLICY AND GLOBAL WARMING

Barry Naughten[1]

The global warming phenomenon and appropriate policy responses are clearly 'adversarial' issues politically. Moreover, the problem highlights more general questions about how policy should be made, especially in a liberal democracy. Global warming will be used in this paper as the case study to investigate rival models of public policy-making in a society and polity that is in many respects and issues sharply adversarial.

Two models of policy-making will be presented for comparison: a stakeholder model characterised by secrecy, and a pluralist model characterised by accountability, consultation and openness. The argument is that for a policy issue that has long term impact globally, and on future generations largely unrepresented in a stakeholder model, that model is seriously inadequate to the task. The history of the issue since 1990 is that its gravity encouraged at least the appearance of the pluralist model. However, the stakeholder model was always in the background. More recently, the latter has asserted its complete dominance with a more typical combination of secrecy and spin.

Some attention is also given to the arguments and the role of a key pro-business think-tank that has been active on both fronts: that is, (i) arguing in terms of political philosophy for the stakeholder model and (ii) taking a series of positions on the climate change issue that is consistent with this model protective of powerful vested interests, and hence failing to recognise its gravity and the need for a more comprehensive vision.

Finally, there are some comments on the relationship between global warming as an issue in long run ecological security and the parallel issue of global energy supply security.

Global warming as the case study

With respect to the Australian government and global warming, the key break in its treatment as a policy issue has been the government's refusal to ratify the Kyoto Protocol on Climate Change (1997) or, even more importantly, its rejection of mandated targets and the related question of how these are to be attained at least cost. On the website of the National Greenhouse Office can still be found, after eight years, a sad document called *The National Greenhouse Response Strategy* (1998).[2] This document, a useful background source on Kyoto and what it implied for Australia, states that

> Australia is a party to the United Nations Framework Convention on Climate Change, and took an active part in negotiating the Kyoto Protocol to that Convention which Australia has subsequently signed. If ratified, the Protocol will commit Australia to a legally binding limit on its future greenhouse gas emissions.

But the Protocol has not been ratified by the Australian Government or Parliament. Further, the Government has signalled that it has no intention of doing so, at least as long as the United States also remains the key 'holdout' among OECD states.

Under the auspices of the UN Framework Convention on Climate Change (UNFCC), the Kyoto Protocol sets targets for abatement of greenhouse gas emissions by 2008-12 relative to 1990 levels. These targets are applicable to so-called Annex B states, basically the states of the advanced industrialised world plus the transitional states of the FSU and the former Eastern bloc—but applicable only to those states that actually ratify the Protocol. By now, Kyoto Protocol has come into effect as an international treaty, the required number of Annex B states having ratified.

In this paper, are considered some of the reasons why the symbolic step of Australia's signature of the Kyoto Protocol has been taken but not the substantive step of ratification, with its requirements for a 'legally binding limit on its future greenhouse gas emissions'.

Pre-1997, the Australian government's lobbying internationally had been able to gain especially lenient treatment under the Protocol. First, its target under the Protocol allows an eight per cent increase in such emissions relative to 1990 compared with a requirement for most Annex B states of a reduction of five to eight per cent, with the EU effectively included as a single multi-state unit[3]. Second, the Protocol allows that reductions in emissions of CO_2 (the most important greenhouse gas) can include the effects of a one-time reduction in land-clearing.[4]

Despite significant increases in greenhouse gas emissions from the energy system over the period 1990–2010, this latter dispensation effectively means that Australia's target for 2008-12 is accessible[5] but even this expectation has not been enough for the Australian Government to agree to ratify the Protocol suggesting that opposition to the principle of mandated targets and the need for tighter restrictions in the future is the real motivation.

This refusal has two fundamental political causes. The first is the power of the coal lobby. This has two aspects: domestic coal dependence in electricity generation and export-dependence on steaming coal markets.

Domestically, Australia is one of the largest emitters of CO_2 on a per capita basis. This is largely due to its dependence on coal-fired electricity generation despite good supplies of natural gas from electricity that can be generated at much lower levels of CO_2 emission. Against this, it has ample supplies of low cost natural gas that could be used to supply baseload electricity at much lower rates of emission plus a range of renewable sources to supplement requirements.

Australia is the world's largest exporter of steaming coal. Given that coal-fired electricity is by a wide margin the most intensive CO_2 emitter in the energy sector, it

requires no sophisticated modelling to show that the Australian economy may be adversely affected by the world's adoption of limits on such emissions. In this sense, neglecting the damage due to global warming itself, Australia can be presented as having a short term narrow economic interest in the world failing to abate greenhouse gas emissions, not merely in failing to meet its own obligations. However, there is little that Australia can do about this, short of sabotaging the international agreement. It can only do this by reinforcing the position already adopted by the United States as the key hold-out.

Thus, the second political cause of Australia's failure to ratify Kyoto has been the refusal of the United States (by far the world's largest emitter of greenhouse gases in absolute terms) to follow the majority of Annex B states by ratifying the Protocol; and Australia's undue dependence on leadership from the United States in such matters.

Or is it more a case of a sad coincidence of narrow stakeholder interests in both cases? This is a question to be focussed on below.

In considering global warming as the case study here, the adversarial society theme will be sustained. In part, this will be done by considering two related questions: (i) rival prescribed models of democracy and their divergent impacts on ecological energy security; (ii) the role of the market mechanism and its regulation to this same end.

Policy making as a defining feature of competing visions of democracy

The first question thus concerns politics and the political sphere, and is about the legitimate interpretation of democracy. Is energy security, including its ecological aspects, and associated rules and structures, too important to be left solely in the hands of governing and business elites, or is it a matter that should closely concern the citizenry at large, requiring vigorous public debate?

The narrow definition of democracy highlights regularly elected representative government as virtually its sole criterion. In this vision, policy-making and advising are properly matters for governing elites alone[6] including those other elites, mainly but not confined to business, having ready access to government circles. Debate is properly confined within a version of parliament that has become a mere talking shop, the top-down structures of a mainly commercialised mass-media and in the stage-managed context of elections that hardly differ from the costly product advertising campaigns they are. This closed and insufficiently accountable system has been compatible with the stakeholder model of policy-making, especially to the extent this model thrives on secrecy.

In the US, the term 'client capture' has been used to describe the undue influence that stakeholders may come to have over regulatory machinery of government. It is interesting to note, however, that stakeholders can also exert power by making use of congressional or parliamentary arms. In the case of oil and auto companies in the US, this process is well described by Goel.[7]

In the second and rival vision, referred to here as pluralist, a working democracy also involves grass-roots involvement and public debate that is properly informed. The latter condition requires whatever accountability remains in the institutions of representative democracy, especially parliament and the checks and balances supposedly

inherent in a liberal republican division of powers. A particular concern arises because so much of modern societies' vital specialist knowledge is locked up in corporations and agencies (quasi-government and government) serving corporations, and in the employees of these organisations.

In making this knowledge available to the public, the role of parliamentary committees and special commissions of inquiry can be crucial. But these are very weak features of the Westminster system compared even with the US system of checks and balances, or at least with the way that system is supposed to work. Therefore, it is to be expected that there will be constant struggles and tensions about the rights of such currently employed technical specialists to make public comment, not as political activists, but as citizens with a duty to make such comment, provided information sources are protected where appropriate and so on. In the absence of these rights of comment, the result will be close to the US practice as described above, in which the debate, like the secret policy-making, is captured by the corporate players and their vast resources, just as the executive and regulatory agencies can be so captured.

The pluralist critics argue empirically that neither parliament nor the mass media actually function adequately to promote such public debate. The Parliament is increasingly dominated by the executive. The mass media is (largely) part of big business, has become even more alarmingly concentrated in a very few hands or monopolised in recent years, and the governing elite has considerable if not unlimited financial power to use it as a propaganda channel. The pluralist prescription for ~~view of~~ democratic politics deplores the breakdown of safeguards protecting the position of the less powerful groups and individuals in such public debate.[8]

The multiple roles of the IPA

Without using this terminology, the Melbourne-based Institute of Public Affairs (IPA) has taken upon itself the role of advocate of the stakeholder model of public policy decision-making and opponent of the pluralist model. But it has multiple roles. Founded in 1943 by Charles Kemp (father of the Howard Government's Ministers David and Rod), the Institute of Public Affairs calls itself 'Australia's oldest and largest private-sector think tank'.

In the stakeholder model or interpretation of democracy prescribed by the IPA, the critical (= scrutinising) roles of educated and professionally trained elites are particularly denigrated. This is part of a growing neo-conservative and populist rhetoric of attack on such elites At the same time, the political activity of ordinary citizens is also treated with suspicion as illegitimate and destabilising. An exposition of the IPA's principled opposition to a more participatory democracy can be found in an article by former Hawke-Keating ALP MHR who has now been on the staff of the IPA for some years.[9]

It is not unusual for these same ideologists, wearing a different hat, to be involved in secret lobbying and PR on behalf of the stakeholders that reward such activities financially. But apparently this politics of corridors and smoke-filled rooms is an altogether different and acceptable form of the genre.

It is especially relevant here that among these major stakeholders are industries and corporations of the energy sector, and especially the fossil fuel industries that form a large and significant part of the Australian economy. Within this group of stakeholders, it has been those associated with the coal industry and coal-generated electricity that have been especially hostile to the Kyoto Protocol on Climate Change. This is the group that has worked hard and effectively to ensure Australia's refusal to ratify the Protocol.

Just as the IPA represents the interests of big business stakeholders, it is also involved in another practical activity (apart from its ideological crusades) to stymie public debate and genuine pluralism. That is its role in attempting to depoliticise NGOs. Thus, in her book on Howard and the religious right, Marion Maddox[10] writes:

> Long associated with the "dry" end of the Liberal Party, IPA's primary concerns have always been economic. … being a Non-Government Organisation or NGO, jealously guards its special influence with the Howard Government, and enjoys the *quid pro quo* that follows. In 2003 the IPA, as an NGO itself, received a $50,000 contract from the Howard Government to investigate "the relationship between government and NGOs".

Within the IPA, this NGO task has been the special responsibility of Gary Johns, the same former ALP federal politician who put together its attack on the pluralist model of public policy-making. Ironically, many of the NGOs under such scrutiny are voluntary or non-profit organisations taking up the provision of social services from which Government has withdrawn as part of its neo-liberal program. The Orwellian irony is that the Government has used taxpayers' money to fund a Liberal party support organisation (the IPA) precisely to delegitimise or discredit the notion of Government support for any organisation likely to criticise its own policies in areas of vital public interest, and on matters from which its has been seeking to retrench and deny political responsibility, such as the provision of vital social services.

Clive Hamilton[11] has documented the application of this NGO depoliticisation program especially to environmental organisations. He quotes the Coalition Government's Minister for the Environment, according to which

> It is mandatory that any tax-deductible donations [to these NGOs] … only be expended on the conservation of the natural environment and not for any other purpose, such as political activity.

As Hamilton notes, 'the last four words are the key'. For example, pointing out the failure of the Government to ratify Kyoto and the principle of mandated targets for greenhouse gas emissions would presumably be tantamount to political activity. In the field of public information about environmental matters, what would not be?

'Free markets' *versus* 'market instruments'

The second matter of contention is about the governance of markets. What are the appropriate joint roles of the market and of the state in providing for objectives such as sustainable and secure energy supply and demand?

IPA commentators can sometimes appear well disposed to using market instruments to achieve public policy objectives such as ecological sustainability. However, for its constituencies, the fossil fuel stakeholders, such a use of the market can

appear as dangerous in the extreme. Market instruments can threaten those powerful business interests by forcing them to meet the full social costs of their activities. This poses some interesting tensions for an organisation such as the IPA and its clients because, in its ideological role, the IPA has to concede the efficiency of market instruments.

Yet it must also be admitted that advocates of a more accountable, pluralist and consultative approach also do not have an agreed concept of the how the market can and should be harnessed to achieve desired social, sustainable and other objectives. In particular, there is a conflation (fostered by the big stakeholders and their advisors in political philosophy) between unregulated free markets and the use of market instruments to attain goals of social welfare and ecological sustainability. An objective of this paper is to address aspects of this confusion.

Energy policy in an adversarial society

Despite Adam Smith's 'invisible hand', by the mid-to-late 19th century, the sometimes catastrophic social inefficiency of unregulated markets had become obvious. Unregulated markets were under-providing public goods such as industrial health and safety, public sanitation and public health generally. Free markets were resulting in over-utilisation of unpriced or unpriceable common property resources like clean air and water, for which property rights were ill-defined or ill-enforced. The state was forced by public pressure to regulate, to alter the system of property rights, and to raise and use higher taxes and charges to fund provision of public goods in the interest of correcting these market failures. By the 1930s, full employment was added to the list of public goods radically underprovided by the unregulated market and hence requiring major public intervention and government responsibility.

By late in the 20th century, it was further evident that emerging forms of market failure were of greater consequence globally than had hitherto been understood. The leading examples were the greenhouse gas emissions from human activity that are the main cause of global warming, and the CFCs and related emissions that were found to be destructive of the ozone layer. In both cases, the over-utilised common property resource was not just regional but the global atmosphere itself. The global scale of these newly evident externalities posed new policy and political challenges. A world government capable of the design and enforcement of optimal intervention was absent, infeasible and in the view of many – including pluralists – undesirable. Fortuitously, a legacy of WWII was an international system of global governance and international law, under UN auspices, that could at least allow such global problems to be addressed, if not to guarantee their full resolution.

Any effective response would have to take a form in which sovereign nation-states would be responsible for enforcement domestically once national standards or target maxima had been voluntarily committed through multilateral international treaties. The successful experience of the 1987 Montreal Protocol to ban or limit ozone-damaging emissions seemed to indicate it could be done, although the case of global warming was much more complicated and difficult, both administratively and politically.

The UN's Rio Convention of 1992 set in motion a process under which the nations of the industrialised world, plus the economies in transition (FSU and Eastern Europe) were to

take the lead in abating the emission of greenhouse gases. This process culminated in the Kyoto Protocol.

Tokenism and rear-guard actions

After a succession of major scientific reports by the International Panel on Climate Change (IPCC), even the Australian Coalition Government now finds it inexpedient to countenance publicly a position of denial on global warming. In 2005, it commissioned a report on the magnitude of that problem[12] and has now established an instrumentality entirely devoted to examining strategies of adaptation to inevitable global climate change. 'The *National Climate Change Adaptation Programme* is a $14.2 million programme which aims to commence preparing Australian governments and vulnerable industries and communities for the unavoidable impacts of climate change'.[13]

This again illustrates the stake-holder bias of policy-making. The agricultural and other interests jeopardised by 'unavoidable' global warming have to be placated, if only by the gesture of a budgetary allocation to set up machinery to advise on local manifestations of the problem. The embarrassing and therefore suppressed point is that the extent of such damage is heavily dependent on the degree to which greenhouse gas emissions are abated at the global level, and hence reducing the extent of global warming, including its effects in Australia.

This can hardly be denied directly by the Government—hence its recent endorsement of a multinational initiative supposedly to encourage transfer of greenhouse gas abating technology among the developing economies of China and India, states not obligated under Kyoto but projected to be major emitters. This is the Asia-Pacific Partnership for Clean Development and Climate (APPCDC). The report by Black[14] notes that the scheme is 'entirely voluntary, entirely technology-based, with no binding targets for reducing emissions, no sanctions and no mechanisms.' It certainly places no obligation on the worst emitter, the United States. Yet the Minister's claim was that this scheme is in some sense a superior substitute for Kyoto[15].

Promotion of this initiative has implied that the consultative and rule-making processes involving the UNFCC have ignored the importance of technical fixes in responding to the abatement of greenhouse gas emissions. This is absurd on two counts.

First, there are ~~a~~ vast numbers of already existing technologies the deployment of which can radically reduce greenhouse gas emissions. If greenhouse gas emissions are properly priced in accordance with mandated targets and market instruments, the economic incentives will be there first, to deploy these technologies, especially as existing technologies reach the end of their economic lives; and second, to influence behaviour patterns, such as the length of vehicle journeys.

Second, the same price signals reflecting the requirement to meet mandated targets for emissions will also prompt the greater research and innovation effort necessary to bring forward even more cost-effective solutions in the future.

Rival private sector interests and the IPA's evolving position on global warming

For many years, the IPA had toyed with a denialist position on global warming, for example, by promoting visits and presentations by the global warming denialist Patrick Michaels.[16]

Even in publicly associating itself with the Allen Consulting Report in July 2005, the IPA has not renounced its earlier flirtation with a denialist position, if not denying global warming itself, then still denying a necessary connection with CO_2 emission. This position was evident in an interview with the ABC, involving IPA spokesperson Jennifer Marohasy:[17]

> It's ambiguous. It's not clear that climate change is being driven by carbon dioxide levels. But let's move beyond that argument and let's start talking about how we can adapt to what will be a different climate in the future. … I actually think that it's good if we can get beyond this debate of whether increase in carbon dioxide levels are [sic] driving more extreme climate events. I think that we need to move beyond that and accept and recognise that whether or not we can reduce carbon dioxide levels, there will be climate change.

In doing so, the IPA has gone beyond the Allen brief and position, and reiterated another stance long promoted by its former in-house global warming commentator, the retired CSIRO climate scientist Brian Tucker, namely that of adaptation only.[18]

The IPA's revived attempt in July 2005 to gain credibility for this adaptation-only position was in part based on the (now) admitted seriousness of the global warming problem. But here its argument is multiply dishonest. Apart from the CO_2 connection, no reasonable proponent of the abatement of greenhouse gas emissions would deny that measures of adaptation will also be necessary and unavoidable, and need to be addressed. Studies of climate change impact and adaptation measures have accordingly been a major part of IPCC activities, along with its focus on greenhouse gas emission abatement and the mechanisms and extent of future climate change itself.

In a business as usual situation or otherwise, great uncertainty exists about the level of greenhouse gases in the atmosphere over the coming decades depending, as that level must, on imponderables such as future GDP growth and changes in the shape of the energy sector. There are also major unresolved scientific arguments about how these atmospheric concentrations may determine the complex consequences of global warming. This is especially so given positive feedbacks and irreversible effects, and uncertainties about the levels of atmospheric concentration at which such discontinuities or tipping points may be induced. This has led to the terminology '*dangerous* climate change' that alludes specifically to such catastrophic risks.[19]

The global optimum, or tolerable level of future global warming, bearing in mind all costs, would be suggested by attempts to model this extremely difficult problem given data and assumptions about such costs of (i) abatement, (ii) damage and (iii) adaptation. It is quite implausible *a priori* that any such solution will exclude some level of policy-induced abatement.[20] Results presented by the IPCC suggest that significant and urgent greenhouse gas emission abatement is required, with Kyoto as little more than a modest first step.

Those commentators taking up an adaptation-only position must therefore be presumed to have motives other than seeking such a global optimum or to base their position on ideological considerations. These latter might include a principled opposition to government intervention in markets at the national level—or perhaps more particularly at the international level. Such a stance might be based in part on a self-fulfilling

pessimism about the prospects of the latter, or on a principled opposition to the nation being bound by multilateral agreements that would be necessary for such an approach.

The theorist of international strategy, Thomas Schelling argues that such multinational agreements will be necessary to address the problem but does not find it plausible that commitments can be binding in any strict sense, as distinct from being persuasive.[21] But even persuasive commitments are too much to ask of the present Australian Government and the fossil fuel lobby, the self-styled greenhouse mafia that effectively makes Australia's climate change policy.[22]

Another dimension of weakness in the adaptation only position on global warming concerns the social justice aspects involved. These aspects are of two types: spatial and inter-temporal (or intergenerational).

First, the adaptation-only position amounts to discounting the future more heavily. The implication is that future generations ought to be left to manage as best they can to bear the burdens of global warming despite this being due to greenhouse gas emissions attributable to the present generation and previous ones. Second, such an approach would mean that much more of the burden of a consequently greater quantum of climate change would be met by the low income, highly populated countries that tend to be located in more equatorial regions.[23]

An adaptation only approach might be defended by rhetoric such as the following[24]:

> Human beings are highly adaptable. We have a gift for innovation that enables us to survive and even flourish in hostile environments that would challenge other creatures.

The effect of such highly generic or species-level statements is precisely to abstract from economic and social realities of highly unequal actual abilities to adapt, or of costs (especially human costs) of such adaptation. At Government behest, this source - the Allen report – (while not itself advocating adaptation only) confines itself almost entirely to adaptation problems associated with Australian territory. Even remaining within a realist, national interest framework, some discussion of the challenge, for Australia, of environmental refugees prompted by global warming might have been expected. In fact there is no such reference despite a minor recognition of the problem of sea-level rise for Pacific Island nations.

The business stakeholders do not speak with one voice

In fact, the IPA is not the purveyor simply of business-friendly and anti-statist ideologies. It is also a think-tank funded by big business and sensitive to specific profit requirements of stakeholders.[25] However, big business by no means speaks with one voice on matters of global warming and that evolving situation has also been reflected in positions taken by the IPA, and organisations like it, on the global warming issue.

Though some sections of big business internationally still fund and support global warming denialists (notably Exxonmobil)[26] even sections of the Australian coal industry are tending to abandon total commitment to such an extremist position, as scientifically implausible and politically self-defeating. In Australia, the coal industry and related interest groups have long provided funding in support of R&D effort on capture, sequestration and storage of CO_2 from fossil-fuelled power stations. Undoubtedly this

effort is in its own realistic self-interest but would (and justifiably) be even greater were mandated targets in place.

Other sections of big business not merely accept the need for greenhouse gas emission abatement but have called on governments to address seriously the problem, if not necessarily to ratify the Kyoto Protocol. Among international oil companies (IOCs), BP-Amoco and Royal Dutch-Shell have wanted to project such an image and have done so with actions as well as words. Another such expression[27] referred to the intolerable policy uncertainty due to (certain) governments' failure internationally to commit to a program of abatement. This major policy uncertainty contributes substantially to the business risk entailed in long term investment in capacity and infrastructure having to do with energy extraction, transformation, use and also conservation or energy saving.

Commercial motives can also explain some business policies supportive of greenhouse gas emission abatement. Within the fossil fuel industry, gas producers also stand to gain from replacing coal, especially in electricity generation, and thereby significantly reducing CO_2 emissions. By contrast, potential manufacturers of technologies such as wind-power or photovoltaics have much less financial weight and political influence but can sometimes be placated with random or niche R&D assistance that can divert attention from government inaction on more critical fronts such as mandated targets.

Hence it is no surprise to see that recent comment in the IPA's journal[28] has been highly favourable to nuclear power while remaining negative and dismissive about a technology such as wind power, despite the fact that globally, annual additions to generating capacity of the latter have exceeded additions of nuclear capacity in recent years.[29] This analysis lacks documentation about costs and required risk-inclusive rates of return, a major shortcoming where high risk-inclusive rates are detrimental to the prospects of both coal and nuclear. It also fails to refer specifically to gas-fuelled CCGT technology, to highlight its competitiveness relative to coal-fired generated base-load electricity[30] and its ability to abate CO_2 emissions cost-effectively by replacing coal-fired generation.

Rival notions of market governance and global warming

As illustrated in Figure 1, a useful threefold distinction can indeed be made between (i) technical fixes, (ii) regulatory actions, especially with respect to construction of 'market instruments', and (iii) changes in the culture or values of energy users and other parties in consumption, energy markets and in the political domain.[31] But the central issue is the way these elements are linked. Regulatory actions, by definition, are about government modification of market processes, for example, through taxes on energy or emissions, or by instituting fuel efficiency standards. But the other two responses are also influenced by public policy, and are not just about actions in the private domain. In general, these three mechanisms are best viewed and designed as complementary, not as alternatives. For example, taxing energy from carbon-intensive sources will be the most effective means of promoting technical fixes in the sense of both encouraging market penetration of existing climate-friendly technologies (like hybrid cars, CCGTs and wind power) and of supporting innovative approaches in the longer term. Second, such market signals and

efficiency regulations (where appropriate) will encourage, reward and support consumer behaviour or values that places greater weight on conservation of fossil-fuel based energy – instead of taxing such altruistic behaviour.[32]

Advocates of technical fix or of regulatory change often point to opportunities for significant abatement at minimal cost, if not zero or negative cost, for example, through energy conservation or more energy-efficient appliances.[33] These opportunities can be important, but in general some cost premium will indeed be attached to better energy efficiencies. Changes may also take time—for example, existing capital assets such as vehicle fleets may have lengthy turn-over periods; or costs entailed in their early scrapping may be incorrectly neglected in analysis. Behavioural changes should not be taken for granted in policy-making, but neither should it be assumed that the consumer preferences are as unchanging as they are in economists' models, or are unresponsive to changing societal priorities and values. Finally, initial gains may indeed be possible at low cost, but incremental costs of abatement will increase as targets are made more stringent or are required more imminently. Significant additional costs and sacrifices will eventually be required as deeper cuts in emissions prove necessary. To some extent, technological progress will be a favourable offsetting influence as learning processes take effect over time, and such progress will also be concentrated in areas in which carbon penalties are incorporated in market signals.

Importance of a 'least cost' approach to the role of 'market instruments'

There is virtually an infinite number of possible combinations of *ad hoc* assistance to less carbon-intensive technologies, renewables targets and regulatory approaches. Some of these can entail an aggregate cost that that is unnecessarily greater than the minimum possible for a given target—increasing the possibility that the target will be diluted or abandoned by governments as too costly. Given that with increasingly stringent emission targets, higher costs will be involved, it therefore makes sense politically to discover the least cost approach.

Least cost abatement is best achieved through universal application of a workable system of market instruments—in this case, carbon penalties, for example, carbon taxes or internationally tradable emissions permits.

Some committed environmentalists may be among those insufficiently mindful or supportive of this aggregate least-cost policy guideline, and for different reasons — perhaps because of a stakeholder's association with some preferred technical option promoted as renewable. Once again, rivalry and competition among proponents of allegedly green technologies is likely to assist in bringing about a least-cost solution through market mechanisms, providing that emissions are properly costed. The less desirable option is where, in another variant of stake-holder policy making, particular favoured technologies obtain government assistance mainly because of their ability to make tactical alliances or otherwise apply political pressure.

Bridging technologies

Because of these diverse uncertainties, there is a key role for bridging technologies in a risk-averse policy response. Such technologies are both well-tested and offer the prospect of substantial emission reductions with minimum delay. Choosing these technologies is not a matter of 'picking winners' since economic analysis bears out their cost-effectiveness. Their use would doubtless be favoured by market instruments but in the absence of these policies, their claims may be presented.

In base-load electricity generation, the key example often applicable is combined cycle gas turbines (CCGTs) fuelled with natural gas.

CCGTs will also prosper to the extent that bans on nuclear power remain in place. As a bridging technology, CCGTs thus offer a more greenhouse-friendly alternative to coal, having only 40-50 per cent of the CO_2-intensity of coal-fired electricity.

The technology can also assist in avoiding the multiple hazards of the nuclear fuel cycle. Among many, these include the unsolved problem of long term radioactive waste disposal and the problem of nuclear weapons proliferation based on civil nuclear programs. As to the latter, the eminent economist William Nordhaus comments as follows:[34]

> Early studies of the role of nuclear power in proliferation were highly critical of the international non-proliferation regime, and these have proven perspicacious. In fact, virtually all recent cases of proliferation (North Korea, India, Pakistan, and other countries that might be on the way or have given up nuclear ambitions such as Iran, Libya, Brazil, and Argentina) were ones in which countries gained their nuclear material from nuclear power facilities. … In a world of altruists, nuclear power would be an attractive option. In the world we inhabit, it is looking increasingly like a Faustian bargain.

Some will object to CCGT's dependence on natural gas, a depletable energy resource. However, the object is to find an optimum path and not merely a utopian end state - hence the role of bridging technologies. Others with concerns about global warming may object that CCGT-based electricity is not renewable. However, many, far less cost- effective technological alternatives, although said to be renewable, may themselves have a flimsy basis for such claims. For example, liquid biofuels typically depend on fossil fuel-based fertilisers and require fossil fuels in their processing. Biofuels used in transport, such as fuel ethanol, may be far from renewable in this sense. In other cases, technological development may indeed lead to biofuels, such as cellulose-based ethanol, for which full cycle CO_2 emissions are much less than those from conventional fossil-fuels. Once again, provided emissions bear an appropriate penalty, such technologies will be brought to the fore by the market so modified.

In private road transport, a sector-wide analysis would suggest hybrid cars that use petroleum fuels with very high efficiency in conjunction with batteries, while making use of the energy from regenerative braking. Prices of these cars are already competitive in the US and likely become more so with economies of scale. Since internationally traded, such technologies do not necessarily require any special start-up assistance in Australia, but they will become more potent to the extent that emission targets are put in place, greenhouse gas emissions are properly priced, and market distortions favouring gas-

guzzling and dangerous SUVs are removed. Hybrid cars are more fuel efficient than standard cars by a factor of more than two and by a factor of four to five relative to large SUVs. Given that average vehicle lifetimes are around 15 years, a more ecologically sound policy environment could easily mean that hybrids can become a dominant share of the national vehicle fleet by 2020. This would not only markedly reduce CO_2 emissions cost-effectively, but would also substantially reduce national oil dependency.

Lessons and parallels with the global problem of oil security

Attention in this paper has so far been confined to just the one ~~case study~~ key example of energy-related security, the ecological case of global warming to the extent this can be ameliorated by reducing CO_2 emissions from the energy sector. Space has precluded detailed consideration of other security issues such as over-dependence on oil, mainly as a transport fuel, given the special problems of this fuel which must be increasingly supplied through international trade as indigenous supplies in the main consuming countries are exhausted or become prohibitively costly to extract.

Increased price volatility and uncertainty compared with the pre-1970s period, as well as political uncertainty in the Middle East and elsewhere, has tended to inhibit investment in the exploration and production of expanded supplies of oil. Combined with bursts in demand now associated with rapid economic growth, especially in developing Asia, this recurring supply constraint in turn leads to further volatility and price spikes in a cycle of cause and effect.

Part of this cycle is that of conflict and war in the Middle East. Here, the war on Iraq (2003-) and the ongoing US occupation have clearly contributed to the present price super-spike. This is in significant part because of ~~both~~ direct disruption to supplies by a wide range of differently motivated insurgents in Iraq[35]. The war has also contributed to a general atmosphere of price uncertainty more generally (not just in Iraq) in which investment in oil supply is inhibited. This underinvestment in exploration and supply is despite the oil producing states and the international oil companies being the beneficiaries of record profit levels due to the oil price spike.

Over and above such price spikes and volatility is the fact that the long run average price of oil must increase as its marginal supply cost increases, especially in the non-OPEC regions and despite some further advance in supply technologies. Much debate has occurred about how soon supplies of oil and oil substitutes will peak and what the consequences of this will be. Such a global supply peak would not be new. One occurred as a result of the 1970s oil price spike when there was a sharp and sustained decline in OECD demand for oil, and CO_2 emissions from the energy sector that was not exceeded until the early 1990s.[33]Any future global supply peak for oil would also be associated with demand declining in response to some form of price spike or sustained price increase. It is uncertain how sharp such price signal would be, and how disruptive macro-economically or in terms of its distributional effects domestically and internationally.

The overall welfare result of an oil supply peak need not be negative (compared with alternatives) if the effects of global warming are taken into account. However, the net effects of such price-induced substitutes for oil should not such as to exacerbate that problem. This will not be easy because alternative liquid fuels based on hydrocarbons

(liquefied coal, tar sands) may be more intensive in greenhouse gas emissions. Even liquefaction of gas or its use as CNG in vehicles will drive up the price of gas available for electricity generation. Market instruments addressing the full social costs of private transport will highlight the need for a strong focus on oil-saving technologies.

Over and above these cycles is the fact that the long run average price of oil and oil substitutes must increase as its marginal cost increases. This gives rise to debate about how soon supplies of oil and oil substitutes (such as tar sands and liquefied gas) will peak. This timing will also be affected by price increases inhibiting consumption.[36]

This damaging oil price-investment cycle cannot be broken by 'wars to end all wars' in the Middle East as prescribed by the some advocates of the Iraq war 2003, in part on spurious arguments about breaking OPEC, and magically reducing oil prices![37]

The best approach to dealing with the oil security problem is indeed to stabilise growth in its demand globally. This can most effectively be done by strong domestic measures of demand restraint in countries such as the United States and OECD generally. Such measures having been taken, it is then plausible to encourage similar efforts internationally, especially directed at encouraging the developing world to do likewise. The potentially disastrous alternative is that these economies will mimic the American model of economic development with its heavy emphasis on the private motor vehicle as the engine of development.

The policy responses thus parallel those appropriate to the other key global problem in energy security - global warming. A key such parallel is that in both cases the emphasis has to be on demand restraint and fuel switching. Global warming considerations also call for switching to transport fuels, whether produced domestically or traded internationally, that are less carbon-intensive.

In this policy effort, a goal of greater national energy self-sufficiency as such is not the point. Unless it has a strong focus on reducing dependency on transport fuels generally such an objective likely not only to be excessively costly (foregoing the benefits of international trade) but is likely to exacerbate other problems associated with excessive fuel use, especially the ecological.

Imposition of higher taxes on oil-based transport fuel plus tighter fuel efficiency standards can thus contribute to energy security generally and also to addressing the ecological security objective of combating global warming. This kind of complementary benefit is sometimes referred to as a double dividend. The same policy measures can also internalise the social costs of urban traffic congestion and air pollution, borne at the national and social levels, entailing a triple dividend.

In other cases, there will be a need for trade-offs, balances or compromises between national energy security and ecological security objectives. Examples include: greater international trade dependence, especially if there is to be greater use of the more climate-friendly natural gas (LNG or pipelined) relative to coal or nuclear; greater dependence on the CO_2-intensive processing of tar-sands as the marginal cost of extracting conventional crude oil increases, possible use of biofuels involving increased use of fertilisers and competition for alternative land-uses including food production and environmental amenity. Promoting some of these supply options, and especially nuclear

power, on grounds of global warming would be quite unnecessary and premature.[38] It is preferable to implement bridging technologies while undertaking a strong and broad-based R&D effort directed to more benign alternatives introduced into the market as existing energy-using assets and infrastructure are turned over.

Conclusion

In all such decisions, especially those calling for balances and trade-offs, there are essential roles for both open and accountable political processes - not the secret stakeholder model of policy-making; and for market instruments reflecting external diseconomies such as global warming - not the so-called free market, or 'market forces'.

The best approach to the crisis of global warming is one that includes as its central element, a combination of policies requiring national mandatory targets (upper limits) on greenhouse gas emissions combined with policies that promote these targets in a way that imposes least costs on consumers and firms in general, that is, by suitable 'market instruments' such as carbon taxes or internationally tradable emission permits. Such measures will have most effect by also promoting, reinforcing and rewarding habits of greater energy frugality and ecological consciousness in the community. This necessary approach has been resisted by government in response to pressures from so-called 'stakeholders', mainly a 'mafia' of coal industry and other vested interests[39] who misleadingly argue that some combination of pious rhetoric and R&D support (mainly to them) will suffice.[40]

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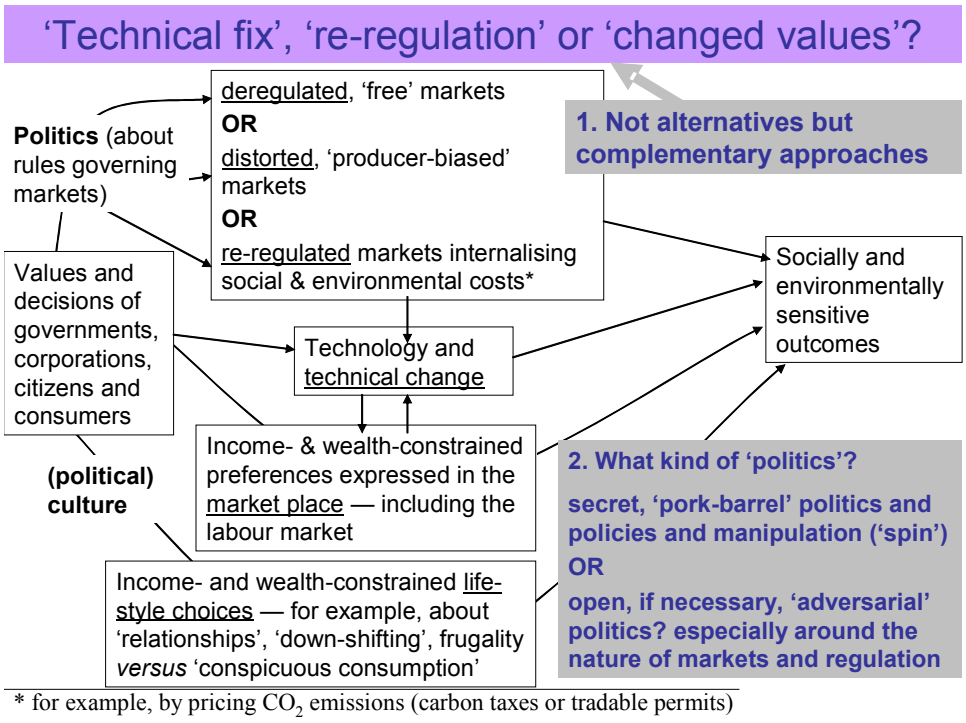
Figure 1. Public policy and markets in emission abatement



* for example, by pricing CO_2 emissions (carbon taxes or tradable permits)

[1] barry.naughten@anu.edu.au

[2] http://www.greenhouse.gov.au/government/ngs/pubs/

[3] Under the protocol, apart from Australia, only Norway (+1%) and Iceland (+10%) were allowed emission increases compared with 1990 levels. New Zealand, Russian Federation and the Ukraine were not required to reduce emission levels below their 1990 levels. The Protocol also envisages international trade in emission rights so that, as a result of such trade, states may legitimately choose to meet targets more stringent or less so than those specified. States not listed under Annex B (for example, China and India) are not required to meet targets under the Protocol.

[4] UNFCC, 1997-2005, Kyoto Protocol Countries included in Annex B to the Kyoto Protocol and their emissions targets, accessed November 2005. http://unfccc.int/essential_background/kyoto_protocol/items/3145.php

[5] Hamilton, C, 2001, *Running From the Storm: The Development of Climate Change Policy in Australia*, University of New South Wales Press.

[6] The term 'elites', without suitable qualification, is far too vague. CW Mills' term power elite referring to the triumvirate of political, corporate and military top leadership is preferable. See Mills, C W, 1956, *The Power Elite*, Oxford University Press.

[7] Goel, R, 2004, 'A bargain born of a paradox: the oil industry's role in American domestic and foreign policy', *New Political Economy*, vol 9:4, December.

[8] Macnab, K, 2005, 'The Limits of Adversarial Legitimacy', The Adversarial Society, Annual Conference of the Independent Scholars Association of Australia (ISAA), National Library, Canberra, 13-14 October.

[9] Johns, G, 2005, 'The NGO Project: Why We Care', *Institute of Public Affairs Review*, vol 57:2 June, pp 30-32 and 2002, 'Government and Civil Society: Which is Virtuous?', Paper presented as a lecture in the Department of the Senate Occasional Lecture Series at Parliament House on 23 August. http://www.aph.gov.au/Senate/pubs/pops/pop39/c06.pdf

[10] Maddox, M., 2005, *God under Howard: The rise of the religious right in Australian politics*, Allen & Unwin. (passages in the text cited by Grace Pettigrew 16 Feb 2005, pp 210, 254. http://forum.onlineopinion.com.au/thread.asp?article=3034

[11] Hamilton, C, 2005, 'Government stymies advocacy by green NGOs', *Australia Institute Newsletter*, No 43 June. www.tai.org.au

[12] Allen Consulting 2005.

[13] http://www.greenhouse.gov.au/impacts/index.html#programme

[14] Black, R, 2005, 'Climate pact: For good or bad', BBC News. http://news.bbc.co.uk/1/hi/sci/tech/4725681.stm

[15] Clive Hamilton, 2006 'The dirty politics of climate change' on the website of The Australia Institute: www.tai.org.au p.6

[16] Professor of environmental sciences, University of Virginia, and state climatologist, Virginia

[17] Bannerman, M, 2005, Report released on climate change: Interview with Clive Hamilton, Senator Ian Campbell, Jennifer Marohasy, 7:30 Report, Program Transcript, Australian Broadcasting Corporation, 26 July. http://www.abc.net.au/7.30/content/2005/s1423001.htm

[18] Tucker, B, 1995, 'Climate Change resulting from increasing greenhouse gas emissions will be calamitous unless governments take drastic action', Chapter 3 in Bennett, J (ed) *Tall Green Tales*, Institute for Public Affairs.

[19] Schellnhuber, H J, Cramer, W, Nakicenovic, N, Wigley, T.and Yohe, G , 2006, *Avoiding Dangerous Climate Change*, Cambridge University Press.

[20] Most global economic modelling connected with global warming is confined to the costs of achieving various levels of greenhouse gas emission abatement. Models that attempt to also incorporate costs of both adaptation and of the remaining damage itself are referred to as integrated assessment models.

[21] Schelling, T C, 2002, 'What Makes Greenhouse Sense?', *Foreign Affairs*, May-June. http://www.foreignaffairs.org/20020501facomment8138/thomas-c-schelling/what-makes-greenhouse-sense.html.

[22] ABC 2006, 'The Greenhouse Mafia', Four Corners, ABC TV, Reporter: Janine Cohen, Broadcast 13 February. http://www.abc.net.au/4corners/content/2006/s1566257.htm

See also, Baker, R, 2005, 'How big energy won the climate battle', *The Age*, July 30. http://www.theage.com.au/news/national/how-big-energy-won-the-climate-battle/2005/07/29/1122144020224.html

[23] Schelling, 2006.

[24] Allen Consulting Group, 2005, *Climate Change: Risk and Vulnerability: Promoting an Efficient Adaptation Response in Australia - Final Report*, March, Report to the Australian Greenhouse Office, Department of the Environment and Heritage, by The Allen Consulting Group, pp 17, 28. http://www.greenhouse.gov.au/impacts/publications/risk-vulnerability.html:).

[25] In Gary Johns' own words (2002):

> We [the IPA] don't take funding directly for any work that we do, and you'll read this on our website, it's all quite public. We have a range of supporters, individuals as well as corporations, and we have a couple of rules. No more than one corporation can constitute, I think, more than 15 percent of any industry, and no industry can constitute any more than 15 percent of our income. We try to spread as much as possible our backers. I don't want to damn them by naming them, but if Rio Tinto rings me and says: 'Gary, can you write a really hard piece on x and y', I can say no.

[26] 'Exxonmobil Information sheet' produced by a group at Stanford University states that:

> ExxonMobil is a member of the Global Climate Coalition (GCC), an industry front group that gives financial and moral support to a small handful of scientists who vocally dispute the reality of global warming and the necessity of taking action to combat it. In Exxon's brochure, 'Global Climate Change: Everyone's Debate,' CEO Lee Raymond writes, 'Our analysis indicates that the current state of climate science is too uncertain to provide clear answers to many key questions about global climate change. Even if global warming were a proven threat – which it is not – targets agreed upon in Kyoto, Japan, fail to provide a fair, practical or cost-effective solution.'

http://www.stanford.edu/group/SICD/ExxonMobil/exxonmobil.html

[27] Jeffrey Immelt, chairman and CEO of General Electric, *Ecomagination* launch, May 9, 2005:
There's no time to wait because tomorrow is now. We are living in a carbon-constrained world where the amount of CO_2 must be reduced. But industry cannot get there alone. We need to work in concert with the government and environmental groups to promote and reward leadership.
http://www.environmentaldefense.org/article.cfm?contentID=4437

[28] Moran, A, 2005, 'The Economics of Nuclear power', *Institute of Public Affairs Review*, vol. 57:2 June, pp 12-14.

[29] In 2004, world wind capacity reached 47.3 GW with 8 GW having been installed in 2004 alone. Since 1990, wind has been the fastest-growing power source worldwide http://www.awea.org/

[30] Naughten, B, 2003, 'Economic assessment of combined cycle gas turbines in Australia: some effects of micro-economic reform and technological change', *Energy Policy*, vol. 31:3 February, pp 225-45.

[31] Trainer, E, 2001, 'The Petroleum Situation: A brief summary', http://socialwork.arts.unsw.edu.au/tsw/#petroleum ; and 2003, 'Renewable energy: what are the limits?'. http://socialwork.arts.unsw.edu.au/tsw/#What_about_renewable_energy_sources

[32] Denniss, R, 2000, 'Green Power: Taxing concern?' *Australia Institute Newsletter*, September 24, pp 7.

[33] for example, Lovins, A B, Kyle Datta, E, Bustnes, O E, Koomey, J G, Glasgow, N.J, 2004, *Winning the Oil Endgame, Innovation for Profits, Jobs, and Security,* Rocky Mountain Institute www.rmi.org

[34] Nordhaus, W D, 2004, *The Outlook for Energy Three Decades After the Energy Crisis*, June, Prepared for The International Energy Workshop, Paris, June 22-24.

[35] IEA, 2005, World Energy Outlook, OECD/IEA, Paris, p. 261.

[3]

[36] Global supplies of oil actually peaked significantly in 1979 (at 66 Mb/d), fell to a trough in 1983 (56.5 Mb/d) and did not recover to above the 1979 level until 1994, 15 years later. This historical example indicates that a global peak in oil production (and consumption) is, in economic terms, as much an issue of demand and price as it is one of supply and increasing marginal costs.

[37] This motive for the Iraq war, quickly shown to be a disastrous failure, is fully documented in Palast, G, 2005, 'OPEC on the march', *Harper's Magazine*. New York: April, vol. 310, Iss. 1859; p 74-6.

[38] This is not to deny that the nuclear power industry must be required to solve and fund solutions or remedies to problems, for example, of long term waste disposal with respect to *existing* nuclear capacity and past electricity generation from that capacity.

[39] Details of a self-styled 'greenhouse mafia' that actually assists in drafting cabinet submissions on the Government's greenhouse policy were revealed in an episode of the ABC program 4-Corners broadcast on 13 February 2006 http://www.abc.net.au/4corners/content/2006/s1566257.htm See also Clive Hamilton's 'The dirty politics of climate change' www.tai.org.au

[40] The conclusion drawn here, is fully consistent with that presented in a recent excellent review of Jared Diamond's Collapse (2004, Penguin), December 2005, pp 1049-62. by Scott Page in *Journal of Economic Literature* vol. XLIII.