REDUCING CARBON DIOXIDE EMISSIONS: CAN A SUSTAINABLE SOLUTION TO COMBAT CLIMATE CHANGE BE AN EFFECTIVE ALTERNATIVE TO THE CARBON POLLUTION REDUCTION SCHEME*?*

Dr Ted Christie
Environmental Lawyer, Mediator and Environmental Scientist

EXECUTIVE SUMMARY

1.0 In signing and ratifying the Kyoto Protocol, Australia has done so believing that it is in the nation's best interest to take appropriate national action to address the global problem of climate change. By complying with the Kyoto Protocol, Australia's trustworthiness, prestige, influence, international honour and reputation, at the global level, is maintained (1).

2.0 The "*Emission Trading Scheme*" concept was first introduced in the United States, around 1980, to address the environmental problem of acid rain caused by industrial emissions of the gas sulphur dioxide. The origin of "*sustainability*" as a unifying global concept for environmental management and protection was the "*Brundtland Report*" - released by the World Commission on Environment and Development in 1987. Whilst the ETS concept has been adopted to address greenhouse gases and climate change – a pathway for reducing greenhouse gas emissions to combat climate change based on finding a sustainable solution, surprisingly, has received little consideration.

3.0 The approach of the *White Paper's Carbon Pollution Reduction Scheme* to combat climate change represents an **economic fix** to an environmental problem – notwithstanding that it is argued that a **sustainable solution** is required.

4.0 Finding a sustainable solution requires a balancing of *multiple and competing objectives - ecological, economic, social and cultural* – by evaluating different "mixes" of energy options that differ in their reduction of CO_2 emissions. A sustainable solution should aim to secure as much available value as possible for Government, industry and the community.

5.0 A sustainable solution integrates a "mix" of options as essential elements for the overall solution to achieve a prescribed cap to reduce national CO_2 emissions. Apart from a **regulatory control option**, based on a national, uniform standard for CO_2 emissions, other options must also be considered as part of the mix of options that most effectively give rise

to a sustainable solution e.g. (i) **renewables** such as solar and wind energy sources (ii) **technological options** such as clean coal technology-CCS and (iii) **ecological options** such as reafforestation and bio-char.

6.0 The following Terms of Reference ("ToR") are addressed in this submission:

6.1 "**ToR (a):** The **choice of emissions trading as the central policy** to reduce Australia's carbon pollution, taking into account the need to: (i) reduce carbon pollution at the lowest economic cost (ii) put in place long-term incentives for investment in clean energy and low-emission technology, and (iii) contribute to a global solution to climate change"

The submission advances an alternative pathway to emissions trading for reducing Australia's carbon pollution – based on "sustainability" - a unifying global concept for environmental management and protection. Finding a "sustainable solution" to reduce CO_2 emissions to combat climate change takes into account the prescribed needs of ToR (a)(i)(ii) and (iii) as relevant considerations.

6.2 **"ToR (b): The relative contributions to overall emission reduction targets from complementary measures** such as renewable energy feed-in laws, energy efficiency and the protection or development of terrestrial carbon stores such as native forests and soils"

This goal is achieved by constructing a number of scenarios along a continuum of sustainability. A scenario is a hypothetical construction of different mixes of options for reducing carbon dioxide emissions to combat climate change. Each scenario results in a different percentage reduction in carbon dioxide emissions. The options for reducing CO_2 emissions fall into four categories: (i) Legal e.g. regulatory control (ii) Technological e.g. CCS (iii) Renewables e.g. wind and solar and (iv) Ecological e.g. reafforestation and bio-char.

6.3 **"ToR(c): Whether the Government's Carbon Pollution Reduction Scheme is environmentally effective,** in particular with regard to the adequacy or otherwise of the Government's 2020 and 2050 greenhouse gas emission reduction targets in avoiding dangerous climate change"

The process for finding a sustainable solution for climate change incorporates a comparative evaluation of the proposed CPRS that aims to reduce greenhouse gas emissions by 5-15%, ***below 2000 levels, by the year 2020*** *i.e. against the mix of options in each scenario referred to in para. 6.2. A common set of objective criteria is used to evaluate all options.*

6.4 **"ToR(d):** The **appropriate mechanism for determining what a fair and equitable contribution to the global emission reduction effort** would be"

One dimension for this ToR is the process that is outlined in the submission to effectively engage affected industries in setting national standards for reducing CO_2 emissions. It is based on established principles for conflict resolution. An approach based on shared responsibility, joint action and joint problem-solving for setting

national standards for CO_2 emissions would offset any concerns by Industry that unnecessarily onerous obligations may be imposed by Government. Ownership in the outcome so derived in such an approach, would facilitate the national implementation of CO_2 emission standards by Industry.

6.5 **"ToR (f): Any related matter**"

The focus of the submission is on a process for finding a sustainable solution to reduce CO_2 emissions to combat change. The significant features of the process are that it is based on established principles and concepts for conflict management, conflict resolution, alternative dispute resolution and principled negotiation.

7.0 Following the release of the "Brundtland Report in 1987 and during the "Hawke-Keating era", Australia led the world by implementing an innovative, national environmental policy for sustainable development; policy was subsequent incorporated into environmental protection legislation, soon after. There are now opportunities for Australia to once again lead the world by focussing on finding a sustainable solution to address the environmental impacts of global climate change.

8.0 This submission is based on two articles that were first posted on the *LexisNexis Electronic Professional Development Newsletter – Hot Topics Papers* web site on 27 February 2009 and 26 March 2009. It is a pleasure to acknowledge LexisNexis for enabling these articles to be developed and, in turn, forming the basis for this submission to the Senate Select Committee on Climate Policy.

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PART 1: INTRODUCTION

1.1 The Emissions Trading Scheme [now referred to as the *Carbon Pollution Reduction Scheme ("CPRS")* in Australia], as proposed by the Federal Government, persists as a volatile issue. The CPRS caps the maximum amount of emissions and leaves major emitters with two alternatives: Either (i) to buy permits where their emissions exceed their cap or (ii) to reduce their emissions.

1.2 This submission focusses on reducing CO_2 emissions through a problem-solving approach to combat climate change based on finding a sustainable solution. It represents an alternative approach to the ETS.

1.3 Carbon dioxide emissions arising from the use of fossil fuels for energy production account for around 70% of Australia's greenhouse gas emissions; the stationary energy sector contributes around 50% of total Australian emissions (2).

1.4 Concerns expressed within Australia over the potential adverse impacts arising from the CPRS include its impacts on Australia's overseas exports, significant increases in power costs for the manufacturing sector through to job losses and possible closure of mines. Moreover, there are also concerns whether the adoption of the CPRS will exacerbate the economic impacts of the global financial crisis (3).

1.5 Is there a more effective alternative to reduce CO_2 emissions that warrants consideration in Australia, relative to the CPRS? Should climate change be seen as an environmental problem that requires a "**sustainable solution**" rather than an "**economic fix**"?

1.6 Recent case law in the United States provides the basis for regulatory control to reduce CO_2 emissions and so represents **one key option** to consider for any sustainable solution to combat climate change.

1.7 The US statute, the *National Environmental Policy Act of 1969* has been described as possibly being "the most successful legal export in history" as it has been a model for the EIA process for over 100 countries (4). Could it also be possible that the decision of the US Supreme Court in *Massachusetts et al. v Environmental Protection Agency* could also fulfil a role equivalent to NEPA i.e. as an international model for providing one element of a sustainable solution to combat climate change by reducing greenhouse gas emissions?

PART 2: THE CONCEPT OF SUSTAINABILITY AND THE ENVIRONMENT

2.1 **Sustainable development**, as a unifying global concept for environmental management and protection, had its origin in the "Brundtland Report" - released by the World Commission on Environment and Development in 1987. Acceptance by the UN General Assembly then followed. In 1992, two non-binding texts, having scope for sustainable development, were agreed to by the UNCED held at Rio de Janeiro: the ***Rio Declaration on Environment and Development*** that set out the relevant principles; and ***Agenda 21***, a global plan of action for sustainable development.

2.2 The response in Australia to the Brundtland Report was for the Commonwealth Government to release *Ecologically Sustainable Development: A Commonwealth Discussion Paper* in June 1990. This Discussion Paper identified, comprehensively and systematically, what Australians needed to do to embrace Ecologically Sustainable Development *("ESD").* The public participation processes that followed culminated in the endorsement by the Council of Australian Governments of an environmental policy titled, "*National Strategy for Ecologically Sustainable Development"* (December 1992). Under the ESD Policy-Sectoral Issues, at Section 8 *(Energy Use, Energy Production and Transport),* the significance of this Sector for greenhouse gas emissions was reflected in one **Objective**:

- "To limit emissions of greenhouse gases and air pollutants arising from energy use, energy production and distribution, wherever economically efficient, and to promote alternative energy sources (Objective 8.1)".

2.3 It needs to be recognized that the **ETS concept** predates the concept of sustainability as it was first developed, around 1980, to reduce acid rain in the United States through a trading market to control emissions of the industrial gas, sulphur dioxide. The ETS concept has been subsequently extended, globally, to a trading market for greenhouse gases e.g. the *European Union Emission Trading Scheme.*

2.4 Climate change is one of "four agreed priorities" in the UK National Policy, "*Securing the Future. Delivering UK Sustainable Development Strategy*" (March 2005). One of the "five shared guiding principles" in the UK policy is *Achieving a Sustainable Economy:* "*Building a strong, stable and sustainable economy which provides prosperity and opportunities for all, and in which environmental and social costs fall on those who impose them (polluter pays), and efficient resource use is incentivised."*

2.5 It is clear that here is some global justification to consider reducing greenhouse gas emissions to combat climate change in the context of a sustainable solution. Sustainability

represents a problem solving approach that enables as much available value as possible for Government, industry and the community to be secured, given that it balances multiple and competing objectives – ***ecological, economic, social and cultural***, rather than an inordinate focus on only one objective.

2.6 Some of the key elements and objectives for sustainability identified in the "Brundtland Report" include (i) meeting essential needs for food, energy, water (ii) conserving and enhancing the resource base (iii) reorientating technology and managing risk and (iv) merging environment and economics in decision-making.

2.7 Contemporary comments that the concept of sustainability is vague, or has become too diluted to have any practical value, overlook one central feature of the concept. That is, a country cannot achieve economic development when its environment becomes degraded; nor can it restore its environment in the absence of economic development (5).

PART 3: DIVERGENT SCIENTIFIC OPINION ON CLIMATE CHANGE AND CONFLICT MANAGEMENT

> "*A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because the opponents eventually die, and a new generation grows up that is familiar with it*." **Max Planck 1858-1947**

3.1 The above statement by the philosopher, Max Planck, captures the ongoing controversy created by the divergent opinion that exists within the scientific research community as to the reasons for causation for climate change. There is a long held belief that science generates exact knowledge with logical certainty. The reality is that this is a misconception as divergent scientific opinion on any issue will always, invariably, exist.

3.2 In this regard, the Supreme Court of the United States in *Daubert v Merrell Dow Pharmaceuticals Inc.***,** 509 U.S. 579 (1993) identified a number of considerations to ensure that scientific evidence was "***both relevant and reliable".*** One such consideration was whether the theory or technique in question "***has attracted widespread acceptance within a relevant scientific community***".

3.3 There would be little dispute that the international scientific community would accept the validity of this conclusion by the US Supreme Court. It is consistent with the central "test" employed by scientists to determine the reliability of an experimental finding or theory - widespread consensus. Whilst legal principles arising from US Supreme Court decisions are not binding on Australian courts, they may have persuasive value. The decision in *Daubert's case* has been referred to, or followed, in a small number of cases decided by Australian and UK courts.

Atmospheric Carbon Dioxide Emissions and Climate Change

3.4 Applying the "widespread acceptance test" within the climate change research community, a number of conclusions can be made in terms of understanding the relation between atmospheric carbon dioxide emissions and climate change:

i. *A 3°C temperature increase will occur with each doubling of atmospheric carbon dioxide (Intergovernmental Panel on Climate Change);*
ii. *From high resolution atmospheric carbon dioxide back 80000 years, 100 parts per million ("ppm") of the current 385 ppm atmospheric carbon dioxide arises from human activities since the industrial revolution (6); and*
iii. *From the time of the Kyoto Protocol in 1997, atmospheric carbon dioxide emissions have increased from 363 ppm to 386 ppm (7).*

Consensus Decision-Making and Climate Change

3.5 Divergent scientific opinion and conflict over causation makes finding a solution for climate change, based on unanimity, an illusory bargain. This situation exists, notwithstanding that the balance of opinion within the international climate change scientific research community is markedly skewed towards widespread acceptance for greenhouse gases, such as carbon dioxide, to contribute to climate change.

3.6 At the very least, it could be argued that there is reason to assume that there is a relationship between atmospheric carbon dioxide emissions and climate change. In these circumstances, a precautionary approach is justified in order to find a solution for reducing carbon dioxide emissions; failure to act now, may well mean that allowing atmospheric carbon dioxide concentrations to continue to increase, over time, will lead to a situation where the adverse environmental impacts of climate change may become irreversible.

3.7 From a conflict management and resolution perspective, finding a solution for climate change should be based on consensus decision-making. Consensus decision-making provides flexibility in joint problem-solving and reaching agreement on how to reduce carbon dioxide emissions. Consensus does not mean total agreement on every part of the solution but willingness to accept the overall solution and to live and abide with the solution.

3.8 In addition, consideration should be given to adopting the *interest-based approach* of Fisher and Ury and "*Principled Negotiation*"; it provides a pathway for joint problem-solving that facilitates finding a mutually acceptable solution for sustainability that result in mutual gain. In addition, this approach establishes the underlying needs and concerns of Government, industry and the community and for finding ways to satisfy these interests to ensure that as much available value as possible is secured.

PART 4: THE OPTIONS FOR REDUCING CO_2 EMISSIONS

(a) Regulatory Controls for Reducing Atmospheric CO_2 Emissions

4.1 The traditional approach for dealing with environmental problems associated with air emissions has been a reactive one focussing on polluting industries and regulatory control. However, a contemporary global approach has seen a shift away from an approach based strictly on pollution control to one directed at preventing "***environmental harm***". The concept of "environmental harm" incorporates air pollution but also extends to the much broader considerations of environmental quality and sustainability as well. Community consultation may also be a feature of harm-based environmental protection legislation.

4.2 Air pollution statutes, such as the clean air acts of the past, represent the "first generation" approach to the environmental regulatory control of pollution. The position in Australia, today, has changed significantly. Australia has generally adopted "environmental harm" as the basis for environmental regulatory control of pollutants i.e. the "second generation" approach.

Climate Change and Regulatory Control of CO_2 Emissions in the United States

4.3 On a Federal basis, The United States represents a paradox, in terms of addressing the global need to address CO_2 emissions and climate change. On the one hand, the United States is a signatory nation to the Kyoto Protocol – but the Senate has yet to ratify it and so consent for the United States to become bound by the Protocol.

4.4 In contrast, on 2 April 2007, a landmark decision by the Supreme Court of the United States has taken an entirely different direction. In a 5:4 majority decision in *Massachusetts et al. v Environmental Protection Agency*, 549 U.S. 497 (2007); 127 S. Ct. 1438, the Supreme Court ruled that the greenhouse gases that cause climate change are "*air pollutants"* as defined in the meaning under the *Clean Air Act* (42 U.S.C.). In addition, that the United States Environmental Protection Agency (the "EPA") may regulate their emission.

4.5 The action was brought by 12 States and a number of cities. It focussed on Section 7521(a)(1) of the *Clean Air Act* which provided for the EPA to set emission standards for "any air pollutant" from motor vehicle engines "which… cause, or contribute to, air pollution which may be reasonably anticipated to endanger public health or welfare". In California, passenger vehicles and light trucks account for about 40% of the State's total greenhouse gas emissions (8).

Regulatory Control of Environmental Harm in Australia

4.6 Environmental harm, as the legislative basis for the regulatory control of pollutants, was first introduced in South Australia in 1993: *Environment Protection Act 1993 (SA).* Almost all of the other States and both Territories then followed: *Environmental Protection Act 1994 (Qld); Environmental Management and Pollution Control Act 1994 (Tas); Protection of the Environment Operations Act 1997 (NSW); Environment Protection Act 1997 (ACT);* and *Waste Management and Pollution Control Act 1998 (NT*). In Victoria, the *Environment Protection Act 1970 (Vic)*, whilst still primarily pollution-based, now has provisions giving general effect to "harm to the environment". In Western Australia, the *Environmental Protection Act 1986 (WA)* is also pollution-based but now also incorporates "environmental harm".

4.7 Depending on the specific statute, a licence, authority, permit or developmental approval must be applied for and granted for any industry or activity that may emit a listed substance that will, or has the potential, to cause environmental harm, dependent on the intensity [or concentration] of the substance emitted.

The Scope for the Regulatory Control of CO_2 Emissions in Australia

4.8 Environmental harm has a much broader legal meaning under the environmental protection legislation in Australia, relative to the meaning of pollutant in the various clean air statutes that have been superseded. On the basis of the impacts on Australia's environment arising from increasing CO_2 emissions, as described in the Commonwealth's White Paper, *The Carbon Pollution Reduction Scheme,* it is argued that there is a case for the States and Territories to consider amending their environmental protection legislation; and to list CO_2 emissions in the Schedules of these statutes as a substance that will, or has the potential, to cause environmental harm. The States and Territories would then have the authority to regulate CO_2 emissions.

4.9 It needs to be emphasized that legislative amendment would require *c*arbon dioxide, as a contaminant or pollutant, *to come within the legal meaning of "environmental harm",* as defined in the environmental protection statute for each State and Territory – *and not whether greenhouse gases cause climate change*. The regulatory control option has the potential to be applied universally throughout Australia, to all point sources of carbon dioxide emissions, as there is no spatial dimension.

4.10 If there were to be the case, then the Commonwealth has the legislative power to set national pollution standards for the regulatory control of CO_2 emissions as "pollutants" (in the

language of the Commonwealth's White Paper) that will, or may, cause environmental harm under the environmental protection legislative schemes of the States and Territories.

Setting a Uniform National Standard for Atmospheric CO_2 Emissions in Australia

4.11 Under the *National Environmental Protection Council Act 1994 (Cth),* "National Environmental Protection Measures" could be introduced designed to improve the national consistency in environmental protection measures – such as a national pollution standard for specific air emissions. For example, by prescribing a standard for "*lowest achievable CO_2 emissions*", throughout Australia based on *existing technology/best practice environmental management* that is specific for each trade or industry that emits CO_2. Depending on the risk of environmental harm, a uniform Australia-wide standard for CO_2 emissions, specific for each industry, or activity, would apply nationally.

4.12 National pollution standards may be achieved through the co-operative procedures arising under the national environmental policy, the *Intergovernmental Agreement on the Environment (1992).* The process for achieving "National Environmental Protection Measures" is the National Environment Protection Council established by the *National Environment Protection Council Act* 1994 (Cth) and corresponding legislation for each State and Territory.

4.13 The implementation by the Commonwealth and by Commonwealth agencies of "National Environmental Protection Measures" is governed by the *National Environment Protection Measures (Implementation) Act 1998 (Cth*). The States and Territories give effect to the national standards through their own legislation.

4.14 There are a number of issues in applying this option: (i) whether the national standard for carbon dioxide emissions should be applied uniformly to **all** point sources of carbon dioxide emissions and (ii) whether some sectors should be targeted with a higher national standard to reduce carbon dioxide emissions*?*

Industry Involvement in Setting a National, Uniform Standard for Atmospheric CO_2 Emissions

4.15 A prudent path to take for prescribing a national emission standard aimed at achieving the "*lowest achievable carbon dioxide emissions*", based on existing technology, would be to ensure it did not impose unnecessarily onerous obligations on industry and to ensure electricity production costs did not become prohibitive i.e. it was cost-effective. For example, the level set for any national emission standard could be counterbalanced against the costs for capturing and disposing of carbon dioxide.

4.16 There is scope for Government to *effectively engage* affected industries in setting national standards, based on established principles for conflict resolution. An approach based on *shared responsibility, joint action* and *joint problem-solving* for setting national standards for CO_2 emissions would offset any concerns by Industry that unnecessarily onerous obligations may be imposed. *Ownership in the outcome* so derived in such an approach, would facilitate the national implementation of CO_2 emission standards by Industry. It is clearly evident that co-operation between the Commonwealth and the States and Territories – and industry, is paramount if such a regulatory approach for CO_2 emissions is to be adopted, as part of any sustainable solution to combat climate change in Australia.

(b) Technology Options for Reducing Atmospheric CO_2 Emissions

Carbon Dioxide Capture and Permanent Geological Storage

4.17 The *Carbon Dioxide Capture and Permanent Geological Storage"* technology (or "*CCS*") option is an essential complement to the regulatory control option by providing the potential for industry to achieve greater future reductions in emissions. The *time dimension* is a major issue for the adoption of CCS technology - given there is scientific uncertainty associated with the long-term geological storage of captured carbon dioxide.

4.18 It has been suggested that the application of this option may be as far away as 2015 (9). The capture, or separation, and transport of carbon dioxide are not in issue. But a new element for uncertainty does arise – the long-term fate of carbon dioxide following geological storage e.g. whether it will dissolve in the liquid or whether it will form minerals, permanently binding the gas underground (10). Agreement on any new technology, such as CCS, becoming part of any sustainable solution for climate change should depend on the scientific uncertainty being resolved and validated with a risk management evaluation.

4.19 Resolving the scientific uncertainty for CCS technology should lead to a further reduction in carbon dioxide emissions at some later time. Future adoption will be dependent on CCS research resolving the uncertainty associated with the disposal of liquid carbon dioxide.

Nuclear Energy

4.20 The role for nuclear energy remains as somewhat a dilemma. Concerns over disposal of nuclear waste, accidental escape and potential for weapons proliferation continue to exist. More recently, it has been claimed that nuclear power does not have a

long-term role to play for climate change as worldwide supplies of cheap uranium will not last more than a few decades (11).

4.21 One alternative, it could be argued, would be to assess the scope for liquefied natural gas ("LNG") as one preferred, alternative energy source to nuclear power.

*(*c) Renewable Energy Options for Reducing Atmospheric CO_2 Emissions

4.22 It is clear that the future will bring a much more efficient system of energy generation and that renewables will have a key role as part of any sustainable solution for reducing carbon dioxide emissions to combat climate change. The *spatial dimension* is a significant one for both wind and solar energy. That is, should only locations of land within Australia that are both technically and commercially feasible for large scale renewable energy generation be evaluated?

(d) Ecological Options for Reducing Atmospheric CO_2 Emissions

Reafforestation

4.23 Reafforestation has long been advocated and used as a desirable strategy to offset carbon dioxide emissions e.g. in 1988, a new coal fired power station in the USA funded a reafforestation project, over an area of 1000 km^2 in Guatemala, to absorb its carbon dioxide emissions. However, estimates for the area of land required to *stabilise* the total carbon dioxide emissions for Australia are enormous (12). Reafforestation should be seen as a sound cost-effective option for reducing emissions – but only as *part* of any sustainable solution.

4.24 Reafforestation programmes should be directed towards specific problem areas, such as the burning of fossil fuels as well as deforestation e.g. clearing of forests for woodchip. The concept of sustainability recognizes the contribution to exports made by coal and woodchip – but not at the expense of environmental quality. A Government that provided financial incentives for reafforestation programmes to offset atmospheric carbon dioxide emissions would be recognised, globally, as an environmentally responsible government.

Bio-char Technology

4.25 The Leader of the Opposition in the Federal Parliament, Malcolm Turnbull MP, has advocated "Bio-char Technology" (or biosequestration) "as the biggest opportunity in the near term for reducing emissions" (13). But there appears to be both *time and spatial*

dimensions that may limit its immediate adoption for a role in reducing carbon dioxide emissions.

4.26 There is some scientific uncertainty for one key issue: whether bio-char has a wide or limited application for **all** Australian soils e.g. low organic matter, sandy soils; high organic matter, self-mulching cracking clay soils; soils with limited surface infiltration; and soils with impeded internal permeability ("sodium clays"). Some form of cost/benefit analysis *(for climate change and agriculture*) would be advantageous for identifying soil types and land areas within Australia in which bio-char could be part of any future, sustainable solution for climate change.

(e) Status Quo Option – The Reference Point for Atmospheric CO_2 Emissions

4.27 The "status quo" is a measure of total Australian carbon dioxide emissions for a defined year e.g. 2000. The defined year of 2000 then acts as the "reference point" (i) to enable a comparative evaluation of the effectiveness of the alternative options for reducing atmospheric CO_2 emissions and (b) to ensure targets set to reduce emissions are achieved along the prescribed time scale.

4.28 In this submission, the prescribed time scale is 2000-2020.

PART 5: MULTI-OBJECTIVE ANALYSIS: A CONFLICT RESOLUTION PROCESS FOR FINDING A SUSTAINABLE SOLUTION TO COMBAT CLIMATE CHANGE (14)

5.1 The process for finding a **sustainable solution** for reducing carbon dioxide emissions to combat climate change can be distinguished from the ETS model. The process for achieving sustainability requires a balancing of *multiple and competing objectives - ecological, economic and social* – by evaluating different "mixes" of energy options that differ in their reduction of CO_2 emissions. Where Indigenous traditional knowledge has a role in environmental management for climate change (e.g. biodiversity), sustainability extends to include a *cultural objective*.

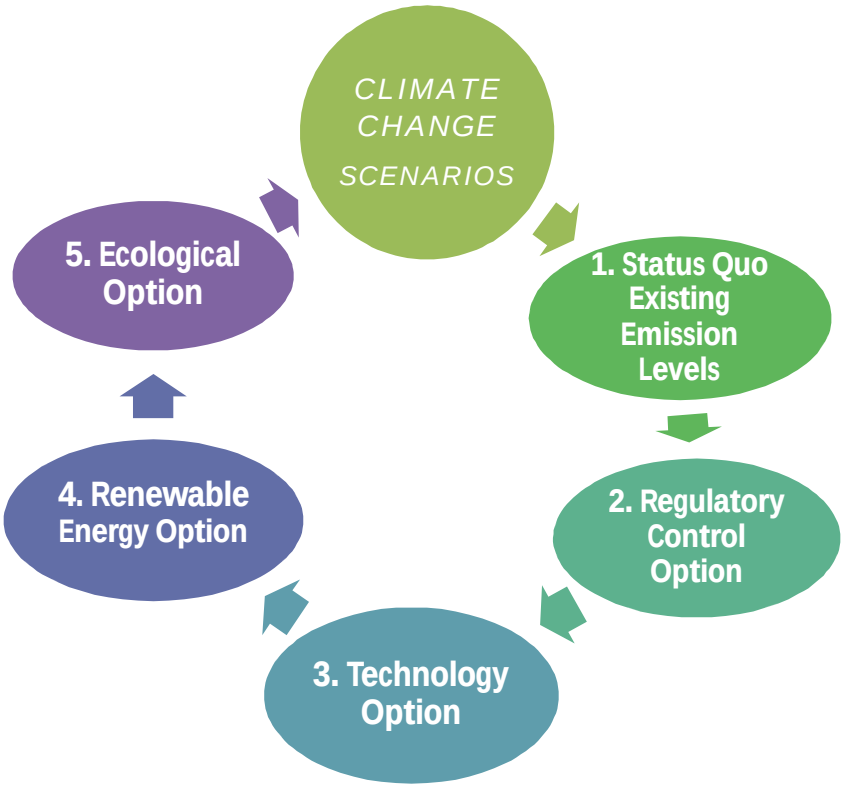


Figure 1. The Multi-objective process: Finding a sustainable solution for reducing atmospheric carbon dioxide emissions and climate change.

An Overview of the Multi-Objective Analysis Process

5.2 *The* objective of this process is to set a prescribed target to reduce atmospheric carbon dioxide emission by considering (i) *the* ***rate*** *e.g.* as some percentage reduction in the total carbon dioxide emissions for Australia, *and (ii) the* ***stage(s)*** *for the reductio*n to be achieved. There are two dimensions to address these issues: ***time*** and ***space***.

5.3 In terms of *time*, the issue is what should be the time-span for reduction? Should there be, for example, flexibility in the target for reduction by aiming for progressive reductions in emissions over defined periods of time?

5.4 Where there is scientific uncertainty in the effectiveness for a new technology to reduce carbon dioxide emissions, flexibility in the time for reaching a prescribed target is the appropriate path to take. A good example is the existing scientific uncertainty associated with "*Carbon Dioxide Capture and Permanent Geological Storage"* technology and the "*Bio-char*" technology.

5.5 *Spatial boundaries* are also problematic. Not all options for reducing CO_2 emissions have universal application throughout Australia as they may be site- or location-specific. There may be limits on the area of land involved e.g. renewable energy options and reafforestation. The regulatory control option, in contrast, has the potential to be applied universally throughout Australia, to all point sources of carbon dioxide emissions, as there is no spatial dimension.

The Multi-Objective Analysis Process - Stage 1: Evaluation of Options for Reducing Carbon Dioxide Emissions

5.6 By reviewing **all** relevant and reliable information based on **conflict management** concepts, the scope for the options of (i) regulatory controls (ii) technology (iii) renewables and (iv) ecological, to reduce atmospheric CO_2 emissions, relative to the "status quo option", can be evaluated. Defining any time or spatial limitations would be a relevant consideration as part of this evaluation.

The Multi-Objective Analysis Process - Stage 2: Reducing Carbon Dioxide Emissions/ Evaluating Climate Change Scenarios

5.7 The Multi-objective Analysis process is based on ***conflict resolution concepts****.* The process for finding a sustainable solution for climate change focusses on two of the key elements of ***Principled Negotiation*** *of Fisher and Ury: (i)* generating creative options for mutual gain and (ii) insisting that the agreed solution be based on objective criteria.

The Multi-Objective Analysis Process and Principled Negotiation: Generating Creative Options for Mutual Gain

5.8 This goal is achieved by constructing a number of scenarios along a continuum of sustainability. Climate change is seen as a land use problem. A scenario is a hypothetical construction of different land use options for reducing carbon dioxide emissions to combat climate change. Different weight is given to ecological, economic, social and cultural objectives in each scenario. Each scenario will result in a different percentage reduction in carbon dioxide emissions.

5.9 Although an innumerable number of scenarios could be constructed, the process requires a finite number of scenarios - but with one proviso: that all feasible options for reducing emissions are included in one scenario that is to be evaluated. The continuum of scenarios is not fixed but may change after evaluation commences e.g. by increasing the national standard for emissions.

5.10 Options where scientific uncertainty exists – CCS and bio-char technology – are not used in the scenarios at this stage. However, as the scientific knowledge base changes, they may be introduced at a later stage of the defined time period that scenarios are evaluated.

5.11 As a guide, some possible examples of scenarios to reduce carbon dioxide emissions that could be evaluated, **over a finite period of time viz. 2000-2020** are:

- *Scenario 1 "The rights of one option to prevail over all others": A multiple use scenario in which the regulatory control option of a national emission standard applying uniformly to all point sources of carbon dioxide emissions predominates. Limited use of the renewable energy and reafforestation options.*
- *Scenario 2 "Steady growth in the use of all options over time": A multiple use scenario in which the regulatory control option of a national emission standard applies uniformly to coal-fired power stations, high scale industrial emitters (e.g. iron or steel and cement production) and new motor vehicles, only. The reduction in the regulatory control option is balanced by greater use of the renewable energy and reafforestation options.*
- *Scenario 3 "Alternative options to fossil fuels for energy production to prevail". A multiple use scenario constructed around all locations of land - that are technically and commercially feasible - being used for large scale renewable energy generation, financial incentives for reafforestation programmes provided by Government to accommodate increased reafforestation and all new industrial/energy producing facilities to be LNG based. No controls imposed on any point sources of carbon dioxide emissions.*
- *Scenario 4 "The Federal's Governments planned Carbon Pollution Reduction Scheme". As proposed, an Emission Trading Scheme that would reduce greenhouse gas emissions by 5-15%, below 2000 levels, by the year 2020.*

The Multi-Objective Analysis Process and Principled Negotiation: The Agreed Solution to be based on Objective Criteria

5.12 Agreement on appropriate criteria to evaluate each of the multiple objectives is paramount. The **same criteria** are used to evaluate all scenarios. Some examples for possible objective criteria for use in the evaluation of scenarios follow:

- ***Ecological Objective (Resource Management****): Impacts on: biodiversity; ecologically critical habitat of threatened species*
- ***Ecological Objective (Heritage Preservation****): Protection and maintenance of World Heritage Listed Properties*
- ***Economic Objective (National and State):*** *Impacts on: gross domestic product; balance of payments of nation; employment/unemployment; mineral exports*
- ***Economic Objective (Regional):*** *Household income; employment /unemployment; range of employment options*
- ***Economic Objective (Fiscal Consequences):*** *Net fiscal consequences for Government and industry*
- ***Social Objective (National Security):*** *Probability of catastrophic bush fires; impacts on food security and primary production*
- ***Social Well-Being Objective****: Provision and costs of energy for the community*
- ***Indigenous Peoples Interests Objective****: Promotion of Indigenous traditional knowledge for biodiversity*

The Multi-Objective Analysis Process - Stage 3: The Preferred Scenario to Combat Climate Change

5.13 The preferred scenario is derived from a systematic and consistent procedure which evaluates different mixes of options for addressing climate change. Each scenario results in differences in the percentage reduction in total carbon dioxide emissions as well as differences in ecological, economic, social and cultural impacts. Scenarios, having very different outcomes, are evaluated with a common set of objective criteria, in order to identify the optimal balance for sustainability.

5.14 Decision-making untaken as part of the *Multi-Objective Analysis Process* is characterized by its flexibility. The preferred scenario may be one of the original set of scenarios evaluated. Alternatively, it could be a new scenario that is constructed based on the best features of all the scenarios evaluated. It will most likely comprise a mix of options that most effectively balances the multiple and conflicting objectives for sustainability and which secures as much available value as possible for Government, industry and the community.

END NOTES

(1) Based on the advantages for any nation in complying with multi-lateral international conventions as discussed in Ferrey, S *Environmental Law. Examples & Explanations (3rd Edition)*, Aspen Publishers, New York, USA.

(2) Environment Protection and Heritage Council and the Ministerial Council on Mineral and Petroleum Resources , 'Draft Paper on Environmental Guidelines for Carbon Dioxide Capture and Geological Storage – November 2008'.
http://www.nepc.gov.au/taxonomy/term/25 (accessed 6 February 2009).

(3) See columns of Dennis Atkins and Graham Readfern in the "*Brisbane Courier Mail*", February 21-22, 2007 at pages 50-1.

(4) Craig, R.K. *Environmental Law in Context: Cases and Materials,* Thomson West, St. Paul, Minnesota USA (2005).

(5) Halpern, S. 'UNCED: Process and Documentation, Academic Council for the UN System (1992).

(6) Pease, CM 'Will "peak coal" limit warming?' (2008) **25**[5] The Environmental Forum (*Journal of the United States Environmental Law Institute*) 18.

(7) Pease, CM 'How might we cool the earth?' (2009) **26[**2] The Environmental Forum (*Journal of the United States Environmental Law Institute*) 20
.
(8) See Sec. 1(e) ***Assembly Bill 1493 (signed into law in 2002)*****.** Commencing in 2009, the California Air Resources Board was required to adopt a regulation requiring carmakers to reduce global warming emissions from new passenger cars and light trucks.
http://www.newrules.org/environment/climateca.html/ (accessed 6 March 2009)

(9) Pellerin, C, 'International Forum Tackles CO_2 Emissions from Power Plants'.
http://usembassy-australia.state.gov/irc/us-oz/2004/12/15/wfl.html/ (accessed 6 March 2009).

(10) See Footnotes (2)(9).

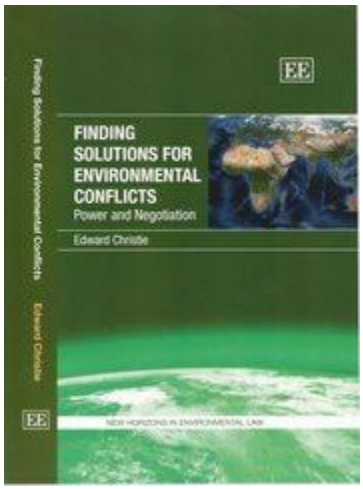
(11) See Dujack, SR 'Keeping carbon down on the farm' (2008) **25**[2] The Environmental Forum (*Journal of the United States Environmental Law Institute*) 22.

(12) See Christie, E. 'The greenhouse gases and environmental law' (1990) *Environmental and Planning Law Journal* **7**, 114-126.

(13) Interview of Malcolm Turnbull MP by Kerry O'Brien, "The 7.30 Report", 24 February 2009.
http://www.abc.net.au/7.30/content/2009/s2500334.html/ (accessed 25 February 2009)

(14) For a detailed description of the multi-objective analysis process and its application see '*Sustainability and the Environment'* Chapter 5, 105-32 and '*Managing and Resolving Environmental Conflicts by Negotiation*', Chapter 10, 263-94, in, Christie, Edward ***Finding Solutions for Environmental Conflicts: Power and Negotiation,*** Edward Elgar, Cheltenham, UK (2008).

About me, Dr Ted Christie …Science, law, ADR and the environment



I have a Bachelor's degree in agricultural science (*soil science major)* and a research Master's degree in agricultural science *(plant nutrition/plant physiology),* both awarded by the University of Queensland, and a research PhD (*physiological plant ecology)* from Macquarie University, Sydney. My formative professional years were spent in field research based at an ecological research centre in the semiarid pastoral zone of Queensland, Australia (in US terminology, "*rangelands*"). My special area of research focused on the "conservation" of natural ecosystems used for wool production and the mathematical modelling of ecosystem processes. Conservation research was directed at managing the human use of grazed natural ecosystems as renewable natural resources; conservation research into management extended to the enhancement of the existing land condition as well as the restoration of degraded ecosystems. My early professional activities also involved some extension work i.e. *rural sociology and the adoption of technological change,* with graziers.

In the 1980s, I was on the Faculty Staff of the School of Australian Environmental Studies (as it was then called), Griffith University at Nathan in Queensland. As an Associate Professor (*Applied Ecology*), I convened and taught inter-disciplinary courses on the management of natural and agricultural ecosystems as renewable natural resources.

Two events during my period in academe became the catalyst for me to become a student of law: planning and directing an International Training Course on the "*Desertification of Arid and Semiarid Natural Grazing Lands" (*attended by 24 participants from 12 developing countries) as part of the foreign aid program for the Australian Development Assistance Bureau. In addition, being an invited participant to an early UNEP Workshop convened by the late Swedish climatologist, Dr Bert Bolin. The UNEP Workshop was held at Stockholm and its focus was "*The Global Carbon Cycle*" and the environmental

impacts of the "Greenhouse Effect". The global dimensions of both these environmental problems demonstrated to me that the resolution of environmental disputes required a cross-disciplinary collaboration between law and science. I now saw, environmental dispute resolution, not as the sole province of science, or as the exclusive domain of law. Rather, that there needed to be a more effective integration between law and science to facilitate effective environmental decision-making.

Ultimately, I was admitted to professional legal practice. In the "early days" of alternative dispute resolution in Australia, in the 1990s, I completed the professional legal requirements to become an accredited mediator. In 1993, I introduced, in the School of Australian Environmental Studies at Griffith University, what may well have been one of the first undergraduate and post-graduate courses in *Alternative Dispute Resolution* offered by an Australian University, other than in a non-law Faculty,

Following admission to legal practice, I have had the unique experience of being involved in *very different and changing roles, over time, in* terms of influencing the outcome of a wide spectrum of public interest environmental conflicts. These roles have focussed on identifying, accessing, evaluating and understanding information central to the outcome of public interest environmental conflicts; some roles have extended to being the actual decision-maker. These roles have included:

- Commissions of Inquiry: as *Principal Adviser to* the Commission Chairperson Tony Fitzgerald QC in the *Fraser Island-Great Sandy Region* public inquiry - including the role as Chair of the *Independent Scientific Expert Advisory Group;* and as a Commissioner in the *Shoalwater Bay-Capricornia Coast* public inquiry;
- A past, long-standing, part-time appointment, as the environmental member - and a presiding member, of the Commonwealth of Australia's Administrative Appeals Tribunal (*a merits review Tribunal of administrative and Ministerial decisions made by Government*);
- Chair of a Ministerial Advisory Committee into tree clearing on public and private lands in relation to nature conservation value /biodiversity /land degradation /ecologically sustainable land use: Queensland Department of Natural Resource Management's *Ministerial Advisory Committee on Vegetation Management*;
- Chair of the CSIRO *Meat Dairy and Aquaculture Scientific Advisory Committee*. CSIRO is Australia's premier research organization;
- The grant of a Fulbright Professional Award (*an Award made to practising lawyers)* by the United States Government. Research Area: *"Environmental Risk Assessment, the Precautionary Principle and Legal Decision-Making";*

- The author of part of a chapter on 'Environmental Law' in the encyclopaedic series, *Halsbury's Laws of Australia;*
- Private legal practice as a barrister specializing in environmental law and as a mediator; and finally
- Through convening and teaching cross-disciplinary courses at Griffith University, Nathan, Queensland, Australia, on a part-time basis, to a generation of students who were both committed and stimulating to teach: *Environmental Law* to Faculty of Law undergraduates and *Alternative Dispute Resolution and Environment Conflicts* to Master of Environmental Management post-graduates.

My involvement in these diverse roles enabled me to crystallize the knowledge so acquired and to publish a book in 2008, titled *Finding Solutions for Environmental Conflicts: Power and Negotiation*, Edward Elgar (New Horizons in Environmental Law), Cheltenham**,** UK. Key unifying principles in administrative and environmental law from Australia, the UK-EU and USA are linked to accepted scientific concepts for environmental management and protection to provide a cross-disciplinary approach to collaborative problem-solving using ADR processes to resolve environmental conflicts.

I was privileged to be awarded a *Centenary Medal* for services related to education and the law. The *Centenary Medal* was established by the Australian Government in 2001 to commemorate the centenary of Australia's federation in 2001 and to honour the contribution made to Australian society and government by its citizens and other persons.