STATE BASED CARBON EMISSIONS TRADING MECHANISM ISSUES AND RECOMMENDATIONS

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SUMMARY

Increases in atmospheric concentrations of carbon dioxide and other greenhouse gases as a result of certain human activities (for example burning fossil fuels) means more heat may be trapped, causing the earth to become warmer. This 'enhanced greenhouse effect[1]' may cause changes to Earth's climate and physical environment such as rising temperatures, changing rainfall patterns and sea levels. Climate changes caused by the enhanced greenhouse effect represents a market failure on a global scale to adequately price the pollution caused by human activities.

The adoption of the Kyoto Protocol in December 1997 by the parties to the United Nations Framework Convention on Climate Change demonstrated the extent of international concern about global climate change. The Kyoto Protocol and subsequent Conferences of the Parties to the Kyoto Protocol have aimed at developing an international framework for nations to reduce greenhouse emissions in a way that causes minimal disruption to the economy and provides a number of low cost abatement strategies. Australia remains ambivalent about whether it will ratify the Kyoto Protocol, but remains committed to achieve the of limiting greenhouse levels to 108% of 1990 levels set by the Kyoto Protocol.

Despite the Federal and international uncertainty regarding the rules, mechanisms and institutions necessary to reduce national and global greenhouse gas emissions, some state governments and some Australian

[1] Greenhouse effect is a process where gases in the atmosphere reduce the amount of heat escaping from the earth into space. It is a natural process that keeps the earth's temperature at levels that can sustain life (about 33°C warmer than it would otherwise be). www.science.org.au/nova/054/054key.htm

companies are developing their own policies, legislation and means of reducing greenhouse gas emissions. Development of emissions trading systems in advance of concrete national and international guidelines has been characterised by a loosely constructed voluntary *ad hoc* framework where a range of mainly project based emissions trading programs have evolved and serve collectively as precursors to formal Greenhouse gas regulation[2].

This paper discusses the issues; the imperative for developing a state based emissions trading mechanism; and provides one recommendation for developing a state based mechanism in advance of formal national greenhouse emissions regulation. The impetus to develop a state based trading system in advance of a national system is two fold. Currently in Western Australia there are several major gas extraction and processing developments proposed on the Burrup Peninsula. These developments have significant economic benefits for Western Australia and Australia as a whole if they proceed. However, there are important environmental impacts that must be addressed. It is estimated that carbon dioxide emissions for Western Australia will increase in the order of 30% as a result of developing these projects. Such increases will pose a significant cost to the Western Australian economy if the emissions are not managed at the outset and if a national model for emissions reduction is implemented at a later date.

The second reason for developing a state based emissions trading mechanism in advance of formal national regulation is the planting of perennial vegetation to sequester carbon dioxide has multiple benefits for Western Australia. Sequestration activities provide a market based and economically viable means of assisting landowners biodiversity management and salinity management efforts. Private funding for sequestration schemes would supplement government funding for land rehabilitation projects to be focussed into areas of public significance. The potential for carbon sequestration activities to be implemented through a state based trading

[2] http://www.pewclimate.org/projects/trading_execsumm.cfm

mechanism in Western Australia is large and attractive for both net emissions reduction opportunities and land rehabilitation and management benefits.

A recommendation for a state based mechanism is provided after a discussion of the major issues involved in developing a state based emissions trading mechanism. The recommendation for a state based mechanism aims to achieve a high level of net emissions reductions through providing low cost abatement opportunities and minimising disruption to the state economy, which are the two most significant issues of developing a state based emissions trading mechanism. However, there are many different mechanisms for emissions trading and these options require examination in advance of any state based trading mechanism being developed. The scope of this paper is limited to one recommendation due to the severe time constraints on this project.

BACKGROUND

Kyoto Protocol

The extent of international concern about global climate change was demonstrated by the adoption of the Kyoto Protocol in December 1997 by the parties to the United Nations Framework Convention on Climate Change. The Kyoto Protocol provides a framework for nations to reduce the amount of greenhouse gases being released into the earth's atmosphere to reduce the impacts of the enhanced greenhouse effect. To achieve an international reduction of greenhouse gases of 5.2% below 1990 levels by the first commitment period (2008-2012), each developed nation set a specific target that reflects their own national situation.

Australia's target to limit greenhouse gas emissions agreed to under the Kyoto Protocol is 108% of 1990 levels. This reduction in greenhouse gas emissions for Australia must be achieved by the first commitment period, 2008-2012. This target recognises the energy intensive nature of Australia's exports, the increasing population, the wide separation of its cities and the significant changes to land use patterns that are still occurring.

In addition to reducing their own emissions, the Kyoto Protocol also commits developed nations to assist developing nations in limiting their net emissions. The Protocol recognises that developed nations emit the majority of Greenhouse gases, both in total and on a per capita basis and historically have contributed the vast majority of greenhouse gas emissions into the atmosphere. To be implemented and legally enforceable, 55 countries that account for at least 55% of the Annex 1 emissions of carbon dioxide in 1990 emissions must sign and individually ratify the Protocol.

The national limits to aggregate greenhouse gas emissions specified in the Kyoto Protocol recognises the significant economic costs that reducing the gross greenhouse gas emissions to the same target level would impose on both developed and developing nations. Under the Kyoto Protocol, developed countries like Australia are required to limit their aggregate greenhouse gas emissions. This means that Australia can emit more than its assigned amount (1990 + 8%) if it can simultaneously sequester an equal amount of carbon in sinks. Articles 3.3 and 3.4 of the Kyoto Protocol outline the carbon sequestration activities a nation can undertake to meet their commitments.

- Article 3.3 provides that carbon sequestered from '…direct human-induced land-use change and forestry activities, limited to afforestation and reforestation since 1990' can be credited against a nation's Greenhouse gas emissions.
- Article 3.4 provides those additional human-induced changes to the carbon sink capacity of agricultural soils and other land use changes may also be included when they are agreed to.

Bonn Agreement

Clarification of key issues relating to the implementation of the Kyoto Protocol and in particular Articles 3.3 and 3.4 has been reached recently through the Bonn Agreement and the Marrakech Accords. The Agreement reached at the resumed sixth session of the Conference of the Parties at Bonn set out rules for governments to cooperate on making the Kyoto Protocol's institutions and procedures a reality. The Bonn Agreement also increased the flow of financial and technical support to developing countries. Significant outcomes of the

Bonn Agreement were clarification on the use of Kyoto Mechanisms[3] (Clean Development Mechanism[4], Joint Implementation[5] and international emissions trading) and land use and forestry sinks to achieve national abatement targets.

In regards to offsetting greenhouse emissions through carbon sink activities the Bonn Agreement set the framework for the inclusion of various carbon sequestration activities for developed countries to assist in reaching their Kyoto targets. The Bonn Agreement provided further clarification of Articles 3.3 and 3.4. It was decided that for Article 3.3 activities, the debits used in the first commitment period from harvesting following afforestation and reforestation since 1990 cannot be greater than the credits on the same land. The Bonn Agreement determined that relevant sink activities under Article 3.4 for the first commitment period were forest management, cropland management, grazing land management and revegetation. To achieve national targets, nations could choose to apply all or a selection of the sink activities defined by Article 3.4. Activities covered by Article 3.4 are not bound by any caps. For both Articles 3.3 and 3.4, the sink activities must be proven to be human-induced and to have occurred since 1990[6].

The Bonn Agreement determined that domestic action should constitute a significant element of the effort made by every Annex 1 party to fulfil its commitment. The use of the three Kyoto mechanisms can only be used to supplement domestic action. The issue of supplementarity was dealt with qualitatively rather than quantitatively.

Marrakech Accords

The Marrakech Accords provide most of the legal framework for the rules and structures that will govern the international emissions market under the Kyoto Protocol. The framework provided by the Marrakech Accords should allow

[3] **Kyoto Mechanisms** allows for international trading abatement initiatives where the marginal cost of emission reduction is low (Heyhoe, E., Anderson, M., Jakeman, G., Brown, S., and Beil, S., 1998. *Emissions Trading and the KyotoProtocol* ABARE Confgerence Paper 98.29, Canberra)

[4] **Clean Development Mechanism** is a mechanism where an Annex 1 country invests in emission reduction projects in developing countries and receives a share of the resulting credits (Certified Emission Reduction unit). (Ibid, 1998)

[5] **Joint Implementation** allows emissions reduction projects to be conducted by Annex 1countries with other Annex 1 countries on a project by project basis (Ibid, 1998).

[6] To prove that the sink activity has occurred since 1990, good satellite photography records are essential, which Australia has.

ratification by the EU, Russia, Japan and developing countries, possibly before the World Summit on Sustainable Development (Rio + 10) in September 2002, allowing the Kyoto Protocol to enter into force.

The Accords are reasonably market and sink friendly through a key provision that the four emission units generated under the Kyoto Protocol framework should be fungible (i.e. equivalent and interchangeable), which allows them to be traded in the one market. This provision should result in a more liquid market and lower transaction costs. The four units are:

Assigned Amount Units (AAUs) - allocated on the basis of national targets under the Protocol.

Certified Emission Reduction Units (CERs) - these are generated by CDM projects.

Emission Reduction Units (ERUs) - generated by JI projects.

Removal Units (RMUs) - generated by sink projects[7].

Parties compliant to the Protocol provisions can trade these units between Parties.

Compliance to effective maintenance and reporting of the national emissions inventory is required, as is the establishment of a national registry to record transfers and acquisition of emissions units. To prevent overselling, nations must maintain in its registry a 'commitment period reserve'[8]. Nations that have fulfilled the eligibility requirements can authorise legal entities, such as companies, to trade but the nation is responsible for meeting its Kyoto commitments.

The Marrakech Accords guidelines for the use of provisions from Article 3.3 and 3.4 of the Protocol were in line with the Bonn Agreement outcomes, allowing a range of carbon sequestration activities to be available to generate

[7] RMUs are comparable to the other units, however, they will not be bankable for the second commitment period. This restriction on banking RMUs for the second commitment period and the setting of individual country quotas ensures that sinks only account for a fraction of the emissions reductions that can be counted towards the Kyoto targets. . This was a major issue at Marrakech as it was perceived that carbon sink activities could be overused/ abused in nations attempting to attain their net emissions quotas. Sink accounting rules in the Accords included negotiated Party caps on credits from forest management and JI sink projects (Beck, T., 2001. 'The Marrakech Accords and the Kyoto Mechanisms: Framework for a Market', *in AETF review December/January 2001/2*, pp. 3-5 www.aetf.net.au

[8] The 'commitment reserve period' is defined in the Bonn Agreements as being 90% of the nation's assigned amount or 100% of five times its most recently reviewed inventory whichever is lowest.

carbon credits to be used to meet commitments. Under Article 3.3 of the Protocol 'afforestation', 'reforestation' and 'deforestation' activities are accounted for in the Marrakech Accords (Beck, 2001). Under Article 3.4 (additional sink activities), nations can choose to use all or a selection of additional activities (forest management, cropland management, grazing land management and revegetation) during the first commitment period (Ibid). Any emissions reduction claims must be proven to have occurred since 1990 and to be human-induced.

> 'It is likely most national targets for the first commitment period will be achieved by actions not primarily aimed at reducing our dependence on fossil fuels. However, compliance by the developed countries in the first commitment period will not only confirm their international agreement to take action against ever-increasing greenhouse gas emissions but also will turn around emission trends in a major bloc of Parties. The world needs to look forward to the second commitment period where the challenges will rest firmly with the fossil fuel users' (Noble, 2001:7[9]).

The reduction in global greenhouse gas emissions of 5.2% aimed at for the first commitment period of the Kyoto Protocol is only a small step towards the greenhouse gas reductions required to stabilise atmospheric greenhouse gas concentrations that would prevent dangerous anthropogenic interference with the climate system[10]. The IPCC scientists agree that to stabilise the global climate, carbon dioxide emissions would have to be reduced by 60-80% (Ayres, 2001[11])

The role of uncertainty in developing a state-based emissions trading scheme

It is currently unclear if Australia will ratify the Kyoto Protocol or whether it will enter into an alternative arrangement with the US and other non-signatories to the Kyoto Protocol. The current policy position of the Federal Government is that there are two substantial flaws in the Kyoto Protocol: firstly, it does not

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[9] Noble, I, 2001. 'The Kyoto Protocol after Bonn' in *AETF review Aug/Sep 2001*, pp6-7 www.aetf.net.au

[10] United Nations Framework Convention on Climate Change, '*Full Text of the Convention'* http://unfccc.int/resource/conv/conv_004.html

[11] Ayres, R., 2001. *'How Economists have Misjudged Global Warming*' excerpted from September/October 2001 World Watch. www.worldwatch.org

apply to developing countries, and; secondly, it is not going to involve the United States (which is responsible for 35% of global emissions)[12]. By the United States and developing countries not adhering to emissions reduction targets they are in a position of increased export competitiveness in producing emissions intensive commodities relative Annex 1 countries complying with emissions abatement targets[13].

However, failure to ratify the Kyoto Protocol will exclude Australia from any of the economic advantages Kyoto compliant countries will enjoy[14]. Economic advantages of ratification for Australia include emissions trading opportunities provided through the Kyoto Mechanisms and the rehabilitation and biodiversity benefits of establishing carbon sink projects in Australia for other Kyoto compliant countries. Despite the uncertainty surrounding Australia's position on ratifying the Kyoto Protocol, Australia is still committed to its assigned amount target of 108% of 1990 levels.

In spite of the Federal and international uncertainty regarding the rules, mechanisms and institutions necessary to reduce national and global greenhouse gas emissions, some state governments and some Australian companies are developing their own policies, legislation and means of reducing greenhouse gas emissions. To date, the development of emissions trading systems in advance of concrete national and international guidelines has been characterised by a loosely constructed voluntary ad hoc framework, where a variety of primarily project based emissions trading programs have evolved and which serve collectively as precursors to formal Greenhouse gas regulation[15]. These emissions trading systems cover different greenhouse gas sources and different greenhouse gases.

The adoption of Greenhouse trading schemes in the absence of set international and national guidelines has been due to corporate and state governments risk management strategies. Failure to take action now could

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[12] Koutsoukis, Jason, 2002 'Kyoto not completely written off' in *Australian Financial Review* , 14 March, 2002, p.3.
[13] Jakeman, G., Hester, S., Woffenden, K. and Fisher, B., 2002, 'Kyoto Protocol: The first commitment period and beyond' in *Australian Commodities*, v. 9 no. 1, March quarter 2002, pp.176-197
[14] Macken, Julie, 2002. 'Risky Business', in *Australian Financial Review*, 13 March 2002, p. 52.
[15] http://www.pewclimate.org/projects/trading_execsumm.cfm

result in greater costs of mitigating greenhouse risks in the future when international and national regulations are determined.

For Western Australia, a number of issues are forcing the need for a state based emissions trading scheme. Firstly, there is increasing political pressure for State governments to take action in spite of the Federal Government's lack of action. Secondly, there is a high level of awareness that the state may miss out on state, national and international capital investment into carbon sequestration projects if there is no emissions abatement mechanism in place. This issue is emphasised by the range of proposed major gas development projects on the Burrup Peninsula that will increase Western Australia's greenhouse emissions considerably if the developments proceed. These issues are critical and require thoughtful consideration in the creation and development of a carbon emissions trading mechanism in Western Australia. Therefore many options for an emissions trading mechanism must be discussed to determine what is the most appropriate mechanism for a state based scheme.

Major Gas Resource Developments in Western Australia

Several major resource developments currently being proposed for development on the Burrup Peninsula are centered on gas extraction and gas to liquids (GTL) processing. It is estimated that the six gas processing plants for which land has been allocated are alone worth a total of $6.1 billion[16]. In addition to these GTL projects, Sasol-Chevron plans to develop a GTL project worth $8-10 billion over the nine-year development period on the Burrup Peninsula. Projects of such magnitude have significant economic benefits for Western Australia and Australia as a whole. However, such significant gas and petrochemical production projects will also have a major impact on Western Australia's total carbon dioxide emissions. It has been estimated that Western Australia's carbon dioxide emissions will increase by approximately 30%.

[16] Anonymous, 2002. 'Gas-to-liquids: A new era', in *Prospect*, March-May 2002, p5-7

The use of Kyoto Mechanisms to annul emissions from major gas projects in Western Australia

In a global context, if Australia ratifies the Kyoto Protocol, these proposed major gas development projects might result in a reduction of carbon dioxide emissions if the products are used to reduce the use of more carbon intensive fossil fuels such as coal. Kyoto mechanisms could be used to abate the increase in emissions predicted as a result of developing these major gas projects. Two examples are provided to demonstrate how Kyoto mechanisms could be used to cancel out the emissions from developing the gas projects.

The carbon dioxide emissions generated from developing these gas resources could be partially acquitted through joint implementation or clean development mechanisms. Australia could enter a joint implementation program with a developed nation to replace diesel fuels, synthesised from more carbon intensive fuel sources than GTL diesel, with GTL produced diesel. Through agreeing to supply 'cleaner' GTL diesel to the developed nation, Australia could use some of the resulting emissions reductions towards the national abatement target.

Australia could use the Clean Development Mechanism in a similar manner to achieve the national emissions abatement target. Through CDM partnership projects with developing nations Australia could provide GTL products to substitute more carbon intensive fuel sources. Australia could use the resulting reduction in carbon emissions from such a project towards the national emissions abatement target in return for providing the developing country with a 'cleaner' fuel source.

By not ratifying the Kyoto Protocol, Australia could face significant impediments to trading gas products from these proposed developments internationally. Emissions abatement mechanisms provided through the Kyoto Protocol would not be available for either Australia or the country importing the GTL products from Australia. Kyoto compliant countries would be more hesitant to import GTL products that cannot be used towards their national emissions abatement targets.

Carbon Sequestration Benefits and Opportunities in Western Australia

The planting of perennial vegetation to sequester carbon dioxide has multiple benefits for Western Australia. Carbon sequestration activities provide a market based and economically viable means to assist in land rehabilitation for biodiversity management and salinity management. A major economic benefit of carbon sequestration activities is that the funding for these schemes is from private companies, which alleviates pressure on government funding for land rehabilitation projects to be focussed into areas of public significance. Carbon sequestration activities provide a means of offsetting the costs of private land rehabilitation, and in most cases landowners should profit financially from such schemes. The development of an effective emissions trading mechanism will ensure that investment in carbon sequestration activities will encourage the magnitude of perennial plantings required for some degree of land rehabilitation and perhaps even foster the development of new agricultural practices that have a large sink component.

Currently there are a number of opportunities for carbon sequestration activities to develop in Western Australia, as shown in Table 1. If Australia ratifies the Kyoto Protocol, Japan views Australia as an ideal place to invest in carbon sequestration activities to off-set their emissions through international emissions trading mechanisms due to the stable political climate, cheap land prices and large land mass that was cleared prior to 1990[17]. In the event Australia ratifies the Kyoto Protocol, international interest in Australian carbon sequestration activities could intensify.

In Australia, States are beginning to make arrangements for state based trading schemes. In New South Wales, the proposed changes to the New South Wales Electricity Supply Act aim to provide fairer and more cost effective abatement rules for electricity retailers. One proposed change to the New South Wales Electricity Supply Act is allowing electricity retailers to purchase carbon sequestration credits from interstate sources. This proposed change to the NSW Electricity Supply Act could provide Western Australia

[17] Wilder, M. and Guli, M., 2002. 'Australia – lost in the haze?', in *Ecofutures* February-April, pp.32-33.

with significant carbon sequestration opportunities that could be assisted by the drafting of Carbon Rights Bill 2002.

Perennial Plant Species	Rainfall Zone suited to plantings (mm/year)	Current Plantings (Hectares)	Targeted Plantings (Hectares)	Carbon Capture (tonnes per hectare)	Number of Years between rotations/ harvesting	Yield (cubic metres/hectare/year)
Oil Mallee	<500	7500	2 million	3 to 20[I]	2 to 4	10 to 20 green tonnes/ha/yr
Maritime Pine (*Pinus Pinaster*)	400-600	14,984[II]	No Specific target set	318[III] to 363[IV]	30 (approximately)	12 – merchantable timber (average)
Saltbush/ Saltland pastures	Mainly 300-500	No Data Available	1 million	10[V]	N/A	No data available
BioEnergy	800+	300	3000[VI]	119	15	32
Bluegums (*Eucalyptus globulus)*	>600	100,000[VII]	No specific target set	[VIII]	10	10-40

Table 1: Carbon sequestration potential of economically viable perennial plant species.

[I]Carbon capture will occur in two forms:

1. Harvested stands: For harvested stands there will be two forms of carbon benefit:
   a) Carbon emissions avoided by using mallee biomass as a fuel. If used for electricity generation the fuel should qualify for renewable energy credits (RECs) under the Renewable Energy Act.
   b) Mallee biomass sequestered in the above and below ground parts of the crop. The above ground biomass varies across the harvest cycle averaging about half the harvested quantity of biomass. The below-ground parts of the crop ('lignotuber' and roots) will continue to grow and increase in mass even under a harvest regime (or at least the harvest regime will need to take account of the imperative to keep the below ground part of the crop vigorous and productive). For harvested stands the above ground average across the cycle should average around 20 tonnes CO_2. Below ground will accumulate at 3 to 4 tonnes CO_2/ha/year for some decades.
2. Unharvested stands: There will only be whole plant sequestration of carbon in unharvested stands. If we can't get commercial harvest operations up and running then this will be a potential alternative income. Indeed we are negotiating with several parties who are interested in mallee carbon sequestration. Although the per hectare rate of sequestration in mallee is not as large as forestry crops, the area over which it may be planted is very large and it presents a very large carbon sink option. Long-term growth data not presently available. For unharvested stands we have growth data up to age 7 or 8 but only for 3 of the species we use and only for several sites. Indications are that the total biomass will plateau (30 years or so) at comparable levels to forestry species in the 500 to 600 mm rainfall zone at some 400 tonnes CO_2/ha. With some 25% of that being below ground.

[II]Figures include FPC plantations in addition to 1,228 ha established for BP refinery. This figure is effectively all plantations. There may be a few privately owned areas not included, however, in terms of area they would be insignificant.

[III]Figure indicates tonnes CO2 per hectare averaged over one rotation

[IV] Figure indicates tonnes CO2 per hectare averaged over three rotations.

[V]Based on an estimation of a stand of Atriplex spp north of Kellerberrin. This figure would vary depending on the species of salt tolerant plants used, the severity of the salinity and the number of sheep grazing on salt tolerant pasture species.

[VI] Target set for 2004

[VII]1998 figure. http://www.fpc.wa.gov.au/plantations_tree_crops2.html

[VIII] Carbon capture of bluegum plantations is dependent on growth rates (which vary according to climate, soil type etc) and conversion factors (eg. wood volume to CO2-e in whole plant + roots).

Carbon Rights Bill 2002

The introduction of *Carbon Rights Bill 2002* in Western Australia is setting the framework where carbon rights can be created for a specified area of land. Carbon covenants can be entered into in relation to a carbon right between the owner of the land and a party interested in sequestering a certain amount of carbon on that area of land. This simple Bill basically provides the framework for carbon rights agreements. The Bill is not bound by the conditions of the Kyoto Protocol. The terms of the Kyoto Protocol have not formed the framework of the Bill due to the current uncertainty of the final framework of the Kyoto Protocol and whether Australia will ratify the Kyoto Protocol. Therefore, amendments can be made to the Bill in the future when concrete international agreements are enforced.

The *Carbon Rights Bill 2002* leaves the means by which the carbon is sequestered entirely up to the parties entering the agreement. Not adopting the terms of the Kyoto Protocol or any other international or national guidelines in a covenant created under this legislation is a risk that the parties to the covenant take. The carbon credits accrued by the sequestration activities under a covenant that does not adhere to the international or national guidelines cannot be used to meet the emissions levels for the party, neither can they be traded internationally.

The robust nature of the *Carbon Rights Bill 2002* framework enables interstate and overseas companies to enter covenants that are defined by the terms of the legislation in that state/territory or nation. This provides greater opportunities for carbon sequestration activities to occur in Western Australia than would be achieved if only Western Australian based companies enter carbon covenants.

ISSUES TO CONSIDER WHEN DEVELOPING A STATE BASED EMISSIONS TRADING SCHEME

Cost and economic disruption

When considering the options for a state based carbon emissions trading scheme, a number of issues must be considered. It can be argued that the most important issue is how a market mechanism can be introduced in a low cost and minimally disruptive manner to adequately price the environmental impacts of carbon emissions (pollution) into the atmosphere[18]. This is considered to be especially important in the Western Australian economy due to the vulnerability of an energy intensive economy to adverse macroeconomic effects from carbon constraints. Therefore the introduction of any carbon emissions trading mechanism into the state economy must consider the best way to implement the mechanism to minimise costs and disruption to the economy.

However, while the cost issue is important, it is often presented in isolation due to the hypothetical and difficult nature of quantifying spin off benefits from introducing an emissions reduction mechanism (Ayres, 2001[19]). Ayres (2001) argues that the immediate environmental benefits and later cost savings (as economies of scale are developed) may compensate for the short-term increases in costs as a result of pricing the environmental impacts of carbon emissions. Other factors that may compensate for short term increases in costs include long term benefits from new products, services, jobs and profits resulting from the introduction of new non fossil fuel based technologies and new applications of these technologies. These benefits of early introduction of carbon emissions trading mechanisms must be considered when weighing up the costs of introducing a carbon emissions-trading market mechanism.

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[18] It will be unavoidable to have some level of disruption on market equity and economic efficiency as a cost that was previously non-existent in industrial production must now be met (reducing the profit margin). Carbon constraints will impact on every sector of the economy and different greenhouse gas abatement cost curves across sectors mean differentiated impacts (Watkins, C., 2002 *Carbon Constraints, Emissions Trading and the Macroeconomy* Seminar Presentation Notes)

[19] Ayres, R., 2001. *'How Economists have Misjudged Global Warming*' excerpted from September/October 2001 World Watch. www.worldwatch.org

Emissions and industry sectors covered by the trading scheme

To minimise the costs to a company for reducing aggregate carbon emissions, the creation of a market with a large number of participants and highly diverse emissions sources and a diverse range of emissions control costs is essential. To achieve this in a state based system, upstream carbon dioxide emitters such as major gas development projects, electricity and gas utilities, major power users and greenhouse gas emitters must be included in the emissions trading scheme. By ensuring that all major emitters of carbon dioxide are included in an emissions-trading scheme, the issue of equitable distribution of costs of abatement in the state economy is addressed.

Developing an economy of scale that delivers low cost abatement measures and achieves a high level of aggregate carbon emissions reduction at a state level is difficult due to the limited number of participants in the state economy[20]. However, by incorporating a number of emissions sources increases the opportunities for state based companies to trade within the state and with other companies that are covered by other emissions trading mechanisms both interstate and internationally. The scope for linking up with other emissions trading schemes will provide more liquid and efficient markets (Haites and Mullins, 2002[21]). Including all major sources of all carbon dioxide emissions in a state based trading system could minimise the impact of a state based trading scheme in the evolving and fragmented national and international markets[22].

Introduction of an emissions trading scheme to minimise costs and disruption

One major problem with creating a state-based carbon emissions trading scheme that includes all major emitters of greenhouse gases for Western Australia, is the high cost and major disruption that implementing such a scheme could cause the state economy. Minimisation of the costs to emitting industries and the disruption to the whole economy could be achieved through

[20] This is compared to a national or international based carbon emissions trading system.
[21] Haites, E. and Mullins, F., 2002. 'Linking Emissions Trading Systems' in *AETF review February/March 2002*, pp6-7 www.aetf.net.au
[22] http://www.pewclimate.org/projects/trading_execsumm.cfm

the phased introduction of emission caps throughout emitting sectors of the economy.

Due to the significant increases to carbon dioxide emissions that the proposed major gas development projects threaten, implementing an emissions cap on this sector would be an appropriate sector to begin a phased introduction of emissions caps to all sectors of the Western Australian economy. As major gas development projects must adhere to Environmental Protection Authority guidelines, an emissions cap as a guideline to the development of these projects could be implemented through the revision of EPA assessment guidelines. This could ensure the aggregate emissions from such major developments adhered to a specified emissions cap. The issue of co-ordinating how the emissions cap for major gas developments could be consistent with emissions caps from other emitting sectors of the economy requires serious consideration.

The phased introduction of emissions caps on other carbon dioxide emitting industries could be prioritised according to the intensity of carbon dioxide emissions from industry sectors. Depending on the success of phased emissions caps on carbon dioxide emitting sectors, this phased programme of emissions reductions could be extended to other greenhouse gases. Introduction of voluntary emissions caps for each sector for a period of two years prior to legislated mandatory emissions caps would enable industry sectors to gradually reduce their aggregate emissions over a two-year period. Early compliance in the voluntary stage of emissions reductions would put compliant companies at a competitive advantage when mandatory emissions reduction targets are implemented. This competitive advantage would be secured due to costs of emissions reduction at the mandatory stage being significantly lower for companies that have taken steps to reduce their emissions in the voluntary phase of compliance.

Once mandatory compliance is phased in, if an emitter is in excess of the annual emissions allowances, a penalty should be imposed per metric ton of excess. The setting of a relatively low financial penalty (though higher than the

cost of abatement measures) will reduce the competitive disadvantage that Western Australian industries would experience compared to national and international industries that do not face similar requirements. As with the Danish carbon dioxide emissions trading scheme, the penalty for non-compliance could be increased if other Australian state and nations develop similar programs[23]. The revenue from non-compliance penalties could be re-directed back into energy-saving or carbon sequestration projects[24].

Emissions scheme framework

Due to the lack of international and national certainty regarding the rules mechanisms and institutions necessary to reduce greenhouse gas emissions, creating a state based trading scheme has many difficulties. To maximise the benefits of a state based scheme developed in the absence of a set of international and national guidelines, the framework of a state based carbon emissions trading scheme must be based on educated risk management strategies.

Despite the uncertainty surrounding Australia's position on ratifying the Kyoto Protocol, the mechanisms and framework provided by the Kyoto Protocol (as discussed earlier in this paper) for emissions reductions are still the most clear set of guidelines on which to base an emissions trading scheme. If Australia chooses not to ratify the Kyoto Protocol, the emissions reductions achieved in a state based emissions reduction scheme may be (partially) transferable to a new emissions reduction scheme. However, if Australia chooses to ratify the Kyoto Protocol at some time in the future, Western Australia will be at a competitive advantage to the other states. This will be as a result of Western Australia taking steps towards early abatement that is based around the terms of the Kyoto Protocol in an emissions-trading program. The Western Australian model for emissions trading and abatement could also serve as a foundation to formal national greenhouse gas regulation.

[23] Ibid.
[24] Ibid.

The 108% of 1990 greenhouse gas emissions levels target is in line with Federal policy and the Kyoto Protocol. This would be a sound target for an emissions trading scheme in Western Australia.

RECOMMENDATIONS FOR A STATE BASED EMISSIONS TRADING MECHANISM

As discussed in the previous section a state based emissions trading scheme has several major issues and a number of benefits that need to be addressed in the design of a trading mechanism. The emissions trading scheme recommendation put forward in this paper includes elements of trading schemes from the United Kingdom, Denmark and European Union that are either currently in use or proposed to come into effect before the first commitment period. By developing a trading scheme that uses elements of these trading schemes, the state based trading mechanism has more scope for linking up with other emissions trading schemes to develop more liquid and efficient markets. The recommended emissions mechanism is presented in point form as the justification has been provided in the discussion of issues in developing a state based emissions trading scheme. It is essential to note however, that a full analysis of all emissions trading options was not possible in this paper and prior to developing any state based system all options must be considered.

- The agreed greenhouse emissions target of 108% of 1990 levels is adopted.
- There is a phased introduction of emissions caps into carbon dioxide emitting sectors to minimise disruption to the economy and the cost of implementation.
- The phased introduction of emissions caps into different emitting sectors should be based on the emissions intensity of that sector.
- Major gas project developments are prioritised for emissions capping due to the significant increases to Western Australian carbon dioxide emissions as a result of these developments.

- Introduction of an emissions cap into the major gas development projects could be made through the EPA approval guidelines to ensure a fast and effective means of limiting emissions from this sector.
- Introduction emissions caps on all emitting sectors to form a common framework for emissions reductions across all sectors of the state economy.
- To minimise the costs of introducing emissions caps to various sectors of the economy, there is a two-year voluntary compliance period prior to mandatory and legislated compliance.
- In the mandatory compliance phase, emissions in excess of annual emissions allowance will be penalised per metric ton of excess. The penalty should be set at a relatively low cost (though higher than the cost of abatement measures) to reduce the competitive disadvantage that Western Australian industries would experience compared to national and international industries that do not face similar requirements. The penalty for non-compliance could be increased if other Australian state and nations develop similar programs.
- Revenue from non-compliance penalties could be re-directed back into energy-saving projects.
- Companies are responsible for the cost and organisation of external auditing and verification of emissions reductions achieved internally. Failure to provide accurate information to the government will result in more serious penalties than the emissions in excess penalties to provide a strong disincentive against such actions.
- Emissions permits are allocated to emitting sources based on historical emissions (i.e. grandfathered). The point of time chosen as the basis of permit allocation must be determined after significant cost benefit analysis of the impacts of such a system on the Western Australian economy.
- Review of the allocation method after two years of mandatory compliance will determine if this is the most effective means of allocating permits.
- Banking of permits needs to be further investigated to determine if companies banking permits would be in the interest of a state based trading scheme, due to the limited scale of such a trading scheme.

Banking of permits by companies may force up the price of emissions abatement for some sectors so that abatement is not feasible.