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Renewable Energy & the Kyoto Flexibility Mechanisms
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Opportunity or Obstacle?

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1. Introduction

This paper argues that it is in Australia's interest to promote its renewable energy sector in anticipation of a carbon constrained future and the application of 'flexibility mechanisms' such as Joint Implementation (JI), Clean Development Mechanism (CDM) and emissions trading. Whether the Kyoto Protocol in its current form is ratified or not, the Protocol itself may well represent a turning point in modern history, that of a decisive transition from the fossil-fuel based technologies of the industrial era to the renewable energy (RE) and energy efficiency (EE) technologies of the future.

Key concern:

1. Will the *Australian* RE sector be encouraged to grow via the Kyoto flexibility mechanisms?

2. Renewable Energy, climate change and Kyoto

Influenced at least in part by growing concerns about climate change, governments the world over have increased their policy and program support for the RE industry. More and more, the linking of climate change and RE is moving clean energy technologies up the political agenda. For example:

- USA - President Clinton recently proposed the largest climate package in U.S. history as part of his fiscal year 2001 budget. The request to Congress for $4 billion would see spending for RE and energy efficiency programs increase by 40%. The White House is highlighting the non-environmental benefits of programs within this package, such as promoting U.S. technology exports and increasing U.S. energy security.

- UK - Power providers in the UK will be required to generate a portion of their electricity from RE sources. The step is one of several the British government is announcing to achieve a target of generating 10% of the country's electricity from renewable resources by 2010.

- EU - The EU's proposed RE directive, known as 'Implementing Renewable Energy in the 21st Century- The Campaign for Take off ' is increasingly seen as providing part of the solution to meeting CO2 commitments by governments. Under it a European-wide green power credit trading may be integrated with a system for allocation of CO2 emissions credits. (WindWire, 2000)
- Denmark - Denmark is making an ongoing effort to switch fuel use away from coal to natural gas and RE for domestic consumption. For example, Denmark has a goal to obtain 50% of its electricity from wind by 2030 with accompanying support measures envisioned. (Zarganis, 1999)

Recently in Australia, RE has enjoyed an environment of better policy and program support and marketing opportunities than it has in a decade or more. This is due to a number of factors, the major domestic ones being:

- Prime Minister's "Safeguarding the Future" statement of November 1997. This established, amongst other things, the Australian Greenhouse Office (AGO) as the agency responsible for domestic greenhouse actions, a Renewable Energy Equity Fund (which is geared at promoting venture capital investment) and 2% Renewables Target (requiring electricity utilities to increase renewable supply by 2% by 2010).
- Prime Minister 's "Measures for a Better Environment" statement of May 1999 as part of the revised GST tax reforms. This also contains measures to promote RE growth.
- Development of an 'Action Agenda for Renewable Energy', a collaboration between the Department of Industry Science & Resources and the RE sector
- Direct market impetus for RE provided by 'Green Power' initiatives by electricity utilities.

These measures may create the growth of the Australian RE industry. But will it be enough to ensure that in future Australia does not find itself as just a small South Pacific customer of a global renewable energy industry that has been captured largely by the USA, Japan and Europe?

2.1. A key part of the solution to global warming

In order to effectively address global warming and ensure energy security, in the medium to long term there must be a transformation of the energy system toward the use of renewable resources. (Penfold, Jan - Feb 2000)

The Kyoto flexibility mechanisms alone will not foster *local* RE solutions to GHG reduction. This is a concern similar to that raised with respect to the 2% Renewables Target. There is already evidence that electricity retailers may simply opt to import established technologies such as large wind turbines from Denmark. This would be a great shame with respect to local industry development.

2.2. The price of carbon depends on the price of RE

- *The key influence on the evolution of the price of allowances over the next decade will be the extent of technological progress in RE and energy efficiency technologies.*

With respect to energy efficiency, a range of studies suggests large savings are available. Wilkenfeld (1996) reviews a range of Australian studies and concludes that the potential for cost-effective energy reductions is in the range of 20-30%

and another group estimates reductions in the range of 40-48%. If cost-effective energy reductions amounted to around 30% of 1990 emissions, and they applied across industry sectors, then they would be sufficient for many countries to reduce their expected emissions growth to their Kyoto target levels by 2008-2012 and there would be no need to buy additional emission allowances. Similarly, more rapid technological progress in RE will simultaneously increase the surplus allowances and reduce demand for them. To this extent, the cost of RE (and energy efficiency) as an abatement option will set the price of permits. (Hamilton, 1998)

- *The penalty for non-compliance with the 2% Renewables Target helps set a price for CO2 abatement.*

The 2% Renewables Target represents some 9,500GWh of additional renewable electricity in Australia's energy mix. The target is a medium to long term greenhouse gas reduction strategy with 3 specific objectives:

1. reducing GHGs via accelerated uptake of RE (and specified waste product) electricity in grid-based applications
2. along with other policy measures, developing a commercially competitive RE sector in Australia
3. developing an internationally competitive RE industry with a focus on the Asian market. (Walsh, 1999)

The penalty for non-compliance with the 2% Renewables Target has been set at $40 / MWh (It has been suggested that the cost of the fine to companies may be closer to $57 / MWh if we consider that the fine is not tax deductible) Assuming in Australia a carbon intensity of about 1 tonne CO2/MWh for producing 1 MWh of fossil-fuel electricity than the CO2 value of RE generation under the 2% Renewables Target $40 - $57 / tonne of CO2.

- *What consumers are willing to pay for 'green power' sends a market signal with respect to the value of clean energy.*

'Green power' electricity marketing attracts customers by offering them electricity from RE sources. In energy-based schemes, retailers increase the grid-connected RE supply in proportion to purchases by green power customers. As of February 2000 green power schemes have attracted nearly 60,000 customers in Australia. These customers in Australia are paying on average of $20 - $35/MWh more for their electricity than standard rates, suggesting that this is market value of 'greenhouse friendly' electricity. (McIntosh, 24 March 2000) Given that in Australia 1 MWh of coal-fired electricity is responsible for about 1 tonne of CO2, this is roughly equivalent to a price of carbon of $20-$35/tonne of CO2.

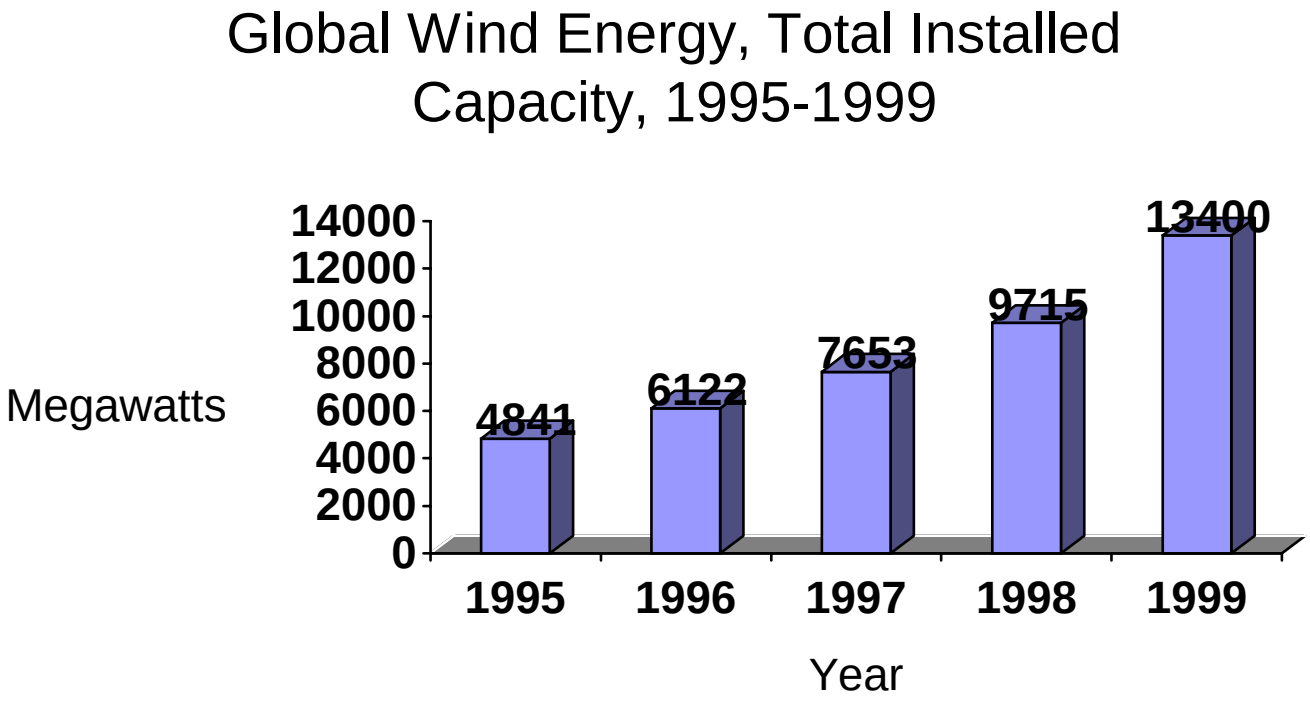
2.3. Renewable energy is a major growth industry.

Many nations have a goal of developing a strong domestic RE sector as part of a strategy to benefit from greenhouse response - and the current (and projected) boom in these industries. The International Energy Agency (IEA) has estimated that the global market for RE will increase from 13GW in 1995 to 43 GW in 2010 (an increase of over 230%). (DISR, 1999) In recognition of this potential, the federal Department of Industry, Science & Resources and the RE industry have been equal partners in developing a Renewable Energy Action Agenda. (DISR, 2000)

2.3.1. Wind

With the end of the millennium world wind energy markets have turned in another record-breaking performance. Preliminary estimates indicate that during 1999 more than 3,600MW of new wind energy generating capacity were installed worldwide, bringing total installed capacity to the 13,400MW range. This total represents an increase of more than 36% over the 1998 total installed capacity of 9,751MW, and the largest worldwide addition to capacity in a single year. With this dramatic growth rate, wind energy seems to retain its position as the fastest growing energy technology in the world. Already, from 1995 to 1998, a total of 4,893MW of additional worldwide capacity were installed, representing a worldwide average growth rate of 27.75%. Wind energy capacity installations worldwide have surged from under 2,000 MW in 1990 to the present level of approximately 13,400 MW at the end of 1999, representing more than a six and a half –fold increase during that time period. (AWEA, 2000) See Figure 1.

Figure 1



Source: (Currie, 1998), (AWEA, 2000)

2.3.2. Solar Photovoltaics

The world photovoltaic cell / module production increased 31.5% from 153.2 MW in 1998 to 201.5 MW in 1999. United States shipments increased 20% from 53.7 MW in 1998 to 64.6 MW in 1999, primarily due to increased exports to Japan and US grid connected sales which resulted from state incentives and Y2K concerns. Japanese shipments increased 63% from 49 MW in 1998 to 80.0 MW in 1999. For the third year in a row, most of the Japanese manufacturing capacity growth was designed to serve the subsidized PV home systems and the institutional buildings program. European shipments increased from 31.8 MW in 1998 to 36.4 MW in 1999. The rest of the world (including Australia) increased from 18.7 to 20.5 MW. See Figure 2.

2.3.3 Biomass

In Australia biomass from sugar cane waster (bagasse) is potentially a major resource for electricity production. Globally, the bagasse resource is predicted to

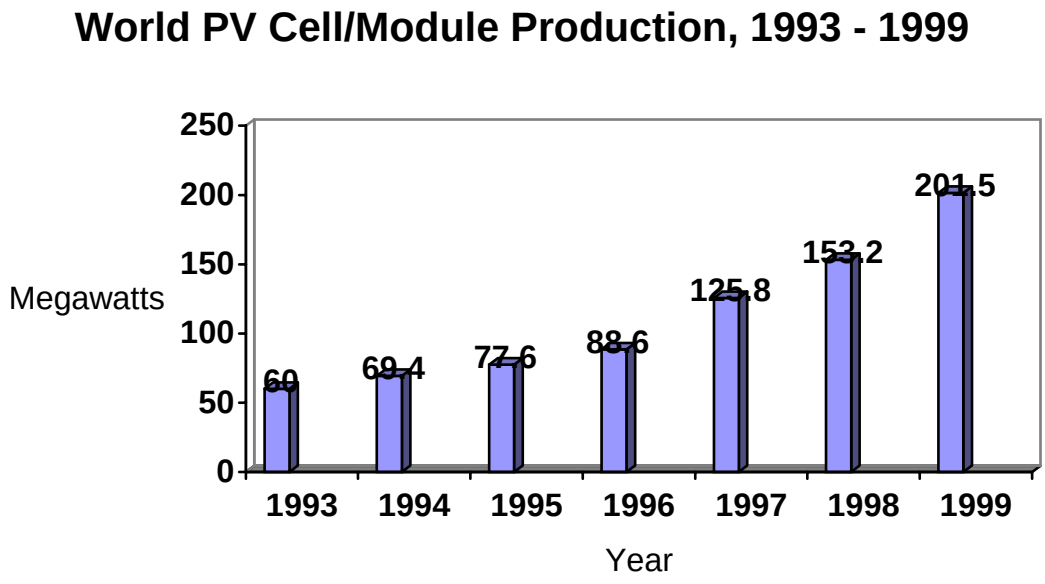
grow from 911.5 Megatonnes p.a. in 1987 to 3,144 Mt p.a. in 2027. (Currie, 1998)

Biomass currently contributes about 12-13% of world's primary energy demand. This figure could be considerably higher as up to a third of energy demand in developing countries comes from fuel wood, for which data is not available. The potential for biomass as a major renewable fuel is considerable, as the global resource is quite large. One source suggests that current production of biomass may be as much as 69,000Mega tonnes of oil equivalent (Mtoe) which is about eight times the total world consumption of energy from all other sources. (Currie, 1998)

If this huge energy source could be effectively and sustainable harvested the world's energy needs could be met for the foreseeable future.

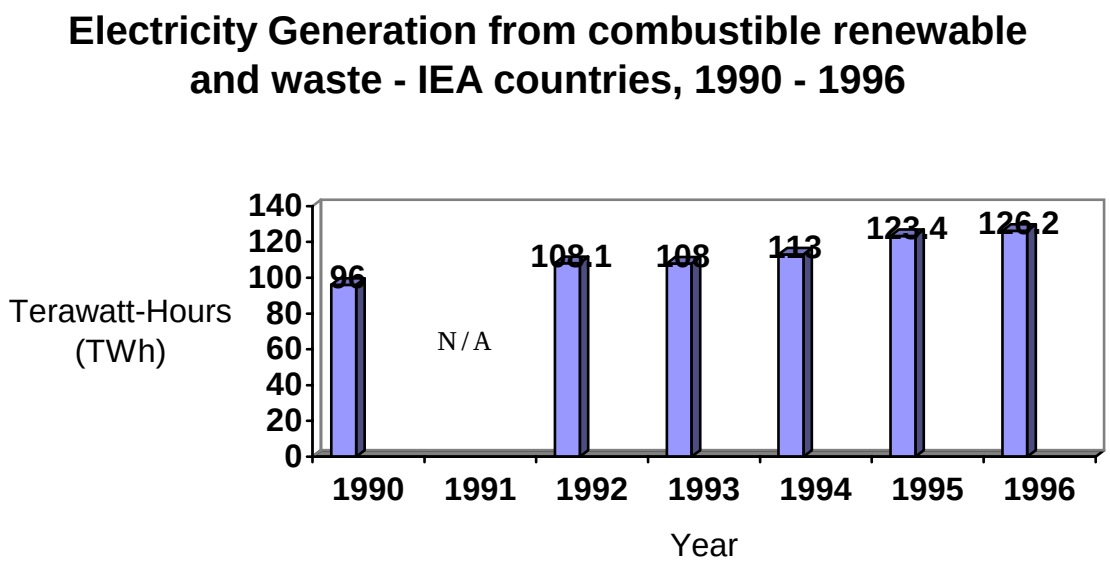
See Figure 3.

Figure 2.



Source: (World PV News, February 2000)

Figure 3



Source: (International Energy Agency, 1997)

3. The Flexibility Mechanisms - AAUs, CERs & ERUs

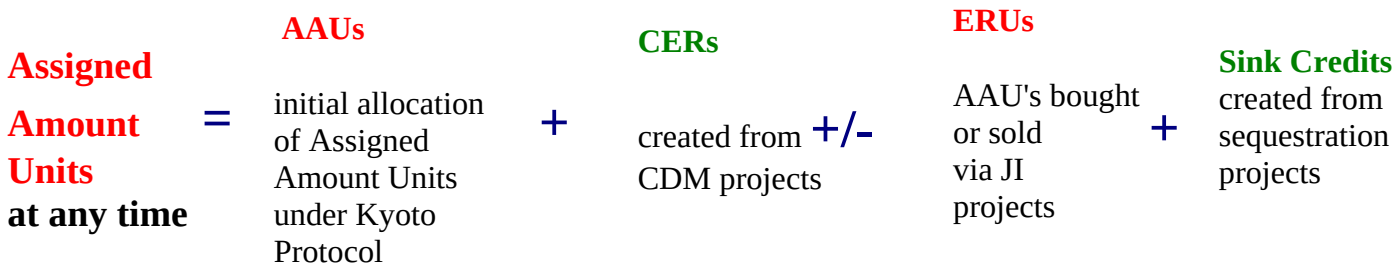
The emissions trading scheme proposed under the Kyoto Protocol is a market created by governments to facilitate the reduction of GHG at least cost. The 'currency' is Assigned Amounts Units (AAUs) and the underlying 'commodity' is reductions in atmospheric CO2. Its *raison d'être* is achieving an environmental outcome through profit maximisation by stakeholders.

With the envisaged emissions trading scheme under the Kyoto Protocol there are two types of allowances, allocated and created. Firstly, there is an allocated entitlement AAUs (also known as permits) based on parties' agreed emissions limit. And, secondly, there are created credits. These are credits from Joint Implementation (JI) projects (including carbon sequestration projects) and Clean Development Mechanism (CDM) projects. These credits are referred to in the Protocol as Emission Reduction Units (ERU) and Certified Emission Reductions (CER), respectively.

In fact, ERUs are not strictly created as they result in part from one country's AAUs may be transferred to another country, unlike CERs, which are additional to AAUs. We can differentiate between JI projects and CDM projects in this respect. CERS actually bring more AA s into the 'trading bubble' of Annex 1 (developed) countries - ERUs do not. The transfer of ERUs, say from Australia to Japan will increase Japan's AAUs but it will decrease Australia's by an equivalent amount. The aggregate AAUs of Australia & Japan will remain the same. Because CDM projects result in an increase in Annex I emissions compared with the limits agreed in the Kyoto Protocol, more stringent certification and verification procedures are likely to be required for these created

entitlements. Such projects are already required to provide evidence of accurate baseline estimation and additionality. (Jones, 1999). See Figure 4.

Figure 4. 'Assigned Amount' can vary over time



In the Kyoto Protocol, it was envisaged that CDM projects would be sponsored by Annex I Parties for the benefit of the non-Annex I host developing country and the creation of CERs for the investing Party. However, there is nothing in the Protocol to preclude non-Annex I Parties from investing in domestic projects which create CERs and then seek an international buyer retrospectively.

Carbon sequestration via land use, land use change and forestry has attracted a good deal of attention within Australia and elsewhere. This is because sequestration actually removes CO2 from the atmosphere and is (potentially) a means to create new credits by Annex 1 countries. However, accurately estimating the amount and timeframe over which the CO2 is sequestered and managing the resources involved has made sinks a contentious issue within the operation of the Kyoto flexibility mechanisms. At this stage, there is no explicit provision for carbon sequestration projects under Article 12 (CDM). Indeed, there is a body of opinion within the Conference of the Parties, which takes the view that sequestration projects should be excluded from the CDM. If this view wins the day then non-sink projects such as RE will have a much greater role. (Jones, 1999)

3.1. Concerns with the flexibility mechanisms

Even those that pioneered the adoption of the flexibility mechanisms have concerns that they may lead to the corruption and collapse of global efforts to contain climate change. One such person, Michael Grubb (now Professor of Climate Change and Energy Policy, Imperial College and Associate Fellow at the Royal Institute of International Affairs) suggests that the economic theories upon which Kyoto 's market mechanisms are based are 'dangerously incomplete'. They neglect both the industrial dynamics of how energy systems need to change over coming decades and the scope for abuse of these mechanisms given the uncertainties in real -life energy projects and projections. He suggests that the policies that may be most efficient in implementing the reductions specified for the Protocol's single budget period may not be the best to solve longer-term climate change. (Arris, 1998)

For example the flexibility mechanisms may:

1. Enable countries to avoid taking politically awkward domestic measures to combat pollution, e.g. such as removing subsidies from fossil fuel electricity.
2. Promote the establishment of sinks while diverting attention away from RE and energy efficiency.
3. Fail to deter investment in extensive new carbon-based resources and technologies.
4. Create a 'blow out' in the AAUs of Annex 1 countries. See Figure 5
5. There have been many debates regarding the setting of baselines, matched by the concern that baselines can be manipulated to exaggerate the reductions being achieved via CDM and JI projects. The need for transparency is very important, as the CERs and ERUs created through such projects should be fungible with AAUs. (Jones, 1999)

That having been said, the flexibility mechanisms should be supported in principle on the basis that they are more politically acceptable then other options. In due course, this could enable targets to be tightened faster than otherwise and bigger reductions to be achieved.

Some of the early speculative deals in carbon 'credits' being carried out in recent months seem to ignore the requirement for the official transfer of AAUs between nations, the basis of the efficacy of the Kyoto Protocol as a tool to combat climate change. Sale of such credits is banking on some sort of 'credit for early action' coming into play in the near future. If it doesn't these deals may find they have sold (or purchased) carbon 'credits' without government backing, akin to 'printing money'.

Figure 5. Creating Carbon Offsets, not Credits

There is an expectation that 'credits' can be created domestically through energy efficiency and RE projects and still uphold the CO2 reduction commitments made by signatories to the Kyoto Protocol. Unfortunately, this is not the case.

However, RE and EE projects do create a valuable 'offset' against the emissions reduction requirements of an emitter required to hold emissions permits.

The following highlights the danger of allowing emission-displacing activities to earn additional credits in a cap-and-trade system - and points out why RE (and energy efficiency) needs additional mechanisms to support their uptake via domestic trading.

A Simple Example

- Australia is allowed to emit 108 tonnes of CO2, 1 tonne = 1 permit
- The government issues 108 permits.
- Someone builds a wind farm, which they estimate, saves 8 tonnes of CO2 and creates 8 credit (1tonne of CO2 = 1 credit)
- Now Australia has 116 permits in circulation.
- Coal-fired power stations purchase all 116 permits and emit 116 tonnes of CO2.
- As a result, Australia overshoots its target of 108 tonnes and is in breach of its Kyoto commitments - a bad environmental outcome.

A Simple Example - Take 2

- Australia is allowed to emit 108 tonnes of CO2, 1 tonne = 1 permit
- The government issues 100 permits and holds back 8.
- Someone builds a wind farm that saves 8 tonnes of CO2
- The government awards the wind farm 8 permits, which are then sold.
- There are still 108 permits available in the market - and the wind farm was provided with an additional incentive.
- Australia meets its Kyoto target.

This is how a wind farm (or an energy efficiency project) could be given permits to provide additional incentive for the development of RE while maintaining a good environmental outcome. (Turton, 16 March 2000)

The illustration in Figure 5 illustrates the need for a strong program of RE industry development.

3.2. The flexibility mechanisms - A two-edged sword for RE

The flexibility mechanisms are a two-edged sword as far as RE is concerned. The flexibility mechanisms may have the potential to undermine RE developments in the short term but they also could improve their competitive advantage as RE projects:

1. will not have to purchase permits,
2. can assist those organizations which do have to purchase CO2 permits to reduce their emissions, and
3. are a means to create credits under JI and CDM.

Some countries have considered limiting the use of the flexibility mechanisms and providing additional incentives for market development. But rather than constraining the use of flexibility mechanisms on a country - by - country basis, Grubb suggests their use could be constrained within certain industry sectors or technologies. In this case limits could be set on the amount of reductions that could be achieved through existing technologies - for example, limiting reductions achieved through sinks to some percentage of the total reductions achieved. (Arris, 1998)

It is likely that some form of the flexibility mechanisms of emissions trading, JI and CDM are likely to be put in place once the 'rules' are decided, the expected outcome of COP6 (Nov 2000, The Hague). It is therefore of interest to understand how RE technologies can be made more attractive under such a regime.

4. Will the flexibility mechanisms benefit RE?

It is often assumed that RE will 'automatically' benefit from carbon trading as embodied in the flexibility mechanisms:

> "Opportunity for industry growth should also be recognized. The fact that producers and consumers would pay for the economic and environmental cost of their emissions under an emissions trading system provides a price advantage to zero or low -emission activities and inputs. RE technologies would gain a clear market advantage." (Australian Greenhouse Office, 1999) *Australian Greenhouse Office, 'National emissions trading - Issuing the permits - Discussion Paper No 4', Canberra, June 1999, p11.*

RE would not be a participant in the primary market for CO2 emissions permits: such companies will not receive permits in the initial allocation process. Rather, RE is a means to help the 'big emitting' companies that will be required to hold permits to reduce their emissions. RE will compete, appropriately, with other possible means of reducing greenhouse gases. See Figure 6.

Figure 6. Possible Greenhouse Gas Abatement Measures by Category

Fugitive Gas Capture
- repair leaks in natural gas transmission and distribution systems
- cease venting and flaring of natural gas, except for genuine safety
- capture CO2 in natural gas fields and re-inject into other reservoirs

Energy
- end use efficiency
- production process improvement
- end use fuel switching
- transport modal change
- enhanced traffic management
- fugitive gas capture at point of extraction
- reduction of transmission, distribution and reticulation system losses
- electricity generation efficient technologies
- electricity generation fuel substitution
- bio-gasification and waste gasification
- cogeneration (combined heat and power)
- renewable energy electricity generation

Waste
- capture of methane from solid wastes in landfills
- production of methane from bio-digestion of solid waste
- production of methane from bio-digestion of wastewater

Agriculture
- Livestock methane — enteric fermentation from livestock ruminants
- Anaerobic fermentation (manure management)
- Reduction of methane emissions from rice paddies
- Reduction of nitrous oxide emissions
- Enhancement of soil carbon

Forestry
- Reduce the rate of deforestation
- Increase forested land — afforestation
- Increase stocks of land in existing forests
- Increase wood use and efficiency
- substitute wood and other biofuels for fossil fuels
- Agroforestry and multiple-use
- Urban forestry

Integration Across Sectors
- Agriculture- and Waste-to-Energy
- Waste-to-Energy
- Agriculture-to-Energy
- Forestry-to-Energy

(SRCI, 1999)

The early uptake of RE is not an assured outcome of the flexibility mechanisms as other options may be seem to be cheaper, easier or simply able to sell themselves better to prospective buyers. If this is the case the maturation of the RE industry could be delayed, resulting in a loss of market share on the part of

nations slow to promote this industry sector, a possible delay in addressing global warming and in shifting to sustainable energy on a global scale.

5. Encouraging RE industry development under Kyoto

The previous highlights the importance of a serious program of RE industry development in Australia and designing emissions trading schemes which will encourage the growth of sustainable energy technologies. Some approaches to this are now discussed.

5.1. Emissions trading

- *Auction permits as the method of initial allocation*

Auctioning of permits by the government to industry would create a substantial source of revenue, which could go back into promoting RE and other GHG reduction activities. Auctioning also makes RE (and other GHG reduction methods) relatively more cost effective because beneficiaries of grandfathering - allocating permits free to existing emitters - only need to purchase emissions permits that are additional to their allocation. Thus grandfathering can create a barrier to new, innovative companies, as new emitters would need to pay for all of their emission requirements. Grandfathering can also provide an incentive to maximise emissions now in order to get a large number of permits, once emissions trading comes into play. Many will also object to grandfathering on the grounds that it is effectively a transfer of public wealth - access to the atmosphere - to the private sector. Auctioning - or some combination of auctioning and grandfathering - seems a fairer approach. (Hamilton, 1998)

- *Direct revenue from allocation of permits (assuming auctioning of permits in whole or part) to promotion of RE.*

What happens to the revenue from sale of emissions permits is a critically important complement to any emissions trading scheme. Within Australia, it has been proposed that some of the revenue from sale of emissions permits (estimated at $3billion / year at a permit price of $10/tonne of CO2) be applied to financial incentives for products and services that facilitate reduction of emissions by end-users. For example, a once-off cash rebate could be linked to the quantity of greenhouse gas emissions avoided over the life of an energy efficient HVAC system, and be provided to suppliers of such solutions.

In the absence of such measures, it is most unlikely that a scheme that concentrates on large emitters and relies on flow-on of price signals will be effective in encouraging an energy system towards low CO2 outcomes. (Pears, 2000)

- *'Hold back' permits during initial allocation so that they can be awarded to new entrants as well as RE companies.*

One way to reduce barriers to new entrants would be for the government to reserve permits for new emitters. To further encourage the development of the RE industry, major RE projects could also be awarded some of the reserved permits, thus allowing them to trade in the primary market from its onset.

5.2. RE Industry Development

At the recent 'International Conference on Accelerating Grid-Based Renewable Energy Power Generation for a Clean Environment' (hosted by the U.S. Energy Association, the World Bank and others) came a clear message - remove barriers to entry hampering the development of renewable energy. The key actions recommended were:

1. *Create long-term loan programs to finance long-lived RE projects.* Large RE projects, that might provide clean power to the grid for decades, can only get relatively short-term funding - financial institutions often want their money back in fewer than 10 years. Stiff payback terms make it difficult for companies to build new projects, generate low cost power and provide profits needed to attract other investors.

2. *Stop government subsidisation of power generation projects that burn fossil fuels.* The fossil-fuel industry is mature and shouldn¹t need government assistance. Taxpayer-provided funding for carbon emitting power plants should end if governments are serious about reducing GHG emissions - and about promoting renewable energy. (United States Energy Association, 2000)

   A recent report estimates that US taxpayers will pay more than $26 billion in the next five years for energy programs that benefit the oil, gas, coal, and nuclear industries. (Lazaroff, 24 March 2000) In Western Europe there is a similar trend with direct subsidies to fossil fuels equalling about $US10.25billion from 1990 - 1995. In the same time period renewable energy received just $US1.49billion. (Ruijgrok, 1997)

   In Australia the fossil fuel industry has received over $A3 billion in direct subsidies and over $A37billion in subsidies to consumers since the end of World War II . While many of these subsidies have been discontinued they were important in the development of the fossil fuel sector. Some of the subsides to electricity consumers have had the effect of discriminating in favour of the choice of grid-supplied fossil fuel generated electricity and against the choice of stand-alone RE systems. These include:
   - cross -subsidisation of rural electricity consumers
   - more generous tax deductibility for the cost to consumers of grid connections, compared with the cost of stand-alone systems , and
   - a NSW Government scheme to heavily subsidise the cost of grid extensions in the far north west of the State. (Saddler, 1995)

A USA-based study *Meeting America's Kyoto Protocol Target: Policies and Impacts* by the American Council for an Energy-Efficient Economy (ACEEE) finds that 10 policies to increase energy efficiency and use of RE could achieve the U.S. Kyoto target (reducing GHG emissions to 7 percent below 1990 by 2008-20012). Rather than costing money, the study finds that achieving the Kyoto targets would save the United States $200 billion by 2010. The study recommends ten major domestic policies to stimulate widespread adoption of more efficient appliances, vehicles, buildings, power plants and industrial facilities. Two of the policies accelerate the use of RE sources and the shutdown of older, dirty coal-fired power plants. Specifically they call for a Renewable Portfolio Standard as part of electric utility restructuring and tighter emissions standards on coal-fired power plants. (Geller, December 1999)

Within Australia the federal government is facilitating the development of an Action Agenda for Renewable Energy to assist the sector to move the "industry to a higher and sustainable growth path". The Action Agenda will develop strategies to build industry competitiveness, community commitment, industry partnerships, R&D and a broad supportive policy framework. (DISR, 1999)

6. Action by the RE industry

While supportive government policies are critical, there are certain things that the RE industry may do to position itself to take advantage of the flexibility mechanisms:

1. Bundling or pooling of small projects and credits
2. Streamline certification , verification and monitoring
3. Identify multiple income streams from RE projects
4. Educate, Train and Promote RE as a 'Kyoto solution'

6.1. Bundling (or pooling) of small projects and credits

The NSW Carbon Rights Legislation, while focused on trees, has been important in ensuring that carbon accounts have a legal basis. This legislation introduced the ability to separately register a forestry right and a carbon sequestration right over land in NSW. It is anticipated that these carbon accounts could move toward the concept of a pool structure in which one or more forest owners could set up carbon accounts and sell carbon benefits without transferring the formal carbon sequestration rights. While timber harvesting continues to occur new trees are planted to keep the balance between sequestration and harvesting. Independent certification and registration would create a sound basis for registering and issuing tradable emissions credits and offsets against the pool over time. (Brand, 1999)

Figure 7. World Bank Prototype Carbon Fund

On January 18, the World Bank launched a carbon trading fund to encourage investment in greenhouse gas reduction projects in developing countries and economies in transition. The Prototype Carbon Fund (PCF) is expected to start operations in April 2000 and is expected to finance approximately 20 projects over the next three years, with an emphasis on renewable energy.

The Bank will act on behalf of investors (e.g. Annex I countries and companies) to establish greenhouse gas reduction projects in a non-Annex I (developing) country. The projects will receive initial financing and periodic payments upon the delivery to the Fund of carbon offsets. Each investor will receive a pro rata share of the carbon offsets that are transferred to the Fund, based upon that investor's relative contribution to the Fund.

Companies and governments have committed $85 million to the fund, which will be capped at $150 million. Government contributors include Norway, Sweden, Finland and the Netherlands. Private sector contributors include several Japanese and Belgian power companies, and car company Mitsubishi. Governments must pay $10m and companies $5m to participate in the fund.
Source: (World Bank, 2000), (Jacobson, Feb 2000)

It is possible that a similar concept could be applied to RE projects. Many RE projects, especially Remote Area Power Systems (RAPS) are often small suggesting that the cost of monitoring the CO2 savings for an individual installation would be uneconomic. Such systems may also be commissioned and decommissioned over time, creating a fluctuation in CO2 savings. However, a large 'pool' of RAPS projects could balance this fluctuation and make CO2 monitoring worthwhile. Certification, verification and sale of CO2 savings from numerous small to medium size RE projects could be 'bundled' and sold, without the buyer having to be directly involved in the 'on the ground' project(s). Within Australia, RAPS projects could contribute to meeting the 2% Renewables Target by tracking the kWh of electricity produced by the pool. Internationally in a CDM context, CO2 savings from RAPs projects could create CERs. Indeed the World Bank has developed such a mechanism in its Prototype Carbon Fund.
See Figure 7.

6.2. Streamline certification , verification and monitoring, particularly of small projects

Some of the principle objectives of the accreditation and certification process for emissions trading are:

- to provide a service which instils confidence that the trading scheme regulations are being properly and consistently applied
- to ensure that the trading scheme is regulated in such a way that it is equitable and free from anomalies, and that expanding the scheme does not disadvantage either the incumbents or the new entrants;
- to be cost-effective and not a burden which might discourage trading;
- to be independent, auditable, rigorous and transparent. (Jones, 1999)

Improving cost competitiveness has been identified as the single most important factor impeding greater market penetration of the RE industry. [12] As mentioned in Section 6.1 the 'bundling' of the CO2 benefits of RAPs projects could help to make RE projects more economic by adding another income stream. To enable this to happen, a standard approach to CO2 certification, verification and monitoring of RE projects is needed. ACRE is developing such an approach.

6.3. Identify multiple income streams from RE projects

Tree planting as an approach to greenhouse gas abatement is seen to provide several income streams to the investor. Potentially, RE electricity projects can also be conceived of as creating several income streams:

- RE credits from 2% Renewables Target- As mentioned earlier, the penalty for non-compliance with the 2% Renewables Target has been set at $40 - $57 / MWh. It is likely that 'RE credits' will be traded between electricity retailers as a means of satisfying the 2% Target at least cost. These credits would be likely to have a value of something less than $40- $57 / MWh.
- Carbon offsets - Predicted cost of CO2 in 2010 ranges from just $5 to $191 / tonne, with the midrange falling at about $30/tonne. (Australian Greenhouse Office (AGO), 1999) In so far as RE projects will help emitters create ‘offsets’ against their Assigned Amount, RE projects can be valued at the cost of CO2.

- Green Power premium - About 70,000 green power customers in Australia are paying on average of $20 - $35/MWh more for their electricity than standard rates. In some instances, this represents an additional income stream from the RE projects.
- Standard price of electricity - Of course, electricity from RE would also generate the standard price for its sale to customers, on average about 8.6c/kWh for domestic customers in Australia. (1998 prices) (Electricity Supply Association of Australia, 1999) Large industrial customers are able to negotiate to pay much less per kWh.

6.4. Promote RE as a Kyoto Solution

It is in the interest of RE companies to understand how their products and services will fit in to an emissions trading environment. While the 'rules' are still evolving it is important that the RE industry as a whole is abreast of the issues so they are better able to meet customer needs. RE companies can benefit by building partnerships with companies that will be required to reduce their CO2 emissions. Understanding the needs of these potential customers and marketing RE services as a CO2 solution is essential.

7. Conclusions

In a carbon constrained future, strong government policies and programs to promote renewable energy and energy efficiency - and the overall design of any proposed emissions trading scheme - will both be critical to Australia's ability to capture a significant part of this global growth industry.

While to an extent the Australian RE industry can prepare and position itself to take advantage of the market opportunities resulting from the Kyoto flexibility mechanisms, appropriate industry development policies will continue to be necessary.

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