# *Garnaut Climate Change Review*

## *Submission of Pacific Hydro Ltd*

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## Contents

# Introduction

Pacific Hydro welcomes the opportunity to provide a submission to the Garnaut Climate Change Review (the Review).

Pacific Hydro has carefully examined the publications released thus far as part of the Review process and wish to commend the comprehensively well constructed and considered work achieved by the Review. Whilst inevitably the Review will draw criticism from competing interest groups, the Review has consistently adhered to first principles provided from the literature on the science of climate change, economics of climate change and the practical lessons learnt thus far from international experience. This adherence to these principles should remain first and foremost the focus on the Review.

The key contribution we wish to make to the Review through this submission is to highlight the role Renewable Energy can make to reducing emissions, to building future abatement industry capacity and to achieve a level of policy flexibility through the MRET Scheme. We also emphasise that this can enhance the economic growth of Australia and reduce the risks of future external shocks as the world moves quickly to become carbon neutral.

The challenge for policy makers is to provide a regulatory and policy framework that provides incentives for investment in new zero emissions capacity and over-turns market barriers – many of which are a result of historical lock-in so that renewable energy can be introduced in to the Australian economy in the most cost effective, efficient way. Without a significant influx of renewable energy, and in the absence of immediate and significant technological breakthroughs it is impossible to envisage any alternate measure of substantially reducing Australia's emissions of greenhouse gases in the near term.

Whilst there is a small group that resist increasing renewable energy in Australia, there have been no alternative measures put forward that would actually stabilise and then reduce overall emissions in the near term. In this regard it is important that we move away from focusing on "emissions reductions" from Business as Usual levels as this still means an increase in overall emissions. Australia's commitments under Kyoto and beyond are almost certainly going to involve actual reductions in emissions from 2012 onwards.

Renewable energy has been deployed extensively around the world by nations seeking to stem the growth in emissions from their stationary energy sector and will play an increasing role in delivering actual emissions reductions below historical levels and not just a slowing of growth when BAU is used as your base trend.

Therefore, the question for policy makers is to ensure its introduction in the most cost effective way that delivers real emissions reductions, enhances the value of Australian business, builds long-term industry capacity and provides clear and unambiguous signals to the Australian economy that allows it to progressively adjust to a carbon constrained future.

The second contribution we wish to make to the Review is in the area of Emissions Trading. As the first Australian company to trade Certified Emissions Reductions in the European Union Emissions Trading Scheme and having extensive trading and development experience in zero-emission, renewable energy projects in Australia, Chile, Fiji, the Philippines and Brazil we feel uniquely place to comment on how an Australian Emissions Trading Scheme (ETS) should be approached, particularly the issue of international linkages.

# Mandatory Renewable Energy Targets

> *The MRET's current virtue is that it can begin its work earlier than an ETS.*
>
> Garnaut Review February 2008

The MRET scheme is a world leading market mechanism designed to specifically address greenhouse emissions in the stationary energy sector in a cost effective manner. The MRET creates a market with only one rule: a percentage of energy within the electricity market is to be sourced from renewable generation technology. Within the confines of that one rule we have a free market. Any technology, company or individual can choose to participate.

There are five main advantages with the MRET schemes.

1. The MRET can begin reducing emissions immediately
2. The current costs of MRET provide technology incentives that will lead to lower cost abatement in the future and lower cost abatement overall than an ETS alone.
3. MRET is able to isolate costs of abatement within the stationary energy sector, which is Australia's single largest source of greenhouse emissions.
4. MRET provides risk management for security of supply and altering emissions pathways in light of changing scientific and international circumstances.
5. An MRET provides spin-off benefits (positive externalities) such as new manufacturing industries and regional development.

## 1. MRET can reduce emissions immediately

For various reasons it is likely to be some time before an ETS will deliver a "transformational" carbon price for the stationary energy sector and therefore it may have little effect on actual levels of emissions within the sector in the immediate future. Although the Government has declared 2010 as the starting point for an ETS, it would not be unreasonable to expect some "teething" problems in the early years of the scheme, particularly around certification and verification of abatement certificates. In reality, achieving significant emissions reductions from an ETS, particularily in the stationary energy sector may be a decade away.

The pre-existence of State based renewable energy targets means that renewable energy via a rolled up federal MRET is effectively already underway. New projects built and announced based on State Government policy commitments are already in excess of the MRET schemes early trajectory and are already reducing Australia's emissions significantly.

Table 1: State Based Renewable Energy Targets

| State | Target | New Generation |
|---|---|---|
| Victoria | 10% by 2016 | 3,250 GWh |
| New South Wales | 15% by 2020 | 7,250 GWh |
| Queensland | 10% by 2020 | 3,355 GWh |
| South Australia | 20% by 2014 | 3,300 GWh |
| Western Australia | 15% by 2020 | 2,177 GWh |

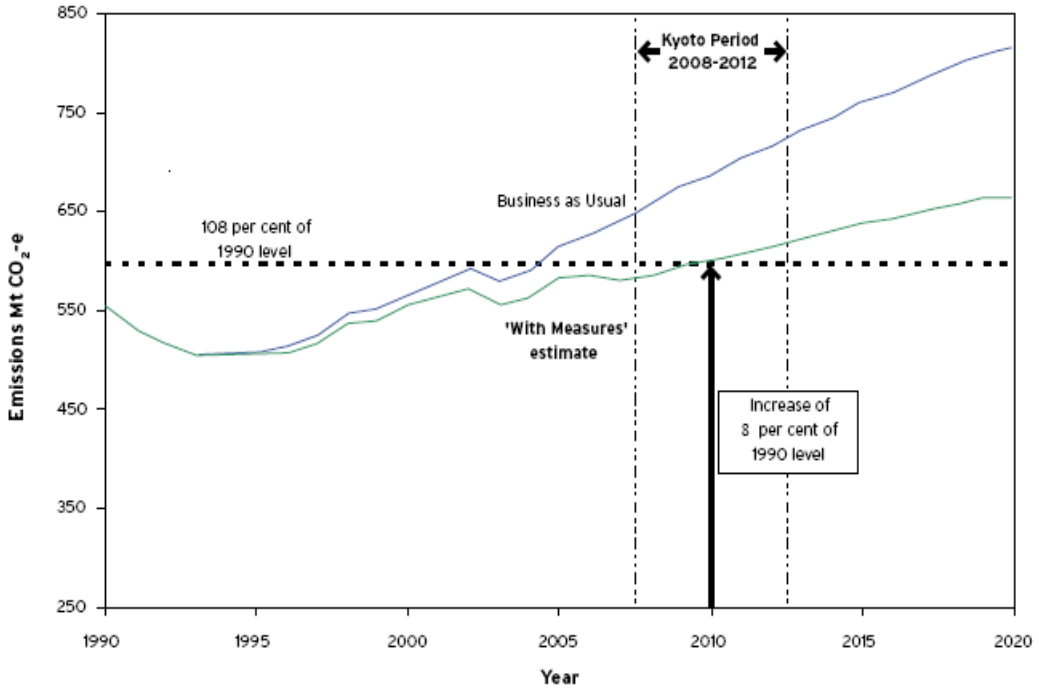
Assuming all of these State based initiatives would have been implemented in the absence of a single Federal MRET scheme, renewable energy in Australia would grow from 10% to 15% of the electricity market by 2020 and drive approximately $10 Billion in new clean energy investment by 2020.

A recent report issued by the Federal Department of Climate Change "Tracking to the Kyoto Target" states the following:

"On an indicative basis, emissions for 2020 are projected to reach 120% of the 1990 level. This is below the 127% projected previously, reflecting a projected decline in emissions from electricity generation in the latter part of the projection. This decline reflects an increase in electricity generation from renewable sources in line with the *20% Renewable Energy Target."*

These forward estimates only serve to reinforce the Review's previous statement that MRET starts the abatement task immediately. In the next 10 years, MRET will be the most potent measure the nation has in reducing emissions in the stationary energy sector.

**Figure 1: 'Business as Usual' and 'With Measures' emissions estimates**




[1]

2. The current costs of MRET provide technology incentives that will lead to lower cost abatement in the future and lower cost abatement overall than an ETS alone.

There is strong reason to suggest that supposed higher cost of abatement attributed to an MRET scheme ignores inter-temporal technology dynamics and that the investment in an MRET scheme now will yield lower overall costs of abatement in the long term. The Review has already dealt with this issue in depth in relation to government funding for R & D[2], but the same argument can be made for the MRET scheme. Namely that a scheme that encourages market driven technological entrepreneurship and both supply push and demand pull enhances downward cost curves associated with renewable energy technologies.

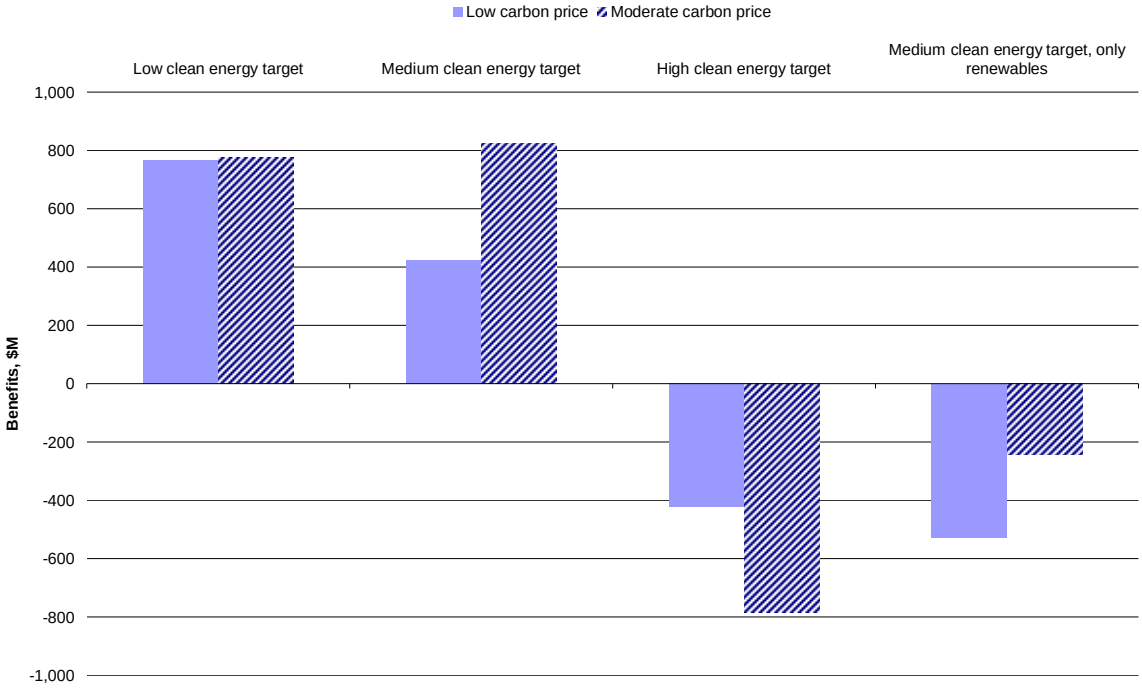
McLennan Magasanik Associates conducted modelling on this issue to ascertain the net economic benefits associated with various combinations of emissions targets under cap and trade and renewable energy targets and showed that a moderate renewable energy target (20% by 2020) coupled with a moderate emissions trading scheme would achieve a lower overall cost of abatement than an aggressive emissions trading scheme alone and achieve the highest net benefit to the economy. The net benefits being any benefit compared with a "business as usual" scenario that assumed delayed

[1] *Figure 1 Source: Department of Climate Change February 2008 "Tracking to the Kyoto Target"*

[2] *Garnaut Review Issues paper 4*

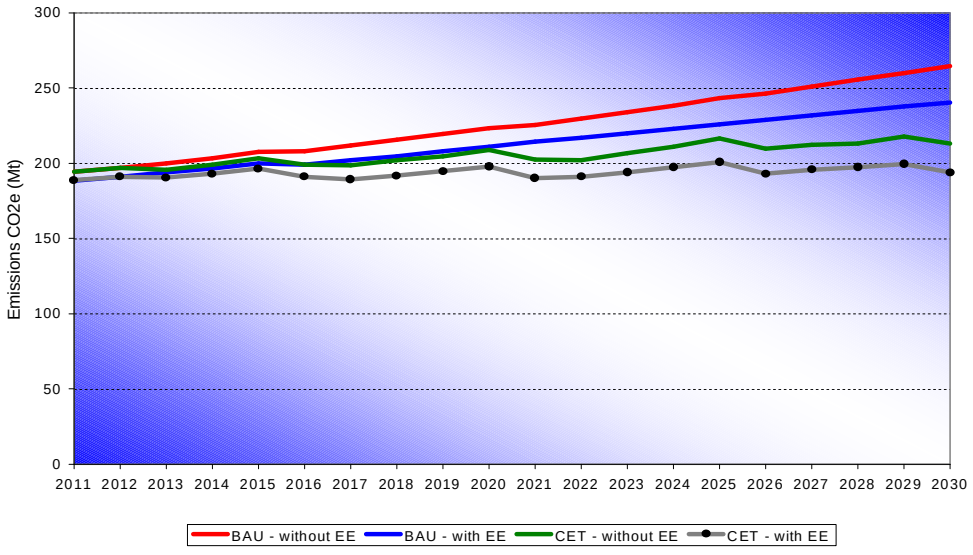
economic adjustment to climate change versus immediate action. These results cast some doubt on the conventional wisdom that an emissions trading scheme "must" provide lowest cost abatement and also give provide further evidence that action now will lead to lower overall costs than delayed action.

Figure 2: NPV of the benefits and costs to the electricity market of a clean energy target (assuming emissions trading) – McLennan Magasanik Associates




In addition to the work undertaken by McLennan Magasanik Associates, Frontier Economics undertook work on behalf of the renewable energy industry during 2007, specifically looking into the cost associated with various renewable energy targets (described in the following table as a Clean Energy Target or CET) and the interaction with energy efficiency measures. The key greenhouse objective of this modelling was to "stabilise" greenhouse emissions from the stationary energy sector and to ascertain the overall cost of doing so.

The following chart demonstrates the BAU growth trajectory and the abatement stabilisation effects of both renewable energy targets and energy efficiency measures.



One of the issues that must be kept in mind when assessing future costs of various energy technologies is that substantial investment will need to be made in the stationary energy sector over the coming 15 to 20 years in order to meet the expected 3% per annum increase in energy demand regardless of any factors pertaining to climate change.

The "Business as Usual" investment required between 2010 and 2030 in thermal electricity plants is estimated to be in the order of $40 billion. As these assets typically have an economic life of 30-50 years the decisions we make over the next few years will have profound effects on our ability to manage future greenhouse emissions caps over that period and beyond.

As the following table illustrates, using a combination of renewable energy (table assumes 30% RE by 2030) and robust energy efficiency programs, stabilising greenhouse emissions from the energy sector at today's level can be achieved at similar costs to the BAU investment scenario.

If these two measures only achieve stabilisation of emissions then we would have achieved something that to this point has avoided our grasp. To do this at a similar cost to that which is already expected should be seen as both highly desirable and realistically achievable.

| | With energy efficiency assumptions ($B) | Without energy efficiency assumptions ($B) |
|---|---|---|
| BAU | $34.8 | $40.4 |
| CET | $40.0 | $48.1 |
| Increase in costs (CET v BAU) | $5.2 | $7.7 |

Comparison of total cost of meeting demand (NPV over the period 2011-2030, $B)

3. MRET is able to isolate costs of abatement within the stationary energy sector

The stationary electricity sector accounts for 50% of Australia's total emissions and is growing. This fact requires the stationary energy sector to be responsible for a certain proportion of emissions reductions and therefore demands that specific action is taken within the sector itself to ensure its long term sustainability.

Arguments in favour of pursuing an ETS alone centre on economic efficiency, primarily because it leads to abatement activity being undertaken by those most efficient at abatement and therefore, provides lowest cost abatement. This also spreads costs across the entire economy to provide an overall reduced or "least" cost. However this cross sectoral approach provides some perversities in regards to environmental goods and services by allowing participants in one market place that are inefficient to bypass the inefficiency issue within their own sector by "outsourcing" abatement activity to another sector therefore potentially allowing environmentally inefficient activities to continue.

The problem is it assumes abatement activities are homogenous across sectors and could potentially and inadvertently prop up inefficient activities for extended periods of time when they otherwise could have become more efficient if fully "exposed" to on site emissions abatement and environment efficiency drivers. An MRET scheme directly provides like for like competition within the electricity sector where both the outputs, MWh of electricity and t/carbon, are comparable providing for (rather than delaying) immediate and direct incentives within the sector itself.

*Appendix 1 illustrates the complexity of differing costs attached to abatement across sectors.*

4. MRET provides risk management for security of supply and altering emissions pathways in light of changing scientific and international circumstances.

> *A high proportion of the incentive to introduce low emissions energy emissions energy in the early years of the ETS, and a higher proportion of the economic cost, may be carried by MRET scheme.*
>
> Garnaut Review February 2008

When marginal costs of generation is used to determine least cost abatement then emissions trading provides the generator with the lowest emissions profile ($ cost for a MW/h adjusted per t/carbon produces). With current available technologies, based on marginal costs, the most cost efficient abatement in the energy sector would come from new generation Closed Cycle Gas Turbines (CCGT). Using only marginal cost analysis indicates that structural adjustment in the energy sector because of an ETS encourages investment in this particular technology.

However, this argument ignores existing capital stock in less efficient thermal generation. This market failure exists because of the information asymmetry of investment decisions between policy makers and firm financial decisions. In general, investment decisions in new thermal generation assets are based on a 20 – 25-year Net Present Value. Yet in reality an asset has a much longer life-span. Because of this discrepancy there is a tendency to lock in technologies for much longer periods of time.

This would not pose a significant issue if we expected NPV circumstances to remain constant, however long lead times in planning and construction and the advantages of incumbency mean that any change in circumstances do not readily result in structural adjustment to the best economic option. This situation could be exacerbated where the degree of carbon constraints into the future remains uncertain and will in all likelihood tighten.

An MRET scheme provide a useful insurance or risk management device for policy makers and investors in light of a change in international circumstances of a dramatic shift in scientific information. The Review has already suggested five year windows/pathways to change emissions trajectories. Given all hypothetically possible trajectories, the lower trajectory pathways will only be achieved through zero emissions renewable energy.

Importantly, many technologies deployed under MRET, such as wind, have asset lives of 20 years and are based on a 15 year NPV. While there is risk associated in any investment where future government objectives may change this risk is clearly less for assets with shorter life spans. Many renewable energy technologies also involve shorter lead-in time and can be built relatively quickly in response to policy changes.

An MRET allows future flexibility for policy makers to maintain energy security and the option of pursuing tighter emissions targets in light of changing scientific information or international circumstances. By ensuring a certain percentage of renewable energy enters the electricity market, it prevents major alterations to the merit order of the electricity market, while still achieving abatement and allowing for future flexibility if the market requires renewable energy in the future.

For instance, if in 2017 an international agreement was struck that required Australia to reduce its emissions by 20% below its current level without a renewable energy sector operating in Australia, the only way of achieving this would be through closing existing plants and sacrificing energy security. By ensuring a viable renewable energy sector, the risk of this scenario occurring is greatly reduced.

In addition to the quick response capabilities and reduced risk profile due to shorter capital payback periods, the drought that has afflicted South Eastern Australia and Southern Queensland in the past five years has exposed the risks associated with not diversifying the electricity mix in Australia and over reliance on thermal coal generation.

Whilst there has been awareness around the high greenhouse gas intensity associated with fossil fuel electricity generation, it was ignored that coal-fired electricity generation requires around 20% of Australia's entire water use. Much of this water is high quality drinking water and the water scarcity concurrent with the drought has caused some coal power stations, as well as some large hydro stations to reduce generating capacity.

The reduction in energy supply into the National Electricity Market (NEM) has caused upward pressure on wholesale electricity prices and substantial price volatility. Combined with growth in demand of electricity at around 3% per annum nationwide, the drought has highlighted the need for continued increase investment in diversified generating capacity.

Table 2: Water Usage in Electricity Production

| | Installed capacity MW | Annual Output MWh | Water Use Kl |
|---|---|---|---|
| Coal | 100 | 700,000 | 1,400,000 |
| Nuclear | 100 | 700,000 | 2,000,000 |
| Wind | 250 | 700,000 | 0 |
| Annual Average Household Usage | | 7 | 240 |

5. MRET will lead to $20 Billion being invested in renewable energy assets and substantial regional development.

Pacific Hydro built the first private sector wind farm in Australia at Codrington in South West Victoria which was also the largest in the country at the time (July 2000). Since then we have built an additional wind farm at Ararat in Western Victoria and pursued planning approval for numerous other projects in Victoria and South Australia. These projects were developed under the existing Federal MRET arrangements and played a significant role in establishing a tower manufacturing facility in Portland by local engineering firm Keppel Prince and the establishment of a wind turbine blade facility in Portland by Vestas. A similar situation occurred in Tasmania and to a lesser extent South Australia based on wind energy development activity.

Since the Victorian Government introduced their own renewable energy legislation (VRET) in 2007 Pacific Hydro have also commenced construction of a $350M wind farm in Portland and progressed planning approvals for an additional $300M in potential wind farm development. In all, development activity in Victoria over the last 12 months as a result of VRET would see the state based target exceeded by 2012.

All of these projects will be included in the Federal 20% MRET when in place as the industry prepares for the $20 billion market that will be created. Under a 20% MRET, it is likely that Pacific Hydro alone will invest in the order of $4B in Australia over the coming years.

Importantly, increasing renewable energy targets will bring significant benefits to rural and regional Australia. Based on current wind energy proposals a 20% renewable energy target by 2020 would deliver:

- More than $12 billion in investment in new wind energy generation.
- An additional 6,000 direct jobs will be created (based on European experience).
- Continued expansion and support for the export of renewable energy technologies and services.
- A substantial part of this new investment and job creation will be in regional and rural Australia.

Potential ongoing economic benefit to rural communities from planned wind projects would be:

- Landholder lease payments~$25 million per year
- Operation and Maintenance costs~$150 million per annum

## Phasing out MRET

> *A second implication of the co-existence of the MRET with an ETS is that the former will affect the dynamics of the latter, with the potential for depressing the carbon price and thereby diminishing its capacity to drive both demand and supply change across the covered sectors.*
>
> *It will therefore be critical that these interactions are fully understood when the parameters of the ETS are being finalised. These matters are being analysed for discussion in the full report*
> Garnaut Review March 2008

The Review has asked for clarity around the interaction between the MRET Scheme and an ETS. Theoretically abatement services provided in MRET and an ETS would be interchangeable and MRET would be phased out when the Price REC = Price ETU (These prices cannot be directly compared because the first uses MWh as a unit and the latter t/carbon abated but are generally compared due to the coincidence that a MWh of electricity from thermal generation produces around 1t of carbon in Australia – this an historical accident but means that 1 MWh = 1t/carbon abated using current baselines).

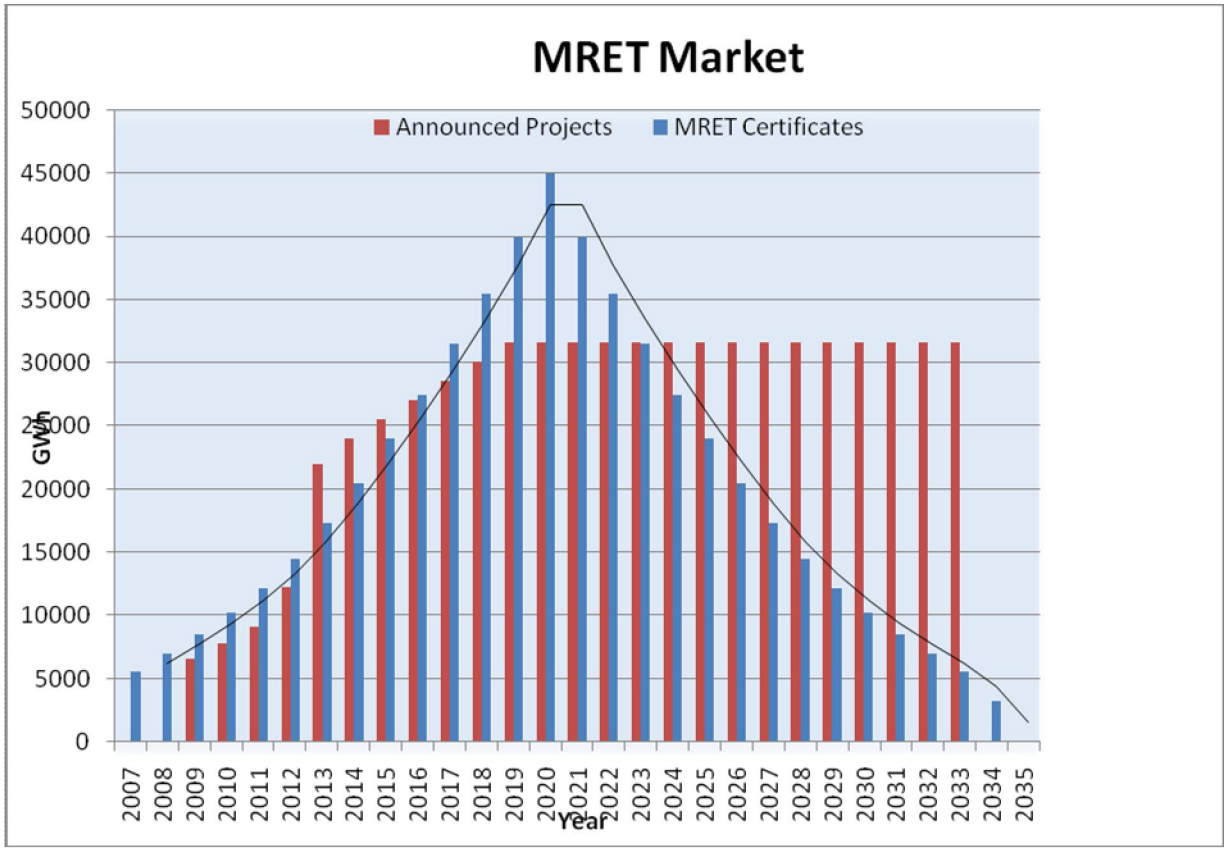
At this stage we understand that the Review is still undertaking modelling on the way the MRET and the ETS will interact and at what point in the future an ETS price and the MRET price will begin to converge. While the costs of renewable energy technologies continue to fall they are falling at different rates which must be taken into account in any such modelling. Additionally, like all forms of new energy generation assets, the costs of building renewable energy projects will in a large part be driven by the cost of key inputs such as steel, concrete and labour which must also be considered.

These are by no means the only future technology cost issues to consider and we would welcome continued discussions with the Review on this issue.

The MRET scheme will peak in terms of REC creation in 2020 and then be step phased downwards based on REC production in the year N-15 (where N is the current year). This means that all projects will be eligible to produce RECS for 15 years and retailer's liability will be calculated based on deducting annually (2020-2035) from 20% the amount of electricity produced from projects that become non-eligible at the start of each year.

The following graph shows how a REC market might act with an ETS market. This assumes the cost of abatement from 1 MWh of electricity is equal to the cost of abatement across all sectors from 2035. There will be no REC's produced after 2035 and once MRET projects are no longer eligible to create RECS (2023 onwards) they will only earn revenue through the normal operation of wholesale electricity markets.

Figure 3: Operation of REC Market 2008-2035



# Emissions Trading

## Permit Allocation

The allocation of permits is one of the most important and possibly one of the most controversial aspects of the proposed National Emissions Trading Scheme. As the Discussion Paper points out, the permit allocation method is unlikely to have a significant effect on the price of carbon credits but could have the unintended effect of so called wealth transfer as occurred in the formative round of the European ETS if not carefully managed.

The main questions for government regarding permit allocation and degree of permit auctioning seem to be:

- What is the most appropriate point in the process to assist adversely affected parties?
- Who (industry or government) is best placed to establish and manage strategic industry transition plans?
- Who is ultimately responsible for energy security of the nation?

In the interest of avoiding future sovereign risk issues for existing assets a pathway must be provided for investors and managers of assets to prepare an orderly transition to either significantly reduce their carbon footprint or eventual decommissioning of the asset at some future point.

It must be assumed that a level of asset decommissioning will occur in which case there must also be sound strategic planning to ensure the capacity of the asset is replaced and that suitable transition and retraining programs are in place for the existing workforce. This will also assist in creating an environment conducive to future long-term investment in the stationary energy sector.

Full auctioning of permits, as proposed by in the Emissions Trading Scheme Discussion Paper, indicates a desire to ensure the integrity of the scheme itself is maintained and to avoid the so called wealth transfer issues experienced in the EU. At the same time the discussion paper recognises the need to assist certain sections of industry in transition to a lower carbon footprint. The discussion paper also recognises certain sections of society may not have the capacity to deal with the resultant higher energy costs associated with an emissions trading scheme and that these sections of society may require specific assistance.

Assisting these groups by dispensing assistance, in whatever form it takes, outside the scheme seems to be both transparent and efficient and would be a reasonable way of ensuring the mistakes of the EU scheme are avoided. It also centralises any risks associated with future security of supply as government can balance the level of assistance to achieve both a reduced carbon footprint and security of supply.

Through the auctioning of permits it is expected that substantial revenues would be raised by Government. In addition to providing the above groups with transitional assistance these revenues should be channelled back into areas of the economy that will accelerate and in some cases facilitate additional greenhouse related programs such as:

- Accelerate R&D and deployment assistance in areas such as emerging renewable energy technologies and carbon capture and storage
- Assist with nation building infrastructure projects such as substantial transmission system augmentation, possibly in partnership with the private sector
- Fund climate change “adaptation” programs that deal with climate change impacts already upon us

If permits were to be allocated to affected industries it must be accompanied by significant cuts to emissions within a timeframe that is consistent with an emissions reduction trajectory that achieves a 60% reduction below 2000 levels by 2050

## International linkages

> *The integration of the ETS through the international trade would have several advantages. First it would reduce global (and Australian) abatement costs by ensuring that the cheapest abatement opportunities were sought out first, wherever they occurred.*
> Garnaut Review March 2008

The Review discusses a number of potential problems with the Clean Development Mechanism (CDM) under the Kyoto protocol that have emerged over the last 2-3 years.

It must be remembered the purpose of the CDM is two-fold; it was used as a "carrot" to allow developing countries (non Annex 1) not subject to emissions targets in the first Kyoto period to be able to participate in the process through technology transfer from the developed world and secondly to provide further global abatement opportunities that can provide a lower overall cost of abatement.

These two principles remain entirely valid. While the post 2012 period will potentially see some targets set for developing countries, the CDM remains a worthwhile part of any international agreement. The issues identified by the Review seem to be issues of verification and additionality. In some cases there is a lack of trust in the abatement activities achieved under the CDM. However much like the decision to ratify the Kyoto protocol in the first place, we see these issues are issues that need to be first engaged with in order for them to be dealt with and improved upon. Importantly, much of this work has been done and a process of continuous improvement is in place.

Australian companies are already providing expert advice all over the world on what constitutes both carbon offsets and additionality under the CDM. Pacific Hydro is providing these services already in India, Brazil, Chile and other countries in South-East Asian through a joint venture with SMEC (Snowy Mountain Engineering Corporation) called Perenia Carbon.

For Pacific Hydro our focus is on the development of new renewable energy assets, which as we have found provide for easy verification and monitoring of abatement and therefore deliver a high degree of certainty. To this point the early teething issues experienced by CDM have not overly affected renewable energy projects which have proven to be highly reliable. To disallow such initiatives participation in the Australian ETS would be counter-productive to the goals of technology transfer and cost effective greenhouse abatement.

However, to help reduce such risks even further it would be worthwhile considering using existing international climate change forums such as the Asia Pacific Partnership on Clean Development and Climate (APP) to agree a common set of trading principles for international linkages that further "underwrite" the CDM process. This would be consistent with suggestions put forward by the Review in relation to developing such bilateral relationships with Papua New Guinea

While much has been made of the increase in emissions in China and India, the following chart shows that without the projects built as a result of the CDM, this would be much worse. The fact is measures like the CDM are already providing significant abatement activity and technology transfer. (Graph should show CO2e avoidances by the CDM activities and China and India CO2 emissions in the last years)

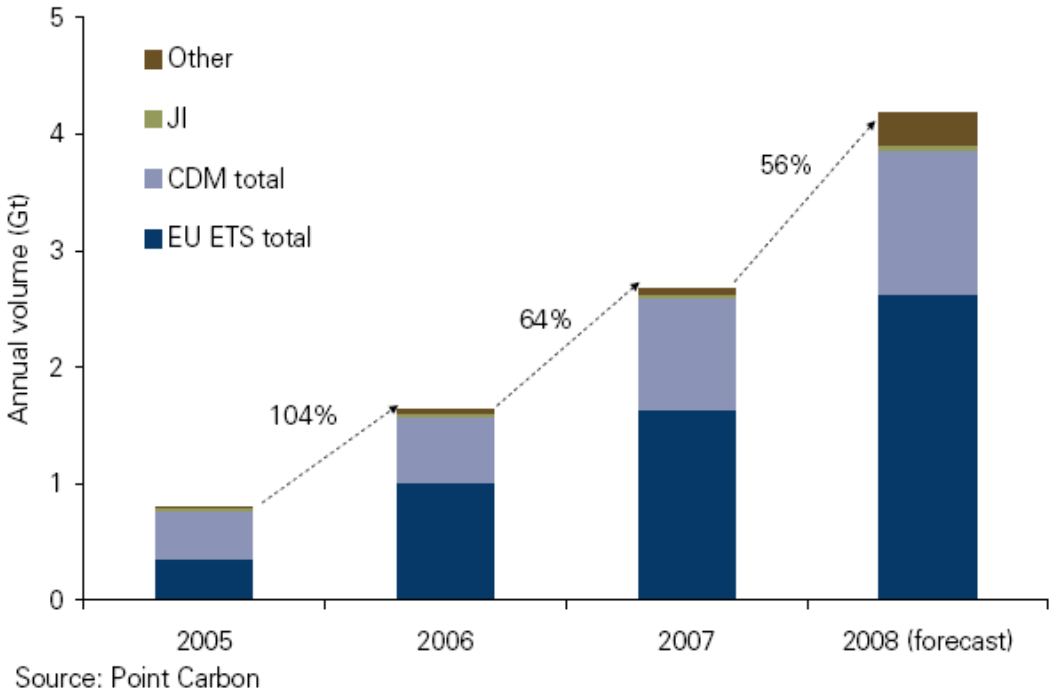
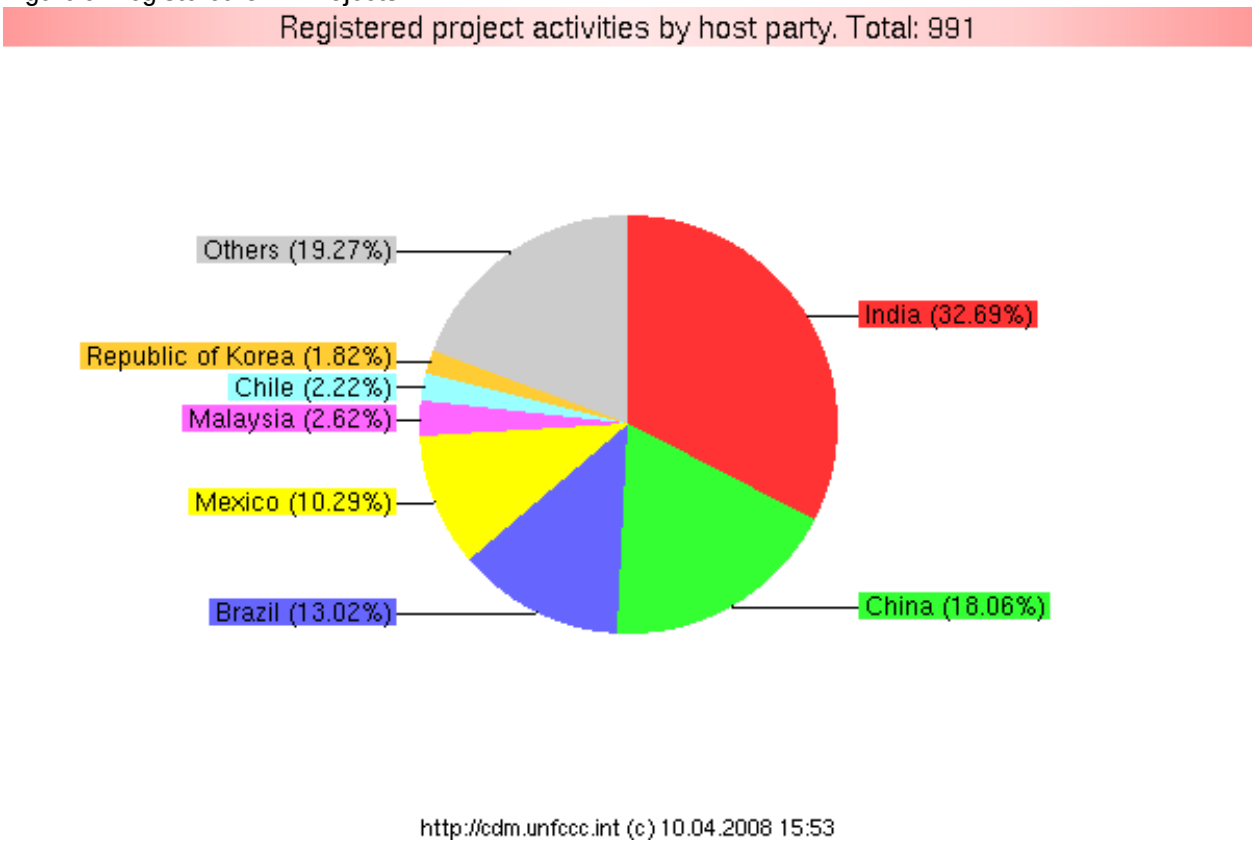



Figure 5: Registered CDM Projects[3]




3 http://cdm.unfccc.int/Statistics/Registration/RegisteredProjActivityChart?party=HostParties&activity=NumberOfProjects&cacheok=True

# Future Issues

## Transmission Infrastructure

> *Infrastructure will be important in Australia's mitigation and adaptation to climate change. Private investment in supply-side infrastructure, particularly for electricity transmission and natural gas and carbon dioxide pipeline transportation, faces first mover disincentives.*
>
> Garnaut Review February 2008

Pacific Hydro is delighted that Review has been so quick to realise the important role public good infrastructure will play in Australia achieving both emissions reductions and continued economic growth. We believe that urgent reform is required in the transmission and distribution segments of the electricity sector. The exact nature of that reform is still open and the Energy Supply Association of Australia has made an important start to the debate with the release of a report[4] on this subject.

We believe that in many cases transmission is a public good and that conventional monopoly regulation in this important area is not appropriate. Transmission lines are similar in their economic nature to some road, port, rail and communications infrastructures where a natural monopoly exists; however conventional monopoly regulation has resulted in large scale under-investment in this infrastructure. An example of both the problem and opportunity is the existing Transmission arrangements means the excellent wind resource in South Western Australia remains isolated from the NEM network as does the geothermal resources in Northern South Australia.

Currently there is no mechanism available to develop new transmission to renewable energy rich remote areas. The costs are prohibitive for the private sector under the conventional monopoly rate of return regulations that persists in Australia that creates a first mover disadvantage while the Government has been reluctant to build infrastructure where it believes it may crowd out more efficient private investment. This stand-off has resulted in continual under-investment in grid maintenance, upgrades and expansion.

The Review correctly identifies work on public contributions being made in Britain and California. We would also like to bring to the Reviews attention, less conventional approaches to this issue already in place in Texas. Appendix 1 to this submission gives the Review an alternative viewpoint into how transmission investment is handled in other parts of the world, in this case, the largest US State of Texas where an excellent wind resource is located in remote areas with no connection to existing grid infrastructure. As a result of their policy Texas achieved the highest level of wind installation in the world in 2006 which affirms our contention that the regulatory environment closely correlates with the investment environment in the sector.

In addition to those initiatives described in the Appendix 1 we encourage the Review and the Federal Government to engage with the private sector in developing a strategic infrastructure initiative that identifies areas of high resource or strategic value such as wind, solar, gas and geothermal resources. Likewise geological storage will require substantial infrastructure assistance if it is to realise its full potential.

Given the threat of first mover disadvantage, potential owners and operators of transmission infrastructure must look to secure a long-term revenue stream before investing. A role of government could be to enter into Public Private Partnerships with industry, by issuing concessions on these infrastructure assets. The level of underwriting "risk" would progressively reduce over time as more generation capacity is connected or usages of the asset increases.

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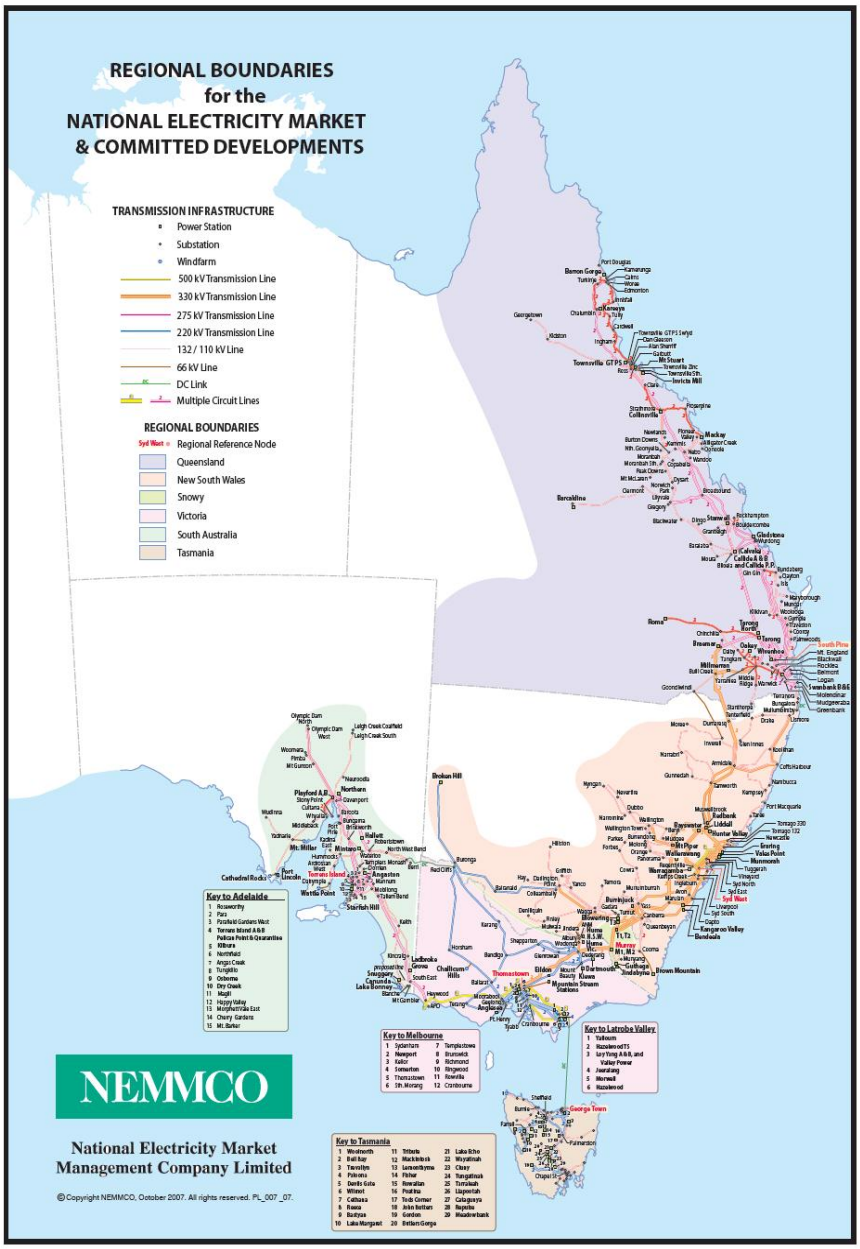
4 http://www.esaa.com.au/images/stories//3cs%20cra%20report_effects%20of%20retail%20price%20regulation%20in%20energy%20markets.pdf

Figure 6: NEM grid




The Australian market currently favours large wind farms connected to the high voltage network while the existing Transmission system favours sources of generation in proximity to the coast. According to a study by the Australia Greenhouse Office, "*the NEM could readily accept 8000MW of wind farms under certain conditions*"[5].

Given the current installation of wind in the NEM is around 1000MW, it is safe to say that the NEM could easily cope with a rapid expansion of the industry in the short term without any major upgrades to the grid infrastructure. However, beyond this substantial new wind capacity will be restricted as will new capacity in many forms of renewable energy such as large scale solar and geothermal.

Therefore, the potential of both the renewable energy and gas industries to deliver deep, long-term cuts to greenhouse emissions will only be realised if the nature of infrastructure planning is reassessed to ensure the equitable treatment of distributed generation investment.

[5] National Wind Power Study, Australian greenhouse Office, November 2003.

## NEM Governance

Consideration of broader policy objectives concerning climate change should give rise to a review of the purely economic objective of the National Electricity Market (NEM) dispatch regulations. The current market objective does not consider the environmental impact associated with the delivery of energy.

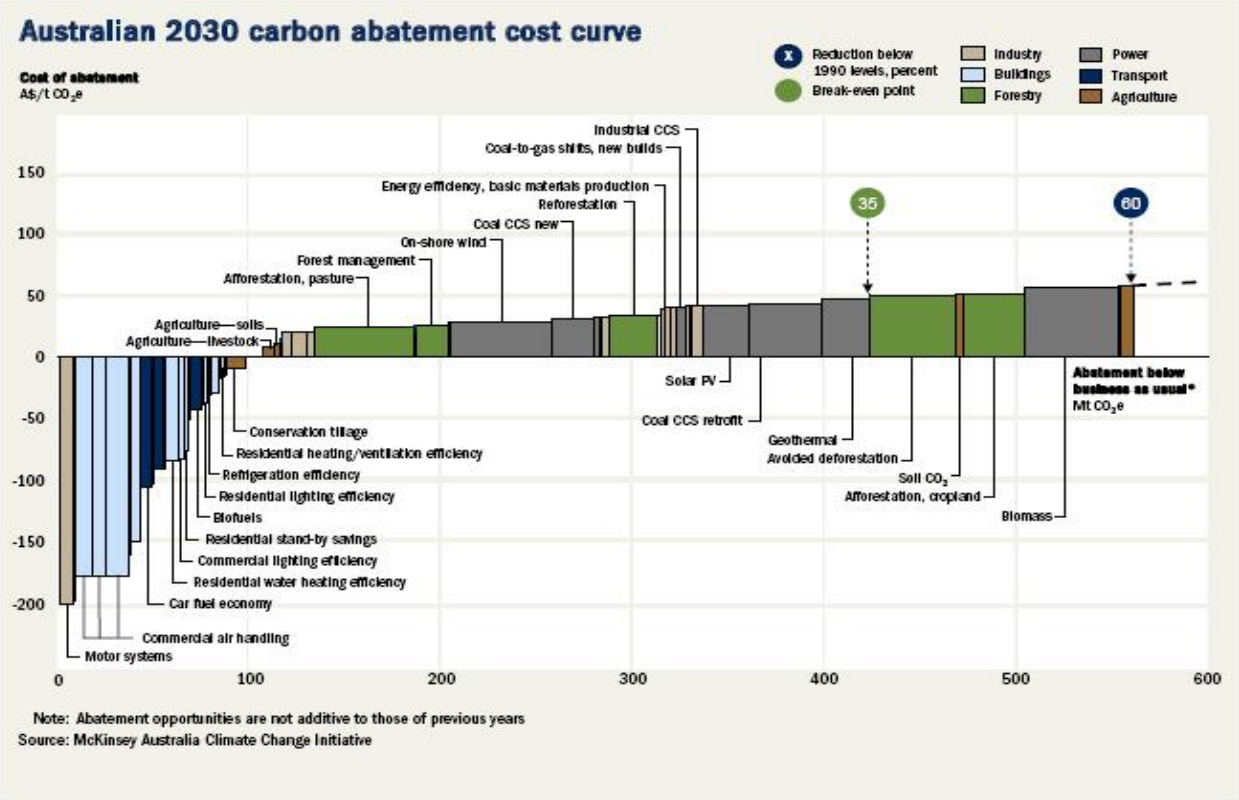
While the NEM objectives aim to deliver the least cost energy, it does so without accounting for the cost to the environment. The objective ought to now be redrafted with the broader aim of delivering the cleanest mix of energy at the least cost. This in turn would help deliver the country's obligations under Kyoto and the overall emission reduction target.

The Rules of the market are currently being amended to bring intermittent generation into the central dispatch. While this provides for a level playing field and improves the management of transmission network flows, it may also lead to a reduction in the availability of green certificates for carbon abatement.

However the system continues to rely on a capacity basis rather than the correct unit of management, energy flow. In the case of intermittent energy sources such as wind, solar and run of river hydro, these sources are offering energy to the market rather than set capacity. A recognition that "energy" is the key market unit being managed rather than capacity would have a different ramification for NEM governance.

The NEM will also have to provide new modelling techniques on top of the marginal cost principles under an expanded MRET because constraining renewable energy in the NEM will reduce the available carbon and other environmental credits and thus impact downstream electricity costs at the retail end.

# APPENDIX 1 Abatement Costs



# APPENDIX 2

# A TEXAS OVERVIEW

## Texas Facts

| | |
|---|---|
| Population | 23 million |
| Installed capacity | 120, 000 MW |
| Net Electric Generation | 400 TWh |
| Natural gas | 50% ($50US a MWh) |
| Coal | 37% |
| Nuclear | 9% |
| Renewable | 3% |
| Wind capacity installed | 4000 MW + 25% growth per year |
| Average Capacity Factors | 40 % |
| Average cost of wind contracts | $40US per MWh |
| Major Players | Horizon Wind Energy<br>BP Energy<br>Shell Wind Energy |
| Governor | Rick Perry ( R ) |

## History

1999 Texas Renewable Portfolio Standard introduced (RPS). Mandated that electricity providers, including retailers and utilities install an additional generation capacity (880MW baseline) by 2009.

Liable parties are mandated to install new renewable capacity proportional to their market shares.

REC market created for liable parties to trade to meet their obligations. The trading program has a life of 20 years 1999-2019.

2005 $1 Billion of investment in wind projects. RPS target achieved. 2880 MW installed capacity (all wind).

Senate Bill 20 passed to increase RPS goal to 5000MW additional installed capacity by 2015 (5,880 MW in total) and 10,000 by 2025.

## Transmission

The major wind developers in Texas locate their wind turbines in areas which are ideal for maximum wind power generation but which also are the least populated and remote areas far from load and demand centres

Senate Bill 20 includes a transmission plan for areas of high wind resource but poor grid connectivity. This was recognised as an issue when the 775MW of wind capacity in West Texas could only export a maximum of the output of 330MW of the installed capacity.

## ERCOTS McCamey plan

The Electricity Reliability Council of Texas (ERCOT) are the transmission operator and traditionally offered developer friendly transmission costs to generator by running a “postage stamp” pricing scheme where all transmission costs were spread evenly amongst all customers regardless of the distances required. However the long time to build transmission lines 5-6 years was still not considered adequate enough for wind generation.

The McCamey plan in 2003 was adopted by ERCOT to construct 345kw transmission lines to the remote McCamey area at a cost of $155 million to connect with 1100MW worth of wind capacity.
The McCamey plan initially required that the transmission lines are 100% subscribed with wind interconnection agreements prior to installation of the 5 year process. This proved insurmountable.

CREZ

To overcome the shortcomings of the McCamey plan, Senate Bill 20 was modified to provide a process whereby ERCOT are able to nominate Competitive Renewable Energy Zones (CREZ).

These Zones are ways to identify the best wind resources anywhere in the state of Texas and details the transmission available in those areas.

The CREZ's will be nominated and defined by 5 July 2007. Once a CREZ passes the nomination process the grid will be paid for evenly by ratepayers.

As a result of the CREZ project, Governor Rick Perry announced that $10 Billion of investment in 10,000 MW has been promised.

On the transmission side, several companies have partnered together to form ventures to build merchant transmission for the CREZ's for the construction of around 2000 km of transmission line and also a 1500km high voltage high capacity backbone transmission system.

Federal Rule for Transmission Access

In February 2007, The Federal Energy Regulatory Commission (FERC) made a ruling to allow greater access to transmission lines for power generators of all types, including renewable energy projects.

Under this rule wind developers are exempt from excessive charges when the amount of energy deliver differs from what they are scheduled to deliver.

This new rule on open access transmission tariffs eliminates the broad discretion that transmission providers have in calculating unused available capacity on their lines.

Texas however is not subject to FERC regulation because most of its transmission lines do not cross state boundaries.

Other US Transmission Policy Initiatives

| Policy | Administered by |
|---|---|
| National Interest Electric transmission Corridors | DOE |

More information

http://www.awea.org/policy/regulatory_policy/transmission.html

# ATTACHMENT 3 Garnaut Climate Change Review Terms of Reference

TERMS OF REFERENCE
30 April 2007

To report to the Governments of the eight States and Territories of Australia, and if invited to do so, to the Prime Minister of Australia, on:

1. The likely effect of human induced climate change on Australia's economy, environment, and water resources in the absence of effective national and international efforts to substantially cut greenhouse gas emissions;

2. The possible ameliorating effects of international policy reform on climate change, and the costs and benefits of various international and Australian policy interventions on Australian economic activity;

3. The role that Australia can play in the development and implementation of effective international policies on climate change; and

4. In the light of 1 to 3, recommend medium to long-term policy options for Australia, and the time path for their implementation which, taking the costs and benefits of domestic and international policies on climate change into account, will produce the best possible outcomes for Australia. In making these recommendations, the Review will consider policies that: mitigate climate change, reduce the costs of adjustment to climate change (including through the acceleration of technological change in supply and use of energy), and reduce any adverse effects of climate change and mitigating policy responses on Australian incomes.

This Review should take into account the following core factors:
- The regional, sectoral and distributional implications of climate change and policies to mitigate climate change;

- The economic and strategic opportunities for Australia from playing a leading role in our region's shift to a more carbon-efficient economy, including the potential for Australia to become a regional hub for the technologies and industries associated with global movement to low carbon emissions; and

- The costs and benefits of Australia taking significant action to mitigate climate change ahead of competitor nations;

And

- The weight of scientific opinion that developed countries need to reduce their greenhouse gas emissions by 60 percent by 2050 against 2000 emission levels, if global greenhouse gas concentrations in the atmosphere are to be stabilised to between 450 and 550ppm by mid century. Consult with key stakeholders to understand views and inform analysis. A draft Report is to be distributed for comment by June 30 2008. The final Report is to be completed and published by September 30 2008. Interim draft reports on particular issues may be released before that time for public discussion. The Report will embody the independent judgments of its author.