



## **Managing Electricity Related Greenhouse Emissions in New South Wales via Retail Licence Conditions – Projected impacts and the importance of accurate accounting**

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### *Abstract:*

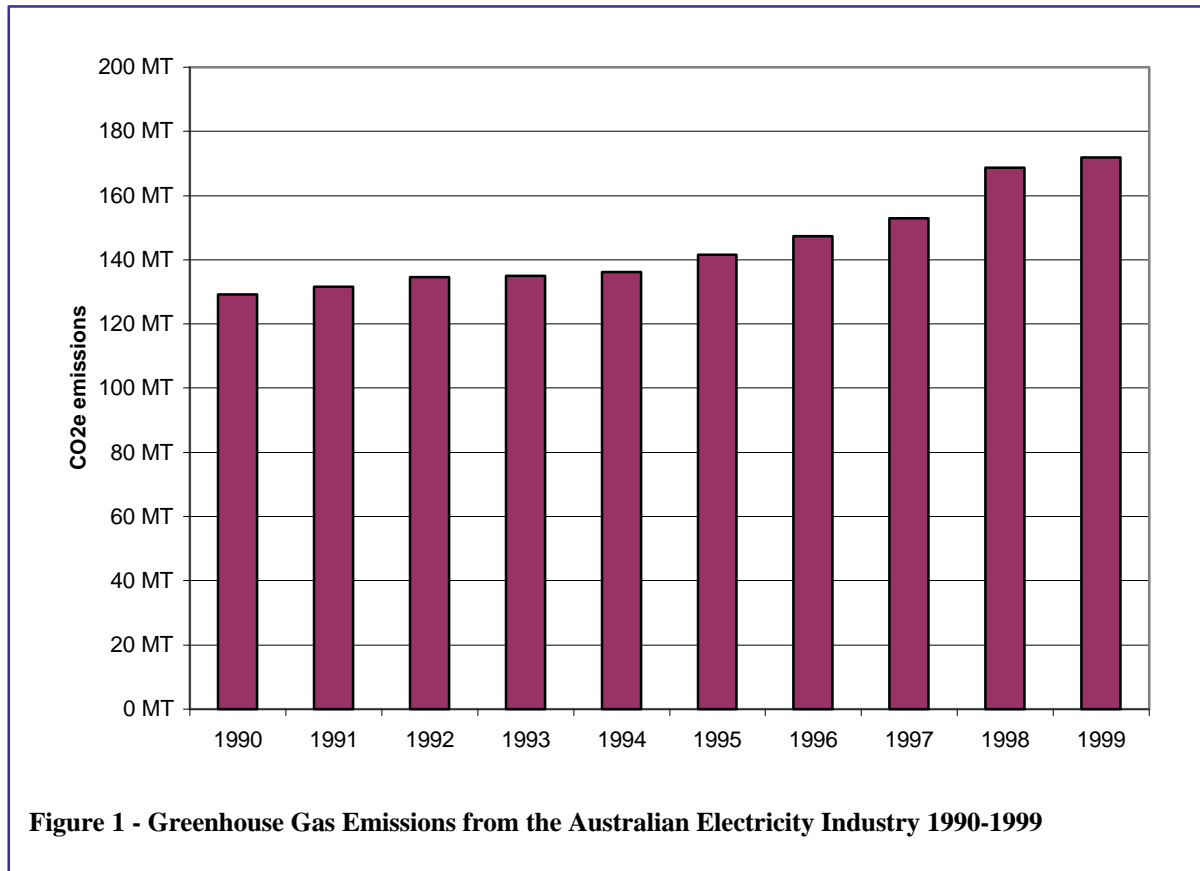
In December 2001 the NSW Government released a proposal to reform the Greenhouse Gas emissions targets contained within the Electricity Retailer Licence Conditions under the NSW Electricity Supply Act (1995). These licence conditions set annual per capita emissions reduction targets between 1996/97 and 2000/01 for the State's electricity retailers. However the GHG Licence Conditions proved to be of very limited impact. A primary reason was the lack of credible penalties for non-compliance by retailers. The reforms currently proposed by the NSW Government include applying a penalty for non-compliance and resetting the emission targets. If successfully implemented, the NSW scheme could make a significant contribution towards placing the NSW Electricity Supply Industry on an emissions reductions path compatible with Kyoto protocol compliance for the sector. Unfortunately, implementation of the scheme as proposed has a number of significant difficulties that may mean that the reformed licence conditions are no more effective than the previous arrangements. A significant issue is the lack of accounting reconciliation between activities claimed under the revised NSW licence conditions, and activities claimed under the Federal Mandatory Renewable Energy Target (MRET) to ensure credit is not claimed for the same action under both schemes. Because of the lack of accounting reconciliation with the MRET an effect similar to "double-counting" arises. The probable outcome is that the introduction of the NSW Licence Conditions as currently proposed will not lead to any significant greenhouse gas emission abatement additional to that already legislated under MRET. It is further possible that NSW electricity consumers will in effect disproportionately fund actions already planned to occur under the national MRET program. This lack of accounting reconciliation between separate NSW and federal programs would seem to threaten the success of the NSW licensing scheme in driving GHG emissions reductions in the electricity sector.

This paper is based on the proposed framework as detailed in public documents released by the Ministry of Energy and Utilities. The authors are aware that considerable development work has occurred within government on the proposed licence conditions over recent months, however since this material is not publicly available, analysis has been performed using the released papers.

## Macro policy problem – Greenhouse Gas Emissions above potential targets

Whilst not universally accepted, the Kyoto Protocol is a useful benchmark against which to assess greenhouse gas (GHG) related policy options. Should the Kyoto Protocol as currently formulated become binding on Australia, it would be obliged to cap national greenhouse gas emissions at no more than five times 108% of 1990 emissions during the first five year commitment period, 2008-2012.

In 1999 Australia's total greenhouse emissions<sup>1</sup> were 458 MT CO<sub>2</sub>-e, of which the Electricity Supply Industry (ESI) emitted 172 MT CO<sub>2</sub>e. On a national basis the ESI is responsible for 37% of Australian greenhouse emissions, making it the largest sectoral source of greenhouse emissions. Further, its emissions are growing at a faster rate than any other sector [1]. Figure 1 shows the trend in electricity sector emissions between 1990 and 1999 [2].



GHG emissions attributable to the ESI in 1990 were approximately 129 MT CO<sub>2</sub>e, and ESI emissions nationally grew by 43 Mt (33.1%) from 1990 to 1999. If it is assumed that the Kyoto Protocol target were applied pro-rata to the ESI, then the average target emissions for the ESI during the Kyoto Protocol First Commitment Period (2008-2012) would be around 140 MT CO<sub>2</sub>e pa (being an 8% increase from 1990 emissions).

Clearly there is an upward trend for electricity related emissions. There is of course uncertainty as to if this trend will continue, and at what rate.

Modelling conducted by Monash University using the MMRF-GREEN model [3, 4] suggests that the gap between Australia's Kyoto target and Business As Usual (BAU) emission levels at the start of the first Kyoto commitment period could be approximately 113 MTCO<sub>2</sub>e pa. Assuming that the ESI

<sup>1</sup> Following the convention applied in the Australian National Greenhouse Gas Inventory, this figure does not account for Forest and Grassland Conversion – i.e.: Land clearing. In 1995, estimated emissions from land clearing totaled the equivalent of 85 MT of CO<sub>2</sub>, a decline of 38 MT, or 31%, from the 123 Mt emitted in 1990. Uncertainty estimates currently stand at about ± 30% for the rate of change in area cleared and ± 40% for change in carbon per unit area.

remains at 37% of the national total, and that the ESI were required to reduce emissions on a pro-rata basis with their contribution to the national total, then this would imply that the ESI would need to reduce emissions by 35 – 45 MT pa. Note however that on current growth trends, the ESI will represent more than 37% of the national total by 2010, and hence 35-45 MT may be an underestimate of the implied obligation to reduce ESI emissions.

An alternate analysis comes from Australia's Second National Report under the UNFCCC, prepared by Environment Australia in 1997. This report projected that stationary energy emissions (of which electricity generation is responsible for approximately 62%) would be 208 MT CO<sub>2</sub>e in 2010, implying that the ESI emissions would be around 186 MT CO<sub>2</sub>e. On this estimate, the ESI emissions will be "over-target" by around 45MT CO<sub>2</sub>e. It is important to note that in the 5 years since the Second National Report in 1997, actual emissions have consistently been greater than projected, so on that basis the excess emissions from the ESI would be greater than 45MT CO<sub>2</sub>e in 2010.

It should be noted that there is some potential for Kyoto compliance strategies that take larger reductions from 'easier' emissions sectors – such as altering land use practices and various forms of carbon storage. This may challenge the rationale for the ESI to undertake actions in proportion to their contribution to emissions. A great deal of work is currently underway to develop these options, although significant carbon accounting and basic science issues remain.

Nevertheless, it remains clear that the Australian electricity industry faces a significant challenge to meet the Kyoto Protocol target during the first commitment period. Given the investment lead times for electricity related infrastructure – generally measured in years, and the long asset life (often in excess of 30 years), policy settings need to be made earlier rather than later.

## **Current Policy Settings**

As of early 2002, there are four major Federal and State initiatives directly focused on either changing the electricity generation mix or undertaking other abatement activity, vis:

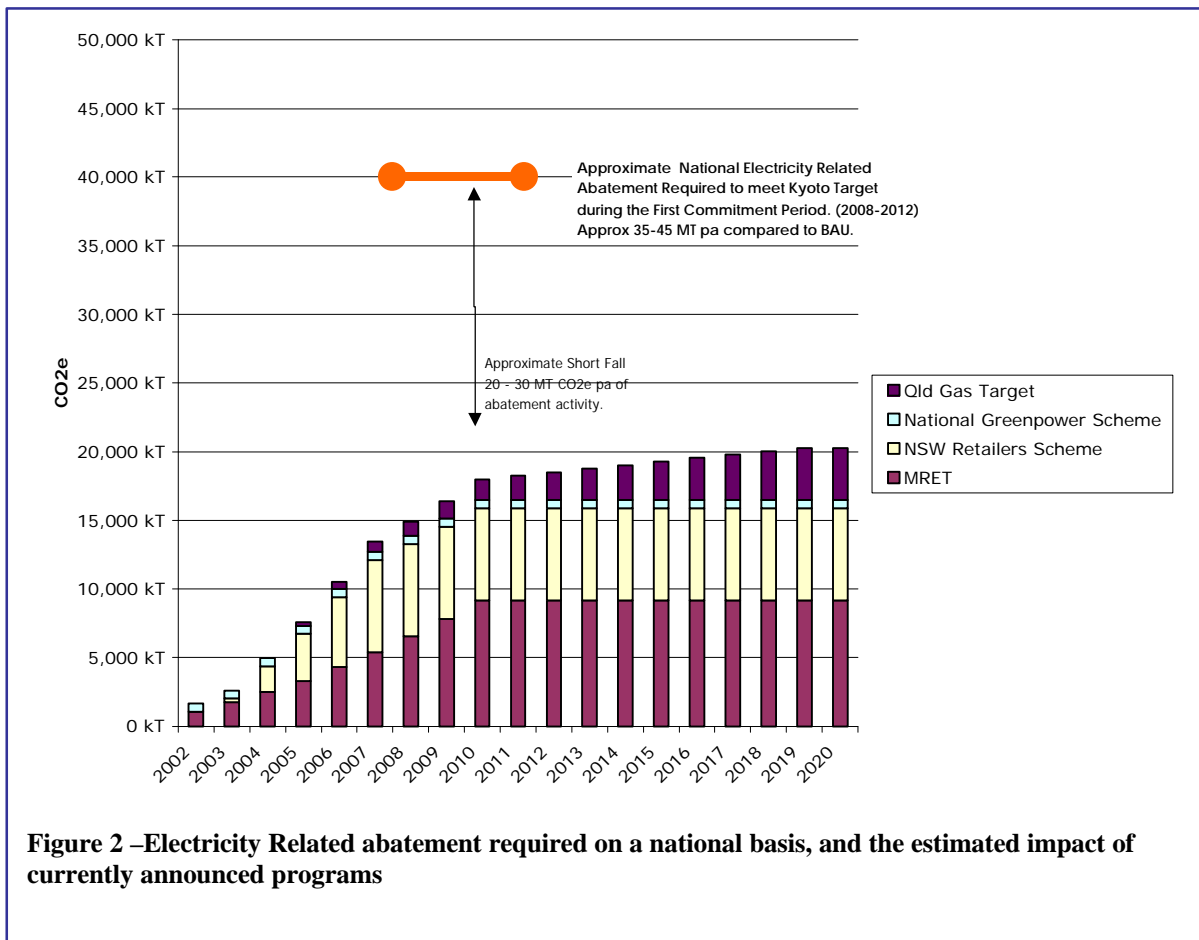
- The Federal Mandatory Renewable Energy Target (MRET – sometimes referred to as the "2% renewable target")
- The NSW GHG Licence Conditions on NSW Electricity Retailers
- The Queensland Gas and Renewables Policy (Queensland Cleaner Energy Strategy)
- The National Greenpower Program (A consortium of state based programs).

There are a number of other more focused programs and policies that impact the area – such as rebates for the installation of Photovoltaic systems, subsidised energy audits, Generator Efficiency Standards, etc. Despite the success of some of these programs, individually they remain relatively minor in impact compared to the broad market impacts targeted by the schemes listed above<sup>2</sup>.

Even if the four programs listed are implemented completely as currently outlined (with appropriate accounting reconciliation between programs, which is a significant issue), no Australian state, and certainly not Australia as a whole, would come close to meeting the Kyoto Protocol targets as it might reasonably relate to electricity related emissions – as shown in Figure 2.

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<sup>2</sup> Most of the impact of these other initiatives (such as the generator efficiency standards) would also count under the NSW Scheme. For example, if a significant reduction in emissions intensity was achieved, this could be sold as an Assigned Generation Declaration under the NSW Scheme, and thus would not be additional to it.



Clearly, even allowing for perfect implementation of all existing and announced programs, further significant initiatives will be required.

## The NSW Retailers Greenhouse Gas Licence Conditions – 1995 - 2001

The NSW Electricity Supply Act (1995) was the key instrument for the implementation of electricity industry reform within New South Wales. The Act contains a series of licence conditions that apply to persons holding an Electricity Retailers Licence or an Electricity Distributor Licence.

The licence conditions<sup>3</sup> provide for the Energy Minister to set greenhouse emissions targets and require that Electricity Retailers negotiate strategy documents with the NSW Minister for Energy. The implementation of those strategies is required to be audited by the NSW EPA at least once every three years. [5]

Implementation planning for these provisions occurred during 1996, and the NSW Government decided to apply Per Capita emissions targets (outlined below) to the NSW Retailers. These targets took effect from 1997/98 to 2000/01 – reporting being conducted on financial year periods.

### Why was the target applied to retailers?

Given the inter-connected nature of the electricity supply industry some emissions from generators located in SA, Vic and Qld are in fact due to meeting load in NSW, and vice versa.

<sup>3</sup> Licence conditions are applied under Schedule 2 of the Electricity Supply Act. In particular, The Hon. J. H. Jobling (Liberal Party – Opposition) moved amendments on 13<sup>th</sup> December 1995 that required retailers to prepare strategies for meeting targets to be set by the Minister, and for the NSW EPA to audit the effectiveness of those strategies. The NSW Labor Party Government accepted these amendments.

Putting aside the physical reality, the NSW scheme defines a fictional “NSW Pool” and estimates the emissions due to the NSW area of the National Market. The activity of retailing electricity<sup>4</sup> in-fact produces no emissions – emissions are due to electricity generation activity. The Act however attached an emission constraint to retailers for three main reasons:

- The retailers are clearly within the constitutional reach of the NSW Government, unlike the generators, which participate in a national market. Hence applying the constraint to the generators would raise the possibility of legal challenge under s92 of the constitution. (Trade between the states to be absolutely free.) However it is interesting to note that some legal practitioners suggested to the authors that a legal challenge to the validity of the retail licence conditions is under consideration, given the NSW Government’s proposed changes to the licence conditions.
- Retailers have access to end-use customers, and hence have scope to undertake activities such as end use energy efficiency, or altering the end-use fuel mix.
- Retailers have the flexibility to undertake investments across the spectrum of generation, sequestration and end-use activities, and are able to sell multiple competing fuels such as both natural gas and electricity.

### **How successful have the Licence Conditions been to date in reducing NSW emissions?**

The NSW Greenhouse Gas Licence Conditions have been unsuccessful in persuading electricity retailers to meet their emissions targets. The only formal target in the scheme was the end-point in 2000/01, although the interpolated “benchmarks” in intermediate years between 1997/98 and 2000/01 provided some guide as to how well retailers were performing.

Throughout the period 1997/98 to 1999/00 the large majority of retailers did not meet the interpolated benchmarks. Since these were not formally defined, this did not represent a breach of licence conditions. For the final period 2000/01 (and in the words of the IPART compliance report) *“only two retailers achieved their benchmark emissions level. The remaining 20 exceeded the benchmark by an average 15.5 per cent.”*[6]

This outcome was foreshadowed between 1997 and 2001 by several Licence Compliance Advisory Board (LCAB) reports [7-9], and in the annual compliance reports produced by the Ministry of Energy and Utilities and by the Independent Pricing and Regulatory Tribunal (IPART) [6, 10].

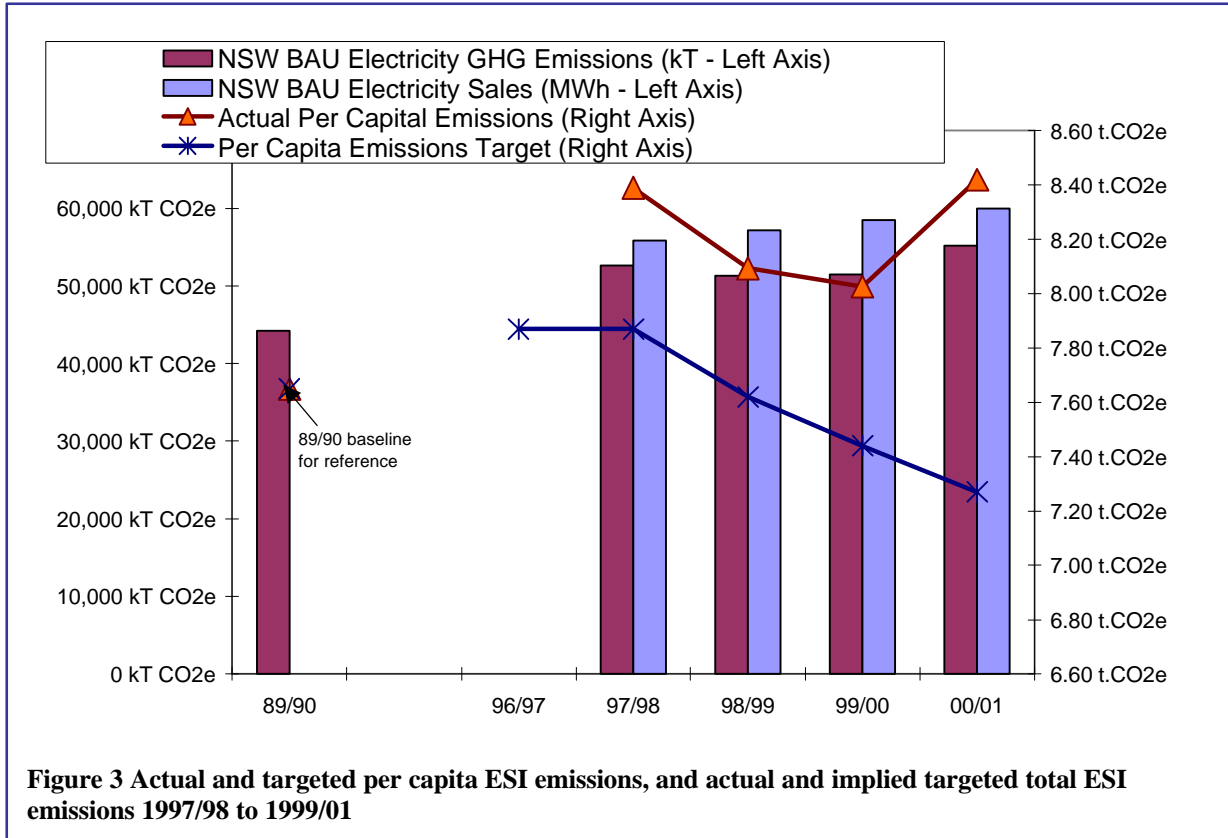
Figure 3 shows the per-capita emissions targets [11] and the actual per-capita emissions achieved. Data for 97/98 to 00/01 is actual emissions and electricity sales data from a variety of sources [7-10].

For ease of reference, this graph also shows the actual electricity sales, and the absolute greenhouse emissions.<sup>5</sup>

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<sup>4</sup> Retailing is the activity of purchasing bulk electricity in the wholesale NEM, and selling smaller parcels of electricity to retail consumers.

<sup>5</sup> NSW Electricity Sales data is actual historical data and Transgrid forecast data. Underlying population data is from the ABS.



## Why were the licence conditions unsuccessful?

Based upon discussions with relevant managers within retail organizations and responsible NSW Government departments, and having reviewed all the available audit reports, a number of reasons for the performance of the scheme between 1997 and 2001 can be suggested:

- A retailer was judged to comply with the scheme if it had negotiated a strategy plan with the Minister and reported on progress against this plan [12]. No requirement existed that a strategy plan had to target meeting the benchmark. In the extreme, a strategy plan could thus in fact target NOT reaching the benchmark, and a progress report could then state that (as planned) no progress towards the benchmark had occurred, and this would still be considered “compliant” by the Ministry of Energy and Utilities.
- The intermediate benchmarks were non-binding, and there was no credible penalty for not meeting the benchmarks. The stated penalties were as for any non-compliance against licence conditions – representing a potential flat penalty applied by IPART. As noted above, showing “non-compliance” in a legal sense would be very difficult because of the manner of the phrasing of the requirement. During the life of the scheme no penalties for non-compliance were imposed on any retailer.
- Confusion existed regarding the eligible activities, the manner in which compliance could be achieved, and the reports required to demonstrate the impacts achieved.
- Lack of rigour in regulatory enforcement, and a perception that other larger regulatory issues existed to be addressed.
- Complexity of the accounting methodologies, and large differences in technical “rigour” between some of the abatement categories. Particular weakness existed in the definition of “Electricity Sales Foregone” – which was intended to account for retailer initiated energy efficiency actions.

- Extreme price pressure upon retailers in their primary business of retailing electricity, lead to a lack of institutional focus on “non-core” regulatory requirements.
- Lack of tradability and market orientation in the licence conditions impeded the ability of over-compliant retailers to trade with non-compliant ones. However given the other difficulties with the scheme, it would seem unlikely that a non-compliant retailer would in fact have been willing to enter into a commercial arrangement to become compliant, given the low financial risk of remaining non-compliant.

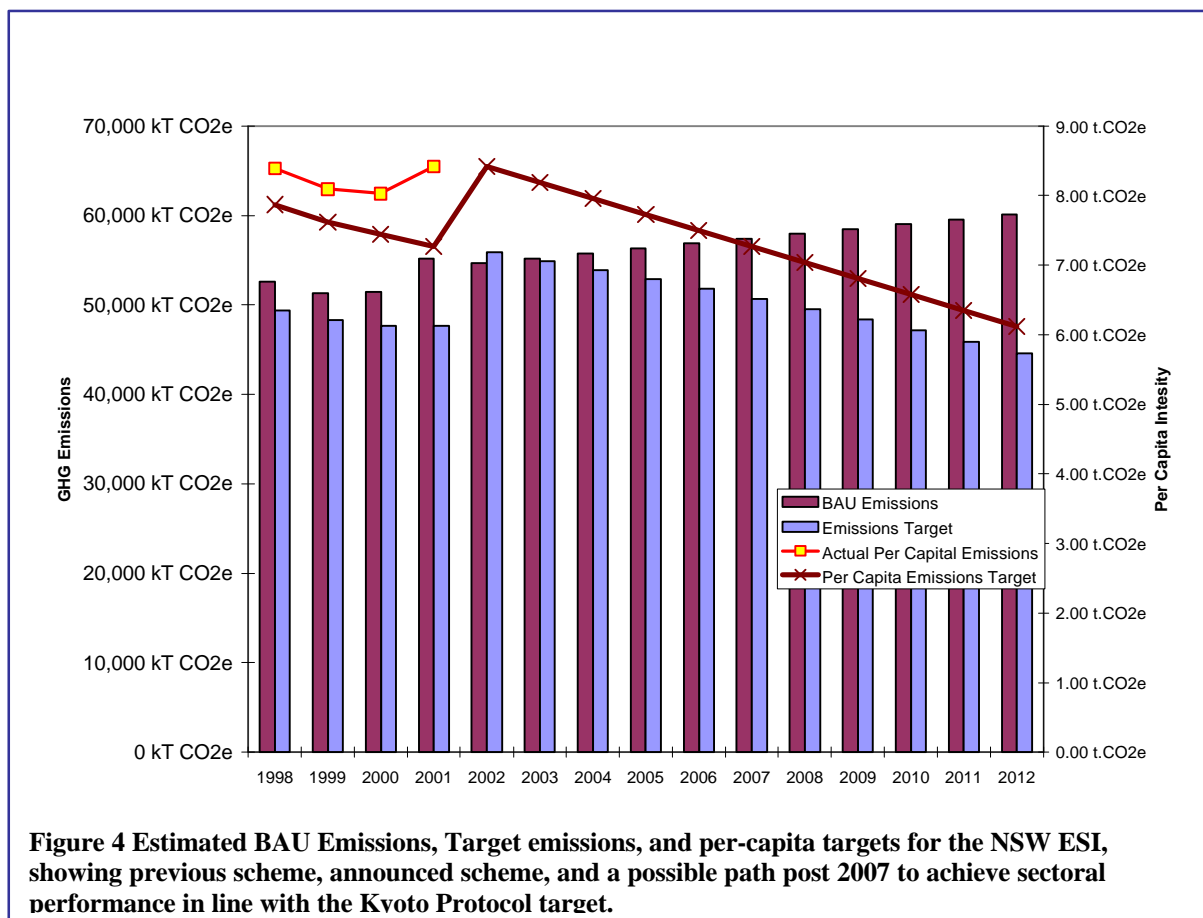
### Proposed reforms to the Licence Conditions – 2002 – 2007

A major stated objective of the NSW Government reform proposal released in December 2001 is to impose financial penalties for non-compliance against annual per-capita targets that have been reset.

The proposal states, “In 2006-07, the benchmark target will be 7.27 tonnes per capita (i.e. a five per cent reduction compared with emission levels in 1989 -90). Interim targets will step down in a linear fashion from 2001-02 (in which the target will be set at 8.42 tonnes per capita, which is the actual level of emissions in 2000-01) to the final benchmark of 7.27 tonnes per capita in 2006-07.”[12]

Taking 1997 as the base year, the past and future licence conditions may be characterised as shown in Figure 4.

If successfully implemented, the NSW Licence conditions could place the NSW ESI on a path to achieving sectoral compliance with the Kyoto Protocol. To achieve this, per-capita targets would need to continue to decline linearly post 2007, down to around 6.12 T.CO2e per capita in 2012. It should be noted that the current NSW proposal is to hold targets constant post-2007. For the sake of demonstrating the approximately reduction path required, a linear decline is projected has been



**Figure 4 Estimated BAU Emissions, Target emissions, and per-capita targets for the NSW ESI, showing previous scheme, announced scheme, and a possible path post 2007 to achieve sectoral performance in line with the Kyoto Protocol target.**

shown in Figure 4, along with the historical and future level of targets, actual performance, per-capita targets and Business as Usual emissions growth.

It can be seen that the reform proposal resets the per capita emissions target to above the 1998 level, and represents a substantial increase in emissions compared to the emissions level at the commencement of the licence conditions in 1996.

## **A key flaw in the NSW Licence Conditions as proposed is the lack of additional impact given current Federal activity.**

The accounting rules developed by the Ministry of Energy and Utilities for the NSW Licence Conditions [13] have the following to say on the issue of accounting reconciliation between multiple greenhouse related schemes at a federal and a state level:

“The reconciliation of AGD<sup>6</sup>s with actual physical performance reflects the intention that the greenhouse benefits of assigned generation should not be devalued by being over-estimated or by being counted more than once. Generators making declarations are therefore required to declare that the greenhouse benefit assigned to NSW retailers for inclusion in their emission reports under the NSW Electricity Supply Act 1995 are not assigned to any other party, for any other similar purpose, such as electricity retailer licence compliance regimes in other State or Territory jurisdictions. **This does not preclude retailers from using the same energy for compliance under substantially different national regimes such as the Commonwealth “2% Renewables” measure, if applicable. The transfer or sale of renewable certificates by a generator under the “2% Renewables” measure to a retailer does not preclude that generator from assigning the same energy separately to the same retailer or to another retailer for NSW licence compliance.** The final arrangement will be a matter for agreement between the parties.”<sup>7</sup> (Emphasis added.)

The accounting rules do not make clear in what way the MRET is “substantially different”, and this is made more confusing since the guidelines do aim to prevent “double counting” against the Queensland gas scheme, which is (like MRET) based on a MWh and % generation basis. This would appear particularly inconsistent compared to the MRET treatment.

Consideration needs to be given to the probable impact of not precluding compliance to the NSW AGD’s through non-additional MRET.

The definitions for accreditation under the MRET are more restrictive than under the NSW Scheme for Assigned Generation. The result is that all current and future generators that are accredited under the MRET scheme appear capable of issuing AGD’s in respect of energy output that earns Renewable Energy Certificates, and are connected to the National Electricity Market (NEM).

It has been specifically confirmed to the authors by the NSW Ministry of Energy and Utilities<sup>8</sup> that there will not be any attempt to reconcile accounting between the MRET and the NSW Scheme. This appears to be on the belief that since the MRET is based on MWh and the NSW Licence Conditions are based on per-capita emissions, that therefore “double counting” is undefined.

In summary, generators accredited under MRET and located in Queensland, New South Wales, the Australian Capital Territory, Victoria and South Australia will be able to produce and market **both** Renewable Energy Certificates under the Federal MRET scheme, and Assigned Generation Declarations under the NSW Scheme for the same generated MWh’s of electricity.

To consider what this means for the impact of the NSW scheme it is worth considering the respective sizes of the NSW Licence Condition scheme and the MRET. This comparison is made somewhat difficult for two reasons:

- The NSW Scheme is defined in per-capita emissions whilst the MRET base is MWh of generation.
- The amount of NEM and Non-NEM MRET accredited generation over the next 10 years must be extrapolated.

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<sup>6</sup> Assigned Generation Declaration – essentially a form of claiming low emission generation output.

<sup>7</sup> Greenhouse Methodology as approved October 2000 by NSW DOE – Page 23.

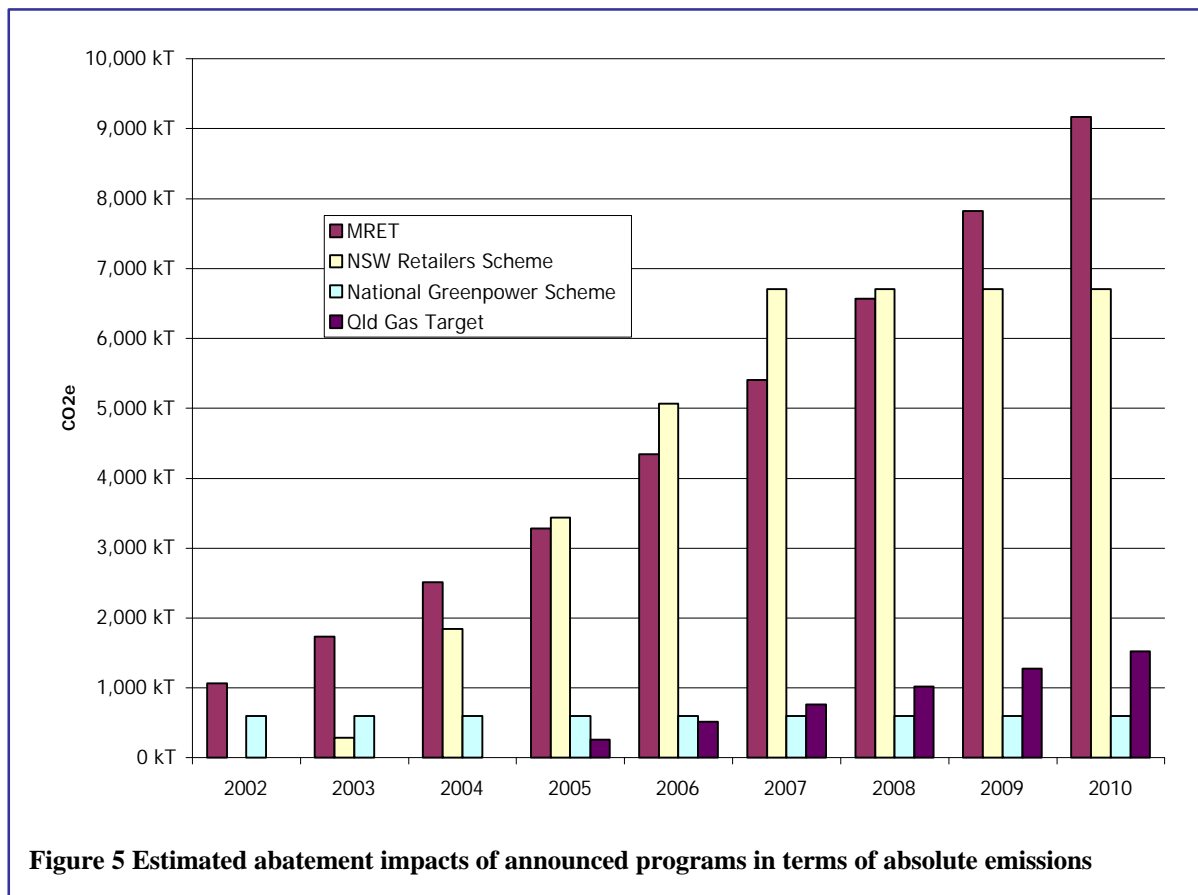
<sup>8</sup> E-mail correspondence from MEU to Karel Nolles



The authors have made the comparison on the basis of assumptions<sup>9</sup> about electricity sales, population growth and emission intensity to 2010.

For comparison purposes, the potential impacts of the voluntary Greenpower program and the proposed Queensland Gas Policy have also been estimated, using similar assumptions.

The estimated annual impacts for each year of operation (in absolute terms, and putting aside any double counting) are shown in Figure 5.



Clearly the two largest programs in terms of potential impact are the Federal Government MRET and the NSW Retailers Licence Scheme.

## MRET mostly negates need for additional action under NSW licence conditions

In most years the impact of the MRET scheme exceeds that of the NSW Retailer scheme. This makes the issue of additionality between the schemes particularly important.

In most years there will be sufficient new low emission generation entering the National Electricity Market (NEM) due to the legislated MRET requirement for NSW Retailers to purchase sufficient

<sup>9</sup> Conversion of impacts of each scheme to a standard unit of total emissions impact in tons of CO2 requires making assumptions about population growth and the average emission intensity of electricity in Australia. For this analysis NGGI and ESAA figures were used to calculate the total emission intensity of electricity consumption in Australia to be around 0.97 kg/kWh<sup>9</sup> (using this figure actually slightly overstates the impact of the NSW Retailers Scheme, since the NSW Pool Coefficient would generally be below the national average). Where required in the analysis population data was obtained from the ABS. Another factor to consider is the slightly different lengths of the various schemes. For example the MRET is legislated to rise until 2010 and remain constant thereafter – the NSW scheme is proposed to have a declining per-capita target until 2007, and remain constant thereafter.

AGD's to meet their NSW Licence Conditions without any additional abatement actions being required.

Thus the policy impact of the NSW scheme on absolute greenhouse emissions from the electricity sector would appear likely to be nil or very small.

However in effect NSW may be able to claim the emission reductions achieved nationally under the MRET.

Given the lack of accounting reconciliation between the MRET and the NSW Licence Conditions, and that the MRET driven abatement exceeds the NSW scheme abatement, it appears that in most years the additional quantity of low emission generation will be Nil.

Since the quantity of low emission generation being supplied remains unchanged, this would imply that the marginal cost of supplying an extra unit of low-emission generation would be unchanged from the case where only MRET is operating.

However the income to any individual producer will now come from the sale of two potential instruments (an AGD and a REC), rather than one (a REC), along with the sale of the underlying electricity.

That is, since the total quantity of low emission generation demanded (in most years) will not rise (the quantity usually being set by the MRET) the marginal cost to supply a unit of low-emission energy will remain the same as with the MRET only. However since this cost may be met by the sale of both a REC and an AGD, this would imply that the price of REC's would fall as the price of an AGD rises. Any positive price achieved for an AGD would flow through the market as a reduced price for RECs, since under perfect market conditions the total cash flow would be competed down to the marginal cost of supply.

In reality, given that other options apart from low emission generation exist under the NSW Scheme guidelines (such as Carbon Sequestration), it would seem unlikely that the price of an AGD would be able to rise significantly above zero, since it would be competed down against other options seeking to fill the small increment existing between the impact of the schemes in some years.

Although this analysis ignores the complexity of the two inter-related markets, it successfully captures our main conjecture. For most years of the proposed NSW Scheme, the marginal cost of additional generation will be set by the MRET demand alone, despite the fact that the NSW Scheme has a broader definition of acceptable low emission generation.

The Electricity Restructuring Group at the UNSW is currently developing an experimental economics research task targeting the possible interrelation between the two markets over time, and aims to discuss these dynamics in a future paper.

## **NSW Consumers may disproportionately fund MRET**

Given that in most years MRET will force the introduction of sufficient new low-emission generation to meet the NSW Retailers demand for AGD's, and that ALL AGD purchases by retailers must be recouped from NSW Electricity Consumers (since only NSW Retailers are subject to the scheme), whilst the REC purchases are recouped nationally, any AGD price above zero would tend to imply that NSW Electricity Consumers are subsidising nationally based MRET activities, in effect subsidising consumers in other states.

Since the minimum cost to produce a good sets a floor price in a market (since no-one should be willing to sell at below their marginal cost of production for any length of time), and since it will be allowed to account the same unit of energy between both schemes, a possible scenario is that renewable generators producing REC's will offer an AGD at a very low price.

This means that the apparent reductions in NSW Per Capita emissions will in fact be due to the accounting methodology applied, and the counting of interstate activity under the NSW Scheme. Actual emissions – both nationally and in NSW as measured at the “end of pipe” may be unaffected.

Some additionality may occur in 2005-2007, when the AGD target will exceed the MRET. This excess could be met through other instruments allowed under the NSW scheme, such as sequestration credits or energy efficiency (ESF) claims. It is however unlikely that any significant sales of other options (such as Carbon Sequestration Credits) will occur even during the years where the abatement required under the NSW Scheme exceeds that from MRET, simply because these options will be

competing to supply the marginal excess between the schemes (which is a relatively small demand), and will also be competing against potential additional generation from existing renewables primarily driven by the MRET.

## Conclusion

If successfully implemented, the licence conditions as proposed would make a significant contribution towards placing NSW Electricity Supply Industry on a path towards sectoral compliance with the Kyoto protocol. However significant implementation hurdles exist.

The most significant failing, would seem to be the lack of accounting reconciliation between the AGD's under the NSW licence conditions and the REC's under the Federal 2% Renewable Target (MRET).

The effect is akin to "double counting", with the result that the NSW Licence Conditions will have a limited impact in terms of both actual absolute emissions and in attracting additional investments into low emission generation or sequestration activity. The majority of the apparent reduction in emissions will be a result of the accounting methodology used.

One possible way to resolve this issue would be to require NSW Retailers to surrender the REC's associated with energy claimed under NSW Licence Conditions to a NSW Government account.

In particular, given the framework released by the MEU in December 2001, the following effects will be observed:

- The price of Assigned Generation Declarations will be very low, and will largely come from generators accredited under MRET, or plant that is already economic with existing electricity prices (such as some gas cogeneration plant).
- There will be limited uptake of other options, such as Carbon Sequestration.
- The national emissions of greenhouse gases from the Electricity Supply Industry will be essentially unaffected.

Unless some form of accounting methodology is developed to reconcile the MRET and the NSW Licence Conditions, it would seem likely that the NSW Licence Conditions will be no more effective between 2002-2007 at managing total ESI emissions than they were between 1996-2001.

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## About the Electricity Restructuring Group:

The Electricity Restructuring Group is an informal collaboration between a number of academics and post-grad students, primarily from within the School of Electrical Engineering at the UNSW. Our mutual research focus is upon the operation of the National Electricity Market (and related markets).

The Electricity Restructuring Group participants have backgrounds across a number of disciplines, and in individual capacities have strong relationships with the Securities Industry Research Centre of Australiasia (SIRCA), the Australian Financial Markets Association (AFMA) and the Co-operative Research Centre for Renewable Energy (ACRE).

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