Centre for Energy and Environmental Markets

The NSW Greenhouse Gas Reduction Scheme:

An analysis of the NGAC Registry for the 2003, 2004 and 2005 Compliance Periods

Sources of registered NGACs,

Estimated impacts on NSW electricity emissions,

Unresolved issues of Scheme design & additionality, and

Governance implications

CEEM discussion paper
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About CEEM:

The UNSW Centre for Energy and Environmental Markets (CEEM) undertakes interdisciplinary research in the design, analysis and performance monitoring of energy and environmental markets and their associated policy frameworks. CEEM brings together UNSW researchers from the Faculty of Business, the Faculty of Engineering, the Australian Graduate School of Management, the Institute of Environmental Studies, and the Faculty of Arts and Social Sciences, working alongside a growing number of international partners. Its research areas include the design of spot, ancillary and forward electricity markets, market-based environmental regulation and the broader policy context in which all these markets operate. You can learn more of CEEM's work by visiting its website: www.ceem.unsw.edu.au.

About this paper:

This discussion paper builds on work by CEEM researchers over the last five years exploring emissions trading scheme design generally, and the evolving efforts by NSW to impose such a scheme through retailer licensing obligations.

Specifically, this paper extends the work of a previous discussion paper, *The NSW Greenhouse Gas Abatement Scheme: An analysis of the NGAC Registry for the 2003 Compliance Period*, by Passey et al, April 2005, that presented some findings of an analysis of the NGAC registry for the 2003 compliance period of the NSW Greenhouse Gas Abatement Scheme (GGAS). A companion paper, *The NSW Greenhouse Gas Abatement Scheme: An assessment of the scheme's performance to date, scenarios of its possible performance to 2012, and their policy implications*, by MacGill et al, April 2005, considered the implications of this analysis in terms of scheme design, and the Scheme's possible future performance to 2012.

Here we extend the original analysis paper by considering the 2003, 2004 and 2005 compliance periods. Note that this is an updated version of our original draft paper released in May 2007.

Appendix 1 details changes that have been made in response to feedback on the draft discussion paper that was released on the 18th May 2007.

Appendix 2 details our responses to a number of statements relating to our work made by the NSW Government in the Legislative Council on the 5th June 2007.

This is an area of ongoing work for CEEM and we welcome feedback and comments on the analysis methodology and findings outlined in this paper.

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Executive Summary

The NSW Greenhouse Gas Reduction Scheme (GGAS)[1] aims to reduce the per-capita greenhouse gas emissions associated with electricity consumption in NSW from 8.65 tonnes CO_2-e in 2003 to 7.27 tonnes CO_2-e by 2007, and continue this level until 2020. This objective is implemented via mandatory emission benchmarks applied to electricity retailers, generators that supply directly to retail customers, and some major energy users.

These benchmarks are met through the surrender of NSW Greenhouse Gas Abatement Certificates (NGACs) which represent an imputed one tonne of CO_2-e of 'avoided' GHG emissions. NGACs can be created through certified low-emission generation and a range of offset activities involving waste methane in States/Territories connected to the National Electricity Market, demand-side activities in NSW and the ACT, and sequestration activities in NSW. Large User Abatement Certificates (LUACs) can be created through emission reduction activities that don't relate to electricity consumption. The NGACs and LUACs are recorded in a certificate registry operated on behalf of IPART, in their role as GGAS Administrator. The GGAS has now been underway for over four years and is to run until 2020.

This paper extends a previous paper and presents a detailed analysis of the NGACs registered for the 2003, 2004 and 2005 compliance periods, and assesses the Scheme's performance over this time. We identify all the activities that earned NGACs for each compliance year, and consider possible issues of transparency (the public availability of data regarding how NGACs are created), market concentration (the number of organisations that created NGACs) and additionality. Additionality is explored in greater detail than in the previous papers, being divided into three overlapping types: Abatement additionality and two subtypes - BAU additionality and policy additionality.

(i) Abatement additionality: where projects have reduced global emissions compared to what they would have been otherwise.

   a. BAU additionality: where the abatement was not driven by what could reasonably be expected to occur in the sectors included in the Scheme, for example, due to technological progress, changes in primary energy availability (eg. low hydro inflows), changes in primary energy price relativities or changes in demand characteristics, and

   b. Policy additionality: where the abatement was not driven by some other government policy designed to reduce greenhouse gas emissions.

Thus, only projects that have all three types of additionality would reduce global emissions compared to before the Scheme started and are unlikely to have occurred in the Scheme's absence.

It is likely that the effectiveness (reduction of emissions), efficiency (at least cost) and equity (where costs and benefits are distributed as evenly as possible) for the Scheme are all low – see the point form summary of our analysis below. In other 'baseline and credit' schemes, such as the CDM, very rigorous and formal tests of additionality are included. The NSW GGAS, however, doesn't formally address additionality at all. It is also doubtful that the Scheme is placing a price on greenhouse emissions as such, rather, it is placing a price on NGACs, which actually represent a reduction in imputed emissions with respect to a projected baseline. In practice, if the market is competitive, the price will reflect the marginal cost of creating NGACs.

Our concerns regarding the scheme's effectiveness and additionality appear to be supported by other external assessments, such as the Federal Government's estimate that the additional abatement likely to be driven by GGAS in 2010 is 5Mt CO_2-e: around one quarter of the 20 million NGACs claimed in IPART's 2006 Compliance and Operation Report.

It is possible the GGAS could delay meaningful action, not only because it may create a perception that emissions are already being reduced, but also because firms that base their

[1] The Scheme's name has been changed from the Greenhouse Gas Abatement Scheme to the Greenhouse Gas Reduction Scheme but retains the acronym GGAS.

business plans on it are likely to actively oppose any later changes in scheme design. Because of the design problems discussed below, the GGAS is unlikely to be compatible with international schemes (such as the EU ETS or the Kyoto Protocol), and it could also decrease the effectiveness, efficiency and equity of an Australian national cap and trade scheme, as well as delay Australia's engagement with the international carbon market.

The task of designing and implementing schemes such as the GGAS can be separated into design, operation and assessment components. Separation of powers between the 'designer', 'operator' and 'assessor' is critical to reduce conflicts of interest, especially where the assessor is publicly reporting on outcomes that are relevant to public welfare and are important to informing revision of the scheme design. There appears to be a clear conflict of interest in IPART being the Scheme Administrator as well as the Compliance Regulator with responsibility for assessing the Scheme with respect to its stated objectives. The NSW government is responsible for establishing both the Administrator and the Regulator, as well as assigning their responsibilities and overseeing their operation. While IPART is responsible for production of the annual Compliance and Operation Reports that have so far failed to identify the design problems described in this paper, IPART's reporting guidelines are assigned to them by the NSW Government. This scheme serves to illustrate the importance of good governance during the design, operation and assessment of policies targeting the reduction of greenhouse emissions.

Most 2003, 2004 and 2005 NGACs come from a few project types

1. Waste coal mine gas and landfill gas projects were the main sources of NGACs, registering just under 58% of the total between them. Together with natural gas-fired plant they made up just over 70% of the total, and these three with coal-fired plant made up just over 83% of the total.
2. The diversity of sources increased from 2003 to 2005, with more NGACs produced by coal-fired plant and through energy efficiency projects, and biosequestration for the first time for 2004 and LUACs for the first time for 2005.

Market concentration is still evident but decreasing

1. Market concentration was lower in 2005 than in 2003 but still remained high, with a single participant, Integral Energy, creating over 35% of the total 2003/04/05 NGACs.
2. Integral Energy, Energy Developments and AGL created most NGACs in all three years, producing 59% of the 2003/04/05 total between them.
3. The Herfindahl-Hirschman Index (a metric used to quantify market concentration) for the supply side of the GGAS was 2,540 for 2003, 1,868 for 2004, 1,653 for 2005 and seems likely to drop further in coming years. Indicatively, a market where the HHI exceeds approximately 1,800 may be considered highly concentrated, with the implication that the assumptions of a competitive market may be violated.

Reporting is not transparent

1. As we have said in previous reports, the lack of publicly available data often makes it difficult to assess both how a particular project created NGACs and the likelihood that the underlying emission reduction activity was additional.
2. The main transparency problems relate to which method or equation was used, how baselines were calculated, and how compliance was achieved.

Impact on NSW electricity sector emissions is limited

1. Just over 33% of the 2003/04/05 NGACs were from projects outside NSW.
2. Of the 2003/04/05 certificates created by NSW projects, over half were due to claimed emission reductions outside the electricity sector - biosequestration made up 4.3%, and methane avoidance made up at least 47%.
3. As a result, the 2003/04/05 certificates created by activities that could directly affect the emissions intensity of electricity generation in NSW is unlikely to be much greater than 30% of the total for those years. This may have significant implications for any future scheme which targets physical emissions from the NSW electricity sector, because actual emissions are likely to be far greater than the per capita targets indicate. This means, for

example, that the claimed per capita emissions could not be used as the basis for the emissions cap (and therefore permit allocations) in a cap and trade scheme.

Abatement additionality is likely lower than claimed

1. It appears the level of abatement additionality is lower than claimed for the Scheme. This is because;

   (i) At least 83% (2003), 76% (2004) and 52% (2005) of the NGACs were created by pre-existing low emission plant that didn't have to increase their operation compared to pre-GGAS levels to create certificates. This particularly applies to Category A fossil fuel and renewable plant which accounted for 53.4% of the 2003/04/05 NGACs,

   (ii) New coal-fired plant built in response to demand growth, and which therefore increase emissions, are creating NGACs and so, according to the Scheme, reduce per capita emissions in NSW,

   (iii) Calculation of NGACs created by efficiency improvements that don't involve changes to their design or fuel mix and are recognised under the GES program is based on a moving baseline, so NGACs can be created even as emissions increase,

   (iv) Generators that are eligible to create NGACs because their emission coefficients are lower than the GGAS Pool Coefficient, do not have to 'pay back' NGACs if their annual energy production falls below their assigned NSW Production Baseline. Such generators created 26.5% of the 2003/04/05 NGACs.

   (v) IPART has acknowledged that the NGACs created through demand side abatement activities up to around the end of 2006 reduced emissions less than originally thought. Such activities created at least 5 and possibly more than 7.2 million NGACs for 2003/04/05.

There are problems with BAU additionality

1. The new fossil fuel plant that can create NGACs because they have lower emissions intensities than the NSW Scheme's Pool Coefficient, can do so either because of technological improvements that increase efficiency, or because of increased need for energy production from gas peaking plant.

There are problems with policy additionality

1. Both Federal and state governments in Australia are implementing policies that drive activities intended to reduce greenhouse emissions. Some of these programs drive activities that can also create NGACs eg. the Mandatory Renewable Energy Target (MRET) and the Greenhouse Gas Abatement Program (GGAP).
   - NGACs created directly from RECs created under MRET use low emission generation that would occur regardless of the GGAS. NGACs created in this way made up 13.6% of those used to meet liabilities for 2003/04/05.
   - By allowing GGAP projects to create NGACs, the Scheme is rewarding projects that have already been made financially viable by GGAP funding support.

Biosequestration is problematic

1. Assessing BAU additionality and abatement additionality of biosequestration is very complex, and in fact may not be possible to any degree of accuracy. This is a problem for a scheme that wishes to place a realistic price on carbon.
2. Non-permanence is also an issue for all biosequestration projects, and the approach taken by the NSW Scheme, which requires sequestration for only 100 years, is unlikely to be compatible with the Kyoto Protocol or similar schemes.

CONTENTS

1 Introduction

The NSW Government introduced the world's first mandatory greenhouse emissions trading scheme with the commencement of the NSW Greenhouse Gas Reduction Scheme (GGAS)[2] in 2003. The stated policy intent is to reduce greenhouse gas emissions created through NSW electricity consumption and to encourage activities that offset these emissions.

The GGAS imposes mandatory greenhouse gas benchmark targets on all NSW electricity retailers and certain other parties for electricity consumed in NSW. The Scheme compares a declining per-capita NSW state target for these emissions to an imputed estimate of actual NSW emissions from the electricity sector each year. The resulting annual emissions reduction target is assigned to liable parties based on their respective market shares of NSW electricity sales. These parties can then demonstrate compliance with their targets by annually surrendering an appropriate number of NSW Greenhouse Gas Abatement Certificates (NGACs), each representing an imputed tonne of CO_2-e of 'avoided' GHG emissions. Alternatively, liable parties must pay a penalty for each imputed tCO_2-e over their target. NGACs can be created through certified low-emission generation and a range of offset activities involving waste methane in States/Territories connected to the National Electricity Market, demand-side activities in NSW and the ACT, and biomass sequestration activities in NSW. Large electricity users can create Large User Abatement Certificates (LUACs) if they have elected to manage their own greenhouse gas benchmark and undertaken accredited 'offset' emission reduction activities that don't relate to electricity consumption. Unless otherwise stated, for the remainder of this report the term 'certificates' refers to both NGACs and LUACs.

The NSW Department of Energy, Utilities and Sustainability managed the design of the Scheme. It commenced on 1st January 2003, and is administered by the NSW Independent Pricing And Regulatory Tribunal (IPART), which is also tasked with ensuring compliance. The legislative framework involves amendments to the State's Electricity Supply Act and Regulation, supported by five benchmark rules issued by the Minister. The ACT GGAS started on the 1st Jan 2005, and is modelled on the NSW GGAS, with IPART also designated as the scheme administrator. The NSW government has now decided to extend the Scheme to 2020 and beyond on a rolling 15-year basis or until a national emissions trading scheme is established (DEUS, 2006).

The scheme design is very different to emissions trading schemes now introduced elsewhere in the world (such as the EU ETS and Kyoto Article 17) or under consideration in countries including Japan and regions of the United States. Points of difference between GGAS and other schemes include:

- the overall GGAS targets are set according to per-capita emissions associated with electricity consumption within the state (rather than physical emissions from major greenhouse gas emitters),
- obligations to meet GGAS targets are assigned to electricity retailers and major energy users who often don't have direct emissions themselves (rather than putting obligations on these major emitters),
- a wide range of activities are permitted to meet GGAS targets including non-electricity sector offsets in waste, sequestration and industrial processes (rather than focussing on electricity generators and other large stationary energy emitters),
- the contribution of such activities to meeting GGAS targets are estimated through a range of complex rules defining *emission reductions* against imputed baselines (rather than directly measuring and regulating physical emissions).

The scheme represents an early and innovative greenhouse trading scheme in a challenging jurisdictional context – the NSW government introduced the scheme while arguing that emissions

[2] The Scheme's name has been changed from the Greenhouse Gas Abatement Scheme to the Greenhouse Gas Reduction Scheme but retains the acronym GGAS.

trading would be better implemented at the national level. NSW is now one of the States leading efforts to introduce a national scheme through all State and Territory governments in the continuing absence of Federal government action.

However, some observers including the authors (Passey et al, 2005; MacGill et al, 2006) have noted concerns about the likely effectiveness and efficiency of the scheme in reducing emissions. Key problems include:

- the scheme's 'baseline and credit' design built around complex and imputed emission reductions: estimating emission reductions requires 'counterfactual' assumptions about what would have happened otherwise,
- the highly abstracted targets, wide range of offset activities and rules for estimating emissions reductions: it is entirely possible for the scheme's targets to be met while NSW electricity related emissions continue to rise,
- the questionable additionality of many of the projects being accredited as reducing emissions and now receiving a cashflow from the scheme: many of these activities were implemented prior to the scheme or are very likely to have occurred regardless, and
- the lack of transparency in how the scheme operates.

IPART has released three annual compliance reports (IPART 2004; IPART 2005a; IPART 2006). While the most recent report contains considerably more information than earlier reports, it still does not provide much detail on the individual projects that created certificates and the organisations involved. Nor does it independently assess the performance of the scheme with respect to its policy intent of reducing greenhouse gas emissions.

Earlier work by the authors was based on the scheme's proposed design, and subsequently its first year of operation. In particular, Passey et al. (2005) presented a detailed analysis of the activities and companies generating NGACs in the 2003 compliance period. In this paper, we present an updated analysis of the certificate registry for the 2003, 2004 and 2005 compliance periods. Again, the primary data source for this analysis is the certificate registry overseen by IPART. We also consider some of the changes to the Scheme design and operation over the last three years. These appear to have been primarily directed at increasing the ease and opportunity for accreditation and the creation of abatement certificates, and don't seem to have addressed the fundamental problems identified by observers, including the authors, in earlier work (eg MacGill et al, 2005).

Section 2 of this report discusses the types of projects as well as the organisations that created certificates for the 2003, 2004 and 2005 compliance years. Section 3 takes a more detailed look at the characteristics of particular projects that created certificates, as well as their possible impact on emissions from the NSW electricity sector. Section 4 then builds on these sections to identify and discuss general design issues relevant to the Scheme's ability to deliver physical emissions reductions over and above any that may have occurred in its absence. The shortcomings identified could have significant implications for the Scheme's compatibility with international schemes and also for the NSW electricity sector if a National scheme is based on physical emissions. Section 5 then discusses the need for separation of powers between the organisations charged with designing, operating and assessing schemes such as the GGAS, and concludes that the Scheme's problems are a direct result of the failure of good governance.

2 Analysis of the certificate registry

The linkage between GGAS targets and emissions from NSW electricity consumption

The scheme uses a complex and highly abstract method to impute annual emissions associated with NSW electricity consumption. This is not based on physical measurements of emissions from NSW generators. Instead, the total NSW electricity demand and the Scheme's assigned pool coefficient are provided by IPART and when multiplied give the Scheme's imputed total emissions. The pool coefficient represents an average of the five previous years' Annual Pool Values (APVs) lagged by two years. The APVs are estimated greenhouse emissions per MWh from the pool of major power stations in NSW (Category B generators) and from inter-state flows from generators in other states of the NEM. The Scheme benchmarks are also provided by IPART, which after subtraction from the state total (after allowing for transmission and distribution losses), give the number of certificates required to meet that year's liabilities. These calculations are performed by IPART - see Table 1.

Table 1 Scheme's Key Factors[3]

	2003	2004	2005	2006
Electricity demand (GWh)	63,178	65,671	66,611	68,358
Pool coefficient (tCO_2-e/MWh)	0.897	0.906	0.913	0.929
Benchmark (tCO_2-e)	57,768,160	56,109,951	54,225,908	52,344,828
Liability[a] (tCO_2-e)	1,699,941	5,897,236	9,150,547	

a – from IPART (2006)

A key problem is that physical, measurable emissions within NSW are not directly incorporated into the calculation of the Scheme's target or its performance against this target. It is entirely possible for the Scheme to be apparently delivering emissions reductions while physical emissions continue to rise.

Types of Projects that Created Certificates[4]

NGACs can be created through:

- Generation of electricity under the Relative Intensity or Efficiency Improvement approaches. This mechanism effectively includes a range of offsets from the waste sector and fugitive emissions from coal-mining,
- Activities that result in reduced consumption of electricity (Demand Side Abatement), or
- The capture of carbon from the atmosphere in forests (Biosequestration of carbon).

A complex set of rules has been developed for each of these categories that 'define' what activities within these areas account for certified 'emissions reductions'. All the methods involve determining baselines from which such emissions reductions are counted. This is discussed further in the following sections.

Renewable Energy Certificates (RECs) from the Federal MRET scheme deemed to correspond to electricity sold in NSW can also be used to meet liable parties' benchmarks, where RECs are multiplied by the NSW pool coefficient to obtain the equivalent number of NGACs. Large electricity users can create Large User Abatement Certificates (LUACs) if they have elected to

[3] Available from http://www.greenhousegas.nsw.gov.au/
[4] Note that certificates can be forfeited in retrospect as a result of IPART's auditing process. This means that for both this report and IPART's Annual Compliance reports, the numbers of certificates attributed to different projects may change over time.

manage their own greenhouse gas benchmark and they have undertaken emission reduction activities that don't relate to electricity consumption. LUACs cannot be traded.

According to our database, from January 2004 to June 2005, 7,652,467 NGACs were registered for the 2004 compliance year, and from January 2005 to June 2006, 10,078,763 NGACs were registered for the 2005 compliance year. These were produced through Generation and DSA activities and, unlike 2003, also through Biosequestration activities. The IPART 2004 Compliance report included only those NGACs registered up to 31st May 2005 giving a total of 5,594,144. The IPART 2005 Compliance report included all NGACs up to end June 2005 and concurs with our database as at Dec 2006.

A total of 5,037,847 NGACs were surrendered for 2004. For 2005, 7,982,204 NGACs and 64,401 LUACs were surrendered. In addition, 841,194 RECs (equivalent to 762,122 NGACs) were used to meet 2004 liabilities, and 1,117,907 RECs (equivalent to 1,020,649 NGACs) were used to meet 2005 liabilities (IPART, 2006).

Our analysis of the NGAC registry database allows the projects to be categorised as shown in Table 2 and Figure 1. This analysis shows that whereas waste coal mine gas, landfill gas and natural gas-fired plant made up 83.7% of the total for 2003, they made up 76.1 % of the total for 2004 and 58.7% of the total for 2005. Although the diversity of sources has increased, these three sources together with coal-fired plant still made up 85.4% of the total for 2004, and 75.9% of the total for 2005. Landfill gas NGACs have steadily increased from 2003 to become the main source of certificates for 2005. Coal-fired plant increased significantly for 2005, mainly because of two brown coal power stations in Victoria, Hazelwood and Loy Yang, which created 675,881 and 311,660 NGACs respectively, or approximately 10% of the 2005 total between them. The number of NGACs created through energy efficiency projects has increased significantly, from 1% of the total for 2003 to 5.4% for 2004 and 10.7% for 2005. Biosequestration activities created 2.2% of the 2004 total, and 5.3% of the 2005 total, whereas LUACs were first created for 2005 and made up 0.9% of the total for that year.

Table 3 details the main changes to the types of projects that created NGACs for 2004 and 2005 compared to 2003.

Table 2 Sources of Certificates by fuel type for 2003, 2004 and 2005
(based on our analysis of the NGAC registry)

	2003			2004		
	Certs	% of tot	Cumul %	Certs	% of tot	Cumul %
Waste Coal Mine gas	2,478,611	37.2	37.2	2,469,990	32.3	32.3
Landfill gas	1,980,441	29.7	66.9	2,217,389	29.0	61.3
Natural gas	1,117,454	16.8	83.7	1,131,944	14.8	76.1
Coal-fired plant	538,184	8.1	91.8	716,489	9.4	85.4
DSA - EE	66,744	1.0	92.8	410,012	5.4	90.8
DSA - Generation	278,397	4.2	97.0	332,221	4.5	95.1
Biosequestration	0	0	97.0	166,005	2.2	97.3
Hydro	132,869	2.0	98.9	123,615	1.6	98.9
Sewage gas	59,381	0.9	99.8	58,928	0.8	99.7
Biomass	10,895	0	100.0	25,874	0.1	100.0
Lge User Abatement	0	0	100.0	0	0	100.0
Total	6,662,976	100	100	7,652,467	100	100

	2005			Total 2003/04/05		
	Certs	% of tot	Cumul %	Certs	% of tot	Cumul %
Waste Coal Mine gas	2,311,215	22.9	22.9	7,259,816	29.8	29.8
Landfill gas	2,620,446	26.0	48.9	6,818,276	28.0	57.7
Natural gas	984,480	9.8	58.7	3,233,878	13.3	71.0
Coal-fired plant	1,741,309	17.3	75.9	2,995,982	12.3	83.2
DSA - EE	1,073,983	10.7	86.6	1,550,739	6.4	89.6
DSA - Generation	435,216	4.3	91.0	1,045,834	4.3	93.9
Biosequestration	538,471	5.3	96.3	704,476	2.9	96.8
Hydro	148,267	1.5	97.8	404,751	1.7	98.4
Sewage gas	100,578	1.0	98.8	218,887	0.9	99.3
Biomass	30,521	0.3	99.1	67,290	0.3	99.6
Lge User Abatement	94,277	0.9	100.0	94,277	0.4	100.0
Total	10,078,763	100	100	24,394,206	100	100

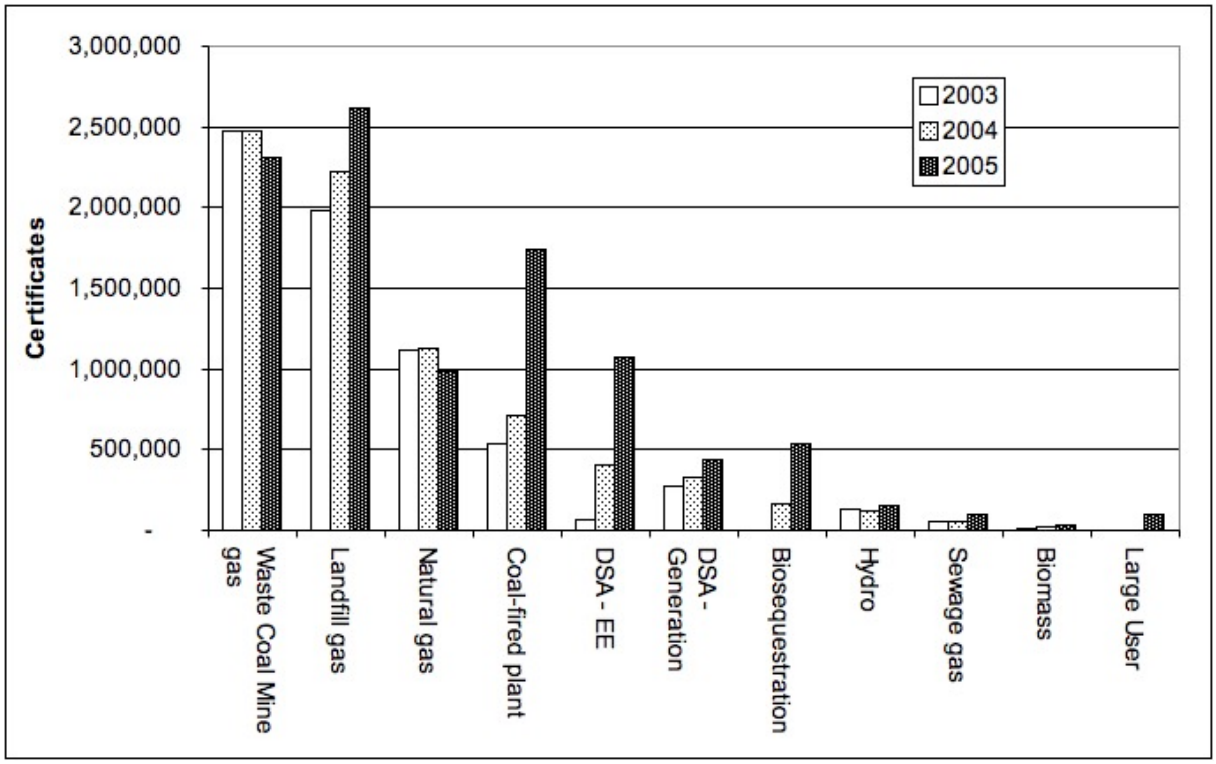

Figure 1 Sources of Certificates by fuel type for 2003, 2004 and 2005
(based on our analysis of the NGAC registry)

Table 3 Main project changes for 2004 and 2005 compared to 2003

	Change
Waste Coal Mine gas	From 2003 to 2005 Tower/Appin decreased by 438,636 (18%), Tahmoor increased by 12,536 (123%) (and created 98,897 more NGACs through DSA on-site gen), and Teralba increased by 258,704 (first creating 158,334 NGACs in 2004).
Landfill gas	More NGACs were produced for 2005 than for 2003 (640,005 or 32% more) because of increased output from the generators that created 2003 NGACs, and from Rochedale (2004) and Whitwood Road (2004). Note that some generators are named in the database according to state only and it is not possible to know whether they are new.
Natural gas	From 2003 to 2005 the number of natural gas NGACs dropped slightly (by 132,974 or 12%), despite increased NGACs from Smithfield (Integral) and contributions by a number of plant that did not create 2003 NGACs (ie. Narrabri Power (Wilga Park), three hospitals (St Vincents, the Royal Melbourne and the Alfred) and Ladbroke Grove. NGACs decreased in 2005 mainly because of reduced contributions by Swanbank E (CS Energy, 160,456 less) and Pelican Point (International Power Hazelwood, 90,068 less). Pelican Point also created none for 2004 – presumably because production went below its baseline. A number of generators created NGACs in 2004 but not in 2003 – Newport (TRUenergy), Torrens Island B, and Townsville and Oaky (Enertrade).
Coal-fired plant	From 2003 to 2005 NGACs creation by coal-fired plant increased significantly – by 1.2 million or 224%. This was despite decreased creation by Eraring (56,966 or 44% less) and was mainly due to increased creation by Delta Electricity (57,213 or 61% more), Hazelwood (424,682 or 169% more) and Mac Gen (211,720 or 334% more). First-time creators for 2005 were Loy Yang A (311,660), Munmorah (1,016), Stanwell HIP turbine upgrades (86,290), and Yallourn (9,033) all through Efficiency Improvement, and Millmerran (78,624) and Tarong North (80,869) both through Relative Intensity. The number of NGACs created by Hazelwood decreased by 109,094 (43.4%) for 2004, which is consistent with its variable emissions intensity.
DSA - Energy efficiency	Energy efficiency projects increased significantly, by 1,007,239 or 1,509%. This was due to a large number of residential projects, mainly involving CFL and low flow showerhead programs.
DSA – Generation	This includes NGACs created through cogeneration (Cronulla and Maroubra sewage treatment plant and Tumut pulp & paper mill) and on-site generation (Tumut pulp & paper mill and Tahmoor waste mine gas) and increased each year; by 145,924 NGACs or 50% from 2003 to 2005.
Biosequestration	NGACs were created by the Forestry Commission of NSW, none in 2003, 166,005 in 2004 and 538,471 in 2005.
Hydro	Hydro NGACs increased slightly from 2003 to 2005 and this was due to increased output from existing plant.
Sewage gas	There were no new plant, just increased output from Werribee.
Biomass	Biomass generation NGACs were first created by Broadwater cogen plant for 2003, then also by Condong and Harwood, as well as Earth Power's Camellia plant and the Tumut pulp & paper mill for 2004, then only by Camellia, Green Pacific Energy's Stapylton plant and the Tumut pulp & paper mill for 2005.
Large User Abatement	LUACs were first created for 2005, 78,690 by Boral cement works and 15,587 by Amcor and Noske Skog pulp & paper mills.

Organisations that Created 2003, 2004 and 2005 Certificates

The nine major providers of 2003, 2004 and 2005 certificates are identified in Table 4 and Figure 2. The same three organisations, Integral Energy, Energy Developments and AGL, created most certificates for all three years, producing 59% of the total between them.

Integral Energy registered almost half the certificates for the 2003 compliance period, dropping to just over one third for the 2004 compliance period, then just over one quarter for 2005, making just over one third of the total for the three years. These drops are due to fewer NGACs being created at Tower/Appin and because the Scheme's annual number of certificates created has increased. Integral Energy is an electricity retailer and distribution network operator based in Western Sydney, and is the second largest of the NSW State-owned electricity utilities. Energy Developments and AGL created 13.7% and 10.2% of the total for 2003/04/05 respectively, mainly from landfill gas, with both achieving absolute increases in certificates over that period.

The fourth largest participant for 2003/04/05 was International Power. Hazelwood power station produced just over 1 million NGACs over the 2003/04/05 period, with just over 675,000 of these being in 2005. Pelican Point gas-fired plant created about 285,000 NGACs for 2003, none for 2004 and about 195,000 for 2005.

Country Energy was the fifth largest creator of certificates, just over 930,000 of which were from waste mine gas (including on-site generation), the remainder being from hydro and bagasse. EnergyAustralia, at number six, produced almost 450,000 NGACs from landfill gas and just over 250,000 from energy efficiency projects.

The Forestry Commission of NSW was not accredited until February 2005 and so created no NGACs for the 2003 period, but created 166,005 for 2004 and 538,471 for 2005 through biosequestration activities. CS Energy created NGACs through gas-fired generation and TRU Energy created NGACs through a mixture of landfill gas, hydro, natural gas and coal-fired plant.

Whereas for the 2003 compliance period, 81.7% of certificates were created by the largest 5 participants, for 2004, the largest 5 participants created 69.2%, and for 2005 they created 62.4%. Although this means greater diversity of certificate creators, it still represents a high level of market concentration. An indicative tool for quantifying market concentration is the Herfindahl-Hirschman Index (HHI)[5]. The HHI ranges from 0 (perfect competition with thousands of firms) to 10,000 (indicating a complete monopoly). As a general rule, a HHI of more than around 1,800 is considered a highly concentrated market place requiring particular regulatory consideration. Using the data extracted from the certificate registry, the HHI on the supply side of the certificate market for 2003 was around 2,540. For the 2004 compliance year, the HHI has dropped significantly to 1,868, and in 2005 dropped further to 1,653. Given the drop from 2003 to 2005, it seems likely to reduce further in coming years.

Unfortunately there is no readily available information on the market share of each retailer in NSW. Nevertheless, the demand for certificates is dominated by the three NSW government-owned retailers; Integral Energy, Country Energy and Energy Australia. They were also the first, fifth and sixth major certificate providers over the 2003, 2004 and 2005 compliance periods.

[5] The HHI is not a definitive measure, however both the U.S. Department of Justice and the Australian Competition and Consumer Commission use it as an indicative tool to quantify the likelihood of market power when evaluating mergers and the need for regulatory intervention. The HHI is defined as follows: $HHI = s_1^2 + s_2^2 + s_3^2 + s_n^2$ (where s_n is the market share of the i^{th} Firm as a percentage).

Table 4 Major providers of 2003, 2004 and 2005 certificates & percentage contribution
(based on our analysis of the certificate registry)

	2003		2004		2005		
	NGACs	% of total	NGACs	% of total	NGACs	% of total	Cumul %[a]
Integral	3,048,880	45.7	2,895,727	37.8	2,662,399	26.4	35.3
EDL	1,007,098	15.1	1,045,725	13.7	1,292,463	12.8	49.0
AGL	684,544	10.3	871,600	11.4	950,626	9.4	59.2
International Power	536,183	8.0	130,906	1.7	870,815	8.6	65.5
Country Energy	173,664	2.6	355,508	4.6	528,283	5.2	69.9
EnergyAustralia	173,970	2.6	374,225	4.9	187,190	1.9	72.9
Forestry Commission		0.0	166,005	2.2	538,471	5.3	75.8
CS Energy	228,718	3.4	359,674	4.7	68,262	0.7	78.5
TRUenergy	152,660	2.3	258,251	3.4	165,883	1.6	80.8

a: Cumulative total for 2003, 2004 and 2005

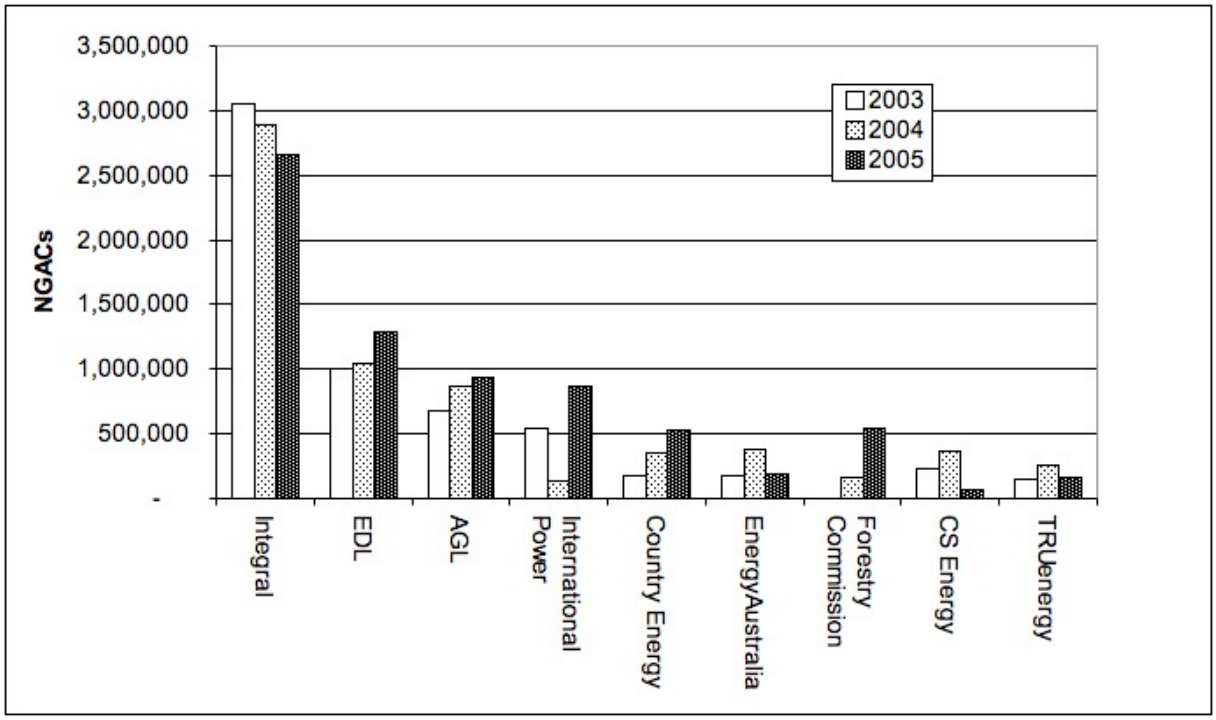

Figure 2 Major providers of 2003, 2004 and 2005 certificates

3 Projects that Created Certificates

Reporting transparency

We have already noted the abstract nature of the Scheme's targets and the lack of transparency in how they relate to physical emissions in NSW. This lack of transparency is also an issue for NGAC creation. The lack of publicly available data in the certificate database often makes it difficult to assess how a particular project created certificates. The main transparency issues identified here are the same as those identified in our previous assessment of the 2003 compliance period:

1. Which method was used to create NGACs under the Generation and DSA Rules?
2. How are renewable energy plant baselines calculated? Were REC or PPA-derived baselines used? How were REC baselines calculated?
3. How was accreditation achieved under the Efficiency Improvement method? eg. did coal-fired plant go through operational changes or changes to either the plant design or fuel mix?
4. How many NGACs were created through avoided methane emissions?
5. Which DSA-NGACs were deemed and so are from projects that should not contribute to further DSA-NGACs in the future?
6. Some projects were not fully identified.

It is unclear why this information is not provided. An additional reporting problem for the 2004 and 2005 compliance periods is the lack of information on how biosequestration activities created NGACs. According to Fowler (2005), three distinct business models could be used for biomass under the Scheme: Permanent forests, Plant-grow-harvest commercial forestry, and Sustainable forest management. The Plant-grow-harvest model is similar if not identical to the Forestry Commission of NSW's standard practice and so was most likely used.

Impact on NSW electricity sector emissions

Table 5 (based on our analysis of the registry) sets out the accredited projects that created 90% of the total certificates for the 2003/04/05 compliance years, the number of certificates they created in 2003, 2004 and 2005, and their cumulative totals.

A large majority of the 2003/04/05 certificates were created by activities that have little or no direct impact on the overall amount or emissions intensity of electricity generated in NSW. According to the 2006 Compliance Report, 33.2% of the 2003 certificates, 31.6% of the 2004 certificates and 34.4% of the 2005 certificates were created by projects outside NSW – or 33.2% of the 2003/04/05 total (IPART, 2006).[6] Of the 2003/04/05 certificates created by NSW projects, biosequestration made up 4.3%, landfill gas projects made up 14.8%, and waste coal mine gas projects made up 44.5% of the three-year total. Because of the methane multiplier applied to landfill gas and waste coal mine gas projects, more than 75% of certificates created by coal mine gas plant and Category A landfill gas plant, and essentially all certificates created by Category C & D landfill gas plant are from methane avoidance.[7] These methane-derived certificates make up at least 47% of the NSW-located total, and at least 31% of the overall total for 2003/04/05.

Accounting for the certificates created by projects outside NSW as well as the biosequestration and methane-derived certificates, the final number of 2003/04/05 certificates created by activities that directly affect the emissions from electricity generation in NSW is unlikely to be much greater than 30% of the three-year total. This may have significant implications for any future scheme which targets physical emissions from the NSW electricity sector because actual emissions are likely to be far greater than the GGAS per capita targets indicate. This means, for example, that the claimed GGAS per capita emissions could not be used as the basis for the emissions cap (and therefore permit allocations) in a cap and trade scheme.

[6] Note that some of these projects may have some influence on the emissions of electricity sold in NSW through interstate flows.
[7] Based on current values for the Emissions Intensity Adjustment Factor, Marginal Loss Factor and NSW Pool Coefficient.

Table 5 2003/2004/2005 Certificates by Operator and Project

(Based on our analysis of the certificate Registry)

Operator	Project	2003		2004		2005		2003/04/05		Total Cumulative
		NGACs	% of total	NGACs	% of total	NGACs	% of total	NGACs	% of total	
Integral Energy	Tower and Appin collieries	2,468,419	37.0%	2,301,104	30.1%	2,029,783	20.1%	6,799,306	27.9%	
	Smithfield natural gas cogen	580,461	8.7%	594,623	7.8%	632,616	6.3%	1,807,700	7.4%	
		3,048,880	45.7%	2,896,299	37.8%	2,662,399	26.4%	8,607,006	35.3%	35.3%
Tower and Appin (1996[8]) and Smithfield (1997) are Category A plant, and therefore all generation output is eligible to create NGACs through the Relative Intensity approach. Tower and Appin reduce their relative emission intensity through avoided waste mine gas, and Smithfield through use of gas-fired generation and cogeneration.										
Energy Developments	Landfill gas	1,007,098	15.1%	1,045,718	13.7%	1,292,463	12.8%	3,345,279	13.7%	49.0%
All landfill gas plant that created NGACs did so under the Relative Intensity rule and are registered with the Office of the Renewable Energy Regulator (ORER) to create RECs. Depending on the plant's circumstances NGACs can be created because of avoided methane emissions and or under the Relative Intensity rule. Some of these plant were commissioned between 1992 and 1995, are Category A and are eligible to create NGACs from all their generation. For the 2003 period, Lucas heights landfill gas plant (1995) was Category C and had a REC baseline that is most probably the average of the five years generation prior to 1997. For 2004 and 2005 this plant was categorised as Cat A. Some landfill gas plant commissioned between 1998 and 2002 are Category D and so are eligible to create NGACs from all their generation. A number of the plant have not been named in the Scheme database and so their commissioning date is not known.									
AGL	Landfill gas	608,707	9.1%	778,770	10.18%	794,869	7.9%	2,182,346	8.95%	
	Sewage and natural gas	75,837	1.1%	75,684	0.99%	118,616	1.2%	270,137	1.1%	
	Gas hot water	0	0.0%	17,146	0.22%	28,926	0.3%	46,072	0.2%	
		684,544	10.3%	871,600	11.39%	942,411	9.4%	2,498,555	10.2%	59.2%
Six landfill gas plant commissioned between 1993 and 1995 create NGACs in the same way as the equivalent Category A EDL plant. West Nowra (2002) creates NGACs in the same way as the equivalent Category D EDL plant. Werribee STP (1997) can create NGACs for generation above the average annual net sent out generation from 1997 to 2001. Varnsdorf (~1994) and Coopers Brewery (2003) can create NGACs from all generation. The gas hot water NGACs were deemed through replacement of electric water heaters with natural gas heaters.										
International Power	Hazelwood coal-fired	251,199	3.8%	130,906	1.7%	675,881	6.7%	1,057,986	4.3%	
	Pelican Point gas-fired	284,984	4.2%	0	0%	194,934	1.9%	479,918	2.0%	
		536,183	8.0%	130,906	1.7%	870,815	8.6%	1,537,904	6.3%	65.5%
Hazelwood (1964) created NGACs through actions taken under the GES. Pelican Point (2001) can create NGACs above the average annual net sent out generation 1997-2001 if it uses the Relative Intensity rule.										

[8] A year in brackets is a year of commissioning

Country Energy	Waste mine gas	120,943	1.8%	168,886	2.21%	281,432	2.79%	571,261	2.34%	
	DSA	0	0.0%	151,468	1.98%	209,648	2.08%	361,116	1.48%	
	Hydro	41,826	0.6%	19,392	0.25%	37,203	0.4%	98,421	0.4%	
	Bagasse	10,895	0.2%	14,901	0.19%	0	0%	25,796	0.1%	69.9%
		173,664	2.6%	354,647	4.6%	528,283	5.2%	1,056,594	4.3%	
Tahmoor (2001) and Teralba (2004) can create NGACs from all generation if using the Relative Intensity approach, and Tahmoor also under the DSA rule by on-site generation. The hydro plant at Nymboida (1928), Oaky (1950s), Wyangala A (1991), Burrendong (1996) and Copeton (1996) can create NGACs for generation above their REC or PPA-derived baselines. Broadwater (1996), Harwood (1990) and Condong (1998) can create NGACs for generation above their REC or PPA-derived baseline, and by reducing their emission intensity through cogeneration.										
EnergyAustralia	Landfill gas	160,449	2.41%	142,139	1.86%	145,213	1.44%	447,801	1.84%	
	DSA	2,786	0.04%	221,472	2.89%	31,944	0.32%	256,202	1.05%	
	Hydro	10,735	0.16%	10,614	0.14%	10,033	0.10%	31,382	0.13%	
		173,970	2.61%	374,225	4.89%	187,190	1.86%	735,385	3.01%	72.9%
Lucas Heights (1995) and Belrose (1995) create NGACs in the same way as the equivalent Category A EDL landfill gas plant. The DSA-EE NGACs were created through residential refit, power factor correction and CFL promotion programs. Glenbawn (1995) can create NGACs for generation above its REC or PPA-derived baseline.										
Forestry Commission	Biosequestration	0	0	166,005	2.17%	538,471	5.34	704,476	2.89%	75.8%
The Forestry Commission of NSW created NGACs through biosequestration activities under the Carbon Sequestration rule.										
CS Energy	Natural gas[9]	228,718	3.43	359,674	4.70%	68,262	0.68	656,654	2.69%	78.5%
Swanbank E (2002) can create NGACs from all generation.										
TRUenergy (was TXU)	Landfill gas	109,839	1.65%	110,039	1.44%	101,439	1.01%	321,317	1.32%	
	Hydro	42,821	0.64%	52,675	0.69%	55,411	0.55%	150,907	0.62%	
	Natural gas	0	0.0%	95,537	1.25%	0	0.0%	95,537	0.39%	
	Coal	0	0.0%	0	0.0%	9,033	0.09%	9,033	0.04%	80.8%
		152,660	2.29%	258,251	3.37%	165,883	1.65%	576,794	2.36%	
Berwick (1992) can create NGACs in the same way as the equivalent Category A EDL plant above. Three hydro plant from 1994 can create NGACs from generation above their REC or PPA-derived baseline. Three hydro plant from 1989 to 1993 can create NGACs from generation above either the PPA-derived baseline, or if there is no PPA then from all generation. Torrens Island B (1975) and Newport (1986) natural gas plant can create NGACs in the same way as Pelican Point. Yallourn coal-fired plant (1974 and 1982) created NGACs through actions taken under the GES.										
Macquarie Generation	Coal-fired			199,124	2.60%			262,486	1.83%	83.0%
Liddell Power Station (1973) created NGACs through actions taken under the GES. Where the plant increases efficiency without changing the design or fuel mix, NGACs can only be created to the extent that the plant efficiency is improved to be lower that the calculated minimum greenhouse intensity (GI) value. Where significant changes are made to the design or fuel mix, all the Performance Improvement Gain or Fuel Switch Gain respectively can be used to generate NGACs.										

[9] Is actually coal seam methane but is classified as natural gas on Swanbank E's NGACs.

Origin Energy	DSA	0	0.0%	0	0.0%	287,101	2.85%	287,101	1.18%	
	Hydro	37,487	0.56%	40,934	0.53%	44,727	0.44%	123,148	0.50%	
	Natural gas	5,542	0.08%	27,210	0.36%	46,654	0.46%	79,406	0.33%	
		43,029	0.65%	68,144	0.89%	378,482	3.76%	489,655	2.01%	85.0%
The DSA-NGACs were created through CFL giveaways. Yarrawonga (1993) created NGACs in the same way as the Country Energy hydro plant. Quarantine (2001/02) and the St Vincents, Royal Melbourne and The Alfred hospitals in Melbourne can create NGACs from all generation. Ladbroke Grove (1990) can create NGACs in the same way as Pelican Point.										
Sydney Water	DSA – residential EE	0	0.0%	91,102	1.19%	197,303	1.96%	288,405	1.18%	
	DSA - cogeneration	54,699	0.82%	56,771	0.74%	53.698	0.53%	165,168	0.68%	
		54,699	0.82%	147,873	1.93%	251,001	2.49%	453,573	1.86%	86.9%
NGACs were created under the DSA-EE rule through a residential shower program. Malabar (1999) and Cronulla (2001) created NGACs under the DSA Rule, most likely under the Generation Emissions Method.										
Visy Pulp & Paper	Biomass cogeneration	112,947	1.70%	124,335	1.62%	172,402	1.71	409,681	1.68%	88.6%
Tumut (2001) created NGACs both as a Category D bioenergy plant and under the DSA Rule through on-site generation.										
Neco	DSA	0	0.0%	2	0.00%	364,838	3.62%	364,840	1.50%	90.1%
Neco created NGACs through a residential showerhead and CFL program.										

4 Scheme Design & Additionality Questions

It is difficult to assess additionality because of the lack of reporting transparency and the number of ways in which certificates may be created under the GGAS Rules. Table 7 sets out possible additionality problems for the different categories of activities that created certificates for the 2003, 2004 and 2005 compliance years. Some certificates had insufficient information to identify the project that created them and so are not included in this analysis. While some projects appear to have clear additionality, it appears that many do not from the information that is available to us.

Claimed emissions reductions and the additionality of such reductions are both impossible to strictly define in the GGAS as it relies on counter-factual estimates of what would have happened in the Scheme's absence. Although other schemes such as the CDM have made very rigorous and transparent efforts to deal with additionality questions (CDM, 2007), GGAS doesn't address the question of additionality in any formal way.

Here, additionality is explored in greater detail than in our previous papers, being divided into three overlapping types: Abatement additionality and two subtypes being BAU additionality and policy additionality.

(ii) Abatement additionality: where projects have reduced global emissions since the start of the scheme compared to what they would have been otherwise.

   a. BAU additionality: where the abatement was not driven by what could reasonably be expected to occur in the sectors included in the Scheme, for example, by technological progress, changes in primary energy availability (eg low hydro inflows), changes in primary energy price relativities or changes in demand characteristics, and

   b. Policy additionality: where the abatement was not driven by some other government policy designed to reduce greenhouse gas emissions.

Thus, only projects that have all three types of additionality would reduce global emissions compared to before the Scheme started and are unlikely to have occurred in the Scheme's absence.

We treat these types of additionality separately because their absence has very different implications:

- Lack of abatement additionality means that emissions have not been reduced by as much as is claimed by the Scheme. As discussed below, this reduces the Scheme's effectiveness, efficiency and equity. It could also make linking to other schemes problematic – especially if, like the EU Emissions Trading Scheme and Kyoto Protocol, they have strict additionality requirements.
- Lack of BAU additionality or policy additionality means that although abatement may have occurred, it would have occurred anyway and so could imply free-riding and windfall profits for the certificate creators. Given the considerable amount of effort that goes into developing and complying with schemes such as GGAS, it is obviously important that they actually drive change that wouldn't have happened anyway.

These additionality tests are similar to those applied to Clean Development Mechanism projects under the Kyoto Protocol: Environmental additionality (that the project leads to real emissions reduction from what would have occurred otherwise), Investment additionality (the project is only economically feasible due to generation of credits), and Policy additionality (the projects are not just complying with existing regulatory requirements or due to other government programs). Additionality requirements are applied to CDM projects because credit creation is, as for the GGAS, based on a baseline and credit methodology.

From a climate change perspective, abatement additionality is crucial. According to the NSW Greenhouse Plan, "The scheme has already achieved around 16 million tonnes of greenhouse savings since it started in 2003 and will accrue around 120 million tonnes by 2012" (Greenhouse

Plan, 2005, p4). This position was reiterated in the policy paper 'Extending the NSW Greenhouse Gas Abatement Scheme' which stated, "In the first three years of the Scheme, accredited projects created approximately 24 million abatement certificates representing emissions reductions, abatement or offsets of 24 million tonnes of carbon dioxide equivalent" (DEUS, 2006, p8). However, as outlined below, the amount of additional abatement driven by the Scheme is likely to be significantly less than claimed.

Pre-existing plant

At least[10] 95% of the 2003 certificates, 85% of the 2004 certificates and 69% of the 2005 certificates were created by plant built and commissioned before the start of the GGAS. At least 83% (2003), 76% (2004) and 52% (2005) were both from plant commissioned prior to GGAS and created under the Relative Intensity Rule and the plant did not have to increase their activity above end-2002 levels to create certificates.[11] Instead their baselines were set according to their level of activity at some time before the Scheme started. While it could be argued that such plant should be rewarded for early action, there are evident abatement additionality concerns for such NGACs – with most created by projects that were built five or more years before the GGAS commenced.

The certificates created in emissions trading schemes serve two functions - providing commercial value to certain projects and organisations, and acting as an accounting tool to quantify emissions. Allowing plant commissioned prior to GGAS to create NGACs without having to provide any additional abatement activity since the Scheme began means the second accounting function is distorted. This, in turn, distorts the degree to which such certificates can be claimed to reduce per capita emissions compared to pre-Scheme levels. This is a strong argument for auctioning permits in a cap and trade emissions trading scheme since genuine earlier movers are automatically compensated - they need to buy less permits.

This is a design weakness that could readily be addressed. A phased reduction in the eligibility of these plant to create NGACs would direct cash flow away from 'windfalls' for pre-existing patterns of behaviour towards changed operation of existing plant or projects involving new investment.

All generation from Category A fossil fuel plant[12], built between 1994 and 1997, is eligible to create certificates, and created 35.6% of the 2003/04/05 total. Similarly, all generation from Category A renewable plant, built between 1928 and 1996, is eligible to create NGACs, and accounted for another 17.8% of the 2003/04/05 total.

The increase in certificates created by activities that began after the Scheme commenced is due mainly to DSA activities (just over 865,000 more NGACs for 2005 than 2004), biosequestration activities (just over 372,000 more for 2005 than 2004) landfill gas projects (just over 285,000 more for 2005 than 2004), and waste mine gas (just over 258,000 more for 2005 than 2004). It is likely the percentage of certificates created by such plant will continue to increase over time. Note that the number of certificates created by plant that were in operation prior to 2003 has also increased each year, from 6,350,000 in 2003 to 6,980,000 in 2005. Assuming 23 million certificates will be required to meet liabilities by 2012 (IPART, 2006), and that pre-2003 generators create 6.5 million certificates, post 2002 projects will create about 70% of certificates by that time. This percentage is likely to increase post 2012 if pre-2003 generators decrease output and because classification as Category A (and therefore all generation being eligible to create NGACs) lasts only as long as the initial PPA.

New plant driven by demand growth

NGACs can be created through the Relative Intensity Rule by new plant anywhere in the NEM that has an emission intensity lower than the Scheme's Pool Coefficient. If these plant were to

[10] Over 1 million NGACs were created by plant that could not be identified using the information in the GGAS database and so it was assumed these started operation after the Scheme began. If they did not, the pre-Scheme certificates increase to over 98%, 89% and 74% for 2003, 2004 and 2005 respectively.
[11] The other pre-GGAS certificates were created under the Efficiency Improvement Rule (eg. fossil fuel plant such as Hazelwood under GES)
[12] Note that Category A classification is retained only for the life of the PPA.

replace older plant with a higher emissions intensity there would be a net reduction in emissions. However, new coal-fired plant are generally built to meet increased demand growth and so increase total emissions, and so clearly lack abatement additionality. Despite this, the NGACs so created are being used to claim an absolute reduction in per capita emissions in NSW. This outcome is difficult to address in a baseline and credit scheme that seeks to reward plant with lower emissions intensity than the average.

For example, the 445 MW Tarong North coal-fired power station in Queensland has so far created 118,981 NGACs for the 2003, 2004 and 2005 compliance years, while at the same time emitting an estimated 3.1 million tonnes[13] of CO_2-e per year since it started operation in August 2003, seven months after the GGAS began. The 840 MW Millmerran power station, which is also a supercritical design, has so far created 171,177 NGACs for the 2003, 2004 and 2005 compliance years, and would have emitted approximately 5.9 million tonnes of CO_2-e per year since its two units started operation in 2002 and 2003 respectively. Thus, both coal-fired plant that have entered into operation since the Scheme began have created NGACs and so, according to the Scheme rules, reduced emissions – and the more energy and emissions that they produced, the greater the emissions reduction that would be claimed under the scheme.

On the other hand, if Millmerran and Tarong North were in fact reducing overall electricity industry-related emissions (because they were displacing generators with a higher emissions intensity) they would then also be good examples of the Scheme's lack of BAU additionality. Their construction began in 1999 and 2000 respectively, well before GGAS was proposed, let alone implemented. However, NSW coal-fired generators have remained operating, thus their NGAC creation merely reflects the fact that new coal-fired plant are more efficient than the NSW average, which consists of a group of generators with a mean age of about 25 years.

We are also seeing increasing investment in gas-fired plant - driven by the need for peaking generation. These generators also have lower emissions intensities than the NSW average. All such plant will be eligible to create NGACs. In the future, government policies driving the implementation of carbon capture and storage (CCS) demonstration projects may also result in the creation of significant numbers of NGACs, although to date CCS technology has not been addressed in the Scheme Rules.[14]

However, the Scheme does offer additional support for low emission plant, which is more readily justified. For example, new gas-fired plant could receive around $7/MWh for CCGT plant at an NGAC price of $12-14/t$CO_2$e, and plant that burn methane that would otherwise be released into the atmosphere could receive significantly more NGACs.[15] These NGACs certainly represent an additional income stream and could influence investment decisions and so result in construction of plant with emissions lower than they would otherwise have been. A number of new landfill gas, sewage gas, waste mine gas and gas-fired plant are projected to be constructed over the next few years. A wide range of factors influence generator investment decisions, including increased demand, fuel availability and fuel cost, as well as NGAC prices if generators are eligible, or indeed more direct carbon pricing. If the price of NGACs increases, GGAS should play a more influential role in the financial viability of eligible generators.

Moving baselines allow NGAC creation even as emissions increase

Where NGACs are created by coal-fired plant that make efficiency improvements that don't involve changes to their design or fuel mix and are recognised under the Generator Efficiency Standards (GES) program,[16] the baseline used to calculate the number of NGACs may move due

[13] According to the Tarong Energy 2003/04 Annual Report, Tarong North had an emissions intensity of 0.86 tonnes CO_2-e/MWh and an availability of 93.5% (TN, 2004).

[14] For example the ZeroGen IGOC+CCS demonstration project proposed for Queensland is driven by the need to develop a low emissions coal technology and is receiving significant funding support from both Commonwealth and Qld State governments. It is aiming for operation by 2011, and once fully operational expects to avoid the production of 420,000 tonnes CO_2 per year and so would presumably be eligible for an equivalent number of NGACs (ZeroGen, 2006).

[15] The actual number of NGACs created depends on a range of factors in addition to emissions intensity – see p62 of the *Greenhouse Gas Benchmark Rule (Generation) No 2*, where the landfill gas example would receive $45/MWh at $12/NGAC.

[16] Note that it is common practice for thermal power plant owners to improve the efficiency of their plants through upgrades and regular maintenance reflecting improving technologies.

to a number of factors such as changes in fuel quality and the operating regime and age of the plant. Thus, it is possible for certificates to be created without any reduction in the generator's emissions intensity. This is a design feature that is difficult to address if the GGAS intends to reward fossil fuel generators for exceeding GES requirements.

The emissions intensity of Delta's Vales Point and Wallerang plant increased from 2002/03 to 2003/04 and yet they created 94,537 NGACs for the 2003 compliance period (Delta, 2004). Emission reduction for Hazelwood Power Station is part of an ongoing process initiated in 1997 with a commitment to reduce or offset annual emissions by 920,000 tCO_2-e per year by 2000, a commitment that saw Hazelwood sign on to the GES in 2001. The number of NGACs created by Hazelwood bears little relationship to the change in physical emissions compared to 2002 (ie. the year before the GGAS started) – see Table 6 (IPH, 2006). In both 2003 and 2004 when Hazelwood was credited with abatement through the creation of 251,199 and 130,906 NGACs respectively, its emissions were 10,780 and 85,638 tonnes CO_2-e higher than 2002 in each of those years. In 2005, Hazelwood's emissions decreased by 890,192 tonnes CO_2-e compared to 2002 and it created 675,881 NGACs, bringing the total to 264,210 more NGACs created than emissions reduced for 2003 to 2005. While it is difficult to compare years (NGACs can be created during an 18 month period), the link between the creation of NGACs and a reduction in physical emissions is certainly not clear - an inherent problem for a baseline and credit scheme.

Table 6 Hazelwood's Emissions and NGAC Creation

	Change in emissions compared to 2002 (tonnes CO_2-e)	NGACs created
2003	+ 10,780	251,199
2004	+ 85,638	130,906
2005	- 890,192	675,881
Total	- 793,776	1,057,986

Changes to Method 2 of the Generation Rule requires consideration of the generation system rather than components of the generation system and so should more accurately reflect the abatement achieved. At this stage it is too early to assess the effectiveness of these changes.

Activities on only one side of a baseline are said to effect emissions

A total of 26.5% of the 2003/04/05 NGACs were created by activities that could go below their NSW Production Baseline but would not 'pay back' their NGACs if they did. Thus, the Scheme explicitly assumes that activity levels above the baseline reduce emissions whereas activity levels below the baseline do not increase emissions, which is implausible and could reduce abatement additionality. This is a design feature that could be addressed if projects were required to pay back NGACs when they went below their NSW Production Baseline.

This problem may have occurred for Pelican Point, which reduced output in 2004 because of delayed supply of gas from the new Minerva gas field in Victoria (IP, 2004), and created NGACs for 2003 and 2005 but not for 2004.

Similarly, between 1997 and 2002 the 'annual abatement' compared to 1996 reported by Hazelwood in its *Annual report on the environment, health & safety and community* has ranged from positive 758,473 to negative 439,556 tonnes due to changes in emissions intensity (IPH, 2003). Should such variability translate into Hazelwood being unable to create NGACs because its adjusted emissions intensity is greater than the GGAS baseline (the appropriate Greenhouse Intensity Value), under the present Scheme rules it would not be required to surrender NGACs to compensate.

Demand Side Abatement

Demand Side Abatement is a significant but very problematic part of GGAS. The problem lies in the enormous range of end-use equipment and actions that impact on energy demand. There is, then, the challenge of determining appropriate baselines from which credit for 'abatement' might be calculated for these numerous and diverse activities.

For example, almost all the NGACs created by small-scale DSA projects were calculated using the Default Abatement Factors Method where the abatement is 'deemed' to have occurred at the time of installation. For example, the Default Emissions Abatement Factor (DEAF) for an 8,000 hour CFL is 0.5 and for a low-flow showerhead on an electric water heater is 4. Depending on how the product is installed, an Installation Discount Factor (IDF) is then applied. For example, for the 2003/04/05 compliance periods, a CFL given away for free had an IDF of 0.8 to allow for the fact that it may not be installed. Thus a free CFL would create 0.4 NGACs.

According to IPART analysis, the market for showerheads and CFLs is approaching saturation. They estimated that by December 2006, almost as many showerheads would have been distributed as there are eligible showers in NSW, and about two thirds of the CFL market would have been exhausted. As a result, an independent survey was conducted which indicated that the IDF of 0.8 for free CFLs and showerheads was too high, and so it was changed to 0.4 for NGACs created from nomination forms signed on or after the 1st October 2006 (Boardman, 2006; Fague, 2006; IPART 2006).

Thus it is clearly possible for the NSW government to fine-tune GGAS to improve its effectiveness. However, having acknowledged that the NGACs created through CFL/showerhead giveaways represent less greenhouse emissions reductions than originally thought, IPART's calculations for per capita emissions in NSW for 2003, 2004 and 2005 will be inaccurate – unless the abatement value of these NGACs is reduced. This lack of abatement additionality is a direct and unavoidable result of the GGAS design, where creation of NGACs is based on perceived abatement with respect to BAU rather than on physical emissions. It is likely that other policy measures such as standards and licencing conditions would be more effective in driving uptake of energy efficient devices.

The number of NGACs created through CFL/showerhead projects increased from 0.13% of the total for 2003 to 4.1% for 2004 and 9.6% for 2005, reaching almost 1.3 million NGACs for these years. By Jan 2007 over 6 million NGACs had been created through CFL and showerhead giveaways for the 2006 compliance year – bringing the total to over 7.3 million NGACs. Although many of these (just under 2.2 million) were created after the 1st October 2006, it is likely they were created from nomination forms signed before this date and so use an IDF of 0.8.

Use of RECs to meet retailer's GGAS liabilities

RECs created through the Australian Government's MRET scheme that are associated with electricity sold in NSW can be used to meet participants' liabilities under GGAS. The associated low emission generation would occur regardless of the GGAS and so these NGACs lack policy additionality. This is a design feature that could be readily addressed by not allowing such RECs to be used to meet retailers' liabilities.

For the 2003, 2004 and 2005 compliance periods, 2,503,619 RECs were converted into 2,271,203 NGACs. These NGACs made up 28.7%, 12.9% and 11.2% of those used to meet liabilities for each of these years respectively, and so made up 13.6% of the total. As the MRET target increases, the number of REC-derived NGACs is also likely to increase, although because of the increasing GGAS target, REC-derived NGACs will make up a decreasing proportion of the total NGAC liability. Note it is possible that RECs from such plant could sell at a premium since they can be used to meet retailers' GGAS liabilities, and so could provide additional support to some renewable plant.

Greenhouse Gas Abatement Program

Projects that received GGAP funding after 1st Jan 2003 can create NGACs in proportion to the funding provided by the generator (as opposed to that proportion of funding obtained from GGAP). Projects initiated before 1st Jan 2003 - such as the Teralba waste coalmine gas plant that received GGAP funding in May 2001 (AGO, 2001) - have no such restriction. Given that the aim of GGAS is to drive additional activity, it is not clear why GGAP projects should be rewarded with NGACs at all. The GGAP rules stipulate that funding will only be provided over and above that which is commercially viable for the proponent. This means the GGAS rewards the proponent for doing what is already commercially viable, and so lacks policy additionality. This is a design feature that could be readily addressed by not allowing GGAP funded projects to create NGACs.

Biosequestration

Biosequestration activities created NGACs under the Carbon Sequestration rule for the first time for the 2004 compliance period. They were created by Forests NSW and contributed 2.2% of the 2004 total (166,005 NGACs), and 5.3% of the 2005 total (538,471 NGACs). It is likely the number of NGACs created through biosequestration activities will increase as the rules for sequestration have been finalised and the program has been extended to a relevant investment timeframe. Although the auditing requirements are very rigorous, as for other methods of NGAC creation, they do not necessarily ensure a high level of additionality. The problems discussed below are difficult to address if the GGAS seeks to create NGACs through biosequestration.

Assessing the additionality of biosequestration is complex, both in terms of measurement uncertainty and in verifying that there are reasonable grounds for believing the project would not have happened anyway. Biosequestration activities through GGAS are project-based, meaning they apply only to the Eligible Forests on the Eligible Lands that are creating NGACs. This means leakage may occur because they don't incorporate other activities of the organisation that may offset the sequestration abatement eg. increased logging in other areas because the GGAS project area is no longer available for logging.

Non-permanence is also an issue for all biosequestration projects since carbon stored in biomass is at continuous risk of being emitted to the atmosphere. Project-based afforestation and reafforestation are allowed in the Clean Development Mechanism and non-permanence is addressed through the issuance of temporary credits that must be replaced with some other credit on expiry. tCERs (temporary Certified Emission Reductions) expire at the end of the commitment period following the one during which they were issued. lCERs (long-term CERs) can be nominated as either fixed or renewable. If fixed, a period of up to 30 years is allowed, and if renewable, a period of up to 20 years is allowed, which can be renewed up to two times, that is, they will expire after at most 60 years depending on the approach selected (UNFCCC, 2006).

The NGACs issued for biosequestration activities through the NSW Scheme require maintenance of carbon stocks for 100 years, after which they need not be renewed. This may make it difficult for the NSW Scheme to be compatible with the Kyoto Protocol or subsequent schemes based on its methodologies. The National Emissions Trading Scheme Discussion Paper also recommends the use of the GGAS 100 year rule and may suffer the same incompatibility (NETT, 2006). The ability to enforce maintenance of plantings for 100 years is clearly problematic – particularly when there are likely to be marked changes in temperature and rainfall over that time that impact the viability and carbon balance of such ecosystems.

While measuring the abatement of biosequestration projects is difficult and by necessity based on estimations, measuring their impact on Australia's net sink inventory is impossible because projects below a certain size are indistinguishable from the 'background noise' due to the limit of accuracy of the national land use, land use change and forestry (LULUCF) database. In its Fourth Communication to the IPCC, the Australian Government acknowledged that its LULUCF inventory estimates have an uncertainty of 20-60% (Australian Government, 2005).

Biosequestration activities allowable under the Scheme can have been planted any time from 1990 onwards, and so may not have been driven by the GGAS. However, it is possible that some of the plantations established during this time were in anticipation of reward for carbon

sequestration that is now not forthcoming because of Australia's non-ratification of the Kyoto Protocol. Thus, although they were not established because of the NSW Scheme, they may have been established with the intent of reducing emissions.[17] In addition, it is possible that establishment of plantations that are dependent on a carbon price for financial viability and are planned to be used as a source of timber, especially sawlogs, could reduce pressure on native forests.

Table 7 Additionality questions for 2003 and 2004 NGACs

(based on our analysis of the NGAC registry)

Category A fossil fuel plant			
Year	**NGACs**	**%**[18]	
2003	3,058,743	45.9%	Applies to Tower and Appin colliery waste coal mine gas plant (1996), Smithfield natural gas cogeneration plant (1997), Varnsdorf natural gas plant (~1994) and the cogeneration plant at St Vincents, Royal Melbourne and The Alfred hospitals in Melbourne.
2004	2,922,741	38.2%	
2005	2,705,558	26.8%	
Total	8,686,470	35.6%	

These generators may have been commissioned at any time prior to the Scheme's commencement, and all generation is eligible to create NGACs. While it has been argued they should be rewarded for early action, given the large number of NGACs being created, this reward significantly reduces the need for new low-emission generation, and so reduces the Scheme's dynamic efficiency. Being rewarded for early action 10 years after commissioning, and possibly until 2020, is certainly generous. Tower/Appin creates NGACs through an abatement activity that has been reducing emissions in another sector (methane from 'Mining – non-energy')[19] since 1996. Under the Scheme rules, as of 2003, this abatement activity was transferred across to the stationary energy sector without any additional abatement occurring overall. Note that Category A fossil fuel plant make a relatively minor direct contribution to the emissions intensity of electricity sold in NSW despite creating a large number of NGACs. Only Tower/Appin and Smithfield are based in NSW, and at least 80% of Tower/Appin's NGACs are created through avoided methane emissions.

Category B fossil fuel plant			
2003	286,985	4.3%	Applies to coal-fired power stations at Eraring (1984), Mt Piper (1992/93), Vales Point (1978/9), Wallerawang (1957/80), Munmorah (1967) and Liddell (1973)[20].
2004	418,581	5.5%	
2005	498,952	5.0%	
Total	1,204,518	4.9%	

It is common practice for thermal power plant owners to improve the efficiency of their plants through upgrades and regular maintenance reflecting technological progress. These efficiency improvements are also recognised under the Australian Government-operated Generator Efficiency Standards program developed through negotiation with the plant owners and so most probably created NGACs using Method 1 – GES Gain.[21] NGACs may be created through routine annual fluctuations in emission intensity – where emission intensities that don't meet GES requirements do not 'pay back' NGACs. If the emissions intensity of the plant increases but is still less than their Production Baseline, NGACs can also be created even as emissions increase. Further, it is nearly impossible to tell whether the GGAS contributed to improvements beyond GES requirements or to any decision to undertake turbine upgrades.

[17] Although note that the UNFCCC did not enter into force until March 1994 and the Kyoto Protocol until 2005.
[18] The percentages do not include NGACs created directly from RECs.
[19] Under the National Greenhouse Gas Inventory guidelines.
[20] Macquarie Generation had entered into the supply contract for its new low pressure turbines before the GGAS was introduced. In addition to lacking BAU additionality, this meant a Valve Wide Open Test had been used to calculate the efficiency gain although the Scheme rules require a Heat Rate Test. Consequently the Scheme rules were changed to allow accreditation (IPART, 2003).
[21] This method is applied if the Generating System improved its efficiency without changing its design or fuel mix and is a participant in the Commonwealth GES program. The generator may create NGACs by performing better than the lower bound of the Generator Efficiency Standards Greenhouse Intensity value for that type of generating system.

Category C fossil fuel plant			
2003 2004 2005 Total	537,476 289,397 1,289,195 2,116,068	8.1% 3.8% 12.8% 8.7%	Hazelwood (1964)[22] and Stanwell (1993, 1996) coal-fired plant. Pelican Point (2001), Alinta DEBO Bairnsdale (2001), TRUenergy Newport (1986) and Torrens Island B (1975), Origin Energy's Ladbroke Grove (1990), and Enertrade's Townsville (2005 upgrade) and Oakey (2000) natural gas plant.

Insufficient information is provided in the NGAC database to determine whether NGACs were created through claimed low emission generation or efficiency improvements. For those generators where the former is correct, generation above the average annual net sent-out generation from 1997 to 2001 is eligible to create NGACs. These plant are operating in a market with growing demand and a range of other policy initiatives support their operation. They do not surrender NGACs if their annual generation is below their baseline. Those plant that create NGACs through efficiency improvements do not surrender NGACs if their efficiency falls below their claimed enhanced efficiency, and it is near impossible to tell whether the improvements used to claim NGACs were due to GGAS or to general energy market incentives for improved efficiency and increased capacity.

Category D fossil fuel plant			
2003 2004 2005 Total	251,045 688,276 543,299 1,482,620	3.8% 9.0% 5.4% 6.1%	Applies to natural gas plant at Coopers Brewery (2003), Swanbank E (2002), Quarantine (2001) and Wilga Park (2004), the Tahmoor (2001, upgrade 2003) and Teralba (2004) waste coal mine gas plant, the Moranbah coal seam methane plant (2004), and the Millmerran (2003) and Tarong North (2003) coal-fired plant.

These plant may have been commissioned on or after 1st July 1997 if 30 MW or less, or on or after 1st Jan 2002 if above 30 MW, and all generation is eligible to create NGACs even though they may have been operating for some time before the Scheme started. It is also possible they were supported by some other scheme such as GGAP[23], or were constructed or had their output increased in response to load growth rather than the GGAS.

Category A renewable plant			
2003 2004 2005 Total	1,359,905 1,466,031 1,527,300 4,353,236	20.4% 19.2% 15.2% 17.8%	Applies to landfill gas plant at Belrose (1995), Berwick (1992), Broadmeadows (1993), Clayton & Springvale (1995), Corio (1992), Highbury Hill (1995), EnergyAustralia's Lucas Heights (1995 and/or 1998), Pedler Creek (1995), Tea Tree Gully (1995), and Wingfield 1 & 2 (1994), and hydro plant at Blue Rock Dam (1991), Burrendong (1996), Cardinia (1993), Copeton (1996), Eildon Pondage (1994), Glenbawn (1995), Lake Glenmaggie (1994), Lake William Hovell (1994), Nymboida (1928), Oaky (1950s), Thomson Dam (1989), Yarrawonga (1993) and Wyangala (1992), and Broadwater (1996), Harwood (1982) and Condong (1981) bagasse cogeneration plant.[24]

These plant may have been commissioned at any time prior to the Scheme's commencement, and all generation is eligible to create NGACs.[25] While it has been argued they should be rewarded for early action, the large number of NGACs being created significantly reduces the need for new low-emission generation, and so reduces the Scheme's dynamic efficiency. Significant numbers of NGACs were likely created through combustion of methane that wouldn't have been released in the Scheme's absence.

[22] It is unclear why Hazelwood Power Station is classified as Category C since it was constructed between 1964 and 1971 and is a fossil fuel power station with a nominal capacity of 1600MW.
[23] Greenhouse Gas Abatement Program
[24] Some landfill gas plants were not named in the NGAC database, and may otherwise have been included here.
[25] If there exists a Power Purchase Agreement that includes a maximum amount of electricity expressed in MWh to which the Deemed Retailer is contractually entitled in a calendar year, this may be used as the baseline. If a REC baseline has been assigned by ORER, it may be used instead. The retailer is entitled to NGACs created by generation below the baseline and the generator is entitled to NGACs created by generation above the baseline. Note that generation cannot be used to create both RECs and NGACs, except where NGACs are created through methane combustion.

Category C renewable plant			
2003	90,952	1.4%	Applies to EDL's Lucas Heights I LFG plant (1995) and Werribee sewage treatment plant (1997).
2004	58,928	0.8%	
2005	100,578	1.0%	
Total	250,458	1.0%	

These plant create NGACs through low emission generation above their REC baseline and through methane avoidance. They were operating before the GGAS started and do not surrender NGACs if their annual generation is below their baseline. Again, large numbers of NGACs were likely created through combustion of methane that wouldn't have been released in the Scheme's absence.

Category D renewable plant			
2003	732,729	11.0%	Applies to EDL's Lucas Heights II LFG plant (1998), and to LFG plant at Brooklyn (2001), Eastern Creek (2002), Molendinar (2002), Mornington (2002), Stapylton (2002), Suntown (2002), Reedy Creek (2003), West Nowra (2002) and Wyndham (2003) and EarthPower's Camellia plant (2003).
2004	900,847	11.8%	
2005	1,271,934	12.6%	
Total	2,905,510	11.9%	

Plant are classified as 'new' with a zero baseline as long as their first commercial operation was on or after 1st Jan 1997. Plant that were operating before the GGAS started were already being rewarded for early action through the MRET scheme.

Demand Side Abatement – Generation activities			
2003	278,397	4.2%	Applies to Tahmoor waste coal mine gas plant (2001), Visy pulp and paper mill (2001), Malabar (1999) and Cronulla (2001) sewage treatment plant.
2004	332,221	4.3%	
2005	435,216	4.3%	
Total	1,045,834	4.3%	

These plant, that created NGACs through cogeneration, were operating before the GGAS started and may be driven by a range of licensing and other requirements, or other policy measures that place a financial incentive on abatement activities.

Demand Side Abatement – Energy Efficiency activities			
2003	66,744	1.0%	Numerous activities, including Sydney Water's shower head replacement program that is in part driven by its water demand side management targets.
2004	410,012	5.4%	
2005	1,073,983	10.7%	
Total	1,550,739	6.4%	

The potential range of energy efficiency activities across the economy is very wide, and certainly deserves policy support. However it is not clear that trading schemes are the most effective and efficient way to drive uptake. There is a range of possible licensing and other policy measures that could be more effective, and may in fact be driving many activities that earn NGACs. Continuing technical progress has also improved the efficiency of some appliances, equipment and industrial processes. The degree to which some activities that earn NGACs are actually implemented is uncertain and subject to significant errors (as discussed above).

Biosequestration			
2003	0	0.0%	All biosequestration NGACs to date have been created by the Forestry Commission of NSW.
2004	166,005	2.2%	
2005	538,471	5.3%	
Total	704,476	2.9%	

Biosequestration is an extremely problematic area for a number of reasons: uncertainties in measuring carbon stocks in ecosystems; non-permanence; and because the activities that create NGACs are project-based, other activities of the organisation that may offset the sequestration abatement are not incorporated into the NGAC calculations.

Large User Abatement Certificates			
2003	0	0.0%	Amcor - Botany mill, Boral - Berrima works upgrade and Norske Skog Paper.
2004	0	0.0%	
2005	94,277	0.9%	
Total	94,277	0.4%	
While these activities may represent additional abatement, in the absence of increased transparency regarding how LUACs were created, it is impossible to tell.			

5 A Question of Governance

Schemes such as the GGAS can be separated into design, operation and assessment components, where the scheme may be implemented through the following process: Scheme design – initial scheme operation – scheme assessment – revised scheme design and implementation – further operation – scheme assessment – revised scheme design and implementation, etc. In this process, separation of powers between the 'designer', 'operator' and 'assessor' is important to reduce conflicts of interest, especially where the assessor is publicly reporting on outcomes that are relevant to public welfare and are important to informing revision of the scheme design. Managing this interface for complex schemes is very challenging.

Figure 3 below illustrates one possible decision-making framework for the GGAS. The scheme is designed at the Governance level, which for GGAS involved the NSW Department of Energy Utilities and Sustainability (DEUS)[26], and 'Regulator' corresponds to the assessor, which for GGAS is the Independent Pricing and Regulatory Tribunal (IPART)[27]. IPART also fills the role of 'Scheme Administrator' and so is responsible for operation of the Scheme. Thus, IPART is responsible for both operating and assessing the Scheme. The 2006 Compliance Report states that IPART has taken on the role of "robust assessment and quantification of abatement" in the Scheme. ie.

> "In establishing the framework for accreditation and ongoing monitoring of ACPs, IPART as the Scheme Administrator has continued to be guided by the need to ensure Scheme integrity through robust assessment and quantification of abatement and the ongoing monitoring of ACPs' compliance with obligations arising from accreditation." (IPART, 2007, p19)

This would appear to take IPART's role beyond simple assessment of compliance with the Scheme Rules to assessing the Scheme's ability to deliver real emissions reductions.Figure 3 also illustrates the importance of good governance. The NSW Government is responsible for scheme design and for establishing both the Regulator and Scheme Administrator, as well as assigning their responsibilities and overseeing their operation. As illustrated by our independent assessment, the NSW GGAS is an excellent example of governance failure. While IPART is responsible for production of the annual Compliance and Operation Reports that have so far failed to identify the design problems described in this paper, IPART's reporting guidelines are assigned to them by the NSW Government. Indeed, organisations such as IPART may have a role to play in reporting readily quantifiable Scheme outcomes, such as the number of certificates created and the number of participants. What is lacking is an independent assessment of the Scheme's effectiveness, efficiency and equity.

This governance problem is not limited to NSW, as other government schemes, including MRET and the European Union Emissions Trading Scheme, also have serious design flaws. A key challenge facing society is the development of governance processes able to design and implement schemes that will reduce greenhouse gas emissions in the most effective, efficient and equitable way.

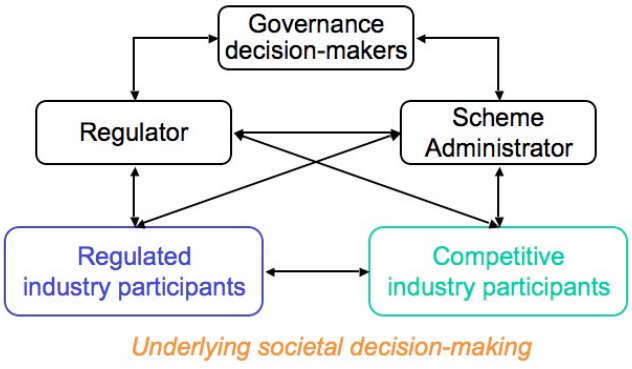

Figure 3 Possible decision-making framework for an emission reduction scheme for a competitive electricity industry

[26] Now the Department of Water and Energy
[27] The Independent Competition and Regulatory Commission in the ACT

Conclusion

Compared to the 2003 liability period, the 2004 and 2005 liability periods have seen NGAC creation by a greater variety and number of projects – including more from energy efficiency, and from biosequestration for the first time. LUACs were also created for the first time for 2005. However, waste coal mine gas, landfill gas and natural gas-fired plant still made up almost 60% of the total in 2005, with landfill gas being the main source of certificates for 2005, mainly through methane combustion.

There is still some potential for the exercise of market power, with Integral Energy, Energy Developments and AGL creating most NGACs for 2003, 2004 and 2005, producing 59% of the total between them. This concentration should decrease over time as more firms enter the market. The NGAC database still lacks reporting transparency, with missing information including the method or equation that was used to create NGACs, how baselines were calculated, and how compliance was achieved.

Around 70% of the 2003/04/05 NGACs were created by activities that were either outside NSW or involved methane combustion or biosequestration and so had little or no affect on the emissions intensity of electricity sold in NSW. This has significant implications for any future scheme that targets physical emissions in the NSW electricity sector, for example, if the claimed per capita emissions were used as the basis for the emissions cap (and therefore permit allocations) in a cap and trade scheme.

There is no doubt that some projects that created NGACs represent additional abatement, and the Scheme is likely to drive some additional investment in generation that has lower emissions than would otherwise have been the case. However, additionality concerns remain for many of the projects that have created NGACs to date, and relate to whether the abatement has occurred, and if it has, whether it was driven by other government policies, or whether the activity would have occurred anyway because of, for example, technological improvements or the need for peaking plant.

Our concerns are supported by external assessments such as those of the Federal Government presented in the recent Report of the Prime Ministerial Task Group on Emissions Trading. Their assessment is that the additional abatement likely to be driven by GGAS in 2010 is 5Mt CO_2-e (PMTGET, 2007), around one quarter of the 20 million NGACs claimed in IPART's 2006 Compliance and Operation Report (IPART, 2007). A number of the Scheme's design problems can readily be addressed and doing so should increase the Scheme's additionality and significantly increase the incentives for investment in new plant.

Unfortunately many of these additionality problems are inherent in a baseline and credit scheme, which is one of the reasons that the EU ETS, the proposed multi-state scheme in Australia and other proposed schemes elsewhere in the world have all chosen a 'cap and trade' approach instead. Cap and trade approaches are based around physical measurable emissions instead of abstract notions of emission reductions from an estimate of what would have happened otherwise. Where a 'baseline and credit' approach is taken in the CDM, very rigorous and formal tests of additionality are included – that is, they require projects seeking accreditation to very clearly demonstrate that they will reduce emissions from what would have happened otherwise. The NSW GGAS rules, however, don't formally address additionality at all.

It is instructive to assess government policy against the criteria of effectiveness (have emissions been reduced), efficiency (has this occurred at least cost) and equity (have costs and benefits been distributed as evenly as possible). As discussed, it is very likely that emissions have not been reduced nearly as much as is claimed, decreasing the Scheme's effectiveness. This means that efficiency is also reduced - there is a significant impact on dynamic efficiency when a large part of the scheme's cash flow is collected from electricity consumers and delivered to participants who are not actually undertaking genuine, non-BAU, abatement activities. Although the Scheme's costs have been distributed amongst electricity consumers, the allocation of NGAC cash flow has been highly concentrated, and so equity is also low, especially where the

abatement would have occurred anyway or has not occurred at all. Thus while there have been improvements compared to the 2003 compliance period, which is to be expected with the establishment of a new scheme, the Scheme's performance with respect to these assessment criteria is insufficient for the likely abatement task out to 2020.

Placing a price on greenhouse emissions is an important function of any emissions trading scheme, and is necessary for the capacity building within industry and government required for the transition to a less carbon-intensive economy. Unfortunately it is doubtful that the GGAS is doing this. Rather, it is placing a price on NGACs, which actually represent the absence of imputed emissions with respect to an historical or projected baseline. Thus, although it has been claimed the GGAS "has minimised the cost of abatement to NSW consumers and industry, compared to other types of regulatory measures or Government programs" (DEUS, 2006), this would not be true if the actual abatement was much less than claimed and much of the 'abatement activity' either would have occurred anyway, was already happening, has not decreased emissions or has actually increased emissions.

It is possible the GGAS could delay meaningful action, not only because of the perception that emissions are already being reduced more than they actually are, but also because firms that base their business plans on it are likely to actively oppose any changes. It could also distort an Australian national cap and trade scheme (NETS), reducing its effectiveness, efficiency and equity, for example if projects currently creating 'non-additional' NGACs are credited with abatement and compensated in some way if a NETS replaces GGAS. Because of the design problems discussed above, the GGAS is unlikely to be compatible with international schemes (such as the EU ETS or the Kyoto Protocol) and so delay Australia's engagement with the international carbon market.

The numerous design flaws in the Scheme point to a poor design process and there appears to be a clear conflict of interest in IPART being the Scheme Administrator as well as the Compliance Regulator with responsibility for assessing the Scheme with respect to its stated objectives. This highlights the need for good governance in designing the policies required to reduce greenhouse gas emissions.

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Appendix 1

Response to Feedback on the Draft Report for Comment

This report was released in draft form on the 18th May 2007 seeking comments and feedback from interested parties. In response to feedback from a number of stakeholders, and in addition to some minor grammatical changes, the following clarifications have been made in the final report.

Clarification 1

The draft report stated (p4):

> "There is a clear conflict of interest in IPART being the Scheme Administrator as well as the Compliance Regulator with full responsibility for assessing the Scheme."

Feedback: As far as I am aware, IPART was not given the role of assessing the GGAS, but only tasked with the functions of Scheme Administrator and Compliance Regulator, neither of which can reasonably be described as 'assessor'. Doesn't this mean that there is no conflict of interest?

CEEM Response: As can be seen from the following extract from the 2006 Compliance Report, IPART states it has taken on the role of "robust assessment and quantification of abatement" in the Scheme.

> "In establishing the framework for accreditation and ongoing monitoring of ACPs, IPART as the Scheme Administrator has continued to be guided by the need to ensure Scheme integrity through robust assessment and quantification of abatement and the ongoing monitoring of ACPs' compliance with obligations arising from accreditation." (IPART, 2007, p19)

This takes IPART's role beyond simple assessment of compliance to assessing the Scheme's ability to deliver real emissions reductions. Of course, this is not the same as having "full responsibility for assessing the Scheme" as stated in the draft report.

The final report now states (p4):

> "There appears to be a clear conflict of interest in IPART being the Scheme Administrator as well as the Compliance Regulator with responsibility for assessing the Scheme with respect to its stated objectives."

The final report now states (p29):

"The 2006 Compliance Report states that IPART has taken on the role of "robust assessment and quantification of abatement" in the Scheme. ie.

> "In establishing the framework for accreditation and ongoing monitoring of ACPs, IPART as the Scheme Administrator has continued to be guided by the need to ensure Scheme integrity through robust assessment and quantification of abatement and the ongoing monitoring of ACPs' compliance with obligations arising from accreditation." (IPART, 2007, p19)

This takes IPART's role beyond simple assessment of compliance with the Scheme Rules to assessing the Scheme's ability to deliver real emissions reductions."

The final report now states (p31):

> "The numerous design flaws in the Scheme point to a poor design process and there appears to be a clear conflict of interest in IPART being the Scheme Administrator as well as the Compliance Regulator with responsibility for assessing the Scheme with respect to its stated objectives."

Clarification 2

The draft report stated (p4):

> "As a result, the 2003/04/05 certificates created by activities that could directly affect the emissions intensity of electricity generation in NSW is unlikely to be much greater than 30% of the total for those years. This may have significant implications for any future scheme which targets physical emissions from the NSW electricity sector, for example, if the claimed GGAS per capita emissions were used as the basis for the emissions cap (and therefore permit allocations) in a cap and trade scheme."

Feedback: It is unlikely any future scheme designer would ignore the architecture and objectives of GGAS in assessing NSW sector emissions.

CEEM Response: We agree this should be clarified. The draft report wasn't claiming a scheme designer would use the claimed GGAS per capita emissions as the basis for the emissions cap. It was illustrating the point by stating that if they did this then it would very quickly become apparent that actual emissions by the NSW electricity sector were far greater than the GGAS per capita targets indicate.

The final report now states (p4, 15):

> "This may have significant implications for any future scheme which targets physical emissions from the NSW electricity sector because actual emissions are likely to be far greater than the GGAS per capita targets indicate. This means, for example, that the claimed GGAS per capita emissions could not be used as the basis for the emissions cap (and therefore permit allocations) in a cap and trade scheme."

Clarification 3

The draft report stated (p5):

> "At least 83% (2003), 76% (2004) and 52% (2005) of the NGACs were created by pre-existing low emission plant that didn't have to increase their operation compared to pre-GGAS levels to create certificates. This particularly applies to Category A fossil fuel and renewable plant which accounted for 53.4% of the 2003/04/05 NGACs."

Feedback: Giving Category A plant a zero baseline was to recognise the actions of early movers regarding greenhouse gas abatement and to provide initial liquidity.

CEEM Response: The certificates created in emissions trading schemes serve two functions - providing commercial value to certain projects and organisations, and acting as an accounting tool to quantify emissions. In the GGAS architecture, allowing Category A generators to create NGACs without having to provide any additional abatement activity focuses only on the first function. Regardless of the degree to which Category A generators deserved to be rewarded for early action, providing them with such certificates meant the second accounting function was distorted – because the rewarded activity had not lead to additional abatement since the scheme began. This, in turn, distorts the degree to which such certificates can be claimed to reduce per capita emissions compared to pre-Scheme levels. It is always difficult to assess BAU from 'early movers'. This is a strong argument for auctioning permits since genuine earlier movers are automatically compensated - they need to buy less permits.

The final report now states (p20):

> "While it could be argued that such plant should be rewarded for early action, there are evident abatement additionality concerns for such NGACs – with most created by projects that were built five or more years before the GGAS commenced.
>
> The certificates created in emissions trading schemes serve two functions - providing commercial value to certain projects and organisations, and acting as an accounting tool to quantify emissions. Allowing plant commissioned prior to GGAS to create

> NGACs without having to provide any additional abatement activity since the Scheme began means the second accounting function is distorted. This, in turn, distorts the degree to which such certificates can be claimed to reduce per capita emissions compared to pre-Scheme levels. This is a strong argument for auctioning permits in a cap and trade scheme since genuine earlier movers are automatically compensated - they need to buy less permits."

Clarification 4

The draft report stated (p5):

> "Calculation of NGACs created by efficiency improvements under the GES program is based on a moving baseline and so NGACs can be created even as emissions increase."

Feedback: From the Scheme Rules it seems this is only true under GES Method 1.

CEEM Response: This is correct, however from the information available to the public it is not possible to determine which Method was used.

The final report now states (p5):

> "Calculation of NGACs created by efficiency improvements that don't involve changes to their design or fuel mix and are recognised under the GES program is based on a moving baseline and so NGACs can be created even as emissions increase."

The final report now states (p21):

> "Where NGACs are created by coal-fired plant that make efficiency improvements that don't involve changes to their design or fuel mix and are recognised under the Generator Efficiency Standards (GES) program, the baseline used to calculate the number of NGACs may move due to a number of factors such as changes in fuel quality and the operating regime and age of the plant."

Clarification 5

The draft report stated (p5):

> "IPART has acknowledged that the NGACs created through demand side abatement activities up to around the end of 2006 reduced emissions by half as much as originally thought. Such activities created at least 5 and possibly more than 7.2 million NGACs for 2003/04/05."

Feedback: The position taken in the Installation Discount Factor (IDF) seems quite conservative and ignored any installation that may occur after the surveys. To say that the activities reduced emissions by half as much as claimed overstates the position.

CEEM Response: The survey respondents stated that just under half of the CFLs and showerheads had been installed, and almost all the remaining CFLs would be installed and half the remaining showerheads would be installed. It is possible that most of the remaining CFLs will in fact be installed, presumably as the existing lights need replacing. However, it is not clear that half the remaining showerheads will be installed. To the extent that this was going to happen, it would presumably have happened already since there was no need to wait until the existing showerhead broke before replacing it. It is also unclear to what extent that the people who installed CFLs under the Scheme would have installed them anyway. Thus, while it is true that stating that the activities reduced emissions by half as much as claimed overstates the position, it is likely that the real rate of installation lies somewhere between the 0.4 and 0.8 IDF.

The final report now states (p5):

> "IPART has acknowledged that the NGACs created through demand side abatement activities up to around the end of 2006 reduced emissions less than originally thought. Such activities created at least 5 and possibly more than 7.2 million NGACs for 2003/04/05."

The final report now states (p23):

> "However, having acknowledged that the NGACs created through CFL/showerhead giveaways represent less greenhouse emissions reductions than originally thought,……"

Clarification 6

The draft report stated (p10):

> "Coal-fired plant increased significantly for 2005, mainly because of two brown coal power stations in Victoria, Hazelwood and Loy Yang, which created 675,881 and 311,660 NGACs respectively, or approximately 10% of the 2005 total between them."

Feedback: The actual figure for Loy Yang A following the audit was 254,015 NGACs. The data provided in report is often incorrect due to it being out of date. NGAC numbers can change as a result of verification audits.

CEEM Response: It's true that the data is sometimes inaccurate because certificates have been forfeited. This also applies to IPART's Annual Compliance and Operation Reports.

The final report now states (footnote, p9):

> "Note that certificates can be forfeited in retrospect as a result of IPART's auditing process. This means that for both this report and IPART's Annual Compliance reports, the numbers of certificates attributed to different projects may change over time."

Clarification 7

The draft report stated (p20):

> "At least 95% of the 2003 certificates, 85% of the 2004 certificates and 69% of the 2005 certificates were created by plant built and commissioned before the start of the GGAS. At least 83% (2003), 76% (2004) and 52% (2005) of these were created under the Relative Intensity Rule and the plant did not have to increase their activity above pre-2003 levels to create certificates. Instead their baselines were set according to their level of activity at some time before the Scheme started."

From the feedback received, there was some confusion over what was meant by pre-2003.

CEEM Response: In the draft report, pre-2003 levels meant immediately prior to 2003, not at any time before 2003. The final report instead refers to end-2002 levels. This is important because the Scheme began at the beginning of 2003, and so abatement activities can only be additional to the extent that they increase compared to end-2002 levels.

The final report now uses end-2002 instead of pre-2003 in the above quote.

Clarification 8

The draft report stated (p23):

> "For example, the number of NGACs created by small-scale DSA projects is calculated using the Default Abatement Factors Method where the abatement is 'deemed' to have occurred at the time of installation."

Feedback: The Default Abatement Factors Method is only one of a number of approaches to the DSA rule.

CEEM Response: This is correct and almost all the NGACs created by small-scale DSA projects were calculated using the Default Abatement Factors Method.

The final report now states (p23):

> "For example, almost all the NGACs created by small-scale DSA projects were calculated using the Default Abatement Factors Method where the abatement is 'deemed' to have occurred at the time of installation."

Appendix 2

Response to recent comments on the CEEM Draft Report

"*The NSW Greenhouse Gas Abatement Scheme: An analysis of the NGAC Registry for the 2003, 2004 and 2005 Compliance Periods*"**:**

The Centre for Energy and Environmental Markets (CEEM) at the University of NSW has been undertaking research into the design and implementation of the NSW Greenhouse Gas Abatement Scheme since it was first proposed in 2001. Some 20 or more papers and presentations assessing the scheme are available on the CEEM website www.ceem.unsw.edu.au.

Our most recent report, "*The NSW Greenhouse Gas Abatement Scheme: An analysis of the NGAC Registry for the 2003, 2004 and 2005 Compliance Periods*" has just been released. As with all CEEM reports, it is released in draft form and we seek corrections and comments from interested parties.

A number of statements relating to our work were made by the NSW Government in the Legislative Council on the 5th June 2007. We welcome this feedback and address these statements below. The statements are in italics and are taken from Hansard.[28]

The Hon. Ian Macdonald:

"*Since 2003 there has been a reduction of more than 41 million tonnes of greenhouse gas emissions*."

CEEM Response:

This statement is not supported by the evidence to date. Actual physical emissions in both NSW and Australia, both in Energy Industries and nationally (excluding LULUCF), have risen rather than been reduced over the life of GGAS. If this statement is instead taken to mean a 'reduction from what would have happened in the absence of the scheme' our work demonstrates that this is also not correct. As noted in our report, there are many examples of projects earning NGACs that were commissioned, or the investment was committed, well before the scheme began. Approximately 80% of the certificates for the 2003, 2004 and 2005 periods were created by plant that were performing their 'low emission activities' before the scheme began and so these activities can't be claimed to have reduced emissions again since the GGAS started. In our view, all that can meaningfully be said about the GGAS scheme is that more than 41 million NGACs, representing imputed, hypothetical tonnes of CO_2 abatement have been created under the scheme to date.

[28] The full Hansard transcript is appended to the end of this document.

The Hon. Ian Macdonald:

> *"The University of New South Wales Centre for Energy and Environmental Markets report is a draft for comment only—nothing more, nothing less. The report misses the point of the scheme's two primary objectives that I mentioned earlier and makes many inaccurate claims. Let me answer some of those. Almost all emissions trading schemes, such as the European Union Emissions Trading Scheme, allow the use of offsets. There is nothing odd in this. Far from sending a distorted signal to sectors about the cost of carbon, it establishes the cost of carbon abatement across a broader section of the economy."*

CEEM Response:

Most CEEM reports are released as 'Draft for comment' and we welcome corrections and comments on our work. Part of the challenge with GGAS, as noted in our report, is that the scheme's complexity and abstraction makes assessment of its actual performance very difficult. Errors are sometimes made and differences of interpretation are certainly possible. However, in this case we are not clear what "many inaccurate claims" we made.

As noted in our report, we are well aware of the two stated objectives of the scheme: "The stated policy intent is to reduce greenhouse gas emissions created through NSW electricity consumption and to encourage activities that offset these emissions." (p.7)

Our main point is that a scheme whose first stated intent is to reduce emissions created through NSW electricity consumption but has, to date, seen approximately 70% of the claimed abatement occur in offset activities not related to electricity supply and use in NSW, lacks coherence and credibility. This is adversely impacting the scheme's ability to drive innovation and change in the NSW electricity sector. While many emissions trading schemes allow offsets, their use is generally intended to play only a supplementary role in meeting the emissions target. The potential distortions from the use of offsets have led to rigorous debate and restrictions in the EU ETS for example.

Futhermore, the use of offsets does not necessarily establish the cost of reducing emissions across a broader section of the economy. Rather, they only establish a 'rule approval' price ie. the cost of getting a project through the rules that determine eligibility for certificates. If these 'offset' rules don't properly test additionality, this reduces the opportunities for projects that can genuinely reduce emissions to receive support under the scheme as they are competing against free-riders.

One key challenge, then, is to ensure that such offsets reflect genuine, transparent and credible reductions in emissions compared to what would have happened otherwise – meaning in this context that they have 'additionality'. The EU ETS allows only CDM/JI offsets which incorporate very strict and transparent tests of additionality. Note that even with these tests, the CDM is finding it challenging to ensure projects deliver real emission reductions.

Finally, even with 'additional' offset projects there is a risk that rather than driving the innovation required to reduce emissions in the targeted sector, allowing offsets simply removes the 'lowest hanging fruit' in a number of sectors, leaving only the more expensive options available for the deeper cuts almost certain to be required at a later date.

So one possible result of such low-cost offset projects is that there may be inappropriate emissions-intensive investment in the NSW electricity sector. This makes the necessary task of achieving real emissions reductions in the future that much more difficult. Current debate about the possibility of building new coal-fired generation in NSW highlight this problem.

The Hon. Ian Macdonald:

> *"The New South Wales Government rewarded some projects that were in place before the scheme was operational because we believed that early action taken in offsetting carbon emissions should not have been penalized simply because they were on the wrong side of the start date of the scheme. I make one point very clear: The only pre-1997 projects currently eligible to create certificates are those that participated in the preceding voluntary version of the scheme. So, not just any pre-1997 generation is eligible under the scheme—only the generation that complied with the voluntary scheme. To punish these companies would send the wrong signal that the rest of the community should wait as long as possible to act because there is no advantage in doing the right thing."*

CEEM Response:

We note that the earlier voluntary NSW scheme that preceded GGAS was, itself, controversial and its performance was questioned by reviews including that undertaken by the EPA. Furthermore, while providing a new cashflow to companies for actions taken without any expectation the GGAS would be rewarding them a decade or so later is certainly generous, not giving them that money is hardly a punishment. Rather, this practice risks setting a precedent where companies might now feel justified in claiming to be suffering unjust punishment for not receiving money from new NSW Government programs perhaps a decade after their projects started operation.

Even where projects do represent genuine early action on greenhouse abatement, NSW energy consumers have every right to expect that rewards received under the scheme have some relationship to the efforts taken. For example, the Tower Appin Coal Mine gas project was built more than a decade ago under a Power Purchase Agreement yet is now earning Integral Energy in the order of $24 million/year through GGAS.

The certificates created in emissions trading schemes serve two functions - providing commercial value to certain projects and organisations, and acting as an accounting tool to quantify emissions. In the GGAS architecture, allowing pre-GGAS generators to create NGACs without having to provide any additional abatement activity focuses only on the first function. As noted above, we question the wisdom of this approach. However, regardless of the degree to which these generators deserved to be rewarded for early action, providing them with such certificates means the second accounting function is distorted – because the rewarded activity had not lead to additional abatement since the GGAS began. This, in turn, distorts the degree to which such certificates can be claimed to reduce per capita emissions compared to pre-GGAS levels.

More generally, pre-existing projects created about 80% of the certificates during the GGAS's first three years of operation, and more than 50% of the first three year's certificates were created by plant built at least 5 years before the GGAS began. Inclusion of pre-existing projects in GGAS reduces the cashflow available to drive deployment of the new low emission technologies required to reduce NSW emissions between now and 2020, and would appear to provide NSW energy users poor value for money in driving emission reductions.

A far simpler way and more credible way to reward projects that take early action would be to have a cap and trade scheme and require emitters to buy emissions permits. Businesses and projects that had taken early action would need to buy less permits and so would be at a competitive advantage.

Finally, the Minister appears to be in error in stating "*I make one point very clear: The only pre-1997 projects currently eligible to create certificates are those that participated in the preceding voluntary version of the scheme."* To take just one example, Hazelwood power station in Victoria is some forty years old, perhaps the most greenhouse polluting power station in the OECD, did not participate in the earlier voluntary scheme as far as we are aware, yet is an accredited NGAC creator. Over the last three years NSW energy consumers have paid the owners of Hazelwood some $10 million for their claimed contribution to emissions reductions, a period over which the number of NGACs created by Hazelwood bears little relationship to the change in physical emissions from the plant.

The Hon. Ian Macdonald:

> *The report also criticised the scheme for allowing certificates to be claimed for supposedly increasing emissions, though this is not the case. The scheme allows certificates to be claimed for producing less greenhouse emissions than the current average of all generation. It does not matter where the power comes from as long as the level of greenhouse gas emissions is reduced. I add that this reduces the overall cost of low emission electricity for consumers in New South Wales.*

CEEM Response:

As noted earlier the scheme doesn't define what 'emissions reductions' actually means in practice. The GGAS does not actually assess claimed abatement on the basis of a 'reduction' in the level of greenhouse gas emissions. Instead it assesses projects on the basis of scheme Rules that are sometimes claimed to represent a reduction in emissions from what would have happened otherwise.

As stated in our report, GGAS is awarding considerable NGACs to coal-fired power stations that started operating after the scheme commenced. The GGAS rules assess claimed 'emission reductions' from these power stations on the basis that they have displaced existing NSW power stations, and have a lower emissions intensity (less CO_2 released per kWh produced) than the existing NSW average emissions intensity. However, these power stations were clearly built primarily in response to ongoing growth in demand. Their generation is therefore more adding to, than offsetting, existing generation and hence emissions are very likely to be increasing.

The Hon. Ian Macdonald:

> *As for other reports relating to the concerns about the integrity of some offset schemes, I assure honourable members that a rigorous framework administered by the Independent Pricing and Regulatory Tribunal supports the New South Wales scheme. That framework requires companies creating certificates from tree planting to ensure trees are not harvested or damaged by bushfires or pests. It also requires that estimation of carbon sequestered is conservative and is subject to requirements for rigorous auditing on a regular basis. If the trees do not remain for 100 years, the company creating these offset credits must make amends by making good the abatement from other forestry activities or pay substantial penalties.*

CEEM Response:

We did not suggest that IPART undertakes its task in a less than rigorous fashion. The framework administered by IPART assesses compliance with the GGAS Rules and it is the Rules that don't address whether the projects rewarded with certificates have reduced emissions compared to what would have happened in the GGAS's absence. Our report demonstrates how a wide range of offset projects can earn NGACs for activities that had already happened, or would likely have happened in the absence of the scheme.

In the case of tree planting, GGAS requires that biosequestration projects are maintained for 100 years after which the sequestered carbon may be released into the atmosphere. This implies that removing CO_2 from the atmosphere for only 100 years is equivalent to the very much longer geological sequestration of carbon in fossil fuels such as coal – clearly a much surer form of sequestration. Biosequestration is allowed in the Clean Development Mechanism but in that case the certificates so created must be replaced with some other permanent certificate (ie. not biosequestration) after a maximum of 60 years.

As stated in our report, the GGAS highlights the need for good governance during the design, operation and assessment of policies targeting the reduction of greenhouse gas emissions. This applies equally to other existing and proposed emissions trading schemes such as that outlined in the recently released Prime Minister's Report of the Task Group on Emissions Trading. Good governance includes separation of powers of those that design a scheme, those who operate a scheme and those who assess it. Otherwise conflicts of interest can distort not only the reporting of the scheme's outcomes but also any revision and redesign aiming to improve the scheme. Such conflicts represent a failure in the policy process and scheme design, not a failure of the scheme administrator.

Thus, although the NSW Government should be congratulated for implementing an emissions trading scheme in the absence of Commonwealth Government action, the NSW GGAS has significant flaws that greatly reduce its effectiveness and efficiency. Improvements to the GGAS's design could significantly increase support for innovation and deployment of low emission technologies, and so strategically position NSW for the deeper emissions cuts that will be required in a future carbon constrained world.

Unfortunately the poor performance to date with the NSW GGAS has also been seen in other emissions trading schemes such as the EU ETS. Such Schemes have, to date, generally demonstrated low effectiveness and efficiency, and very adverse equity outcomes – rather than enforcing the 'polluter pays' principle, the schemes more closely follow a 'polluter is paid' approach. Our Centre's work evaluating existing and proposed schemes highlights the key role of governance in all of these failures – policy makers have, to date, largely failed to protect the public interest and instead implemented schemes that make very significant wealth transfers to large polluters.

For more details of this work and related work see www.ceem.unsw.edu.au.

We welcome further feedback from interested parties regarding our GGAS work.

Extract from Hansard for the NSW Legislative Council, 5th June 2007

GREENHOUSE GAS ABATEMENT SCHEME

The Hon. LYNDA VOLTZ: My question is addressed to the Minister for Energy. Will the Minister update the House on the success of the State Government's Greenhouse Gas Abatement Scheme [GGAS] in the wake of media reports today?

The Hon. IAN MACDONALD: First, let me make one thing perfectly clear: New South Wales is leading the way on greenhouse gas reduction. The Government has filled the vacuum left by Federal Government inaction through the New South Wales greenhouse reduction scheme. It has been a resounding success. The figures speak for themselves. Since 2003 there has been a reduction of more than 41 million tonnes of greenhouse gas emissions. That is the equivalent of removing nine million cars off the road for a year. The primary objectives of this scheme are sound. They are to reduce greenhouse gas emissions for the electricity industry while at the same time encouraging the offset of greenhouse gas emissions. Nic Frances from Easy Being Green was reported in the *Australian* on 8 June 2006 as saying:

One state [New South Wales] is quietly fighting climate change through a very simple market-friendly action. It put a price on carbon.

Ken Edwards from Next-gen, one of Australia's largest brokers of carbon offsets, was quoted in the *Australian Financial Review* on 17 June 2006 as saying:

The NSW Scheme is highly regarded around the world.

Even the Prime Minister's task force, which handed down its report last Friday, recognises the New South Wales scheme and acknowledges that there would need to be a transition process to give due regard to industry participants who have already made significant greenhouse gas reduction investments under the scheme. I regret to say that some media reports today contain a number of factual errors regarding this groundbreaking scheme.

The University of New South Wales Centre for Energy and Environmental Markets report is a draft for comment only—nothing more, nothing less. The report misses the point of the scheme's two primary objectives that I mentioned earlier and makes many inaccurate claims. Let me answer some of those. Almost all emissions trading schemes, such as the European Union Emissions Trading Scheme, allow the use of offsets. There is nothing odd in this. Far from sending a distorted signal to sectors about the cost of carbon, it establishes the cost of carbon abatement across a broader section of the economy.

The New South Wales Government rewarded some projects that were in place before the scheme was operational because we believed that early action taken in offsetting carbon emissions should not have been penalised simply because they were on the wrong side of the start date of the scheme. I make one point very clear: The only pre-1997 projects currently eligible to create certificates are those that participated in the preceding voluntary version of the scheme. So, not just any pre-1997 generation is eligible under the scheme—only the generation that complied with the voluntary scheme. To punish these companies would send the wrong signal that the rest of the community should wait as long as possible to act because there is no advantage in doing the right thing.

The report also criticised the scheme for allowing certificates to be claimed for supposedly increasing emissions, though this is not the case. The scheme allows certificates to be

claimed for producing less greenhouse emissions than the current average of all generation. It does not matter where the power comes from as long as the level of greenhouse gas emissions is reduced. I add that this reduces the overall cost of low emission electricity for consumers in New South Wales.

As for other reports relating to the concerns about the integrity of some offset schemes, I assure honourable members that a rigorous framework administered by the Independent Pricing and Regulatory Tribunal supports the New South Wales scheme. That framework requires companies creating certificates from tree planting to ensure trees are not harvested or damaged by bushfires or pests. It also requires that estimation of carbon sequestered is conservative and is subject to requirements for rigorous auditing on a regular basis. If the trees do not remain for 100 years, the company creating these offset credits must make amends by making good the abatement from other forestry activities or pay substantial penalties. I also point out a clear distinction between the credibility of the voluntary offset market and the products delivered through the New South Wales greenhouse gas reduction scheme. [*Time expired.*]