How the forward market has raised the penalty rate for MRET, GGAS and GES by 20%.

This document has been sent as a submission to the National Emissions-trading Task Force, since it discusses issues current in the Australian environmental markets that should be known by the NETF participants.

It is not directly a submission on the NETF discussion paper. Rather it is a general background document discussing some of the interactions between the forward and spot markets for existing environmental products in Australia. It also provides some introduction to the manner in which the forward markets operate (Appendix A).

This document arose from interaction by the author and some NETF members at the Sydney information session in late 2006. Following those verbal discussions, a number of people asks if the author could supply further information on the issue why spot market prices could trade above the penalty rate, and how the forward market participants have effectively raised the penalty rate by 20%. This document is the result. For anyone wanting a more "academic" treatment a related paper by the author on similar issues has been accepted for publication in the Australian Journal of Agricultural and Resource Economics (AJARE) during 2007, and I'm happy to forward a copy to the interested reader…..

As always, I am pleased to discuss these matters further should the NETF members desire.

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14th November 2006

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Summary:

In late 2006 the forward price for NSW Greenhousegas Abatement Certificates (NGACs) and Gas Electricity Certificates (GECs) approached and then exceeded by a small margin the applicable penalty rates. This apparently irrational trading behaviour represents the value placed by market participants in managing reputational and financial risks. In response to prices rising above the penalty rate, the Environmental Products Committee of the Australian Financial Markets Association altered the standard contract document used for forward trading of RECs, NGACs and GECs. The new version states that at settlement date there is an option for cash settlement at "1.2 x the tax adjusted legislative charge".

In effect, this change raises the effective penalty price in the NGAC, GEC and REC markets (where this documentation is used) by 20%. It will affect ALL market participants, since it allows market prices to rise considerably above the government stated penalty rate (if supply and demand conditions demand it). It is a strong example of the **interaction between forward and spot markets.**

The notion that setting the penalty rate in an environmental market will cap the societal costs to be imposed does not account for the value attached to reputational and financial risk management, and the exact manner in which the obligations are phrased. **Prices in an environmental market can rise substantially above the penalty rate.**

In this case government policy setting regarding the spot market for NGACs and GECs has been overruled, and market participants have in effect nullified the government decision making process that led to the setting of the penalty rate in these markets.

This change was made because market participants value managing reputational and financial risk, and government has not managed this risk. The willingness of buyers (retailers) in all these markets to trade at a premium is primarily because of reputational risk they face should the forward contract be cash settled and they end up non-compliant. There is also some wish to minimise the financial risk of being unexpected forced to re-enter the spot market at short notice, and having to pay an unknown (but high) price to secure compliance.

The decision to alter the forward contract documents in this manner can be taken to indicate

that retailers value mitigating the reputation and financial risk at a value of **at least 20% of the applicable permit price**, and this provides a unique real-life contingent valuation of these risks.

To cap societal costs to the penalty rate the implementing Government must change the manner in which such markets are phrased. If a government implementing an environmental market wishes to limit the potential societal cost to that of the penalty rate, then they have the following options:

- Remove the "penalty" nature of the scheme, and alter phrasing in the legislation and regulations away from terms such as "non-compliant". The fundament nature of the scheme may be retained, but the "penalty" would need to be rephrased as a "levy" or other more neutral term.

- Make clear publicly that the government expects participants to be "non-compliant" if prices rise too high, and to accept onto themselves the reputational risk (of having a scheme that is perceived to be "failing") that would follow participants being "non-compliant".

- Move the market basis to being one where governments are "buying" the compliance instruments, rather than "penalising" for not having them. For example, the government could announce that it is prepared to buy a certain number of "NGACs" from each retailer at the penalty rate, as opposed to demanding the retailer surrender that number of NGACs or face the penalty. Appropriately structured these two market models are economically (incentive wise) equivalent, although the revenue effects are different.

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Capping the societal cost and the impact of reputational and financial risk

One of the oft quoted benefits of using a penalty based tradeable market instrument[2] to implement an environmental policy where the cost of compliance is uncertain is that the implementing government can control the maximum societal cost to be incurred through the choice of the penalty level. In the event that compliance proves to be much more costly than originally expected, the penalty level has been considered to place a cap price in the market, and thus limits the risk of a large cost being imposed unexpectedly upon the society as a whole.

A very incomplete list of citations where this idea has been raised (with a focus on Australian implementations) would include (Montgomery 1972; NSW Department of Energy 1997; Ministry Of Energy And Utilities 2001; McKibbin and Wilcoxen 2002; ORER 2002; Tambling, Laver et al. 2003; Energy Task Force 2004), along with many others. The underlying economic argument is that the liable party (for example, electricity retailers in the case of MRET and GGAS) is faced with making an optimal choice between purchasing from the market the compliance instrument (be that a REC, or an NGAC, or some other instrument), or paying the set penalty rate.

If the liable party cannot purchase a compliance unit at below this price, then the profit maximising (or cost minimising) choice is to pay the penalty rate. Thus (in the absence of "make good" provisions of the form existing in the EU Emissions Trading Scheme, which raise the effective penalty rate), there is no economic reason for any participant to pay more than the set penalty rate, and hence the maximum price in the market has been capped.

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[2] Such a market design is used in Australia for the Mandatory Renewable Energy Target Market (MRET), the NSW Greenhouse Gas Abatement Scheme market (GGAS), and the Queensland Gas Electricity Scheme market. It is also the basis of the EU Emissions Trading Scheme, the UK Renewable Obligation Target scheme, and a large number of other environmental markets.

Where the penalty rate is a civil penalty (and hence is not tax deductible), tax impacts need to be accounted, and thus for example in MRET, where the nominal penalty is set at $40 for each REC short, the effective avoided penalty for the retailer is in fact $40/(1-30%) = $57 (where the liable retailer is subject to a 30% corporate tax rate.)

Clearly the setting of the penalty rate is a key design feature of any such market. If the penalty rate is set too low (meaning below the actual cost of meeting the set environmental target), then the environmental target will not be achieved. If it is set too high, then the society as a whole may incur high costs in order to meet the target. In the case of the GGAS scheme, the penalty rate was deliberately chosen to be close to the estimated cost of meeting the compliance benchmark (Ministry Of Energy And Utilities 2001), with the express intention of limiting the potential cost to the society as a whole.

However, there is now some strong empirical evidence from GGAS to demonstrate that this analysis does not adequately capture the incentives present in the market, and that prices can rise above the penalty rate.

Two related factors need to be considered – one is that the nature of the scheme is "penalty" based, and that any participant not meeting their target is considered as "non-compliant". The other is the relationship between forward markets and spot markets.

Evidence of prices at or above the penalty rate in Australian markets

Using the AFMA Environmental Products Revaluation Curve[3] issued 11th October 2006 (the full curve is available in Appendix D) the spot and forward prices for NGAC's by delivery date, and the tax adjusted penalty rate, are as shown in Figure 1:

Figure 1 – Forward Curve Prices for NGAC's from AFMAData as of 11/10/2006
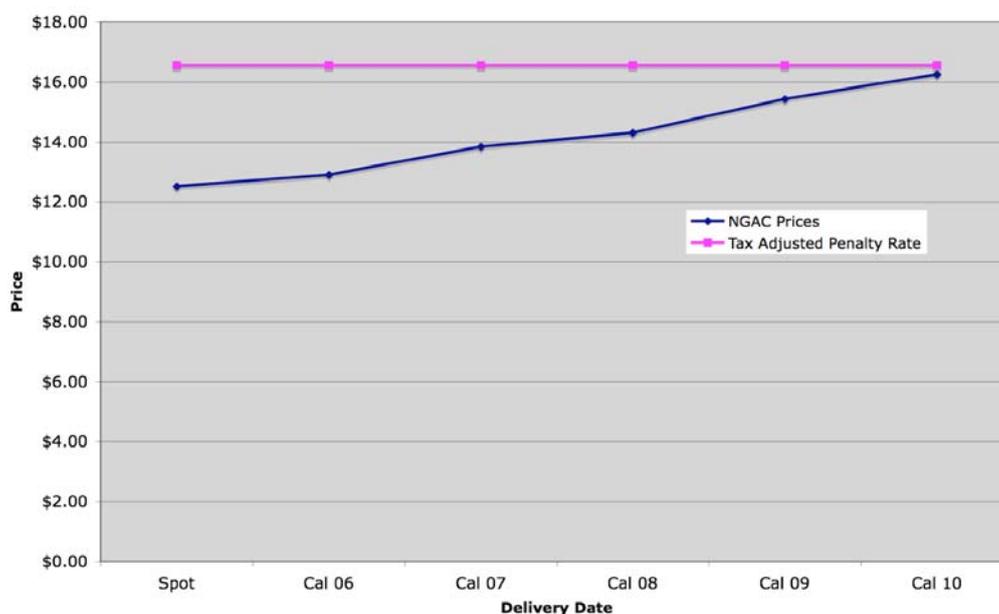
Under the GGAS legislation[4], the penalty rate until the commencement of the 2011 compliance year is set at $11.50 per NGAC that the participant is short of their target. Tax adjusted (at a 30% corporate tax rate), this is equivalent to a penalty of $16.56, and this is also shown for reference in Figure 1.

It will be noticed that the forward price (that is, the price for the delivery of an NGAC in the 2010 compliance year – referred to as "Calendar 2010" or "Cal 10") is closely approaching the penalty rate, and there is anecdotal evidence[5] that NGAC trades have occurred at slightly

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[3] For information about the AFMA Revaluation Curve and other pricing data available in the Australian environmental markets, please refer to Appendix C of this document.

[4] The NSW Greenhouse Gas Abatement Scheme is created under Part 8B of the Electricity Supply Act (1995) NSW. Much of the specific detail of the scheme is then implemented under the Electricity Supply (General) Regulation (2001).

[5] This piece of information was from a conversation between the author and a major market participant in the NGAC market, who asked not to be identified

above the tax-adjusted penalty rate.

Likewise, in the Queensland GEC market, where the compliance penalty is set at $11.00 ($15.71 tax adjusted), GECs have traded in October 2006 at $15.73[6]. Thus we have some evidence that prices have already risen above the penalty rate in both the GGAS and GEC markets.

Why will prices trade above the penalty rate?

Why does this occur? Three factors can be identified:

1) The nature of the scheme is a "penalty" scheme, where a penalty is applied for "non-compliance". To be non-compliant to a regulatory requirement has implications for risk-management and other corporate procedures. When setting corporate policy, company boards generally have a policy of "compliance with all regulatory requirements" – not a policy of "compliance at reasonable cost".

2) The scheme is an "environmental market" – where the product is one where a considerable amount of public interest is present. No retail organisation wishes to be "named-and-shamed" as being non-compliant with their environmental obligations.

3) The responsible officer within the company is frequently an "environmental" compliance or dedicated "environmental" trader, and is not tasked with trading the RECs, or NGACs to meet a profit target. That is, the assumption underlying the market based approach is that the traders/participants involved will be profit maximisers. However, in the environmental markets it has become clear that many participants have a compliance goal, not a profit maximisation goal. (AFMA 2003; AFMA 2006) That is, the NGAC trader in a major retailer will not be promoted for aggressively trading NGACs and making a profit, but they will surely be demoted if at the end of the compliance period sufficient NGACs are not obtained.

For these reasons, the environmental markets evidence "buy and hold" behaviours – where participants purchase the required number of NGACs or RECs, and then hold them, even when on market fundamentals it may be "rational" for the participant to short sell now, and buy back RECs at a later time at a lower price, in the same manner that stock-traders will short-sell a falling stock.

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[6] AFMA Data has only commenced collecting GEC pricing in November 2006. This piece of information was from a conversation between the author and a major market participant in the GEC market, who asked not to be identified.

The forward market response – raise the cash settlement price

Spot prices at or above the penalty rate raises a significant issue for the forward trading of these products, due to the manner in which forward contracts are structured. The response of the forward market participants to this issue has been to raise the cash settlement price, and this has made it highly likely that prices will continue to rise above the penalty rate. This is an important example of forward market operation driving the behaviour in the spot market.

As discussed in Appendix A (where we discuss the details of how forward contracts are structured), forward contracts are required to provide a cash-settlement mechanism, to avoid a default event in the entire portfolio of trades under the ISDA master agreement in the event that sufficient RECs, NGACs, or GECs cannot be sourced. When the standard contract documentation was originally developed, it was assumed by the AFMA Environmental Products Committee that spot prices would always be below the penalty rate, and thus providing for cash settlement at the penalty rate appeared to be a sensible thing – this provided incentive the for supplying party to actually physically deliver, rather than to cash settle.

Specifically, the AFMA OTC Guide, Part 31, Page 13, section 1(j) stated that standard for the cash settlement price was to be "the Tax Adjusted Legislative Charge". (Extracts from this document are provided in Appendix B).

To see the impact of this phrasing, consider the case of a major retailer with a large forward contract in place for NGACs (using the September 06 version of the OTC Guide Part 31), say at a strike price of $10.00, for delivery in 2010. This retailer has reason to believe that they have successfully covered their NGAC liability, since the required NGACs are contracted for delivery a month ahead of the government set acquittal date. However, when that time arrives, the prevailing spot price (say $17.00) proves to be above the penalty rate ($16.56). The seller will exercise the cash settlement option (clause 1(j)), paying the buyer (the retailer) at the penalty rate ($16.56), and will sell the physical NGACs into the spot market at $17.00, making an arbitrage profit of $0.43 per NGAC. The seller has done nothing illegal (since the forward contract allows cash settlement), and has made a profit.

However the retailer, who had considered their position to be covered, will now discover that they are "non-compliant" with only a month to go until the acquittal date. This will require the retailer to rush to the market to obtain alternative supply, or be non-compliant and pay the penalty rate (using the funds paid to them by the cash-settlement under the forward contract). As outlined in previously, the retailer has good reasons for being prepared to pay above the penalty to avoid being non-compliant. However, having to re-enter the market only shortly

before the acquittal date, particularly if other retailers are in a similar situation, means that the price to be paid will be uncertain, but probably high, and this places the retailer in a risky situation.

The impact of the forward contract documentation on the spot market

Fearing the above scenario, retailer representatives on the AFMA Environmental Products Committee proposed that the contract standard (that is, Part 31 of the AFMA OTC Guide) should be altered to provide for cash settlement at some level above the penalty rate.

This raised the question of how much above. **Notice that whatever price is set in the forward-contract for cash-settlement becomes, in effect, the new penalty rate for the entire market**, and hence once the contract is used in the market, participants under that contract are prepared to pay up to that cash-settlement rate to achieve physical delivery.

In particular this means that retailers are providing NGAC suppliers with the ability to sell NGACs at any market price up to that cash-settlement rate. Thus suppliers have no incentive to argue against raising the cash-settlement price.

After some discussion at the AFMA Environmental Product Committee meetings in October 2006 the decision was made to move to a standard cash-settlement clause set at 1.2 times the price of the tax adjusted penalty. That is, a 20% rise in the cash-settlement rate.

The relevant sections of Part 31 of the OTC Guide is shown in Appendix B for reference.

Thoughts for Policy Makers

Government policy setting has been pre-empted

The effective penalty price has been raised by 20% in the NGAC, GEC and REC markets, by unilateral action by the forward market participants. The decision made in that documentation will affect ALL market participants, since it allows market prices to rise considerably above the government stated penalty rate, if supply and demand conditions demand it. The market participants have in effect nullified the government decision making process that led to the setting of the penalty rate. The effective maximum price in the market has been raised for all market participants through the actions of a small number of major market participants.

Participants value managing reputational and financial risk

The willingness of buyers (retailers) in all these markets to trade at a premium to the penalty

rate is primarily because of reputational risk they face should the forward contract be cash settled and they end up non-compliant. There is also some with to minimise the financial risk of being unexpected forced to re-enter the spot market at short notice, and having to pay an unknown (but high) price to secure compliance.

The decision can be taken to indicate that retailer's value mitigating the reputation and financial risk at a value of **at least 20% of the applicable permit price**, and this provides a unique real-life contingent valuation of these risks.

To cap costs Government must change the phrasing

If a government implementing an environmental market wishes to avoid the circumstances outlined above, and to genuinely limit the potential societal cost to that of the penalty rate, then they the following options:

- Remove the "penalty" nature of the scheme, and alter phrasing in the legislation and regulations away from terms such as "non-compliant".

- Make clear publicly that the government expects participants to be "non-compliant" if prices rise too high, and to accept onto themselves the reputational risk (of having a scheme that is perceived to be "failing") that would follow participants being "non-compliant".

Move the market basis to being one where governments are "buying" the compliance instruments, rather than "penalising" for not having them. For example, the government could announce that it is prepared to buy a certain number of "NGACs" from each retailer at the penalty rate, as opposed to demanding the retailer surrender that number of NGACs or face the penalty. Appropriately structured these two market models are economically (incentive wise) equivalent, although the revenue effects may be different.

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Appendix A: How are environmental product trades conducted and documented in Australia?

This appendix is provided so that the reader who is unfamiliar with the financial markets can understand the manner in which forward contracts initiated and documented.

Forward contracts are negotiated bilaterally between the supplier and receiver (possibly via an intermediary such as a broker). A range of contracts are used, however for trades of significant size most market participants will desire to follow standard financial market practice of contracted under the International Securities and Derivatives Agreement (ISDA) master contract. This contract, which is a global standard contract managed by the International Securities and Derivatives Association (also ISDA) provides a "framework" that is entered into between major companies that anticipate trading with each other. Any particular product traded is then documented via an "annexure" to the ISDA agreement. This approach means that all products traded by the company are traded under a single agreement with standard terms and conditions. It has particular importance in the event of the failure of a counter-party to deliver (for example, through bankruptcy), since such a "default event" will cause ALL trades with that entity to be included in the default negotiations.

The importance of this was strongly emphasised by the collapse of Enron (Australia) Pty Ltd. Counterparties to Enron who had all their contracts with Enron under the ISDA contract had their entire portfolio of Enron contracts netted out and handed to the Administrator for payment – that is, both trades that as at the time of liquidation were profitable, and those that were not, were settled against each other, and the balance paid (at some cents in the dollar) to the creditor. Those participants who had NOT traded under ISDA found that the administrator could "cherry pick", by insisting that trades that were profitable to Enron be filled, and that those that were not profitable be placed in the list of creditors. (Interested readers should consider the decision of the Supreme Court of New South Wales in **Enron Australia Pty Limited (In Liquidation) v Integral Energy Australia** (2002) NSWSC 753.) Clearly, participants who found themselves in this situation ended up badly out of pocket.

For this reason, and other good reasons of convenience and risk-management, market

participants in all manner of financial markets (including the forward markets for electricity and environmental products in Australia) seek to contract under an ISDA framework wherever possible.

Thus, to successfully trade a particular product (such as NGACs) under ISDA requires:

1) That the counterparties enter into an ISDA Master Agreement between each other.

2) That the counterparties agree an ISDA Schedule that covers the localised product. In Australia, AFMA has carriage of the management of the standard schedules used under the ISDA Master Agreement.

AFMA publishes (via the AFMA Over The Counter Guide – the OTC Guide) standard schedules. The AFMA OTC Guide is divided into "Parts" – each Part dealing with particular products. For example, Part 20 deals with forward trading of Electricity within the Australian National Electricity Market. Part 31 deals with forward trading of Environmental Products within Australia. The process for developing these standard contracts is dealt with by the AFMA Committees. These are formed through an election conducted within the AFMA membership, to form a committee with approximately 12 representatives who are actively involved in the product being traded. The AFMA Environmental Products Committee typically has representatives from generators, retailers, financial institutions and brokers. This committee then has carriage (within AFMA) of developing the relevant part of the OTC Guide.

The AFMA Environmental Products Committee thus has carriage of Part 31 of the OTC Guide – "*Environmental products Transactions*". The committee members for 2006/2007 are listed in Table 1:

Table 1 - AFMA Environmental Product Committee Members - 2006/07

Member Name	Organisation
Stephen Davy	Hydro Tasmania
Craig McBurnie	ABN AMRO Bank NV
Forrest Moebes	ICAP Australia Pty Ltd
Greg Foy	EnergyAustralia
Marcus Walker	Country Energy
Adrian Fisher	Integral Energy Australia
Anne Casamento	Origin Energy
Marc Barrington	The Australian Gas Light Company
Alexander Fowler	Ergon Energy
Cameron Fisher	Snowy Hydro Limited
Peter Sherman	Sun Retail Pty Ltd

The OTC Guide is a commercial contract document, and is only available in full to subscribers to the AFMA OTC Guide service. AFMA has however provided permission for selected sections of Part 31 of the guide to be made available for this document. Pages 1,2 and 13 of Part 31 are provided in Appendix B for reference.

Appendix B – Extract of Part 31 of the AFMA OTC Guide

PART 31 - ENVIRONMENTAL PRODUCTS TRANSACTIONS

INTRODUCTION

This Part 31 has been prepared under instructions from the AFMA Environmental Products Committee ("Committee"), member firms of which are elected every two years by AFMA Financial Markets members directly involved in energy markets. The Committee typically has representatives from generators, retailers, financial institutions and brokers.

Environmental Products

[31.01] As at June 2006 the following types of environmental products are in existence in Australia:

- **Greenhouse Gas Abatement Certificates** or **GACs** being certificates created under Division 5 Part 8A of the *Electricity Supply Act 1995 (NSW)*;

- **Gas Electricity Certificates** or **GECs** being certificates created under Division 1 of Part 4 of Chapter 5A of the *Electricity Act 1994 (QLD)*; and

- **Renewable Energy Certificates** or **RECs** being certificates created under Division 4, Part 2 of the *Renewable Energy (Electricity) Act 2000 (Cwlth)*,

(referred to collectively in this Part 31 as "Environmental Products").

Environmental Products are created pursuant to legislation and are registered on a specifically created database. GACs are created with reference to eligible activities resulting in a reduction or abatement in greenhouse gases. GECs are created with reference to the production of electricity from natural gas, methane and other eligible fuels. RECs are created with reference to the generation of electricity from eligible renewable energy sources.

Each Environmental Product scheme is established by legislation (as indicated above) and each scheme:

- establishes the ability of qualifying entities to create Environmental Products; and

- imposes a charge or penalty on liable entities, such as electricity retailers, to the extent that they do not purchase and surrender to the scheme administrator the required number of Environmental Products for a particular year.

Each Environmental Products scheme has a scheme administrator and an electronic register which records the ownership of the Environmental Products. The Environmental Products can be transferred in accordance with the scheme rules.

Liable entities will generally avoid paying the penalty or shortfall charge by purchasing Environmental Products created by accredited Environmental Product

creators. Contracts for the purchase of Environmental Products could be on a spot or forward basis.

This Part 31 (prepared by Johnson Winter & Slattery) relates specifically to documenting Environmental Products transactions under the terms of the 2002 ISDA Master Agreement published by International Swaps and Derivatives Association, Inc. where the parties want to specify the governing law as the law in force in one of the Australian states or territories. Parties should take into account that some of the comments in this Part and the market conventions set out in this Part reflect discussions with and the views of the Committee.

The Committee has also published an AFMA endorsed short form contract for spot trading small volumes of Environmental Products and this is available on AFMA's web site under the Environmental Products section. This section also contains an explanatory note commenting on the treatment of the short form contract for Environmental Products as "derivatives" under the *Corporations Act 2001 (Cwth)* and under applicable accounting standards (AASB 139/IAS 39).

[31.02]   **What are Environmental Products**?

Whilst the Environmental Products are called "certificates" in their establishing legislation, this is a misnomer because in fact a certificate of ownership is not created. They are all uncertificated entitlements made up of various rights and obligations contained in the legislation pursuant to which they are created. As such Environmental Products are not tangible things but rather an entitlement to the benefits that accrue to the registered owner under the scheme legislation, being primarily that the scheme administrator will accept the surrender of the Environmental Product as a credit against the liability otherwise imposed to pay a shortfall charge or penalty.

These rights are enforceable by suit by the registered owner of the Environmental Product. The right of enforcement is a statutory chose in action and as such Environmental Products are a form of intangible property. In some respects the nature of the Environmental Products are therefore analogous to the statutory rights of copyright and registered trade marks.

[31.03]   This Part 31 contains the following parts:

[31.01]- [31.07] Introduction, important notes, assumptions, qualifications, conclusion

[31.08] Commentary on documenting Environmental Products transactions

[31.09] – [31.10] Recommended clauses for Part 5 of the Schedule to the ISDA Master Agreement

[31.11] – [31.12] Recommended clauses for the fixed forward confirmation for Environmental Products

[31.13] – [31.14] June 2006 Australian Environmental Products Addendum ("Addendum")

[31.12]   [**ISDA confirmation for Environmental Products, using AFMA June 2006 Australian Environmental Products Addendum**]

[Name and address of counterparty]

[Date]

[Reference number]

Fixed forward purchase of Environmental Products (as indicated below) for physical and cash settlement – single exercise

The purpose of this letter is to confirm the terms under which the Seller agrees to sell Environmental Products (as indicated in clause 1(a) below) to the Buyer. This is a fixed forward commodity contract for GACs, GECs or RECs entered into under the ISDA Master Agreement between the Seller and the Buyer on the Trade Date specified below ("Transaction").

1   The details of the particular Transaction to which this Confirmation relates are as follows:

(a)   Commodity: ☐ GACs

                                         ☐ GECs

                                         ☐ RECs

(b)   Creation Period: In the case of:

- GACs, any time up to 31 December in the calendar year preceding the Settlement Date;

- GECs, the period commencing [**1 January 2005**] and ending on the Settlement Date.

- RECs, any time up to 31 December in the calendar year preceding the Settlement Date;

(c)   Excluded Source: [description of any excluded source]

(d)   Quantity: [number] of units of Commodity

(e)   Trade Date: [date]

(f)   Seller: [**Party's name**]

(g)   Buyer: [**Party's name**]

(h)   Fixed Price: A$[#] per unit, exclusive of GST.

(i)   Settlement Trigger Date: [date]

(l)   Cash Settlement Price: (Tax Adjusted Legislative Charge multiplied by 1.2) or as otherwise agreed

Appendix C: What pricing information on environmental markets is available in Australia?

The question may be asked as to how a non-market participant could be informed about the pricing and activity in the spot and forward markets for green products in Australia. There are two sources of information – the AFMA Environmental Products Revaluation Curve, and data from brokers who participate in these markets.

The AFMA Revaluation Curve

The primary source of "independent" pricing from green markets in Australia is the Environmental Products Revaluation Curve (or "Reval curve") prepared on a weekly basis by the Australian Financial Markets Association (AFMA) since 2001. AFMA is an industry association that *"represents more than 120 participants in the wholesale banking and financial markets. Its key functions are:*

- *Coordinating the efficient operation and effective self-regulation of the over-the-counter (OTC) financial markets.*

- *Promoting high professional standards in the conduct of wholesale financial markets.*

- *Speaking for the wholesale banking and financial markets on regulatory issues that affect these markets.[7] "*

AFMA operates (via its subsidiary, AFMAServices), the AFMAData service, which collects and disseminates a wide range of financial markets data. The Environmental Products Reval Curve was developed to meet the need of treasury and risk management professionals inside major companies to have an independent source of pricing information with which to calculate the value of portfolios and holdings. It is prepared by AFMAServices surveying

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[7] Extract from: www.afma.com.au The reader particular interested in AFMA and environmental markets is referred to the "environmental products" section under "Practices, Standards and Documentation" on the AFMA website.

each Tuesday approximately 15 major environmental market participants regarding their belief as to the prevailing price for trading a range of environmental products, both on spot and under forward contracting going forward 5 years. The resulting surveys are then statistically analysised in the following manner. Means and variances are calculated, and then any survey response more than 2 standard deviation from the raw mean are removed, and the means, mid-points, and variances are recalculated on this reduced sample. The sample is topped/tailed in this manner to reduce the ability of one or two samples to skew the result – in part because there had been evidence in other markets (such as the Bank Bill Swap Rate – BBSW – that market participants were deliberately trying to ramp the rates by putting in very high or low survey responses). The resulting composite curve is published each Wednesday. A complete example curve is included in Appendix D.

Broker Pricing Data

Brokers act as intermediaries between principals in the financial markets. They typically do not take positions in the market in their own right, although they may on occasion do so. The Australian environmental markets have seen a number of brokers enter (and leave) the market – as of November 2006 there are 5 active brokers, listed in Table 2.

Table 2 - Brokers of Environmental Products in Australia as of November 2006

Name	URL
NextGen	http://www.nges.com.au/
Fimat Australia (Sydney)	http://www.fimat.com/fimat/index.html
Prebon	http://www.prebonenergy.com/products_power_asia.html
ICAP	http://www.icap.com/contacts_localregion.aspx?regionID=16
TFS	http://www.tfsbrokers.com/company.html

All these brokers will provide some pricing data on environmental products in Australia – although they differ in respect of the information that they will provide to non-clients or on a non-commercial basis.

Broker pricing information (understandably) tends to be based on the business that the particular broker has seen – and depending on the particular strengths of the brokers business that may be a skewed sample of the market as a whole. However, broker pricing information

has the advantage of being actual prices at which a counterparty is prepared to trade. Hence such pricing data has the advantage of being "tradeable", unlike the AFMAData service, which is purely a survey of market participants, and does not represent the firm trading intention of any particular participant.

Appendix D: Example of the AFMA Environmental Products Revaluation Curve

AFMA Environmental Product Curve

Curve Date: 11-Oct-06

National curve (all regions)   ALL PRICES ARE ON AN EX-GST BASIS.

REC- Non-Woodwaste

Term	Mean all Bids	Mean All Offers	Spread (Percentage)	Median of Mids (Excl Outliers)	Median of Mids (All)	Mean of Mids (Excl Outliers)	Mean of Mids (all)	Std Dev of Mids (All)	Number of Contributions Received	Number of Contributions <> 1 sd
Spot	$15.88	$16.81	5.69%	$16.75	$16.50	$16.66	$16.34	0.67	9	2
Cal 06	$17.22	$18.16	5.31%	$17.63	$17.63	$17.60	$17.69	1.09	9	2
Cal 07	$18.76	$19.98	6.30%	$18.52	$18.52	$19.08	$19.37	1.97	9	2
Cal 08	$20.59	$22.17	7.39%	$20.38	$20.75	$20.57	$21.38	2.60	9	1
Cal 09	$22.32	$23.82	6.50%	$21.88	$22.50	$22.14	$23.07	3.13	9	1
Cal 10	$24.06	$26.17	8.40%	$24.13	$24.25	$24.13	$25.12	3.16	9	1

ALL PRICES ARE ON AN EX-GST BASIS.

Term	Mean all Bids	Mean All Offers	Spread (Percentage)	Median of Mids (Excl Outliers)	Median of Mids (All)	Mean of Mids (Excl Outliers)	Mean of Mids (all)	Std Dev of Mids (All)	Number of Contributions Received	Number of Contributions <> 1 sd
Spot										
Cal 06										
Cal 07										
Cal 08										
Cal 09										
Cal 10										

Non-Quorate (<5 contributors) on ALL contracts   ALL PRICES ARE ON AN EX-GST BASIS.

Green Right Old

Term	Mean all Bids	Mean All Offers	Spread (Percentage)	Median of Mids (Excl Outliers)	Median of Mids (All)	Mean of Mids (Excl Outliers)	Mean of Mids (all)	Std Dev of Mids (All)	Number of Contributions Received	Number of Contributions <> 1 sd
Spot	$0.78	$1.35	53.42%	$0.85	$0.88	$0.85	$1.07	0.38	3	1
Cal 06	$0.92	$1.45	44.80%	$0.90	$0.93	$0.90	$1.18	0.49	3	1
Cal 07	$0.92	$1.45	44.80%	$0.90	$0.93	$0.90	$1.18	0.49	3	1
Cal 08	$0.92	$1.58	52.80%	$0.88	$0.88	$0.88	$1.25	0.65	3	1
Cal 09	$0.92	$1.58	52.80%	$0.88	$0.88	$0.88	$1.25	0.65	3	1
Cal 10	$0.92	$1.58	52.80%	$0.88	$0.88	$0.88	$1.25	0.65	3	1

Non-Quorate (<5 contributors) on ALL contracts   ALL PRICES ARE ON AN EX-GST BASIS.

Green Right New

Term	Mean all Bids	Mean All Offers	Spread (Percentage)	Median of Mids (Excl Outliers)	Median of Mids (All)	Mean of Mids (Excl Outliers)	Mean of Mids (all)	Std Dev of Mids (All)	Number of Contributions Received	Number of Contributions <> 1 sd
Spot	$1.26	$2.03	46.84%	$1.38	$1.51	$1.46	$1.64	0.39	4	1
Cal 06	$1.29	$1.95	40.77%	$1.38	$1.51	$1.41	$1.62	0.46	4	1
Cal 07	$1.26	$1.91	40.93%	$1.38	$1.44	$1.37	$1.59	0.46	4	1
Cal 08	$1.32	$2.30	54.20%	$1.34	$1.38	$1.34	$1.81	0.82	3	1
Cal 09	$1.28	$2.10	48.46%	$1.16	$1.20	$1.16	$1.69	0.92	3	1
Cal 10	$1.28	$1.93	40.42%	$1.04	$1.20	$1.04	$1.61	1.00	3	1

ALL PRICES ARE ON AN EX-GST BASIS.

NSW Greenhouse Gas Abatement Certificate (or equivalent)

Term	Mean all Bids	Mean All Offers	Spread (Percentage)	Median of Mids (Excl Outliers)	Median of Mids (All)	Mean of Mids (Excl Outliers)	Mean of Mids (all)	Std Dev of Mids (All)	Number of Contributions Received	Number of Contributions <> 1 sd
Spot	$12.36	$12.66	2.40%	$12.55	$12.55	$12.52	$12.51	0.21	7	2
Cal 06	$12.73	$13.21	3.70%	$13.00	$13.00	$12.90	$12.97	0.44	7	2
Cal 07	$13.52	$14.10	4.20%	$13.85	$13.85	$13.84	$13.81	0.16	7	2
Cal 08	$14.05	$14.48	3.02%	$14.48	$14.48	$14.31	$14.26	0.52	7	2
Cal 09	$15.06	$15.74	4.42%	$15.50	$15.50	$15.44	$15.40	0.97	7	2
Cal 10	$15.85	$16.41	3.47%	$16.38	$16.38	$16.26	$16.13	1.24	7	2

NOTES: Spread is expressed as a percentage - defined as (Offer-Bid)/(Midpoint). In a simplistic sense, a lower percentage represents a more liquid market.

REC Pricing is on the basis of a parcel of 5,000 units, for delivery on 15th January in the subsequent year.
 That is, a Cal 06 REC means 5,000 RECS for delivery 15th January 2007.
NGAC pricing is on the basis of a parcel of 5,000 tons, for delivery on 15th December in the SAME calendar year.
 That is, a Cal 06 NGAC means an NGAC for delivery on 15th December 2006.
GreenRight Pricing is on the basis of a parcel of 5,000 MWh, for delivery on 15th December in the SAME calendar year.
 That is, a Cal 06 greenright means a greenright for delivery on 15th December 2006.
Greenright -old means a Greenpower Right from a generator built PRE 1/1/97

Spreadsheets prepared by AFMA. Enquiries to: recs@afma.com.au