Price Estimation of Kyoto Compliant Emission Units

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THE TREASURY

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Background

In 2006, Geoff Sinclair was commissioned by the Treasury to conduct the annual review of the carbon price that is used by the Government to calculate its provision for Kyoto liability in the Financial Statements of the Government of New Zealand. The methodology was peer reviewed by the Allen Consulting Group, and considered to be robust.

The Treasury has closely followed Mr Sinclair's methodology in the 2007 update of the carbon price.

Trades in Kyoto-compliant units have been heavily dominated by trades in Certified Emission Reduction (CERs). CERs are the Kyoto units that relate to the Clean Development Mechanism (under the Kyoto Protocol, the Clean Development Mechanism allows Annex 1 countries such as New Zealand to claim credit for projects that reduce emissions in non-Annex 1 countries).

This report estimates a price for Certified Emission Reductions (the unit involved is a United States dollar price per tonne of carbon dioxide equivalent – USD per tonne CO2-e).

Methodology

Two primary data sources are used: The World Bank's *State and Trends of the Carbon Market 2007* report; and Point Carbon, a leading carbon information and analysis service. Data from the European Union Emissions Trading Scheme (EU ETS) is used as a check only, and is not included in the final calculation of the carbon price recommended by this report.

The World Bank's *State and Trends of the Carbon Market 2007* report provides an average volume weighted price for CERs.

The World Bank data is for the calendar year 2006, so given that it is now half way through 2007, a check is needed to ensure that the 2006 World Bank CER price is not likely to have increased substantially in the last six months.

The World Bank average CER price for 2006 was compared against closing prices from the EU ETS for the last half of 2006. On average, international CER prices as reported by the World Bank traded at a certain percentage of the EU ETS price.

The average EU ETS price in the first half of 2007 is then multiplied by this percentage. The result is a proxy for what we would expect the CER price to be for the first half of 2007. If the proxy is broadly similar to the 2006 World Bank CER price, this gives us confidence that the World Bank data is still valid, and appropriate for inclusion in our final calculations.

A mid-point of the most likely price range in which the Crown could expect to purchase CERs is then calculated from Point Carbon data gathered over the past year.

The final carbon price recommended in this report is a mid-point between the Point Carbon mid-point, and the World Bank average volume weighted CER price.

It is worth noting that the EU ETS price is not appropriate to apply to New Zealand, as we are not bound by EU emissions caps and trading restrictions[1]. The EUA price is considerably more than the price of other Kyoto-compliant credits, so simply using the EUA price as a proxy for the assumed price in the Crown's carbon liability would significantly over-estimate the cost of Kyoto compliance to New Zealand.

Valuations

World Bank Data – Source: 'State and Trends of the Carbon Market 2007'

The average volume-weighted price for CERs in 2006 was around USD 11.07 per tonne of CO2-e. This is a 54% increase from the World Bank price used in last year's estimate of the carbon price (USD 7.20).

	Volume (mT)	Value ($m)	Average price ($US)
Primary CDM	450	4813	$10.70
Secondary CDM	25	444	$17.76
Total CDM	475	5257	$11.07

The World Bank commented in their *State and Trends of the Carbon Market 2007* report:

> *"Unlike the EU ETS, where the values of Phase 1 EUAs saw significant volatility, CER prices saw remarkable stability over 2006. Average CER prices for the whole year were only slightly lower than the US$11.10 per tCO2e observed in the first quarter of 2006."*

Check – Discount from EUA Dec 08 Prices

The World Bank data is for the 2006 year only. The steps below are used as a check to ensure that the World Bank information is still relevant, given that it is now half way through 2007. The following approach was taken:

1. Collect EUA Dec 08 data. Daily prices from the European Climate Exchange (ECX)-traded EUA December 2008 contract were collected for the past year (from 1 June 2006 to 5 June 2007). The ECX is the most liquid exchange for EUAs, particularly forward vintages, accounting for over 80% of the exchange traded volume in the market. Because EUA prices are in euros but World Bank-reported CER prices are in USD, the conversion of the EUA prices to USD was undertaken using historical exchange rate data from http://www.oanda.com/[2].

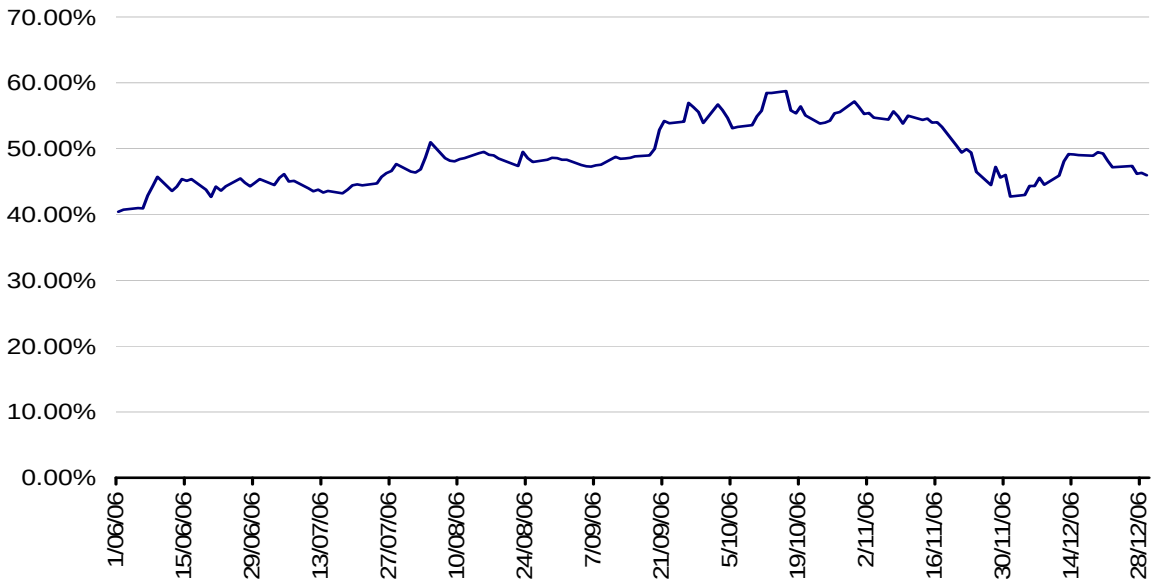
[1] For example, credits from land use, land use change and forestry are not included in their trading scheme.

[2] It is preferable to convert to the EU ETS data to US dollars rather than converting the World Bank data to Euros as the World Bank data is in aggregate form only.

2. Collect CER price data. World Bank CER price data from 2006 was used. Unfortunately, it was not possible to gain more disaggregated data than the information reproduced above.

3. Calculate CER price as a percentage of EUA price for the last half of 2006 (illustrated below). On average, CERs traded at 48% of the price of December 2008 EUA contracts.

Figure 1: CER Price as a percentage of the EU ETS price in the last half of 2006



4. Multiply the average EUA price for the first half of 2007 by 48% in order to estimate a proxy CER price for the 2007 year to date. This proxy implies a CER price of **USD 11.02**.

As the EU ETS average price has not changed significantly between the last half of 2006 (USD 22.83) and the first half of 2007 (USD 22.72), it is not surprising that the result is very close to the 2006 World Bank price. It would therefore appear valid to use the World Bank price of 11.07 per tonne of CO_2e in our final calculations.

Point Carbon Data

Our second primary data source is the "recent transactions" section of Point Carbon's *CDM & JI Monitor* reports from June 2006 to June 2007.

For each trade it reports, Point Carbon collects information on the extent to which the Emissions Reduction Purchase Agreements guarantee delivery. A breakdown of prices and risk categories is shown in the table below.

Category[3]		Price Range (EUR)
1	The seller does its utmost to deliver a flexible/non-firm volume, whereas the buyer commits to buy what the seller delivers.	CER: 5-9 ERU: N/A
2	The seller does its utmost to deliver a flexible/non-firm volume, whereas the buyer commits to buy if the seller delivers. The contract is only valid on a set of preconditions.	CER: 6-13 ERU: 6-10
3	The seller guarantees to deliver a firm volume; the buyer commits to buy if the seller delivers. The contract is only valid on a set of preconditions and usually has a strong force majeure clause.	CER: 11-15 ERU: 6-15
4	The seller guarantees to deliver a firm volume, and the buyer guarantees to buy if seller delivers.	CER: 12-15 ERU: N/A

From the Crown's point of view, there is a choice: buy low risk credits for a higher price or buy cheap credits and bear the risk of failure to deliver. Given that the Crown is likely to acquire a wide range of units with an average or medium delivery risk across the entire portfolio, it would appear appropriate to use in our final calculations the range of prices identified in category 2 - which is within the mid range of delivery risk. Category 2 also has by far the greatest volume of trade, and is therefore most likely to produce reliable pricing information.

Using the average closing EUR/USD exchange rate for June of 1.340794, the appropriate price to use from the Point Carbon data is between USD 8.04 and USD 17.43. The mid-point between these two prices is **USD 12.73**.

Conclusions and Recommendation

As Mr Sinclair noted in his 2006 report, any estimate of a carbon price for the purposes of recording the Kyoto related liability on the Crown Balance Sheet is fraught with difficulty and uncertainty given the nature of the market: primary, bilateral, non-transparent, and with prices heavily influenced by project-specific factors. However, given the need to determine a carbon price for calculation of the Crown's Kyoto liability, we consider the best estimate is a midpoint between the following two prices:

World Bank data:	USD 11.07 per tonne CO2-e
Point Carbon data Mid-point:	USD 12.73 per tonne CO2-e

It is recommended that the Crown assume a carbon price of **USD 11.90** per tonne of carbon dioxide equivalent, a point estimate half-way between the World Bank CER price of USD 11.07 and the Point Carbon midpoint of USD 12.73, for the purposes of calculating the value of its liability under the Kyoto protocol.

This price estimate is based on current market conditions and practices as at 30 June 2007, but should not be seen as a guarantee of the prices obtainable if/when the Crown enters the market to purchase credits.

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[3] The price categories are developed by Point Carbon and are based on the risk distribution between buyer and seller.

[4] Source: http://www.oanda.com/convert/fxhistory

Glossary of Terms

Kyoto Protocol	The international treaty under which New Zealand has an obligation to reduce emissions to 1990 levels (see http://www.climatechange.govt.nz/about/kyoto.html)
CER	Certified Emission Reduction. An emission reduction credit generated under the Clean Development Mechanism
Clean Development Mechanism (CDM)	One of the mechanisms under the Kyoto Protocol under which carbon credits (CERs) can be generated in developing economies by investing in projects that reduce emissions compared to what they would be without the emissions-based investment
Emission Reductions Purchase Agreement	This is common terminology for the sale/purchase agreement for project credits (CERs or ERUs) between a project owner and the buyer of the credits
EU ETS	EU Emissions Trading Scheme. An EU-wide emissions cap and trade scheme for greenhouse gas emissions. Major industrial and energy installations through the EU are set emissions caps through National Allocation Plans (NAPs) and can trade allowances (EUAs) as part of their compliance strategy
EUA	European Allowance. A tradable carbon instrument under the EU ETS. Denominated in 1 tonne of CO2-e
Point Carbon	A leading carbon information and analysis service – see www.pointcarbon.com
Kyoto-compliant emission units	Tradable emission units that are eligible for use against a country's Kyoto obligation. These include AAUs, ERUs, CERs and RMUs (see definitions in this glossary)
Kyoto Protocol cap	Countries' emissions targets under the Kyoto Protocol (New Zealand's is to reduce emissions to 1990 levels over 2008-2012)
Commitment Period 1	The first period of time when countries have an emissions target under the Kyoto Protocol – 2008 to 2012
AAUs	Assigned Amount Units. These are tradable units derived from an Annex I Party's emissions target under the Kyoto Protocol. They may be counted by Annex I Parties towards compliance with their emissions target and are equal to one tonne of carbon dioxide equivalent gases
ERUs	Emission Reduction Units. Greenhouse gas credits generated from Joint Implementation projects
Joint Implementation (JI)	One of the mechanisms under the Kyoto Protocol under which carbon credits (ERUs) can be generated in countries that have an emissions target by investing in projects that reduce emissions compared to what they would be without the emissions-based investment. Similar to the CDM but for a different set of countries. ERUs can only be created from 2008, but CERs can be created from 2005
RMUs	Removal Units. Carbon credits generated through carbon sequestration from land use, land use change and forestry
Project credits	Carbon credits generated through projects under the CDM or JI
Delivery risk (of projects)	The risk that the emission reductions forecast to occur as a result of a project do not eventuate or are only partially realised