

Introduction

Governments around the world, and more recently in Australia, are now taking aggressive actions to minimise the impact of consumers and industry on the environment. In Australia, the central platform will be the introduction in 2010 of an Australian Emissions Trading Scheme (ETS).

Given this changing regulatory landscape, it is imperative that organisations make early efforts towards understanding the proposed regulations and ways it will affect their respective industries. Such an approach is particularly crucial in emission intensive sectors such as stationary energy, where emissions in 2020 are projected to be 84 per cent higher than 1990 levels. In particular for electricity generators (for whom the electricity market price is determined by marginal bids, not by total system cost), there is no guarantee that the total additional costs attributable to emissions trading will be reflected in the electricity price received.

To address these challenges, SAHA and Ventyx¹ have undertaken market modelling to analyse the effects that an ETS will have on electricity generators in the National Electricity Market (NEM). Initial modelling aims to predict the price of permits that participants face in the first ten years of the ETS. These permit prices were then incorporated into NEM market modelling, and the 'with' and 'without' carbon trading scenarios then compared to analyse the effect that an ETS will have on wholesale electricity prices. The results enable the determination of the proportion of the permit cost that would be recoverable from the market, with winners and losers varying depending on their relative carbon intensity.

About the Australian Emissions Trading Scheme

The Australian emissions trading scheme is expected to affect any "facility"² or business which creates emissions of more than 25,000 tonnes of CO₂-e (carbon dioxide or other greenhouse gas equivalent amount) per annum. Facilities emitting more than this threshold will be required to hold a permit for each unit of emissions. As permits will be traded, their price will be determined by market forces and will fluctuate over time depending on the level of demand and supply.

The Emissions Permit Price Trajectory

The price of permits is critical in determining how much extra cost generators will incur, and ultimately what the changes in electricity prices will be. SAHA and Ventyx have established a price trajectory under a cap-and-trade emissions trading scheme that incorporates an assessment of both the supply of and demand for the instrument being traded.

Modelling the Permit Price

The Long Run Marginal Costs ("LRMC") and Short Run Marginal Costs ("SRMC") of all existing and required plants (including those required to meet the 20% Mandatory Renewable Energy Target) at all emissions levels were used in modelling the emissions price. The resulting permit prices for 2010 to 2020 are as follows:

Table 2 Emissions Price Trajectory (\$/tCO₂-e)

(Available upon purchase of report)

¹ Ventyx comprises the Indus, MDSI, Global Energy Decisions and New Energy Associates businesses

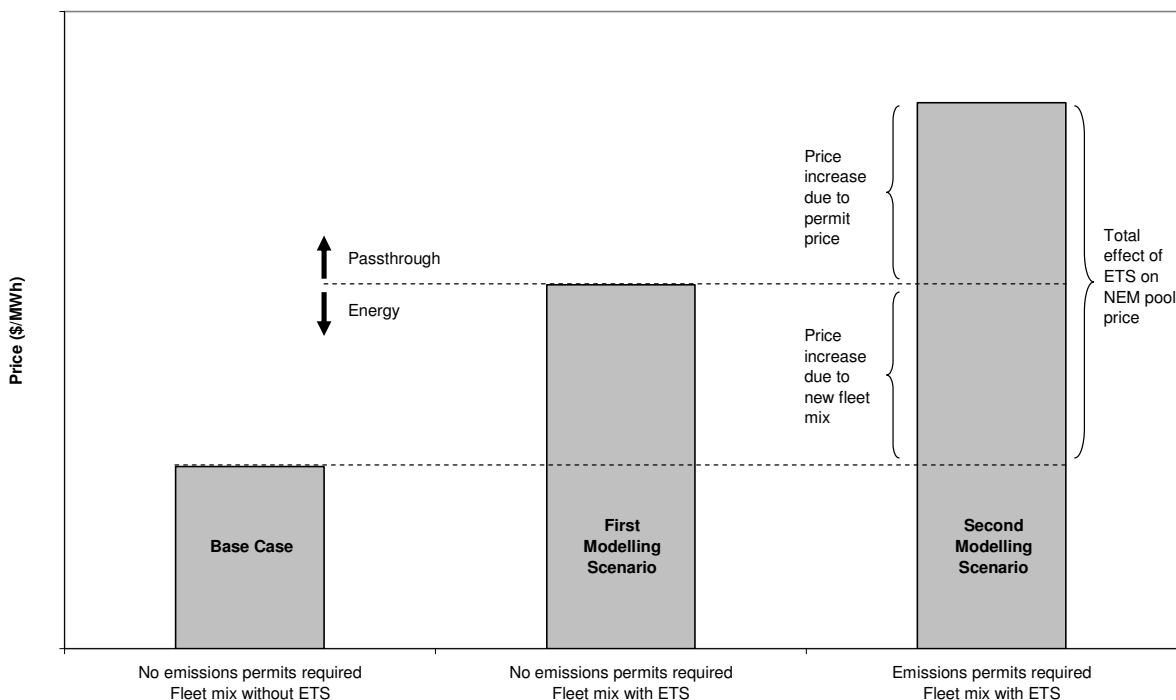
² Facility is defined as "an activity, or a series of activities (including ancillary activities), that involve the production of greenhouse gas emissions... and form a single undertaking or enterprise" Source: National Greenhouse and Energy Reporting Act 2007, Section 9.

Electricity pool price outcomes under an ETS

The emissions permit prices identified in Table 2 have been incorporated into modelling of the NEM wholesale electricity pool market for 2010-2020. The objective of this is to assess the proportion of the (average) ETS price that is reflected in an increased energy market price – the ETS ‘passthrough’.

SAHA and Ventyx have undertaken three modelling runs to analyse the impact that an ETS will have on NEM pool prices. The purpose of the three runs is to break-down the causes of the total wholesale price increases between (i) changes in the fleet mix under emissions trading; and (ii) emissions permit prices.

Figure 1 Causes of NEM pool price increases arising from an ETS (not to scale)



Impact of an ETS on Supply

The revised supply schedule arising from the inclusion of Emissions Trading and MRET targets is presented in Figure 2 below:

Figure 2 Net Difference in Total NEM Supply ‘With’ and ‘Without’ Carbon, 2010-2020

(Available upon purchase of report)

As expected the constraining of emissions and hard targets for renewable plant as set by the 20% MRET target increase the overall volume of new entry renewable plant and the timing of that plant commissioning brought forward. Most scheduled renewable plant in the NEM bids at or close to zero, and non-scheduled generation such as wind³ does not bid at all, rather it is treated as an offset to demand and receives the pool price at the time of its generation. This change in plant volume and type has resulted in a decrease in pool

³ Except in SA where wind is considered scheduled, however the bids associated with forecast generation are generally zero.

prices compared to the baseline. This suggests that any NEM price increases arising from the introduction of an ETS are almost exclusively due to the cost of purchasing emissions permits, not changes to the fleet mix.

Impact of an ETS on Price

The prices are markedly higher in this case than in the previous two cases modelled. Pool prices increase compared to the previous supply change case in line with the increased cost to generate as imposed.

Figure 4 Impact of ETS costs on pool prices (all regions \$/MWh)

(Available upon purchase of report)

Carbon Price Passthrough

The figure below summarises the regional differences in \$/MWh of the pool prices with and without carbon, and compares those numbers to the range of permit prices achieved from the modelling. Comparing these differences with the modelled permit price for a given year allows for the determination of the amount of the permit price that is “passed through” to the NEM market.

Figure 5 Regional Comparison of Permit Price Passthrough 2010 to 2020

(Available upon purchase of report)

It is clear from the above figure that less than 100% of the carbon price is reflected in the pool price, and that there are significant variances on a state-by-state basis. To appreciate the concept of passthrough it is important to keep in mind that the emissions price as an input cost is the same price applicable to all generators in the NEM, and the increase in each generator’s cost structure is reflective of the emissions intensity of their plant.

The differential in pool prices between the ‘with’ and ‘without’ carbon cases has been calculated as a percentage of the carbon price (i.e. passthrough) by year and by region as follows:

Figure 6 Percentage of Permit Price Passed Through to the Pool Price

(Available upon purchase of report)

The year-on-year analysis above suggests that the passthrough is being affected by the relative emissions intensity of each pricing region. For example, South Australia has a low carbon footprint relative to other states due to its high level of gas-fired generation and large number of (viable) wind generation sites. As such, it is getting a far lower pool price passthrough than a high intensity region such as Victoria.

Despite the relatively high percentage passthrough achieved by Victoria in the pool, the overall emissions intensity of installed capacity in the region implies that a significant loss will be incurred by participants from this region. Conversely, despite the relatively poor passthrough percentage achieved in South Australia, the lower emissions intensity of the region results in a lower (absolute) loss for participants of the region.

The Impact of an ETS on New Entrants

As would be expected, the impact of the ETS on electricity generators means that the new entry costs in all regions are expected to rise significantly.

Table 3 New Entry LRMC With and Without Carbon

(Please contact us for details)

Of importance to most existing generators in the NEM is that if the pool and contract values converge towards CCGT new entry pricing in the NEM, or even towards wind as the “new entry technology”, the recovery of total costs for existing coal generators will not be achieved and these assets will likely become stranded.

Conclusions

The results of the study illustrate that:

- The standout opportunity for the construction of new entry generation plant with low emission intensity exists in Victoria. In this state, there is expected to be the greatest increase in pool prices arising from an ETS, thereby creating the largest differential between pool prices and generation costs.
- AFMA and SFE contracts for 2010 and 2011 are currently trading with an emissions passthrough clause. Therefore current trades have been made, and will continue to be made for some time to come, as “energy only”. The determination of the passthrough to be applied on these contracts is critical, and windfall gains or losses for market participants may exist.
- The margins of generation assets are impacted by the introduction of an Australian emissions trading scheme from negative \$17/MWh to positive \$32/MWh in 2010 and 2011; the first 2 years of the modelling. Over the longer term (2012 to 2020) the change in plant mix will affect thermal generation margins more than renewable, as the additional cost of carbon manifests in the pool market at between 65% and 75% of cost.
- In all regions of the NEM pool prices post-emissions trading do not reflect the full value of permits. Half hourly pool prices are predominantly set by plant with emissions intensities of less than 1 kg CO₂-e/kWh. As a result of this, a number of higher-intensity plants (predominantly coal-fired) become financially unviable. Without freely allocated permits these power stations will become stranded assets, and may be shut-down before the completion of their economic life.

The implementation of an Australian Emissions Trading Scheme imposes significant challenges and risks to existing generation asset values, much of which may not be compensated for by the Federal Government. Managing the impact of this regime in terms of maintaining asset value would require a number of strategies. These could include:

- Ability to change the current asset operations to optimise the physical performance of generation assets in relation to minimising emissions;
- Refurbishment or retirement of plant;
- Use “banking” strategies to manage a permit portfolio; and
- Realign portfolios with consideration to overall portfolio greenhouse gas intensity.

Any of these strategies will result in fundamental changes within corporations holding generation assets, the prices they need to achieve to remain profitable, and the resulting cost of energy to the end user.