



FINAL DETERMINATION

REVIEW OF THE TARIFF FORMULA

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Review of the Tariff Formula

Introduction

The Energy Market Authority (“EMA”) conducted a review of the electricity retail market including the formula for setting the regulated tariff for non-contestable consumers.

2 Cambridge Energy Research Associates (CERA) was engaged to advise EMA in this review. Based on CERA’s recommendations, EMA will implement changes to the tariff formula starting from third quarter 2009 (Jul – Sep 2009), i.e. the regulated tariff for third quarter 2009 will be set using the revised formula.

Background

3 The quarterly vesting price is used to set the electricity tariff each quarter. Currently, the fuel component of the vesting price is updated every quarter based on the three-month forward fuel oil price in the first month of the preceding quarter. For example, the vesting price and hence the tariff for the first quarter of 2009 (i.e. Jan-Mar 2009) is based on the 3-month forward fuel oil price in the determination month of Oct 2008.

4 The current practice has a disadvantage, as there is a long time lag between the determination month and the period for which the tariff is set.

Changes to the Tariff Formula

Broadening the determination period to 2.5 months

5 CERA has recommended that the quarterly forward fuel oil price in **all the months of the preceding quarter** be used to update the fuel component of the vesting price every quarter¹. For example, to set the vesting price (and hence the tariff) for third quarter of 2009, we will use the fuel oil price data of Apr 2009, May 2009 and Jun 2009. By making use of the more up-to-date data, we would reduce the time lag inherent in the current formula.

6 By applying the revised formula using the historical data, it is observed that the overall level of the tariff would have been about the same had the revised formula been used in the past. However, instead of a record 21% tariff hike in the fourth quarter of 2008, the tariff would have been increased by a smaller amount of 12% (see Table below).

¹ To allow time for calculation of the tariff, data of the first 15 calendar days of the last month in the preceding quarter (e.g. Jun 2009 for the tariff for third quarter of 2009) will be used rather than using data of the whole month.

Difference between Current vs. Revised Formula

Period 2004~2008	<u>Current Formula</u>	<u>Revised Formula</u>
Average tariff (cents/ kWh)	<u>20.47</u>	<u>20.39</u>
Maximum increase in tariff between quarters	<u>21%</u>	<u>12%</u>

Quarterly swaps

7 EMA had earlier consulted the industry on whether to continue using the *quarterly* forward fuel oil swaps under the present arrangements or to change to using *monthly* forward fuel oil swaps to determine the fuel component of the vesting price. The advantage of using monthly forward fuel oil swaps is that the market for monthly forward fuel oil contracts is more liquid.

8 Most of the gencos indicated a preference to stick to the current arrangement of quarterly swaps. In addition, CERA has compared the historical prices of quarterly swaps and monthly swaps and concluded that the prices of both products are very similar. CERA also did not have any strong preference for either product.

9 Given the above considerations, EMA will continue to use *quarterly* forward fuel oil swaps to determine the fuel component of the vesting price (and hence the tariff).

Determination days

10 Another issue relates to the number of days used for the determination period. CERA observed that there was a possibility of manipulation in the oil prices should a limited number of days (for example every Tuesday and Thursday during the determination period) is used. This may then lead to spikes in prices on the determination days, as all counterparties would know that the gencos are more likely to be going out on those days to buy the swaps. Hence, CERA has recommended using the forward fuel oil prices for every business day in the determination period to minimise the possibility of potential price manipulation.

11 CERA also noted that using prices on all business days in the determination month could potentially cause difficulties for the gencos to hedge, particularly the smaller gencos, as the gencos would have to spread their purchases of swaps across more days. In other words, the gencos would have to spread one quarter's worth of swap purchases across approximately 50 business days over 2.5 months, compared to the current arrangement of about

20 business days over 1 month. This potentially could result in higher hedging costs for the gencos.

12 At the same time, CERA acknowledged that even if all business days in the 2.5-month determination period were to be used, it would not be necessary for the gencos to go out for swaps every business day. A genco could have a hedging strategy that allows hedging, say, three days a week to achieve a portfolio that is highly correlated to a portfolio with daily hedging. Such a hedging strategy would mitigate the issue of gencos having difficulty hedging due to an increase in the number of determination days.

13 To address concern of price manipulation, EMA agrees with CERA's recommendation to use the forward fuel oil prices for every business day in the determination period to set the fuel component of the vesting price (and hence the tariff). EMA concurs with CERA's view that gencos are likely able to adopt hedging strategies to deal with the increase in the number of determination days and develop a portfolio that closely matches the risks they face.

14 In light of these factors, EMA will use the forward fuel oil prices on every business day in the determination period to set the fuel component of the vesting price (and hence the tariff).

Platforms used to determine prices of quarterly swaps

15 Under the current arrangement, the forward fuel prices from the Intercontinental Exchange (ICE) are used to set the fuel component of the vesting price. The advantage of using the ICE platform is that ICE is an Over-The-Counter (OTC) platform which allows gencos to purchase the quarterly swaps, whereas providers like Platts and Argus are publishing companies which provide an assessment of the prices through discussions with traders, buyers, sellers, and financial counterparties. On this basis, CERA recommends to continue using prices of the quarterly swaps traded on ICE.

16 However, CERA has also observed that the liquidity on ICE is low. This poses risks associated with possible price manipulations, especially on days where there are no or thin trades (for example, there were 14 trading days in January 2009 where no trades were reported on ICE). To mitigate such risks, CERA recommends that EMA supplement the prices of the quarterly swaps traded on ICE, with the prices of the quarterly swaps published by other providers such as Platts or Argus.

17 On the comparison between Platts and Argus, CERA noted that the gas contracts prices of the gencos are pegged to the HSFO prices published by Platts. In addition, CERA assessed that Platts reports more trades than Argus. On this basis, Platts is preferred over Argus for EMA's purpose of determining the fuel component of the vesting price (and hence the tariff).

18 Some gencos have commented that the shorter trading window on Platts (compared to ICE) may result in speculative prices on Platts. CERA has compared the historical swaps prices on both Platts and ICE and assessed that the prices are very close and hence there is less concern that pricing manipulation will occur on Platts.

19 Overall, EMA agrees with CERA's recommendations. To reduce the risks associated with low levels of liquidity found on the ICE platform and the risks of price manipulation on a single platform, EMA will use the average of the quarterly swaps on ICE and Platts for all the business days in the determination period to set the fuel component of the vesting price (and hence the tariff).

Feedback from industry players

20 A summary of the changes to the formula, the feedback from industry players and EMA's response to the feedback is shown in Appendix 1.

Changes to take effect for tariff setting starting 3rd quarter 2009

21 The above changes will take effect for the setting of the fuel component of the vesting price and hence the tariff starting from the 3rd quarter of 2009 (i.e. Jul – Sep 2009) onwards.

~ End ~

Appendix 1

Feedback from Industry Players and EMA's Response

Current Formula	Revised Formula	Remarks
The determination period is the first month of the preceding quarter, i.e. forward fuel prices of the <i>first month of the preceding quarter</i> is used to set the fuel component of the vesting price (and hence the tariff) for the quarter.	The determination period is <i>all the months of the preceding quarter</i> (up to the 15 th business day of the 3 rd month).	<p><u>CERA's recommendation</u> CERA recommends the proposed determination period of using 2.5 months of forward fuel prices.</p> <p><u>Industry's comment</u> All the gencos are agreeable to the proposed determination period of using 2.5 months of forward fuel prices.</p> <p><u>EMA assessment</u> The determination period will be increased to 2.5 months to set tariffs to be more reflective of prevailing market conditions.</p>
The <i>quarterly forward prices</i> are used to set the fuel component of the vesting price (and hence the tariff) for the quarter.	No change to the current arrangement.	<p><u>CERA's recommendation</u> CERA has compared the historic prices of quarterly swaps and monthly swaps and concluded the prices of both products to be very similar, not surprisingly due to arbitrage. CERA has indicated no strong preference for either product.</p> <p><u>Industry's comment</u> Keppel, Senoko, Seraya and Tuas have indicated preference for quarterly swaps. Sembcorp prefers a month-to-month option (for example, forward price in Apr for Jul, forward price in May for Aug etc).</p> <p><u>EMA assessment</u> We will continue to use the quarterly swaps for vesting contracts, given that most of the gencos' prefer quarterly swaps, and that CERA has concluded that the prices of quarterly swaps and monthly swaps are similar.</p>
<i>Every business day</i> of the determination period is used to set the fuel component of the vesting price (and hence the tariff) for the quarter.	No change to the current arrangement.	<p><u>CERA's recommendation</u> CERA has recommended using the forward fuel prices for every business day in the determination period to avoid issues associated with price manipulation.</p>

Current Formula	Revised Formula	Remarks
		<p><u>Industry's comment</u> All the gencos prefer to keep to roughly the same number of determination days as present, i.e. using prices on Tuesdays and Thursdays of each week in the determination period.</p> <p><u>EMA assessment</u> EMA agrees with CERA's recommendation. EMA will use the forward fuel prices for every business day of the determination period to set the fuel component of the vesting price (and hence the tariff) for the quarter.</p>
<p>Quarterly forward fuel prices as traded on the <i>Intercontinental Exchange (ICE)</i> platform were used to set the fuel component of the vesting price (and hence the tariff) for the quarter.</p>	<p>Quarterly forward fuel prices as quoted on Platts platform to be used to set the fuel component of the vesting price (and hence the tariff) for the quarter, in addition to the prices traded on ICE. Thus, the forward fuel price to determine the fuel component of the tariff would be a simple average of the prices quoted on <i>ICE and Platts</i>.</p>	<p><u>CERA's recommendation</u> While using prices from ICE is advantageous in providing an actual platform for gencos to trade the quarterly swaps, CERA has observed that the liquidity on ICE is low, and therefore poses risks of possible price manipulations. Hence, CERA recommends that EMA use prices of the quarterly swaps published by providers such as Platts or Argus, in addition to the prices of the quarterly swaps traded on ICE. Platts is preferred over Argus because of the greater number of trades reported on Platts and that the gas contracts of the gencos are pegged to the HSFO prices published by Platts. Hence, CERA suggests the use of both prices of the quarterly product on ICE and Platts to determine the fuel component of the vesting price.</p> <p>On the gencos' view that the shorter trading window on Platts compared to that on ICE may result in speculative prices on Platts, CERA has compared the historical swaps prices on both Platts and ICE and assessed that the prices are very close and hence there is less concern that pricing manipulation will occur on Platts.</p> <p><u>Industry's comments</u> Most gencos have indicated a preference of the current method of using prices on ICE. Tuas have indicated ICE has a longer trading window (10am to 6pm), whereas the trading window for Platts and Argus is much shorter (4pm - 4:30pm).</p> <p>All gencos have indicated for the prices on ICE, to continue the current arrangement of using offered prices (rather than the midpoint of the bid and offered prices) on days where there are no trades, because the offered prices</p>

Current Formula	Revised Formula	Remarks
		<p>are the prices paid by gencos for the product.</p> <p>EMA's assessment EMA agrees with CERA's recommendation. To reduce risks associated with low levels of liquidity found on the ICE platform and risks of price manipulation on a single platform, the average of the quarterly swaps on ICE² and Platts³ will be used for each determination day.</p> <p>EMA notes the gencos' argument for using offered prices on ICE when there are no trades. EMA will continue with the current arrangement of using offered prices on ICE where there are no trades.</p>
<p>To calculate the relevant exchange rate, the arithmetic average of the middle 2 quartiles of the bid/ask spread of the contributed outright forward rates is added to the arithmetic average of the middle 2 quartiles of the outright forward ask rate contributed by the participating banks at ABS</p>	<p>To calculate the relevant exchange rate, the outright forward ask rates contributed by the participating banks at ABS are ranked and the arithmetic average of the middle 2 quartiles is taken.</p>	<p>EMA's assessment The revised formula calculates the forward ask rate that a buyer would pay.</p>
<p>The forecasted vesting contracts quantity is given to individual gencos in the middle of the 2nd month of the preceding quarter of the</p>	<p>Forecasted vesting contracts quantity to be given to individual gencos in the middle of the 1st month of the preceding quarter of the vesting</p>	<p>Industry's comments Gencos have requested for this change to allow them to manage their volume risk more effectively.</p> <p>EMA's assessment</p>

² For prices quoted on ICE, there is no change in methodology to obtain the prices of the quarterly swaps. EMA will use the average of (i) the daily weighted average of consummated trades for those days where there are consummated trades and (ii) the daily average ask prices of concurrent bid/ask (with a spread not exceeding US\$2) for those days where there are no trades, for the month defined in (a). ICE will set a minimum 15 seconds validation period for the concurrent bid/ask. EMA will not consider those days where there are no concurrent bid/ask with a spread not exceeding US\$2.

³ For prices quoted on Platts, the midpoint of the prices quoted for the relevant quarterly product will be used. Platts has confirmed that the midpoint of the prices quoted represents the traded price.

Current Formula	Revised Formula	Remarks
vesting contracts quarter (for example, vesting contracts quantity is released in mid-May for the vesting quarter for 3 rd quarter)	contracts quarter (for example, vesting contracts quantity is released by mid-April for 3 rd quarter)	This is a reasonable request. EMA will request SP Services to provide the forecasted vesting contracts quantity 1 month earlier than the current procedure.. Because of changes to be made to the Vesting Contracts Calculator, the change will take effect from the 4 th quarter 2009, i.e. SPS will send the vesting contracts quantity for 4 th quarter 2009 to the gencos in mid-Jul 2009.
	Hedging costs to be included as an additional cost item of the vesting price.	<p><u>Industry's comment</u> Tuas pointed out that gencos need to bear and manage the risks associated with the vesting contracts. The risks include volume variance, current & commodity market volatilities, counterparties credit risks. Over the past few months, Tuas commented that their counterparties have requested credit support arrangements for the hedging transactions. There is an associated cost arising from the credit support arrangements. There are also increase activities in Middle/Back Office operations to monitor the exposures. Tuas requested EMA to look into including the hedging costs as a cost item in the vesting price to reflect the increase in hedging cost.</p> <p><u>CERA's recommendation</u> CERA considers that the proposed system imposes costs which are similar to the current system in regards to credit support arrangements, while acknowledging that credit support has become more expensive since the credit crisis. However, the price of increased volatility is included in the price of the swaps and this cost is included in the calculation of the vesting contract price. There will likely be some small increase in Middle/Back Office costs but there should be reduced volume risks due to the earlier release of the vesting contract quantities. CERA therefore recommends no specific allowance in this regard.</p> <p><u>EMA's assessment</u> EMA agrees with CERA's recommendation that there is no basis for including any additional specific allowance for hedging cost.</p>
	Gas costs associated with the opening of the Gas Market in Sep 2008	<p><u>Industry's comment</u> Tuas has requested EMA to include any additional costs associated with the opening of the Gas Market in Sep 2008.</p>

Current Formula	Revised Formula	Remarks
		<p><u>EMA's assessment</u> All relevant costs have already been factored in the current methodology. There is no basis for including any additional cost items associated with the opening of the Gas Market.</p>