



FINAL DETERMINATION

REVIEW OF THE PARAMETERS FOR SETTING THE VESTING PRICE FOR THE PERIOD 1 JANUARY 2010 TO 31 DECEMBER 2010

5 NOV 2009 | ENERGY MARKET AUTHORITY
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1 Introduction

1.1 The Energy Market Authority (“EMA”) conducts a review of the vesting price every 2 years, or at other times where it considers necessary. The last review, to set the vesting price for 1 January 2009 to 31 December 2010, was completed in November 2008. At that time, in view of the economic slow-down, EMA had informed the industry that it intends to conduct a mid-term review of the vesting parameters in 2009 to set the vesting price for 1 January 2010 to 31 December 2010.

1.2 This paper sets out the Final Determination by the EMA on “The Review of Vesting Parameters for Setting the Vesting Price for the Period 1 January 2010 to 31 December 2010”.

1.3 As part of this review, EMA has also reviewed the methodology of setting the scale factor indices of the quarterly vesting price, following a request from one of the market participants.

Review of the Vesting Parameters

2.1 Since EMA initiated the review in June 2009, we have conducted several rounds of consultation with the industry players. We note that the generation companies (“gencos”) have expressed dissatisfaction with the lower Weighted Average Cost of Capital (“WACC”) proposed in this review. EMA has explained the rationale behind our proposed WACC, which we believe is a reasonable one. Nevertheless, we recognise that the gencos’ concerns about the proposed revision to the credit rating warrant a deeper study, which would be more appropriately undertaken as part of a full review rather than this mid-term review. EMA’s response to the gencos’ feedback is detailed in this paper.

2.2 On the setting of the technical parameters, EMA had engaged KEMA International B.V. (“KEMA”) to advise EMA in the review of the technical parameters. KEMA’s assessment is that the capital cost of power plants had increased since the last review in November 2008. KEMA noted several points of contention: the gencos had proposed the inclusion of costs not included in previous reviews, such as the

lenders' fee, while objecting to KEMA's specific assessment in the earlier draft reports such as the inclusion of the more efficient Mitsubishi generator. The inclusion of the lenders' fee is a new item and therefore merits a more thorough study to assess whether it should be included as part of the generation cost for a power plant in Singapore for the purpose of setting the vesting price. The gencos had objected to the inclusion of the new Mitsubishi generator (which was not available in the last review) on the basis that it is of a larger size compared to other "F" class Combined Cycled Gas Turbine (CCGT) machines. However, KEMA is of the view that the size of all CCGTs would have been normalised when KEMA calculates the US\$/kW cost for the proxy plant when setting the vesting price and hence the size of any particular generator is not of concern. KEMA is of the view that a review of these contentious points which revolve around new items would not be appropriate for a mid-term review such as this. KEMA's recommendation is therefore to retain the current technical parameters for the setting of the vesting price for 1 January 2010 – 31 December 2010.

Review of the Scale Factor Indices

3.1 In a letter to EMA dated 11 March 2009, Senoko Power had asked "that the EMA review the capital cost indexation mechanism at the earliest opportunity, if possible as part of the imminent scheduled review of the capital cost element of the vesting price."

3.2 Arising from the suggestion of Senoko Power, EMA had requested KEMA to review the relevant scale factor indices for the setting of the quarterly vesting price. As part of the review, KEMA had proposed using a sub-index of the Domestic Supply Price Index (DSPI) – "DSPI 15.5 Power Generation Machinery" - as an alternative index to the DSPI.

3.3 However, EMA notes that all the gencos including Senoko Power have expressed dissatisfaction with the alternative index proposed by KEMA, on the grounds that the sample size of this alternative index may not be sufficiently representative for such a purpose. At the same time, none of the gencos have proposed any appropriate alternative index to the DSPI.

3.4 KEMA had assessed that while the alternative index was not perfect in reflecting generation costs in Singapore, it was the least volatile among the indices KEMA had examined. KEMA also assessed that given that the current methodology had generally worked well in the past and that no better alternative index is available, the current methodology of indexing the quarterly vesting price should be retained.

3.5 KEMA's full report and detailed response to the gencos' feedback is attached with this paper.

EMA's Determination

4.1 Given the points of contention in the setting of the WACC and the technical parameters, and taking into consideration KEMA's assessment that resolving the contentious points would be more appropriately undertaken as part of a full review rather than a mid-term review, EMA has decided to retain the current vesting parameters for the setting of the vesting price from 1 January 2010 – 31 December 2010. A full review will be conducted in 2010 for the parameters to set the vesting price for the years 2011 – 2012, where the relevant points of contention would be reviewed more thoroughly.

4.2 On the review of the scale factors indices, EMA noted that the gencos had objected to the alternative index proposed by KEMA. In particular, EMA notes that despite its earlier stance to revise the methodology, Senoko Power has now reversed its position and requested in its written comments to the EMA that the indexation review be deferred to a later date. Given KEMA's assessment that the current methodology had worked reasonably well, EMA has decided to retain the current methodology on setting the scale factors indices until a suitable alternative index is proposed.

4.3 In considering the matter, EMA has also taken into account the interests of consumers. In particular, we note that the vesting price using the current parameters and current indexation would be marginally lower than that of the revised parameters

and alternative methodology¹. Hence, electricity consumers would not be disadvantaged as a result of EMA's decision to retain the vesting parameters and indexation methodology for the setting of the vesting price for 1 January 2010 – 31 December 2010.

4.4 EMA has consulted the gencos on refining specific operational details for the purpose of calculating the vesting price. For the purpose of allowing industry participants to verify the data and to minimize the risk of input errors, EMA would be using the data source for US\$/S\$ 3-month forward exchange rate from the rates published by Bloomberg BGN when calculating the vesting price from the 2nd quarter of 2010 onwards. There was no substantive feedback from the gencos on this issue. Please refer to Part B Section 1 of this paper for more details.

4.5 In addition, for future reviews, EMA will use data in the 3 months leading up to the base month² for determining specific "base parameters". There was no substantive feedback from the gencos on this issue. Please refer to Part B Section 2 of this paper for more details.

¹ Please refer to Table 2 of EMA's Draft Determination paper (dated 9 Sep 2009). The non-fuel component of the vesting price for 4th quarter of 2009 using the current parameters and indexation methodology is \$46.42/MWh, compared to that of the indicative vesting price of \$47.48/MWh using the revised parameters and alternative indexation.

² For example, if June is the base month, the average data for the three months April to June will be used for the calculation of the base parameters.

Review of the Parameters for Setting Vesting Price for the Period 1 January 2010 to 31 December 2010

Part A

1 Review of the WACC parameters

1.1 In this review, EMA has used March 2009 as the base month. All available market data up to 31 March 2009 would be used in the review of the parameters. March 2009 was chosen as the base month because this was the latest month where data for all parameters used for this review was available at the start of the review process in July 2009.

1.2 EMA takes the Capital Asset Pricing Model (“CAPM”) approach to estimate the WACC of the capital investment. The formula is as follows:

$$WACC = [g \times (r_f + DP)(1 - t)] + \{(1 - g)[r_f + \beta(r_m - r_f)]\}$$

Where:

r_f	is the risk-free rate
DP	is the debt premium
r_m	is the market rate of return
$(r_m - r_f)$	is the market risk premium (MRP);
β (equity)	is the measure of the sensitivity of the company's returns to market returns;
g	is the proportion of debt to total assets;
t	is the corporate tax rate

1.3 For each review, EMA would review the values of and methods used to estimate:

- the risk-free rate
- the credit rating to calculate the debt premium
- the applicable corporate tax rate
- the proportion of debt to total assets
- the equity beta
- the market risk premium

2 Selection of comparator companies

2.1 EMA selected the comparator companies from publicly listed electric utility companies³ which satisfy the selection criteria set out below.

2.2 Selection Criteria

- 1. *The company operates principally (i.e. the company has the majority of its businesses) in developed economies that have similar risk characteristics as Singapore.***

The market equity beta of a company is affected by the country risk of the countries in which the company operates.

- 2. *Availability of market and financial data of the company for the last 5 years.***

The most recent 5 years of market and financial data is a good balance between using recent data and having a sufficiently long period to allow the averaging of the likely effect of economic cycles on the financial ratios of a company.

- 3. *The company should be in good financial health.***

The market and financial data of companies with significant or frequent operation losses or in financial distress would not reflect the average risks an efficient new entrant would face, or the sustainable long-term financial ratio of the generation investment.

- 4. *The majority of the company's income should be from its non-regulated generation business.***

³ Comprises all listed utility companies that are in the Bloomberg database as of 31 March 2009.

The risk associated with the uncertainty in revenue from the generation business would be reflected in the market equity beta of the comparator company.

5. The company's generation portfolio should have a majority of fossil fuels based generation.

The risk associated with the fossil fuel price risk would be reflected in the market equity beta of the comparator company.

2.4 Appendices 1 and 2 show the list of companies that satisfied the selection criteria and the relevant financial data of the companies respectively.

Response to feedback

PowerSeraya commented that Allegheny Energy and Edison SpA should be excluded from the list of comparator companies on the basis that the non-regulated generation business accounts for less than 50% of the company's total revenues for these two companies.

EMA would like to clarify that for both Allegheny Energy and Edison SpA, the non-regulated generation business accounted for more than 50% of the company's total revenues. Both companies had inter-segmental sales, where the costs from one segment of the company become revenues for another segment. The inter-segmental sales had to be eliminated for the purposes of computing the ratio. Both Allegheny and Edison had reported their revenues after eliminations of the inter-segmental sales. By this account, US\$746.1m out of US\$1298.3m of Allegheny's Group EBITDA comes from its non-regulated generation business, and €1.326b out of €1.643b Edison's group EBITDA comes from Electric Power Sales of which it was indicated that 74% was sold to non-regulated markets.

3 Risk free rate

3.1 EMA used the yield to maturity of the “AAA” rated Singapore Government Securities whose term to maturity would closest match the term of the generation investment as the proxy for the risk free rate in Singapore.

3.2 At present, the furthest dated bond is the 20 year NZ07100S, which was issued in 2007, maturing in Mar 2027. The average daily closing yield of this bond for the Base Month of Mar 2009 was 3.02% (refer to Appendix 3).

4 Credit rating, debt premium and gearing

4.1 In its draft determination the EMA used a credit rating of BBB- (the lowest level of investment grade debt according to Standard and Poor’s (S&P’s) classification) as the benchmark for the debt premium. This is one notch higher than the BB+ assumed in the previous review of the WACC parameters. A BB+ rating is the highest level of non-investment grade debt according to S&P.

4.2 The sub-prime crisis and related adverse economic climate have led to a significant tightening in credit markets and a larger differential between the cost of investment grade and non-investment grade debt. In the light of these factors the EMA had proposed a revision to the assumptions underlying the cost of debt finance. Our proposal noted that

- a number of the comparator companies identified as providing relevant benchmarks for the cost of capital had investment grade credit ratings
- the large premia associated with non-investment grade debt appeared to reflect general concerns about the likelihood of financial distress. Further, investors would not typically commit funds to a new capital intensive project such as a power station if the probability of financial failure were deemed to be high. On this basis it appeared more consistent to assume that a new investor would only choose to proceed with an investment in a power station if the project had access to investment grade funding or other financing on similar terms, and
- the approach was consistent with that used by regulators in other jurisdictions. For example, the debt premium used by the Single Electricity Market Committee (comprised of Ireland’s Commission for Energy Regulation and

Northern Ireland's Authority for Utility Regulation) in its recently concluded consultation on the Best New Entrant was based on investment grade debt.

4.3 Taking account of all these factors the EMA has assessed that it is appropriate to use the cost of BBB- debt as the benchmark for the cost of capital. Three gencos have made strong representations in relation to these matters, contending that the BBB- benchmark is not appropriate and suggesting a benchmark based on debt classified as BB+. These arguments are addressed below.

Response to feedback

Senoko Power strongly disagreed with the reduction in the debt premium from the previous review of vesting prices noting that it is 'irrefutable that credit market liquidity has decreased'.

The EMA accepts that credit market liquidity has decreased and credit market conditions have become more difficult. Nevertheless, the majority of the comparator companies identified in Appendix 1 have retained access to investment grade finance and so this is not an unreasonable basis for setting the cost of debt of finance.

Senoko Power said that a new entrant generator would be a single asset genco, with no regulated cash flow or long-term contracts, and, on this basis would not be able to support investment grade financing. PowerSeraya made similar points noting that a new entrant would be stand alone and project financed, without a parent company guarantee and, that long-term sales agreements were very difficult to obtain.

Senoko Power commented that the investment grade rating obtained by established companies such as Allegheny and Edison SpA is not comparable to what the new entrant would achieve. A single asset new entrant would, in the current financial markets, face significant difficulties in raising substantial quantum of non-recourse financing, which would then lead to such new entrant having to significantly reduce its gearing level.

Senoko Power added that under the Rating Methodology provided by Moody's Global Infrastructure Finance – Power Generation Projects, to achieve an investment grade rating of Baa requires nearly 100% of the cash flows to be contracted and the offtake arrangements to cover the entire term of the financing.

It is important to be realistic about the market conditions that support new entry and the type of investors that are typically involved in electricity generation projects. International experience suggests that new entrant power stations generally require a significant degree of contractual cover before projects proceed. While it may be the case that such arrangements have not yet been seen in Singapore, markets are capable of evolving quickly and new contractual arrangements can emerge very rapidly. Without such arrangements or a significant comparative advantage to reduce risks it is highly unlikely that there would be any new entry. It seems reasonable to assume that new entry in Singapore will be made on a similar basis to that experienced in competitive electricity markets around the world, and projects will achieve a degree of protection from the volatility associated with pool prices.

Further, a new entrant to a particular market is often an established international energy company with access to investment grade financing. This suggests that the comparator companies identified in Appendix 1 are relevant benchmarks for Singapore, and that it is realistic to assume that new entrants may have access to investment grade financing.

On Senoko's point that a new entrant would have to reduce its gearing level to achieve an investment grade rating of Baa in the present market, we would like to highlight that the gearing level of 45.6% is consistent with the overall average for the comparator companies.

PowerSeraya commented that the BBB rating used by the Single Electricity Market Committee (comprised of the Commission of Energy Regulator and the North Ireland Authority for Utility Regulation) in its decision paper "Fixed Cost of a Best New Entrant Peaking Plant, Capacity Requirement & Annual Capacity Payment Sum for the Calendar Year 2010" was based on the assumption that the investor would be an integrated utility.

As noted above a new entrant to a particular market is often an international energy company with access to investment grade financing.

PowerSeraya commented that Tata Power, with a credit rating of BB-, was shortlisted by Temasek to bid for Senoko Power and suggested that this demonstrated the potential of non-investment grade companies to be new entrants.

The EMA has not rejected the possibility of non-investment grade companies entering the market, but our view is that in the present market conditions it is more appropriate to consider new entrants with access to investment grade financing.

Senoko Power and PowerSeraya both argued that the EMA should engage an independent expert to assess the cost of debt finance.

The EMA has carefully consulted on these matters and considered a wide range of evidence, including the guidelines published by the credit rating agencies, before putting forward this proposal on the cost of debt finance. On this basis EMA has been able to reach informed and reasonable judgments on the cost of debt finance.

SembCorp Cogen suggested that the EMA should use the average credit rating of the comparator companies as this would reduce the subjectivity and ambiguity associated with the method, and, that this would suggest a credit rating of BB+.

The comparator companies provide very valuable information as to the overall cost of both debt and equity finance. However, the mechanistic use of benchmark information can sometimes produce unrealistic results. Hence it is necessary to apply a degree of judgment to the outputs from benchmarking exercises. As indicated earlier, EMA is of the view that the credit rating of a new entrant should at least be at the minimum investment grade of BBB-.

SembCorp Cogen commented that EMA should have only used the BFV US Utility Index to compute the debt premium as that Index is already an average of bond yields with credit ratings from S&P, Moody's, Fitch and/or DBRS so there is no need

to re-average it again by using the Moody's Utility Bond Index. PowerSeraya pointed out that in the consultation paper, EMA had made adjustment of 10 basis points to the average yield of the Moody's Baa Utility Bond Index to take into account the difference in the average yield between BBB- and the equivalent average of Baa bonds(Baa1 to Baa3). This adjustment had been left out in the draft determination.

On SembCorp Cogen's point, EMA clarifies that not all the utility companies in the Moody's Baa Utility Bond Index may have been used in the Bloomberg Fair Value (BFV) US Utility Index. As such, EMA has included the average yield from the Moody's Baa Utility Bond Index to increase the sample size and therefore obtain a more robust estimate of the debt premium. EMA has correspondingly accounted for the difference between the BBB- (or Baa3) bonds and the average BBB (or Baa) grade by adjusting upwards by 10 bps of the Moody's Baa Utility Bond Index. This adjustment has been reinstated, in response to PowerSeraya's point.

4.4 The cost of debt finance reflects the overall state of credit markets, the level of gearing and the business risks faced by the project or undertaking. As indicated earlier, the gearing level for the new entrant is set at 45.6%, consistent with the overall average for the comparator companies. This is also in line with the approach used at the last vesting review where the overall level of gearing was assumed to be 50%. BBB- debt is used as the benchmark for the cost of capital.

4.5 Based on these considerations, the debt premium for the setting of the vesting price is 469bps. This is obtained by taking the difference between the average of the daily yield of the Bloomberg Fair Value US Utility BBB- 20yr Index⁴ (8.84%) and the Moody's Baa Utility Bond Index⁵ adjusted upwards by 10bps⁶ (8.10%), and the yield on the 20-yr U.S. Treasury bond⁷ (3.78%) for March 2009 (see Appendix 3).

⁴ The Bloomberg Fair Value US Utility BBB- 20yr Index represents the average bond yields issued by utility companies having credit ratings of BBB- from S&P, Moody's, Fitch and/or DBRS of 20 years' maturity.

⁵ The Moody's Baa Utility Bond Index represents the average bond yields issued by utility companies having credit ratings from Baa1 to Baa3. The minimum maturity for the bonds in this index is 20 years.

⁶ On average, it is observed that BBB- (or Baa3) bonds have a 5 to 10bps premium over the average BBB (or Baa) grade.

⁷ Information of the Federal Reserve Treasury Bond is available at <http://www.federalreserve.gov/releases/h15/data.htm>

6 Tax Rate

6.1 As announced by the Ministry of Finance on 22 January 2009, the corporate income tax rate will be reduced to 17% from Year of Assessment 2010. Hence, the tax rate applicable for the purpose of calculating the vesting price is 17%.

7 Equity Beta

7.1 The proxy equity beta for the new entrant was calculated to be 1.035 by re-levering the average asset beta of the comparator companies⁸ (0.602) with the average debt-to-equity ratio of the comparator companies (0.867) and the corporate income tax rate for Singapore (17%) by the following formula:

$$\beta_{equity-adjusted} = \beta_{asset} * \left(1 + (1 - T_c) * \frac{D}{E} \right)$$

7.2 The proxy equity beta was cross-checked with that of the MSCI World Electric Utilities Index⁹ of 0.796 to ensure that it was a fair reflection that a generation company without regulated returns would generally have a higher market risk.

Response to feedback

SembCorp Cogen commented that they have calculated a market debt-to-equity ratio (D/E) to be different from 0.838 used by the EMA in the draft determination.

The 0.838 in the draft determination was calculated from the average gearing of the comparator companies (an approach that was used prior to 2008). In consideration of SembCorp's comment, we will revert to using the same approach as was used in the 2008 review i.e. the debt to equity ratio is calculated as 0.867 based on the average debt to equity ratio of the respective comparator companies.

⁸ See Appendix 2 for the average asset beta and average debt-to-equity ratio of the comparator companies

⁹ The MSCI World Electric Utilities index has an equity beta of 0.796 regressed against the MSCI World Index.

8 Market Risk Premium

8.1 To estimate Singapore's Market Risk Premium (MRP), EMA has taken into consideration (1) the difference between the expected long-run market return in Singapore, based on the forward-looking Dividend Growth Model approach,¹⁰ and the risk free rate; (2) the MRP determined by regulators in Australia¹¹ and UK and (3) the MRP used by Singapore listed companies such as SembCorp Industries, Keppel Corporation and Capitaland¹².

8.2 As the MRP is a long-run forward looking parameter, EMA assessed the risk premium to remain as 7% as in the previous review.

9 WACC

9.1 A summary of the WACC parameters is as follows:

Risk-free rate	3.02%
Debt premium	469bps
Tax rate	17%
After-tax cost of debt	6.39%
Equity beta	1.035
Market risk premium	7%
Cost of equity	10.26%
Gearing	0.456
Post tax nominal WACC	8.50% ¹³

¹⁰ The expected market return in Singapore is 9.822%. The equivalent MRP is 6.806% (Source: Bloomberg)

¹¹ Australia Energy Regulator used the MRP of 6% for the review on WACC parameters completed in December 2008.

¹² The 3 listed companies mentioned used MRPs of 5% to 6% in the financial reports for 2009.

¹³ The final WACC to be applied is rounded off to 2 decimal places. 5 significant figures are used for intermediate calculations in the WACC parameters.

Part B

1 Change in Data Source for 3-month forward exchange rate

1.1 For the calculation of the vesting price from 2nd quarter 2010, EMA would be using the data source for US\$/S\$ 3-month forward exchange rate from the rates published by Bloomberg BGN. The Bloomberg source would allow industry participants to verify the US\$/S\$ 3-month forward exchange rate used in the calculation of the vesting price in retrospect. It would also minimize the risk of input errors in calculating the US\$/S\$ 3-month forward exchange rate, which under the current method is inherent due to the format of the data provided by the Reuters system. Amendments to the Vesting Contracts Procedures Document would be made to cater for this change.

2 Review of Methodology to LRMC parameters: Duration of data

2.1 EMA has identified certain parameters (as indicated in the list below) which can be very volatile. This results in the “base parameters” being highly dependent on the choice of the base month. As such, to minimize the volatility and to avoid the contention of the choice of base month, from the next review onwards, EMA will be using the data in the 3 months leading up to the base month for determining the following “base parameters”:

- a. Exchange rate to convert the costs denominated in foreign currencies into Singapore Dollars;
- b. Diesel price to calculate cost of carrying fuel;
- c. Risk-free rate;
- d. Debt premium to calculate cost of debt;
- e. Consumer Price Index;
- f. Domestic Supply Price index
- g. Imported Iron & Steel Index.

Appendix

The Appendices have been removed from the public version of the Final Determination. Please contact Mr Ang Zi Kai (ang_zi_kai@ema.gov.sg) or Mr Eugene Toh (Eugene_toh@ema.gov.sg) for information.