



**CONSULTATION PAPER
(DRAFT DETERMINATION)**

**REVIEW OF THE WEIGHTED AVERAGE COST OF CAPITAL
(WACC) PARAMETERS FOR SETTING VESTING PRICE FOR
THE PERIOD 1 JANUARY 2009 TO 31 DECEMBER 2010**

Closing date for submissions of comments and feedback:
5 September 2008

Note: There will be no extension of deadline beyond 5 September 2008, 5 pm

23 JUL 2008

ENERGY MARKET AUTHORITY
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Disclaimer:

The information in this Consultation Paper is not to be treated by any person as any kind of advice. The Energy Market Authority shall not be liable for any damage or loss suffered as a result of the use of or reliance on the information given in this Consultation Paper.

1 Introduction

- 1.1 Vesting contracts were implemented on 1 January 2004. The vesting contracts commit the generation companies to sell a specified amount of electricity at a specified price and thereby prevent gencos from exercising their market power to drive up prices. The specified price under the vesting contract i.e. vesting price is set at the long run marginal cost (LRMC) of the most efficient technology that accounts for at least 25% of our system demand. At this time the most efficient generation technology is the combined cycle gas turbine (CCGT).
- 1.2 At the last review in 2006, EMA had determined the LRMC parameters¹ for setting the vesting price to be applied from 1 January 2007 to 31 December 2008. Under the established procedures for setting the vesting price, EMA is required to review the LRMC parameters for setting the vesting price to be applied from 1 January 2009 to 31 December 2010.

2 Request for comments and feedback

- 2.1 EMA invites comments and feedback on its draft report for the review of the Weighted Average Cost Of Capital (WACC) Parameters (i.e. excluding the Technical Parameters) for setting the vesting price for the period 1 January 2009 to 31 December 2010 as set out in the Appendix.
- 2.2 Please send your submission by e-mail to:
wong_mui_quee@ema.gov.sg,
teo_nan_shing@ema.gov.sg,
lee_ming_tao@ema.gov.sg

Alternatively, you may send your submission by post/fax to the following address:

Director (Market)
Regulation Division
Energy Market Authority
111 Somerset Road, #15-05
Singapore 238164.
Fax: (65) 6 835 8084

- 2.3 Anonymous submissions will not be considered.
- 2.4 All comments and feedback must reach EMA by 5 pm on 5 September 2008.
- 2.5 EMA will acknowledge receipt of all submissions electronically. Please contact Mr. Lee Ming Tao at lee_ming_tao@ema.gov.sg if you have not received an acknowledgement of your submission within two business days.
- 2.6 EMA reserves the right to make public all or parts of any written submissions made in response to this Consultation Paper and to disclose the identity of the source. Any part of the submission, which is considered by respondents to be confidential, should be clearly marked and placed as an annex. EMA will take this into account regarding disclosure of the information submitted.

~ End ~

¹ The LRMC parameters comprise broadly 2 groups of parameters viz., the Technical parameters and the WACC (weighted average cost of capital) parameters.

APPENDIX

Review of The Weighted Average Cost Of Capital (WACC) Parameters For Setting Vesting Price For The Period 1 Jan 2009 To 31 Dec 2010

Note: This is a Draft Report solely for the purpose of seeking feedback on the assumptions and approach to setting the WACC in the Vesting Price for 1 Jan 2009 to 31 Dec 2010.

Introduction

The Energy Market Authority (“EMA”) implemented vesting contracts on 1 Jan 2004 to control the market power of generation companies (“gencos”). The vesting contracts commit the gencos to sell a specified amount of electricity (viz. the vesting contract level) at a specified price (viz. the vesting price). Such contracts control market power by removing the incentives for gencos to exercise their market power by withholding their generating capacity to push up prices in the wholesale market.

2. The existing WACC parameters were determined in Dec 2006 and apply to the vesting price for the period 1 Jan 2007 to 31 Dec 2008. The proposed WACC parameters set out in this draft determination are to be applied to the vesting price for the period 1 Jan 2009 to 31 Dec 2010.

Weighted Average Cost of Capital (“WACC”)

3. The Capital Asset Pricing Model (“CAPM”) is adopted to estimate the WACC. The formula is given by:

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

Where:

r_f	is the risk-free rate of return;
DP	is the debt premium paid by the company;
r_m	is the market rate of return
$(r_m - r_f)$	is often referred to as the market risk premium (MRP);
β (equity)	is the measure of the risk premium required by investors to hold the company’s equity. Under CAPM, it is a measure of risk relative to the market;
g	is the level of gearing, i.e. debt as a proportion of debt and equity; and
t	is the marginal corporate tax rate

Determination Month

4. At the start of the WACC review, EMA will adopt a “Determination Month” as a base reference point. The last day of the month preceding the Determination Month shall serve as the “cut off” date for the calculation of data inputs for the draft WACC parameters.

5. For this WACC determination, EMA has adopted Jul 2008 as the Determination Month. This means that available data over a selected time period up to the last business day of Jun 2008 will be used for the calculation of the WACC parameters.

Risk Free Rate

6. To derive the risk-free rate, EMA proposes to use the yield of the Singapore Government Bond (“SGB”) with the longest tenure that is closest to the lifespan of the relevant asset. The risk-free rate shall then be determined as the average of the daily closing yield of that SGB for the month preceding the Determination Month.

7. The 20-year SGB with Issue code: NZ07100S will be used for the determination of the risk-free rate.

Comparator Companies

8. EMA has used the following criteria to select the comparator companies used as benchmarks in the assessment of debt and equity capital. The criteria were chosen to ensure that the comparator companies chosen match the risk profile of the new entrant. Criterion b) is included to reflect EMA’s assessment that the risk profile of the new entrant should be higher than the market average.

- a) Availability of data in the period examined;
- b) Equity beta of the comparator company is above 1;
- c) Absence of financial distress;
- d) Operation in developed markets of comparable country risk to Singapore;
- e) Sales revenue is primarily from power generation activities;
- f) Majority of existing generation revenues accrues from merchant activities; and
- g) Absence of significant ownership by individual investors/funds that could distort liquidity.

9. Based on the above selection criteria, the following companies are used to form the comparator group:

- a) International Power PLC, UK
- b) The AES Corporation, US

10. These 2 comparator companies best match the risk profile of the new entrant and will appropriately reflect the new entrant's risk. Data from these companies are used for the determination of the proxy beta and gearing and are taken into consideration in determining the appropriate credit rating for the new entrant.

Beta

11. To compare betas across companies with different capital structures, EMA first derive the adjusted equity beta using the following formula²:

$$\beta_{equity-adjusted} = (0.67) * \beta_{equity-raw} + (0.33) * 1.0$$

where $\beta_{equity-raw}$ is derived through a regression of individual monthly data points for a period of 5 years, ending on the last business day of Jun 2008.

12. Each adjusted equity beta is then de-levered using the respective debt-to-equity ratio and the current corporate tax rate for the home country of the company to derive the asset beta. The following de-levering formula is used:

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

Where T_c is the corporate tax rate
D/E is the debt-to-equity ratio

13. Table 1 shows the beta values of the comparator companies based on available data.

Table 1: Beta of the comparator companies (using monthly data)				
Comparator Company	Adjusted Equity Beta	Debt to Market Capital Ratio (D/E)	Tax Rate	Asset Beta – derived using Equation (a)
International Power PLC	1.10	1.04	0.3	0.64
The AES Corporation	1.04	1.88	0.4	0.49

Source: Bloomberg

14. An average is then taken for the resulting asset betas to derive the proxy asset beta of 0.563 for the WACC review. The proxy asset beta is then re-levered by applying the proxy debt-to-equity ratio and Singapore's corporate tax rate to derive the equity beta of 1.18.

² Bloomberg's formula to derive Blume-adjusted beta, which is based on the assumption that a company's beta typically moves towards unity.

Debt Premium

15. The debt premium represents the excess return over the risk-free rate, which a provider of finance or an investor expects when providing credit to an investment. As in the previous review of WACC parameters in 2006, a credit rating of BB+, which is the highest sub-investment credit rating, is set for the new entrant.

16. In determining the debt premium, the term of the debt used as comparator information will be based on available debt premium information with term closest to 15-years. EMA has hence derived the debt premium by benchmarking against the debt spread from 10-year BB+ rating corporate bonds issued by the utilities companies. The debt spread data is sourced from the corporate debt spread report published by the Bondsonline Group (based on Reuters market data) as at 30 June 2008. The debt premium is determined as 330 basis points (“bps”).

Market Risk Premium

17. Market Risk Premium (MRP) measures what investors, on average, demand as extra return for investing in the market portfolio relative to the risk-free asset. It is the average spread that the stock market earns above the risk free rate over time.

18. To estimate Singapore’s MRP, we have taken into consideration several approaches, viz. the forward-looking Dividend Growth Model approach and the Historical Premium approach. As a further crosscheck, we have also cross referenced to appropriate “benchmarks”, including Singapore listed companies such as SembCorp Industries, Keppel Corporation, Capita Land and Singapore Food Industries, as well as the MRP determined by regulators in Australia and UK. After assessing the various approaches, we assess that the MRP for Singapore would fall between 5% and 9%. Taking a balanced view, we conclude on a MRP of 7%, which is the midpoint of the range of 5% to 9%.

Gearing

19. EMA has derived the proxy gearing based on the average gearing of the selected comparator companies over the most recent 5-year period. The average gearing of comparator companies over the most recent 5-year period, based on their latest available audited figures, ranges from 0.51 to 0.63 (see Table 2). These figures are derived from their debt-to-equity ratios using Equation (b) below. Taking arithmetic average, the proxy gearing for the new entrant is 0.57.

$$Gearing = \frac{D}{E} / \left(1 + \frac{D}{E}\right) \quad - \text{Equation (b)}$$

Where D/E is the debt-to-equity ratio

Table 2: Capital structure of comparator companies		
Comparator Companies	D/E ratio	Gearing
International Power PLC	1.04	0.51
The AES Corporation	1.88	0.63

Source: Bloomberg

Summary

20. Based on the above principles, EMA's draft determination of the WACC parameters is shown in Annex 1.

**DRAFT DETERMINATION OF WACC PARAMETER VALUES TO SET
VESTING PRICE FOR 1 JAN 2009 TO 31 DEC 2010**

Parameter	Values
Risk Free Rate, r_f	4.04%
Debt Premium, DP	330 bps
Market Risk Premium, MRP	7%
Asset Beta	0.56
Gearing Ratio, g	0.57
Equity Beta, β_{equity}	1.18
Corporate Tax Rate, t	18%
Post-Tax Nominal WACC	8.72%