Smart Energy, Sustainable Future

MID-TERM REVIEW OF THE CAPITAL COST PARAMETERS FOR SETTING THE VESTING CONTRACT PRICE FOR 2018

FINAL DETERMINATION PAPER

12 SEPTEMBER 2017

ENERGY MARKET AUTHORITY
991G Alexandra Road
#01-29 Singapore 238164
www.ema.gov.sg

Disclaimer:

The information contained in this document is subject to change and shall not be treated as constituting any advice to any person. It does not in any way bind the Energy Market Authority ("EMA") to grant any approval or official permission for any matter, including but not limited to the grant of any exemption nor to the terms of any exemption. EMA reserves the right to change its policies and/or to amend any information contained in this document without prior notice. Persons who may be in doubt about how the information in this document may affect them or their commercial activities are advised to seek independent legal advice or any other professional advice as they may deem appropriate. EMA shall not be responsible or liable for any consequences (financial or otherwise) or any damage or loss suffered, directly or indirectly, by any person resulting or arising from the use of or reliance on any information contained in this document.

MID-TERM REVIEW OF THE CAPITAL COST PARAMETERS FOR SETTING THE VESTING CONTRACT PRICE FOR 2018

FINAL DETERMINATION PAPER

1. INTRODUCTION

1.1. The Energy Market Authority (**"EMA"**) implemented vesting contracts on 1 Jan 2004. The objective of the vesting regime is to enhance economic efficiency in the electricity market by mitigating the exercise of market power by the generation companies (**"gencos"**). The vesting contracts mandate a specified amount of electricity (viz. the vesting contract level) to be hedged at a specified price (viz. the vesting contract price). This removes the incentives for gencos to withhold their generation capacity to sustain inefficient spot prices in the wholesale electricity market.

1.2. The vesting contract price is set based on the long run marginal cost (**"LRMC"**) of the most efficient generation technology that accounts for at least 25% of the system demand in Singapore. The most efficient technology at present is the F-class combined cycle gas turbine (**"CCGT"**). EMA reviews and determines the vesting contract price parameters biennially or when necessary in accordance with the published *EMA's Procedures for Calculating the Components of the Vesting Contracts* (**"Procedures"**). EMA also conducts a mid-term review of the capital cost parameters.[1]

1.3. EMA appointed WSP Consultancy Pte Ltd (**"WSP"**) and KPMG Services Pte Ltd (**"KPMG"**) (**"Consultants"**) to conduct a review of the LRMC parameters for setting the vesting contract price for 2017 and 2018, and also the mid-term review of the capital cost parameters for 2018. On 13 July 2017, EMA issued a Draft Determination Paper to seek comments on the Consultants' Revised Report setting out their assessment of the capital cost parameters for 2018. The Consultants' responses to the comments received are set out in **Annex 1**. Their Final Report after taking into account the comments received are attached at **Annex 2**.

2. EMA'S FINAL DETERMINATION

2.1. Having considered the comments received, the Consultants' responses thereto and their Final Report, EMA makes the Final Determination on the capital cost parameters for setting the vesting contract price for 2018 as set out in ***Appendix 1***.

[1] The capital cost parameters refer to item 7 (Capital cost of the plant) and item 8 (Land, infrastructure and development cost of the plant) under Section 2.3 of the Procedures.

2.2. The capital cost parameters, including a comparison with the current values are summarised in ***Table 1*** below.

Table 1: Summary of Capital Cost Parameters

Capital Cost Parameters	Current	Proposed for 2018
Capital cost (S$ million) • Turnkey Engineering, Procurement and Construction ("EPC") cost • Discounted through-life capital cost	$495.7m	$510.0m
Land, infrastructure and development cost (S$ million) • Land and site preparation cost • Connection cost • Miscellaneous cost	$155.7m	$155.6

2.2. The indicative vesting contract price is $138.78/MWh based on the capital cost for 2018 and the gas price of S$11.94/GJ used for setting the current (i.e. Q3 2017) vesting contract price. This is marginally higher than the current vesting contract price of $138.10/MWh (refer to ***Table 2***).

Table 2: Indicative Vesting Contract Price*

	Based on Current Capital Cost	Based on Capital Cost for 2018
Vesting Contract Price (S$/MWh)	138.10	138.78
Capital Cost Component (S$/MWh)	31.13	31.80

* Based on the gas price of S$11.94/GJ

* * *

Appendix 1

EMA's Final Determination of the Capital Cost Parameters for Setting the Vesting Price for 2018

1. Base Month

1.1. The Base Month is May 2017.

2. Generating Technology

2.1. Currently, the most efficient technology that accounts for at least 25% of the system demand in Singapore is the F-class CCGT.

3. Capacity per Generating Unit

3.1. A new entrant is assumed to install two units of CCGTs. Taking into account the effects of degradation (due to fouling, erosion and material losses in the turbine section), local air temperature and conditions, and allowance for gas compression, the achievable effective plant capacity in Singapore for an F-class CCGT is 407.9 MW.

4. Exchange Rate

4.1. The SGD/USD and SGD/EUR exchange rates, averaged over the three-month period from Mar 2017 to May 2017, are 1.3994 and 1.5147 respectively.

5. Investment Cost

5.1. ***Capital cost***. The capital cost includes the cost of purchasing the plant and all associated equipment, including the cost of delivery of the plant in a state suitable for installation in Singapore. The total capital cost for one CCGT unit is $510.0m, comprising:

a.	Turnkey Engineering, Procurement and Construction ("EPC") cost:[2]	*$502.6m (about US$359.1m)*

[2] The EPC cost includes the cost for specialised equipment, mechanical and electrical engineering, gas compressors, the jetty and fuel tanks.

b. Discounted through-life capital cost: *$7.4m*

5.2. ***Land and site preparation cost***. The total land and site preparation cost for one CCGT unit is $16.0m, comprising:

a. Land lease cost and waterfront fees: *$15.0m*

b. Land preparation cost: *$1.0m*

5.3. ***Connection cost***. The total connection cost for one CCGT unit is $46.3m, comprising:

a. Electrical connection cost including standard connection cost payable, switchgear and underground cable: *$39.2m*

b. Gas connection cost: *$7.1m*

5.4. ***Miscellaneous cost***. The total miscellaneous cost for one CCGT unit is $93.3m, comprising:

a. Owner's costs after financial close including engineering, initial spares, start-up costs and construction related insurance: *$60.4m*

b. Owner's costs prior to financial close including permits, licences, fees, legal and financial services, engineering and in-house costs: *$32.9m*

* * *