REVIEW OF THE VESTING CONTRACT REGIME

CONSULTATION PAPER

Closing date for submissions of comments and feedback:
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REVIEW OF THE VESTING CONTRACT REGIME

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INTRODUCTION

1 The Energy Market Authority ("EMA") implemented the vesting contract ("VC") regime on 1 January 2004. The objective of the VC regime is to mitigate the exercise of market power by the generation companies ("gencos"). 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), which in turn removes the incentives for gencos to exercise their market power by withholding their generation capacity to push up spot prices in the Singapore Wholesale Electricity Market ("SWEM").

2 EMA has appointed Frontier Economics ("FE") to undertake a review of the vesting contract regime ("Review") including:

a. Reviewing the vesting contract level (VCL) for 2017 and 2018;

b. Reviewing the existing mechanisms used to mitigate market power in the SWEM;

c. Reviewing the international experience in market power mitigation; and

d. Developing possible new mechanisms to mitigate market power in the SWEM.

3 A summary of FE's evaluation and recommendations is set out below (refer to the FE's Draft Report attached herewith for the details).

REVIEW FRAMEWORK

4 FE recommends the following criteria to evaluate the current vesting contract regime and alternative market power mitigation measures:

a. Effectiveness of a measure in curbing market power at the market-wide level as well as at a localised level;

b. Dispatch efficiency – whether a measure promotes merit-order dispatch;

c. Resource adequacy – whether a measure promotes efficient generation investment and retirement decisions i.e. dynamic efficiency;

d. Intrusiveness and administrative burden – how onerousness and costly a measure is to participants, the market operator and EMA; and

e. Transparency and predictability – whether a measure operates in a manner that actual and prospective participants can reasonably anticipate.

REVIEW OF VCL FOR 2017 AND 2018

5 EMA's Procedures for Calculating the Components of the Vesting Contracts ("Procedures") provide for the VCL to be set primarily to curb the market power of gencos taking into account the following factors:

a. Expected long run marginal cost ("LRMC") of a new entrant combined cycle gas turbine plant;

b. Supply and demand projections;

c. Robustness of different VCLs to data uncertainty;

d. Likely data scenarios, including the potential range of plant configurations; and

e. Avoidance of frequent fluctuations in the VCL through a monotonic rollback schedule, if possible.

6 To determine the VCL for 2017 and 2018, FE has modeled the spot price in the SWEM under a wide range of potential VCLs for 2017 and 2018 – from 35 percent (of total electricity demand) down to the LNG vesting level (~18 percent). For each VCL, FE considers both cases of the unvested load served by the Market Support Services Licensee (viz. SP Services) at the regulated tariff ("MSSL load") either (a) hedged via competitive tenders and/or electricity futures in the Singapore Exchange ("SGX"); or (b) unhedged such that the spot price exposure of the gencos would increase. FE also modeled the impact of the different VCLs across the following scenarios:

a. A base case scenario, incorporating standard assumptions of demand and plant availability;

b. A bidding sensitivity scenario, where FE assumed that both steam and OCGT units were offered into the SWEM at $350/MWh; and

c. A supply-demand sensitivity scenario, where FE assumed that the growth rate for electricity peak demand doubled, and that around half of the steam units were removed from the SWEM.

7 FE has observed that in all (base case and sensitivity) scenarios, spot prices on average remain substantially below the LRMC, with potentially higher and more volatile spot prices with unvested MSSL load unhedged in the sensitivity scenarios.

8 Given the limited evidence of the likely exercise of market power in the near term, FE has assessed that there is scope to reduce the VCL to the LNG vesting level by the end of calendar year 2018 if the unvested MSSL load is fully hedged. If the unvested MSSL load is not hedged, FE recommends that the VCL be reduced to no lower than 20 percent for calendar years 2017 and 2018.

ASSESSMENT OF THE CURRENT VESTING CONTRACT REGIME

9 FE has assessed that the vesting contract regime has been effective in mitigating market power which also contributed to promoting dispatch efficiency.

10 However, there are concerns from the resource adequacy perspective. While the vesting regime does not systematically prevent generators from recovering efficient costs, the allocation of vesting quantities to licensed capacity offers perverse incentives for generators to keep inefficient plants in service and to oppose efficiency-enhancing reforms.

11 As vesting contracts are imposed on the vested gencos, they represent a relatively intrusive measure for mitigating market power. The design and operation of vesting contracts also involves a degree of complexity and administrative burden on participants, market operators and EMA. For these reasons, vesting contracts are usually authorised as a time-limited mechanism in most overseas markets where they have been applied.

12 The current vesting contract regime operates in a reasonably transparent manner. However, there is significant uncertainty associated with the biennial resetting of the VCL.

INTERNATIONAL REVIEW OF MARKET POWER MECHANISMS

13 FE has reviewed the mechanisms used to mitigate market power in a range of overseas electricity markets. This includes the energy-only markets in Australia (except Western Australia), New Zealand, Alberta (in Canada) and Texas (in the United States), and also the energy and capacity markets in PJM (in the United States), Ireland and in Western Australia. FE identified and assessed the following range of tools used in these markets to mitigate market power:

a. Conditional price caps, including:
    i. Scarcity pricing (used in New Zealand), and
    ii. Cumulative price threshold caps (Australia);

b. Bidding restraints and obligations, including:
    i. Mandated short run marginal cost ("SRMC") bidding (Ireland and Western Australia),
    ii. Pivotal supplier tests (PJM and Texas),
    iii. Voluntary mitigation plans (Texas), and
    iv. General behavioural obligations (Australia and New Zealand);

c. Other mechanisms, including:
    i. Capacity or concentration caps (Alberta, and more generally in the United States), and
    ii. Directed contracts (Ireland).

14 FE has assessed that a number of these mechanisms are not suitable for the SWEM. Conditional price caps are unlikely to be effective in mitigating market power in the SWEM. Bidding rules imposed in capacity markets, such as the requirement for generators to bid at SRMC, are not appropriate for Singapore's energy-only market. Voluntary mitigation plans are likely to have limited efficacy in mitigating market power, while general behavioural obligations on generator bidding can be subjectively interpreted by market participants leading to disputes and litigations.

ALTERNATIVE MECHANISMS FOR MITIGATING MARKET POWER IN THE SWEM

15 FE has considered in greater detail the remaining tools that may be useful for managing market power in the SWEM. They include: (a) pivotal supplier tests to manage localised or transient market power relating to transmission constraints; (b) capacity or concentration caps to prevent structural market dominance; and (c) concentration model to determine the VCL (similar to the directed contract cover in Ireland) to provide a more transparent and mechanistic approach to determining the VCL.

16 FE thereafter designed various alternative "packages" for mitigating market power in the SWEM. Each package is developed by combining various features of the current regime and/or the mechanisms applied in other jurisdictions. The packages are as follows:

a. The **status quo** refers to the current arrangements for mitigating market power in the SWEM, comprising the existing vesting contract regime, the licensed capacity cap applied to each of the three largest gencos, and EMA's monitoring and investigation powers under the

Electricity Act. FE has proposed minor enhancement to the current vesting contract regime to provide investors with greater confidence about the size and direction of changes to the VCL by setting: (i) the maximum level that the EMA would raise VCL to; and (ii) the maximum change in VCL that EMA would implement over any given two-year period.

b. The **improved vesting contract regime** involves the following changes, in particular to address some of the key shortcomings associated with the status quo package:

   i. Imposing a capacity market share cap of 25 percent on each generation licensee. With regard to the three largest gencos which have existing licensed capacity caps imposed on them by EMA, their respective licensed capacity cap will be replaced by the 25 percent capacity market share cap after their respective capacity market share has fallen below the 25 percent threshold. This is to prevent forced divestment by these gencos to meet this market share cap;

   ii. Replacing the current approach to setting the VCL with a more mechanistic approach to improve transparency and predictability. Specifically, FE recommends to set the VCL to achieve a target "vested" Herfindahl-Hirshman Index ("HHI") (defined as the HHI obtained by excluding any vested generation capacity from each genco's market share) of 1,250;

   iii. Changing the allocation of the VCL such that the vesting contract quantities will be allocated to all generation licensees in proportion to their respective *licensed* generation capacity that can respond to short term price events ("effective capacity"). Currently, effective capacity equates to licensed combined cycle gas turbine ("CCGT") capacity and open-cycle gas turbine ("OCGT") capacity. This is in contrast to the current approach to allocate vesting contract quantities based on their respective historically licensed or planned generation capacities;

   iv. Obliging the MSSL to hedge unvested MSSL load via futures contracts to be purchased on the SGX, subject to the following pre-conditions: (1) development of appropriate trading and risk management/compliance arrangements for the MSSL; (2) availability of peak, off-peak and shoulder products on the SGX; and (3) development of appropriate regulated tariff setting arrangements. Before these conditions are met, the unvested MSSL load could continue to be hedged via competitive tenders;

v. Retaining EMA's monitoring and investigation powers under the *Electricity Act*; and

vi. Incorporating the same minor enhancement proposed for the status quo package above.

c. The **balanced market regime** is a relatively hands-off approach to managing market power in the SWEM. It entails the following changes:

i. Phasing out vesting contracts in two key stages:

(1) Balance vesting quantities ("BVQ") will be reduced to zero over a defined period, say two to three years. Given the intention to reduce BVQ to zero, the VCL will not be reallocated based on effective capacity, i.e. the allocation method for BVQ will remain status quo; and

(2) LNG vesting quantities ("LVQ") will be transitioned to zero once the LNG vesting contracts expire in 2023.

ii. Imposing a capacity market share cap of 25 percent on each generation licensee. With regard to the existing three largest gencos with licensed capacity caps imposed on them by EMA, their respective licensed capacity cap will be replaced by the 25 percent capacity market share cap when their respective capacity market share has fallen below the 25 percent threshold;

iii. Obliging the MSSL to hedge unvested non-market/non-contestable load ("MSSL load") via futures contracts to be purchased on the SGX, subject to the following pre-conditions: (1) development of appropriate trading and risk management/compliance arrangements for the MSSL; (2) availability of peak, off-peak and shoulder products on the SGX; and (3) development of appropriate regulated tariff setting arrangements; and

iv. Retaining EMA's monitoring and investigation powers under the *Electricity Act*.

d. The **combined approach** builds on the balanced market regime by adding a pivotal supplier test ("PST") to address instances of localised market power. FE has recommended the following features:

i. Apply the PST: (1) to identify generators that are required to meet demand in any import-constrained network nodes (i.e. are

pivotal) arising from transmission constraints; and (2) on a trading interval basis to ensure that gencos are not able to game by bidding to trigger the PST and simultaneously withdrawing capacity within a given trading interval;

ii. The bids of pivotal generators will be capped at a notional level, for example $350/MWh representing an OCGT plant's SRMC with doubled fuel costs. This is to ensure generators' avoidable costs would always be covered, thereby removing the need for compensation.

iii. With the potential capping of bids of pivotal generators, the introduction of the PST should be paired with an independent review of the market price cap level to ensure overall resource adequacy for the SWEM.

17 ***Table 1*** summarises the four packages/regimes to mitigate market power in the SWEM.

Table 1: Packages/regimes to mitigate market power in the SWEM

<table>
<tr><th rowspan="2">Packages</th><th colspan="2">Maintain Vesting Contracts</th><th colspan="2">Phase Out Vesting Contracts</th></tr>
<tr><th>Status Quo</th><th>Improved Vesting Contract Regime</th><th>Balanced Market Regime</th><th>Combined Approach</th></tr>
<tr><td>Market monitoring</td><td colspan="4">Retain EMA's monitoring and investigation powers under the Electricity Act</td></tr>
<tr><td>Capacity / concentration cap</td><td>Maintain current licensed capacity cap</td><td colspan="3">Introduce capacity market share cap of 25%</td></tr>
<tr><td>VCL</td><td>No change to approach, scope for reduction in VCL

Explicit cap on the maximum VCL and the maximum change in VCL over any given two-year period.</td><td>Set VCL based on target vested HHI of 1,250</td><td colspan="2">Reduce BVQ to zero over a defined period (eg. 2 to 3 years)

Transition LVQ to zero once the LNG vesting contracts expire in 2023</td></tr>
</table>

<table>
<tr><th rowspan="2">Packages</th><th colspan="2">Maintain Vesting Contracts</th><th colspan="2">Phase Out Vesting Contracts</th></tr>
<tr><th>Status Quo</th><th>Improved Vesting Contract Regime</th><th>Balanced Market Regime</th><th>Combined Approach</th></tr>
<tr><td>Vesting allocation</td><td>No change to approach</td><td>Gradual change to allocation based on effective capacity (licensed CCGT + OCGT)</td><td colspan="2">Not applicable</td></tr>
<tr><td>Hedge unvested MSSL load (i.e. non-contestable / non-market load served by MSSL)</td><td>Hedged via tender</td><td colspan="3">Hedge via SGX</td></tr>
<tr><td>Pivotal supplier test + higher market energy price cap</td><td colspan="3">Not applicable</td><td>Energy offers of pivotal generators capped at notional level, for example $350/MWh representing an OCGT plant’s SRMC with doubled fuel costs</td></tr>
</table>

ASSESSMENT OF THE VARIOUS PACKAGES/REGIMES

18 FE has assessed that the improved vesting contract regime will improve the efficacy of the arrangements compared to the status quo. Although vesting contracts remain in place as the primary mechanism to mitigate market power, a revised contract allocation and the introduction of the requirement for MSSL to hedge its unvested load via the SGX will improve the effectiveness of the arrangements in managing market power and improve dispatch efficiency. The reallocation of the vesting contracts will also improve resource adequacy relative to the status quo. The mechanistic approach to determining the VCL further improves transparency and predictability. However, under this regime, relatively intrusive vesting contracts will remain entrenched as a feature in the SWEM.

19 Under the balance market regime, the phasing out and ultimate removal of vesting contracts avoids the intrusiveness, administrative burden, and lack of transparency and predictability associated with the status quo. The obligation on the MSSL to hedge its unvested non-contestable/non-market load acts as an effective mechanism to mitigate market power and enhance dispatch efficiency. While the balanced market approach is less effective than the alternatives in managing localised market power, opportunities for exercise of localised market power will be significantly lessened once the transmission constraint between Jurong Island and Singapore mainland is lifted in 2018.

20 As in the balanced market regime, the phasing out and ultimate removal of vesting contracts under the combined approach improves resource adequacy and transparency and predictability relative to the status quo. Compared to the balanced market approach, the combined approach improves on the management of localised market power due to the introduction of the PST. However, the PST and potential capping of pivotal generators may reduce the frequency and extent of high price events in the SWEM. This may impact negatively on resource adequacy and require raising the market energy price cap (currently $4,500/MWh). Overall, the introduction of the PST represents a relatively intrusive modification to the market design and is likely to involve significant development costs.

21 On balance, FE considers the package of measures under the balance market regime to be the most effective, least intrusive and most transparent and predictable way to mitigate market power in the SWEM. FE therefore recommends the balance market regime to be adopted for the SWEM.

TRANSITIONING TO THE BALANCE MARKET REGIME

22 The transition from the status quo to any new regime should proceed in a staged and orderly manner. This is necessary to allow appropriate enabling arrangements to be developed and ensure market participants are able to adjust their portfolios as required. FE advocates for a transition path to be developed in consultation with market participants to transit from the status quo to the proposed new arrangements.

REQUEST FOR COMMENTS

23 EMA would like to invite comments on the attached Draft Report of FE. Please submit all written feedback via email to: *ema_mdsd@ema.gov.sg*

24 All feedback should reach EMA by **5pm on 6 Jun 2016** in the format as shown in ***Appendix 1***. You are requested to include a soft-copy of your comments in both **PDF and Microsoft Word** format in your submission.

25 EMA will acknowledge receipt of all submissions via email. Please contact Mr Chong Zhijia (6376 7564) or Mr Lee Guo Rui (6376 7830) if you do not receive an acknowledgement of your submission within two business days.

26 Please note that EMA will not consider anonymous submissions. EMA reserves the right to make public all or part 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 (with justification on the need to maintain confidentiality). EMA will take this into account in the disclosure of the information submitted.

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FORMAT FOR SUBMISSION OF COMMENTS AND FEEDBACK

REVIEW OF THE VESTING CONTRACT REGIME

S/No.	Please indicate in each cell in this column, the section/paragraph in the Consultation Paper/Consultant's Report to which your comment/feedback refers	Comments
1		
2		
3		
. . .		
Please state in this row if you have any views/proposals on the transition path from the status quo to any of the new regimes (viz. improved vesting contract, balance market and/or combined approach)		
Any other comments and feedback		

Comments/Feedback submitted by

Name :
Designation :
Company :
Email :
Contact No. :