



REVIEW OF THE VESTING CONTRACT REGIME

FINAL DETERMINATION PAPER

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INTRODUCTION

1. The Energy Market Authority (“EMA”) implemented the Vesting Contract (“VC”) regime on 1 January 2004 with the objective of mitigating the exercise of market power by generation companies (“gencos”) to enhance economic efficiency in the Singapore Wholesale Electricity Market (“SWEM”). VCs mandate a specified amount of electricity to be hedged (viz. the VC level or “VCL”) at a specified price (viz. the VC price). This removes the incentives for gencos to exercise their market power by withholding their generation capacity to push up spot prices in the SWEM.
2. EMA appointed Frontier Economics (“FE”) to undertake an independent review of the VC regime (“VC Review”) including:
 - a. Reviewing the 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. EMA published FE’s draft report for consultation on 16 May 2016. After taking into account the industry comments on FE’s draft report and its responses to those comments, EMA published FE’s Revised Report and the Draft Determination Paper for the second round consultation on 31 August 2016.
4. The responses of FE and EMA to the comments received from the second round consultation are set out in **Appendix 1** (refer to **Appendix 2** for the detailed comments). FE’s Final Report, which takes into account the comments received, is attached at **Appendix 3**.
5. EMA has carefully considered all the comments received and FE’s responses thereto. The Final Determination by EMA is set out below.

FE'S ANALYSIS & RECOMMENDATION

VCL for 2017 & 2018

6. FE modelled spot prices over a wide range of VCLs from 35% (of total electricity demand) to the LNG vesting level (~18-19%) across several sensitivity scenarios¹. For each scenario, FE considered the unvested load served by the Market Support Services Licensee (viz. SP Services) at the regulated tariff ("unvested MSSL load") being either: (a) hedged; or (b) unhedged such that the spot price exposure of gencos would increase.

7. FE observed that in all (base case and sensitivity) scenarios, spot prices on average remain *substantially below* the Long Run Marginal Cost ("LRMC") of efficient combined cycle gas turbine ("CCGT") units. There are potentially higher and more volatile spot prices when unvested MSSL load remains unhedged in the sensitivity scenarios.

8. Given that there is no market power concern in the near term due to the current over-capacity situation in the electricity market, FE assessed that the VCL can be reduced to the LNG vesting level by end 2018, along with prudent hedging of the unvested MSSL load.

Alternative Regimes for Mitigating Market Power in SWEM

9. FE assessed that the VC regime, although effective in mitigating market power, is relatively intrusive and introduces concerns on long term resource adequacy. Specifically, the regime allocates VC quantities to the vested gencos in proportion to their respective installed capacities that were licensed before the decision was made in 2004 to implement VC. Consequently, gencos may unduly defer retirement of their less efficient plants so as to be allocated more VC quantities. Furthermore, the biennial review of the VCL reduces certainty and predictability on the VCL for the gencos.

10. To address the above shortcomings of the VC regime, FE considered three alternative regimes for mitigating market power by combining various features of the current regime and/or the mechanisms adopted in other jurisdictions (see **Table 1**).

¹ The modelling scenarios include: (a) a base case scenario with standard assumptions of demand and plant availability; (b) a bidding sensitivity scenario assuming both steam and open cycle gas turbine ("OCGT") units are offered into the SWEM at \$350/MWh, which is around the short run marginal cost ("SRMC") of an OCGT unit with doubled fuel costs; and (c) a supply-demand sensitivity scenario assuming the growth rate for electricity peak demand is doubled, and around half of the steam units are removed from the SWEM. Refer to Appendix C of FE's Final Report for details on the assumptions.

Table 1: Alternative regimes for market power mitigation in the SWEM

Mechanisms	Retain Vesting Contracts	Phase Out Vesting Contracts	
	Improved Vesting Contract Regime	Balanced Market Regime	Combined Approach
Market monitoring	Retain EMA’s monitoring and investigation powers under the <i>Electricity Act</i>		
Capacity / concentration cap	Introduce capacity market share cap of 25%		
VCL	Set VCL based on target vested Herfindahl-Hirshman Index ² (“HHI”) of 1,250	Reduce Balanced Vesting Quantities (“BVQ”) ³ to zero over a defined period of 2 to 3 years; No more LNG Vesting Quantities (“LVQ”) once the LNG vesting contracts expire in 2023.	
Vesting allocation	Gradual change to allocation based on all <i>effective</i> capacity (licensed CCGT + OCGT)	Not applicable	
Hedge unvested MSSL load	Transition to hedging via the electricity futures market		
Pivotal supplier test (“PST”)	Not Applicable		Energy offers of pivotal generators capped at notional level of \$350/MWh representing an OCGT plant’s SRMC with doubled fuel costs

11. FE recommends the Balanced Market regime for the SWEM. Under this regime, the phasing out and ultimate removal of VCs would avoid the intrusiveness, administrative burden, as well as the lack of transparency and predictability associated with the status quo. Imposing the 25% capacity market share cap, along

² The vested HHI level is defined as the HHI obtained by excluding any vested generation capacity from each genco’s market share.

³ BVQ is the amount of VC quantities above the LNG vesting quantities.

with prudent hedging of unvested MSSL load, will effectively mitigate market power and enhance generation dispatch efficiency.

ADOPTION OF BALANCED MARKET REGIME

12. *Industry comments:*

- a. The three large gencos (viz. YTL PowerSeraya (“Seraya”), Senoko Energy (“Senoko”) and Tuas Power Generation (“Tuas”)), objected to adopting the Balanced Market regime. They commented that the VC Review focused solely on market power mitigation without regard for their financial sustainability, and asserted that the VCL should be increased. However, Senoko also acknowledged the limitations in using the VCL to provide revenue support in a highly competitive market environment, and suggested having a more gradual VCL rollback schedule.
- b. In contrast, the other market participants comprising the small gencos (viz. Keppel Merlimau Cogen (“Keppel”), PacificLight Power (“PacificLight”), SembCorp Cogen (“Sembcorp”) and Tuaspring) and RCMA Group (which owns an independent retailer, iSwitch) supported the Balanced Market regime.
- c. The small gencos also supported the use of the PST to dynamically identify and curb the offer prices of gencos with localised market power due to transmission network constraints.

13. *EMA’s assessment:*

- a. The scope of the VC Review focuses on the mitigation of market power to enhance market efficiency, taking into account dispatch efficiency, generation resource adequacy in the long term, transparency and predictability, as well as the intrusiveness and administrative burden of various options compared to the status quo. In their comments, the large gencos are suggesting that VC be used to provide financial support. This is beyond the objective of controlling market power. There is no basis for EMA to do so, given that investments in new/repowered generation capacity are commercially driven. Doing so could also lead to moral hazard.
- b. The move to the Balanced Market regime will effectively control market power to ensure efficient market outcomes including generation resource adequacy, while avoiding the intrusiveness, administrative burden, and the lack of transparency and predictability associated with VCs.

- c. With regard to the PST, we agree with FE’s assessment that the occurrence of transmission network constraints facilitating the exercise of localised market power has not been frequent or persistent in the SWEM. This is unlikely to be a material problem in the future as transmission network constraints will be reduced and removed in a timely fashion. While there is no strong justification to implement the PST currently, we will consider implementing it in future if transmission congestion is expected to materially increase.

PHASING OUT THE VC REGIME

14. To phase out the VC regime and transit to the Balanced Market regime, EMA’s Draft Determination Paper indicated the VCL rollback schedule and period weighting factors (“PWFs”)⁴ as shown in **Table 2**:

Table 2: VCL rollback schedule

Period	VCL	PWF		
		Peak Period	Shoulder Period	Off-Peak Period
1 Jan 2017 to 30 Jun 2018	25%	1.1	1	Balancing Factor
1 Jul 2018 to 31 Dec 2018	22.5%			
1 Jan 2019 to 30 Jun 2019	20%			
1 Jul 2019 to 30 Jun 2023	LNG vesting only	N.A.		
With effect from 1 Jul 2023	Not applicable (VC regime phased out)			

15. **Industry comments:**

- a. Seraya and Senoko continue to assert that the VCL should be set above 25% to provide revenue support. Seraya specifically commented that the VCL should be set at a *minimum of 40% until 2023* and requested to continue with the biennial review of the VCL for 2019 and beyond. In contrast Keppel, PacificLight and Tuaspring commented that the proposed VCL rollback schedule is overly gradual since there is no

⁴ In the biennial review of the VCL based on the published *EMA’s Procedures for Calculating the Components of the Vesting Contracts* (“Procedures”), EMA will also review and set the peak PWF. The peak PWF is a multiplier applied to the prevailing VCL to allocate more VC quantities during peak periods. This is to better control expected higher market power during peak periods relative to the shoulder and off-peak periods. The shoulder PWF is set at unity, while the off-peak PWF is a balancing factor to maintain the overall VC quantities at the prevailing VCL given the peak and shoulder PWFs.

market power concern. Keppel suggested to set VCL at 25% for 2017, 20% for 2018, and the LNG vesting level from 2019 onwards. Tuaspring suggested that the VCL should be reduced to the LNG vesting level from the start of 2017.

- b. Keppel and Sembcorp further requested to, during the transition period, allocate any VC quantities based on efficient CCGT capacity of all gencos (instead of the current allocation method based on existing vested generation capacity which includes the steam plants)⁵. They asserted that the current allocation method is “inefficient and inequitable” as it discourages the retirement of steam plants which “are inefficient, rarely operated, and do not contribute to the power system”.
- c. Senoko and PacificLight commented that the peak PWF should be set to unity given that there is no market power.

16. **EMA’s assessment:**

- a. EMA is mindful to avoid making sudden changes to the VCL that may disrupt our electricity wholesale and retail market, potentially resulting in unintended adverse consequences. Furthermore, we need to cater for sufficient time to establish the enabling arrangements for prudent hedging of unvested MSSL load in conjunction with the rollback of the VCL. These include developing a robust regulatory framework and governance arrangement, as well as the capabilities, systems and operational processes for prudent hedging and risk management in respect of MSSL load, which would become dynamic with full retail competition (“FRC”). Taking into account the industry comments and adopting a balanced view on the issues involved, EMA will adopt the VCL rollback schedule as shown in **Table 2**.
- b. We agree with FE’s assessment that retaining the current allocation method during the transition period of two to three years would not result in inefficient market outcomes in terms of generation dispatch in the short term. It also would not undermine efficient investments in generation capacity in the longer term. The BVQ will be reduced to zero by the start of 2H 2019, after which the current allocation method will effectively be discontinued. It will be disruptive to change the allocation method for the transition. EMA has decided on balance to retain the current allocation method in moving towards the Balanced Market regime.

⁵ The current licensed generation capacity eligible for allocation of VC quantities under the VC regime is based on the licensed generation capacity of the vested gencos before EMA’s decision to implement VC in 2004.

- c. The current allocation method and the peak PWF of 1.1 will effectively be phased out as part of the wider reduction of BVQ to zero by the start of 2H 2019. It will be disruptive to change these for the transition. EMA has decided on balance to retain them in moving towards the Balanced Market regime.

IMPOSITION OF 25% CAP ON CAPACITY MARKET SHARE

17. Since Dec 2002, EMA has imposed a *MW licensed capacity cap* on Seraya (3,100 MW), Senoko (3,300 MW) and Tuas (2,670 MW) to prevent them from increasing their market dominance/power. Under the Balanced Market regime, FE recommends a *25% cap on capacity market share* to be applied to all generation licensees.

18. **Industry comments.** Seraya and Senoko objected to replacing their respective MW licensed capacity cap with the proposed 25% capacity market share cap. They were concerned that it could prevent them from repowering back to their current MW licensed capacity cap after they retire their steam plants.

19. **EMA's assessment.** We agree with FE's recommendation to impose the 25% capacity market share cap which will be applied consistently across all generation licensees to prevent structural increases in market concentration/power, while allowing portfolio expansion by each genco as the SWEM grows. In implementing this mechanism, EMA will not require any genco to divest when its capacity market share exceeds 25% due to the plant retirement decisions of other gencos. Additionally, with regard to the three large gencos, EMA will impose the higher of either the 25% capacity market share cap or their respective MW licensed capacity cap, until the current expiry date of their respective generation licence (refer to **Table 3**). Beyond the current expiry dates, their respective MW licensed capacity cap will be terminated and the 25% capacity market share cap will apply.

Table 3: Expiry of large gencos' generation licences

Genco	Licensed capacity cap	Current expiry date of generation licence
YTL PowerSeraya	3,100 MW	31 Dec 2032
Senoko Energy	3,300 MW	31 Dec 2032
Tuas Power Generation	2,670 MW	31 Dec 2044

FINAL DETERMINATION

20. EMA has carefully considered FE's assessment and recommendations, as well as the comments from the two rounds of public consultation. EMA has decided on balance to adopt FE's recommendations to transit towards the Balanced Market regime by implementing the following measures:

- a. ***Impose a capacity market share cap of 25%*** on each generation licensee except for the three large gencos (viz. Seraya, Senoko and Tuas). For the three large gencos, EMA will impose the higher of either the 25% capacity market share cap or their respective MW licensed capacity cap, ***until the current expiry date of their respective generation licence*** (refer to **Table 3**). Beyond the current expiry dates, their respective MW licensed capacity cap will be terminated and the 25% generation capacity market share cap will apply. For the avoidance of doubt, each generation licensee is still subject to the condition in its generation licence that it shall not acquire, own, operate or have control over any generating unit, other than those set out in Schedule A of the licence, without the prior written approval of EMA;
- b. ***Prudently hedge unvested MSSL load*** which could be via a combination of futures products, tenders and bilateral trades; and
- c. ***Gradually phase out the VC regime as per the schedule in Table 2***, specifically by maintaining the VCL at 25% (of total demand) from 1 Jan 2017 to 30 Jun 2018, and reducing the VCL to 22.5% for 2H 2018 and to 20% for 1H 2019. Thereafter, only LNG vesting quantities will remain until the expiry of LNG vesting on 30 Jun 2023. During the transition period, retain the current VC allocation method and peak PWF which will effectively be phased out as part of the wider reduction of BVQ to zero by the start of 2H 2019.

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