



**DEVELOPING A FORWARD CAPACITY MARKET TO ENHANCE
THE SINGAPORE WHOLESALE ELECTRICITY MARKET**

THIRD CONSULTATION PAPER

Closing date for submissions of comments:
25 JUN 2020

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

Disclaimer:

The information 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 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. The Energy Market Authority reserves the right to change its policies and/or to amend any information 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. The Energy Market Authority 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 in this document.

DEVELOPING A FORWARD CAPACITY MARKET TO ENHANCE THE SINGAPORE WHOLESALE ELECTRICITY MARKET

THIRD CONSULTATION PAPER

Introduction

1 The Energy Market Authority (“**EMA**”) is the statutory board responsible for ensuring reliable electricity supply to all consumers in Singapore. In this regard, EMA will plan and ensure that there is sufficient generation capacity available to meet the electricity supply reliability standard (“**Reliability Standard**”).

2 Energy infrastructure can take years to plan and build, and they typically have a long lifespan. EMA therefore needs to take a long-term view on infrastructure planning for our energy needs. The provision of reliable electricity is critical in supporting economic development and maintaining a high standard of living in Singapore.

3 EMA introduced the Singapore Wholesale Electricity Market (“**SWEM**”) in 2003 to facilitate competition among power generation companies (“**gencos**”) and provide pricing signals to guide efficient investment and consumption decisions. The SWEM is designed as an Energy-Only Market (“**EOM**”) with ancillary services, where gencos are remunerated primarily based on the prevailing half-hourly spot energy price for the electricity that they generate, with no separate capacity payments. This was the best practice adopted in the early 2000s by other established competitive electricity markets such as in Australia, New Zealand, the United Kingdom and the United States.

4 The EOM, by design, provides short-term price signals to guide longer-term investments in generation capacity. Specifically, gencos make commercial investment decisions based on their own market outlook, including their projections of longer-term supply and demand conditions, and the corresponding spot energy prices. The experience in other jurisdictions with EOMs is that spot energy prices can be highly volatile and there is no assurance of adequate and timely investments in generation capacity to ensure electricity supply reliability.

5 To meet the Reliability Standard, the Singapore power system requires a minimum amount of spare generation capacity, above peak demand, to cater for planned and unplanned outages of generating units in a given year – referred to as the required reserve margin (“**RRM**”).¹ The actual reserve margin (“**RM**”) may be

¹ Given the characteristics of the Singapore power system, a RRM of at least 27% above system peak demand is needed to meet the Reliability Standard of no more than three expected Loss of Load Hours (“**LOLH**”) in each year. The RRM corresponding to 3 LOLH may vary over time as the power system’s generation fleet and load characteristics evolve. For more information, please refer to EMA’s Operating Reserve Policy available at this link: https://www.ema.gov.sg/System_Planning.aspx.

higher or lower than the RRM, depending on the summation of individual gencos' commercial decisions to invest in new or retire old capacity in each year as well as the actual peak demand:

- a. As the RM tightens due to demand growth and/or generation capacity retirements, spot energy prices are expected to rise towards (and above) the long run marginal cost (“**LRMC**”) to attract investments in new generation capacity. Thereafter, as lumpy new capacity enters the market, spot energy prices are expected to fall towards the prevailing short run marginal cost (“**SRMC**”) of producing energy. This translates to a generation capacity cycle that causes the RM and spot energy prices to rise and fall in cycles that will affect supply reliability, price volatility and financial risk to both consumers and gencos.²
- b. While high prices may eventually attract new generation capacity investments, there is no certainty that they will be adequate or timely, to maintain the RRM to meet the Reliability Standard in each year. One reason is that the construction lead-time is about four years for a new CCGT unit, and it is likely that the RM will fall below the RRM during this period. This would result in consumers suffering from unreliable electricity supply and high electricity prices, potentially for protracted periods. The sustained high prices may in turn attract over-investments in new generation capacity, resulting in another cycle of depressed energy prices and financial challenges for gencos.

6 Today, spot energy prices are depressed due to over-supply, with a RM of about 70% as at end-2019. This arose from some gencos' investment decisions, made around 2010, to increase CCGT capacity to run on regasified liquefied natural gas and to meet their own bullish demand projections, which ultimately did not materialise.

7 The COVID-19 pandemic has reduced electricity demand. However, when the economy recovers post-COVID-19, electricity demand is expected to normalise and start growing over the medium to long term due to new emerging electricity-intensive sectors such as data centres, electrification of vehicles, agri-technology and 5G telecommunications. Considering that about 2.8 GW of generation capacity is expected to retire or mothball over the next few years, new investments will need to take place to ensure sufficient generation capacity to meet the Reliability Standard. However, it is likely that these investments will neither be adequate nor timely, for the reasons set out above.

Objectives of the FCM

² For more information, please refer to EMA's Information Paper on “*Enhancing the Singapore Wholesale Electricity Market for Supply Reliability, Economic Efficiency and Financial Sustainability*” available at this link: https://www.ema.gov.sg/Licensees_Electricity_Market_Rules.aspx.

8 Singapore is not alone in experiencing the limitations of an EOM. Other jurisdictions have faced or are facing similar challenges and have adopted or plan to adopt some measures to supplement their EOM. EMA plans to introduce a Forward Capacity Market (“**FCM**”), to enhance the current SWEM, in order to meet the Reliability Standard going forward – not just to address the nearer-term challenges mentioned above but for the long term. EMA has assessed that a FCM, together with the current real-time spot energy market (with ancillary services), is the best market mechanism to achieve the following objectives:

- a. Maintain the Reliability Standard by providing adequate incentives to existing and new resources; and
- b. Maximise economic efficiency to minimise long-run costs to consumers.

9 EMA has engaged The Brattle Group (“**Brattle**”) to assist in the design and implementation of a FCM that is appropriate for Singapore’s power system and market characteristics.

Design of the FCM

10 The FCM is a competitive auction that is held annually, to procure sufficient resources to be available to meet the Reliability Standard, a few years in advance of a specified delivery period (that typically lasts for one year). For Singapore, our Reliability Standard will be met by procuring sufficient resources up to four years in advance. This will facilitate orderly entry and exit of generation capacity. Being a market-based mechanism, the FCM will promote effective and efficient competition between various types of resources (including new, existing, renewable, demand response) and procure the most cost-efficient mix of resources to meet the Reliability Standard. The FCM will also have the following key features to maximise economic efficiency to minimise long-run costs to consumers:

- a. Resource Qualification process to value each resource based on its expected ability to contribute to meeting the Reliability Standard in the delivery period.
- b. Capacity Market Power Mitigation measures to pre-empt market failure arising from potential anti-competitive behaviour of participants in the FCM auctions.
- c. Rebalancing Auction(s) held after the four-year ahead Base Auction and before the start of the delivery period, to procure additional resources or release cleared resources based on updated demand projections and availability of cleared resources.

- d. Bilateral Transactions after the Base Auction, to enable the transfer of capacity obligations between qualified resources and allow participants to efficiently manage the potential risk of non-delivery.

11 Resources that are cleared in a FCM (Base or Rebalancing) auction are subject to a Capacity Supply Obligation (“**CSO**”), that in return provides a fixed capacity payment on a monthly basis during the delivery period. Under the CSO, the resource provider will be required to meet the associated availability and performance terms or be penalised otherwise. This is to ensure that all cleared resources are remunerated appropriately, based on their actual contribution to meeting the Reliability Standard.

12 For resource owners, the FCM provides more certainty than the EOM. First, EMA will project the amount of generation capacity needed to meet the Reliability Standard. Second, the FCM facilitates competition among new, existing and different capacity technologies to be procured on a four-year ahead basis to be available in the delivery period, thereby facilitating their entry and exit in a coordinated and orderly manner to meet the Reliability Standard in each delivery period. Third, it reduces the risk of over-bullish investments in generation capacity, as a strong signal will be sent to bids that are not cleared in the FCM that they are less competitive – uncleared capacity will not receive capacity payments and will face a disadvantage in the SWEM. Fourth, the steady stream of capacity payments will provide more revenue certainty to resource owners for the recovery of capital and fixed operating and maintenance costs. Simulations carried out by EMA indicate that gencos are more likely to recover their LRMC in the enhanced SWEM (*i.e.*, FCM plus spot energy market), as compared to the EOM.³

13 EMA has engaged Brattle to assist in the development of a FCM that is appropriate for Singapore, considering the characteristics of our power system and market. EMA/Brattle’s responses to industry comments to the Second Consultation Paper, issued on 4 Dec 2019, is in Annex A. EMA has also conducted industry briefing sessions in Oct 2019, Jan and Feb 2020 to familiarise stakeholders with the proposed FCM design. Considering the comments received hitherto, the adjusted FCM design is set out in Brattle’s FCM Design Proposal in Annex B.

14 In developing the detailed FCM design to achieve the objectives stated in Paragraph 8, EMA will need to calibrate the design, considering the context and unique circumstances in Singapore, including the need to improve the overall energy efficiency of the power generation sector. In this regard, EMA is planning to impose a heat rate standard for power generation as set out in Annex C. Concurrently, EMA is monitoring the features and potential enhancements that are being considered for the FCMs in other jurisdictions (including the United States, the United Kingdom and

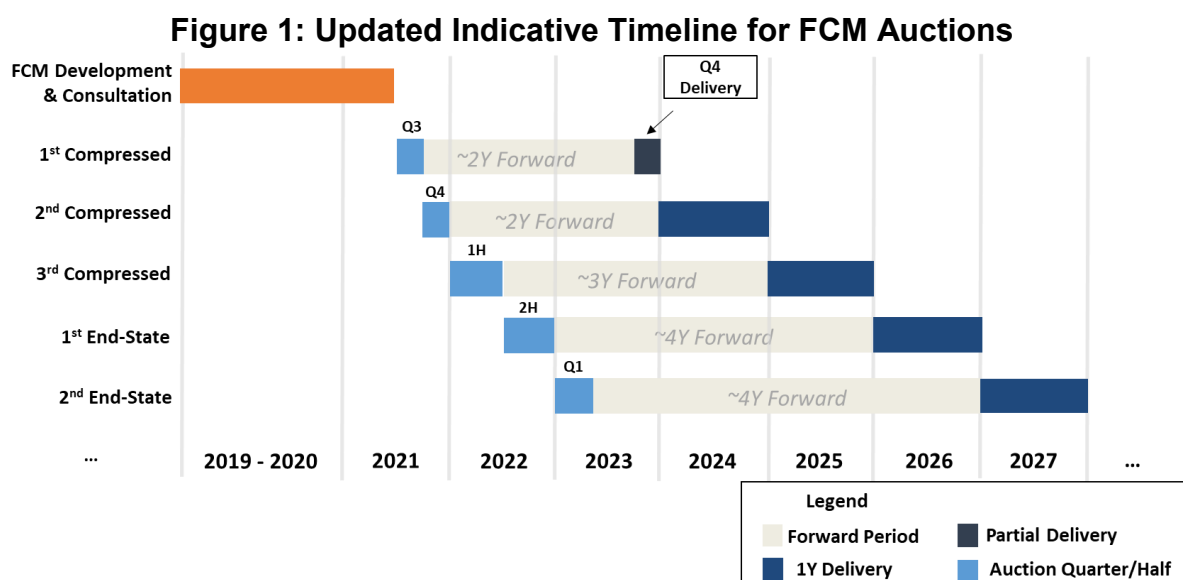
³ For more information, please refer to EMA’s Information Paper on “*Enhancing the Singapore Wholesale Electricity Market for Supply Reliability, Economic Efficiency and Financial Sustainability*” available at this link: https://www.ema.gov.sg/Licensees_Electricity_Market_Rules.aspx.

Ireland). EMA will continue to adapt and incorporate enhancements or refinements to the Singapore market to achieve the stated objectives and desired market outcomes.

FCM Implementation Timeline

15 The Second FCM Consultation Paper provided an indicative implementation timeline for the FCM, that proposed conducting the first Compressed Auction (with a two-year forward period) in Q1 2021 for the delivery period Q2 2023. Based on the feedback from stakeholders, including the Energy Market Company on the development timeline for Market Rules and IT systems, the timeline will need to be extended.

16 The revised indicative implementation timeline is shown in Figure 1. The first Compressed Auction will be conducted in **Q3 2021** for delivery period **Q4 2023**. There will be a total of three Compressed Auctions for market participants to gain practical experience with the auction mechanics, before the first End-State Auction is held in **2H 2022**, for delivery year **2026**. EMA will maintain a minimum two-year forward period for the Compressed Auctions, to provide Electricity Futures Market participants and electricity retailers with a sufficient lead time to adjust their contract positions. With the experience gained from each auction, EMA intends to further adapt and incorporate enhancements or refinements where appropriate to the FCM's features and rules, to ensure alignment with policy objectives.



Request for Comments

17 EMA would like to invite written comments on Brattle's FCM Design Proposal in Annex B and the Heat Rate Standard for Power Generation in Annex C via <https://go.gov.sg/thirdconsultationfcm> by 5pm on 25 Jun 2020.



18 For clarifications, please contact ema_mdscd@ema.gov.sg.

19 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 Third 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 as “Confidential”. Such comments, together with justification on the need to maintain confidentiality, should be separately attached as an appendix. EMA will take this into account in the disclosure of the information submitted.

* * *