



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

**SECOND CONSULTATION PAPER**

Closing date for submissions of comments:  
**2 Jan 2020**

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

## SECOND CONSULTATION PAPER

### Introduction

1 The Energy Market Authority (“**EMA**”) introduced the Singapore Wholesale Electricity Market (“**SWEM**”) in 2003 to facilitate competition among the generation companies (“**gencos**”). 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 price for the energy 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.

2 By design, the EOM seeks to provide short-term price signals to guide longer-term investments in generation capacity. However, the experience in other jurisdictions with EOMs is that the spot energy prices resulting from prevailing demand and supply conditions may not attract adequate new investments in generation capacity to meet the target electricity supply reliability standard (“**Reliability Standard**”).

3 Therefore, EMA is planning to develop and implement a Forward Capacity Market (“**FCM**”), which together with the real-time wholesale spot energy market with ancillary services, aims to meet the following objectives:

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

4 EMA has engaged The Brattle Group (“**Brattle**”) to assist in the development and implementation of a FCM that is appropriate for Singapore, taking into account the characteristics of our power system and market conditions.

### Recap on the High Level FCM Design for Singapore

5 A FCM is a competitive market-based auction, which procures adequate resources one to four years in advance, to maintain the Reliability Standard in the delivery period (“**Delivery Year**”). The longest forward period typically corresponds to the time needed for constructing a new reference generation capacity (e.g. an efficient combined-cycle gas turbine generating unit). This facilitates orderly entry of efficient new generation capacity and the exit/retirement of inefficient existing generation capacity for the Delivery Year.

6 Broadly, a FCM has three main components: (a) a demand curve for capacity; (b) the rules defining how suppliers participate and form a supply curve; and (c) the format of the auction in which supply and demand come together to determine which resources clear the market and the prices that they are paid.

7 The demand curve is administratively constructed, and generally based on the amount of capacity needed to meet the required reserve margin (“**RRM**”) above the projected peak demand in the Delivery Year. It is shaped to reflect the declining marginal value of additional capacity beyond the RRM, and to mitigate price volatility.

8 To ensure sufficient capacity is procured to meet resource adequacy requirements, EMA will encourage wide participation from different types of resources. All resources participating in the FCM (both existing and new resources of different technology types) will be subject to a resource qualification process. This is to validate their availability in the Delivery Year, as well as the megawatt (“**MW**”) value that they may offer into the FCM auction, taking into account their operating characteristics.

9 Resources will compete in the FCM based on capacity offer prices in dollars per MW-year of qualified capacity. Each MW-year capacity offer requires that MW of qualified capacity be available and offer into the energy market, for a year, subject to penalties for failing to perform (“**Capacity Supply Obligation**” or “**CSO**”). The supply curve is formed by offers stacked in ascending order of capacity offer prices. Market power monitoring and mitigation measures will be implemented to ensure that offers are reasonable and competitive.

10 For each Delivery Year, the FCM auction brings together the relevant ascending supply and the descending demand curve. The resources with offers at or below the market-clearing capacity price (i.e. the marginal capacity price offer where the supply and demand curves intersect) will be cleared. The cleared resources will take on the CSO and will be paid the market-clearing capacity price in that year. Subsequent to the forward auction, rebalancing auction(s) will be held nearer to the Delivery Year to efficiently address changes in demand or supply availability.

### **Developing the Detailed FCM Design and Implementation Timeline**

11 On 10 Jun 2019, EMA issued the first consultation paper to seek comments on Brattle’s High-Level Design Straw Proposal, including the indicative implementation timeline. EMA also conducted industry-briefing sessions in Oct 2019. Brattle has taken into account the comments received to develop a detailed draft design proposal (“**Draft Detailed Design Proposal**”), which is attached at [Annex A](#), covering the following design elements:

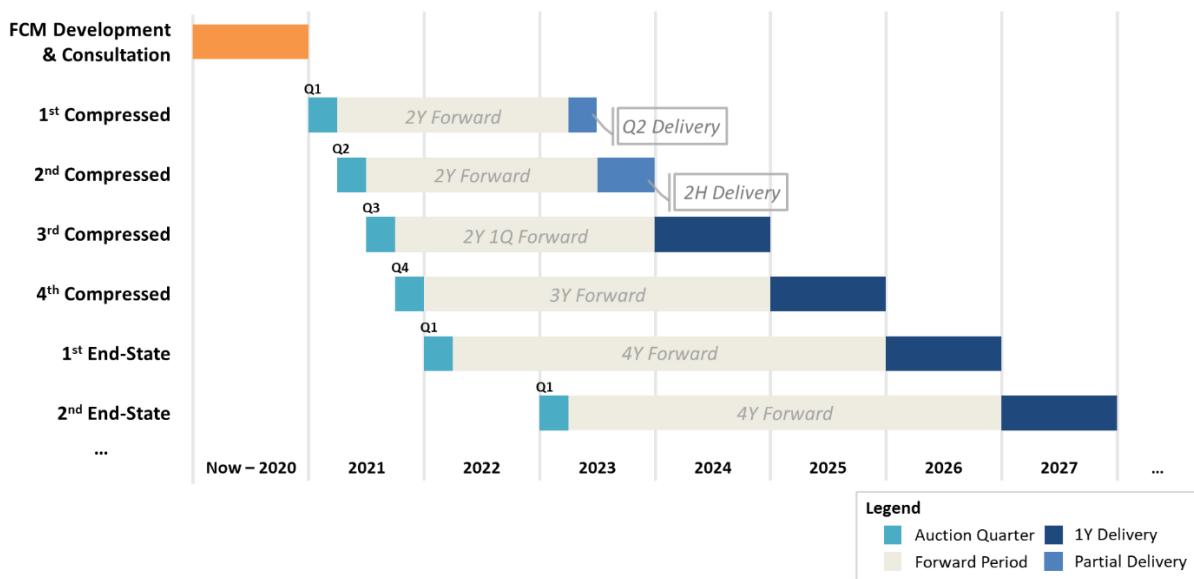
- a. Section II – Product Definition;
- b. Section III – Administrative Demand Curve;
- c. Section IV – Supply Resource Qualification and Capacity Ratings;
- d. Section VI – Forward Capacity Auction; and

e. Section X – Settlements and Cost Allocation.

Brattle is in the process of developing the remaining design elements, which will be issued in due course.

12 Electricity Futures Market participants and electricity retailers provided feedback on the indicative implementation timeline set out in the first consultation paper. They expressed that the forward period (i.e. the period between conducting a base FCM auction and the corresponding delivery period) should be at least two years, to provide them with a sufficient lead time to adjust their contract positions. Taking this into account, EMA has revised the implementation timeline (refer to [Figure 1](#)) such that the detailed FCM design and rules is targeted to be ready for the first **Compressed FCM auction** to be held in **Q1 2021**, for delivery in **Q2 2023**. There would be a total of four Compressed FCM auctions for market participants to gain practical experience with the auction mechanics, before holding the first **End-State FCM auction** in **2022**, for delivery in **2026**.

**Figure 1: Indicative Timeline for Compressed and End-State FCM Auctions**



13 EMA is also concurrently studying the features of FCMs in overseas jurisdictions and the ongoing enhancements made to their FCM design, to ensure that our FCM is able to attract adequate investments in existing and new resources to meet the Reliability Standard at minimal cost to consumers. EMA may subsequently adjust the design features in Brattle’s Draft Detailed Design Proposal to mitigate unintended consequences and/or meet other policy objectives (e.g. to meet climate change obligations, ensure sufficient diversification of fuel mix and generation types, etc.), by adapting and incorporating the design elements from their FCMs where relevant and useful for Singapore’s market characteristics.

## Request for Comments

14 EMA would like to invite written comments on Brattle's Draft Detailed Design Proposal (refer to Annex A) and the above revised implementation timeline.

15 Please submit all written comments via email to [ema\\_mdspd@ema.gov.sg](mailto:ema_mdspd@ema.gov.sg).

16 All submissions should reach EMA by 5pm on 2 Jan 2020 in the format shown at Appendix 1. You are requested to include a soft-copy of your submission in both PDF and Microsoft Word format.

17 EMA will acknowledge receipt of all submissions via email. Please contact Mr Nathaniel Tang (6376 7661) or Ms Chloe Wang (6376 7522) if you do not receive an acknowledgement of your submission within two business days.

18 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 Second 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 appendix (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**

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

S/No.	Please indicate in each cell in this column, the section/paragraph in <b>The Brattle Group’s Draft Detailed Design Proposal</b> to which your comment refers	Comments
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3		
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.		
Any other comments		

**Comments submitted by:**

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