Annex A: Summary of Responses Received to the Second Consultation Paper on Developing a Forward Capacity Market to Enhance the Singapore Wholesale Electricity Market

Stakeholder	Section/Paragraph	Comments	Responses
Energy Market Company Pte Ltd	General comments I. Overview of Market Design	Implementation EMC understands that the proposed timeline allows for the shortest possible implementation timeline and the earliest commencement of capacity commitments. However, based on EMC's discussion with the relevant organisations in other jurisdictions (United Kingdom and Ireland), we understand that it will generally take at least 1 year after the confirmation of the design of the FCM to draft the rules and a further 1.5 years for the IT systems to be ready for the implementation of the FCM. Nevertheless, EMC will work closely with EMA and PSO on the drafting of the FCM rules and the development of the relevant IT systems for the implementation of the FCM. EMC would like to express its intention to work with EMA to develop plans for conducting the compressed auctions if the auction IT systems are not ready in time or delayed. In addition, EMC would like EMA to confirm whether would there be any re-balancing auctions in 2021, 2022 and 2023 for Delivery Years 2023, 2024 and 2025.	Noted. The proposed timeline for Rebalancing Auctions is covered under Section VIII (Rebalancing Auctions) of the FCM Design Proposal.
	II. Product Definition	Focus on MW availability EMC would like EMA to confirm that the capacity product that each unit of capacity transacted represents a MW of capacity normalized for expected unavailability without locational capacity differentiation, no seasonal capacity product differentiation and no specific characteristics such as fast-start and spinning reserves.	This is covered under Section II (Product Definition) of the FCM Design Proposal.
	III. Administrative Demand Curve	Principles and Best Practices EMC generally agrees with the principles and recommendations of the setting of demand curve. In this regard, EMC suggests that EMA set out, in a document, the procedures that EMA will adopt or apply in the determination and setting of the demand curve, similar to EMA's document "EMA's Procedures for Calculating the Components of the Vesting Contracts". This document should include the objectives, principles, considerations and variables/ factors taken into account in the determination of the demand curve. Reliability Standard	Noted.

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		EMC suggests that EMA set out, in a document, the procedures that EMA will adopt or apply in setting the reliability standard and how it translates to Qualified Capacity (QCAP), similar to EMA's document "EMA's Procedures for Calculating the Components of the Vesting Contracts"	Noted.
		<u>Net cost of new entry</u>	
		EMC suggests that Brattle/ EMA provide a document detailing how the Transitional Net CONE would be calculated and set for the compressed forward period (Delivery years 2023 – 2025), similar to EMA's document "Reviewing of the Long Run Marginal Cost Parameters for Setting the Vesting Contract Price for 2019 and 2020".	Noted.
		For the transitional Energy & Ancillary Services (E&AS) Offset, EMC proposes that it should proxy the Short Run Marginal Costs (SRMC) of the Vesting Contract Parameters due to the advantages it provides such as expedience, simplicity, transparency and familiarity to the industry. Historical information on market revenue should be adjusted for, if it is used in the calculation of E&AS offset for the transitional Net CONE. EMC suggests that EMA set out, in a document, the procedures that EMA will adopt or apply in calculating and reviewing the Net CONE for delivery year 2026 onwards, similar to EMA's document "Reviewing of the Long Run Marginal Cost Parameters for Setting the Vesting Contract Price for 2019 and 2020". For the final E&AS offset, EMC generally agrees with the approach of undertaking an analysis to assess the likely E&AS offset that would be produced from a combination of historical data and future simulations of related NEMS data.	The E&AS offset refers to the expected margins that the reference technology (i.e. a new CCGT in the first instance) may earn from the E&AS market. The considerations and Brattle's proposed approach for determining the E&AS offset for calculating Net CONE are detailed in Section III (Administrative Demand Curve) of the FCM Design Proposal. The current proposal is to estimate the E&AS offset based on the expected reserve margin in the long-term equilibrium state. Technical parameters of the CCGT for vesting contracts is proposed to be used for the simulation assumptions. This avoids several disadvantages of a historical-based E&AS offset – historical margins can be highly volatile reflecting historical market conditions which do not reflect the expected market condition in the relevant delivery year. For e.g. high historical E&AS offsets when reserve margins were low would lead to low Net CONE which would deter entry of new capacity, and vice versa when reserve margins were high.
		<u>Demand Curve Parameters</u>	
		EMC generally agrees with the recommendations in this section. EMC proposes to include a price floor (p>0) on the demand curve in, at the minimum, the 1st and/or 2nd compressed auctions. As this is a new market, market participants would lack clarity and certainty on how the market will clear in the first few auctions. The price floor is to ensure that the capacity price will not collapse and be worth more than	The inclusion of a price floor in the demand curve can potentially lead to inefficient market outcomes such as retention of old inefficient capacity that should be retired/mothballed. Moreover, other jurisdictions that have implemented "temporary" price floors have experienced much pressure from suppliers to continue them indefinitely, as in

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		zero. This price floor could be removed subsequently for the subsequent auctions (e.g. the 3rd, 4th and full auction) when the market participants have a better sense of the capacity price. In PJM, New-England ISO and NYISO, Minimum Offer Price Rule (MOPR) for subsidized resources effectively works as a price floor in these jurisdictions' capacity market.	ISO-NE, which result in overcapacity and over-compensation being perpetuated. In PJM, NE-ISO and NYISO, a Minimum Offer Price Rule (MOPR) is applied to prevent subsidised resources, typically renewables receiving state-subsidies, from entering a low or zero prices. This does not apply in Singapore as we do not offer subsidies to renewable sources. Their auction design does not have a price floor even though some resources have MOPR. However, EMA has also noted industry concern of the capacity price risk in the formative years of the FCM when market participants are gaining experience in how the FCM will clear. On balance, EMA proposes a transitional price floor at 0.2× Net CONE be in place up till the auction for delivery year 2028 and will be removed thereafter. EMA will regularly review the FCM including the auction results and adjust the design parameters to provide more market certainty where appropriate.
		<u>Demand Curve Review and Updates</u> EMC proposes that the demand curve review and updates adopt a similar approach to the current vesting contract regime.	Noted. Brattle has proposed to update the demand curve in two timeframes – an annual formulaic update on necessary changes to maintain consistency with the market conditions, and a more comprehensive review on a periodic basis. Please refer to Section III (Administrative Demand Curve) of the FCM Design Proposal for more details.
	IV. Supply Resource Qualification and Capacity Ratings	<u>Qualified capacity</u> EMC generally agrees with the use of the QCAP approach in determining capacity ratings. EMC would like EMA/Brattle to provide more details on the frequency of resource qualification and QCAP updates for both existing and new capacity resources.	Noted. Please refer to Section IV (Supply Resource Qualification and Capacity Ratings) of the FCM Design Proposal for details.
	V. Market Power Monitoring and Mitigation	<u>Roles and responsibilities</u> EMC would like EMA/Brattle to provide further details and examples on how the proposed steps to be implemented to mitigate market power would function in both the FCM and	Please refer to Section VI (Capacity Market Power Monitoring and Mitigation) and Section XII (Reforms to Energy/Ancillary Services) of the FCM Design Proposal for details.

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		energy markets (including the roles of the market monitor in the market power monitoring and mitigation), in the next consultation.	
	VI. Forward Capacity Auction	<u>Uniform pricing & Commitment term</u> EMC generally agrees with the following recommendations: (a) A uniform-price, single-round, sealed-bid auction design; (b) A 1-year commitment term (delivery period). EMC is of the view that a price lock-in for new or refurbished plants will be necessary in order to ensure a certain level of investor confidence, given that Singapore energy sector is small and mostly free from long term contracting. This is unlike other jurisdictions such as NYISO, MISO and PJM where there is significant investor confidence and/or where the possibility of long-term contracting supports the investments in resources. <u>Auction Timeline</u> Pre-auction: EMC would like to clarify with EMA that the resources qualification will be done by PSO and that market power mitigation procedures will be conducted by EMA. EMC's role will be limited to developing market power screening tests in the auction system to assist EMA in their market power mitigation role and to conduct the auction based on EMA's finalized auction parameters. Post auction: EMC would like to clarify on the details of the information to 14be published on EMC's website. Forward period: EMC generally agrees with the proposal to have a 4-year forward period as a start. This forward period should be reviewed on an ongoing basis together with the parameters of Net-CONE to incorporate new technology, expectation and policy changes.	Noted. PSO will carry out resource qualification. EMA will develop the market power mitigation procedures including screening tests and offer caps to be incorporated into the FCM IT system administered by EMC. EMA will work with EMC on this. Noted.
	VII. Reconfiguration auction	EMC requests that EMA/Brattle provide more examples on how the rebalancing auction would work in the FCM market, in the next consultation. The examples should include examples on how the main auction would settle with the rebalancing auction.	Please refer to Section VIII (Rebalancing Auctions) of the FCM Design Proposal for details.
	VIII. Bilateral transactions	EMC would like to understand if EMA would be taking up the role of tracking bilateral exchange of the physical CSOs from the auction. If it is contemplated that EMC would take on the	Changes in CSOs arising from successful bilateral transactions will need to be tracked and updated in the FCM IT system. Except for aggregated information, the identities of

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		role of tracking these bilateral exchanges of CSOs, EMC would like to clarify whether these transactions will be made available to the public or be treated as confidential information and only made available to EMA and the parties involved in the bilateral exchanges.	the relevant FCM participants and their respective bilateral transaction details should be kept confidential. Please refer to Section IX (Bilateral Transactions) of the FCM Design Proposal for details.
	IX. Supply Obligations and Performance incentives	<u>Obligations on Capacity Resources</u> EMC would like EMA/Brattle to list down scenarios and provide examples on how the suppliers are to meet their obligations on the provision of capacity resources. For example: • Would a gas turbine plant which has a valid black-start contract fulfill the CSOs even if it did not offer in the energy only market? • How would a demand side or solar resource fulfill their CSOs? <u>Penalties for Resource Unavailability</u> EMC generally agrees with EMA/Brattle that penalties should be imposed for underperformance and suggests that EMA should also consider performance incentives for outperformance. The incentives and penalties need not be tied to the capacity prices. Instead, EMC suggests that this could be linked to the respective resource's QCAP via QCAP adjustments or having an effectiveness factor similar to how NEMS reserves markets is implemented.	Resources that have been contracted to provide ancillary services (e.g. black start) are not allowed to 'double-dip' and participate in the FCM. Please refer to Section X (Supply Obligations and Performance Penalties) of the FCM Design Proposal for details on the fulfilment of CSOs. Penalties for under-delivery of CSO should be higher than the FCM capacity payment to deter under-delivery. Any over-delivery is ad hoc and cannot be relied upon to meet the supply reliability standard in Singapore. Accordingly, there should be no performance incentive for over-delivery. This will also encourage all resource providers to ensure that they optimise QCAP during resource qualification and bid competitively in the FCM auctions, rather than withholding with the intent to over-deliver in the delivery year. Please refer to Section X (Supply Obligations and Performance Penalties) in the FCM Design Proposal for details.
	X. Settlements and Cost Allocation	<u>Allocation to retailers</u> EMC generally agrees with EMA/Brattle on the recommendations for settlements and cost allocation. EMC proposes a daily collection of FCM payments from the retailers and/or consumers and delayed FCM payments to the CSO holders on a monthly basis. This could help reduce the amount of credit support required from NEMS' market participants for FCM and allow EMA/PSO to have sufficient time to assess the FCM holders' obligations and exposure on a monthly basis.	Noted.

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I Switch Pte Ltd	I. Introduction Context and Objectives	Brattle has highlighted that the AESO has progressed significantly towards the implementation of a FCM but has decided to eventually abandon the proposed capacity market. This is rather surprising and we thought that it would be good for Brattle to do an analysis on why did Alberta chose to abort their transition from an energy only market to a capacity based market so that the industry can understand the difference between the Singapore and Alberta power markets and that Alberta's reasons for not having a capacity market is not applicable to Singapore.	The Alberta capacity market was cancelled following a change in the government in Alberta.[1]
	I. Introduction Product Timeline	Jade fully supports EMA's proposed timeline especially for taking into account the circumstances facing the retailers and futures market participants who face retails and futures contracts that extend 2 years out.	Noted.
	III. Administrative Demand Curve	We believe that the shape of the demand curve is the essence of the FCM and will largely determine the effectiveness of the FCM in achieving the desired goals of ensuring supply adequacy and maximising economic efficiency to reduce long run costs to consumers. Brattle has not been able to complete their analysis for the various parameters for the demand curve before the publication of the 2nd consultation paper as it would have useful to know the recommended parameters as suggested by the experts for the areas left out such as the width of the demand curve and the shape of the demand curve. With this information, the industry can then utilise their understanding of the Singapore power market to offer recommendations on the ways we can tweak international standards to be better aligned to the nuances we have in our market. We would like to suggest to the EMA that for the 3rd consultation, it would be good if Brattle could provide their expert opinion on the specific areas up for consideration with justifications on why they recommended the specific structure for Singapore. We find their current papers quite broad and lacking detail which is relevant to our market. This will allow the industry players to have a better understanding of the FCM parameters and the rationale behind some of the suggestions instead of having to sieve through the entire spectrum of	Please refer to Section III (Administrative Demand Curve) of the FCM Design Proposal for details. The complete FCM Design Proposal is set out in the Third FCM Consultation Paper and annexes, including the options, considerations and recommendations for each key design parameter for Singapore.

[1] See link: https://www.cbc.ca/news/canada/edmonton/alberta-electricity-market-ucp-government-1.5325071.

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		options available and try to piece together the optimal parameters for ourselves as it is entirely possible that given our limited experience with capacity markets, we could be missing some key understanding that Brattle would be familiar with and have already considered.	
	III. Administrative Demand Curve Reliability Standard	Brattle suggested that the minimum acceptable reliability standard is 3 LOLH. What exactly is LOLH defined as? Does it refer to only system-wide blackouts or does it include brownouts? Also it would be great if Brattle would be able to provide an explanation on why 3 LOLH is the recommended reliability standard for Singapore. Perhaps this value is derived from an economic analysis basis the VOLL? Given the recent liberalisation of the retail market, customers have become much more educated in regard to Singapore's power market and how it operates. They have also become more acute in the questions raised to their retailers and we at iSwitch hope that the EMA and Brattle will be able to assist us by providing a little more details on how the standard is derived so we can answer the more knowledgeable customer. We would also like to know if the 3 LOLH standard will be applicable for the foreseeable future or is this level subject to change?	EMA sets the electricity supply reliability standard for Singapore. The reliability metric adopted is called the Loss of Load Hours (LOLH) which represents the expected number of hours per year when available generating capacity is insufficient to serve the hourly system demand. The reliability standard based on this metric is LOLH of not more than three hours per annum. EMA will provide more information on the methodology to determine the required reserve margin (RRM) for each delivery year based on the reliability standard.
	III. Administrative Demand Curve Net CONE	We support the use of the current vesting parameters as the initial benchmark for Net CONE. However, the Net CONE calculation methodology should be reviewed regularly to allow for other technology should they become more pertinent to the Singapore power market in the future and not be restricted to a F-class CCGT.	Noted and we agree with the statement.
	III. Administrative Demand Curve C. Cost of New Entry E&AS	We believe that the E&AS component should not be based upon the historic spot market outcomes and should be basis the implied generation margins derived from the futures market listed with the SGX. Historic outcomes provide a reasonable estimate of where E&AS outcomes had been but is not indicative of future outcomes whereas the current futures market presents significant liquidity that provides a transparent benchmark of where the entire market's view of expectation regarding the results of the SWEM. It is a much more justifiable benchmark to an historic lookback method with the more recently proposed capacity markets, IESO and AESO, both opting to adopt a forward-looking methodology in determining the E&AS offset.	Brattle's current proposal is to estimate the E&AS offset based on the expected reserve margin in the long-term equilibrium state. Technical parameters of the CCGT for vesting contracts is proposed to be used for the simulation assumptions. This avoids several disadvantages of a historical-based E&AS offset – historical margins can be highly volatile reflecting historical market conditions which do not reflect the expected market condition in the relevant delivery year. For e.g. high historical E&AS offsets when reserve margins were low would lead to low Net CONE which would deter entry of new capacity, and vice versa when reserve margins were high. Please refer to Section III (Administrative Demand Curve) of the FCM Design Proposal for more details.

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	III. Administrative Demand Curve D. Demand Curve Parameters Price Cap	iSwitch believes that the price cap of 2X Net CONE is a little too high. Our main concern is when speaking to our customers, it is very difficult to justify to them why we would need to provide generators with over 100% profit margins to ensure supply adequacy. Even a 50% profit margin at 1.5X Net CONE is difficult enough as it is given the thin margins that most industries face given the current economic situation. We understand that a higher cap may be necessary to induce further planting should the CSO only be for a single year as there in uncertainty in future payments. However, should a longer lock-in period be available, then would it not make sense that the price cap be lowered to a much more reasonable level such as 1.1X of Net CONE? As pointed out during the recent industry session, the current vesting contracts are already bankable, and they are only at 1X of Net CONE for a portion of the unit's capacity instead of the entire capacity.	The 2x or 1.5x multiple of Net CONE is the price cap, not the expected average FCM clearing price. The concept of a price cap in the capacity market is similar to the price cap in the energy market. While the price cap in the energy market is $4,500/MWh, actual prices are rarely settled at that level. Based on experience in other markets, the clearing prices are usually much lower than the price cap. And if the market performs as expected, the long-term average clearing price is expected to be 1x Net CONE.
	III. Administrative Demand Curve D. Demand Curve Parameters Demand Curve Width and Steepness	We are of the opinion that the width of the demand curve beyond the quantity at the cap should not be larger than the expected New Entrant's typical unit ICAP. This is because there is never a need to procure more than 1 additional unit worth of capacity beyond the minimum reliability standard as that is not efficient with the consumers bearing the cost of supporting additional generating units that are not needed. Once the unit's ICAP is adjusted to be QCAP, there should be sufficient buffer that the price volatility will be less severe so as to make the CSO price more reliable for the 2nd year. An alternative may be to have the width set to the New Entrant's QCAP and allow the New Entrant to lock in the CSO for a multi-year period. This will help to regulate the orderly entrance and exit of resource better as the price will fall post a new planting, disincentivising further plantings.	Please refer to Section III (Administrative Demand Curve) of the FCM Design Proposal for more details on how the width is determined and the trade-off to be made.
	III. Administrative Demand Curve D. Demand Curve Parameters Demand Curve Shape	Further to the above point on the width of the demand curve. We support a 2-part convex curve as it more accurately reflects the diminishing value of additional capacity. A concave curve will not be sending the right signals to the market as prices rise too slowly when the demand/supply balance gets tighter.	Noted.
	III. Administrative Demand Curve	On the topic of setting a price floor. Jade fully agrees with Brattle and is strongly against such a floor as it will incentive the hoarding of inefficient capacity that has already been	EMA has noted the industry's concern of the capacity price risk in the formative years of the FCM when market participants are gaining experience in how the FCM will clear.

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	D. Demand Curve Parameters	written down and does not actually supply to the market. Consumers will eventually end up funding of the maintenance of less the economic units that should have been retired and replaced with newer, more efficient technology.	On balance, EMA proposes a transitional price floor at 0.2× Net CONE to be in place up till the auction for delivery year 2028 and will be removed thereafter. EMA will regularly review the FCM including the auction results and adjust the design parameters to provide more market certainty where appropriate.
	IV. Resource Qualification	How will the resource qualification be conducted? How firm does a capacity provider needs to be before they can participate in either the compressed auction, the full auction or the reconfiguration auction? If the qualification process is too far down the actual build process, then would it not make a New Entrant the same as an Existing Resource as they have already committed too much to back out should they not clear in the capacity market? This will then result in the FCM not being able the provide for the orderly entry and exit of the market players as initially planned.	Brattle has provided details to address these questions under Section IV (Supply Resource Qualification and Capacity Ratings) of the FCM Design Proposal.
	IV. Resource Qualification B. Recommendation for Singapore Rationale for Adopting the QCAP Approach Para 3	A study is mentioned there showing the relationship between ICAP, QCAP and the reliability target. Is it possible for Brattle to share which study is this so that the industry can better understand the relationship between them?	EMA will be releasing more information on the reliability target, including the methodology for determining the corresponding required reserve margin. Please refer to Section IV (Supply Resources Qualification and Capacity Ratings) of the FCM Design Proposal for details on the determination of QCAP for different types of resources.
	IV. Resource Qualification B. Recommendation for Singapore	We are of the strong opinion that non-dispatchable resources should also qualify in the FCM as they too are an integral part of providing the resource adequacy that Singapore needs. While the approach may be different, non-dispatchable resources, embedded generation etc should be treated in the same manner as existing conventional generation so that all market participants will be treated in an equal and fair manner.	Non-dispatchable and embedded (i.e. behind the meter) resources are allowed to participate in the FCM subject to certain requirements/conditions. Refer to Section VI (Capacity Market Power Monitoring and Mitigation) of the FCM Design Proposal for more details.
	IV. Resource Qualification B. Recommendation for Singapore Rationale for Adopting the Account for	With regards to the POR, will this have to be determined during the resource qualification process which is 4.5 years before the actual delivery under the CSO? This is a rather long lead time, what will happen if there are new planned maintenances scheduled for the delivery year between the capacity auction and the delivery date? Will the QCAP of the unit be adjusted to reflect the new POR and hence be derated more and the unit is forced to buy back in the reconfiguration	Before the start of the delivery year, the QCAP of each resource will be updated annually after the FCM base (i.e. 4-year ahead) auction. Through bilateral transactions and rebalancing auctions, cleared resources will be able to adjust their CSOs for the delivery year taking into account their updated QCAP.

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	Unplanned and Planned Outages in Determining QCAP	auction? Difficult to ascertain POR 4 years ahead, plus must-offer requirement may result in many forced buybacks and excessive risk for Existing Resources? Potentially lead to over declaring of POR which leads to false signal of market is undersupplied? The last para suggests that the UOR is only applicable if market prices were higher than the variable costs of the resource. Does this mean that if a unit tripped but the market price is below the unit's variable cost, the unit's UOR ratings will not be affected? Is this applicable for UOR only or both UOR and POR?	The measurement and application of unplanned outage rates (UOR) are addressed under Section IV (Supply Resource Qualification and Capacity Ratings) of the FCM Design Proposal.
	VI. Forward Capacity Auction D. Auction Timelines Pre-Auction	What information will be disclosed to the market before the auction is conducted such as the amount of resource qualified, shape of demand curve, QCAP amount at 3 LOLH etc?	The demand curve including its shape and minimum QCAP required to meet the reliability standard for the delivery year will be disclosed to the FCM participants before conducting the auction.
	VI. Forward Capacity Auction D. Auction Timelines Post-Auction	What information will be disclosed to the market regarding the final auction results besides the price and volume?	Post auction, FCM participants will be informed of the clearing price and their respective cleared QCAP.
	IX. Supply Obligations and Performance Assessments B. Penalties for resource unavailability	We fully support a floor for penalties as this prevents unreliable units from bidding in, depressing the capacity payment and then defaulting on their CSOs causing stress on the system. We also believe that penalties should be used to reimburse consumers as they are essentially paying for reliability of supply under the capacity market and non-performance under the CSO could potentially result in the breach of this reliability.	Noted. The penalty for not meeting CSOs will be determined and collected ex post on a monthly basis. The penalty payable by a resource provider will be used to offset the capacity payment to it by EMC.
	X. Settlement and Cost Allocation	It was mentioned during the industry sharing session that the capacity charge is proposed to be absorbed into the current MEUC charge. iSwitch is of the strong belief that for the sake of transparency and fairness to all consumers and retailers, the costs of the FCM should be billed by MSSL as a separate line item and all consumers, regardless of their retailer, should transparently display this charge as per what the customer actually incurred. The suggested mechanism would be a single line item on the bill which is the passed through in the same manner by all retailers, regardless of whether they are IR or Genco. The FCM charge should not vary across retailers	EMA is of the view that it is appropriate for EMC, as the enhanced SWEM (spot energy plus FCM) operator and administrator, to levy and collect the capacity charge directly from all market participants in respect of their half-hourly energy purchase under the electricity market rules, similar to existing wholesale market charges. EMA notes the industry's preference to levy the capacity charge as an independent charge, distinct from the other market charges. We will be consulting the industry on the

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		and should be a mandated charge which retailers cannot chose to absorb or pass through. Must all be pass through. This also help to push EMA's objective of letting the customer understand that their current consumption behaviour is attracting a significant capacity charge so as to incentives consumers to change their consumption behaviour, redistribute the peak load into other periods so as to flatten out Singapore's demand.	proposed settlement framework for capacity charge in Jun 2020.
	XI. Reform to Energy/Ancillary Services	We would like to request the Brattle review and potentially model the impact on the energy market after the reforms so that the industry will be better prepared heading into the new market structure. We also propose placing a cap on the energy price offers of resources cleared in the capacity market as it does not help the market if resources cleared were to simply offer into the energy market at the $4,500/MWh price cap. We suggest that the price cap to be linked to the SRMC of the unit + 10% of Gross CONE. This provides avenues for the unit to remain profitable while reducing the volatility in the energy market as this is no longer necessary to incentivise new plantings.	With the FCM, there is no plan to lower the current spot energy price cap (i.e. $4,500/MWh) in the first instance. However, to mitigate potential uncompetitive bidding in the spot energy market, EMA intends to implement a one-pivotal supplier test (1PST) and cap the offer prices of suppliers who fail the 1PST. Please refer to Section XII (Reforms to Energy/Ancillary Services) of the FCM Design Proposal for more details.
	Others	We would also like to inquire how the FCM will affect the prices of the SP Services Regulated Tariff. The tariff is currently based on the vesting regime. How will this change when the FCM is implemented? Will EMA be able to share a preliminary formula on how the Tariff will be determine thereafter? Are Brattle aware that retailers have DoT contracts beyond 3 years?	With the FCM, all load serving entities including retailers and MSSL will be levied capacity charge by EMC in respect of their respective consumers' half-hourly load. So long as the MSSL offers regulated tariff for electricity supply to non-contestable consumers, the regulated tariff should incorporate the capacity charge. The energy component of the regulated tariff will depend on the arrangement by MSSL to hedge its bulk purchase from the spot energy market to serve any non-contestable load, especially when the remaining LNG vesting contracts expire post Jun 2023.
	Others	Will EMA be conducting an official announcement and/or sharing sessions with the public on what is the FCM and how it will affect them? Given the recent market liberalisation, many residential consumers have become much more aware of the power market dynamics. We hope that the EMA will be able to provide a common set of information to the public on what the FCM is so that all the consumers will be on the same page and no one will misunderstand the intention and implications of this structural change to the market.	Yes, EMA intends to educate the public with regard to the FCM.
	Others	As an independent retailer and Trader, we are rather concerned with the implications the FCM will have on the retail market and if it could potentially stifle competition that has	The FCM rules, including those pertaining to the capacity charge to be introduced and levied on load serving entities, will be applied without discrimination to achieve the stated

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		brought consumers significant savings since the market liberalised. The last thing we hope to see is that the FCM may tilt the balance of pricing power in favour of certain types of market participants and result in the market returning to the days where 5% DoT is the norm. We hope that this is part of the consideration during the structuring of the FCM and that the wider repercussions across the industry will be investigated and shared in the next Brattle report.	objectives of the FCM. Affected stakeholders can and should factor in the structural change and rules to make the necessary adjustments to their respective business plans and contract position during the 2-year forward period leading up to the first delivery period (currently expected to be Q4 2023). EMC, as the enhanced SWEM (spot energy plus FCM) operator and administrator, is the appropriate party to levy and collect the capacity charge directly from all market participants in respect of their half-hourly energy purchase under the electricity market rules, similar to existing wholesale market charges.
	Others	The FCM should be a transparent charge which is passed through to the consumer in the same way and for the same value, regardless of who their retailer is. We suggest a line item on the consumers bill called “reliability charge”.	EMA notes the industry’s preference to levy the capacity charge as an independent charge, distinct from the other market charges. We will be consulting the industry on the proposed settlement framework for capacity charge in Jun 2020.
	Others	Extension of current Vesting Scheme and also SGX Market Making Scheme for 5 years: We would like the EMA to consider extending the existing Vesting and MM frameworks. The overall current market structure and ecosystem, while not perfect, is still world best so why make such a drastic change? The market is only just completing its adjustment phase to the last 5 years of major changes and another change like this risks undoing much of the success achieved. We believe that the next 5 years should be a period of stabilisation.	The Vesting Contract (VC) Regime, Electricity Futures Market (EFM) and FCM serves different objectives. The VC Regime was implemented in 2004 to mitigate the exercise of market power by gencos to enhance economic efficiency in the SWEM. Starting Jul 2019, the VC Regime has been gradually phased out as there was no market power concerns in the near term due to the over-capacity situation. Please refer to the Review of the Vesting Contract Regime, Final Determination Paper published on 30 Sep 2016 for more information. EMA established the EFM in 2015 in partnership with the Singapore Exchange (SGX) to facilitate market participants in hedging their spot energy price risk. EMA has assessed various market design options to meet Singapore’s reliability standard sustainably for both consumers and capacity investors. The assessment, which EMA shared during the Industry Briefing Session in Feb 2020, established the need to introduce a FCM to achieve the objectives of: (i) maintaining the reliability standard by providing adequate incentives to existing and new resources; and (ii) maximising economic efficiency to minimise long-run costs to consumers. When the FCM rules are developed and

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			implemented, affected stakeholders can and should factor in the structural change and rules to make the necessary adjustment to their respective business plans and contract position during the 2-year forward period leading up to the first delivery period (currently expected to be Q4 2023).
Keppel Infrastructure Holdings Pte Ltd	Introduction	Keppel supports the implementation of a FCM in Singapore, conditional upon EMA's confirmation on the following: (i) One fundamental objective of the FCM is to promote the recovery of long run marginal cost for generators over the life of its generation asset; and (ii) The FCM does not lead to drastic reforms on the SWEM. Any regulation that artificially suppresses energy offers under the SWEM will potentially offset the benefits from the capacity payment under the FCM. We therefore seek EMA's confirmation on the points (i) & (ii) above.	The FCM is intended to procure in advance sufficient capacity supply that is required to be available to meet the reliability standard at least cost to consumers. This facilitates orderly entry and exit of capacity, mitigating the down and up cycles expected from the current energy-only market, which is undesirable for both capacity investors and consumers. In the long run, the capacity charge and spot energy prices that consumers pay in the enhanced SWEM is expected to, on aggregate, be at the long-run marginal cost (LRMC) of efficient capacity. With the FCM, there is no plan to lower the current spot energy price cap (i.e. $4,500/MWh) in the first instance. However, to mitigate potential uncompetitive bidding in the spot energy market, EMA intends to implement a one-pivotal supplier test (1PST) and cap the offer prices of suppliers who fail the 1PST. Please refer to Section XII (Reforms to Energy/Ancillary Services) of the FCM Design Proposal for details.
	Auction	There are two key design elements of the FCM which are particularly crucial in attracting investments in new power generation assets. (i) Multi-Year Commitment ("MYC") for New Resource The provision of MYC for new and/or refurbished resources is essential to reduce the merchant risk of new generation assets. The lifespan of a new resource is lengthy, and that of a generation plant ranges between 25 to 30 years. A 1-year forward capacity contract is insufficient to provide any confidence for both investor and financier that the project is bankable. We recommend for new resources to be given the option to commit up to 10 - 15 years under the proposed FCM, such that the cash flow for a larger proportion of the project lifespan can be projected with more confidence.	Taking into account the pros and cons of MYCs set out under Section VII (Forward Capacity Auction) of the FCM Design Proposal, the current proposal is to provide a 10-year MYC for new/repowered CCGTs with an economic lifespan of at least 25 years and which meets the proposed heat rate standard for power generation, in the first auction that the CCGT clears over the next decade. Over the next decade, gas-fired CCGTs will continue to be the main generation technology to meet baseload electricity demand efficiently. They are also proven frequency responsive resources that provide online reserves which are essential for maintaining power system security. With growing electricity demand and significant CCGT capacity reaching end of life, there is a need to facilitate the adoption of more efficient CCGTs to meet baseload demand as well as provide reliable online reserves so that the overall

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			energy efficiency of our power generation sector can also be improved. For the delivery years after the end of the MYC, the CCGT will be considered an existing unit and will not be eligible for MYC in the auctions for those delivery years
	Administrative Demand Curve	To encourage investment in new generation assets, we suggest revising the Price Cap formula to "Maximum of (1.5x to 2x Net CONE, 1x to 1.5x Gross CONE)". The current proposed Price Cap formula does not provide Market Participants with confidence because: - Net CONE cannot be relied upon for investment decisions as they are subject to market volatility. - Price Cap of 1x Gross CONE or below artificially limits upward movement in prices. There is little commercial incentive for new investments if prices are cleared below 1x Gross CONE. Demand curve: - Can Brattle clarify how the demand curve will intersect with the x-axis? We support a wider, downward sloping slope (i.e. intersect further on the x-axis) such that the entry or exit of resources do not cause large volatility in prices. Large price volatility should be avoided as it causes disruption to end consumers, especially major offtakers in the manufacturing sector. - In order for market participants to determine which curve is more applicable to the Singapore market, can Brattle elaborate on the market circumstances/conditions that will lead to convex, concave, or linear demand curves? On E&AS offset methodology: - Prices from the electricity futures market should not be used to estimate E&AS margins as the futures market is not reflective of the fundamental supply and demand conditions in the physical market, and correspondingly the spot prices in NEMS market. - Can Brattle provide worked examples on how the net revenue is derived for E&AS offset, including reference gas prices, reserves revenue, etc.? We support the adoption of vesting parameters for the initial auctions to facilitate expediency and simplicity. Can Brattle	A new efficient CCGT, as the current reference technology, is expected to be an inframarginal unit due to expected higher fuel efficiency than existing CCGT units. It should therefore be able to earn inframarginal economic rent in the spot energy market, and accordingly, would require Net CONE rather than Gross CONE in the capacity market to recover LRMC. The FCM price cap reflects Singapore's willingness to pay for in-market supply under tight supply conditions. It is set at a multiple of Net CONE as the reliability value of resources should exceed Net CONE when LOLH exceeds the target. The multiplier also caters for potential Net CONE estimation error. Please refer to Section III (Administrative Demand Curve) of the FCM Design Proposal for details. Using a historical-based E&AS offset could result in volatile Net CONE estimates – high historical E&AS offsets when reserve margins were low would lead to low Net CONE which would deter entry of new capacity, and vice versa when reserve margins were high. Brattle's current proposal is for Singapore to adopt a forward-looking E&AS offset based on the expected margins of a new CCGT in the long-term equilibrium state in the spot market. The other technical parameters of the CCGT will be based on vesting contract parameters. Please refer to Section III (Administrative Demand Curve) of the FCM Design Proposal for more details.

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		provide worked examples on how vesting parameters will be applied to derive Net CONE and Gross CONE?	
	Forward Capacity Auction	New resources: - To encourage new investment, Keppel is supportive of allowing new resources to lock-in the clearing price for multiple years after they are initially cleared in the auction. - Similar to price lock-in periods in other jurisdictions, we believe new resources should have the option of committing up to 15 years under the proposed FCM market. - Differentiation between new resources and refurbished resources: - To encourage new entrants/investors to plant in Singapore and introduce competition into the local market, we suggest for new resources to be distinguished from refurbished resources. This is because new resources are likely to have higher barriers to entry (e.g. securing new land space). - New and refurbished resource can be distinguish through (a) and (b), below. a. Qualifying Years for Multi-Year Bid New and refurbished resource status should start from the calendar year in which a FID has been declared to EMA, and end on the calendar year in which the generation asset has declared commercial operation date (COD). b. Different Length of Multi-Year Contract In the scenario that 15 years is the maximum multi-year forward capacity contract, a new resource will be able to participate in up to 15 multi-year contracts while refurbished resource can participate for up to 7 years (i.e. rounding down 15 years divide by 2). We seek clarification on the auction mechanism for multi-year price lock-ins for new entrants. How will the auction be conducted? Will there be separate demand and supply curves for new entrants? If a new entrant has a price and quantity 'lock-in' for multiple delivery years, how is the FCM auction for subsequent years affected (e.g. how will the demand curve be constructed)? Keppel's preferred offer format is to allow new entrants to submit different offer prices for different years in a	Taking into account the pros and cons of MYCs set out under Section VII (Forward Capacity Auction) of the FCM Design Proposal, the current proposal is to provide a 10-year MYC for new/repowered CCGTs with an economic lifespan of at least 25 years and which meets the proposed heat rate standard for power generation, in the first auction that the CCGT clears over the next decade. Over the next decade, gas-fired CCGTs will continue to be the main generation technology to meet baseload electricity demand efficiently. They are also proven frequency responsive resources that provide online reserves which are essential for maintaining power system security. With growing electricity demand and significant CCGT capacity reaching end of life, there is a need to facilitate the adoption of more efficient CCGTs to meet baseload demand as well as provide reliable online reserves so that the overall energy efficiency of our power generation sector can also be improved. For the delivery years after the end of the MYC, the CCGT will be considered an existing unit and will not be eligible for MYC in the auctions for those delivery years For a given delivery year, all existing and new resources (including new CCGTs to be built) will participate in the same auction with the same demand curve. Cleared CCGT capacity that is awarded MYC will be treated as zero price offers in the subsequent (base and rebalancing) auctions for all delivery years that overlap with the MYC period.

<table>
<tr><th>Stakeholder</th><th>Section/Paragraph</th><th>Comments</th><th>Responses</th></tr>
<tr><td></td><td></td><td>multi-year forward capacity contract due to different pricing views across different time horizons. This would also provide EMA with insights on the industry view in the short, medium and long term through such bidding format. The table below illustrates Keppel's suggestion:

<table>
<tr><th rowspan="2">Delivery Year</th><th colspan="3">Price ($/MWh)</th></tr>
<tr><th>Offer Segment 1</th><th>Offer Segment 2</th><th>…</th></tr>
<tr><td>X</td><td>A1</td><td>A2</td><td>…</td></tr>
<tr><td>X+1</td><td>B1</td><td>B2</td><td>…</td></tr>
<tr><td>X+2</td><td>C1</td><td>C2</td><td>…</td></tr>
<tr><td>X+3</td><td>D1</td><td>D2</td><td>…</td></tr>
<tr><td>..</td><td>…</td><td>…</td><td>…</td></tr>
<tr><td>..</td><td>…</td><td>…</td><td>…</td></tr>
<tr><td>..</td><td>…</td><td>…</td><td>…</td></tr>
<tr><td>X+15</td><td>E1</td><td>E2</td><td>…</td></tr>
</table></td><td></td></tr>
<tr><td></td><td>Rebalancing Auction</td><td>Keppel is supportive of rebalancing auctions to account for unplanned changes in the supply and/or demand.

It was mentioned in the paper that the last rebalancing auction should be conducted at least 12 months prior to delivery. If there happens to be a shortage of capacity procured through the FCM (e.g. under-forecasted demand), will EMA call for an ad-hoc rebalancing auction even if it is less than 12 months from the delivery period? If Party A receiving a Capacity Supply Obligation (CSO) is not able to fulfil this obligation (e.g. unplanned outage) but has transacted the CSO bilaterally with another qualified resource (Party B), Party B should liable for fulfilling the CSO. Can EMA confirm this?</td><td>Noted.

EMA intends to conduct one rebalancing auction within 12 months before the start of the delivery year. Prior to this rebalancing auction, EMA may conduct additional rebalancing auctions, taking into account updates to its electricity demand projection for the delivery year. FCM participants will be allowed to engage in bilateral transactions to take on additional, or transfer existing, CSOs for the delivery year.</td></tr>
<tr><td></td><td>Supply Obligations and Performance Assessments</td><td>Can Brattle define how resources are differentiated between being available or not available in the real-time market, and what is meant by being "available for emergency, out-of-market commitment by the system operator"?

For a level playing field between all qualified resources, we urge that the same supply obligations be applied to all types of resources in the capacity market.</td><td>Cleared resources will receive capacity payment subject to meeting their respective CSOs in the delivery year. A penalty will be imposed on a cleared resource for failure to meet its CSO which includes (a) being on outage in excess of the planned and unplanned outage rate assumed for determining its CSO, or (b) failing to comply with PSO's dispatch instruction. To be effective, the penalty will have to be set reasonably higher that the capacity payment. Separately, resources which fails to offer into the real-time market during projected scarcity conditions (that are neither on planned nor</td></tr>
</table>

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			unplanned maintenance) will be monitored and penalised by the Market Assessment Unit (MAU). Please refer to Section X (Supply Obligation and Performance Penalties) of the FCM Design Proposal for details.
	Supply Obligations and Performance Assessments	The penalty should not be unnecessarily punitive to the extent it negates the effectiveness of the FCM in incentivizing new investments. A penalty factor slightly larger than 1.0 times of the clearing price ensures Market Participants are aligned in meeting capacity obligations whilst encouraging active participation in the FCM. We suggest, especially in the initial years, to set the penalty to be 1.1 to 1.2 times of the cleared price.	Please refer to Section X (Supply Obligations and Performance Penalties) of the FCM Design Proposal for the proposed penalty rates.
		Does EMA plan to procure emergency short term capacity if a resource previously allocated in the FCM delivery year is on prolonged unplanned outage and thus no longer able to meet its capacity obligations?	A resource that expects to be unable to meet its CSOs should transfer them to other resources via rebalancing auctions or bilateral transactions to avoid being penalised in the delivery year. If necessary, EMA may procure ancillary services to ensure that power system security and supply reliability is maintained.
		We propose for penalty exemptions to be granted if the resource unavailability was due to reasons outside of the supplier's reasonable control (e.g. disruption of supply due to feeder outage in the power grid).	Noted. Penalties may be waived where reasonable on a case-by-case basis.
		We are supportive for the re-allocation of penalties collected back to consumers.	Noted.
	Settlements and Cost Allocation	The proposed cost allocation disproportionately impacts peak load consumers, as they are indirectly subsidizing the cost of capacity incurred by off-peak consumers.	Brattle/EMA disagree with this statement. The proposed cost allocation methodology is economically efficient – it is aligned with the principle of aligning the allocation of system capacity costs to the driver of those costs i.e. system peak demand, and thereby providing efficient price signals for consumers to peak shave to lower system peak demand and capacity cost in the long run.
		Instead, we suggest for the FCM cost to be allocated based on 2 tranches, with a baseline set using the average load forecast: - The proportion of the FCM cost corresponding to the ratio of the average load forecast to the peak load forecast should be distributed equally to consumers based on their	Keppel's proposed method is flawed. Firstly, the method segregates the total capacity cost into two segments by arbitrarily applying the required reserve margin (RRM) on the average system load. There is no basis for this, as the RRM is determined based on peak demand to meet the reliability standard. EMA will be providing more information on the reliability standard and the methodology to determine the

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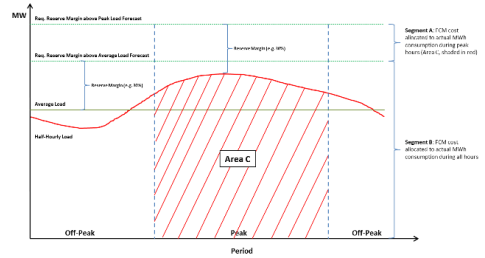
		average daily consumption across all 48 periods (refer to segment B from the diagram below). - The proportion of the FCM cost corresponding to the ratio of the difference between the peak load forecast and the average load forecast to the peak load forecast should be bored by consumers based on their consumption during peak hours (refer to segment A from the diagram below).  $$Cost\ allocated\ to\ Peak\ Consumers\ (\$/MWh) = \frac{Segment\ A\ (\$)}{Area\ C\ (MWh)}$$ $$Cost\ allocated\ to\ All\ Consumers\ (\$/MWh) = \frac{Segment\ B\ (\$)}{Area\ under\ Half-Hourly\ Load\ Curve\ (MWh)}$$ We urge EMA to introduce a new regulated charge to pass through the cost of FCM to consumers. This ensures transparency to all stakeholders in the market, including consumers, retailers, and FCM awardees. Clarity of the new charge will facilitate the process of explanation by retailers to consumers on the FCM market, whereas the pass-through of the FCM cost through an existing charge item will only confuse consumers in both their tender process and upon receipt of invoice. It will be even more difficult to educate residential users on a cost being subsumed under a current charge item.	corresponding reserve margin. Secondly, the method recovers from all consumers a disproportionately large portion of the total capacity cost and furthermore at the same capacity charge rate regardless of whether they are consuming during peak or off-peak periods. There is little, if any, price signals to incentivise consumers to peak shave to reduce system peak demand and capacity cost in the long run. EMC, as the enhanced SWEM (spot energy plus FCM) operator and administrator, is the appropriate party to levy and collect the capacity charge directly from all market participants in respect of their half-hourly energy purchase under the electricity market rules, similar to existing wholesale market charges. EMA notes the industry's preference to levy the capacity charge as an independent charge, distinct from the other market charges. We will be consulting the industry on the proposed settlement framework for capacity charge in Jun 2020.
PacificLight Power Pte Ltd / PacificLight Energy Pte Ltd	Para 12 Developing the Detailed FCM Design and	In the first consultation paper issued on 10 Jun 2019, the EMA stated the intention to implement the first interim FCM auction in early 2020 for delivery in 2021 to be followed by four annual interim FCM auctions until the end-stage FCM is implemented from 2026 onwards. We note that the timeline has been	Following the first consultation, Electricity Futures Market (EFM) participants and electricity retailers provided feedback that a forward period of at least two years is required to provide them with sufficient lead time to adjust their contract positions. EMA as the regulator will need to balance the stakeholders'

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	Implementation Timeline	revised in the second consultation paper issued on 4 Dec 2019 with a first delivery period of 2023 and that the interim FCM has been replaced with four compressed FCM auctions. PLP would like to express its concerns regarding the objectives of FCM: 1. If FCM aims to provide incentives to existing resources and new investments, then it fails to achieve its stated objective by delaying the implementation to 2023. By that period, projected reserve margins are already expected to fall below the minimum threshold level of 30%, as stated in the 2019 Singapore Energy Market Outlook. Furthermore, without an interim FCM, the "missing money" problem is not addressed. 2. Despite the stated objectives of FCM, we are concerned that an unintended result of its implementation under the proposed scheme is the creation of a price control mechanism. As such, it does not support both existing Gencos dealing with the ongoing "missing money" problem as well as potential investors to the market. PLP proposes that meetings/workshops be arranged between EMA/Brattle and the industry to better understand the intention of the FCM and direction with regard to any concurrent changes to the energy market so that PLP will be in a position to offer its feedback to the scheme.	interest. EMA has therefore adjusted the timeline to cater for a 2-year forward period for the first auction which is now called a Compressed Auction for ease of reference. The proposed FCM is intended to complement the existing spot energy market to achieve the following objectives in the long term: (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. The FCM achieves these objectives by procuring in advance sufficient capacity supply that is required to be available to meet reliability standard in the delivery year at least cost to consumers. This facilitates orderly entry and exit of capacity and mitigates the down and up cycles expected from the current energy-only market (EOM) which is undesirable for both capacity investors and consumers. In the long run, the capacity charge and spot energy prices that consumers pay in the enhanced SWEM (FCM plus spot energy market design) is expected to, in aggregate, be at the long-run marginal cost (LRMC) of efficient capacity. The FCM is not intended to address any short-term financial challenges that gencos are facing in the current market down cycle, nor to address near term concerns with supply reliability. EMA has the statutory responsibility to ensure electricity supply reliability. Prior to the development and implementation of the FCM, EMA will procure ancillary services to ensure reliable electricity supply in Singapore. In addition to the industry-wide workshops and briefing sessions that EMA has conducted on a regular basis since last year, we have also been engaging stakeholders through group meetings in particular for gencos. We will be conducting more sessions/meetings.
	General Comments	We have reservations that the proposed FCM, modelled after the PJM framework, is able to achieve its stated objectives. In the presentation provided by the Brattle Group on 10 February 2020, it cited that the clearing prices for the PJM capacity market were far below expected costs, at 50% or more below calculated NET CONE, which is not a sustainable level for any Genco. The implementation of the FCM is a major development for the SWEM and we strongly advocate that	The best measure of whether a market is sustainable is whether it continues to attract and retain capacity sufficient to meet its needs. Indeed, PJM has done that year after year. And it continues to attract new investment as a vote of confidence. The reason prices were low in the initial years was because of excess capacity and the availability of low-cost new resources, including DR, uprates, and imports. In the more recent 6-7 years when new generation has been

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		more thorough studies should be conducted to understand the impact that the FCM will have on new and existing market players and that it is able to meet its stated objectives.	economic and entered, it entered at prices below the administrative Net CONE because the administrative Net CONE value was set too high based on an OGCT, rather than the more economic CCGTs that were actually being built. Please refer to the Brattle Group's 2018 Quadrennial Review of PJM's capacity market for more details.[2]
		As highlighted during the presentation on 10th February 2020, the minimum reserve margin is 27% (lower than the previously stated 30% margin due to increase in the network size). A reserve margin at this level means that Singapore does not need any additional capacity by 2023, hence ample time should be given for the industry to thoroughly evaluate the proposal. Therefore, we should not rush into calling an auction in Q1 2021.	The FCM is not intended to address near term concerns with supply reliability. As EMA has assessed that the FCM and SWEM is the best market mechanism to achieve a sustainable wholesale electricity market design, we should develop and implement the FCM as soon as practicable.
		We must ensure that the FCM has no un-intended impact and consequences and provides an unbiased mechanism for both existing and future Gencos with no preferential treatment for any party. Based on our review of the current proposed scheme we are concerned that there are aspects of the FCM where existing Gencos are treated adversely as compared to new Gencos, which we believe needs to be addressed. We are not able to support the FCM until the concerns we have raised are adequately addressed.	EMA agrees that there should be no undue discrimination between resources in the FCM in terms of technology type and vintage. In respect of CCGTs, they will continue to be the main generation technology to meet baseload electricity demand efficiently over the next decade. They are also proven frequency responsive resources that provide online reserves which are essential for maintaining power system security. With growing electricity demand and significant CCGT capacity reaching end of life, there is a need to facilitate the adoption of more efficient CCGTs to meet baseload demand as well as provide reliable online reserves so that the overall energy efficiency of our power generation sector can also be improved. As such, EMA intends to facilitate this by offering multi-year commitment (MYC) of 10 years for new/repowered CCGTs with an economic lifespan of at least 25 years and which meets the proposed heat rate standard for power generation, in the first auction that the CCGTs clears over the next decade. For the delivery years after the end of the MYC, the CCGT will be considered an existing unit and will not be eligible for MYC in the auctions for those delivery years
	Linkage of FCM to EOM	FCM's stated objective is to ensure sufficient resources are available to meet demand. By capping the FCM price to a multiple of Net CONE we believe will lead to the opposite	The FCM price cap is intended to reflect Singapore's willingness to pay for in-market supply under tight supply condition. It is set at a multiple of Net CONE as the reliability

[2] See link: http://files.brattle.com/files/13894_20180420-pjm-2018-variable-resource-requirement-curve-study.pdf

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		outcome. When EOM prices are high, signaling insufficient capacity, the cap on FCM, being Gross CONE less earnings in the EOM, will be set low. Hence it will not attract new capacity. On the other hand, when EOM prices are low, an indicator of capacity oversupply, the cap in FCM is set high attracting capacity when it is not needed. In addition, forecasting EOM earnings is difficult, if not impossible. Hence, PacificLight advocates that Gross Cone be used in determining the demand price curve, as practiced in ISO New England.	value of resources should exceed Net CONE when LOLH exceeds the target. The multiplier also caters for potential Net CONE estimation error. Using historical-based E&AS offset will result in volatile Net CONE estimate – high historical E&AS offsets when reserve margins were low would lead to low Net CONE which would deter entry of new capacity, and vice versa for when reserve margins were high. It is therefore recommended for Singapore to adopt a forward-looking E&AS offset based on the expected reserve margin in the long-term equilibrium state. A price cap minimum will be set equal to 1.0x gross CONE to ensure that it does not collapse in the event that Net CONE is underestimated (typically from overestimating E&AS offsets). In ISO-NE, the price cap is set at 1.6x Net CONE with a minimum price cap of 1.0 x gross CONE. This is similar to the above proposal. Please refer to Section III (Administrative Demand Curve) of the FCM Design Proposal for details.
	Forward Capacity Auction	The proposed scheme is skewed towards new capacity at the disadvantage of existing capacity, particularly those that are near the end of their asset life. With the modest annual demand growth in Singapore, at least 80 to 90% of demand in each delivery year is expected to be met by the existing supply resources. As such, we propose to structure the auctions in the following manner on the basis that the proposed 4 years forward period is excessive for existing plant to determine whether their plant's condition is still capable of participating in the FCM: a. Reduce the forward period of auction to 2.5 years before the Delivery Years in line with the construction period of a new plant as per the existing Vesting assumptions. b. For new plant, a shorter forward period would ensure that it is in an advanced stage of development to ensure it can come online in the delivery year. This is also in line with the requirement in the ISO New England and even PJM. Having shorter forward periods will yield the following benefits:	A four year forward period for end-state auctions is necessary to cater for the lead-time to plan, make final investment decision (FID) and to build a new CCGT unit. This will also provide sufficient time for gencos to plan and undertake new investments to repower or extend the economic lifespan of existing capacity. Conducting the auction with shorter forward period could result in the unintended consequence of investors making FID before the auction, resulting in building excess new capacity to be available in the delivery year.

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		a. It minimizes errors in the demand forecast and reduces probabilities of having to call for a rebalancing auction; and b. Existing capacity resources will have a better grasp of the plant's condition notably the ageing plants before they bid into the FCM. This will remove the risk of existing capacity being subject to hefty penalty should the plant be not available in the delivery year. Gencos will have incentive to bid their older assets to the FCM. c. There is greater certainty that the new capacity will be available in the delivery year, the very intent of the FCM.	
	Reforms to Energy and Ancillary Services	We understand that the EMA does not intend to impose any offer mitigation to the energy market. A well designed FCM will ensure sufficient capacity is procured for energy security and self-regulation through competition. Any offer mitigation therefore should not be necessary and may potentially lead to an unintended outcome of suppressing the price signal in the event of short-term demand shortfall arising from a forced outage.	With or without the FCM, potential exercise of market power in the spot energy market remains a concern. To mitigate potential uncompetitive bidding in the spot energy market, EMA intends to implement a one-pivotal supplier test (1PST) and cap the offer prices of suppliers who fail the 1PST. Please refer to Section XII (Reforms to Energy/Ancillary Services) of the FCM Design Proposal for more details.
	Administrative Demand Curves	We would like to re-emphasize that whilst a downward sloping demand curve reduces price volatility, and recognizes the incremental value of capacity, we need to ensure that the capacity price clears at a sustainable price level. Hence, we advocate to adopt a floor price, following the practice in ISO New England, based on the following principles: a. Set a floor price at a percentage of the CONE. For instances in ISO New England, it is set at 60% of the CONE price; and b. If price is cleared at floor price, offers shall be pro-rated such that no more than the requirement is procured in the forward capacity auction. This will avoid a fall in capacity prices when excess supply occurs and thus provides stability to the firm energy price, which reduces supplier risk and consumer cost in the long term.	The inclusion of a price floor in the demand curve can potentially lead to inefficient market outcomes such as retention of old inefficient capacity that should be retired/mothballed. Moreover, other jurisdictions that have implemented "temporary" price floors have experienced much pressure from suppliers to continue them indefinitely, as in ISO-NE, which result in overcapacity and over-compensation being perpetuated. However, EMA has noted the industry's concern of the capacity price risk in the formative years of the FCM when market participants are gaining experience in how the FCM will clear. On balance, EMA proposes a transitional price floor at 0.2× Net CONE to be in place up till the auction for delivery year 2028 and will be removed thereafter. EMA will regularly review the FCM including the auction results and adjust the design parameters to provide more market certainty where appropriate.
	Settlement and Cost Allocation	The current dire state of the market is that Gencos and retailers are not able to pass on the costs to the consumers.	EMA will consult the industry on the proposed settlement framework for capacity charge in Jun 2020.

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		With FCM, Gencos should be able to retain all of their FCM incentives in order to achieve the stated objective of maintaining resource adequacy. To do so, we would urge that a cost allocation scheme is adopted that allows retailers to fully pass through the entire FCM costs to end consumers. Hence we advocate that FCM costs be treated as a new non by-passable regulated charge with appropriate amendment to the Retailers Code of Conduct, in particular Clause 2.10.4 (c and d) and Clause 3.9.1.	
	Treatment of unallocated capacity	In the event that an existing Genco bids into the FCM but is not allocated capacity, we wish to enquire the following: 1. Will it be still able to operate within the energy market? 2. If the Genco elects to not operate the unallocated capacity in the energy market are they able to retire the unit(s) at their discretion? If the unallocated capacity was not allowed to retire and was required to be kept operational would the Genco receive any form of assured payment incentive to keep the capacity operational?	Capacity offered into the FCM that did not clear the auction can still participate in the spot energy market in the delivery year. With or without FCM, the current requirement for gencos to engage PSO to plan and execute retirement plans for CCGTs will continue to apply.
	Pivotal Supplier Test	We do not support market power monitoring and mitigation through a single pivotal supplier test under the FCM. Should a test be introduced, a. Mitigated Quantity should be only the required supply from the pivotal supplier to meet the demand; and b. Offer capped at LRMC as opposed to avoidable going forward costs.	Any exercise of market power that distorts competitive pricing in the FCM is a market failure and must be mitigated. The proposed single pivotal supplier test (1PST) is an objective measure to identify and cap the offers of each pivotal supplier as they can unilaterally set the FCM clearing price. The offer cap should be imposed on all the capacity under the control of the pivotal suppliers and at a price level based on the net avoidable forward cost, as this is the expected offer behaviour for all existing capacity in a fully competitive FCM auction.
Sembcorp Industries Ltd	I. Introduction	The Brattle Group's latest draft design proposal has not gone into significant detail on all fronts of the design of the Forward Capacity Market (FCM). Based on the implementation timeline shared during the Industry Briefing on 14 January 2019, the 3rd Consultation would be conducted in Q2 2020. For transparency and clarity to the industry, we look forward to a complete and comprehensive design proposal from the Brattle Group including a detailed procedure paper (with mathematical work example) documenting how each of the design parameters of the FCM will be determined for the tender i.e. similar to the Procedure for Vesting Contract Parameters Determination. The first industry session	The full substantive FCM design is detailed in the FCM Design Proposal as part of the Third Consultation Paper. In addition to the industry-wide workshops and briefing sessions that EMA has conducted on a regular basis since last year, we have also been engaging stakeholders through group meetings in particular for gencos. We will be conducting more sessions/meetings.

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		conducted by EMA on 14 January 2020 is a good start. The rigorous process that that Singapore has taken during the implementation of the current Energy Only Market should be followed. We look forward to more regular industry briefing/engagement with the EMA team on the design of the FCM so that the collective wisdom of the industry can be tapped to shape the FCM design to suit our unique market in Singapore. In these comments, we have focused specifically on design settings which have been elaborated in greater detail by EMA and Brattle in the 2nd Consultation Paper. These are: • Product definition • Administrative demand curve • Supply resource qualification and capacity rating • Forward capacity auctions • Settlement and cost allocation	
	II. Product Definition and IX. Supply Obligations and Performance Assessments	<u>Capacity Supply Obligation (CSO) and Penalty Regime</u> The Brattle Group has recommended that the capacity product represents a MW of capacity, normalised for expected unavailability. It is also stated generally that there will be penalties imposed for unavailability and non-performance to deliver the CSO during the delivery year. There is a reference error on Page 5 of the report, it is "Section IX" instead of "Section XI" that provide more specifics on the obligations and how they relate to Singapore's energy market design. It is not clear how the penalty will be administered for unavailability and non-performance in relation to the CSO. For example, a 100 MW of solar capacity was determined to have a CSO of 20 MW after taking into consideration the intermittency. This capacity won the EFM tender. During the delivery year, the solar capacity will be generating 0 at night and above 20 MW in the daytime. How would the penalties be administered? This obligation has to be designed around technological limitations for technologies with energy/time-constrained nature (e.g. storage and solar) to ensure efficient investments do not become deterred by requirement to make capacity available for all periods. We would request for more	Noted. For solar, the proposed approach for performance assessment will consider when the solar resource generates and whether or not those times coincide with when the system has a high expected probability of losing load. Please refer to Section X (Supply Obligations and Performance Penalties) of the FCM Design Proposal for details.

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		in-depth discussion with illustrations on how the penalty regime on unavailability and non-performance will work in relation to the CSO <u>Aggregation of Capacity</u> We would like to seek confirmation that a participant can aggregate CSO from multiple sites to meet the 1 MW requirement to participate in the FCM tender. Most of the solar capacity behind a single connection point will not be able to meet the 1 MW requirement. If aggregation is not allowed, substantial amount of the solar capacity will be prohibited from participation.	The minimum capacity to participate in the FCM is 1 MW based on installed capacity. Aggregation across multiple sites to meet this participation threshold is allowed.
	III. Administrative Demand Curve	<u>Demand Curve Shape</u> The Brattle Group indicated that they will be conducting a study of anticipated FCM auction outcomes on reliability and price volatility. Can the Brattle Group provide more details on what is the purpose of this modelling and how it would be conducted and use to determine the demand curve shape to be used? <u>Reliability Standard</u> The Brattle Group's paper did not explain how the reliability standard of 3 hours expected lost load per year would translate into a reserve margin and what levels of reserve margin would be adequate. However, EMA had in its industry briefing on 14 January 2020 provided the explanation. We would like to request for all the methodology to be clearly documented in a single procedure paper for future referencing. <u>Reference Technology</u> The Brattle Group has laid out only a general principle on how the reference technology should be selected. As the choice of the reference technology has a significant impact on the determination of CONE, it is important that the criteria and methodology to select the CONE be clearly stipulated in the final design paper i.e. similar to how the choice of technology for the determination of the LRMC has been clearly stipulated to the vesting contract holders. We are concern with the recommendation that the vesting contract methodology will be adopted in the "initial" auctions and will be change to a	A Monte Carlo simulation model is used to test the performance of a range of alternative demand curve (and corresponding shapes) and to determine the trade-offs between reliability, price and quantity volatility. For more information, please refer to Section III (Administrative Demand Curve) of the FCM Design Proposal for more details. EMA will be providing more information to explain the reliability standard of 3 Loss of Load Hours per year and how this translates into the required reserve margin. The reference new entrant technology will be the CCGT in Singapore's context for the foreseeable future. In the first instance, the prevailing vesting contract parameters for an F-class CCGT (which is reviewed biennially) will be used for determining the CONE. EMA will consult the industry prior to making any substantive change. Refer to Section III (Administrative Demand Curve) of the FCM Design Proposal for more details.

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		comprehensive bottom-up engineering cost study in the future because this creates uncertainty that the CONE might be substantially change (i.e. lowered) after an investment has been made based on initial auctions. We would like to have clarity in the final design paper how the comprehensive bottom-up engineering cost study will be conducted and when is the expected timeline for the change in the reference technology determination. <u>Gross CONE</u> We noted that the land cost has been omitted in the suggested components of overnight capital expenditure (p.15). It should be included. <u>Energy/Ancillary Services (E&AS) revenue</u> The paper suggests using both historical data and future simulation to estimate the energy and ancillary services revenue. We are of the view that historical data would be unsuitable as it does not take into account the likely level of capacity on the system and changes in fundamental drivers of the electricity prices. The use of future simulation would be more suitable. The Price Cap is determined by subtracting the forecasted E&AS revenue from the Gross CONE. While the Price Cap will be set above the Net CONE to cater for any forecasting error in the E&AS revenue, there is a possibility that the actual E&AS is lower than the forecasted E&AS. In the end state, there is a gap of 4 years from the date the tender is closed and the actual delivery date. During these period, new regulatory changes might be introduced and could potentially impact the actual E&AS revenue vis-a-vis the forecasted E&AS. A higher forecasted E&AS will result in a lower Net CONE and lead to a lower EFM clearing price. We would like EMA to consider a true-up arrangement to compensate the participants for the change in actual E&AS revenue arising from any change in regulatory regime after the FCM tender has been conducted. <u>Price Cap</u> The Brattle Group has not explained how the Price Cap of 1.5 vs 2.0 for Net CONE, and 0.25 vs 1.0 for Gross CONE is being derived and why it is deemed as reasonable for the Singapore market. A range of possible values has been recommended	We agree and will include land cost. The FCM price cap is intended to reflect Singapore's willingness to pay for in-market supply under tight supply condition. It is set at a multiple of Net CONE as the reliability value of resources should exceed Net CONE when LOLH exceeds the target. The multiplier also caters for potential Net CONE estimation error. Using historical-based E&AS offset could result in volatile Net CONE estimate – high historical E&AS offsets when reserve margins were low would lead to low Net CONE which would deter entry of new capacity, and vice versa for when reserve margins were high. Brattle's current proposal is to adopt a forward-looking E&AS offset based on the expected reserve margin in the long-term equilibrium state. A price cap minimum is proposed to be set between 0.5x to 1.0x gross CONE to ensure that it does not collapse in the event that Net CONE is underestimated (typically from overestimating E&AS offsets). Given the above, it is not necessary and also not practical to have a true-up arrangement for E&AS, especially after the auction has been completed. Please refer to Section III (Administrative Demand Curve) of the FCM Design Proposal for more details. The price cap is one of the demand curve parameters to be determined based on the Monte Carlo model simulations to assess the trade-offs between consumer costs and price.

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		but there are no details on how the final value shall be determined for each of the tender. Without a clear methodology, too much discretion will be given to the market administrator of the FCM tender. As such, we would like to request for the methodology to set the factor to be applied to the Gross and Net CONE be included in the final design paper. <u>Demand Curve Width and Steepness</u> The Brattle Group has not make any recommendation how the demand curve width and steepness should be derived for each tender. We request for the methodology to set the demand curve width and steepness to be clearly stated in the final design paper. <u>Periodic Comprehensive Review and Annual Formulaic Adjustments</u> The paper suggested periodic comprehensive review and annual formulaic adjustments to estimates for Gross CONE and Energy/Ancillary Services Revenue. For clarity, we would like the following details to be included in the final design paper: • Frequency of comprehensive review • Exact items reviewed in periodic review and formulaic updates	Please refer to Section III (Administrative Demand Curve) of the FCM Design Proposal for more details. Refer to Section III (Administrative Demand Curve) of the FCM Design Proposal for the methodology. Brattle has proposed to update the demand curve in two timeframes, i.e., an annual formulaic update on necessary changes to maintain consistency with the market conditions, and a more comprehensive review on a periodic basis. Please refer to Section III (Administrative Demand Curve) of the FCM Design Proposal for more details.
	IV. Supply Resource Qualification and Capacity Ratings	<u>Qualified Capacity (QCAP) for Dispatchable Technology</u> The QCAP is determined by applying Planned Outage Rate (POR) and Unplanned Outage Rate (UOR). We would like to understand how the POR and UOR would take into consideration a situation whereby there is technical derating of the capacity during period of availability i.e. is availability based solely on duration or both duration and capacity. <u>QCAP for Non-Dispatchable Technology</u> We agree that the QCAP for Non-Dispatchable Technology would require a different approach. The paper indicated that it will be review in the later versions of the design proposal. We would like to confirm that "review in later versions" means that the methodology will be ready in the final design proposal i.e. solar capacity in Singapore will be able to participate in the 1st Compressed tender. The approach to determine QCAP for	The QCAP is determined ex ante before the delivery year taking into account the POR and UOR where applicable for the technology type. Any planned or unplanned technical derating in terms of capacity and/or duration should be brought to the attention of PSO as part of the resource qualification process. We confirm that solar will be able to participate in 1st Compressed Auction. The methodology for determining QCAP for intermittent and energy storage solutions are provided in Section IV (Supply Resources Qualification and Capacity Ratings) of the FCM Design Proposal.

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		intermittent generation and storage solutions needs to consider the following: • Outage assessment for renewables should be sampled from relevant peak periods; and • Battery storage should consider technical limitations of storage solutions requiring to recharge in the event of back-to-back peak periods	
	X. Settlements and Cost Allocation	The settlement and cost allocation are very crucial elements of the FCM design because the capacity charge is expected to be a substantial cost to be pass-through to the consumer. The Brattle Group has provided only a high level recommendation on the proposed cost allocation approach in this paper. For the industry to review the impact to our business, we would require detailed work examples and timeline on how the entire settlement and "true-up" will be conducted on a monthly/quarterly basis. It is important to evaluate how the charging will be done for a customer with AMI and a customer without AMI. From a retailer's perspective, we would like to request that the Brattle Group can consider an arrangement whereby the estimated capacity charge for the delivery year can be made known after the closure of each auction i.e. the capacity price for 2026 is published after the auction is closed in 2022. At the end of 2026, any true-up should be applied in 2031 i.e. the next available tender. This would provide a retailer's visibility of the capacity charge and be able to better manage the exposure. If the proposal is for a monthly or quarterly true-up, we would like to suggest that the EMA consider making it a mandatory pass-through item to consumers where it has to be displayed separately from the energy rate. The current recommendation of a wide peak period approach is made based on existing demand profile. The Brattle Group should include as part of the design a trigger event that would require a review of this approach.	EMA notes the industry's preference to levy the capacity charge as an independent charge, distinct from the other market charges. We will be consulting the industry on the proposed settlement framework for capacity charge in Jun 2020.
	Other points (not tagged to any paragraph or section in particular)	<u>Market Power Screening</u> We wish to emphasise that market power screening techniques need to be explored in detail. These are often challenging to get right (e.g. determining status of pivotal supplier, estimating net going-forward costs). Likewise, more details on ex-post market power review need to be carefully considered and documented.	The proposed mechanism to mitigate market power in the FCM is detailed in Section VI (Capacity Market Power Monitoring and Mitigation) of the FCM Design Proposal.

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		Must-offer requirement exemption Requiring an exemption to offer in view of plant closure could result in inefficient outcomes where unprofitable plants may stay in the system.	To prevent physical withholding of generation capacity, all sizable generation resources (i.e. with unit generation capacity of 10 MW or above in ICAP terms, inclusive of aggregated capacity) that are directly connected to the grid must offer into the FCM (a) in order to be eligible to participate in the real-time market in the delivery year, or (b) before approval can be given to mothball.
		SRMC Bidding The paper suggests some form of mandated SRMC bidding is likely to be a feature in the capacity market. The right price for energy, particularly in times of scarcity, is not SRMC but some reflection of scarcity rent. The European Commission has recognised this and suggests that it is acceptable to embed scarcity functions in market designs so that prices go up higher than SRMC when there is scarcity. Also, if SRMC bidding limits market price volatility, this negates the need for an Electricity Futures Market and even a retail market – this would spell the end of independent retailers and the EFM.	With the FCM, there is no plan to lower the current spot energy price cap (i.e. $4,500/MWh), in the first instance, to allow spot prices to rise above SRMC during scarcity periods. However, to mitigate potential uncompetitive bidding in the spot energy market, EMA intends to implement a one-pivotal supplier test (1PST) and cap the offer prices of suppliers who fail the 1PST. Please refer to Section XII (Reforms to Energy/Ancillary Services) of the FCM Design Proposal for details.
		FCM Administrator The Brattle Group has indicated in the design proposal on what is the appropriate process to appoint a FCM administrator. Can the Brattle Group share how other jurisdictions have managed this and what are the mechanism that should be put in place to ensure that the cost to administer the FCM is fair and reasonable for the industry? In addition, we would like to have clarity on the expected cost and recovery mechanism of the FCM administrator as well. Would this cost be included as part of the capacity charge for recovery or it is a separate charge?	EMC is the appropriate party to administer and operate the FCM which is part of SWEM. The implementation and administration cost will be recovered as part of EMC's administration fee.
Senoko Energy Pte Ltd	Page 1 Introduction	The current market imbalance should first be resolved before our market is ready to embark on the adoption of a new market structure which will create new uncertainties to the industry that is already facing great challenges and continues to generate negative cash flows. The introduction of FCM represents a major shift from the current market structure of SWEM, which is a self-commitment market. The adoption of a scheme that will create a significant impact to the existing	The proposed FCM is intended to complement the existing spot energy market to achieve the following objectives in the long term: (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. The FCM achieves these objectives by procuring in advance sufficient capacity supply that is required to be available to meet reliability standard in the delivery year at

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		market warrants a detailed study incorporating an inclusive stakeholder consultation process. At the outset, there should be a proper review of the current market issues and due consideration of alternative ways forward to make sure that whatever new design eventually adopted addresses the key issues. Any review undertaken should focus not only on resource adequacy, but ought to also consider the issues of gas supply in Singapore, viable technologies that may be implemented locally, and energy security and efficiency. However, Brattle's proposal does not provide a holistic review of Singapore's market structure and condition. Such a holistic review was contemplated by the Market Advisory Panel organized by EMC but this was eventually not carried out for reasons unclear to us (for the avoidance of doubt, we are referring to the study that EMC proposed to be undertaken by Frontier Economics).	least cost to consumers. This facilitates orderly entry and exit of capacity and mitigates the down and up cycles expected from the current energy-only market (EOM) which is undesirable for both capacity investors and consumers. In the long run, the capacity charge and spot energy prices that consumers pay in the enhanced SWEM (FCM plus spot energy market design) is expected to, in aggregate, be at the long-run marginal cost (LRMC) of efficient capacity. The FCM is not intended to address any short-term financial challenges that gencos are facing in the current market down cycle, nor to address near term concerns with supply reliability. As EMA has assessed that the FCM and SWEM is the best market mechanism to achieve a sustainable wholesale electricity market design, we should develop and implement the FCM as soon as practicable. The full substantive FCM design is given in the Third Consultation Paper. We would appreciate constructive comments on what are the changes necessary to enhance the proposal to better achieve the above stated objectives of the FCM. This should not be conflated with other issues pertaining to gas supply which EMA will address by, for instance, introducing more competition in term LNG supply to benefit gas users including gencos in terms of more competitive gas pricing and flexible terms.
	Page 2 Demand for capacity	We note that in SEMO 2017, EMA forecasted a minimum peak demand in 2019 of 7,480MW, however the actual peak demand was only 7,195MW. Back in 2008-2011, policy formulation and investment decisions were made based on an annual compounded average growth rate of 3 to 6 percent which did not materialise and contributed to the over-investment in generation capacity and over-contracting of long-term gas supply in the market. There should be a transparent process of determining the demand forecast. The reserve margin should not be based on peak demand observed in one single period which will result in an overly inflated projection of demand.	In the SEMO 2017, the lower bound peak demand forecast for 2019 was 7,480MW. The actual peak demand in 2019 was 7,404MW (and not 7,195MW), i.e. a variance of only 1%. EMA will be providing more information on how peak electricity demand forecasts are made, as well as the reliability standard adopted and the methodology to determine the corresponding required reserve margin.
	Page 6 Reliability standard	EMA to provide an equivalent % or MW figure to give MPs the context of how many MWs is needed at a minimum.	EMA will be providing more information on how peak electricity demand forecasts are made, as well as the reliability standard

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		Is EMA able to share the basis of how the 30% reserve margin for capacity is set? We note that other jurisdictions have lower reserve margins and would like to query if it could be lowered as the base of Singapore energy system grows larger. (I.E., ratio of capacity size for each unit to the peak demand grows smaller).	adopted and the methodology to determine the corresponding required reserve margin.
	Page 12 E&AS Offset	We would need to know details of the reform to the Energy Market before we could comment on how the parameter is established to develop the net CONE. The limitation of bidding in the Energy Market to SRMC as indicated in the first proposal from Brattle is unacceptable as it will pose significant downside risk to the Gencos who may not recover its investment of their generation assets from the market as there is a limit to the revenue whilst there is no floor to the capacity price which could collapse in current over-capacity market. Modelling used to predict future E&AS net revenues need to be done in a transparent manner, allowing MPs to provide relevant inputs.	There are currently no plans to lower the spot energy price cap of $4,500/MWh, in the first instance. However, with or without the FCM, any exercise of market power to sustain uncompetitive spot energy prices is a market failure that must be mitigated. Please refer to Section XII (Reforms to Energy/Ancillary Services) of the FCM Design Proposal for more information on the mechanism to curb anti-competitive bidding behaviour in the spot energy market. Brattle's current proposal is for the E&AS offset to be estimated using a forward-looking approach based on the expected margins of a new CCGT in the long-term equilibrium state in the spot market. Refer to Section III (Administrative Demand Curve) of the FCM Design Proposal for the details.
	Page 17 Demand curve parameters	We recommend having a price floor as part of the Demand curve parameters. In reference to the PJM, where suppliers are required to bid at a minimum price to reflect the true cost of their investment and avoid price distortion. This is to prevent cleared capacity prices from falling below investors' capital expenditures, fixed O&M and financial costs. If prices were to crash, FCM will not solve the "missing money problem", which it has set out to do in the outset.	In PJM, NE-ISO and NYISO, a Minimum Offer Price Rule (MOPR) is applied to prevent subsidised resources, typically renewables receiving state-subsidies, from entering a low or zero prices. This does not apply in Singapore as we do not offer subsidies to renewable sources. Their auction design does not have a price floor even though some resources have MOPR. Setting a floor price will artificially limit downward price movement, leading to market potential inefficiency such as retention of uneconomic capacity which will increase overall system cost in the long term. EMA has noted industry concern of the capacity price risk in the formative years of the FCM when market participants are gaining experience in how the FCM will clear. On balance, EMA proposes a transitional price floor at 0.2× Net CONE to be in place up till the auction for delivery year 2028 and will be removed thereafter. EMA will regularly review the FCM including the auction results and adjust the design parameters to provide more market certainty where appropriate.

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	Page 24 "Similar to ICAP, different approaches are required to estimate QCAP MW. **Guiding principle is that 1 MW of QCAP should provide equivalent reliability value across resource types**"	As the name "Intermittent" suggests, it will be very ambitious to assume that 1 MW QCAP from an intermittent source will provide the same reliability as 1 MW QCAP from a thermal generation source. Careful consideration is required when qualifying intermittent generation, perhaps even a different capacity price should be awarded to intermittent QCAP MW. Sending out the wrong price signals will further exacerbate the current plant under-utilisation issue, and will expedite the 'duck-neck curve' phenomenon seen in countries with higher renewable penetration. The papers have not determined the treatment of embedded generators and imported capacity. EMA to be explicit on the treatment and how would these units qualify for capacity (QCAP).	We disagree. The QCAP rating methodology is designed to rate each resource according to its marginal contribution to system reliability and will accordingly equate 1 MW QCAP across resource types. There is no basis for providing different capacity payment for the same QCAP value. Please refer to Section IV (Supply Resource Qualification and Capacity Ratings) of the FCM Design Proposal.
	Page 27 QCAP = ICAP * (1 - UOR) * (1 - POR)	In an operational world, emerging plant issues will surface, and could materially alter the planned outages i.e. QCAP rating on plants could be materially under-stated should outage plans shift earlier / later. Would there be a process to deal with the change in outage plans?	Before the start of the delivery year, the QCAP of each resource will be updated annually after the FCM base (i.e. 4-year ahead) auction. Through bilateral transactions and rebalancing auctions, cleared resources will be able to adjust their CSOs for the delivery year taking into account their updated QCAP.
	Page 30 "Estimating the UOR requires determining when a resource would have been needed if it was available based on historical data. In a market with clear price signals, this can be accomplished by **observing the hours when the market price is higher than the variable cost of the resource**."	Using this method to calculate UOR will be an unfair methodology. We will need to take into consideration various trading strategies applied at any point in time. As SWEM is a self-commitment market, possible scenarios where units are not running when market prices are higher than its variable cost may be due to the following considerations: 1. Expected run-time vs start costs 2. Market price depth 3. Gas curtailment 4. Portfolio management strategy The calculation of UOR rates should just be based on AGOP data.	EMA agrees that the UOR for determining QCAP of a resource should not be dependent on the relativity between market price and resource's variable cost. Section IV (Supply Resources Qualification and Capacity Ratings) of the FCM Design Proposal has been adjusted accordingly.
	Page 31 Market power monitoring and mitigation	The process of monitoring and determining market power, followed by mitigation measures applied on suppliers should be transparent to ensure a level playing field among all Gencos in the system.	The methodology to determine pivotal suppliers in the capacity market will be made transparent to market participants. Please refer to Section VI (Capacity Market Power Monitoring and

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			Mitigation in the FCM Design Proposal) of the FCM Design Proposal for more information.
	Page 31 "To prevent economic withholding, the market monitor will **cap ("mitigate") the auction offer prices** of market participants that are deemed likely to have both the incentive and ability to exercise market power."	EMA will need to provide much more details on the "Cap" of auction offer prices, and also the pre-defined offer thresholds. It will be unfair to place an obligation on Gencos to offer in capacity for plants that have been slated for retirement or moth-balling, this will distort Gencos' investment / divestment decisions.	Please refer to Section VI (Capacity Market Power Monitoring and Mitigation) in the FCM Design Proposal for details on the setting of offer price caps for pivotal capacity suppliers. To prevent physical withholding of generation capacity, all sizable generation resources (i.e. with unit generation capacity of 10 MW or above in ICAP terms, inclusive of aggregated capacity) that are directly connected to the grid must offer into the FCM (a) in order to be eligible to participate in the real-time market in the delivery year, or (b) before approval can be given to mothball. Such a unit that plans to be mothballed in the delivery year will have to bid into the relevant base auction, and will be allowed to mothball in the delivery year if it is not cleared in the auction. As for a unit that plans to retire in the delivery year, the current requirement for gencos to engage PSO to plan and execute the retirement plan will continue to apply. Please refer to Section VI (Capacity Market Power Monitoring and Mitigation) in the FCM Design Proposal for details.
	Page 44 Penalties for Resource Unavailability	The size of penalties to be implemented should be carefully considered, given that capacity price is already at Net Cone, and E&AS markets may be capped at SRMC which is unacceptable. Too large a penalty might make this market overly financially burdensome for generators. We recommend that the capacity refund penalties should be capped at the capacity price. Should refunds be handed back to consumers and penalties be higher than the cleared capacity price, consumers will potentially be paying for less capacity than they are receiving. Thus, we also recommend that penalties should be refunded to performing Generators. The QCAP concept clearly discounts ICAP values, where in times of need, certain generators could ramp up generation output above and beyond QCAP values. This could be done for short periods of time, but not over the long run. As the QCAP concept currently assumes that 1 MW QCAP from an IGS and 1 MW QCAP from a dispatchable source is equally as reliable, we need to ensure that the same penalties will apply to IGS.	Cleared resources will receive capacity payment subject to meeting their respective CSOs in the delivery year. A penalty will be imposed on a cleared resource for failure to meet its CSO which includes (a) being on outage in excess of the planned and unplanned outage rate assumed for determining its CSO, or (b) failing to comply with PSO's dispatch instruction. To be effective, the penalty will have to be set reasonably higher that the capacity payment. Separately, resources which fails to offer into the real-time market during projected scarcity conditions (that are neither on planned nor unplanned maintenance) will be monitored and penalised by the Market Assessment Unit (MAU). The penalty regime will be applied consistently across all cleared resources including IGS. Please refer to Section X (Supply Obligations and Performance Penalties) of the FCM Design Proposal for more details.
	Others	There should not be any discrimination between the incumbents and new entrants in terms of the tenure of the	EMA agrees that there should be no undue discrimination between resources in the FCM in terms of technology type and vintage. In respect of CCGTs, they will continue to be the main

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		locked-in capacity price, this is to ensure a level playing field among the market participants.	generation technology to meet baseload electricity demand efficiently over the next decade. They are also proven frequency responsive resources that provide online reserves which are essential for maintaining power system security. With growing electricity demand and significant CCGT capacity reaching end of life, there is a need to facilitate the adoption of more efficient CCGTs to meet baseload demand as well as provide reliable online reserves so that the overall energy efficiency of our power generation sector can also be improved. As such, EMA intends to facilitate this by offering multi-year commitment (MYC) of 10 years for new/repowered CCGTs with an economic lifespan of at least 25 years and which meets the proposed heat rate standard for power generation, in the first auction that the CCGTs clears over the next decade. For the delivery years after the end of the MYC, the CCGT will be considered an existing unit and will not be eligible for MYC in the auctions for those delivery years.
		As indicated in the first proposal by Brattle that the Energy Market will be subjected to SRMC bidding, it is unclear what will be the treatment for capacity above the QCAP over the delivery period.	With or without the FCM, anti-competitive bidding behaviour in the spot energy market remains a concern. Please refer to Section XII (Reforms to Energy/Ancillary Services) of the FCM Design Proposal for details of the proposed mechanism to curb the potential exercise of market power in the spot energy market.
		The settlement and recovery mechanisms of capacity payments are still unknown. It is critical to ensure that a causer-pays principle exists, where there should be a separate billing item for the capacity charge to consumers. This is in order to avoid a situation where suppliers are pressured into subsidising the costs due to competition.	EMA notes the industry's preference to levy the capacity charge as an independent charge, distinct from the other market charges. We will be consulting the industry on the proposed settlement framework for capacity charge in Jun 2020.
SP Group on behalf of SP Services Ltd	X. Cost Allocation	• SPS notes the proposal to implement FCM from Q1 2021 for delivery in Q2 2023, while LNG vesting ends Q2 2023. a. As there is over-lap between FCM and LNG vesting, will both FCM fees and vesting contract fees be collected from consumers in Q2 2023? b. Will FCM be replacing vesting contracts as a new subsidy to the Gencos?	Please refer to the Third Consultation Paper for the adjusted FCM implementation timeline.

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		• What is the notional cost for vesting versus the FCM; and the expected impact of FCM on consumers? • SPS would like to stress that the cost of the FCM should be allocated equally to all consumers based on actual consumption to be equitable.	The capacity charge and spot energy prices that consumers pay in the enhanced SWEM is expected to, in aggregate, be at the long-run marginal cost (LRMC) of efficient capacity. Please refer to Section XI (Settlement and Cost Allocation) of the FCM Design Proposal for the considerations and recommendation for the FCM cost allocation framework.
	VI. Forward Capacity Auction	• As the clearing price for the FCM is dependent on the bids of participants, how does EMA intend to address the issue of a few large suppliers exercising market power to drive up the clearing price? Will there be a cap on the clearing price and/or bids to mitigate the situation of runaway prices? How does EMA envisage smaller players participating in this auction?	Please refer to Section VI (Capacity Market Power Monitoring and Mitigation) of the FCM Design Proposal for the measures to control market power in the FCM which include imposing (a) offer caps on pivotal capacity suppliers to prevent economic withholding of capacity (b) must-offer requirements on all sizable generation resources (i.e. with unit generation capacity of 10 MW or above) that are directly connected to the grid to prevent physical withholding of capacity.
	X. Settlements	• SPS needs to be consulted on the required changes in advance so that it has sufficient time to study the impact of such changes, including changes to the settlement, billing, tariff as well as funding impact on SPS. How will the associated cost be passed onto SPS/retailers? o The proposal to assign costs to each customer based on their demand during peak periods works only if all customers have AMI meters, which is not the case today. There are inaccuracies with using an assumed load profile in lieu of actual half hourly reads. For a start, EMA could consider smearing costs to all consumers on a kWh basis. o Will there be new billing line items? Are we expecting a new billing line item or changes to the existing billing line items for both contestable and non-contestable load accounts, or non-market participant retailers who buy through SPS? What about billing line items for consumers with distributed generation (both IGS and non IGS) or participate in demand response schemes as they may participate in FCM?	EMA will consult the industry, including SPS, on the settlement framework for capacity charge in Jun 2020.

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		Misalignment in the allocation of costs to SPS and by SPS to its customers could result in over/under recovery for SPS. Consideration needs to be given on the treatment of uncollected costs if there are changes in the consumer base (e.g. account closure), actual consumption turns out to be different from forecast etc. ○ Based on the revised recommendation, we would like to clarify whether EMA still intends to track costs at a consumer level as this introduces added complexity as information needs to be time sliced and stored, and the consumer base could change over time (e.g. account closure). ○ It is preferred for the cost to be allocated ex-post based on actual consumption, and for the half hourly $/MWh rates to be published by EMC (as opposed to a lump sum amount to be charged to SPS) and provided to SPS for billing. Otherwise, OUR will rise due to the difference in the EMC charges/prices, and in the actual/forecasted consumption. It will also be difficult for the industry/consumers to verify against our bills and for SPS to explain to consumers how the charge is derived. • What is the impact on the tariff formulas? With the implementation of FCM as well as reforms to the existing spot market and roll down of vesting, will there be changes to the associated tariff formula?		With the FCM, all load serving entities including retailers and MSSL will be levied capacity charge by EMC in respect of their respective consumers' half-hourly load. So long as the MSSL offers regulated tariff for electricity supply to non-contestable consumers, the regulated should incorporate the capacity charge. The energy component of the regulated tariff will depend on the arrangement by MSSL to hedge its bulk purchase from the spot energy market to serve any non-contestable load, especially when the remaining LNG vesting contracts expire post Jun 2023.
Sunseap Group Pte Ltd		Comments (Solar Generators)	Comments (Reserve/Ancillary Services Providers)	
	Product Definition	Seek clarity if the CSO is limited to per grid connection or aggregatable to the	Suggests that participating capacity to be on an aggregated basis.	Please refer to Section IV (Supply Resource Qualification and Capacity Ratings) of the FCM Design Proposal details.

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		portfolio of the market participant. Sunseap strongly suggests to have aggregable CSO at the portfolio level.		
	Supply Curve (including Resource Qualification and Offer Mitigation)	How would solar generation be defined in UCAP since technically there is neither UOR nor POR? Sunseap suggests Qualified Participating Capacity = solar system size x annualised average daily sun hours x 365 days *Note: Annualised average daily sun hours to be determined jointly by EMA & SERIS*	NIL	
	Supply Obligations and Performance Incentives	Due to the highly unpredictability and intermittent nature of solar generation, Sunseap is willing to take a lower annualised average daily sun hours as performance incentive if actual supply exceeds CSO, under the condition that when the performance is below the CSO, penalty rates will not be imposed.	NIL	
	Dispatchable Generation	Will there be a different formula to quantify ICAP & QCAP for IGS like solar?	Will there be a different formula to quantify ICAP & QCAP for ancillary services (e.g. contingency reserve provider and regulations services using ESS)?	
	Imported Capacity	Seek clarity on specifications and in-depth requirements for	NIL	

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		both grid connected capacities and NEMS valuation.	
Tuas Power Generation Pte. Ltd.		**<u>Tuas Power's comments on Developing a Forward Capacity Market to enhance The Singapore Wholesale Electricity Market Second Consultation Paper</u>** We noted the major changes in the framework of the FCM design from the first consultation paper, including removing the interim auction and compressing the design and implementation schedule of the FCM from two years to one year. The design and implementation of the end-state auctions in the first consultation paper was expected to complete by end of 2021 but the second consultation paper has planned for the design and implementation to be completed by end of 2020). The interim auctions, with delivery from 2021 to 2025, were previously communicated to the Gencos with the intention to address the sustainability issues faced by the power generation sector saddled with generation over-capacity, excess gas commitment and slow power demand growth than that projected. If the current financial situation of the Gencos can be improved, reasonably, the retirement or mothballing plans of the existing generation capacity will be pushed back and the projected reserve margin can be maintained above the minimum reserve margin of 30%. The existing generation capacity will be able to fulfil the projected peak system demand and to meet the minimum reserve margin until new capacity/ investment enters the market. In this regard, the interim auctions can serve to provide incentives to the existing resources to maintain resource adequacy and supply reliability in the short-term, which is in line with the objectives of the FCM. We have also expressed concerns on the accelerated implementation schedule for the FCM from end of 2021 to end of 2020. The Draft Detailed Design Proposal issued by the Brattle Group ("Brattle") in December 2019 is still at a	Following the first consultation, Electricity Futures Market (EFM) participants and electricity retailers provided feedback that a forward period of at least two years is required to provide them with sufficient lead time to adjust their contract positions. EMA as the regulator will need to balance the stakeholders' interest. EMA has therefore adjusted the timeline to cater for a 2-year forward period for the first Compressed Auction. The FCM is not intended to address any short-term financial challenges that gencos are facing in the current market down cycle, nor to address near term concerns with supply reliability. The proposed FCM is intended to complement the existing spot energy market to achieve the following objectives in the <u>long term</u>: (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. The FCM achieves these objectives by procuring in advance sufficient capacity supply that is required to be available to meet reliability standard in the delivery year at least cost to consumers. This facilitates orderly entry and exit of capacity and mitigates the down and up cycles expected from the current energy-only market (EOM) which is undesirable for both capacity investors and consumers. In the long run, the capacity charge and spot energy prices that consumers pay in the enhanced SWEM (spot energy plus FCM) is expected to, on aggregate, be at the long-run marginal cost (LRMC) of efficient capacity. As EMA has assessed that the FCM and SWEM is the best market mechanism to achieve a sustainable wholesale electricity market design, we should develop and implement the FCM as soon as practicable.

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		preliminary stage and has not addressed some of the key principles and design parameters, including	
		1) How would the translation of minimum reliability standard of 3 Loss of Load Hours ("LOLH") to the minimum reserve margin of 30%/ ICAP or QCAP change with (i) the entry of large capacity units, such as H-class CCGT with installed capacities of 550-600MW; and (ii) an increased solar deployment target of at least 2GWp by 2030. There is a discrepancy in the minimum reliability standard stated in the Brattle's Draft Detailed Design Proposal and in the Capacity Assurance Scheme ("CAS") consultation paper issued in November 2005. The CAS consultation paper cited a 3 days per annum of Loss of Load Probability (LOLP), i.e. 3 days in a year when system demand could not be fully met, which translates to a required reserve margin of 30%. On the contrary, the Brattle's report cited a 3 Loss of Load Hours (LOLH) in a delivery year, i.e. 3 hours per year when system's hourly demand is projected to exceed the generating capacity. Therefore, if the minimum acceptable reliability level is increased to 3 LOLH, it is expected that the required reserve margin/ ICAP Reserve Margin/ equivalent QCAP procurement quantity in the FCM, also taking into account point (1), will have to be increased correspondingly. We would appreciate if Brattle/ EMA can share with the industry how the LOLH is being translated to the required reserve margin.	EMA will be providing more information, to explain in detail the reliability standard based on LOLH and the methodology to determine the required reserve margin to achieve the standard.
		2) The possible reforms to Energy, Ancillary Services markets. In particular, we do not support to mitigate the resources' energy offers to short-run marginal cost. The market design ("*Wholesale Market Design*" – PHB Hagler Bailly, 2nd Aug 2000) adopted for Singapore Wholesale Electricity Market ("SWEM") is that of a self-commitment market "*driven by both a desire for economic efficiency and for increased commercial sovereignty*". In the wholesale market design paper, the designer articulated that generators offers should have enough flexibility to signal to the market their desired unit commitment for a workable market design, including managing startup costs and coordinating their gas nominations with their	With the FCM, there is no plan to lower the current spot energy price cap from the current $4,500/MWh in the first instance. However, to mitigate potential uncompetitive bidding in the spot energy market, EMA intends to implement a one-pivotal supplier test (1PST) and cap the offer prices of suppliers who fail the 1PST. Please refer to Section XII (Reforms to Energy/Ancillary Services) of the FCM Design Proposal for details.

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		electricity market dispatch. There was also an articulation for "uncapped" energy price (*pg 7 – "Unrestricted energy offers"*), which is represented by the high upper and lower limits on the energy prices specified in Appendix 6J of the market rules (currently set at ±S$4,500MWh).	
		3) With regards to the Commitment Term, we propose for EMA and Brattle to consider not to differentiate between a new and existing resource and the duration of commitment term for all the cleared resources. Compared to other jurisdictions with larger power systems, such as the PJM, Singapore's market is relatively small with an average demand of ~6000MW. Coupled with slow demand growth (1-2%), a new CCGT entry may result in an overcapacity situation and low FCM clearing prices for 3-5 years and this may not be viable for the resources with high capital investment (e.g. CCGT). In view of the size of the different markets and the expected demand growth, we would appreciate if Brattle could provide a proposal on the Commitment Term that is equitable to both the new and existing resources.	The purpose of providing a commitment term of more than the default period of one year is to improve revenue certainty for new investors with high capital costs, which may reduce financing costs. This is to attract new entrants when the need for additional capacity to meet demand arises. On the other hand, existing resources have already entered the market. The current proposal is to accord new/repowered CCGTs, with an economic lifespan of at least 25 years and which meets the proposed heat rate standard for power generation, to qualify for a multi-year commitment of 10 years in the first auction that the CCGTs clears over the next decade. Over the next decade, gas-fired CCGTs will continue to be the main generation technology to meet baseload electricity demand efficiently. They are also proven frequency responsive resources that provide online reserves which are essential for maintaining power system security. With growing electricity demand and significant CCGT capacity reaching end of life, there is a need to facilitate the adoption of more efficient CCGTs to meet baseload demand as well as provide reliable online reserves so that the overall energy efficiency of our power generation sector can also be improved. For the delivery years after the end of the MYC, the CCGT will be considered an existing unit and will not be eligible for MYC in the auctions for those delivery years. Please refer to Section VII.C (Commitment Term) in the FCM Design Proposal for more information.
		4) The approach to qualify intermittent resources installed capacity into QCAP. The approach adopted must not over award capacity that is intermittent and not guaranteed to be available when it's most required. Not only would over accrediting intermittent capacity undermine the capacity price by increasing supply, it would expose the Singapore market to potential energy shortfalls if insufficient dispatchable generation is accredited (or cannot otherwise remain viable) because it was squeezed out of	Please refer to Section IV (Supply Resource Qualification and Capacity Ratings) in the FCM Design Proposal for more information on the qualification of intermittent sources.

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		the FCM by intermittent capacity. This risk can be mitigated by limiting eligibility of intermittent capacity, placing a requirement for a minimum level of dispatchable generation that must clear in the FCM, carefully calibrating the contribution of intermittent capacity to reliability, or through transition arrangements that ensure the market is in a more overall balanced and sustainable supply and demand position before exposing new intermittent resources to potential windfall financial gains at the expense of existing capacity. Without clarity on the key principles and design parameters, it would be challenging for the Gencos to provide comments to design a FCM that can lead to sustainable and viable FCM and Singapore Wholesale Electricity Market ("SWEM"). Given that design proposal from the Brattle Group has yet to be completed, Tuas Power would like to reserve the opportunity to review the design proposal and provide revised and further comments based on any updated information on the design parameters by the Brattle Group. Notwithstanding the above, we would like to iterate our position that there is currently no evidence to suggest that an Energy-Only-Market ("EOM"), in its equilibrium state, is unable to provide appropriate signals for new planting. In additional, there are many forms of capacity remuneration mechanisms available, including the CAS that EMA has planned to implement in 2006. In this regard, we would like to EMA to share with the industry if a feasibility study has been conducted to conclude that a competitive auction-based FCM is the most appropriate mechanism for the Singapore market. Finally, given that the FCM has significant impact on the electricity market, especially on the sustainability of the Gencos, the principles and rationale of this market development should carefully and thoroughly considered, including a full and comprehensive review, as well as simulation studies on the likely outcomes, so that its impact to the various markets can be assessed.	EMA has assessed various market design options to meet Singapore's reliability standard sustainably for both consumer and capacity investors. The assessment, which EMA has shared during the Industry Briefing Session in Feb 2020, established the need to introduce a FCM to achieve the objectives of: (i) maintaining the reliability standard by providing adequate incentives to existing and new resources; and (ii) maximising economic efficiency to minimise long-run costs to consumers. The full substantive FCM design is given in the Third Consultation Paper. We would appreciate constructive comments on what are the changes necessary to enhance the proposal to better achieve the above stated objectives of the FCM.
YTL PowerSeraya Pte. Limited		**FEEDBACK ON THE CONSULTATION FOR DEVELOPING A FORWARD CAPACITY MARKET TO ENHANCE THE SINGAPORE WHOLESALE ELECTRICITY MARKET** YTLPS highlighted that long-term financial sustainability and efficient performance of the industry would be the most	The proposed FCM is intended to complement the existing spot energy market to achieve the following objectives in the

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		important factors to consider in the event the EMA was to create a FCM. Given that a FCM would be a radical change to Singapore's electricity market regime, YTLPS highlighted the importance for the EMA and its consultants, the Brattle Group ("Brattle"), to engage the industry continuously and on an in-depth level to formulate the design of the FCM and also understand its implications for the SWEM. While YTLPS appreciates the EMA hosting the Industry Briefing, industry players have provided feedback that a full market review is required in order to determine the scheme or market design suitable for both investors and consumers. YTLPS reiterates the same request for follow-up industry workshop sessions with Brattle to discuss and evaluate the most suitable arrangement for the future of the SWEM. We believe that more in-depth analysis and discussion should be undertaken before the EMA makes any decisions regarding a FCM, including whether to implement a FCM in Singapore. The milestones indicated by the EMA to issue a final design by Q2 2020 are clearly too rushed. It is not necessary to abide by such a hurried timeline. We will go into detail on why a FCM need not be implemented by Q3 2023 in the later sections of this letter. **Failures of SWEM has not been examined** In Brattle's paper and as described by the EMA at the Industry Briefing, the introduction of a FCM is to supplement the SWEM, which is an energy-only market ("EOM"). The cornerstone of an EOM is that electricity prices are given a free hand to reflect the market's demand-supply situation. When supply scarcity is prolonged, electricity prices will rise, thereby attracting new capacity investments to bring the market back to equilibrium. Creating a FCM does not address the existing problems in the SWEM. The current issue is that there has been a massive oversupply in generation capacity and over-contracting of long-term firm liquefied natural gas ("LNG") after the Singapore LNG terminal was commissioned in 2013. Over 4,400 MW of combined gas cycle capacity was added to the market from 2012 to 2016, during the same time Singapore's economy was maturing and energy demand growth slowed down. In 2010, the EMA had projected that Singapore's peak energy demand would grow from 6,494 MW to 8,661 MW by 2019 (extracted from the EMA's consultant,	long term: (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. The FCM achieves these objectives by procuring in advance sufficient capacity supply that is required to be available to meet reliability standard in the delivery year at least cost to consumers. This facilitates orderly entry and exit of capacity and mitigates the down and up cycles expected from the current energy-only market (EOM) which is undesirable for both capacity investors and consumers. In the long run, the capacity charge and spot energy prices that consumers pay in the enhanced SWEM (FCM plus spot energy market design) is expected to, in aggregate, be at the long-run marginal cost (LRMC) of efficient capacity. The current oversupply situation resulted from gencos' commercial decisions on generation planting and contracting of LNG. The FCM is not intended to address any short-term financial challenges that gencos are facing in the current market down cycle, nor to address near term concerns with supply reliability. EMA has assessed various market design options to meet Singapore's reliability standard sustainably for both consumer and capacity investors in the long term. Other jurisdictions who have faced or are facing similar challenges have adopted, or plan to adopt the FCM to supplement their spot energy market. The assessment, which EMA has shared during the Industry Briefing Session in Feb 2020, established the need to introduce a FCM to achieve the objectives stated above. With regard to the existing energy-only market (EOM) design, it has been established that such design results in gencos facing financial challenges and does not guarantee the required reserve margin will be met to achieve the reliability standard over time. EMA will be issuing more information detailing the analysis comparing the sustainability of the EOM versus a FCM plus spot energy market to achieve Singapore's reliability standard. In addition to the industry-wide workshops and briefing sessions that EMA has conducted on a regular basis since last year, we have also been engaging stakeholders through group meetings in particular for gencos. We will be conducting more sessions/meetings.

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		PA Consulting Group's final report dated 27 September 2010 for The Review of Parameters for Setting the Vesting Contract Price for 2011 and 2012). However, the peak demand in 2019 was only 7,404 MW. Adding to this problem was the increase in market share from embedded generation and solar generation over the past few years. As a result of the aforementioned reasons, electricity prices have been depressed since the entry of LNG and have not risen to a level at which new capacity is needed. At the Industry Briefing, the EMA highlighted its concerns that Singapore's EOM may not be able to address resource adequacy and supply security after 2021. This is not a sentiment felt by the audience, including YTLPS. Due to the slow demand growth and increasing amount of investment in embedded generation and solar generation, conventional generation companies ("gencos") like YTLPS have been struggling to achieve sustainable returns for its investments. The overcapacity predicament is aggravated by the firm LNG commitment taken up by the gencos, which has prevented the market from working its way back to equilibrium. Without allowing the market to work its way back to equilibrium, YTLPS questions whether it is too soon for the EMA to conclude that SWEM as an EOM has failed to ensure resource adequacy for the future. In our view, if a commercial case is warranted, some of the proposed capacity retirements will be deferred while the free market could attract capital for new capacity. Hence, taking into consideration low electricity demand growth, embedded generation and solar generation, YTLPS believes there is no need to introduce a FCM to ensure resource adequacy from 2024 to 2027. **Examining whether a FCM is the best solution for Singapore** The FCM is a market-based framework, just like the EOM. Furthermore, the FCM is an administratively driven market, which creates additional risks on top of the market competition risk which the power industry already bears. YTLPS has voiced our concerns in previous conversations with the EMA about the financial sustainability of the industry. Other than to address the government's resource adequacy concerns, the EMA and Brattle should come up with a suitable market model to ensure the sustainability and flexibility of the industry,	The full substantive FCM design is given in the Third Consultation Paper. We would appreciate constructive comments on what are the changes necessary to enhance the proposal to better achieve the above stated objectives of the FCM. As EMA has assessed that the FCM and SWEM is the best market mechanism to achieve a sustainable wholesale electricity market design, we should develop and implement the FCM as soon as practicable.

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		bearing in mind that Singapore's market size is only 7,500 MW and that gas forms 95% of fuel source for power generation (exacerbated by full reliance on imported gas). YTLPS opines that it is inappropriate to simply adopt a model from other jurisdictions, which are shaped by different considerations and circumstances, and conclude that a FCM is a workable solution for Singapore. At the Industry Briefing, YTLPS suggested that the EMA conduct a full market review to determine the fundamental problems facing the Singapore market and assess if there is a real need for capacity to be added. We believe it is through a root-cause analysis that the right tools to solve the problem can be identified. Thus, YTLPS urges the EMA to conduct such an assessment without delay. At the Industry Briefing, the EMA stated two objectives of a FCM: (i) to maintain resource adequacy and (ii) maximize economic efficiency to consumers. Regarding the latter objective, YTLPS would like to stress that economic efficiency is only truly maximized when consumers, producers and investors are all taken care of. YTLPS agrees that a free-hand EOM like the SWEM could have a sudden entry of new investments resulting in overcapacity, underutilization and, hence, capital loss. However, the same could happen in a FCM if demand is over-projected on any given year, creating more capacity than needed and subsequently becoming stranded or commercially unviable. It is paramount that if a FCM is brought to market, it should not only serve to drive new capacity but serve to drive the right balance of capacity mix continuously over many years. In light of (i) the small size of Singapore's market, (ii) peak demand growing less than 200 MW a year and (iii) the government looking to diversify the electricity fuel mix to renewables and import options, a poorly-designed reform of the SWEM will have the backfiring effect of perpetuating the financial stress of the conventional gencos, which form the bedrock of the power system. YTLPS believes that a FCM may not be a solution that can address the government concerns for energy security and simultaneously enable the industry to be financially sustainable. For instance, the requirement to have 30% of capacity reserve margin in a gas-based system will cause the power generation sector to be perpetually oversupplied and commercially unviable. If this is the case, the EMA needs to use a different set of solutions to ensure supply security instead of relying on a single market-	

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		based FCM to meet, amongst others, this objective. At the Industry Briefing, the industry proposed for vesting contracts to be extended, taking into consideration the low demand growth as well as the increasing capacity in embedded generation and solar generation. Besides extending the vesting contracts, the EMA can also consider other incentives to add to existing resources, such as using reliability must-run and fast-start contracts to contract capacity for providing system reliability. These capacity would be kept for reliability purposes outside of the broader market, whether the market remains an EOM or becomes an EOM with a FCM. **Bankability of FCM is untested** YTLPS, like the other gencos, prefers extending the vesting contract regime because it is well understood by the market and, more critically, the financiers. The power industry is a capex-heavy industry, which requires not only new financing but also regular refinancing. Any proposed reform has to provide confidence to the lenders and investors. Other jurisdictions created capacity markets to supplement and work in tandem with the real-time energy market. The capacity markets provide additional revenues to address 'missing money' issues in the energy market as the growing share of renewable generation have led to very low or even negative energy prices. In mature and deep markets, the two streams of revenue allow lenders and investors to be more confident in financing generation projects. At the Industry Briefing and through the two consultation papers, we have not read or heard anything instilling confidence that this will be the case in Singapore. Instead, the EMA's decision to defer the initial plan to implement the capacity market from 2021 to Q2 2023 due to concerns voiced by the electricity futures market makers is an indirectly acknowledgement that the capacity market could have an impact on energy market outcomes. If, in conjunction with a FCM, the EMA were to implement a further set of reforms for the energy market, that would only add another level of uncertainty to industry players and concerned investors. At the Industry Briefing, YTLPS questioned whether a FCM is suitable for Singapore, considering the potentially volatile outcomes because of the small market and demand uncertainty. This impacts not only the annual capacity auctions but also the energy market as a whole. The price cap	

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		for the capacity auction is currently proposed to be determined through a Net CONE. However, a good Net CONE estimate requires the demand, energy and ancillary market revenues to be projected with a high degree of confidence. In our First Response, YTLPS had suggested not to impose a bid cap on the capacity auctions. This is because doing so would reduce the impact of estimating a Net CONE which is too low. Alternatively, the EMA should acknowledge that offers above the bid cap are not necessarily due to an exercise of market power but may instead be due to potentially erroneous estimates. Gencos should not be penalized by requiring their offers to be mitigated to a level 'acceptable' to EMA. As an industry regulator, the EMA should not be only concerned about high price outcomes, but also low price outcomes. Should the EMA review and still consider a FCM as the best approach moving forward, the EMA must consider setting price floors, not only in the capacity market but also the energy market, at levels which can ensure continued financial sustainability of the industry. **Conclusion** YTLPS agrees with the EMA that a FCM is not meant to be a replica of a power-purchase agreement model. It is a market based mechanism, which will introduce risk and uncertainty to investors and lenders. However, continued financial sustainability of the industry requires a risk-return spectrum which takes into account the foreseeable upsides as well as the potential downsides. As a result of the market's inability to effectively correct the oversupply situation, the several years of poor financial performance by the gencos have led to an erosion of confidence for continued investments into the SWEM. In order for the SWEM to recover its health, it is highly necessary for the EMA to find a most suitable model that will address the core issues faced by the market and plug the gaps in SWEM. We do not agree that the proposed FCM and EOM is going to be better than the current EOM. Instead, this introduces a new level of uncertainty due to the administrative concept. In light of all the reasons stated in this letter, the industry consultation on a proposed FCM requires a longer period than the EMA's proposed timeline. If the EMA's comprehensive review finds that a FCM is suitable, the FCM model should be one which serves the best interests of all	

Annex A: Summary of Responses Received to the Second Consultation Paper on Developing a Forward Capacity Market to Enhance the Singapore Wholesale Electricity Market

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		segments of the industry – consumers, renewable producers and existing and new conventional gencos. YTLPS will continue to lend our support to the EMA on this matter, in line with our stated desire to be engaged in continuous dialogue with the EMA and Brattle on key learnings and takeaways from other jurisdictions.	