
# CENTRALISED PROCESS TO ENSURE SUFFICIENT GENERATION CAPACITY

# FINAL DETERMINATION PAPER

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# CENTRALISED PROCESS TO ENSURE SUFFICIENT GENERATION CAPACITY

## *FINAL DETERMINATION PAPER*

## Executive Summary

1 As global energy markets become more volatile amidst geopolitical tensions and the global energy transition, the Energy Market Authority ("EMA") will be introducing guardrails to strengthen the existing competitive market structure and ensure that Singapore is well-positioned to navigate the energy transition.

2 Over the past two decades, investments in new power generation technology and capacity have been driven by the commercial considerations of power generation companies ("Gencos"). These considerations include Gencos' own business plans and their commercial outlook for electricity demand. While this approach has generally served us well by increasing innovation and efficiencies in operations, it does not provide sufficient assurance that there will be sufficient generation capacity at the system level.

3 To ensure that we have sufficient generation capacity to serve demand in a secure and reliable manner, EMA is introducing a centralised approach to coordinate the planting of new generation capacity in Singapore by the private sector. This will be done through a competitive process as and when additional generation capacity is required ("Centralised Process"). The competitive process will be conducted 5 years ahead of when the additional capacity is required.

4 EMA embarked on a public consultation exercise from 10 Apr 2023 to 8 May 2023 to seek feedback on the proposed Centralised Process. On 1 Jun 2023, an addendum to the consultation was issued to inform the public of the power system's need for new generation capacity in 2028.

5 Feedback received from the public consultation had indicated that the industry was generally supportive of the Centralised Process and recognised the need for a centralised planning process to avoid under/over-capacity in the system. However, there were requests for greater clarity on EMA's supply and demand projection methodologies, operating parameters of generating unit built by EMA, provision of revenue support for new generation planting and the proposed Request For Proposal ("RFP") timeline. These will be addressed in subsequent sections of the Final Determination Paper. The framework for the Centralised Process and the RFP for new generation capacity will also be set out in this Final Determination Paper.

6 EMA will continue to review the design framework of the Centralised Process and the RFP for new generation capacity to safeguard the continued security and reliability of the Singapore power system.

## Feedback from the Public Consultation for the Centralised Process

7 A total of 10 companies responded to the consultation paper.

8 Respondents sought greater clarity on the parameters of the Centralised Process, including:

(i) How EMA projected electricity demand growth;
(ii) How EMA projected electricity supply;
(iii) The operating parameters of the EMA-owned and/or EMA-operated generating unit

Some respondents also asked if EMA will be providing revenue support for the planting of generating units, similar to the revenue support scheme being offered to electricity importers.

**Table 1: Summary of Key Feedback**

| Section | Key Feedback | EMA's Position |
|---|---|---|
| Electricity Demand Forecast ("EDF") | Given the historical growth trend of 1-2%, EMA should provide greater transparency on the considerations of the demand forecast methodology which was used to derive the projected 4-6% demand growth in 2028. This would provide potential RFP participants with better insights before making an informed investment decision.<br><br>To provide more demand certainty, EMA could consider the following options:<br>• Implementing the Large Discrete Load ("LDL") framework;<br>• Delay commissioning of awarded planting, imports or adjust operation of EMA-owned generating units | Electricity demand is driven by various factors such as growth in gross domestic product ("GDP"), temperature, and population. In Singapore, the non-residential sector contributes to about 80% of electricity demand today and is projected to increase over time. Some electricity-intensive industries such as data centres and advanced manufacturing are expected to contribute to the demand growth in the coming years. Additionally, emerging sectors such as agri-tech and electric vehicle charging are envisaged to experience significant growth over the next decade. EMA is unable to share the specifics of these investments as they are commercially sensitive information.<br><br>EMA regularly reviews the EDF to account for latest updates of projected demand of the various sectors. Nonetheless, as with any commercial venture, interested private parties would need to make their own assessment of the demand outlook, before making an investment decision on planting new generation capacity. |

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| | | EMA closely monitors the electricity demand and supply situation, including the growth in large electricity consumers which can lead to significant swings in demand.<br><br>EMA will also phase the entry of new generation capacity through the Centralised Process, to account for changes to the demand and supply picture. EMA will be providing more details on the electricity demand outlook in the upcoming RFP. |
| Supply projection | To clarify on the considerations behind the supply projection (e.g. electricity imports, solar PV and the 2 new CCGTs in 2026) in 2028 as well as the target RRM and the considerations of the assessment methodology used<br><br>EMA should also consider the long-term impact of domestic solar PV growth and large-scale electricity imports to ensure there would not be over-capacity in the system | EMA conducts a holistic projection of generation supply and take into account all generation sources in the system, including electricity imports, solar PV and other potential new sources of generation capacity.<br><br>EMA's projection of the supply capacity in 2028 considers the following developments:<br>i. About 1 GW of existing generation capacity is expected to retire over the next 5 years as these plants will be relatively old (>35 years old)<br>ii. Projected domestic solar PV growth to 2GWp by 2030 with a solar PV effective capacity of 27%[1]<br>iii. 100MW of electricity imports from Lao PDR-Thailand-Malaysia-Singapore Power Integration Project ("LTMS-PIP")<br>iv. New generation capacity by Meranti Power (680MW) in 2025, and Keppel Sakra Cogen (600MW) and Sembcorp Cogen (600MW) in 2026 |

[1] With a solar PV effective capacity of 27%, this means that 2GWp (equivalent to 1.54GWac) of solar provides about 416MWac of effective supply during peak periods. More details on the solar effective capacity are available on https://go.gov.sg/solar-effective-capacity

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| | | The Required Reserve Margin ("RRM")[2] refers to the amount of spare generation capacity above the peak system demand that is required to cater for planned and unplanned outages of generating units.<br><br>EMA periodically reviews and updates the RRM to ensure that it adequately safeguards the adequacy, reliability and security of the power system. The current RRM is 27% and has been used as the basis for capacity projections. |
| EMA's owned/operated unit | To clarify the operating parameters of any generating unit that is built by EMA and how EMA ensures that:<br>• the EMA power plant does not intervene in the market and depress market prices.<br>• There will be a level playing field. | In our liberalised electricity market, the private sector has and continues to play an important role ensuring that we have sufficient generation capacity to meet demand. The upcoming new CCGTs by Keppel and Sembcorp are examples of the critical role that privately-owned gencos play. The Centralised Process is intended to facilitate private sector participation. By coordinating the entry of new generation capacity, EMA seeks to reduce risks of overcapacity, thus lowering investment risks for the private sector.<br><br>However, if there is no private sector interest to plant new capacity, or the RFP proposals submitted are assessed to be unsuitable, EMA will step-in to build the required generation capacity through Meranti Power. |

[2] More details on the methodology used to determine the RRM can be found on https://go.gov.sg/required-reserve-margin

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| | | EMA will consider various operating models, including but not limited to divesting or leasing the unit to the private sector if there is sufficient private sector interest to do so. Should Meranti Power be required to operate the generating unit, EMA will put in place safeguards to ensure that the unit does not compete unfairly against private generation companies. For example, EMA will put in place proper procedures and governance structures to mitigate any conflict of interests and operate Meranti Power at an arms-length from EMA. Meranti Power will also be subject to operational KPIs and performance indicators that are similar to the regulatory requirements and code of practices that privately owned generating units need to comply with.<br><br>EMA will consult the industry on the operating parameters of the Meranti Power-owned/operated unit, if any, in due course. |
| Revenue Support | EMA should consider using market-based mechanisms such as Vesting Contract to incentivise commercial planting, while keeping the market structure intact, instead of EMA stepping in to build. | EMA had previously considered mechanisms such as the Forward Capacity Market ("FCM") which were intended to incentivise commercial plantings. These mechanisms work by reducing gencos' investment risk through revenue support of capacity payments.<br><br>However, EMA did not proceed with the FCM as it is auction-based and may not provide competitive market outcomes and achieve the key objective of maximising economic efficiency, given the high-level of uncertainty the power generation sector faces.<br><br>Vesting Contracts are intended to underpin non-contestable consumer ("NCC") load, specifically to hedge the price of energy to be procured from the Singapore Wholesale Electricity Market ("SWEM") for supply to NCCs. |

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| | | EMA has the statutory duties to ensure sufficiency of generation capacity. As such, should there be be no private sector interest to build, own and operate under the Centralised Process, EMA will have to build as last resort.<br>. |
| Facilitating the Energy Transition | To clarify on the effectiveness of the Centralised Process in mitigating risks of energy transition, i.e. rising financing cost, without revenue support and how EMA intends to coordinate a systematic entry of the power imports into Singapore to prevent stranding of such fossil fuel new generating assets. | The Centralised Process aims to reduce the risks of over/under capacity by ensuring coordinated entry of new generation plantings. This includes considering the forecasted electricity demand, anticipated entry of electricity imports and new generating units, and retirement of existing generating plants to derive the amount of new generation capacity required in the power system.<br><br>This coordinated process helps to reduce the risks associated with the energy transition, such as risks of asset stranding. These should in turn, contribute to improving the bankability of these projects. |
| RFP timeline | The proposed RFP timeline which only gives RFP Participants 3 months to submit their proposals is too short | While the upcoming RFP in Jul 2023 will be opened for 3-months, EMA had given notice at the start of the public consultation process that new generation capacity will be required in 2028. From the start of the consultation, participants would have had 6 months to submit proposals.<br><br>In response to industry feedback, EMA will, for subsequent RFPs, provide advance notice on the generation capacity required 6 years ahead, instead of the current 4 years ahead outlook. This will be reflected in the Singapore Electricity Market Outlook ("SEMO"). EMA will continuously review the Centralised Process timeline and explore extending the opening window of subsequent RFPs. |

9 EMA's response to the rest of the feedback received is detailed in Annex A.

## EMA's Final Determination for the Centralised Process

10 As part of the Centralised Process, EMA will (i) project upcoming electricity demand on a rolling 10-year ahead basis; (ii) project available generation capacity on a rolling 6-year ahead basis. This provides respondents with information on the indicative plantings required for upcoming RFPs.

11 At T-5 years, EMA will assess whether new generation capcity is required. Should the 5-year forward projection show insufficient generation capacity to meet the projected demand and RRM, EMA will call an RFP for the private sector to BOO the required new generation capacity in June/July of the year. Conversely, if no new capacity is required, EMA will inform the industry accordingly. See Figure 1.

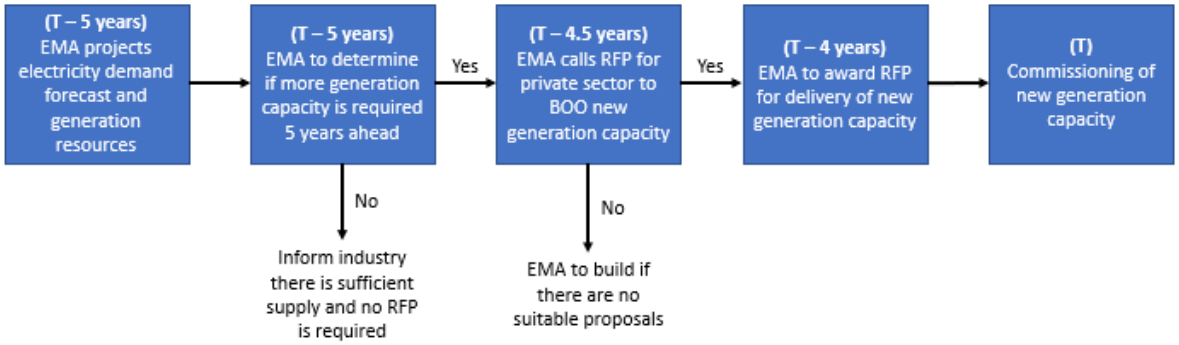


**Figure 1: Centralised Process**

12 In the event that there is no private sector interest to BOO the required new generation capacity or the proposals submitted are assessed to be unsuitable, EMA will step-in to build the required generation capacity through Meranti Power to ensure supply adequacy. EMA will consider various operating models, including but not limited to divesting or leasing the unit to the private sector if there is private sector interest. Should Meranti Power be required to operate the generating unit, EMA will put in place safeguards to ensure that the unit does not compete unfairly against private generation companies. For example, EMA will put in place proper procedures and governance structures to mitigate any conflict of interests and operate Meranti Power at an arms-length from EMA. Meranti Power will also be subject to operational KPIs and performance indicators that are similar to the regulatory requirements and code of practices that privately owned generating units need to comply with. EMA will consult the industry on the operating parameters of the Meranti Power-owned/operated unit, if any, in due course.

13 To avoid risks of over-capacity, EMA will require any proposed new generating unit, or any proposed increase in the capacity of an existing generating unit, of 100

MW or more[3] to participate in the Centralised Process except for the following types of generation facilities ("Excluded Facilities"):

a. Generating units with name-plate generation capacity of less than 100 MW, regardless of whether it is directly connected for direct supply into the power grid, or embedded within a consumer's premises to generate electricity for onsite consumption with potential export of excess electricity into the power grid;

b. For avoidance of doubt, electricity import facility/projects which EMA will select via the separate ongoing RFP process;

c. Energy storage system ("ESS") given its technical limitations which prevent it from constantly injecting into the power grid;

d. Solar photovoltaic ("PV") generation facility given that its energy supply is intermittent and limited to day-light hours;

e. Generating units that EMA may require the Energy Market Company ("EMC") to contract to provide ancillary services under the Electricity Market Rules; and

f. Research and development ("R&D") and testbed projects[4] which are typically selected under separate processes (e.g regulatory sandbox).

14 For avoidance of doubt, besides the Excluded Facilities, no new generation plantings will be allowed outside of this process. Companies with exceptional business considerations (e.g. synergies with plant processes) for the connection of new embedded generation facilities can seek an exemption and will be assessed on a case-by-case basis.

**Specifications for RFP**

***Timeline***

15 If new generation capacity is required, the RFP will be conducted around June/July each year and interested participants will be required to submit their proposals to EMA within 3 months of the launch of the RFP, i.e. September/October. EMA will award the RFP between October and December. The RFP winner will be issued a generation licence and will have minimally 4 years to commission the new generation capacity.

[3] The threshold of 100MW or more will be reviewed from time to time to ensure its relevance in meeting the objectives of the Centralised Process.
[4] E.g. ammonia, geothermal and fuel cell technologies.

16 We have received feedback from the industry that the RFP timeline should be extended to provide interested participants more time to prepare their proposals. In calibrating the timeframe for the RFP, EMA has sought to balance between ensuring that new capacity can be provided in a timely manner and the saliency of projections.

17 EMA has considered the industry feedback and will be introducing an enhancement to the Centralised Process to allow interested RFP Participants to commence the necessary preparatory works for the proposal. Instead of the current practice of providing the supply outlook 4 years ahead in the Singapore Electricity Market Outlook ("SEMO"), EMA will provide the indicative new generation capacity required 6-years ahead. Taken together with the demand projections (which provide a 10-year ahead outlook), this will give interested participants advanced notice on the indicative generation capacity required for the upcoming RFP.

18 EMA will continuously review the Centralised Process timeline and explore extending the opening window of subsequent RFPs.

***Land***

19 The new generation capacity should be built on participants' existing available land to optimise land use. Such proposals would be scored more favorably. However, a greenfield site may be made available for the new generation planting, if required. The indicative site available for the required generation planting in 2028 is indicated in Annex B.

20 To optimise usage of the greenfield site, which could accommodate two generation plantings, if a participant takes up the greenfield site referred to in para 19 to BOO a new generation planting, the participant would be required to participate in the subsequent/future three (3) RFPs called by EMA, to BOO a second new generation planting in the remaining land of the greenfield site. The offer in the subsequent/future RFP for the delivery of the second new generating unit shall minimally be able to meet the cardinal requirements of the subsequent/future RFP and shall minimally be no worse off with respect to the performance parameters. For avoidance of doubt, only the plot required for the first generating planting will be accorded to the RFP winner in the first instance and the remaining land may be accorded upon winning subsequent/future RFP.

***Performance Bond Framework***

21 EMA will shortlist a participant to award the RFP to ("Shortlised Participant"). Prior to being officially awarded the RFP, the Shortlisted Participant will be required to furnish a bond ("Performance Bond") in favour of EMA for a sum of up to S$100 million within 14 days of EMA's notification of being shortlisted. Failure to do so may result in

the Shortlisted Participant being disqualified, which will entitle EMA to shortlist another participant. After the Shortlisted Participant furnishes the Performance Bond to EMA, EMA will notify the Shortlisted Participant on the official award of the RFP ("Notice of Award"). For the avoidance of doubt, the Shortlisted Participant shall not be regarded as being awarded the RFP until and unless the Shortlisted Participant receives the Notice of Award from EMA.

22 The Performance Bond shall be in the form of an irrevocable on-demand performance bond and shall be issued by a local bank, wholesale bank, qualifying full bank or full bank or insurance company approved by Monetary Authority of Singapore.

23 The Performance Bond serves to secure (i) the RFP winner's timely delivery of the new generating unit (through interim project milestones) and (ii) the RFP winner's due and faithful performance and fulfilment of the performance parameters as declared in the proposal and/or as agreed with EMA ((i) and (ii) collectively known as "Performance Conditions").

a. The interim project milestones stipulated in the Performance Conditions shall include but not limited to (1) Signing of Engineering, Procurement and Construction ("EPC") Contract; (2) Receipt of URA's Provisional Permission; (3) Delivery of Gas Turbine(s) to Site; and (4) Registration as Generation Registered Facility ("GRF") with EMC. Participants shall include the proposed completion month and year for each milestone in their proposals.

b. The performance parameters stipulated in the Performance Conditions shall include but not limited to (1) Start-up Time; (2) Fuel Changeover ("FCO") Capability; (3) Low Gas Pressure Trip Setting; (4) Efficiency; and (5) Flexibility for Simple Cycle Mode. The RFP winner shall demonstrate its due and faithful performance and fulfilment of the performance parameters as declared in the Proposal and/or as agreed with EMA during registration as GRF.

The Performance Conditions shall be specified in EMA's notification of being shortlisted for the award of the RFP to the Shortlisted Participant, and/or EMA's Notice of Award to the Shortlisted Participant.

24 EMA will reduce the Performance Bond sum progressively upon completion of each project milestone, as stipulated in the Performance Conditions and/or EMA's Notice of Award. The remainder sum of the Performance Bond shall be returned to the RFP winner after the registration of the new generating unit as GRF with EMC or a date mutually agreed between the parties, whichever is later, provided the RFP winner has fulfilled all the Performance Conditions. An illustration of the performance bond project milestones is in **Figure 2**.

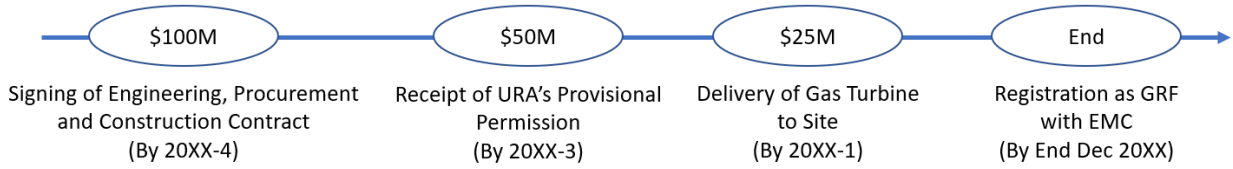


**Figure 2: Illustration of Performance Bond Project Milestones**

25 EMA reserves the right, in its sole and absolute discretion, to forfeit the Performance Bond or such part of it as EMA deems necessary for breach of any of the Performance Conditions.

***Cardinal Requirements***

26 Proposals that do not meet the following Cardinal Requirements will be disqualified for further evaluation:

a. ***Timely Delivery of the New Generating Unit***: The Participant must demonstrate its ability to deliver and register the new generating unit as GRF with EMC no later than 31 December of the preceding year which the generating unit is required. The design and performance of the new generating unit shall not have any adverse impact on the gas and electricity networks when connected and shall comply with the requirements as stipulated in the Transmission Code, Gas Supply Code and other relevant codes of practice and standards of performance issued or approved under the Electricity Act.

b. ***Legal and regulatory requirements***: The Participant must be a Singapore-incorporated company that will hold, if granted, the generation licence if selected by EMA through the RFP. If the Participant is a consortium, the consortium must be a Singapore-incorporated entity.

c. ***Financial Ability and Experience***: The Participant must demonstrate its ability to finance the proposed generation business and have the capability and experience to perform the duties under the Electricity Act and the electricity licence.

d. ***Submission of Generation Licence Application:*** The Participant must submit a Generation Licence application (if it is not an existing Generation Licensee) or submit a modification to Schedule A of its Generation Licence (if it is an existing Generation Licensee) via the GoBusiness Licensing portal as part of the Proposal. This shall be done prior to RFP closure.

e. ***Impact on Existing Generation Capacity***: Proposals which involve retirement of any existing generating units will be disqualified if such

retirement was not approved by EMA as part of the framework for retirement of generation units prior to RFP publication.

f. ***Emission Standards***: Demonstrate ability to meet prevailing Tier 1 [5] requirements under Emission Standards Framework.

***Evaluation Criteria***

27 Proposals that meet the Cardinal Requirements will be further evaluated against a set of Evaluation Criteria. The Evaluation Criteria for the upcoming RFP, subjected to further changes, is as shown in Table 2.

**Table 2: Evaluation Criteria**

| S/N | Criteria | Weightage | Description |
|---|---|---|---|
| 1 | Optimized Use of Land | 25% | Proposals will be assessed based on the type of planting site (i.e. existing site or greenfield site) as well as the amount of land used. Proposals utilising existing site will be scored more favorably. |
| 2 | Availability & Reliability of Generating Unit | 20% | Proposals will be assessed based on the track record of generating units of same make and model, using the following formula:<br>• Availability (%) = [(AH + OH)/Total Hours] x 100%<br>Where,<br>➢ AH is the number of hours the generating unit was available but not in the operating state<br>➢ OH is the number of hours the generating unit was in the operating state<br>➢ Total Hours is the total number of hours over the generating unit's total length of service<br>➢ AH, OH and Total Hours will be based on available aggregated data |

[5] EMA is currently consulting the industry on the Emission Standards Framework. Please refer to https://go.gov.sg/consultation-emissions-standards-framework for more details.

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| | | | • Reliability (%) = [OH/(OH + FOH)] x 100%<br>Where,<br>➢ OH is the number of hours the generating unit was in the operating state<br>➢ FOH is the number of hours generating unit was in forced outage state<br>➢ OH and FOH will be based on the same years considered for Availability<br><br>• Track Record will be based on Total Hours<br>Where,<br>➢ Total Hours is the total number of hours over the generating unit's total length of service<br>➢ Total Hours will be based on the same aggregated data used for Availability |
| 3 | Earlier Delivery | 15% | Proposals will be assessed based on its declared date of GRF registration with EMC. |
| 4 | Market Concentration[6] | 5% | Each Proposal will be assessed based on its impact on the market's Herfindahl-Hirschman Index ("HHI"), against that of other Proposals, considering expected generation capacity retirements and expected new entry. |
| 5 | Commitment to offer Price Competitive Contracts | 5% | Participant to commit to supplying energy to any person(s) nominated by EMA:<br>• using any available and uncontracted capacity of the proposed new generating unit and its existing generating unit(s) (if |

[6] EMA has established a cap of 25% on the generation capacity market share to prevent structural increase in electricity generation market concentration in respect of Keppel Merlimau Cogen Pte Ltd, SembCorp Cogen Pte Ltd, PacificLight Power Pte Ltd, Tuaspring Pte Ltd. With regard to Senoko Energy Pte Ltd, Tuas Power Generation Pte Ltd, and YTL PowerSeraya Pte Ltd, EMA has imposed the higher of either the 25% market share cap or their respective MWac licensed capacity cap, until the current expiry date of their respective Generation License

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| | | | any), capped at the licenced capacity of the new generating; and<br>• at an energy price (in $/MWh) equal to the actual short-run marginal cost ("SRMC") of the marginal capacity used to supply such energy plus a Specified Fixed Margin ("SFM") no higher than the non-fuel component of vesting LRMC.<br><br>Proposals will be evaluated based on the price competitiveness of the SFM. |
| 6 | Start-up Time | 5% | Proposals will be assessed based on the start-up time from each stage (i.e. cold, warm and hot). Start-up time is measured from Notification given to achieving full load. Participant shall provide the supporting document to demonstrate the new generating unit's start-up time capability. |
| 7 | Fuel Changeover ("FCO") Capability | 5% | Proposals that can complete FCO operation earlier than ten (10) minutes[7] upon initiation of FCO process to alternate fuel, and have a wider permissible loading level for FCO operation, will be assessed more favorably. For avoidance of doubt, this criterion does not consider blending of any H2 volume.<br><br>Participants may refer to Appendix F13 of the Transmission Code for FCO requirements. |
| 8 | Low Gas Pressure Trip Setting | 5% | Proposals will be assessed based on the use of natural gas as primary fuel, and gas pressure trip setting lower than |

[7] Transmission Code states that each newly commissioned generation facility, which is to be registered with EMC on or after 1 January 2021, shall be designed to complete FCO operation within 10 minutes upon initiation.

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| | | | 16barg [8] will be assessed more favorably.<br><br>Low Gas Pressure Trip Setting is measured at the System Offtake Point in accordance to the definition in Section A of the Gas Network Code (GNC). |
| 9 | Efficiency | 5% | Proposals will be assessed based on the efficiency while firing on natural gas and alternate fuel (i.e. diesel). |
| 10 | Flexibility for Simple Cycle Mode | 5% | Proposals with flexibility to operate on simple cycle mode will be scored more favorably. Participant shall provide the supporting document to demonstrate the new generating unit's operating mode capability. |
| 11 | Innovative and/or Decarbonised Generation | 5% | Proposals that include any innovative and/or decarbonized technologies will be scored more favorably. |

28 Performance parameters stated in the RFP submission will be checked against supporting documents (e.g. technical datasheets, location and plant layout, detailed project schedule, notification issued by SP PowerGrid and PowerGas for the proposed gas and electricity connections etc.) during the evaluation and verified via the actual performance capabilities of the generating unit during registration as GRF with EMC. These parameters are committal and enforced via the Performance Bond as detailed in paras 21 – 25 to avoid gaming the evaluation process.

29 The Cardinal Requirements and Evaluation Criteria will be reviewed with every RFP to ensure it meets power system needs at the required year of planting.

30 There will be no provision of revenue support for new generating units under the Centralised Process to avoid creating an unlevel playing field with the existing generating units in the system, which would distort competition in the market.

***Need for Generation Capacity in 2028***

31 Based on the current estimated amount of generation capacity in the system and projected electricity demand in 2028, EMA projects that the power system will

[8] Transmission Code states that each newly commissioned generation facility, which is to be registered with EMC on or after 1 January 2021, shall be designed to operate at its rated MW Capacity with a low gas pressure trip setting no greater than 16barg.

require one new CCGT in 2028, in addition to the two new advanced CCGTs by Keppel Sakra Cogen and Sembcorp Cogen which are expected to be commissioned in 2026.

## Annex A – Feedback Received for the Public Consultation for the Centralised Process

| S/N | Relevant Section | Feedback | Response |
|---|---|---|---|
| 1 | General | To clarify on the effectiveness of the Centralised Process in mitigating risks of energy transition, i.e. rising financing cost, without revenue support and that EMA should provide more clarity on the price cap mechanism in the wholesale market moving forward, the expected system demand, the reserve margin target and how EMA intends to coordinate a systematic entry of the power imports into Singapore to prevent stranding of such fossil fuel new generating assets. | The Centralised Process aims to reduce the risks of over/under capacity by ensuring coordinated entry of new generation plantings. This includes considering the forecasted electricity demand, anticipated entry of electricity imports and new generating units, and retirement of existing generating plants to derive the amount of new generation capacity required in the power system.<br><br>This coordinated process helps to reduce the risks associated with the energy transition, such as risks of asset stranding. These should in turn, contribute to improving the bankability of these projects. |
| 2 | General | It is noted that the forward projection on generation capacity is based on EMA's projection on demand and required reserve margin. Participant expresses its view on the adequacy of the said basis, and that they may not be sufficient effective competition in the market procured through the Centralised Process given that all new generation capacity or increase in generation capacity of 100 MW or more is required to participate in the Centralised Process. | The electricity demand is derived using various factors such as growth in GDP, temperature, population and demand from electricity-intensive industries such as data centres, advanced manufacturing, agri-tech and electric vehicles, and is EMA's assessment of the likely demand outlook. Interested participants are encouraged to make their own commercial assessment of the viability of investing in new generation capacity.<br><br>To ensure that there is adequate generation capacity and competitiveness in the Singapore Wholesale Electricity Market, in the case where demand is under-projected, the Centralised Process will |

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| | | | automatically trigger the procurement of more capacity in the subsequent year(s). |
| 3 | General | To align imports RFP and Centralised Process RFP frameworks regarding<br>i. performance bond and<br>ii. procurement of ASC back-up | (i) As the project costs and milestones of local generation planting and electricity imports differ significantly, the performance bond frameworks are tailored for each RFP. Notwithstanding, the performance bond sum for the RFP called under the Centralised Process will be reviewed regularly<br>(ii) Unlike the EOI for the procurement of ASC back-up for electricity imports, which primarily targets at existing CCGTs at end-of-lifespan (EOL), the RFP under the Centralised Process focus on new CCGTs. |
| 4 | General | To clarify if generation capacity awarded under the RFP would still be eligible for incentive scheme | Interested participants can apply for relevant incentive schemes separately from the RFP. |
| 5 | General | To meet climate target, use of other types of low carbon technologies (e.g. CO2 Separation, Hydrogen Generation and CO2-Hydrogenation, green ammonia) would be required | Any generation capacity awarded as part of the Centralised Process would be required to demonstrate its ability to meet the prevailing Tier 1 requirements under Emission Standards Framework.<br><br>To achieve our climate change targets, EMA is exploring electricity imports and hydrogen. Nonetheless, EMA remains open to other types of generation technology that could aid in meeting our climate change target. |
| | **Framework for Centralised Process** | | |
| 6 | Electricity Demand Forecasts | To clarify EMA's EDF methodology and the considerations behind the projected 4% to 6% | Electricity demand is driven by various factors such as growth in GDP, temperature, and population. In |

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| | ("EDF") | growth in EDF (e.g. projected GDP, temperature, new demand entrants etc.), as certainty in the demand projections is critical to making investment decision for generation planting.<br><br>It was proposed for EMA to carry out a 3rd party and independent assessment of EMA's EDF and prior consultation with Gencos before finalizing the demand forecast. | Singapore, the non-residential sector contributes to about 80% of electricity demand today and is projected to increase over time. Some electricity-intensive industries such as data centres, and advanced manufacturing are expected to contribute to the demand growth in the coming years. Additionally, emerging sectors such as agri-tech and electric vehicle charging are envisaged to experience significant growth over the next decade. EMA is unable to share the specifics of these investments as they are commercially sensitive information.<br><br>EMA regularly reviews the EDF to account for latest updates of projected demand of the various sectors. Nonetheless, as with any commercial venture, interested private parties would need to make their own assessment of the demand outlook before making an investment decision on planting new generation capacity.<br><br>EMA will be providing more details on the electricity demand outlook in the RFP. |
| 7 | Electricity Demand Forecasts ("EDF") | To consider the following if demand projections do not materialize:<br>i. delayed commissioning of the awarded planting such that the new planting is commissioned only when demand materialises and be compensated for costs incurred; or<br>ii. delay entry of imports rather than enter into an over-supplied market | EMA will regularly review the demand and supply projections and phase the entry of new CCGTs through the Centralised Process accordingly, to account for changes to the demand picture.<br><br>Awarded participants could request for a delay in the commencement of the generating unit's commercial operations, and EMA would assess it on a case-by-case basis. |

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| | | iii. adjusting operation of EMA-owned generating units | |
| 8 | Electricity Demand Forecasts ("EDF") | To introduce safeguard mechanisms to provide more certainty on demand projections (e.g. similar to the LDL framework proposed under FCM) | The Large Discrete Load ("LDL") framework was initially proposed to be implemented with the FCM to require large loads, 30MVA or greater, to provide indicative 4-year ahead demand projections and binding 1-year ahead demand projection.<br><br>The government has introduced new measures to manage the electricity demand growth of electricity intensive sectors in lieu of implementing the LDL framework. EMA closely monitors the electricity demand and supply situation, including the growth in large electricity consumers which can lead to significant swings in demand. |
| 9 | Supply Projections/ Need for Generation Capacity in 2028 | To clarify on the considerations behind the supply projection (e.g. electricity imports, solar PV and the 2 new CCGTs in 2026) in 2028 as well as the target RRM and the considerations of the assessment methodology used | EMA conducts a holistic projection of generation supply and take into account all generation sources in the system, including electricity imports, solar PV and other potential new sources of generation capacity.<br><br>EMA's projection of the supply capacity in 2028 considers the following developments:<br>i. About 1GW of existing generation capacity is expected to retire over the next 5 years as these plants will be relatively old (>35 years old) |

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| | | | ii. Projected domestic solar PV growth to 2GWp by 2030 with a solar PV effective capacity of 27%[9]<br>iii. 100MW of electricity imports from Lao PDR-Thailand-Malaysia-Singapore Power Integration Project (LTMS-PIP)<br>iv. New generation capacity by Meranti Power (680MW) in 2025, and Keppel Sakra Cogen (600MW) and Sembcorp Cogen (600MW) in 2026<br><br>The RRM[10] refers to the amount of spare generation capacity above the peak system demand that is required to cater for planned and unplanned outages of generating units.<br><br>EMA periodically reviews and updates the RRM to ensure that it adequately safeguards the adequacy, reliability and security of the power system. The current RRM is 27% and has been used as the basis for capacity projections. |
| 10 | Supply Projections/ Need for Generation Capacity in 2028 | EMA's supply projection for power import should not exclude the power generation on a ship based Modular or Sets of Modulars, which may be docked in Singapore water, yet functioning as BOO. | For clarity, the electricity import refers to electricity generated outside Singapore and supplied to any person or premises in Singapore. Power generation from ship docked in Singapore waters are considered as local generation. |

[9] With a solar PV effective capacity of 27%, this means that 2GWp (equivalent to 1.54GWac) of solar provides about 416MWac of effective supply during peak periods. More details on the solar effective capacity are available on https://go.gov.sg/solar-effective-capacity

[10] More details on the methodology used to determine the RRM can be found on https://go.gov.sg/required-reserve-margin

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| 11 | Supply Projections/ Need for Generation Capacity in 2028 | May we understand the process to update/ amend a notified retirement plan? For example, how would a notification made in 2025 regarding an impending 2030 retirement be updated if plans subsequently change in 2027 and the retirement is pushed back to 2031? | Generation Licensee intending to retire any of its generating units, is required to submit a written request to EMA for approval not later than 60 months prior to the date of the intended retirement of the generating unit, and shall provide such information that EMA requires to facilitate EMA's decision in relation to whether to approve the retirement of the generating unit (including whether to approve the same subject to conditions), taking into consideration the protection of the interests of consumers with regard to the security, reliability, availability and continuity of supply of electricity. No Generation Licensee shall retire any of its generating units, unless it has obtained the written approval of EMA and complied with all conditions of approval of EMA.<br><br>Should there be any subsequent changes to the approved retirement date, the Generation Licensee shall submit a written request to EMA and EMA will review it on a case-by-case basis. |
| 12 | EMA-owned/operated generating unit | To clarify the operating parameters of any generating unit that is built by EMA and how EMA ensures that:<br>i. the EMA power plant does not intervene in the market and depress market prices.<br>ii. There will be a level playing field. | In our liberalised electricity market, the private sector has and continues to play an important role ensuring that we have sufficient generation capacity to meet demand. The upcoming new CCGTs by Keppel and Sembcorp are examples of the critical role that privately-owned gencos play. The Centralised Process is intended to facilitate private sector participation. By coordinating the entry of new generation capacity, EMA seeks to reduce risk of overcapacity, thus lowering investment risks for the private sector. |

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| | | | However, if there is no private sector interest to provide the new generation capacity required by the system or the proposals submitted are assessed to be unsuitable, EMA will step-in to build the generating unit(s) through Meranti Power.<br><br>EMA is considering various operating models for CCGTs that are built by Meranti Power, including but not limited to divesting or leasing the unit to the private sector if there is sufficient private sector interest to do so.<br><br>Should Meranti Power be required to operate the generating unit, EMA will put in place safeguards to ensure that the unit does not compete unfairly against CCGTs that are operated by private generation companies. For example, EMA will put in place proper procedures and governance structures to mitigate any conflict of interests and operate Meranti Power at an arms-length from EMA. Meranti Power will also be subject to operational KPIs and performance indicators that are similar to the regulatory requirements and code of practices that privately owned generating units need to comply with.<br><br>EMA will consult the industry on the operating parameters of the Meranti Power-owned/operated unit, if any, in due course. |

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| 13 | EMA-owned/operated generating unit | Any revenue mechanisms (e.g. Vesting Contracts) offered to EMA-built CCGT should be equally offered to importers or local generation planting. | EMA had previously considered mechanisms such as the FCM which were intended to incentivise commercial plantings. These mechanisms work by reducing gencos' investment risk through revenue support of capacity payments.<br><br>However, EMA did not proceed with the FCM as it is auction-based and may not provide competitive market outcomes and achieve the key objective of maximising economic efficiency, given the high-level of uncertainty the power generation sector faces.<br><br>Vesting Contracts are intended to underpin NCC load, specifically to hedge the price of energy to be procured from the SWEM for supply to NCCs.<br><br>EMA has the statutory duty to ensure sufficiency of generation capacity. As such, should there be be no private sector interest to build, own and operate under the Centralised Process, EMA will have to build as last resort.<br><br>EMA's approach towards electricity imports is different from that of CCGTs. This is in view that importers are allowed to request for revenue support as imports may have a much higher upfront capex requirement compared to fossil-base generation.<br><br>. |

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| 14 | Revenue Support | To use market-based mechanism such as Vesting Contract be used to incentivise commercial planting, while keeping market structure intact, instead of EMA stepping in to build | EMA had previously considered mechanisms such as the Forward Capacity Market (FCM) which were intended to incentivise commercial plantings. These mechanisms work by reducing gencos' investment risk through revenue support of capacity payments.<br><br>However, EMA did not proceed with the FCM as it is auction-based and may not provide competitive market outcomes and achieve the key objective of maximising economic efficiency, given the high-level of uncertainty the power generation sector faces.<br><br>Vesting Contracts are intended to underpin NCC load, specifically to hedge the price of energy to be procured from the SWEM for supply to NCCs.<br><br>EMA has the statutory duties to ensure sufficiency of generation capacity. As such, should there be be no private sector interest to build, own and operate under the Centralised Process, EMA will have to build as last resort. |
| 15 | Excluded Facilities | To exclude embedded generation (EGs) from mandated participation in the Centralied Process as an Excluded Facility. | New embedded generation ≥ 100MW and existing embedded generation with increase in capacity of ≥ 100MW will be required to undergo the Centralised Process to minimise the risk of under/over capacity. EMA has proposed a 100MW threshold based on the impact that additional generation capacity of this magnitude will have on the power system. EMA will periodically review the 100MW threshold. |

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| | | | Companies with exceptional business considerations can seek for an exemption and will be considered on a case-by-case basis. |
| 16 | Excluded Facilities | As existing fleet of generators are near end-of-life, will incumbent Gencos be given priority for new planting in the Centralised Process? | All proposals submitted for EMA's RFP for new generation capacity will be assessed based on the Cardinal Requirements and Evaluation Criteria.<br><br>EMA notes that there are synergies with existing auxiliary equipment that incumbent gencos could leverage on when building new generation capacity on existing utility land. |
| 17 | Excluded Facilities | Currently, Gencos provide its generation plans annually to EMA (Repowering/Life Extension/Mothball for existing units) for the next five to ten years. Typically, the capacity increase from repowering or upgrading existing units is marginal and should be exempted from the Centralised Process.<br><br>Please clarify whether the capacity increase of an existing generating unit (100MW) is exempted from the process and if the increase is assessed based on increment from total Combined Cycle capacity or Gas Turbine capacity. | Gencos are to continue providing indicative generation plans to EMA annually for planning purposes.<br><br>Any increase in capacity of an existing generating unit of 100MW or more is required to undergo the Centralised Process. For avoidance of doubt, this refers to the Licensed capacity of the generating unit. |
| 18 | Excluded Facilities | To ensure that the SWEM does not get into an overcapacity situation, EMA should require imports, solar PV and ESS to undergo the Centralised Process. | These facilities would be considered as Exempted Facilities due to their inherent generation characteristics (for solar PV and ESS) or selection/connection approval process (for electricity imports). To manage the impact of these Exempted Facilities in SWEM, the projected capacities will be |

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| | | | considered in EMA's projection for new generation capacity required, if any. |
| 19 | Excluded Facilities | Capacity addition for the purpose for servicing large baseload (>250MW) with long-term PPA not be required to undergo Centralised Process. Instead, entities should inform EMA of the load and capacity under consideration (e.g. before launching RFP then update over time). | All non-exempted new generation plantings are subjected to the Centralised process regardless of Power Purchase Agreements and Retail Contracts between parties. |
| 20 | Excluded Facilities | To only grant Notice-to-Proceed to generating units which have secured a new retail contracts for at least 70% of its capacity. | |
| | **Specifications for RFP** | | |
| 21 | RFP Timeline | To open RFP for at least 6-months to give participants sufficient time to prepare a viable proposal | While the upcoming RFP in Jul 2023 will be opened for 3-months, EMA had given notice at the start of the public consultation process that new generation capacity will be required in 2028. From the start of the consultation, participants would have had 6 months to submit proposals.<br><br>EMA will also enhance the Centralised Process to provide interested participants with advanced notice of the indicative generation capacity which may be required, before the launch of the RFP. Instead of the current practice of providing the supply outlook 4 years ahead in the SEMO, EMA will provide the indicative new generation capacity required 6-years ahead. Taken together with the demand projections (which provide a 10-year ahead outlook), this will give interested participants an early sense of the indicative generation capacity required for the upcoming RFP. EMA will continuously review the |

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| | | | Centralised Process timeline and explore extending the opening window of subsequent RFPs. |
| 22 | Cardinal Requirements | To allow for demonstrations for delivery of new generation capacity within the timelines stipulated in the RFP in phases (e.g. 25MW, 50MW, 100MW etc.) | To ensure there is sufficient generation capacity to meet projected demand, the total awarded generation capacity will need to be commissioned by the awarded delivery year. However, appointed gencos can work with EMA on demonstrations, prior to the timeline stipulated in the RFP. |
| 23 | Cardinal Requirements | To scrutinise incorporation of special purpose vehicle (SPV) company in Singapore to meet the cardinal requirement for tenderer to be a Singapore-incorporated company as control of SPV can still reside with foreign individuals/entities. | EMA will review all relevant information regarding the company's corporate structure and relevant shareholdings as part of the Cardinal Requirements to assess that the applicant has the capability and experience to perform the duties under the Electricity Act and the electricity licence. |
| 24 | Cardinal Requirements | Requirement for tenderers to be a Singapore-incorporated company favours incumbents and reduces the competition in the Singapore energy market. EMA should consider to only impose the requirement before first generation of power in Singapore. | EMA requires the participant to be a Singapore-incorporated company to be able to award the electricity licence together with the RFP award. To apply for licences with government agencies, companies are required to be registered with the Accounting and Corporate Regulatory Authority ("ACRA"), unless exempted. The registration/incorporation of the company would be under Singapore's Company Act. |
| 25 | Evaluation Criteria | To clarify and specify the weightages of the evaluation criteria. | The description of the Evaluation Criteria and its corresponding weightages to be used for the RFP for new generation capacity in 2028 is detailed in Table 2. |

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| 26 | Evaluation Criteria | To remove or minimise the criteria on market competition via the Herfindahl Hirschman Index in the evaluation criteria as there is already an existing 25% market share cap. If included, it should be used at most as a tie-breaker. | Notwithstanding the existing 25% market share cap, all else equal, the entry of capacity by a particular Genco that will improve the power sector's HHI, and thus competitiveness in the wholesale electricity market. As such, this Genco should be evaluated preferentially under the Centralised Process. |
| 27 | Evaluation Criteria | To clarify how the criteria requiring offer of retail/vesting contracts would be assessed. Additionally, will EMA direct MSSL to purchase the generation capacity under vesting contract for the entire duration of the asset economic life? | EMA has revised the criteria for RFP Participant to Commitment to offer Price Competitive Contracts as detailed in the Evaluation Criteria. |
| 28 | Evaluation Criteria | Although the proposed terms for retail/vesting contracts give a better visibility and stability of the retail market, the proposed terms should not be binding and should only be for reference. If there is no revenue support provided to newly built generator, Gencos are exposed to merchant risk on top of any regulatory risk. As such, this criteria should not be made binding | |
| 29 | Land | Will RFP participants be required to source for their own land for the CCGT planting, or will a specific plot be provided by the EMA? | EMA's preference is for the new generation units to be built on participants' existing utility land. There are some advantages to doing so. For example, the new CCGT may be able to leverage existing connections at existing sites, and gencos would also be able to tap on possible operational synergies.<br><br>However, EMA may make a greenfield site available for the new generation planting, if required. The indicative site available for the required generation planting in 2028 is indicated in Annex B. |

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| 30 | Performance Bond | To review the issuance of performance bond requirement:<br>i. Lower the performance bond to not more than $10M as a performance bond together with the short timeline proposed for the RFP would discourage participation.<br>ii. A Performance Bond should not be required from RFP winner(s) as such a requirement will discourage RFP participation. Investors are already naturally incentivized to commence commercial operations as soon as possible in order to optimize their investment returns and should not be unfairly penalized due to unforeseen delays that may be outside of their control. | To ensure timely delivery of the new generation capacity, it is critical that the RFP winner is committed.<br><br>EMA will shortlist a participant to award the RFP to. Prior to being officially awarded the RFP, the Shortlisted Participant will be required to furnish a Performance Bond in favour of EMA for a sum of up to S$100 million within 14 days of EMA's notification of being shortlisted. Failure to do so may result in the Shortlisted Participant being disqualified, which will entitle EMA to shortlist another participant. After the Shortlisted Participant furnishes the Performance Bond to EMA, EMA will notify the Shortlisted Participant on the official award of the RFP. For the avoidance of doubt, the Shortlisted Participant shall not be regarded as being awarded the RFP until and unless the Shortlisted Participant receives the Notice of Award from EMA.<br><br>The performance bond sum is currently set as approximately 10% of new CCGT development project. EMA will review the bond sum regularly to ensure relevancy in meeting the objectives. |
| 31 | Performance Bond | Not to forfeit the Performance Bond under the following circumstances:<br>i. delivery delays due to events out of the tenderer's control (i.e. force majeure events); or<br>ii. Delay in commencement of commercial operations and not by interim milestones | EMA will assess on a case-by-case basis on any forfeiture of Performance Bond.<br><br>EMA will reduce the Performance Bond sum progressively upon completion of each project milestone, as stipulated in the Performance Conditions and/or EMA's Notice of Award. The remainder sum of the Performance Bond shall be returned to the RFP winner after the registration of |

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| | | | the new generating unit as GRF with EMC or a date mutually agreed between the parties, whichever is later, provided the RFP winner has fulfilled all the Performance Conditions. |

## Annex B – Indicative Greenfield Site for Generation Planting in 2028


Figure 3: Indicative Location of EMA's Identified Greenfield Site