Smart Energy, Sustainable Future

ENHANCEMENT TO THE CENTRAL INTERMEDIARY SCHEME FOR EMBEDDED GENERATION

FINAL DETERMINATION

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BACKGROUND

1. Embedded generation ("EG") refers to the onsite generation of electricity for direct supply to a consumer's load facilities within his premises. This is allowed where:

   a. the load facility, and the land on which the generation and load facilities are located, are majority (i.e. at least 50%) owned by the same consumer; and

   b. the generation facility is located on land which is contiguous to the load facility except where there is insufficient contiguous land available for the consumer to accommodate both the generation and load facilities.

2. Such consumer is also allowed to connect his facilities to the grid for additional and/or backup electricity supply, as well as to inject any excess EG output into the grid for sale at the Singapore Wholesale Electricity Market ("SWEM").

3. There are broadly two categories of EG facilities:

   a. Intermittent generation source ("IGS") which has power output that cannot be controlled or varied at will, e.g. solar and wind energy; and

   b. Non-IGS which has power output that can be controlled or varied at will, e.g. thermal generation facilities that use fossil fuel such as natural gas.

4. Under the Central Intermediary Scheme ("CIS"), a contestable consumer ("CC") with embedded IGS capacity below 1 MW[1] can sell his excess IGS output in the SWEM through SP Group at the prevailing half-hourly wholesale energy price. This avoids the need for the CCs to register with the Energy Market Company ("EMC") to be Market Participants ("MPs"). Refer to ***Appendix 1*** for the details of other existing schemes under which consumers (CCs and non-CCs) with EG can get paid for injecting excess EG output into the grid.

[1] The EG capacity (in MW) herein refers to the name-plate rating of each generation facility for non-IGS. For IGS, the EG capacity refers to the aggregate of the output capacity (in MW_{ac}) of all the inverters that: (a) are used for converting direct current from the IGS to alternating current; (b) have the same owner; and (c) have the same connection point to the grid.

CONSULTATION AND FEEDBACK RECEIVED

5. On 11 Jul 2017, the EMA published a consultation paper on the proposal to enhance the CIS by extending it to all CCs with EG capacity (either IGS or non-IGS) up to 10 MW ("Enhanced CIS" or "ECIS"). The objective is to reduce regulatory compliance cost and give consumers more flexibility to manage their electricity requirements. ***Appendix 2*** shows the payment schemes for consumers (CCs and non-CCs) with EG if the proposed ECIS is implemented.

6. In addition, the CC with embedded IGS under the ECIS can choose to have his generation output estimated based on the IGS Generation Profile[2] determined by the EMA (instead of installing physical meters to measure the actual IGS output) for the purpose of paying applicable market-related charges, such as the allocated regulation price ("AFP").

7. At the close of the consultation on 7 Aug 2017, the EMA received comments and feedback from seven respondents. In summary, there is no objection to the proposed ECIS:

a. Most of the respondents sought clarification on how the IGS Generation Profile would be applied under the ECIS.

b. YTL PowerSeraya ("YTLPS") highlighted that under the Market Rules, non-IGS generation facilities, which together with any non-IGS generation facilities within the same premises, have an aggregated capacity of 10 MW or more are required to be registered with EMC, and be subject to dispatch by the Power System Operator ("PSO"). In view of this, YTLPS pointed out that allowing such non-IGS generation facility (with individual capacity less than 10 MW) to participate in ECIS would be "at odds" with the requirement for MP registration under the Market Rules. The EMA would like to clarify that such non-IGS generation facilities will not be eligible to participate in the ECIS, and are hence required to register with EMC and be subject to dispatch by PSO to ensure reliability of the power system.

The industry comments and responses by the EMA are set out in ***Appendix 3***.

[2] Refer to *Addendum to Enhancements to the Regulatory Framework for IGS in the National Electricity Market of Singapore* dated 9 Dec 2015 published on the EMA's website for more information.

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8. Taking into account the comments and feedback received, the EMA has decided to implement the ECIS, specifically to enhance the existing CIS by extending it to CCs with EG capacity (either IGS or non-IGS) no more than 10 MW except where the non-IGS generation facilities, together with any non-IGS generation facilities within the same premises, have an aggregate capacity of 10 MW or more ("Eligible CCs").

9. Under the ECIS, each Eligible CC is not required to register with EMC as a MP to get paid for injecting his excess EG output into the grid. The payment will be through SP Group at the prevailing half-hourly wholesale energy price.

10. The Eligible CC is still required to ensure that his generation facilities meet the relevant technical requirements specified by PSO in the System Operation Manual to ensure reliable operations of the power system.

11. Currently, a CC with EG is required to install physical meters to measure:

a. the actual half-hourly amount of generation output using generation ("M1") meter(s); and

b. the actual half-hourly amount of electricity injected into, and drawn from, the grid using intake ("M2") meter(s).

Under the ECIS, the Eligible CC can choose to have its IGS output estimated based on the IGS Generation Profile determined by the EMA, for the purpose of paying applicable market-related charges. The metering options available for Eligible CCs are summarised in ***Table 1***.

Table 1: Metering options under the ECIS

	Generation (M1) meter	Intake (M2) meter
Embedded IGS	• Estimate output based on IGS Generation Profile; or • Install a physical meter to measure the actual half-hourly output	• Bi-directional meter to measure the actual half-hourly amount of electricity injected into, and drawn from, the grid
Embedded Non-IGS	• Install a physical meter to measure the actual half-hourly output	

12. The ECIS is currently expected to be implemented in Apr 2018, taking into consideration the time required for EMC to modify the Market Rules and SP Group to modify its IT system.

* * *

Appendix 1

EXISTING PAYMENT SCHEMES FOR EXCESS EG OUTPUT INJECTED INTO THE GRID

Table A summarises the existing schemes under which a consumer with EG can get remunerated for excess EG output injected into the grid. Specifically:

a. A non-contestable consumer ("NCC") with EG capacity (either IGS or non-IGS) below 1 MW can choose to join the **Simplified Credit Scheme ("SCS")** administered by SP Group ("SP"). Under the SCS, the NCC will be paid at the rate of the *prevailing regulated tariff less grid charge* for excess EG output injected into the grid.

b. A contestable consumer ("CC") with EG capacity (either Intermittent Generation Sources ("IGS") or non-IGS) below 1 MW can choose to register with the Energy Market Company ("EMC") to be a **Direct Market Participant ("DMP")** in the Singapore Wholesale Electricity Market ("SWEM"). Alternatively, he may appoint a third-party to register with EMC as a Market Participant ("MP") and sell electricity in the SWEM on his behalf. The DMP or MP will be paid by EMC at the prevailing half-hourly wholesale energy price for excess EG output injected into the grid.

c. If the CC has embedded IGS below 1 MW, he has the option to register under the **Central Intermediary Scheme ("CIS")**. Under the CIS, the CC will effectively be selling the excess IGS output in the SWEM through SP at the prevailing half-hourly wholesale energy price.

d. For CC and NCC with EG capacity (either IGS or non-IGS) of 1 MW or more, it is mandatory for him to be a DMP, or appoint a third-party to register with EMC as a MP and sell electricity in the SWEM on his behalf. This is to ensure that all sizable generation facilities, which requires the support of system reserves, are allocated the cost of the reserves through the SWEM. The DMP or MP will be paid by EMC at the prevailing half-hourly wholesale energy price for excess EG output injected into the grid.

Table A: Existing payment schemes for consumers with EG

<table>
<tr><th rowspan="2"></th><th colspan="2">EG with capacity of ‘X’ MW</th></tr>
<tr><th>X < 1 MW</th><th>X ≥ 1 MW</th></tr>
<tr><td>Non-Contestable Consumer</td><td>Voluntary:
Simplified Credit Scheme</td><td rowspan="2">Mandatory:
Register with EMC as a DMP, or appoint a third-party as the MP^</td></tr>
<tr><td>Contestable Consumer</td><td>Voluntary:
Central Intermediary Scheme – for IGS only; or
Register with EMC as a DMP or appoint a third-party as the MP^</td></tr>
</table>

^ This option is not applicable to residential consumers with embedded IGS.

Appendix 2

PAYMENT SCHEMES FOR EXCESS EG OUTPUT INJECTED INTO THE GRID, IF THE PROPOSED ECIS IS IMPLEMENTED

Table B: Payment schemes for consumers with EG if ECIS is implemented

	EG with capacity of 'X' MW		
	X < 1 MW	1 MW ≤ X < 10 MW	X ≥ 10 MW
Non-Contestable Consumer	***Voluntary:*** • Simplified Credit Scheme	***Mandatory:*** • Register with EMC as a Direct Market Participant ("DMP") or appoint a third-party as the MP^	***Mandatory:*** • Register with EMC as a DMP or appoint a third-party as the MP^
Contestable Consumer	***Voluntary:*** • **ECIS***; or • Register with EMC as a DMP or appoint a third-party as the MP^	***Mandatory:*** • **ECIS***; or • Register with EMC as a DMP or appoint a third-party as the MP^	

* As residential consumers are not likely to have embedded non-IGS, the ECIS will not be extended to such consumers in the first instance.

^ This option is not applicable to residential consumers with embedded IGS.

Appendix 3

THE EMA'S RESPONSES TO INDUSTRY COMMENTS

Company	Comment	EMA's response
	General	
YTL PowerSeraya	PSO may require and has required generation facilities of less than 10MW to be registered as generation registered facilities that is subject to PSO dispatch due to the generation facilities of the market participant in the same location though individually less than 10MW, being in aggregate 10MW or more. A current example would be the two generation facilities of SLNG which individually have a generation capacity of 7.8MW but are registered as generation registered facilities. In the past, Singapore Oxygen Air Liquide had a generation facility of 9 MW and another of 5 MW with both registered as generation registered facilities. Given that PSO has seen the need to have control over the dispatch of generation facilities of 1 MW or more but less than 10MW, allowing generation facilities of 1 MW or more but less than 10MW to be registered under the Enhanced Central Intermediary Scheme and therefore not subject to PSO dispatch appears to be at odds with system security considerations and therefore should not be allowed.	Under Chapter 2, Section 5.1.4 and 5.1.7 of the Market Rules, non-IGS generation facilities, which together with other non-IGS generation facilities at the same premises, have an aggregate capacity of 10 MW or more are required to register with EMC as Generation Registered Facilities ("GRFs"). GRFs are subject to dispatch by PSO to ensure power system reliability. The EMA would like to clarify that the intent is to maintain this requirement. Accordingly, a CC will not be eligible for the ECIS if his embedded non-IGS generation facilities, which together with any non-IGS generation facilities within the same premises, have an aggregate capacity of 10 MW or more.

Energetix	Please extend the ECIS to NCC category as well. NCCs are less likely than CCs to appoint a 3rd-party as MP, because they have no relationship with retailers other than SP. They are also less inclined to register as a DMP with EMC. While we agree that it is almost impossible for a residential consumer's EG to exceed 1MWac (for lack of roof area), it is conceivable that a small commercial consumer with large roof area chooses to continue buying electricity from SP at regulated tariffs, just like an NCC. Offering the ECIS to all consumers, regardless of contestability status, keeps things simple.	Non-contestable consumers can participate in the Simplified Credit Scheme ("SCS") to receive payment for their excess generation injected into the grid. There is no requirement for market registration with EMC under the SCS. Alternatively, such consumers can opt to be contestable, subject to the prevailing contestability requirements, and apply for the ECIS or other payment schemes available.
EMC	Currently, EGs that are not Intermittent Generation Sources (IGS), are required to export no more than 50% of its generation to the grid so as to enjoy net treatment and price neutralisation. We would like EMA to clarify if such requirement is still applicable to non-IGS EGs that seek to be registered under the Enhanced CIS.	The requirements for net treatment and price neutralisation under the Market Rules will continue to apply.
Keppel	Can EMA provide an indicative timeline of when the enhanced scheme will be implemented?	The ECIS is currently expected to be implement in Apr 2018 to cater for sufficient time for EMC to modify the Market Rules and for SP Group to enhance its IT system.

Estimating embedded IGS output based on IGS generation profile		
EMC	We would like to clarify that according to Addendum to the Regulatory Framework for IGS in the NEMS published by the EMA, the IGS generation profile also applies to CCs that are registered in the SWEM directly. And it is only for CCs who do not sell excess electricity to the grid.	Yes, the IGS Generation Profile is applicable for CCs who register with EMC and do not inject to sell excess electricity into the grid. However, under the ECIS, CCs with embedded IGS can also choose to use the IGS Generation Profile for the purpose of paying applicable market-related charges.
Keppel	If a contestable consumer chooses to have its embedded IGS output estimated based on EMA's IGS Generation Profile instead of installing meters, does this mean that the upfront and recurring metering charges will no longer apply? Without the physical meters, will there be any implications on the payment made to the embedded IGS for excess electricity injected into the grid?	Yes, consumers who opt for the IGS Generation Profile need not install the generation ("M1") meter(s). The associated upfront and recurring generation meter charges therefore will not be applicable. The import (withdrawal from the grid) and export (excess generation injected into the grid) of electricity will be separately metered via the intake ("M2") meter(s). Under the ECIS, the payment for the excess output injected into the grid will be based on the half-hourly import quantity metered by the M2 meter(s).
Keppel	Can contestable consumers who already have meters installed at their embedded IGS switch to using the IGS Generation Profile to estimate their IGS output instead? If so, are such consumers still liable to pay for the recurring metering charges?	Eligible contestable consumers who have existing generation ("M1") meter(s) can switch to IGS Generation Profile and the associated recurring meter charges will thereafter not be applicable.

PacificLight Power	We understand that under the Enhanced CIS it is proposed that a CC can opt to have its embedded IGS output estimated based on its IGS Generation Profile. This is to account for its market-related charges and allocated cost of system reserves. Whilst an estimate may be beneficial to a CC as it reduces regulatory compliance costs, PLP would recommend requiring the installation of a meter in order to measure the actual IGS output. Given that the Enhanced CIS will already include CCs with sizable EGs of less than 10MW, requiring them to install meters will also ensure such intermittent facilities pay the system costs based on their actual impact to the stability of the power system.	The import (withdrawal from the grid) and export (excess generation injected into the grid) of electricity will be metered via the intake ("M2") meter(s). The metered quantities, together with the IGS Generation Profiled quantities, will be used to determine the applicable market-related charges to the consumer to ensure a fair cost allocation.
Solargy	For contestable customers with EG (of 1 to 10 MW) who do not wish to enjoy net settlement, do they have to install M1 meters under either enhanced CIS or EMC?	Contestable consumers with embedded IGS under the ECIS or registered with EMC as market participant can opt for the IGS generation profile or install physical generation ("M1") meter(s) to measure the half-hourly IGS generation output. Contestable consumers with embedded non-IGS above 1 MW are required to install M1 meter(s), regardless of whether they are under the ECIS or other payment schemes.
Others		

EMC	We would like to clarify that currently for an NCC to register with EMC as a DMP and sell excess electricity generated from its EG in the SWEM, the NCC is required to convert to CC first. NCCs with EGs of capacity between 1 to 10 MW should be similarly allowed to convert to CC and participate in the Enhanced CIS.	With Full Retail Competition in 2H 2018, the consumption threshold for contestability will no longer apply.
SP Group	According to the Metering Code, a "market participant consumer" means a contestable consumer that purchases electricity directly from a wholesale electricity market operated by the Market Company or from a market participant retailer. SP proposes that this market registration and payment scheme for excess EG output should therefore be allowed only for CCs, for alignment to the definition of "market participant consumer" in the Metering Code.	The ECIS is applicable to contestable consumers only.
SP Group	With the lowering of the barriers to entry, PVs and its associated intermittency is expected to increase in the distribution level and the system. SP submits that the stability and reliability of the grid should not be compromised.	The EMA agrees that the stability and reliability of the grid should not be compromised with increasing IGS output in the power system especially at the distribution level. The EMA will separately review with the stakeholders including SP Group on the technical requirements to support the sustainable growth of IGS in our power system.

	SP should be provided with adequate information on IGS to enable it to monitor, influence and intervene as necessary to maintain grid reliability and network stability. SP proposes to work with EMA to develop and establish the necessary technical requirements to progress with the above.	
Solargy	For contestable customers (with EG of 1 to 10 MW) who do not wish to enjoy net settlement, they need not install M1 meters, as proposed under your earlier consultation paper of 30 May 2017. Will the AFP charges will be computed on a fixed basis, as per your consultation paper?	The charging of the allocated regulation price ("AFP") on a fixed basis is only applicable for eligible consumers registered under the new category of market participant to be called the *Market Participant (IGS Non-Exporting)* under the Market Rules.