



Smart Energy, Sustainable Future

**ENHANCEMENTS TO THE REGULATORY FRAMEWORK
FOR INTERMITTENT GENERATION SOURCES IN THE
NATIONAL ELECTRICITY MARKET OF SINGAPORE**

FINAL DETERMINATION PAPER

25 July 2017

ENERGY MARKET AUTHORITY
991G ALEXANDRA ROAD
#01-29
SINGAPORE 119975
www.ema.gov.sg

Disclaimer:

The information in this document is subject to change and shall not be treated as constituting any advice to any person. It does not in any way bind the Energy Market Authority to grant any approval or official permission for any matter, including but not limited to the grant of any exemption or to the terms of any exemption. The Energy Market Authority reserves the right to change its policies and/or to amend any information in this document without prior notice. Persons who may be in doubt about how the information in this document may affect them or their commercial activities are advised to seek independent legal advice or any other professional advice as they may deem appropriate. The Energy Market Authority shall not be responsible or liable for any consequences (financial or otherwise) or any damage or loss suffered, directly or indirectly, by any person resulting or arising from the use of or reliance on any information in this document.

TABLE OF CONTENT

1	Executive Summary.....	4
2	Feedback from the Public Consultation Paper	5
3	Residential Consumers with Embedded IGS below 1 MWac will be Allocated Regulation Reserves Charges on a Net Basis.....	6
4	Streamlined Arrangements for Market Registration	7
5	Annex 1: Response to Feedback.....	9

ENHANCEMENTS TO THE REGULATORY FRAMEWORK FOR INTERMITTENT GENERATION SOURCES IN THE NATIONAL ELECTRICITY MARKET OF SINGAPORE

FINAL DETERMINATION PAPER

1 Executive Summary

- 1.1 The Energy Market Authority (“EMA”) embarked on a public consultation exercise from 30 May 2017 to 20 June 2017, to seek feedback on enhancements to the regulatory framework for Intermittent Generation Sources (“IGS”).
- 1.2 IGS typically comprises renewable generation such as solar and wind energy, where the power output is intermittent and cannot be controlled because it is dependent on the weather and environmental factors. Based on current technologies, solar generation offers the greatest deployment potential in Singapore. In view of new developments in the electricity market, in particular Full Retail Competition (“FRC”) where all electricity consumers can choose an electricity retailer, as well as the evolving business models related to solar deployments, the EMA proposed enhancements to streamline regulatory requirements and lower barriers of entry for solar.
- 1.3 After careful consideration of the feedback received, the EMA is implementing the following enhancements set out in this determination paper:
 - 1.3.1 Allow residential consumers (regardless of contestability status) with embedded IGS below 1 MWac to pay the Allocated Regulation Price (“AFP”) on a net basis; and
 - 1.3.2 Streamline market registration procedures for consumers with embedded IGS below 10 MWac who will not be selling their excess electricity output in the National Electricity Market of Singapore (“NEMS”).
- 1.4 The EMA will continue to review the rules in consultation with stakeholders to ensure that the regulatory framework remains relevant as technologies and business models evolve.

2 Feedback from the Public Consultation Paper

2.1 Recap of the Consultation Paper

2.1.1 In the consultation paper, the EMA sought views on the proposed treatment of AFP for residential consumers with embedded IGS below 1 MWac (regardless of contestability status), and the streamlined market registration process for consumers with embedded IGS below 10 MWac who will not be selling their excess electricity output in the NEMS.

2.2 Summary of Feedback received

2.2.1 The EMA's consultation closed on 20 June 2017 and 6 parties provided responses to the consultation paper (see Table 1). The feedback received were positive and supportive of EMA's efforts to facilitate the deployment of IGS. The respondents' feedback and the EMA's corresponding responses are detailed in the document titled "Response to Feedback on 'The Enhancements to the Regulatory Framework for Intermittent Generation Sources in the National Electricity Market of Singapore'" set out in [Annex 1](#).

Table 1: Parties who have Responded to the EMA's Consultation Paper

Stakeholder Group	Parties that have Responded
Solar Industry	<ul style="list-style-type: none">• Energetix• SolarGY• Sunseap
Licensees	<ul style="list-style-type: none">• SP Group ("SP")• Tuaspring
Government Agencies	<ul style="list-style-type: none">• National Environment Agency ("NEA")

3 Residential Consumers with Embedded IGS Below 1 MWac will be Allocated Regulation Reserves Charges on a Net Basis

- 3.1 The EMA will allow net AFP treatment for all residential consumers with embedded IGS below 1 MWac, regardless of their contestability status¹. In the event that residential consumers have embedded IGS that crosses the 1 MWac threshold (regardless of their contestability status), they will be charged AFP on a gross basis as per other consumers with large embedded IGS, i.e. they will pay AFP charges based on their gross electricity consumption and gross IGS output. Based on existing technology, the EMA has assessed that the solar installations by residential consumers tend to be small due to the limited roof space available².
- 3.2 For non-residential consumers with embedded IGS who choose to be contestable, they will continue to pay AFP based on the gross basis, as per the existing framework. Table 2 summarises the enhanced AFP charging regime for consumers with embedded IGS.

Table 2: AFP charging regime for consumers with embedded IGS

Non-Contestable Consumers ³	Contestable Consumers
With Embedded IGS Less than 1 MWac	
<u>Residential and Non-residential</u> AFP is charged on a net basis (No change)	<u>Residential</u> AFP to be charged on a net basis
	<u>Non-residential</u> AFP is charged on a gross basis (No change)
With Embedded IGS 1 MWac and above	
<u>Residential and Non-residential</u> AFP is charged on a gross basis (No change)	

¹ Residential consumers can choose to become contestable come Full Retail Competition in 2H 2018.

² There are no residential consumers who have solar installations greater than 1MWac currently.

³ Non-contestable consumers refer to non-residential consumers (e.g. Town Councils, Businesses) and residential consumers who buy electricity from SP Services (“SPS”) at the regulated tariff.

4 Streamlined Arrangements for Market Registration

- 4.1 The EMA will allow consumers with embedded IGS below 10 MW_{ac} who will not be selling any electricity back to the market⁴, to undergo a streamlined Market Participant (“MP”) and Generation Facility (“GF”) registration, and pay EMC an estimated fixed charge determined by the EMA (see Tables 3 and 4)⁵. This fixed charge will be determined based on the estimated IGS generation (according to the IGS Generation Profile determined by the EMA⁶), and the historical average rates of the respective charges. This fixed charge will be revised periodically to reflect updated market conditions. The Energy Market Company (“EMC”) would then return the amount collected to the market via the Monthly Energy Uplift Charge (“MEUC”).
- 4.2 **Consumers will be registered under a new MP category as Market Participant (IGS Non-Exporting)**, and they are subject to the relevant Market Rules. This will be implemented once EMC has made changes to the Market Rules and IT system.

Table 3: Streamlined requirements for MP and GF registration

Requirements to be omitted for MP registration		
1	MP-MSSL Agreement	Not applicable for MP with generation facilities.
2	Computation of Initial Credit Support Amount	As the MP pays a fixed charge in advance and there is no daily settlement of energy or any other products, the MP will not owe any payments to EMC.
3	Credit Support (if required)	
4	OCBC Bank Account	
5	Direct Debit Authorisation	As MP pays a fixed charge in advance and there is no daily settlement of energy or any other products, a bank account for daily transactions is not required.
Requirements to be omitted for GF registration		
1	MP-MSSL Agreement	As the MP pays a fixed charge in advance and there is no daily settlement of energy or any other products, MSSL is not required to install generation meters and submit generation meter readings to EMC.

⁴ Based on the size of the IGS installation, the MP will still be required to apply for the relevant licences from the EMA, where applicable.

⁵ This will be applicable to consumers who are unable to register under the proposed Enhanced Central Intermediary Scheme (“ECIS”). For example, consumers under private metering setup and do not have a load account with SP services. The EMA has launched a consultation paper on ECIS on 11 July 2017. More details can be found on EMA’s website: <https://www.ema.gov.sg/cmsmedia/Enhanced%20Central%20Intermediary%20Scheme%20-%20Consultation%20Paper.pdf>

⁶ Refer to Addendum to Enhancements to the Regulatory Framework for Intermittent Generation Sources in the National Electricity Market of Singapore dated 9 Dec 2015 for more information: <https://www.ema.gov.sg/cmsmedia/Consultations/Electricity/Addendum%20on%20Enhancements%20to%20the%20Regulatory%20Framework%20for%20IGS.pdf>

Table 4: Methodology to determine the fixed charge

Methodology of Fixed Charge	
Amount of Fixed Charge = Estimated Charge (\$/MWh) x Estimated Solar Generation (MWh)	
Variables	Details
Estimated Charge (\$/MWh)	Based on the historical weighted average price of respective charges (e.g. AFP) for effective hours ⁷ across the most recent half-year period (i.e. 1 Jan to 30 Jun, or 1 Jul to 31 Dec).
Estimated Solar Generation (MWh)	Based on the IGS Generation Profile determined by the EMA and the installed capacity of the GF.

⁷ To be based on the IGS Generation Profile determined by the EMA. Current effective hours are from 7am-7pm.

ANNEX 1: Response to Feedback

Organisation	Comments / Feedback	The EMA's response
Energetix	<p>We welcome this pragmatic continuation of net treatment for residential consumers (<1MWac) even after they become contestable.</p> <p>Extending the streamlined market registration procedures to systems up to <10MWac is a good idea.</p> <p>However, we see no good reason to restrict this pragmatic approach to systems that do not sell electricity back to the market. It should also apply to those that export surplus electricity and wish to get paid for their exports.</p> <p>The larger the system, the higher the chance of exporting, particularly if the underlying building operates at reduced capacity on weekends and P/H. In such cases, the M1 metering becomes onerous, particularly as large systems are likely to require meters at several connection points.</p> <p>Three common reasons for multiple feed-in points on a building:</p> <ol style="list-style-type: none"> 1) Economic: to reduce cabling costs, installers always seek to connect to the closest DB. Longer distances mean not only longer cables but also 	<p>Under the existing Central Intermediary Scheme ("CIS"), contestable consumers with embedded IGS of below 1 MW can sell their excess generation in the wholesale market through SP Services at the prevailing half-hourly wholesale energy price. This avoids the need for such consumers to register with the EMC to be a Market Participant.</p> <p>EMA is proposing to enhance the CIS by extending it to all contestable consumers with Embedded Generation (IGS and non-IGS) of capacity below 10 MW. Consumers with embedded IGS can also have their generation estimated based on the IGS Generation Profile determined by EMA, instead of installing meters to measure the actual generation output. Please refer to the consultation paper "Proposed Enhancement to the Central Intermediary Scheme for Embedded Generation" on EMA's website.</p> <p>The new MP category of Market Participant (IGS Non-Exporting) mentioned in the Final Determination Paper will help consumers who are unable to register under the ECIS. For example, consumers under private metering setup and do not have a load account with SP Services.</p>

bigger diameter to contain I^2R losses. In an existing building it can also be very costly to lay trunking from one end to the other.

- 2) Capacity constraints: a 1MWac system at 3-phase 400V needs a 2'000A isolator, which is often not available. We typically have to split into 2 x 1'000A.
- 3) Load balance: many large buildings have two incoming supplies. To maximise self-consumption and minimise exports, we must split the PV between the two points in relation to the demand drawn from each.

Thus it is very rare to escape with a single feed-in point for a 1MW+ system.

We therefore request EMA to apply the same market registration & charging procedures all <10MWac systems equally, whether or not they sell exports back to the market.

<p>NEA</p>	<p>EMA is proposing for consumers with embedded IGS below 10 MWac who will not be selling any electricity back to the market to undergo a streamlined market registration and requirements, including paying EMC an estimated fixed charge determined by EMA. Where the estimated fixed charge is based on historical weighted average price of respective charges.</p> <p>(i) How will these weights be calculated? (ii) How will EMA determine the IGS generation profile? (iii) Will each installation's specific circumstances be taken into account (e.g. shading)?</p> <p>EMA proposes that the estimated charge is based on the historical weighted average price of respective charges (e.g. AFP) on effective hours across the most recent half-year period.</p> <p>(i) Could we confirm that the charges are paid every half-yearly? (ii) If so, if there are certain extended periods in the year where solar output is much reduced (due to cloud cover etc.), will consumers pay a reduced fixed charge?</p>	<p>Consumers registered under the Market Participant (IGS Non-Exporting) will pay a fixed charge to the Energy Market Company on a half-yearly basis. The charge will be based on two factors:</p> <p>(a) The historical weighted average price of the respective charges for the most recent half-year period, from 7am – 7pm. (b) The estimated amount of solar generation (MWh) based on the installed capacity of the solar generation facility and the IGS generation profile determined by the EMA.</p> <p>The IGS generation profile is derived based on factors such as the historical average solar irradiance in Singapore, from 7am – 7pm, and will be standardised for all IGS installations to be used throughout the year.</p>
<p>Solargy</p>	<p>I am glad that the costly PV Gen meters will henceforth be dispensed with for those contestable consumers not expecting net settlement. This is indeed a very sensible approach, which I have been advocating.</p>	<p>Under the proposed streamlined arrangement, the relevant requirements for a Market Participant (MP) will still apply to the Market Participant (IGS Non-Exporting). However, the Market Participant (IGS Non-Exporting) registration processes and requirements will be streamlined. If the Market Participant (IGS Non-Exporting) would like to register additional embedded</p>

	<p>My clarifications on the proposed amendments are as follows:</p> <ol style="list-style-type: none"> 1. Will the consumer still need to register themselves as a Market Participant with EMC, notwithstanding the omission of items 1 to 5 of Table 3? The term “Market Participant” is indeed misleading and often result in confusion as the consumer is not expecting net settlement and often they wonder why the need to register themselves as MP. It will be good to simplify the registration process and use a different term for this class of CC w/o net settlement. 2. How do one register and append additional embedded generation facility (for CC without net settlement) after initial registration? 	<p>IGS facilities, they would need to submit the relevant Generation Facility registration form to EMC.</p>
	<ol style="list-style-type: none"> 3. At present, for HT customers with embedded generation, they have to make a choice of the backup scheme. Most consumers choose the summation scheme. <p>Hence for the case of customers installing more than 1 MW of PV system and not expecting net settlement, they will have no PV Gen meters. While they may choose “Installation of Summation Meters” which are provided free by SPPA, why do SP want to make this expense (in some projects there are many feed in points).? Can this requirement be simplified to obviate the need to install summation meters?</p>	<p>SP Group is reviewing the requirements on installing summation meters for consumers registered under the Market Participant (IGS Non-exporting).</p>

	Of course there is a choice of “Solar PV Profiling” but again this is very demanding on the IT resources on the part of the consumer.	
Sunseap	<p>Sunseap welcomes the Energy Market Authority’s constant engagement with the industry, by seeking comments and feedback on changes to Regulatory Frameworks and Codes.</p> <p>Sunseap would like to submit our feedback that we are supportive of the proposed arrangements and enhancements raised in the consultation paper.</p>	The EMA notes the comment.
SP Group	<p>SP supports the continual improvement of the regulatory framework for Intermittent Generation Sources (IGS) in anticipation of new developments in the electricity market and increasing solar deployments by consumers. Enhancements that are geared towards easing the administrative burden for solar “prosumers” represent positive developments to encourage higher solar adoption.</p> <p>However, such enhancements should also take into consideration the principles highlighted in an earlier consultation paper by EMA “Enhancements to the Regulatory Framework for Intermittent Generation Sources in the National Electricity Market of Singapore” dated 28 Oct 13, namely:</p>	The EMA is reviewing the reserves cost allocation framework for IGS to better recognize its characteristics and effects on the power system.

	<p>“...intermittent generation sources impose a cost on the system by requiring reserves ... to manage the fluctuations in output...” and</p> <p>“...costs of the reserves are subsequently allocated to the relevant stakeholders, broadly based on the “causer-pays” principle where participants pay their share of the costs they impose on the system.”</p>	
	<p>Maintaining grid stability and reliability amidst increased intermittency</p> <p>With the lowering of the barriers to entry, PVs and its associated intermittency is expected to increase in the distribution level and the system.</p> <p>SP submits that whilst the streamlining of regulatory requirements is encouraged, the stability and reliability of the grid should not be compromised.</p> <p>SPPA 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.</p> <p>SP proposes to work with EMA to develop and establish the necessary technical requirements to progress with the above.</p>	<p>The EMA is working with SPPG to review the technical requirements for IGS.</p>
	<p>Potential overcharging of AFP</p> <p>SP would like to highlight the following scenarios whereby this group of consumers may be potentially over-charged if they do not undertake market participant deregistration prior to:</p>	<p>The EMA will work with EMC to inform Market Participant (IGS Non-Exporting) that they should deregister from market participation should the mentioned scenarios arise.</p>

	<p>a) Switching back to non-contestability status; or b) Closing their load account; or c) Opting for payment for electricity export via registering in the Enhanced Central Intermediary Scheme (ECIS) with SPS.</p> <p>Although the possibility is remote, for good market practice, SP suggests that EMA and EMC make clear to these consumers that they should inform EMC and SPS, and deregister with EMC accordingly, before they proceed with any of the above-mentioned scenarios. The disadvantage with the implementation of this “outside the system” solution is that parties are required to be reminded manually to perform the deregistration.</p>	
<p>Tuaspring</p>	<p>Tuaspring is supportive of proposals that would bring incremental benefit to the industry.</p>	<p>The EMA notes the comment.</p>