Executive Summary

In the Singapore Wholesale Electricity Market (SWEM), market participants (MPs) may enter into bilateral contracts and authorize the EMC to settle only the net credit or debit after taking the bilateral quantities into consideration.

A review of the current bilateral contract arrangement in this paper has shown that it is largely designed for a market structure of predominantly gentailers. As the market make-up evolves, the bilateral contract arrangement naturally needs to be enhanced to ensure that it remains a relevant and practical tool for the market. Credit risks associated with bilateral contract settlement need to be assessed and monitored closely as well.

We have identified several issues with the current arrangement and analysed the following six potential enhancements to the current bilateral contract arrangement in this paper:

1. For the seller-submitted bilateral contract data should be verified by the buyer before the EMC accepts the bilateral contract for net settlement;
2. For the EMC to validate the seller’s actual generation or credit support level, or both, against the bilateral contract submission and settlement;
3. To introduce different bilateral contract settlement mechanisms;
4. To allow the bilateral contract arrangement to be used for ex-post trade reallocation in the event of a buyer’s margin call;
5. To allow the expected bilateral settlement amount based on the seller’s submission to be subtracted from the initial credit support requirement calculation for new MPs that have entered into bilateral contracts as buyers; and
6. For the timeline for submission of bilateral contract data to be updated to T-15 calendar days to take the additional Retail of Last Resort (RoLR) timeline into consideration.

We would like to seek the views of any interested party on the proposals, specifically on the following questions related to Proposal 3:
a. whether there is substantial benefit in introducing alternative mechanisms in bilateral contract settlement; and
b. what the preferred alternative settlement mechanism is.

We would appreciate receiving comments by **24 August 2020**.
1. Introduction

In the Singapore Wholesale Electricity Market (SWEM), market participants (MPs) may enter into bilateral contracts and authorize the EMC to settle only the net credit or debit after taking the bilateral quantities into consideration (“net settlement”). Bilateral contract settlement is available for all the three products in the SWEM, namely, energy, reserve\(^1\) and regulation.

This paper reviewed the bilateral contract arrangement in the current market rules and proposed enhancements to it.

2. Background

2.1 Overview of bilateral contract arrangement in SWEM

In electricity markets, a contract for difference (CfD) is one of the most commonly used tools to manage spot price risks. By agreeing to a fixed price (the “strike price”) for a fixed quantity (the “contract quantity”) of electric energy or other ancillary products, the parties to the CfD are shielded from wholesale market price volatilities for the contracted quantity. In the context of the SWEM, such CfDs are termed as bilateral contracts.

Since market inception, the generation and retail markets in the SWEM have comprised predominantly of a few large generation companies (“gencos”) and their affiliated retail companies (“gentailers”) respectively. All bilateral contract settlement has been energy quantity offsets between gencos and their affiliated gentailers. Although the market rules provide for settlement of bilateral reserve contracts and bilateral regulation contracts, it has never been used by MPs. This paper focuses predominantly on a discussion on bilateral energy contracts while certain proposals that could be extended to bilateral reserve contract and bilateral regulation contract will be included whenever applicable.

There is a similar regulatory contractual arrangement in the SWEM, namely the vesting contract, between some gencos and the market support services licensee (MSSL). For the avoidance of doubt, vesting contract is not considered in this study.

Our study of the SWEM data from January 2019 to May 2020 has shown that on average, the bilateral energy contract level and vesting contract level are about 65% and 18% of the total withdrawal quantities respectively.

2.2 Current bilateral contract arrangement

2.2.1 Submission of bilateral contract information to EMC

a. The seller of the bilateral contract is the party responsible for submission of the contract to the EMC for settlement purposes.

b. The buyer’s settlement account needs to be specified during the submission.

c. The buyer is neither notified of nor required to verify the submission of the seller.

d. Submission needs to be done at least ten days before the dispatch day to which the bilateral contract data apply.

e. Only contract quantity is submitted to the EMC, strike price is not required. For bilateral energy contracts, the contract quantity can be in one of the three forms: percentage of Injection Energy Quantity (IEQ) of seller, percentage of Withdrawal Energy Quantity (WEQ) of buyer,

\(^1\) In the reserve market, reserve product is further differentiated by reserve provider groups associated with each reserve class. Therefore, a bilateral reserve contract needs to be associated to a specific reserve provider group.
or absolute quantity in MWh; for reserve and regulation, only absolute quantity in MWh is allowed as contract quantity.

2.2.2 Settlement of bilateral contract information

While parties to a bilateral contract would typically agree on a specific strike price as the basis for settlement, the EMC’s net settlement only “partially” settles the contract in the sense that the contract quantities are settled using floating market prices. Specifically, bilateral energy quantities (BEQ), bilateral reserve quantities (BRQ) and bilateral regulation quantities (BFQ) are settled using the uniform Singapore energy price (USEP), the market reserve price (MRP) of the associated reserve provider group and market regulation price (MFP) respectively.

Figure 1 below illustrates the effect of bilateral energy contract settlement by the EMC. It is assumed that the seller has generated 200MWh with its nodal price being $95/MWh, the buyer has consumed 150MWh with USEP being $100/MWh and the seller submits the bilateral energy contract to the EMC for settlement with BEQ being an absolute quantity of 100MWh.

![Figure 1: Effect of Bilateral Contract Settlement](image)

2.3 Benefits of bilateral contract settlement by EMC

- Avoid circular cash flow

Note that the EMC may not be able to “fully” settle the bilateral contract since the agreed contract price might not be equal to the USEP that the EMC uses for contract settlement. For illustrative purposes, assuming the actual contract price is $110/MWh, the seller needs to additionally compensate the buyer $1,000 (100MWh x $10/MWh) after the EMC has netted the bilateral contract amount in settlement.

Despite the need for out-of-market settlement for the residual difference in price, bulk of the circular cash flow has been avoided.

- Lower financing cost and improved cash flow of the buyer

To fulfill its daily market settlement requirement, the buyer only needs to maintain enough float in its bank account to cover the net amount it owes the market.

In addition, lower credit support level is required from the buyer as its trading exposure decreases. In the worked example, the credit support value (CSV) required from the buyer would be about $570,000 ($15,000 x 38 days) without net settlement; with reduced trading exposure due to net settlement; its CSV decreases substantially to about $190,000 ($5,000 x 38 days).

- Lower settlement risk and smaller share of default levy (if any)

In the event of a settlement shortfall due to an MP’s default in payment, all the non-defaulting MPs share the shortfall amount in proportion to their respective invoice amounts. Net
settlement reduces the invoice value of both the seller and the buyer in absolute terms, and consequently results in smaller shares of default levy for both the seller and the buyer of the bilateral contract.

Even if the buyer of the bilateral contract is the party in default, the seller’s proportional share of the default levy is still lower due to the effect of net settlement. For illustrative purposes, assuming the sum of the invoice value of the rest of the market is $200,000, the seller’s share of default levy would be 8.7% ($19,000 ÷ $219,000) without net settlement and 4.3% ($9,000 ÷ $209,000) with net settlement.

3. Issue Analysis and Proposed Enhancements

3.1 Lack of buyer verification of seller’s submission

In accordance with the current bilateral contract arrangement, as summarised in section 2.2 of this paper, the seller is wholly responsible for the submission of bilateral contract data. The buyer is not informed by the EMC of the submission, until the buyer receives its preliminary settlement invoice that reflects the net settlement. Even if the seller lodges an erroneous submission that is different from the contract, the buyer does not get to verify or rectify the submission with the EMC.

Despite this rigidity, the arrangement has worked fine since parties to the bilateral contracts in the SWEM are usually pairs of affiliated gencos and gentailers. However, as the market evolves with emergent new business models and technologies, enhancements to the current arrangement is necessary to expand its applicability and to facilitate participation of new models.

- Example 1 - Bilateral contracts between parties that are unaffiliated

As the generation market becomes increasingly diversified with the influx of new “gencos” such as solar and energy storage system developers, independent retailers may be able to secure a bilateral contract with an unaffiliated genco. Having a mechanism that allows the buyer to be able to verify the seller’s submission of bilateral contracts will significantly boost the buyer’s confidence in settlement certainty. The buyer’s validation also minimizes human errors in data input from the seller, therefore reducing the need for private settlement adjustments between the two parties.

- Example 2 – MPs having bilateral contracts with multiple parties

If a retailer has entered into several bilateral contracts with different sellers in respect of the same trading period, its settlement invoice does not provide the breakdown of individual bilateral contract amounts but only shows the total sum. The buyer will not be able to accurately reconcile its net settlement amount if the retailers are not informed of the detailed submission by all the sellers that it has a contract with.

Proposal 1: we propose that the bilateral contract data submission to be verified by the buyer before the EMC accepts the bilateral contract for net settlement.

3.2 Credit risk associated with bilateral contract settlement

In the securities and commodities markets, CfD is purely a financial contract that is cash-settled. The seller who shorts a CfD is not required to own (or have borrowed) the underlying product to ensure physical delivery upon settlement but needs to maintain an adequate margin with its broker.

Credit risk management in the SWEM revolves around monitoring prudential requirements and mitigation of payment default risk of market debtors. Sellers of bilateral contracts, typically being gencos with generation assets to physically deliver the contract quantity, do not maintain credit supports with the EMC. However, when the EMC settles a bilateral contract, the buyer’s debit is
transferred to the seller and the seller may become a net debtor if the seller’s actual generation is less than its contracted short position.

3.2.1 Failure-to-deliver by gencos

The nature of the current bilateral contract settlement in the SWEM is purely financial. For example, in the event of generation outages and a genco is unable to deliver the contract quantity physically in real-time, the EMC would still proceed to execute the net settlement in accordance with the seller’s ex-ante submission of bilateral contract data. In addition, the seller is not allowed to modify its submission close to real-time as the market rules require the bilateral contract data to be submitted at least 10 days prior to the trading day.

Based on the bilateral contract data submission in the SWEM from January 2019 to May 2020, MPs predominantly submit bilateral energy contracts in the form of a percentage of the buyer’s WEQ and about 85% of submissions of this type specifies the percentage to be 100%. This is consistent with our general understanding of how bilateral contract arrangement is currently used by the MPs – by gencos and their affiliated gentailers to offset the gentailer’s exposure entirely by the genco’s physical generation.

As a result, when the genco fails to deliver at least the gentailer’s WEQ, the genco may temporarily be in a debit position. Since gencos, being market creditors for most of the time, are not required to maintain credit supports with the EMC, their uncovered debit position posts potential credit risk to the market, especially if the debit position is prolonged.

To mitigate the credit risk associated with the current bilateral contract settlement, we propose the following modifications in the prudential requirements and bilateral contract arrangement in the SWEM:

a. Prior to contract data submission

   The seller should self-assess its expected generation output vis-à-vis its contract position on an ongoing basis. If the seller expects its generation to occasionally or regularly fall short of its contract position, it should provide sufficient credit support to cover its expected net short position prior to submission of the relevant bilateral contract data.

b. EMC’s verification of submission

   Prior to accepting the bilateral contract submission made by the seller, the EMC shall first verify if the seller’s contract position poses uncovered trading exposure in the market. Specifically, the estimated credit amount to be transferred to the buyer (BESC) shall be evaluated against the sum of the seller’s expected revenue from energy generation (GESC) and the credit support amount it has provided to the EMC. The verification aims to prevent MPs from taking up excessively significant debit positions (via selling of bilateral contracts) that are beyond the coverage provided by the combination of its physical generation capabilities and its credit support.

A worked example

<table>
<thead>
<tr>
<th>Contract Details</th>
</tr>
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<tbody>
<tr>
<td>o Contract duration: 6 months</td>
</tr>
<tr>
<td>o Contract type: Load (Fraction of WEQ of buyer)</td>
</tr>
<tr>
<td>o Bilateral Withdrawal Fraction (BWF): 100%</td>
</tr>
<tr>
<td>o Contract price used for settlement: USEP</td>
</tr>
</tbody>
</table>

2 Except if the Market Surveillance and Compliance Panel (MSCP) instructs the EMC to reject any bilateral contract data submitted by a suspended MP.

3 BESC and GESC in this paper carry the same meaning as defined in Chapter 7 of the market rules.
Estimated daily BESC amount
- Contract quantity of each period is estimated using the 90-day rolling average of buyer’s historical WEQ in that period, denoted by BEQₙ;
- Contract price of each period is estimated using the 90-day rolling average of historical USEP in that period, denoted by USEPₙ;
- Estimated daily BESC amount could be calculated by summing the products of BEQₙ and USEPₙ over all 48 periods in a trading day, denoted by BESCₖ.

Estimated daily GESC amount
- Daily GESC amount can be estimated using the 90-day rolling average of seller’s historical GESC, denoted by GESCₖ.

EMC’s Verification
Suppose BESCₖ = $350,000, GESCₖ = $300,000 and the seller has additionally pledged $2,000,000 credit support amount with the EMC, its forecasted contract position for 38 days will be $13,300,000 ($350,000 x 38 days) in total which could be sufficiently covered by the sum of its expected generation revenue of $11,400,000 ($300,000 x 38 days) and its credit support amount of $2,000,000, and the seller’s submission of the bilateral contract data can be accepted by the EMC.

3.2.2 Financial trading via bilateral contract
We further expanded the scope of our analysis and studied the prospects of financial trading via the existing bilateral contract arrangement in the SWEM.

Retailers in the SWEM currently finance their credit support requirements by providing cash, Banker’s Guarantee (BG) or Standby Letter of Credit (SBLC) to the EMC. The associated financing cost can be proxied by the commercial loan rate or the bank charges for issuing BG or SBLC respectively. Although a BG or SBLC generally costs less as its bank charges are typically lower than the prevailing commercial loan rate, small businesses may face difficulties in obtaining

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4 By the existing prudential requirements, if an MP starts to default on its payment, it is generally expected to have up to 38 days of trading exposure in the market before its trading activities can be suspended.

5 While the market rules stipulate that the Singapore Government Treasury Bills are acceptable form of credit support, they are not currently used by any MP.
one. We observed that the small independent retailers in the SWEM usually provide credit supports in the form of cash.

Tools for hedging spot price volatilities in the SWEM are limited as well, especially for independent retailers. Gentiologists backed by physical generation assets have a natural hedge while independent retailers do not. Electricity futures\(^6\) are often used as the alternative hedging tool to lock in forward prices. However, unlike bilateral contracts, prudential requirements and settlement of futures position are governed by the Securities and Futures Act (Cap. 289) and administered by the financial exchange. As a result, a retailer’s futures position neither lowers its credit support requirement nor reduces its settlement amount in the SWEM.

By recognizing that bilateral contracts can be purely financial, without the backing of generation assets, to provide more flexibility for settlement reallocation, the market can evolve with new business models and hedging options such as:

- financial traders being the selling party of bilateral contracts,
- bilateral contracts between retailers for their over- or under-contracted positions,
- margin calls satisfied by trade reallocation, and
- offsets of futures positions in the SWEM settlement.

These innovations can encourage more competition in the market by providing more options for trade financing and price risk hedging for MPs. Retailers can potentially enjoy lower financing cost which can in turn flow to the end consumers of electricity thorough lower energy prices.

Our study of other jurisdictions also showed that bilateral contracts in energy markets are generally treated as financial products for trade reallocation. The Ontario’s Independent Electricity System Operator (IESO) explicitly allows parties without physical assets to sell bilateral contracts\(^7\); the Australian Energy Market Operator (AEMO) supports trade reallocations that are based either on contract quantity, or on value in an agreed dollar amount\(^8\).

For sellers of bilateral contracts who do not own any generation asset in the market, credit risk management becomes even more critical. A similar arrangement proposed in section 3.2.1 could be adopted such that the sellers are required to provide sufficient credit support to cover their contract position before submission of the bilateral contract data can be accepted by the EMC.

**Proposal 2:** we propose that the EMC validates the seller’s actual generation or credit support level, or both, against the bilateral contract submission and settlement. For generation-backed sellers, they can use a combination of actual generation and credit support to ensure their bilateral contract data submission will be settled by the EMC; for sellers who do not own generation assets, their credit support needs to be sufficient to cover the bilateral contract amounts that they have submitted to the EMC.

### 3.3 Is there value in providing different forms of bilateral contract settlement?

The commercially sensitive strike price is currently not submitted to the EMC. EMC uses market prices for bilateral contract settlement. As discussed in section 2.3 of this paper, this leads to “partial” settlement of a bilateral contract due to the difference between strike price and the market price used by the EMC for settlement. Parties to the contract must take additional steps to settle the residual difference out-of-market. In rare events that the market price clear at negative values,

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\(^6\) Refers to the SGX USEP Quarterly Base Load Electricity Futures and the SGX USEP Monthly Base Load Electricity Futures traded on the Singapore Exchange (SGX)


the existing settlement arrangement reallocate “negative credit” from the seller to the buyer which might contravene the intention of the bilateral contract in the context of electricity markets.

To minimise the transaction costs of off-market settlement for MPs and provide more flexibility to suit different business needs, we propose to introduce more options in the settlement arrangement such as:

(i) market price settlement – the existing settlement arrangement where the seller submits contract quantity only and the price used for settlement is the market price;
(ii) strike price settlement - the seller can choose to provide the strike price associated with the contract quantity; and
(iii) dollar amount settlement – the seller submits to the EMC a dollar amount to be transferred to the buyer.

For Option (ii), a reasonable price band should be prescribed for the strike price to avoid fraudulent credit transfers. Our initial assessment is that the price floor should be set at zero to prevent negative credit transfer, and the price ceiling could be pegged to a multiple of historical average of market prices, for example, 2 times of the average USEP in the preceding year.

For all the three options, it is important to ensure that the amount of credit transfer does not exceed the coverage provided by the seller’s generation capability or pledged credit support amount.

Proposal 3: we propose to introduce different bilateral contract settlement mechanisms. We would like to seek the views of any interested party on this proposal, specifically on the following questions:

a. whether there is substantial benefit in introducing alternative mechanisms in bilateral contract settlement; and
b. what the preferred alternative settlement mechanism is.

3.4 Use of ex-post trade reallocation to meet margin calls

A margin call issued to an MP needs to be satisfied within 2 BDs by making pre-payment or providing additional credit support. Given the tight timeline, MPs often have to fork out the amount required in cash and it could be rather challenging for MPs with short-term cash flow issues. One of the enhancements we would like to propose is to allow the bilateral contract arrangement to be used for ex-post trade reallocation in the event of the buyer’s margin call.

Specifically, in the event of a margin call, the MP (“buyer”) has the option to negotiate a bilateral contract with another MP (“seller”) to offset its traded positions in order to bring its risk exposure to the required level of the margin call. The seller needs to submit the bilateral contract data to the EMC in accordance with the margin call timeline given by the EMC to the buyer. The arrangement works like a “pre-payment” in the form of another MP’s credit instead of cash, at a potentially lower cost.

Proposal 4: we propose to allow the bilateral contract arrangement to be used for ex-post trade reallocation in the event of a buyer’s margin call.

3.5 Initial credit support value calculation to include bilateral contract offsets

MPs’ credit support requirements are estimated using the rolling 90-day average of their settlement invoices. Bilateral contracts reduce their credit support requirements by decreasing their daily settlement amounts that are used for prudential calculation. For a new MP with less than 90 days of trading in the SWEM, its credit support requirements are calculated using a more prudent approach which takes the product of historical average market price and the maximum of all historical WEQs and their forecasted WEQ. The calculation for a new MP has not considered
the case where a new MP has entered into bilateral contracts that could reduce its wholesale trading exposure as well as credit support requirement.

Proposal 5: to accurately reflect a new MP’s credit risk in the market, we propose that the expected bilateral settlement amount based on the seller’s submission to be subtracted from the initial credit support requirement calculation for new MPs that have entered into bilateral contracts as buyers.

3.6 Inclusion of RoLR timeline in the submission of bilateral contract

To prevent the sellers of bilateral contracts from revising the contract quantities upon the buyer’s payment default in the SWEM, rule modifications introduced in RC 341: Review of Mechanisms to Mitigate Credit Default⁹ updated the timeline for submission of bilateral contract data from T+4BD to T-10 calendar days, T being the trading day to which the bilateral contract data apply. The analysis in RC341 was undertaken by the EMC in 2017 prior to the introduction of the Retail of Last Resort (RoLR) framework in preparation for the launch of Open Electricity Market. As a result, the updated timeline has not taken the impact of the RoLR timeline into consideration and was proposed to be T-10 calendar days on the basis that a defaulting retailer is expected to be suspended from trading within 6 BDs from its default in payment.

The RoLR timeline entails 3 BDs for completion of customer transfers of the defaulting retailer upon the Market Surveillance and Compliance Panel (MSCP) issuing suspension order. Rule modifications introduced in RC 359: Review of Credit Support Requirements in Alignment with the Lead Time for Transfers During a Retailer of Last Resort Event ¹⁰ have increased the prudential requirements in accordance with the extended suspension process timeline arising from the RoLR framework.

Proposal 6: we propose that the timeline for submission of bilateral contract data to be updated to T-15 calendar days to take the additional RoLR timeline into consideration.

4. Conclusion

A review of the current bilateral contract arrangement in this paper has shown that it is largely designed for a market structure of predominantly gentailers. As the market evolves with the influx of new technologies and participants with new business ideas, the bilateral contract arrangement naturally needs to be enhanced to ensure that it remains a relevant and practical tool to continue serving the increasingly diversified mix of MPs. Credit risks associated with bilateral contract settlement need to be assessed and monitored closely as well.

We have identified several issues with the current arrangement and analysed the following six potential enhancements to the current bilateral contract arrangement in this paper:

1. for the seller-submitted bilateral contract data should be verified by the buyer before the EMC accepts the bilateral contract for net settlement;
2. for the EMC to validate the seller’s actual generation or credit support level, or both, against the bilateral contract submission and settlement;
3. to introduce options of different bilateral contract settlement mechanisms;
4. to allow the bilateral contract arrangement to be used for ex-post trade reallocation in the event of a buyer’s margin call;

(5) to allow the expected bilateral settlement amount based on the seller’s submission to be
subtracted from the initial credit support requirement calculation for new MPs that have
entered into bilateral contracts as buyers; and

(6) for the timeline for submission of bilateral contract data to be updated to T-15 calendar days
to take the additional RoLR timeline into consideration.

5. Consultation

We would like to seek the views of any interested party on the proposals, specifically on the
following questions related to Proposal 3:

a. whether there is substantial benefit in introducing alternative mechanisms in bilateral contract
settlement; and

b. what the preferred alternative settlement mechanism is.

We appreciate receiving comments by 24 August 2020.