A GUIDE TO ALL MEMBERS AND APPLICANTS OF THE
PHILIPPINE WHOLESALE ELECTRICITY SPOT MARKET

Vol. 3 Billing, Settlement & Metering
AUGUST 2015
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- Introduction  
- Determination of Ex-Ante Quantity  
- Bilateral Contract Quantities  
- Determination of Metered Quantity  
- Calculation of Generator/Supplier Trading Amounts  
- Calculation of Load/Customer Trading Amounts  

**Other Settlement Methodologies**  
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- MRU Settlement  
- Calculation of VAT  
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INTRODUCTION

- Trading amount is calculated for each trading interval (i.e., one hour). Monthly settlement amount is aggregate of hourly trading amounts.
- Two-settlement system applies so that the hourly trading amount is the total of the ex-ante and ex-post trading amounts for each trading interval.
- Full nodal pricing applies to both generators and customers, thus the nodal prices determined at their respective locations are used for settlements.
- Settlement calculations are made at the market trading node levels, consistent with pricing and scheduling processes which are also determined at the market trading nodes.
- Bilateral contract quantities are netted out in the WESM settlements.

Total Trading Amount (TTA) Formula

\[ \text{TTAi} = \text{Ex-Ante Amount} + \text{Ex-Post Amount} \]

\[ \text{TTAi} = \text{EAQ * EAP} + ((\text{MQ'} - \text{EAQ}) \times \text{EPP}) \]

Where

- TTAi – Total Trading Amount
- i – Trading Interval (1 Hour)
- MQ' – Metered Quantity (SSLA applied)
- EAQ – Ex-Ante Quantity = \( \frac{1}{2} \) (Initial + Target)
- BCQ – Bilateral Contract Quantity
- EAP – Ex-Ante Price
- EPP – Ex-Post Price
DETERMINATION OF EX-ANTE QUANTITY (EAQ)

RTD (Ex-Ante) run for H 0900

Ex-Ante Quantity = \( \frac{1}{2} \) (Initial Schedule + Target Schedule)

BILATERAL CONTRACT QUANTITIES (BCQ)

BCQ is declared to the WESM by the generator counterparty (identifying source node, delivery point/node, and hourly quantity). Hourly BCQ declaration is submitted the day after the delivery date.
Bilateral Contract Quantities Allocation

Bilateral “sell” quantity declared by the generator is equal to the bilateral “buy” quantity netted out of the customer’s settlement quantity. Thus, the cost of losses and congestion associated with the delivery of the BCQ is by default charged to the customers/loads.

Figure 4. BCQ Allocation

- BCQ Declaration on Generator Side – Resource Level
- BCQ Declaration on Load Side – Participant Level/Metering Point/CCs

DETERMINATION OF METERED QUANTITY (MQ)

Metering Installation Standards

1. Location at the Market Trading Node (MTN)

Location of Metering Point
- Metering Point located ideally at the MTN

For loads with meters located at the MTN (coincident with RTU location):
- MQ’ = MQ reading

Figure 5. Metering Installation Standards: Location at the MTN
2. Location after the MTN

For loads with meters after (below) the MTN, consider site specific loss adjustment:

- $MQ' = MQ \times (SSLA \text{ factor})$
- $MQ + \text{Total Loss}$

Where: $SSLA \text{ factor} = 1 + \frac{\text{Total Loss}}{MQ}$

$\text{Total Loss} = \text{LinekW-Loss} + \text{CopperLoss-M} + \text{CoreLoss-M}$

**Figure 6. Metering Installation Standard: Location after the MTN**

**CALCULATION OF GENERATOR/SUPPLIER TRADING AMOUNTS**

$$TTA_{Gi} = [(EAQ_G - BCQ_{G-L}) \times EAP_G] + [(MQ_G' - EAQ_G) \times EPP_G]$$

**Table 1. Calculation of Generator/Supplier Trading Amounts**

<table>
<thead>
<tr>
<th>Component</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>$TTA_{Gi}$</td>
<td>Total Trading Amount</td>
</tr>
<tr>
<td>$EAQ_G$</td>
<td>Ex-ante quantity (initial + target)/2</td>
</tr>
<tr>
<td>$BCQ_{G-L}$</td>
<td>Bilateral contract quantity declared to its customer counterparty</td>
</tr>
<tr>
<td>$EAP_G$</td>
<td>Ex-ante price (nodal price)</td>
</tr>
<tr>
<td>$MQ_G$</td>
<td>Metered quantity</td>
</tr>
<tr>
<td>$EPP_G$</td>
<td>Ex-post price (nodal price)</td>
</tr>
<tr>
<td>$i$</td>
<td>Trading interval</td>
</tr>
</tbody>
</table>
CALCULATION OF LOAD/CUSTOMER TRADING AMOUNTS

\[ TTA_{Li} = [(EAQ_{L} - BCO_{G-L}) \cdot EAP_{L}] + [(MQ_{L}' - EAQ_{L}) \cdot EPP_{L}] + [(EAP_{L} - EAP_{G}) \cdot BCQ_{G-L}] \]

<table>
<thead>
<tr>
<th>Component</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTA_{Li}</td>
<td>Customer total trading amount for trading interval I</td>
</tr>
<tr>
<td>EAQ_{L}</td>
<td>Customer ex-ante quantity (initial + target/2)</td>
</tr>
<tr>
<td>BCO_{G-L}</td>
<td>Bilateral contract quantity declared by generator counterparty</td>
</tr>
<tr>
<td>EAP_{L}</td>
<td>Customer ex-ante price (nodal price)</td>
</tr>
<tr>
<td>MQ_{L}'</td>
<td>Adjusted customer metered quantity</td>
</tr>
<tr>
<td>EPP_{L}</td>
<td>Customer ex-post price (nodal price)</td>
</tr>
<tr>
<td>EAP_{G}</td>
<td>Ex-ante price (nodal price) of generator that declared BCQ</td>
</tr>
<tr>
<td>i</td>
<td>Trading interval</td>
</tr>
</tbody>
</table>

**Line Rental (LR) Trading Amount**

- It is the economic rental arising from the use of a transmission line, calculated as the difference in value between flows out of the receiving and sending node (WESM Rules 3.13.12)

\[ LR = (EAP_{L} - EAP_{G}) \cdot BCQ \]

- WESM Rules Sec. 3.13.1.1(b) states that the seller shall: “Identify the counterparty to the bilateral contract and the party that will pay the line rental trading amount associated with the bilateral contract quantity submitted; provided, however, that in case only one of the bilateral counter parties is registered as a Direct WESM Member, that WESM Member shall be the party that will pay the line rental to the Market Operator; xxxx”

(As amended by DOE DC No. 2004-07-008 dated 7 July 2004 and further amended by DOE DC No. 2006-11-0013 dated 09 November 2006)

**Net Settlement Surplus (NSS)**

Net Settlement (NS)

- \( NS = TTA \) collection – TTA payment
- If \( NS > 0 \), Net Settlement Surplus (NSS)
- If \( NS < 0 \), Net Settlement Deficit (NSD)

NSS or NSD is allocated to relevant Trading Participants

- 100% flow-back, no retention effective January 2014
ADMINISTERED PRICE DETERMINATION METHODOLOGY

Conditions

- Shall be used for settlement in cases where there is Intervention in the market by the System Operator (SO) or where the market is suspended by the Energy Regulatory Commission (ERC).
- Market intervention by the SO is permitted when the grid is in extreme state condition arising from
- An emergency
  - a significant supply capacity shortfall
  - a power system disturbance
  - a significant environmental phenomenon
  - a system blackout or significant power system under-voltage condition
  - material damage to a distribution system
  - a situation in which the Government proclaims or declares an emergency
- A threat to system security
- An event of force majeure.
- Applies also when the Market Operator (MO) is not able to generate or determine the price for energy for any given trading interval.
- Under clause 6.8.1 of the WESM Rules, only the ERC may suspend the operation of the spot market or declare a temporary market failure. Below are the conditions for Market Suspension:
  - natural calamities
  - following official declaration of a national and international security emergency by the President of the Philippines

Calculation of Administered Prices

- The equivalent administered price will be computed by taking the load weighted average ex-post energy price of the corresponding trading interval of the four preceding similar days that have not been administered.
- In case any of the prices covered by the four preceding same or similar days have been administered, said price will be excluded to be replaced by the prices that have not been administered from the most recent earlier same or similar day.

\[
AP_{Gen-i} = \frac{\sum_{D=1}^{4} EPP_{Gen-i,D} \times MQ_{Gen-i,D}}{\sum_{D=1}^{4} MQ_{Gen-i,D}}
\]

\( AP_{Gen-i} \) = Administered Price for any generator at node \( i \)
\( i \) = Generator resources
\( EPP_{Gen-i,D} \) = Ex-post Price of a generator at Node \( i \)
\( MQ_{Gen-i,D} \) = Metered Quantity of Generator at Node \( i \)
\( D \) = number of trading days to be considered

Figure 7. Determination of Administered Price for Generators
Generator Settlement – Calculation of Trading Amount

For market intervention intervals, the trading amount for generators shall be computed as:

\[ T_{A_{Gen-i}} = A_{P_{Gen-i}} \times (M_{Q_{Gen-i}} - B_{CQ}) \]

**Figure 8. Generator Settlement: Calculation of Trading Amount for Intervals with Market Intervention**

\[ T_{A_{Gen-i}} = \text{Trading Amount of Generator at Node } i \]
\[ A_{P_{Gen-i}} = \text{Administered Price of a particular generator at node } i \]
\[ M_{Q_{Gen-i}} = \text{Metered Quantity of Generator at Node } i \]

**Determinaton of Administered Price for Customers**

\[ \text{AP for Customers (AP}_{Load}) = \frac{\sum A_{P_{Gen}} \times M_{Q_{Gen}}}{\text{Total MQ}_{Load}} \]

**Figure 9. Determination of Administered Price for Customers**

Customer Settlement – Calculation of Trading Amount

For market intervention intervals, the trading amount for loads shall be computed as:

\[ T_{A_{Load-i}} = A_{P_{Load}} \times (M_{Q_{Load-i}} - B_{CQ}) \]

**Figure 10. Customer Settlement: Calculation of Trading Amount for Intervals with Market Intervention**

\[ T_{A_{Load-i}} = \text{Trading Amount of Load at Node } i \]
\[ A_{P_{Load}} = \text{Administered Price of Loads} \]
\[ M_{Q_{Load-i}} = \text{Metered Quantity of load at node } i \]
\[ B_{CQ} = \text{Bilateral Contract Quantity} \]

**Additional Notes**

- The total trading amount of the generator is equal to the total trading amount of load.
- There are no surplus for the trading intervals that are tagged as market suspension or market intervention.
- The participants that complied with the market instructions during market suspension or market intervention may be entitled to additional compensation, upon determination and sufficient proof that the administered price is not sufficient to cover the fuel costs and variable O & M costs during the time that the plant is complying with the dispatch instructions.
- Claims for additional compensation should be made no later than two weeks from market resumption.
MUST-RUN UNIT (MRU) SETTLEMENT

### Table 3. MRU Criteria: Security

<table>
<thead>
<tr>
<th>Conditions Criteria</th>
<th>Considerations for Selection/ Qualification of Units</th>
</tr>
</thead>
</table>
| System Voltage Requirement – refers to the required voltage control and reactive power which the System Operator may need to take into account for the reliability of the Grid | • Power plants with reactive power generation/absorption capability.  
• Strategically located in the Grid to control under-/over-voltage in the vicinity |
| Thermal Limits of Transmission Line and Power Equipment – refers to the dispatch limitations of generators affected by the actual condition of the transmission lines and/or power equipment. | • Consider resulting limits of the transmission lines or the requirements of the power equipment |
| Systems Tests of TransCo Facilities/Equipment – are tests undertaken to certain substation equipment that may have impact on the Grid if not addressed by the dispatch of MRUs | • Consider resulting limits in the requirements of TransCo facilities or equipment undergoing tests |
| Insufficient offers from generators – to meet the demands for real-time dispatch of energy | • Power plants with available energy capable of running during trading intervals with under-generation  
• Power plants with fast start capability |
| Inadequate reserve levels – to meet security and reliability requirements of the Grid | • Power plants certified as ancillary services providers  
• Power plants to be selected based on balance of required reserve level |

### Payment

- Generation Price Index (GPI) is the price mechanism use to complete the MRU compensation
- A total of 24 GPIs are computed for each billing month – 1 GPI for each hour of the day
- GPI is computed using the market data of the immediately preceding billing month inclusive of price substitutions and market re-run
- MRU Volume = MQ = max (EAQ, BCQ)
- MRU Compensation = MRU Volume * GPI

### Generation Price Index

\[ GPI = \frac{\sum \text{Payment}_{\text{bilateral}} + \sum \text{Payment}_{\text{spot}}}{\sum \text{Quantity}_{\text{metered}}} \]

\[ GPI_{\text{Adjusted}} = \frac{\sum_{i=1}^{n} \text{BCQ}_{\text{Participants}} + \sum_{i=1}^{n} \text{Total Trading Amount}_{\text{billed}}}{\sum_{i=1}^{n} \text{Metering Values}} \]

\[ GMR = \frac{\sum \text{Vatable Generation Spot Sales}(\text{PHP})}{\sum \text{Generation Spot Sales}(\text{PHP})} \]
Where:  
Payment\text{bilateral} = \sum Basic\ Charges + \sum Other\ charges - \sum Applicable\ Discounts  
Payment\text{spot} = \sum Trading\ Amounts\ spot + \sum Line\ Rental - \sum Settlement\ Adjustments

Additional Notes

- The participants that complied with the market instructions may be entitled to additional compensation, upon determination and sufficient proof that the MRU settlement amount is not sufficient to cover the fuel costs and variable O & M costs during the time that the plant is complying with the MRU call.

CALCULATION OF VAT

Generation Mix Ratio

- It is an indicator of how much of the monthly total spot settlement amount will be subjected to VAT and will be applied to those negative trading amount
- It uses the hourly spot sales or the spot energy delivery that resulted to positive trading amount

Value Added Tax

Vatable Generator

- \text{VAT on Sales} = \text{SALES (Positive Amounts)} \times 12\%
- \text{VAT on Purchase} = \text{PURCHASE (Negative)} \times \text{GMR} \times 12\%

Non Vatable Generator

- \text{VAT on Sales} = 0
- \text{VAT on Purchase} = \text{PURCHASE (Negative)} \times \text{GMR} \times 12\%

WESM BILLING – SETTLEMENT INFORMATION

Hourly Settlement Information

Settlement prices

- Nodal prices (ex-ante and ex-post)
- Special prices (MRU, administered prices and substitute prices)

Settlement quantities

- Ex-ante (scheduled) quantities (initial and target quantity)
- Meter data (adjusted meter data, raw meter data, transformer losses, site specific loss adjustment)
- Bilateral contract quantities (hourly declaration, generator-customer counterparties)

Trading amounts

- Total trading amounts (ex-ante and ex-post trading amounts; line rental trading amounts)
- Additional/adjusted trading amounts (MRU, application of administered prices, etc.)

Other settlement information

- Net settlement surplus allocation
- Value added tax data (tax payments/collections, generation mix ratio)
Peculiarities of the WESM Bill:

- All transactions integrated into one form
- Transactions Summary
- Purchases by Market Participants from WESM (Accounts Receivable) are tagged by “negative sign”
- Sales by Market Participants to WESM (Accounts Payable) are tagged by “positive sign”
- Market participant’s may have a “dual” role, that of buyer and seller
- Bill is reflected as “net” value
- All negative values are posted in accounting as Accounts Receivable
- All positive values are posted in accounting as Accounts Payable
**PRELIMINARY STATEMENT**

**Billed to**
- **MPI#:**
- **Participant Full Name:**
- **Address Line 1:**
- **Address Line 2:**
- **Philippines**

**Prelim Statement Date:** PSxxxxxxxx

**Billing Period:** Mmm 26 - Mmm 25 YYYY

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex Ante Energy Trading Amount for Dispatchable Load</td>
<td>xx.xx MWh</td>
<td>(xx,xxx.xx)</td>
</tr>
<tr>
<td>Ex Post Energy Trading Amount for Dispatchable Load</td>
<td>xx.xx MWh</td>
<td>(xx,xxx.xx)</td>
</tr>
<tr>
<td>Trading Amount for Line Rental-(Generator Participant ShortName)</td>
<td></td>
<td>(xx,xxx.xx)</td>
</tr>
<tr>
<td>Net Settlement Surplus(100%)</td>
<td></td>
<td>xx,xxx.xx</td>
</tr>
<tr>
<td>VAT on Energy</td>
<td></td>
<td>(xx,xxx.xx)</td>
</tr>
<tr>
<td>Net Settlement Surplus Retention Adjustment</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Price Substitution Adjustment</td>
<td></td>
<td>(xx,xxx.xx)</td>
</tr>
<tr>
<td>Must Run Unit Adjustment</td>
<td></td>
<td>(xx,xxx.xx)</td>
</tr>
</tbody>
</table>

**DISCLAIMER:** The Preliminary Statement is issued for review of the trading participants and is not binding for settlements. The amounts and information stated herein are not final and may be revised as warranted.

| Net Settlement Amount | xx.xx MWh | (xxx,xxx.xx) |
**Figure 14. WESM Final Statement**

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Website: www.wesm.ph

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**WESM BILL**

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trading Amount for Line Rental-SNAP</td>
<td></td>
<td>xxx.xxx.xx</td>
</tr>
<tr>
<td>Trading Amount for Line Rental-SNAPB</td>
<td></td>
<td>(xxx.xx)</td>
</tr>
<tr>
<td>Must Run Unit Adjustment</td>
<td></td>
<td>xxx.xx</td>
</tr>
<tr>
<td>Net Settlement Surplus</td>
<td></td>
<td>xxx.xxx.xx</td>
</tr>
<tr>
<td>Price Substitution Adjustment</td>
<td></td>
<td>(xxx.xxx.xx)</td>
</tr>
<tr>
<td>VAT on Energy</td>
<td></td>
<td>(xxx.xxx.xx)</td>
</tr>
<tr>
<td>ExAnte Trading Amount for Dispatchable Load</td>
<td>xxx.xx</td>
<td>MWh (x.xxx.xxx.xx)</td>
</tr>
<tr>
<td>ExPost Trading Amount for Dispatchable Load</td>
<td>(x.xx)</td>
<td>MWh xx.xxx.xx</td>
</tr>
</tbody>
</table>

**Net Settlement Amount**  

xxx.xx MWh (x.xxx.xxx.xx)

Reviewed by:

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  Assistant Manager / Assistant Manager  
  Metering / Stl. & Reconciliation

Approved by:

- **Miclan H. Libongco**  
  Manager  
  Billing, Settlement & Metering

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
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</thead>
<tbody>
<tr>
<td>Total Trading Amount</td>
<td>(x.xxx.xxx.xx)</td>
</tr>
<tr>
<td>Vatable</td>
<td>(xxx.xxx.xx)</td>
</tr>
<tr>
<td>VAT on Energy</td>
<td>(xxx.xxx.xx)</td>
</tr>
<tr>
<td>Total Trading Amount inclusive of VAT</td>
<td>(x.xxx.xxx.xx)</td>
</tr>
<tr>
<td>Market Fees</td>
<td>0.00</td>
</tr>
<tr>
<td>VAT on Market Fees</td>
<td>0.00</td>
</tr>
<tr>
<td>Total Amount Due</td>
<td>(x.xxx.xxx.xx)</td>
</tr>
</tbody>
</table>
Electronic Funds Transfer (EFT)

- Basic interface between the PEMC and the PEMC Bank (SCB-BDO) for settlement of WESM transactions
- Primary mode of payments and collections in the WESM
- Possible Alternatives:
  - Over the counter cash payment
  - Local Bank Check (LBC)
  - Authority to debit
  - Real-Time Gross Settlements

WESM EFT Providers

- Standard Chartered Bank
  - For payment transactions (i.e., payment to generators)
  - Depository bank for prudential requirements (security deposit)
- Banco de Oro
  - For collection transactions (i.e., customer payments)

![Figure 15. EFT Process Flow](image)
Prudential Requirement

- To ensure the effective operation of the spot market by providing a level of comfort that WESM members will meet their obligations to make payments as required under the WESM Rules.

Acceptable Forms of Security

- WESM Rules Sec. 3.15.3 provides the following:
  - Cash
  - Surety Bond
  - Other forms of security or guarantee acceptable to the Market Operator

Default in Payment

- Consequence of default in payment
  - Issuance of Default Notice to defaulting participant
  - Withdrawal on prudential security up to the full amount
  - Need to top-up prudential security level in cases of default
  - Failure to replenish prudential security may result in market participant’s suspension from the market
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