Republic of the Philippines
**DEPARTMENT OF ENERGY**
**(Kagawaran ng Enerhiya)**

**DEPARTMENT CIRCULAR NO.** DC2021-07-0021

**ADOPTING FURTHER AMENDMENTS TO THE WHOLESALE ELECTRICITY SPOT MARKET (WESM) RULES AND MARKET MANUALS ON METERING FOR THE IMPLEMENTATION OF ENHANCEMENTS TO WESM DESIGN AND OPERATIONS**
**(Provisions for Metering Services Provider Performance, Metering Standards and Site-Specific Loss Adjustments)**

**WHEREAS**, Sections 30 and 37(f) of the Electric Power Industry Reform Act (EPIRA) provides that the Department of Energy (DOE), jointly with the electric power industry participants, shall establish the Wholesale Electricity Spot Market (WESM) and formulate the detailed rules governing the operations thereof;

**WHEREAS**, on 28 June 2002, the DOE, with the endorsement of the electric power industry participants, promulgated the WESM Rules through Department Circular No. DC2002-06-003;

**WHEREAS**, on 14 October 2016, the DOE promulgated the amended WESM Rules for the enhancements of WESM design and operations through Department Circular No. DC2016-10-0014;

**WHEREAS**, any changes, amendments, and modifications to the WESM Rules, Retail Rules and their Market Manuals shall be undertaken in accordance with the provisions of Chapter 8 of the WESM Rules;

**WHEREAS**, on 12 February 2019, the Market Operator submitted to the Rules Change Committee (RCC) its proposed amendments to the WESM Rules and Market Manual on Metering Standards and Procedures;

**WHEREAS**, the proposal seeks to clarify that the Philippine Electricity Market Corporation (PEMC) shall have the responsibility to monitor the Metering Services Provider performance as part of its governance function;

**WHEREAS**, 22 February 2019, the RCC during its 149th RCC Meeting discussed with Market Operator the abovementioned proposal, and thereafter approved the publication of the proposed amendments in the market information website to solicit comments from market participants and other interested parties;

**WHEREAS**, on 03 April 2019, the National Grid Corporation of the Philippines (NGCP) also submitted to the RCC its proposed amendments to the WESM Rules and Market Manual on Metering Standards and Procedures with the objective of aligning the WESM's Market Manual on metering with the procedures and standards set forth in the Philippine Grid Code (PGC), Philippine Distribution Code (PDC) and issuances from the DOE and Energy Regulatory Commission (ERC);

**WHEREAS**, 12 April 2019, the RCC during its 151st RCC Meeting discussed with NGCP the abovementioned proposal, and thereafter approved the publication of the proposed amendments in the market information website to solicit comments from market participants and other interested parties;

**WHEREAS**, the RCC during its 151st RCC Meeting held on 12 April 2019 and 152nd RCC Meeting held on 17 May 2019, deliberated upon the abovementioned proposal of the Market Operator, giving due course to the comments and recommendations submitted by the relevant parties;

**WHEREAS,** during the 153rd RCC Meeting and 154th RCC Meeting held on 21 June and 19 July 2019 respectively, the RCC deliberated on the abovementioned proposal of NGCP giving due consideration to the submitted comments and the corresponding responses of the proponent;

**WHEREAS**, the RCC finalized the proposed amendments of the Market Operator and NGCP, and thereafter approved for endorsement to the PEM Board on 17 May 2019 and 19 July 2019, respectively;

**WHEREAS**, on 29 May 2019 and 31 July 2019 during the Regular PEM Board Meetings, the PEM Board, after due evaluation and deliberation, approved the above stated RCC-approved proposal for endorsement to the DOE;

**WHEREAS**, on 14 October 2019, the Market Operator submitted to the RCC its additional proposed amendments to the WESM Market Manual on Metering Standards and Procedures, particularly on the enhancements of the calculation of the Site-Specific Loss Adjustment (SSLA) and clarification on the appropriate location of the metering point;

**WHEREAS**, on 29 November 2019, the Manila Electric Company also submitted to the RCC its proposed amendments to the abovementioned WESM Market Manual on Metering Standards and Procedures, particularly on the standards and requirements for the current transformer for revenue metering;

**WHEREAS**, on 18 October 2019 and 06 December 2019, the RCC during its 157th and 159th RCC Meeting, respectively, discussed the abovementioned proposals, and thereafter approved the publication of the proposed amendments in the market information website to solicit comments from market participants and other interested parties;

**WHEREAS**, on 24 January 2020 and 13 March 2020, the RCC during its 160th and 163rd RCC Meeting, respectively, deliberated on the proposal giving due course to the comments received from market participants, and thereafter finalized and approved for endorsement to the PEM Board;

**WHEREAS**, on 25 March 2020, after due evaluation and deliberation, the PEM Board during its 22nd Regular PEM Board Meeting, approved for endorsement to the DOE the above stated RCC-approved proposals;

**WHEREAS**, on 07 April 2020, the PEM Board-approved amendments to the WESM Market Manual on Metering Standards and Procedures were submitted to the DOE for approval, in compliance with Chapter 8 of the WESM Rules;

**WHEREAS**, the DOE conducted various public consultations on the foregoing proposed amendments to solicit inputs and consider comments of stakeholders in the finalization of the amendments, particularly on the following dates:

| Date | Leg | Venue / Platform |
|---|---|---|
| 07 October 2019 | Luzon | F1 Hotel, BGC, Taguig |
| 10 October 2019 | Visayas and Mindanao | Marco Polo Davao |
| 22 July 2020 | Luzon | Microsoft Teams |
| 29 July 2020 | Visayas & Mindanao | Microsoft Teams |

**NOW THEREFORE**, after careful review of the abovementioned PEM Board-approved proposals and the comments and recommendations received on the same, the DOE, pursuant to its authority under the EPIRA, hereby adopts, issues, and promulgates the following amendments to the WESM Rules and Market Manuals:

**Section 1. Amendments to the WESM Rules.** The following provisions in the WESM Rules promulgated by the DOE through Department Circular No. DC2016-10-0014 are hereby amended:

a. Clause 4.4.1 under Registration of *Metering Services Provider* is amended to read as –

"4.4.1. A *Metering Services Provider* is a person or an entity who:

(a) Is authorized by the ERC to provide *metering services*;
(b) Is registered with the *Market Operator* as a *Metering Services Provider*; and
(c) Is required to have the qualifications and adhere to the performance standards specified in the relevant *Market Manual*."

**Section 2. Amendments to the WESM Market Manual on Metering Standards and Procedures.** The following provisions in the WESM Market Manual on Metering Standards and Procedures Issue No. 12.0 are hereby amended:

a. Section 1.1 (Background) under Introduction is amended to read as –

"1.1 Background

Xxx xxx xxx

This *Market Manual*, in compliance with Chapter 4 of the *WESM Rules*:

(a) xxx xxx xxx
(b) prescribes the manner of labeling and identification of a revenue *metering installation* with a Site and Equipment Identification Label (SEIL)
(c) xxx xxx xxx
(d) xxx xxx xxx"

b. Section 2.2 (Location of the Metering Point) under Metering Installation Standards is amended to read as –

"2.2. Location of the Metering Point

The location of the metering point shall adhere to the applicable provisions of the WESM Rules, the Philippine Grid Code (PGC), the Philippine Distribution Code (PDC), and other relevant issuances of the Energy Regulatory Commission (ERC) and the Department of Energy (DOE).

In accordance with the DOE Department Circular No. DC2016-05-0007, the market trading node, metering point and its *metering installations* shall be located at the *connection point*. In accordance with *WESM Rules* Clause 3.2.2.2 (e), the metering point and *metering installations* shall be located and installed within 500 meters from the *connection point,* as defined in the PGC and PDC.

For non-compliant metering point that is located more than 500 meters from the *connection point*, Site-Specific Loss Adjustment (SSLA) shall be applied to the meter data for the full distance from the *connection point* representing the energy produced or consumed by the Trading Participant at that metering point for determining the quantities to be settled in the WESM. If the metering point is located within 500 meters from the *connection point*, no Site-Specific Loss Adjustment (SSLA) shall be applied."

c. Section 2.4.1 (Requirements for Transmission Grid Revenue Meters) under Meters is amended to read as –

"2.4.1. Requirements for Transmission Grid Revenue Meters

There shall be a main and alternate meter preferably of different meter model but are both compliant to the requirements of the prevailing PGC.

The meter shall also have a mass memory capable of recording the 5-minute required demand interval data for a period of at least 60 days and have communication capabilities for remote and manual data retrievals."

d. Section 2.4.2 (Requirements for Revenue Meters for Embedded Generators Registered as WESM Participants) under Meters is amended to read as –

"2.4.2. Requirements for Revenue Meters for Embedded Generators Registered as WESM Participants

For Embedded Generators registered as WESM Participants, the main meter shall adhere to the prevailing requirements of the PDC and shall be capable of recording 5-minute interval data. If there is an alternate meter, it shall also adhere to the requirements of the prevailing PDC Edition."

e. Section 2.5.1 (General Requirements) under Instrument Transformers is amended to read as –

"2.5.1. General Requirements

*Metering installations*, if applicable, shall include instrument transformers."

f. Section 2.5.1.1 under General Requirements is added to read as –

"2.5.1.1. Requirements for Transmission Grid Instrument Transformers

Instrument Transformers used for metering of transmission grid connections shall adhere to the requirements of the prevailing PGC."

g. Section 2.5.1.2 under General Requirements is added to read as –

"2.5.1.2. Requirements for Embedded Generators Registered as WESM Participants

Instrument Transformers used for metering of Embedded Generators registered as WESM Participants shall adhere to the requirements of the prevailing PDC."

h. Section 2.5.2 (Use of Instrument Transformers) under Instrument Transformers is amended to read as –

"2.5.2. Use of Instrument Transformers

Instrument transformers supplying the revenue meter shall be used solely for purposes of revenue metering and not for any other purposes, including, but not limited to, the attachment of other devices.

The following schemes shall not be allowed:

(a) The use of an instrument transformer for meters other than the registered WESM Meters except as permitted in this section; and
(b) Paralleling of current transformers.

Meters covered by Energy Conversion Agreements (ECA) contracts which were already in effect prior to the operation of WESM shall be temporarily permitted to share the instrument transformers used for WESM metering until the end of the ECA cooperation period; provided that the ECA and WESM meters shall have separate meter enclosure/box and that the secondary terminals of the instrument transformers are properly sealed."

i. Section 2.5.3.1 (Selection of Current Transformer Ratios) under Instrument Transformer Ratios is amended to read as:

"2.5.3.1 Selection of Current Transformer Ratios

Current transformer ratios shall be selected according to the following factors:

(a) The maximum sustained primary current in a current transformer shall not exceed the rated primary current multiplied by the current rating factor of the current transformer; and
(b) The minimum sustained primary current during normal operation shall not be less than the lowest primary current that the current transformer can measure wherein the measurement accuracy is still guaranteed."

j. Section 2.5.4.1 (Current Transformers) under Accuracy Requirements is amended to read as –

"2.5.4.1. Current Transformers

Current transformers shall adhere to the requirements of the prevailing PGC. In addition, the accuracy of the current transformers shall be guaranteed from 0-100% of the rated burden."

k. Section 2.5.4.2 (Voltage Transformers) under Accuracy Requirements is amended to read as –

"2.5.4.2. Voltage Transformers

a. Voltage transformers shall adhere to the requirements of the prevailing PGC. In addition, the accuracy of the voltage transformers shall be guaranteed from 0-100% of the rated burden."

l. Section 2.5.4.3 (Proof of Accuracy Compliance) under Accuracy Requirements is amended to read as –

a. "2.5.4.3. Proof of Accuracy Compliance

Proof of compliance with Sections 2.5.4.1 and 2.5.4.2 shall be provided in the form of factory routine test reports showing the serial numbers of the instrument transformers."

m. Section 2.5.4.4 (Other Requirements Relating to Accuracy) under Accuracy Requirements is amended to read as –

"2.5.4.4. Other Requirements Relating to Accuracy

a. Where accuracy tests are required, they shall comply with the following requirements:

(a) tests shall be carried out by the *Metering Services Provider* using equipment traceable to National or International Standards of Measurements;
(b) tests shall include ratio and phase-angle error tests;
(c) ratio and phase-angle tests of current transformers shall be measured over a range of test currents based on the accuracy curve as defined by the applicable standards whereby the current transformer was designed; and
(d) test results shall provide ratio correction factors at each test point which may be applied, if deemed necessary for WESM settlement, to both active and reactive power."

n. Section 2.5.5.1 (Burden Calculation – All Current Transformers) under Instrument Transformer Burdens: General Requirements is amended to read as –

"2.5.5.1. Burden Measurement – All Current Transformers

The actual connected burden shall be measured using a CT burden measuring instrument. If manual calculation will be employed, the calculation shall consider the following:

(a) the impedance of the secondary wiring; and
(b) the impedance of all devices connected to the current transformer."

o. Section 2.5.5.2 (Not to Exceed Nameplate Ratings) under Instrument Transformer Burdens: General Requirements is amended to read as –

"2.5.5.2. Not to Exceed Nameplate Ratings

The measurement shall verify the actual burdens in service that do not exceed the rated burden limits specified under Section 2.5.4.1."

p. Section 2.5.5.3 (Burden Calculations – All Voltage Transformers) under Instrument Transformer Burdens: General Requirements is amended to read as –

"2.5.5.3 Burden Measurement – All Voltage Transformers

The actual connected burden shall be measured using a VT burden measuring instrument. If manual calculation will be employed, the calculation shall consider the apparent power and power factor at the secondary terminals of the instrument transformers."

q. Section 2.5.5.4 (Not to Exceed Nameplate Ratings) under Instrument Transformer Burdens: General Requirements is amended to read as –

"2.5.5.4. Not to Exceed Nameplate Ratings

The measurement shall verify the actual burdens in service that do not exceed the rated burden limits specified under Section 2.5.4.2."

r. Section 2.5.6.1 under General Requirements for Grounding System is amended to read as –

"2.5.6.1 The installation shall be in accordance but not limited to the following provisions of the Philippine Electrical Code:

(a) xxx xxx xxx

Xxx xxx xxx

(f) For voltage level 69kV and higher, the minimum size of copper conductor to be used for metering instrument transformer grounding shall be 100 $mm^2$.
(g) For voltage lower than 69kV the minimum size of copper conductor to be used for metering instrument transformer grounding shall be 60 $mm^2$.
(h) The minimum size of copper conductor to be used for the secondary circuits of instrument transformers shall be 3.5 $mm^2$.
(i) Connections to all bonded parts shall be made in accordance to Article 2.50.1.8 of the Philippine Electrical Code 2009 Part 1."

s. Original Section 2.5.7 (Current Transformer Requirements) under Instrument Transformers is hereby deleted.

t. Original Section 2.5.8 (Voltage Transformer Requirements) under Instrument Transformers is hereby deleted.

u. Original Section 2.5.9 (Surge Arrester) under Instrument Transformers is hereby renumbered and amended to read as -

"2.5.7. Surge Arrester

2.5.7.1. Surge Arresters installed (if necessary) at the WESM *metering installation*, shall meet the minimum requirements listed below:

| Nominal System Voltage | Max. Rated Voltage | Standard Lightning Impulse Withstand Voltage | Max. Continuous Operating Voltage | Max. Nominal Discharge Current | Maximum Line Discharge Class | | Long Duration Current Impulse Withstand Capability |
|---|---|---|---|---|---|---|---|
| [ KV ] | [ KV ] | [ KV ] | [ KV ] | [ KA ] | IEC | ANSI | [ KVA] |
| 13.8 | 15 | 95 | 12 | 10 | CL 2 | Station | 100 |
| 34.5 | 36 | 170 | 29 | 10 | CL 2 | Station | 100 |
| 69 | 72.5 | 325 | 58 | 10 | CL 2 | Station | 100 |
| 115 | 123 | 550 | 98 | 10 | CL 2 | Station | 100 |
| 138 | 145 | 650 | 116 | 10 | CL 2 | Station | 100 |
| 230 | 245 | 900 | 196 | 10 | CL 2 | Station | 100 |
| 500 | 525 | 1550 | 420 | 20 | CL 4 | Station | 100 |

If there are existing surge arresters in the facility where the *metering installation* is located which already provides the protection as required by this WESM *Market Manual*, installation of additional metering surge arresters shall no longer be necessary.

2.5.7.2 The surge arrester shall be located at the line side, as close as possible to the instrument transformers in the Metering Point. Refer to Figure 2(a) and 2(b)."

v. Section 2.6.1. (Location of Primary Terminals of Current Transformer) under Primary Connections is amended to read as –

"2.6.1. Location of Primary Terminals of Current Transformer

The primary terminals of each current transformer shall be located as close as practicable to the prescribed Connection Point."

w. Section 2.6.2. (Location of Primary Terminals of Voltage Transformer) under Primary Connections is amended to read as –

"2.6.2. Location of Primary Terminals of Voltage Transformer

The primary terminals of each voltage transformer shall be located as close as practicable to the prescribed Connection Point."

x. Section 2.7.1.1 (Size of Secondary Cabling) under Current Transformer is amended to read as –

"2.7.1.1 Size of Secondary Cabling

The secondary cabling between the current transformers and the meter test switch/block shall be of a sufficient size that the rated burden specified in Section 2.5.4.1 accuracy class is not exceeded when current, equivalent to the rated current, flows in the secondary winding."

y. Section 2.7.3 (Codes and Conditions) and its Subsections under Secondary Connections for Instrument Transformers are amended to read as –

"2.7.3. Codes and Conditions

Instrument transformer secondary cabling and cabling accessories shall comply with the following codes and conditions:

2.7.3.1. The Philippine Electrical Code;

2.7.3.2. The meters shall be provided with dedicated current and voltage transformers used only for WESM *metering installation*, except as permitted in Section 2.5.2;

2.7.3.3 Current transformers may be supplied with more than one secondary core. However, no secondary core other than those intended for revenue meters may be provided;

2.7.3.4. Voltage transformers may be supplied with more than one secondary windings intended for the revenue meters and shall not be used for any other purpose;

xxx xxx xxx"

z. Section 2.9.1.1. (Instrument transformers connections) under Physical Security of Metering Equipment is amended to read as –

"2.9.1.1. Instrument transformers connections

Primary and secondary cablings and connections shall be secure, tamper-resistant and compliant with the requirements of the prevailing PGC on security of registered revenue *metering installations* and metering data. Any ratio-tap changing facility which cannot be secured using a security seal or its equivalent shall not be permitted."

aa. Section 2.9.1.7. (Metering Perimeter) under Physical Security of Metering Equipment for Instrument Transformers is amended to read as –

"2.9.1.7. Metering Perimeter

The *metering installation* shall be secured by a perimeter fence similar to Figure 7 if applicable and its gate properly padlocked, sealed and secured. If the *metering installation* is located inside a perimeter which already provides equivalent security as required by this WESM *Market Manual*, installation of additional perimeter fence shall no longer be necessary. A perimeter fence shall also not be required for pole-mounted, vault-type and other similarly secured *metering installations*. Metering perimeter shall also be well lighted and free from any unwanted materials, equipment, vegetation, etc. (refer Table 7). Lighting shall be provided by the owner of the perimeter where the *metering installation* is located."

bb. Section 2.10.1 under Redundant Metering Installation is amended to read as –

"2.10.1. A redundant *metering installation* can be achieved using a single set of instrument transformers to either common or separate core."

cc. Section 2.10.2 under Redundant Metering Installation is amended to read as –

"2.10.2. The minimum requirement for redundant metering shall be the use of a single set of instrument transformers wherein the main and alternate meters are in series-parallel and connected to a common core."

dd. Section 2.10.3 under Redundant Metering Installation is amended to read as –

"2.10.3. The metered energy (kWh) and demand (kW) data recorded by the main and alternate meters shall not deviate by more than +/- 0.6% of the monthly average values recorded by the meters for three (3) consecutive billing periods. In the event that the deviation exceeds this value, the Metering Services Provider shall investigate and correct the causes of such deviations not later than three (3) months from discovery."

ee. Section 2.11 (Metering Installation - Existing) under Metering Installations Standards is amended to read as –

"2.11. An existing *metering installation* that does not fully comply with the requirement of this standard shall be permitted by the *Market Operator* to remain in service subject to the following conditions:

(a) ERC has tested/verified and sealed the meter;
(b) Meters which are non-compliant to the mass memory requirements shall be replaced when they become defective or until they reach the end of their economic life;

(c) All non-compliant instrument transformers shall be replaced within the period of two (2) years from the effectivity of this version of WESM Market Manual on Metering.

Continued non-compliance of *metering installations* shall be subject to applicable sanctions or penalties."

ff. Section 3 (Site Equipment Identification (SEIN)) is amended to read as –

"SECTION 3 SITE AND EQUIPMENT IDENTIFICATION LABEL (SEIL)"

gg. Section 3.1 (Introduction) under Site and Equipment Label (SEIL) is amended to read as –

"3.1 Introduction

xxx xxx xxx

The objectives of assigning Site and Equipment Identification Label (SEIL) for *metering installations* are as follows:

xxx xxx xxx"

hh. Section 3.2 (General Procedures) under Site and Equipment Identification Label (SEIL) is amended to read as –

"3.2 General Procedures

The assignment of the Site and Equipment Identification Label (SEIL), in general, shall be done by the *Metering Services Provider*. However, for embedded generators, with the concerned DU as their *Metering Services Provider*, the responsibility to assign the SEIL is with the *Market Operator*.

xxx xxx xxx"

ii. Section 3.3 (Basis for Establishing the SEIL) under Site and Equipment Identification Label (SEIL) is amended to read as –

"3.3 BASIS FOR ESTABLISHING THE SEIL

xxx xxx xxx"

jj. Section 4.3.2 under Requirements for Registration of Metering Installations is amended to read as –

"4.3.2. To initiate the registration of a *metering installation*, the WESM *Metering Services Provider*, on behalf of its *Trading Participant*, shall submit the following to the *Market Operator*:

(a) Accomplished Metering Installation Form signed or confirmed by both the *Metering Services Provider* and the *Trading Participant*;

xxx xxx xxx

(l) Other Special Features of the Meter."

kk. Section 4.3.5 is added under Requirements for Registration of Metering Installations to read as –

"4.3.5 All requests of the *Trading Participant* for clarifications and/or reconsideration concerning the approval of registration of metering facility shall be addressed to the *Market Operator* for resolution."

ll. Section 5.3.1 (Requirements) under Collection and Submission Procedure is amended to read as –

"5.3.1 Requirements

(a) Data

The metering data shall contain the following:

(i) xxx xxx xxx
(ii) The metering data in kWh (Active Energy), kVARh (reactive energy), voltage per phase and current per phase in their assigned channel (for daily meter data delivery);
(iii) Site and Equipment Identification Label (SEIL) or Recorder ID of Meter (RevMeterID/Meter Point);
(iv) xxx xxx xxx
(v) xxx xxx xxx
(vi) xxx xxx xxx
(vii) Resolution (every 5 minute)

xxx xxx xxx"

mm. Section 5.3.2 (Daily Process) under Collection and Submission Procedure is amended to read as –

"5.3.2. Daily Process

xxx xxx xxx

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(b) All collected meter data shall be submitted by the *Metering Services Provider* to the *Market Operator's* Meter Data Warehouse on or before 0800H of the succeeding trading day. However, for metering facilities with failed communication capability, the *Metering Services Provider* shall conduct remote meter data retrieval and submit to the *Market Operator* not later than 1200H of the same day. The *Metering Services Provider* shall not make, cause or allow any alteration to the original stored meter data as retrieved in the *metering installation*.

xxx xxx xxx"

nn. Section 5.3.3 (Monthly Process) under Collection and Submission Procedure is amended to read as –

"5.3.3. Monthly Process

(a) Not later than three (3) business days after the end of the billing period, the *Metering Services Provider* shall submit, via File Transfer Protocol (FTP) or any secure file storage device, monthly preliminary metering data of all metering points of its associated *Trading Participants*. In addition, the *Metering Services Provider* shall submit a transmittal letter that includes a tabulation of all associated metering points and their corresponding total metered quantity for the billing period.

(b) The *Market Operator* shall validate the monthly metering data relative to its format, the given SEILs, metering data and per *dispatch interval*. The *Market Operator* shall compare the monthly metering data to the values of the daily metering data for each *metering point* submitted by the *Metering Services Provider*. If there are discrepancies between the values, the *Market Operator* shall issue a Meter Trouble Report (MTR) to the *Metering Services Provider*.

(c) Not later than seven (7) business days after the issuance of the Meter Trouble Report, the *Metering Services Provider* shall correct the metering data in accordance with the procedures set forth in Section 6.4.3 of this *Market Manual*.

xxx xxx xxx"

oo. Section 6.2.1 under General Description is amended to read as –

"6.2.1 All metering data received by the *Market Operator* shall be evaluated using the Validation, Estimation and Editing process described in this section. When metering data contains missing values or exceeds the maximum capacity per dispatch interval, such metering data shall undergo estimation and editing where substitution of metering data shall be made using historical validated data."

pp. Section 6.3.1.2 (Validation Checks) under Daily Validation is amended to read as –

"6.3.1.2 Validation Checks

xxx xxx xxx

(e) Review the historical meter readings which fall outside defined parameters max/min of the historical data. The historical data used are as follows:

(i) Value during the same *dispatch interval* of the previous week;
(ii) Value during the same *dispatch interval* for the previous similar day (i.e. weekday or weekend); and
(iii) Average values during the previous days or previous week of the same *dispatch interval*."

qq. Section 6.4.3.1 under Meter Data Estimation and Editing is amended to read as –

"6.4.3.1. When validation indicates that the data from the main meter are missing or have an invalid data, the values shall be estimated and substituted by the *Metering Services Provider* for Settlement purposes.

The following shall be the hierarchy of methods to be used by the *Metering Services Provider* for meter data estimation and editing:

xxx xxx xxx

(b) Meter Data from Alternate Meter

If more than twelve (12) consecutive intervals of the main meter are missing or have invalid data, the values from the alternate meter may directly be substituted to the main meter provided that the data passed the validation based on the checks performed on Section 6.3.1.2. If the average deviation between the main and alternate meter is greater than 0.2% but not exceeding 0.6%, a correction factor shall be applied.

(c) Use of Computed Phase Voltage and Phase Current using % Phase Voltage or % Phase Current method

If there is a loss of a phase current or phase voltage, the estimation shall be computed by the Metering Services Provider, in coordination with the Market Operator and concerned Trading Participant, in accordance with the following formula:

Total Power = $[(V_{an} \times I_a) + (V_{bn} \times I_b) + (V_{cn} \times I_c)] \times \cos \theta \times M$

where:

| | |
|---|---|
| $I_a, I_b, I_c$ | phase current values |
| $V_{an}, V_{bn}, V_{cn}$ | phase voltage values |
| $\cos \theta$ | average power factor |
| M | multiplier |

Missing values of $I_a$:

% $I_a$ = $I_a$ / ($I_a$ + $I_b$ + $I_c$) using the valid data within the same billing month

Total % $I_a$ = sum of % $I_a$ of all intervals

Average % $I_a$ = Total %$I_a$ / No. of intervals

$I_a$ = Average % $I_a$ x ($I_b$ + $I_c$) / (1 – Average % $I_a$)

where:

| | |
|---|---|
| $I_a$ | computed phase A current |
| $I_b, I_c$ | actual recorded per phase current |

Note: Computation shall be the same with other phases.

Missing values of $V_{an}$:

% $V_{an}$ = $V_{an}$ / ($V_{an}$ + $V_{bn}$ + $V_{cn}$) using the valid data within the same billing month

Total % $V_{an}$ = sum of % $V_{an}$ of all intervals

Average % $V_{an}$ = Total %$V_{an}$ / No. of intervals

$V_{an}$ = Average % $V_{an}$ x ($V_{bn}$ + $V_{cn}$) / (1 – Average % $V_{an}$)

where:

| | |
|---|---|
| $V_{an}$ | computed phase A voltage |
| $V_{bn}, V_{cn}$ | actual recorded per phase voltage |

Note:

Computation shall be the same with other phases.

(d) xxx xxx xxx

(e) Historical Main Meter Data

(i) An average 3-day historical data previously gathered from the main meter can be directly substituted
(ii) Values of the same *dispatch interval* of the previous day or same day type (i.e. weekday of weekend)
(iii) Values of the same *dispatch interval* of the same day from the past 3 weeks as recorded on the same meter except for days with shutdown, previous estimation, holidays (i.e. Saturday, Sunday, Holidays)

(f) xxx xxx xxx

(g) Use of Meter Register Reading in VEE

xxx xxx xxx

(i) The per *dispatch interval* equivalent meter data shall be computed proportionately according to the load shape obtained from available RTU data corresponding to metering point for the time covered by the register readings, or to the load shape obtained from the historical load profile data for a similar day and time;
(ii) The per *dispatch interval* equivalent meter data shall undergo site – specific loss adjustment for any equipment between the market trading node and the meter;

xxx xxx xxx

(h) xxx xxx xxx

(i) Parallel lines

Parallel Lines that are Separately Metered (one line with meter data defect): Use metered quantity of the line that has no meter data defect with application of Adjustment Factor (AF).

Note: Adjustment Factor shall be based on historical data.

(j) Temporary Use of correction factor as multiplier for Instrument Transformer in service that failed in accuracy limit.

i. For Current Transformer

Ratio Correction Factor (RCF) = True Primary Current /(True Secondary Current x Marked Ratio)

ii. For Voltage Transformer

Ratio Correction Factor (RCF) = True Primary Voltage /(True Secondary Voltage x Marked Ratio)"

rr. Section 7.2 (Initiation) under Meter Trouble Report is amended to read as –

"7.2. Initiation

xxx xxx xxx

A Meter Trouble Report may be initiated due to the following:

(a) xxx xxx xxx

(b) a *Metering Services Provider* or a *Trading Participant* requests the *Market Operator* to issue a Meter Trouble Report to the *Metering Services Provider* due to difficulties in communicating with a *metering installation*, or validation of metering data. The *Market Operator* shall notify the *Metering Services Provider* or a *Trading Participant* of its decision within twenty-four (24) hours.

Issuance of Meter Trouble Report shall be suspended by the *Market Operator* in cases where a massive communication link failure affects large areas due to force majeure and TELCO related problems which are beyond the control of the *Metering Services Provider*. In cases that *Metering Services Provider* still fails to deliver the meter data of the remaining Metering Point/s to the *Market Operator*, the *Market Operator* shall consider the estimation of meter data of the affected Metering Point/s until such time that the *Metering Services Provider* has collected the meter data remotely or manually and transmitted to the *Market Operator*. In such cases, the *Market Operator* shall inform the affected customer of the temporary estimation made by the *Metering Services Provider*."

ss. Section 7.2.1 (Improving Efficiency in Resolving MTRs) under Initiation is amended to read as –

"7.2.1. Improving Efficiency in Resolving MTRs

In case of outages, a *Trading Participant* and/or its *Metering Services Provider* shall notify the *Market Operator* and *Metering Services Provider* within 24 hours after its occurrence. *Trading Participants* may use the Metering Outages Form to notify their *Metering Services Provider* and the *Market Operator* of any outages that may affect the metering data. The *Metering Services Provider* will use this information to resolve MTRs that

have been issued. A sample of the form and instructions for completion may be found in the Appendices.

xxx xxx xxx"

tt. Section 7.3.1 (Timeline) under Issuance is amended to read as –

"7.3.1. Timeline

Upon receipt of the Meter Trouble Report, the *Metering Services Provider* shall submit the correct metering data to the *Market Operator* within (7) business days."

uu. Section 7.3.2 (Unresolved Meter Trouble Report) under Issuance is amended to read as –

7.3.2. Unresolved Meter Trouble Reports

xxx xxx xxx

(b) Late Resolution

The *Metering Services Provider* may still resolve a Meter Trouble Report and provide metering data acceptable to the *Market Operator* after the deadline set in Section 7.3.1. For late resolutions, the deadline to be reflected in the final settlement statement shall be four (4) working days prior to the issuance of the final settlement statement.

(c) xxx xxx xxx

(d) Certification

The *Market Operator* shall provide a certification on the adjusted metering data showing the agreement of all affected parties and the *Metering Services Provider.*

(e) xxx xxx xxx"

vv. Section 8.2 (Purpose) under Site-Specific Loss Adjustment is amended to read as-

"8.2 PURPOSE

This is an interim procedure which shall be used to adjust the *Trading Participant's* meter data to compensate for the electrical losses in the components that come between the Metering Point and the MTN. The power and energy registered at the Metering Point shall be adjusted to reflect meter readings that would have been obtained if the revenue meter



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is physically located at the MTN. Hence, all Metering Services Providers shall endeavor to harmonize the location of the metering point in accordance with their compliance plan as specified in the DOE Department Circular No. DC2016-05-0007 in order to eliminate the adjustments in the metered quantity and better efficiency in the WESM."

ww. Original Section 8.3 (Loss Factor) under Site-Specific Loss Adjustment is hereby deleted.

xx. Original Section 8.4 (Scope) under Site-Specific Loss Adjustment is renumbered and amended to read as –

"8.3 SCOPE

This interim procedure shall only apply to all revenue *metering installations* of *Trading Participants* in the *WESM*, where the Metering Point is non-compliant with the required location and physically located more than 500m from the *Connection Point* as determined by the *Metering Services Provider*."

yy. Original Section 8.5 (WESM Members Involved in Performing SSLA) under Site-Specific Loss Adjustment is renumbered to read as –

"8.4 WESM MEMBERS INVOLVED IN PERFORMING SSLA

xxx xxx xxx"

zz. Original Section 8.6 (Roles and Responsibilities) under Site-Specific Loss Adjustment is renumbered and amended to read as –

"8.5 ROLES AND RESPONSIBILITIES

The involvement of the *Metering Services Provider*, *Network Service Providers* and *Trading Participants* are as follows:"

aaa. Original Section 8.6.1 (Network Service Provider) under Roles and Responsibilities is renumbered and amended to read as –

"8.5.1 Network Service Provider:

8.5.1.1 The *Network Service Provider* shall submit to the *Metering Services Provider* all data necessary in the preparation of the following information that may affect the SSLA computation not later than 20 calendar days, upon implementation of modification in the actual physical configuration of the conductor and power transformer between the metering point and the *Connection Point*:

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(a) Transformer Resistance, R (ohms)
(b) Transformer Reactance, X(ohms)
(c) Transmission Line Circuit Branch Resistance, R (ohms)
(d) Transmission Line Circuit Branch Reactance, X (ohms)
(e) Transmission Line Circuit Total Branch Susceptance, B (siemens)
(f) Single Line Diagram showing metering point location and distance from the *connection point*"

bbb. Original Section 8.6.2 (Metering Services Provider) and its Subsections under Roles and Responsibilities are renumbered and amended to read as –

"8.5.2 Metering Services Provider

8.5.2.1 The *Metering Services Provider* shall submit to the *Market Operator* the list of the *metering points* that will be subject to the computation of Site-Specific Loss Adjustment (SSLA) including associated single line diagrams and significant line and transformer parameters between the *metering point* and the *connection point,* upon registration of the *metering installation* and as often as it implements significant changes in the actual physical connections between the *metering point* and the *market trading node*.

(a) Transformer Winding Resistance, R
(b) Transformer Winding Reactance, X
(c) Transmission Line Circuit Branch Resistance, R
(d) Transmission Line Circuit Branch Reactance, X
(e) Transmission Line Circuit Total Branch Susceptance, B

8.5.2.2 The *Metering Services Provider* shall submit to the *Market Operator* the meter data from all *metering points* where the *Metering Services Provider* are responsible for in accordance with the format and timeline of submission prescribed in this *Market Manual*."

ccc. Original Section 8.6.3 (Trading Participant) under Roles and Responsibilities is renumbered and amended to read as –

"8.5.3 Trading Participant:

The *Trading Participant* shall coordinate with its *Metering Services Provider* for the submission by the *Metering Services Provider* of all significant conductor and power transformer data between its metering point and the market trading node upon its registration in the WESM, and as often as it notices significant changes in the actual physical configuration of the conductor and power transformer between its *metering point* and the *market trading node*."

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ddd. Original Section 8.6.4 (Market Operator) and its Subsections under Roles and Responsibilities are renumbered and amended to read as –

"8.5.4 Market Operator

8.5.4.1 The *Market Operator* shall use the latest conductor and power transformer data and list of metering points that will be subject to SSLA submitted by the *Metering Services Provider*. For any data discrepancy raised by the *Network Service Provider* or *Trading Participant*, the *Market Operator* shall immediately conduct reconciliation to determine the corrected data agreed by the *Market Operator, the Network Service Provider,* the *Metering Services Provider* and the *Trading Participant*. The *Market Operator* shall use the reconciled data starting on the current billing month only, then progressively for the succeeding billing months until a new conductor and power transformer data is submitted.

8.5.4.2 Calculate the loss adjustment in accordance with this procedure using a suitable computation tool.

8.5.4.3 Develop, in consultation with the WESM Participants, a standard table of reference, containing data for power transformers and conductors."

eee. Original Section 8.7 (Site Specific Loss Factor Calculation) under Site-Specific Loss Adjustment is renumbered and amended to read as –

"8.6 Site Specific Loss Adjustment Calculation"

fff. Original Section 8.7.1 (Loss Calculation) under Site-Specific Loss Factor Calculation is renumbered to read as –

"8.6.1 Loss Calculation

xxx xxx xxx"

ggg. Original Section 8.7.2 (Historical Load Share) under Site-Specific Loss Factor Calculation is hereby deleted.

hhh. Original Section 8.7.3 (Loss Sharing) under Site-Specific Loss Factor Calculation is hereby deleted.

iii. Original Section 8.7.4 under Site-Specific Loss Factor Calculation is renumbered to read as –

"8.6.2 Detailed loss calculations for sample cases are included in the Appendix of this Manual under "Site Specific Loss Adjustment"."

jjj. Original Section 8.8 (Procedural Steps for SSLA) under Site-Specific Loss Adjustment is hereby deleted.

kkk. Section 9.1 (Introduction) under Metering Services Provider Performance Measurement is amended to read as –

"9.1 INTRODUCTION

The integrity and timeliness of submission/delivery of meter data to the *Market Operator* by the *Metering Services Provider/s* allows the *Market Operator* to produce and transmit settlement-ready data to the *Trading Participant/s* on a timely basis. Erroneous meter data and/or a delay in submission/delivery of meter data may affect the timely and accurate billing and settlement of WESM generators, and customers."

lll. Section 9.2 (Purpose) under Metering Services Provider Performance Measurement is amended to read as –

"9.2 PURPOSE

This section provides the steps that *Trading Participant/s*, *Metering Services Provider/s*, *Market Operator* and *Governance Arm* shall follow for the review, evaluation and measurement of the performance of a *Metering Services Provider*. The measurement process monitors the conformance of a *Metering Services Provider* to the WESM Rules Clause 4.3.3 – *Metering Services Provider* Obligation and as discussed in this Section."

mmm. Section 9.3 (Scope) under Metering Services Provider Performance Measurement is amended to read as –

"9.3 SCOPE

This procedure is intended to provide the steps that *Trading Participant/s*, *Metering Services Provider/s, Market Operator,* and Governance *Arm* information shall follow in rating the performance of the *Metering Services Provider/s*. The procedural workflows described in this section serve as reference for the *Trading Participant/s*, *Metering Services Provider/s, Market Operator,* and *Governance Arm* in reflecting the requirement in the WESM Rules.

The scope of an MSP Performance Measurement includes the following:"

nnn. Section 9.3.1 under Scope is amended to read as –

"9.3.1 The integrity of meter data provided by the *Metering Services Provider/s* to the *Market Operator*, and the *Trading Participant/s*.

ooo. Section 9.3.2 under Scope is amended to read as –

"9.3.2 The daily and monthly meter data delivery by the *Metering Services Provider/s* in accordance with the *WESM Rules*."

ppp. Section 9.3.3 under Scope is amended to read as –

"9.3.3 The daily and monthly meter data delivery by the *Metering Services Provider/s* in accordance with the *WESM Rules*."

qqq. Section 9.4.1.1 (Data Meter Data Delivery) under Service Delivery is amended to read as –

"9.4.1.1. Data Meter Data Delivery

Daily Meter Data Delivery or Meter Retrieval Success is the ratio of the number of *metering installations* successfully communicated to the total number of active registered *metering installations*. Required average daily result shall be greater than or equal to 95% as reported in Luzon and Visayas and 85% in Mindanao."

rrr. Section 9.4.1.2 (Integrity of Metering Data) under Service Delivery is amended to read as –

"9.4.1.2. Integrity of Metering Data

Integrity of Metering Data is the valid meter data that passed the validation process as set forth by WESM Rules. This measures the ratio of the number of *metering installations* for which the data passes the validation process to the total number of *metering installation* successfully retrieved (communicated) excluding suspended MP and with no meter data. Required average daily result shall be greater than or equal to 95% as reported in Luzon and Visayas and 85% in Mindanao."

sss. Section 9.4.1.3 (Timeliness and Percentage Resolution to the Daily Meter Trouble Report) under Service Delivery is amended to read as –

"9.4.1.3. Timeliness and Percentage Resolution to the Daily Meter Trouble Report

These measure the percentage of the total number of *metering installations* for which a daily meter trouble reports (MTR) are issued,

that has been resolved or corrected in seven (7) business days. Required average daily result shall be greater than or equal to 90% as reported."

ttt. Section 9.4.1.4 (Timeliness and Percentage Resolution to the Monthly Meter Trouble Report) under Service Delivery is amended to read as –

"9.4.1.4. Timeliness and Percentage Resolution to the Monthly Meter Trouble Report

The MTR issued (for each *metering installation*) based on the submitted monthly meter data for the billing period shall be resolved and corrected within seven (7) business days. Required result shall be greater than or equal to 90% as reported."

uuu. Section 9.5 (Performance Standards) under Metering Services Provider Performance Measurement is amended to read as –

"9.5 Performance Standards

The Performance Standards as set by the WESM are the following:

| Performance Indicator | Category | Performance Measures | Percent Weight | Percent Passing |
|---|---|---|---|---|
| Service Delivery | Daily Meter Data Delivery | Number of Metering Installations successfully retrieved | 20 | 95 |
| | Integrity of Meter Data | Meter Data that passed the validation process | 20 | 95 |
| | Timeliness and Percentage Resolution to the Daily Meter Trouble Report | Resolution to the Meter Trouble Report within 10 calendar days | 15 | 90 |
| | Timeliness and Percentage Resolution to the Monthly Meter Trouble Report | Resolution to the Meter Trouble Report within 2 business days | 20 | 90 |
| | Timeliness of Monthly Meter Data Delivery | Complete delivery of all meter data | 25 | 100 |

| | | | | |
|---|---|---|---|---|
| | | within 3 calendar days after the billing period. | | |

"

vvv. Section 9.7.2 (Semi-Annual Customer Satisfaction Rating) under Performance Rating is amended to read as –

"9.7.2 Semi-Annual Customer Satisfaction Rating

Every six (6) months, the *Governance Arm* shall conduct a Customer Satisfaction Rating (CSR) on the Metering Services Provider performance through the issuance of the CSR form to all the WESM *Trading Participants* to be accomplished and submitted back to the *Governance Arm*. The CSR forms are to be accomplished every first week of July of the current year and January of the following year. The July rating comprises the Metering Services Provider performance from January to June of the current year and the January rating of the following year corresponds to the second half of the previous year (July to December)."

www. Section 9.7.3 (Annual Performance Rating) under Performance Rating is amended to read as –

"9.7.3 Annual Performance Rating

Annual Performance Rating covers the billing periods January to December of each year. It shall consist of:

(a) The annual Performance Measures under Sub-section 10.4.1 – Service Delivery (Average of the 12 months billing).

(b) The Customer Satisfaction Rating under Sub-sections 10.4.2 and 10.7.2."

xxx. Section 9.7.4 (Work Flow for MSP Performance Rating) under Performance Rating is amended to read as shown in ANNEX A of this Circular.

yyy. Section 10.3 (Timeline for De-Registration) under Metering De-Registration is amended to read as –

"10.3 Timeline for De-Registration

The *Metering Services Provider* shall issue a notification to the *Market Operator* when de-registering a *metering installation* within the 15-day period before its scheduled de-registration and/or actual disconnection.

The *Market Operator* shall facilitate the processing of the deregistered *metering installation* and shall also inform the responsible groups of the de-registration of the same."

zzz. Section 10.5 (Workflow for De-Registration of Metering Installation) under Metering De-Registration is amended to read as shown in ANNEX B of this Circular.

aaaa. Section 10.6 (Procedural Steps for De-Registration of Metering Installation) under Metering De-Registration is amended to read as shown in ANNEX C of this Circular.

bbbb. Appendix C (Governing Provisions of the WESM Rules) is amended to read as –

"APPENDIX C

GOVERNING PROVISIONS OF THE WESM RULES

xxx xxx xxx

Clause 4.4.3 If a *Trading Participant* is a *Customer* and also a *Network Service Provider*, the *Trading Participant* may register as a *Metering Services Provider* only for *connection points* that it does not own.

If there are no other party capable and legally authorized to assume the role of the *Metering Services Provider*, the *Network Service Provider* may be permitted to act as the *Metering Services Provider* on an interim basis provided that it has a valid Certificate of Authority as WESM *Metering Services Provider* granted by the ERC.

xxx xxx xxx"

cccc. Appendix D (Metering Service Agreement) is amended to read as shown in ANNEX D of this Circular.

dddd. Appendix F (Meter Trouble Report Form) is amended to read as shown in ANNEX E of this Circular.

eeee. Table 5 (Ratios and Ratings of Voltage Transformers) under Appendix G Metering Installation Standards is amended to read as -

"Table 5 – Ratios and Ratings of Voltage Transformers

| Rated Voltage (V) | Marked Ratio | Secondary Voltage |
|---|---|---|
| 14,400 Grd Y/8,400 | 70/120:1 | 120V/69V |
| 24,940 Grd Y/14,400 | 120/200:1 | 120V/69V |
| 34,500 Grd Y/20,125 | 175/300:1 | 115V/69V |
| 69,000 Grd Y/40,250 | 350/600:1 | 115V/67V |
| 115,000 Grd Y/69,000 | 600/1000:1 | 115V/67V |
| 138,000 Grd Y/80,500 | 700/1200:1 | 115V/67V |
| 230,000 Grd Y/138,000 | 1200/2000:1 | 115V/67V |
| 500,000 Grd Y/287,500 | 2500/4500:1 | 115V/67V |

ffff. Original Title (SITE EQUIPMENT IDENTIFICATION (SEIN)) under Appendix I is amended to read as –

"APPENDIX I

SITE AND EQUIPMENT IDENTIFICATION LABEL (SEIL)

xxx xxx xxx"

gggg. Table 11 (Metering Equipment, Devices and Auxiliaries) under Appendix I Site and Equipment Identification Label (SEIL) Relevant Tables is amended as shown below:

"Table 11 – Metering Equipment, Devices and Auxiliaries

| Designation | Description |
|---|---|
| CT | Current Transformer |
| LA | Lightning Arrester |
| MB | Meter Box |
| MD | Modem |
| MF | Multi-function Electronic Meter (Smart Meter) |
| PT | Potential Transformer |
| ST | Metering Structure |
| TS | Meter Test Switch |
| CI | Combined Instrument Transformer |

hhhh. Appendix K (Site-Specific Loss Adjustment) is amended to read as shown as ANNEX F of this Circular.

iiii. Appendix L (Specifications for Transmission Revenue Meters) is amended to read as shown in ANNEX G of this Circular.

jjjj. Appendix M (Specifications for Revenue Meters for Embedded Generators Registered as WESM Participants) is amended to read as shown in ANNEX H of this Circular.

kkkk. Appendix N (Specifications for Current Transformers) is amended to read as shown in ANNEX I of this Circular.

llll. Appendix O (Specifications for Voltage Transformers) is amended to read as shown in Annex J of this Circular.

mmmm. Appendix P (Specifications for Current Transformers for Embedded Generators) is amended to read as shown in Annex K of this Circular.

nnnn. Appendix Q (Specifications for Voltage Transformers for Embedded Generators) is amended to read as shown in Annex L of this Circular.

oooo. Figure 5 (Meter Enclosure) under Appendix H Drawings, Figures & Pertinent Sketches is amended to read as shown in Annex M of this Circular.

pppp. All references to the term "Site Equipment Identification (SEIN)" in this Market Manual, are hereby amended to refer to term "Site and Equipment Identification Label (SEIL)".

**Section 3. Separability Clause.** If for any reason, any section or provision of this Circular is declared unconstitutional or invalid, such parts not affected shall remain valid and subsisting.

**Section 4. Repealing Clause.** All issuances inconsistent with the provisions of this Circular are hereby repealed or amended accordingly.

**Section 5. Effectivity.** This Circular shall take effect fifteen (15) days following its complete publication in at least two (2) newspapers of general circulation and shall remain in effect until otherwise revoked. Copies thereof shall be filed with the University of the Philippines Law Center – Office of National Administrative Register (UPLC – ONAR).

Issued this _____ 2021 at the DOE, Energy Center, Rizal Drive, Bonifacio Global City, Taguig City, Metro Manila.

**ALFONSO G. CUSI**
Secretary

Republic of the Philippines
DEPARTMENT OF ENERGY
IN REPLYING PLS. CITE:
DOE-AGC-21003684

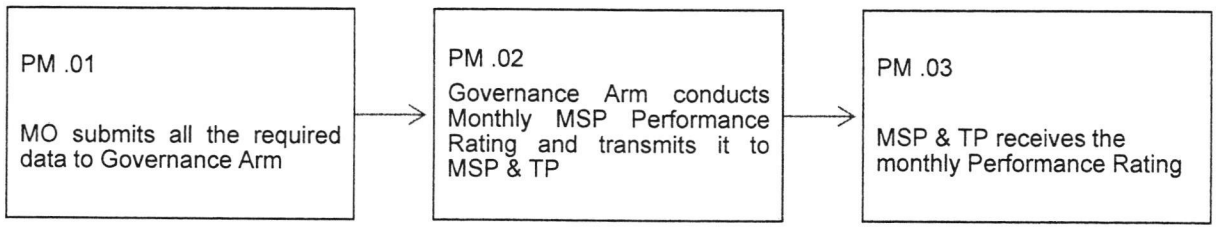
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## ANNEX A

## "9.7.4 Work Flow For MSP Performance Rating

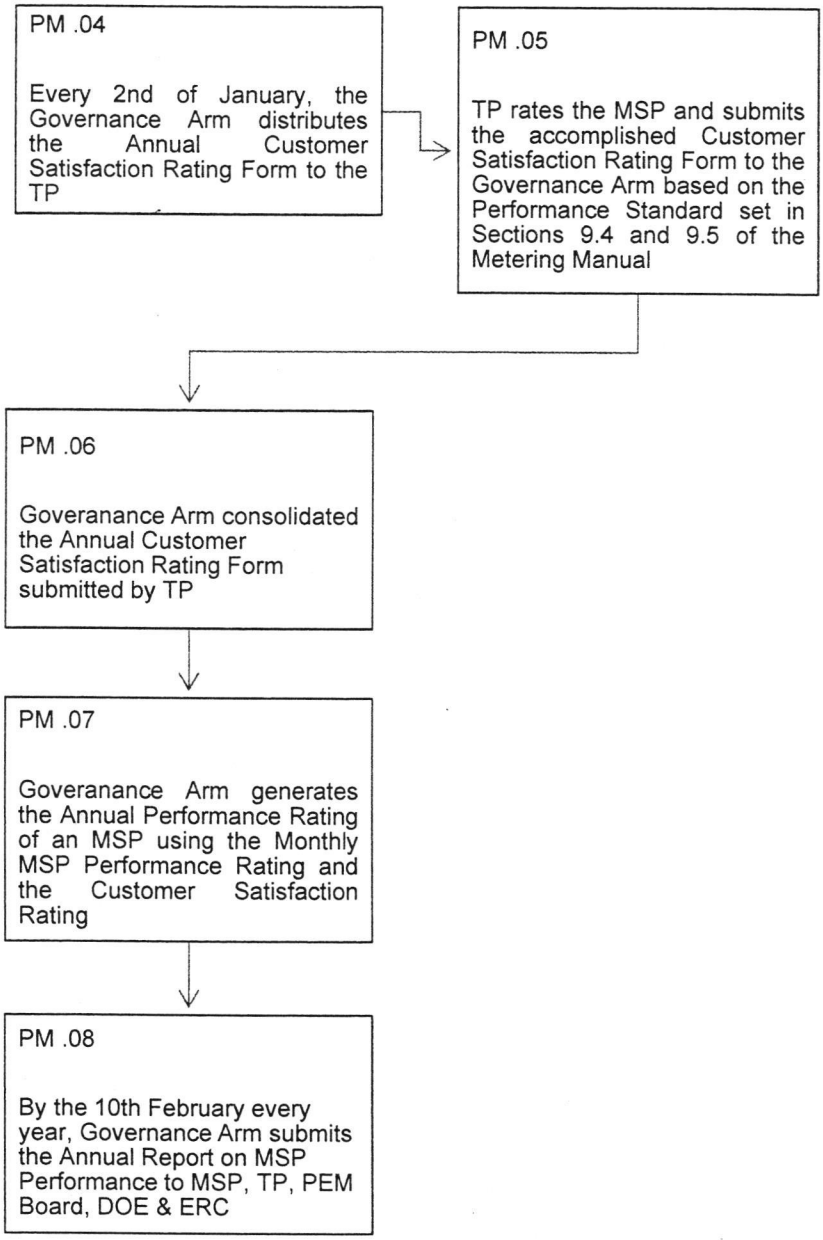
| MO | GOVERNANCE ARM | TP |
|---|---|---|

## MONTHLY



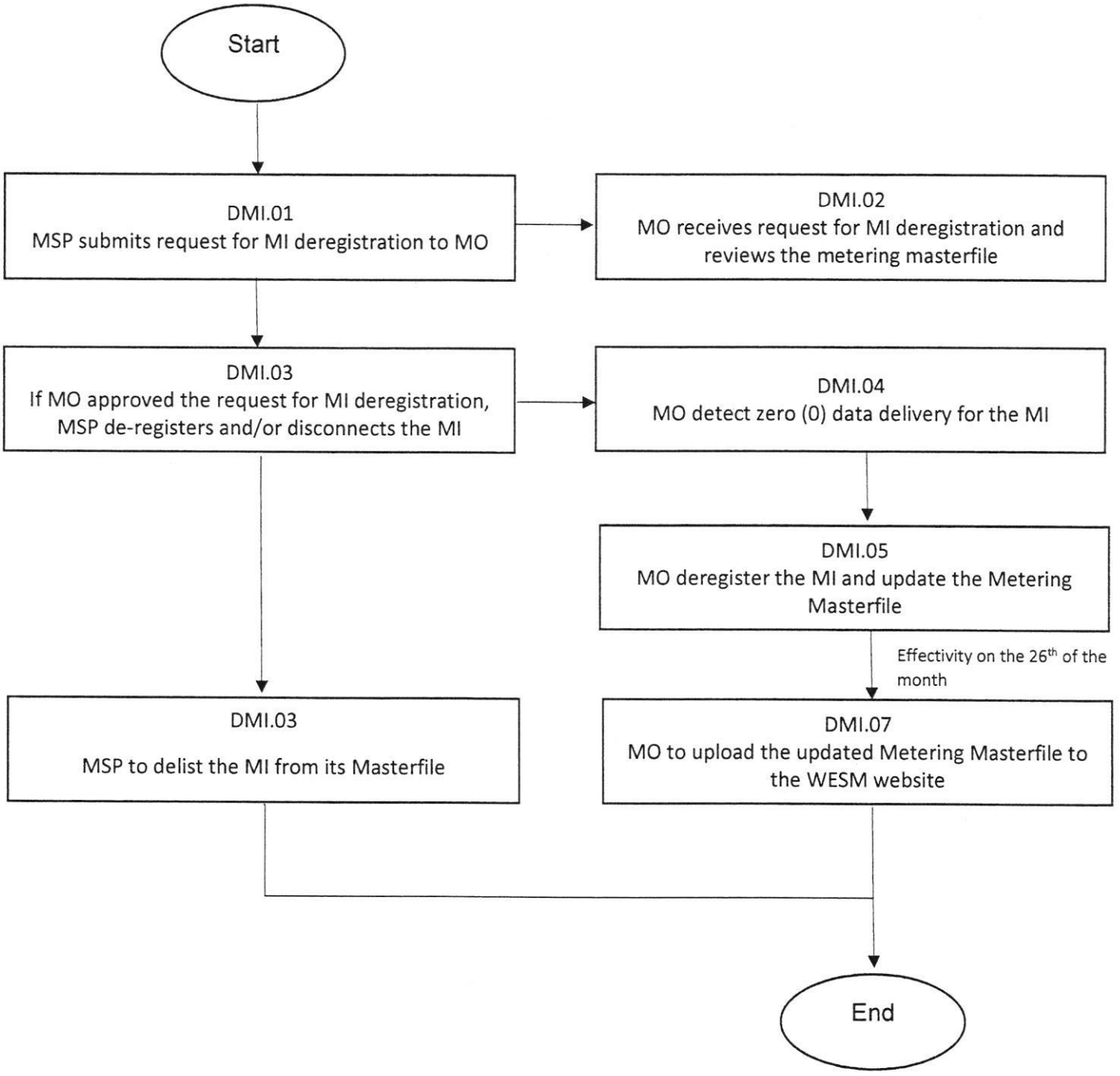

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## ANNUALY



**ANNEX B**

"10.5 WORKFLOW FOR DEREGISTRATION OF METERING INSTALLATION



**ANNEX C**

"10.6 PROCEDURAL STEPS FOR DE-REGISTRATION OF METERING INSTALLATION

| Ref. | Task Name | Task Detail | When | Method | Completion Events |
|---|---|---|---|---|---|
| DMI.01 | MSP submits request for MI deregistration to MO | MSP sends MI deregistration letter to MO containing the reason of deregistration and other pertinent details including the schedule of deregistration. | After reaching an agreement with the WESM member to de-register the MI | By e-mail, courier or fax and official letter address to MO | Notice to MO |
| DMI.02 | MO receives MI deregistration | After receiving the letter of deregistration of MI, MO reviews the request of the MSP.<br>MO review the Metering Masterfile and issue instructions to deregister the MI | After DMI. 01 | By e-mail, courier or fax and official letter address to MO | |
| DMI.03 | MSP de-registers and/or disconnects the MI and notify the MO | If MO approved the request for MI deregistration, MSP de-registers and/or disconnects the MI on the agreed schedule. MSP to cease sending of data of de-registered MI to the MO | At the agreed de-registration or disconnection schedule | | |

**ANNEX C**

| Ref. | Task Name | Task Detail | When | Method | Completion Events |
|---|---|---|---|---|---|
| DMI.04 | MO detect zero (0) data delivery for the MI | MO verify if the MI is de-registered and/or disconnected by detecting zero (0) data delivery for the said MI | After MI de-registration and/or disconnection | By meter data inspection | |
| DMI.05 | MO deregisters the MI | MO deregister the MI and update the Metering Masterfile<br><br>Effectivity of de-registration to the market shall be on the 26th of the month following the actual de-registration or disconnection of the WESM Member by the MSP under DMI.03 | After DMI.04 | | |
| DMI.06 | MSP to delist the MI | MSP to delist the MI from its masterfile and old MIRF shall be deregistered | After DMI.05 | | End of deregistration process of MI |
| DMI.07 | MO to update the MI in the Metering Masterfile | MO to upload the updated Metering Masterfile to the website and old MIRF shall be deregistered | After DMI.06 | | End of deregistration process of MI |

**ANNEX D**

**METERING SERVICE AGREEMENT**
**Between NGCP and [SHORT NAME] for [Name of Power Plant]**

This **METERING SERVICE AGREEMENT** (hereinafter referred to as the "Agreement") is entered into by and between:

The **NATIONAL GRID CORPORATION OF THE PHILIPPINES** (**"NGCP"**), a corporation duly organized and existing under and by virtue of the laws of the Republic of the Philippines, with principal office address at the NGCP Building, Quezon Avenue corner BIR Road, Diliman, Quezon City, represented by its President and Chief Executive Officer, [Name of President and CEO], who is duly authorized to represent NGCP in this Agreement as confirmed by the attached authority marked as **Annex A**;

- and -

**[CUSTOMER]** (**"SHORT NAME"** or **"CUSTOMER"**) a corporation duly organized and existing under and by virtue of the laws of the Republic of the Philippines, with principal office address at [Office Address], represented by its [Position of Representative], **[REPRESENTATIVE]**, who is duly authorized to represent [SHORT NAME] in this Agreement as confirmed by the attached authority marked as **Annex B**;

NGCP and [SHORT NAME] shall be referred to individually as "Party" and collectively as "Parties,"

**WITNESSETH:**

**WHEREAS,** on 13 December 2006, the Energy Regulatory Commission ("ERC") in ERC Case No. 2006-015RC approved the Revised Rules, Terms, and Conditions for the Provision of Open Access Transmission Service ("OATS Rules") which govern the provision of transmission services to qualified grid users;

**WHEREAS,** NGCP is the concessionaire that operates and maintains the nationwide system pursuant to Republic Act No. 9136, otherwise known as the "Electric Power Industry Reform Act of 2001" or EPIRA and NGCP's congressional franchise under Republic Act No. 9511;

**WHEREAS,** NGCP is authorized by the ERC to act as Wholesale Electricity Spot Market ("WESM") Metering Service Provider ("MSP") by virtue of the Certificate of Authority issued to NGCP;

**WHEREAS**, NGCP is also registered as a WESM MSP under the WESM Rules;

**WHEREAS,** [SHORT NAME] requires revenue metering facilities and services for measuring the energy and/or demand delivered and/or received from the Grid for purposes of settlement of energy and transmission charges;

**Signed in the Presence of:**

**[CUSTOMER]**
**By:**
**REPRESENTATIVE**
Designation

**NATIONAL GRID CORPORATION OF THE PHILIPPINES**
**By:**
**[Name of President & CeO]**
President and Chief Executive Officer

**NOW, THEREFORE**, in view of the foregoing premises, the Parties hereby agree that NGCP shall be the MSP of the CUSTOMER, subject to the following terms and conditions:

## I. SCOPE OF AGREEMENT

1. This Agreement shall cover the metering points of the [____]'s facility, as listed in **Annex "C"** and shown in the diagram attached as **Annex "D"** of this Agreement.

## II. GENERAL PROVISIONS

2. **Application and Incorporation of the OATS Rules, WESM Rules, PGC and Other Issuances.** The obligations of the Parties under this Agreement shall also be governed by the prevailing versions of the OATS Rules, WESM Rules, Philippine Grid Code ("PGC"), and other relevant issuances, orders, rules and regulations promulgated by proper government agencies and authorities as if they are written herein. This shall be understood to include all amendments and modifications thereof, as may be issued from time to time as long as vested rights under this Agreement are not impaired.

3. **Definition of Terms.** In this Agreement the expressions set out below shall have the following meanings:

   A. **Metering Equipment.** As defined in the PGC, it is the apparatus necessary for measuring electrical real and reactive power and energy, inclusive of a multi-function meter and the necessary instrument potential, current, and phase shifting transformers and all wiring and communication devices. It includes, but is not limited to, current transformers, voltage transformers, current instrument transformer, lightning arrester, meters, modem, test switch/block.

   B. **Metering Installation**. As defined in the OATS Rules, these are set of devices, equipment and apparatus used to measure and record the consumption and production of electricity installed by NGCP or Customer. It refers to the whole metering facility which includes Metering Equipment and other related requirements such as, but not limited to seclusion fence, perimeter lighting, and gravel surfacing.

   C. **Full Metering Services.** A type of metering service wherein NGCP provides and owns the Metering Installation, including instrument transformers and lightning arrester as may be applicable.

   D. **Meter Only Services.** A type of metering service wherein the CUSTOMER shall provide all the Metering Equipment, except for the revenue meters and appurtenances, *i.e.* meter box, test switches, and modem.

All other capitalized terms shall have the same meaning as defined in the OATS Rules, the PGC, the WESM Rules, and the WESM Metering Manual.

[CUSTOMER]
By:
REPRESENTATIVE
Designation

Signed in the Presence of:

NATIONAL GRID CORPORATION OF THE PHILIPPINES
By:
[Name of President & CEO]
President and Chief Executive Officer

**ANNEX D**

## E. EFFECTIVITY AND TERM

**4.** This Agreement shall be for a period of ___ (___) years and shall take effect on the 26th day of _____ 20____ until the 25th day of _____ 20___, unless earlier terminated in accordance with this Agreement.

## F. OBLIGATIONS OF THE PARTIES

**5. Obligations of NGCP.**

**A.** In accordance with and in addition to NGCP's obligations under the applicable laws and issuances referred to in Section 2, NGCP shall have the following obligations in rendering **Full Metering Services**:

i. Provide and install PGC and WESM – compliant revenue meters, instrument transformers, and other necessary metering equipment and accessories for CUSTOMERS;

ii. Provide concrete foundation for the high voltage metering equipment if the Metering Installation is located inside an NGCP substation. For Metering Installations installed outside an NGCP substation, 6.A.1 will apply;

iii. Install security locks and/or seals at access points of the Metering Equipment;

iv. Retrieve meter data that represents delivered and/or received energy/demand for purposes of settlement of energy and transmission charges;

v. Provide monthly meter data to the CUSTOMER within seven days from the end of each Billing Period;

vi. Deliver meter data to the Market Operator for billing and settlement in the WESM, if applicable;

vii. Periodically perform the prescribed tests on the metering equipment, as may be required in the prevailing versions of PGC, WESM Rules, or other applicable laws and issuances from government entities;

viii. Perform technical investigation to support the resolution of the billing disputes arising from contested meter data; and

ix. Perform such other tasks as may be required of the WESM MSP under the WESM Rules and Metering Manual, if applicable.

**B.** NGCP shall have the following obligations in rendering **Metering Only Services:**

i. Provide and install PGC and WESM – compliant Meter Security Enclosure (Meter Box) and appurtenances such as revenue meter, modem, test block.

ii. Provide concrete foundation for the high voltage metering equipment if the Metering Installation is located inside an NGCP substation, For Metering Installations installed outside an NGCP substation, 6.A.1 will apply;

iii. Install security locks and/or seals at access points of the Metering Equipment;

iv. Retrieve meter data that represents delivered and/or received energy/demand for purposes of settlement of energy and transmission charges;

v. Provide monthly meter data to the CUSTOMER within seven days from the end of each Billing Period;

vi. Deliver meter data to the Market Operator for billing and settlement in the WESM, if applicable;

vii. Periodically perform the prescribed tests on the metering equipment, as may be required in the prevailing versions of PGC, WESM Rules, or other applicable laws and issuances from government entities subject to applicable technical services fee to be paid by the CUSTOMER;

viii. Perform technical investigation to support the resolution of the billing disputes arising from contested meter data; and

ix. Perform such other tasks as may be required of the WESM MSP under the WESM Rules and Metering Manual, if applicable.

## 6. OBLIGATIONS OF THE CUSTOMER.

A. In accordance with and in addition to the CUSTOMER's obligations under the applicable laws and issuances referred to in Section 2 of this Agreement, the CUSTOMER shall have the following obligations whether availing of Full Metering Service or Meter Only Service:

i. For all Metering Installation located outside an NGCP Substation, the CUSTOMER shall, at its own expense:

a. provide sufficient space for the Metering Installation pursuant to the OATS Rules, WESM Rules, WESM Market Manual, and other relevant laws;

b. provide security/exclusion fence, security controls, and adequate lighting and gravel surfacing around the Metering Installation, pursuant to the PGC, WESM Rules, and other relevant laws;

c. provide reasonable logistical assistance to NGCP personnel during commissioning of the Metering Installation;

d. install structurally sound concrete foundation, support structure, and grounding connections for the Metering Installation;

e. install Landline or Public Switched Telephone Network (PSTN) connection to the revenue meter, as may be required by NGCP, to provide connectivity between the meter and the NGCP remote meter data retrieval system; and

f. maintain good housekeeping of the Metering Installation surroundings.

ii. Provide NGCP personnel reasonable access at all times to the Metering Installations for the purpose of maintenance of Metering Equipment and meter reading/data retrieval. NGCP undertakes to strictly comply with the safety and security measures and policies of the CUSTOMER. For this purpose, NGCP shall not hold the CUSTOMER liable for the death or bodily injury to the officers, workers, and representatives of NGCP while inside the premises of the CUSTOMER, unless if the death or bodily injury is caused by willful act or inexcusable negligence of the CUSTOMER. Furthermore, NGCP shall indemnify the CUSTOMER for any damage, loss or other expense incurred or suffered by the CUSTOMER which is proven to be due to a negligence act or omission of NGCP's officers, workers, and representatives while inside the CUSTOMER's premises and in the performance of its duties as MSP;

iii. Review the delivered meter data and notify NGCP of any error or inaccuracy on meter reading and data within thirty (30) days from receipt thereof;

iv. Pay metering service charges to NGCP in accordance with the ERC-prescribed rates and WESM Rules, if applicable.

v. Prior to energization of Metering Installation, the CUSTOMER shall ensure its membership with the WESM, as well as the registration of the Metering Installation with the WESM.

B. In addition to the obligations mentioned in Section 6.A, CUSTOMERS availing of **Meter Only Services** shall have the following obligations:

i. Provide the Metering Equipment compliant with PGC, WESM Rules, and other applicable laws, *provided however*, that revenue meters and appurtenances, *i.e.* meter box, test switches, and modem shall be provided by NGCP.
ii. Coordinate with the ERC for the conduct of the verification test of Metering Installations pursuant to GRM 9.2.5.2.1 of the PGC.
iii. pay for the cost of any testing to be performed on the instrument transformers;
iv. pay for the cost of testing to be performed on the lightning arrester, if such testing is requested by the CUSTOMER; and
v. provide three (3) spare units for each type of instrument transformer and three (3) spare lightning arresters. Otherwise, in case of equipment malfunction and until the CUSTOMER provides an acceptable replacement for the Metering Installation, the procedure in Section 7.1 will be followed.

C. The **CUSTOMER** may, in emergency cases, enter into any agreement with another party for the repair of the Metering Installations owned by the CUSTOMER, subject, however to NGCP's review and assessment. In this

case, the CUSTOMER shall hold NGCP harmless against any claim, loss, or damage arising from such repair, maintenance, or activity.

**7. EQUIPMENT MALFUNCTION.**

7.1 NGCP shall adopt the procedure provided for under the WESM Market Manual in case of malfunction of the Meter Installation or where there is failure of meter data retrieval.

7.2 In case of equipment malfunction for Meter Only Services and in addition to 7.1, NGCP may install a complete set of Metering Equipment upon the request of the CUSTOMER, subject however to availability of such Metering Equipment. Thereafter, Full Metering Service will be adopted.

**8. Upgrading of Metering Installation.** Any subsequent upgrading of Metering Installation to be compliant with the requirements of the PGC and WESM may be the subject of an amendment to this Agreement.

**9. Audit of Revenue Metering Facilities, Equipment and Data.** The CUSTOMER may audit the metering facilities, equipment, and meter data that are covered by this Agreement subject to procedures mutually acceptable to the Parties.

**10. CONFIDENTIALITY OF METERING DATA**

10.1 All metering data shall be considered as Confidential Information and the Parties shall jointly protect and secure such data from unauthorized access. Parties shall not even under conditions of confidence, make available, disclose, provide, or communicate the metering data directly or indirectly, in any form or manner, to any person except:

a. to the entities mentioned in GRM 9.3.6 of the PGC and Chapter 4.8.3 of the WESM Rules.

b. when the disclosure is required by law or specifically ordered by a judicial, governmental, or regulatory authority, in due exercise of its jurisdictional powers, provided:

1. that the Party duly informs such authority that the information requested are confidential,

2. informs the other party of such requirement immediately upon receiving notice of any order (or request that could lead to an order) seeking such disclosure,

3. takes all reasonable measures, as may be consistent with their legal obligation, to hold in abeyance the disclosure to the maximum extent legally possible to allow the other Party reasonable opportunity to exercise its rights available by law relating to the order of disclosure, and

4. promptly extends to the other Party reasonable cooperation necessary to enable the latter to fully protect

its interests, including providing all relevant information, documentation and assistance.

**10.2** Any breach of metering security that is observed or reported to one of the Parties must be reported to the other Party.

**10.3** A Party responsible for any damage resulting from the disclosure or consequent unauthorized use of the Metered Data shall indemnify the other Party for any substantiated damage caused. The provision of Clause 10 shall survive the expiration or termination of this Agreement.

## D. BILLING, PAYMENT AND CREDIT SUPPORT

**11.** **Billing and Payment.** The Rates, Methodology, Billing and Settlement Module of the OATS Rules shall govern the billings by NGCP of the MSP Charge and other applicable charges as may be agreed upon by the parties, and the payment of such billings by the CUSTOMER.

**12.** **Mode of Payment.** Payment shall be made by way of:

a. BDO Bills Payment Slip (BPS);
b. Checks to be paid Over-the-Counter (OTC) through NGCP Cashier;
c. On-line funds transfer to NGCP's account; or
d. Other forms as may be approved by NGCP.

**13.** **Check Payments.** In case a check issued is dishonored, the applicable penalty under the OATS Rules shall accrue from the time the obligation became due. NGCP shall have the right to refuse subsequent payments made by check. NGCP also reserves the right to pursue other available actions against the CUSTOMER.

**14.** **Application of Payments.** In case the CUSTOMER is liable for any amounts due under this Agreement, including penalties, NGCP shall first apply any payments to past due amounts before applying the same to the current billing. In case of partial payments, NGCP shall apply the hierarchy of payments in the following order: (a) regulated charges, (b) charges for excluded services, (c) other charges.

**15.** **Penalty and Interest.** Interest over any unpaid account shall be governed by Module F of the OATS Rules.

**16.** **Credit Support.** CUSTOMER shall, if requested by NGCP, provide credit support or additional credit support in a form and on terms acceptable to NGCP which includes:

a. cash;
b. guarantee;
c. standby letter of credit; or
d. surety bond,

Credit Support, in the form of b, c, and d above, shall be issued by entities acceptable to NGCP.

[CUSTOMER]
By:
REPRESENTATIVE
Designation

Signed in the Presence of:

NATIONAL GRID CORPORATION OF THE PHILIPPINES
By:
[Name of President & CEO]
President and Chief Executive Officer

17. **Designated Commercial Banks.** In accordance with Module F5 of the OATS Rules and for purposes of determining interest on amounts unpaid after Due Date, including amounts placed in escrow or in any other form placed by reason of a dispute, NGCP shall inform the CUSTOMER in writing of its designated commercial banks. NGCP shall have the right to change its list of designated commercial banks and shall notify the CUSTOMER within a reasonable time in writing of the said change, which shall be effective commencing the billing month following the receipt of the notice.

## VI. SUSPENSION AND TERMINATION OF SERVICE

18. **Suspension of Service.** NGCP may suspend the provision of metering service to the CUSTOMER for (1) non-fulfillment of the latter's obligations, (2) for causes in accordance with the OATS Rules, (3) when the CUSTOMER or any of its employees, agents, and representatives commit pilferage of NGCP assets, (4) when the CUSTOMER tampers or make unauthorized alteration of meter data, or (5) when requested by the Market Operator or Contracted Generator or Supplier of a Load Customer, as an interim measure until such time that the CUSTOMER has remedied the cause of suspension and upon payment of reconnection fee.

19. **Termination.**

**19.1** NGCP may terminate this Agreement without need of further notice in the event that the CUSTOMER fails to remedy the cause of suspension within ninety (90) days from the imposition thereof. Services shall resume only if the cause of suspension and termination has been remedied by the CUSTOMER and upon payment of reconnection fee.

**19.2** The Parties may also terminate this Agreement in accordance with the Default and Termination provisions in the OATS Rules.

19.3 If applicable, this Agreement shall be deemed terminated should the CUSTOMER's facility permanently ceases to operate and is disconnected from the Grid.

19.4 In all instances, the CUSTOMER shall arrange the necessary de-energization of electrical facilities and provide access to NGCP personnel to allow de-commissioning and removal of NGCP-installed metering equipment from the metered facilities.

19.5 Termination shall be without prejudice to the fulfillment of the Parties' remaining obligations under this Agreement, if any.

**19.6** In the event that the CUSTOMER's power plant permanently shuts down but continues to be connected to the Grid as a Load Customer as defined in the OATS Rules, this Agreement shall continue to be in force, subject to amendments if necessary.

20. **Limitation of Liability.** NGCP shall not be liable for damages of any form arising from or related to, directly or indirectly, the lawful and proper exercise of its rights and obligations under this Agreement and in accordance with the

[CUSTOMER]
By:
REPRESENTATIVE
Designation

Signed in the Presence of:

NATIONAL GRID CORPORATION OF THE PHILIPPINES
By:
[Name of President & CEO]
President and Chief Executive Officer

grounds and procedures provided under the OATS Rules, WESM Rules, WESM Market Manual, PGC, and other issuances from government entities.

**21. Co-Terminus with the Transmission Service Agreement.** Termination of the Transmission Service Agreement may also cause the termination of this Agreement, at the option of NGCP.

**22. Assignment.** This Agreement may be assigned in accordance with Module A11 of the OATS Rules.

**22.1 Metering Service Business Spin-off.** In the event of the spin-off of NGCP's Metering Service business, this Agreement shall remain binding, and the rights and obligations of NGCP under this Agreement shall be transferred to its successor-in-interest. NGCP shall notify the CUSTOMER in writing at least sixty (60) days prior to such occurrence.

**22.2 Sale of the CUSTOMER's Facility.** In the event that the CUSTOMER's facility are sold or transferred to another entity, this Agreement shall remain binding and the rights and obligations of the CUSTOMER under this Agreement shall be transferred to its successor-in-interest, provided, the CUSTOMER complies with the requirements under Module A11 of the OATS Rules.

**23. DISPUTE RESOLUTION.** The Parties shall endeavor to amicably resolve any dispute in relation to this Agreement. Otherwise, the Dispute Resolution Procedures of the OATS Rules, the PGC, the WESM Rules, and the WESM Metering Manual, as may be applicable, shall apply.

**24. NOTICES.** For communications to be given in relation to this Agreement, Module A12 of the OATS Rules shall apply.

Communications may likewise be sent by email from an email address designated by the sending Party below to an email address designated by the recipient Party below, provided that proof of receipt shall be the email "read receipt" in accordance with Module A12 of the OATS Rules.

**NGCP** NGCP Building, Quezon Avenue cor. BIR Road, Diliman, Quezon City

Attention: **Head of Revenue & Regulatory Affairs**
Email Address: **[xxxxx]**
Backup Email Address: [xxxxxx]

**SHORT NAME** Office Address

Attention:
Email Address:

## VII. MISCELLANEOUS PROVISIONS

**25. Warranty of Corporate Existence and Authority.** Each Party hereby represents and warrants that: (a) it is duly incorporated, validly existing and in

[CUSTOMER]
By:
REPRESENTATIVE
Designation

Signed in the Presence of:

NATIONAL GRID CORPORATION OF THE PHILIPPINES
By:
ANTHONY L. ALMEDA
President and Chief Executive Officer

good standing under the laws of the Republic of the Philippines; (b) it possesses full power and authority to enter into this Agreement, and has taken all the necessary action to authorize the entry into and delivery of this Agreement, and the transactions contemplated hereby, and the performance of its obligations hereunder; (c) it has the power, licenses and permits required to carry on its business as it is being conducted and as proposed to be conducted; (d) this Agreement and the consummation of the transactions contemplated herein are its legal, valid, binding and enforceable obligations; and (e) it shall, in good faith, comply with all its obligations under this Agreement.

26. **Governing Law.** This Agreement shall be governed by and construed in accordance with the laws of the Republic of the Philippines. This Agreement shall be subject to existing laws, policies, rules and regulations, administrative orders and any amendments and modifications thereof, emanating from the Department of Energy, the ERC, other government agencies or authorized bodies, and shall be deemed incorporated herein.

27. **Non-waiver of Rights.** Failure or delay by any Party in the exercise of any right, power or remedy under this Agreement shall not operate as a waiver thereof.

28. **Entire Agreement and Amendments.** This Agreement, its schedules, attachments and annexes supersede any previous agreement, arrangements or representation between the Parties, whether oral or written, in respect of the subject matter of this Agreement and shall constitute the entire agreement between the Parties in relation thereto.

29. **Severability.** If at any time, one or more provisions in this Agreement shall be determined to be illegal, invalid or unenforceable in any respect, the legality, validity and enforceability of the remaining provisions of this Agreement shall not be affected or impaired thereby, provided that the remaining provisions are sufficient to render to each Party the benefits contemplated hereby.

30. **Actions.** The Parties expressly recognize that the ERC has original and exclusive jurisdiction over all cases involving disputes between the Parties, and shall not bring such disputes before any other forum. Any other actions, suits of claims arising out of or related to this Agreement that are not within the jurisdiction of the ERC shall be filed exclusively in the proper courts of Quezon City, Philippines.

31. **Counterparts.** This Agreement may be executed by the Parties in counterparts, each of which when so executed and delivered shall be an original, but all of which shall together constitute one and the same instrument.

**IN WITNESS WHEREOF**, the Parties have executed this Agreement this ____ day of _____ 20___ at _____.

[CUSTOMER]
By:
**REPRESENTATIVE**
Designation

Signed in the Presence of:

NATIONAL GRID CORPORATION OF THE PHILIPPINES
By:
**[Name of President & CEO]**
President and Chief Executive Officer

**ANNEX D**

| **NATIONAL GRID CORPORATION OF THE PHILIPPINES** | **CUSTOMER** |
|---|---|
| **By:** | **By:** |
| **[Name of President & CEO]**<br>President and Chief Executive Officer | **REPRESENTATIVE**<br>POSITION |

**Signed in the Presence of:**

_____ _____

Republic of the Philippines )
Quezon City ) S.S.

**ANNEX D**

**ACKNOWLEDGMENT**

BEFORE ME, this _____ appeared [Name of President & CEO] with [government-issued ID] issued at Quezon City who represented himself to be the same person who executed this instrument and acknowledged the same to be his true and voluntary act and deed and of the corporation he represents.

This instrument, consisting of _____ (____) pages, including the page on which this acknowledgment is written, has been signed on the signature page and on the left margin of each and every other page thereof by the concerned parties and their witnesses, and sealed with my notarial seal.

IN WITNESS WHEREOF, I have hereunto set my seal and signature.

Doc. No. _____;
Page No. _____;
Book No. _____;
Series of 20___.

[CUSTOMER]
By:
_____
REPRESENTATIVE
Designation

Signed in the Presence of:

_____

_____

NATIONAL GRID CORPORATION OF THE PHILIPPINES
By:
_____
[Name of President & CEO]
President and Chief Executive Officer

Republic of the Philippines )
Quezon City ) S.S.

**ANNEX D**

**ACKNOWLEDGMENT**

BEFORE ME, this _____ appeared _____ with _____who represented himself to be the same person who executed this instrument and acknowledged the same to be his true and voluntary act and deed and of the corporation he represents.

This instrument, consisting of ___ (_) pages, including the page on which this acknowledgment is written, has been signed on the signature page and on the left margin of each and every other page thereof by the concerned parties and their witnesses, and sealed with my notarial seal.

IN WITNESS WHEREOF, I have hereunto set my seal and signature.

Doc. No. _____;
Page No. _____;
Book No. _____;
Series of 20___.

## ANNEX D

### Annex "A"

### SECRETARY'S CERTIFICATE – NGCP

## ANNEX D

### Annex "B"

### SECRETARY'S CERTIFICATE – [CUSTOMER]

## ANNEX D

**Annex "C"**

**Metering Points of the CUSTOMER**

| Plant/Facility Name | Metering Point Name | Location/ Address | SEIN | *Applicable Charges |
|---|---|---|---|---|
| XXXXXX | XXXXXX | XXXXXX | | XXXXXX |
| | | | | |
| | | | | |
| | | | | |

***Subject to change when NGCP finds discrepancies on its metering database**

[CUSTOMER]
By:
REPRESENTATIVE
Designation

Signed in the Presence of:

NATIONAL GRID CORPORATION OF THE PHILIPPINES
By:
[Name of President & CEO]
President and Chief Executive Officer

## ANNEX D

**Annex "D"**

**Single Line Diagram for CUSTOMER's Metering Points**

Below is the single line diagram (SLD) of showing the Customer's metering points.

*Insert Single Line Diagram*

[CUSTOMER]
By:

REPRESENTATIVE
Designation

Signed in the Presence of:

NATIONAL GRID CORPORATION OF THE PHILIPPINES
By:

[Name of President & CEO]
President and Chief Executive Officer

**ANNEX E**

# METER TROUBLE REPORT FORM

| | MTR SUMMARY | | | TOTAL MTR: | | TOTAL REMAINING MTR: | | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | TD TOTAL DATA | TM TOTAL MISSING | TU TOTAL UNCERTAIN | INC DATA | | INC DATA | | |
| | | | | INC DATA & UNCERTAIN | | INC DATA & UNCERTAIN | | |
| | | | | NO DATA | | NO DATA | | |
| | | | | UNCERTAIN | | UNCERTAIN | | |

| | | | KWH DEL | | | KVARH DEL | | | KWH REC | | | KVARH REC | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | TP NAME | SEIN | TD | TM | TU | TD | TM | TU | TD | TM | TU | TD | TM | TU | WESM | | MSG | CLOSED/OPEN |
| | | | | | | | | | | | | | | | | | | |

**ANNEX F**

## APPENDIX K

## SITE-SPECIFIC LOSS ADJUSTMENT

A. General Equations

The following are the equations to be used for performing the Site Specific Loss Adjustment (SSLA):

Calculation of Line Losses

$$kW_{Meter} = \frac{kWh_{Meter}}{t}$$

$$kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$$

$$pf = \frac{kW_{Meter}}{\sqrt{(kW_{Meter})^2 + (kVAR_{Meter})^2}}$$

$$I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$$

$$Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$$

Calculation of Transformer Losses:

For the calculation of the transformer losses, the following percent transformer loss (%$Transformer_{Loss}$) shall be used to determine the total transformer losses.

**ANNEX F**

| Capacity (kVA) | Percent Transformer Loss (%) |
|---|---|
| 1000 | 1.9 |
| 2000 | 1.8 |
| 3000 | 1.7 |
| 4000 | 1.6 |
| 5000 | 1.5 |
| 10000 | 1.4 |

*For in between capacities, interpolation shall be performed to calculate the Percent Transformer Loss*

When translating power (and energy) metered at the secondary side to the primary side, the following formula shall be used:

$$kW_{P-Meter} = \frac{kW_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$$

$$kVAR_{P-Meter} = \frac{kVAR_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$$

$$Transformer_{kW-Loss} = kW_{P-Meter} - kW_{Meter}$$

Conversely, power (and energy) that is metered at the primary side shall be translated to the secondary side using the formula:

$$kW_{S-Meter} = kW_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$$

**ANNEX F**

$$kVAR_{S-Meter} = kVAR_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$$

$$Transformer_{kW-Loss} = kW_{Meter} - kW_{S-Meter}$$

Calculation of Adjusted Energy

$$Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$$

$$Adjusted_{kW} = kW_{Meter} \pm Total_{kW-Loss}$$

(+) = if the *connection point* is located before the metering point (i.e., the line current initially passes through the *connection point* then the metering point)

(-) = if the *connection point* is located after the metering point (i.e., the line current initially passes through the metering point then the *connection point*)

$$Adjusted_{kWh} = Adjusted_{kW} \times t$$

Where:

$R_T$ = Total resistance of the line conductor per line, in ohms

$X_L$ = Total Reactance of the Line Conductor per line, in ohms

$pf$ = Power Factor

$kWh_{Meter}$ = Active energy derived from the *meter* registration, in kWh

$kVARh_{Meter}$= Reactive energy derived from the *meter* registration, in kVARh

$kW_{Meter}$ = Demand (*Active Power*) derived from the *meter* registration, in kW

$kVAR_{Meter}$ = *Reactive Power* derived from the *meter* registration, in kVAR

$I_{Line}$ = Current along the line, in Ampere

$V_{Rated}$ = Rated voltage of the line, in kV

$Line_{kW-Loss}$ = the active loss along the line, in kW

$kW_{P-Meter}$ = Translated *active power* at the primary side of transformer, in kW

$kVAR_{P-Meter}$= Translated reactive power at the primary side of transformer, in kVAR

$kW_{S-Meter}$ = Translated *active power* at the secondary side of the transformer, in kW

$kVAR_{S-Meter}$ = Translated reactive power at the secondary side of the transformer, in kVAR

$\%\ Transformer_{Loss}$ = Percent Transformer Loss ~~Factor~~

$Transformer_{kW-Loss}$ = Total loss in the transformer, in kW

$Totak_{kW-Loss}$ = $P_{Loss}$= Total active loss for a metering point, in kW

$Adjusted_{kW}$ = Adjusted *active power*, in kW

$t$ = duration of a *dispatch interval*, in hours

$Adjusted_{kWh}$ = Adjusted active energy, in kWh

B. Cases for Loss Calculation

Note: The following illustrations and computations are sample cases only. Other actual detailed cases may use more than one sample case and may be discussed with the Trading Participants, Metering Services Provider, and Network Service Provider if necessary.

Line Loss Only

Case 1: A *connection point* is located before the metering point Figure L1 and G1) (In this case, the line current initially passes through the *connection point,* then the metering point).

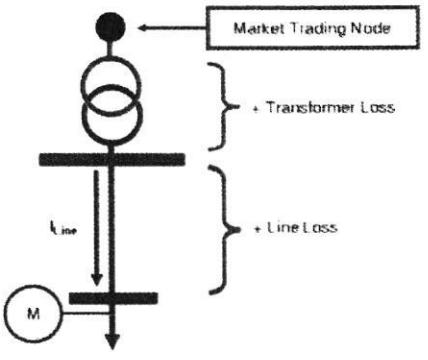



**Figure L1**

## ANNEX F

a. Loads:

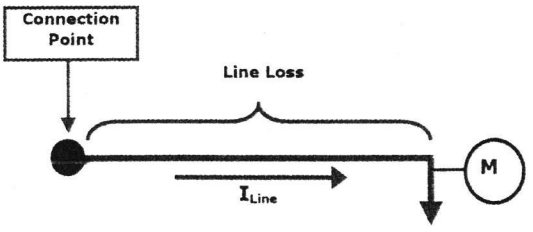



Figure L1

b. Generators

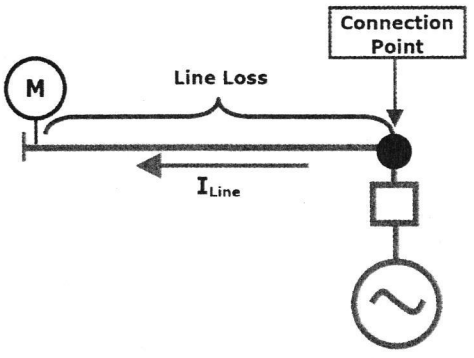



Figure G1

$$kW_{Meter} = \frac{kWh_{Meter}}{t}$$

$$kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$$

$$pf = \frac{kW_{Meter}}{\sqrt{(kW_{Meter})^2 + (kVAR_{Meter})^2}}$$

$$I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$$

$$Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$$

$$Total_{kW-Loss} = Line_{kW-Loss}$$

$$Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$$

$$Adjusted_{kWh} = Adjusted_{kW} \times t$$

Case 2: A *connection* point is located after the *metering point* (Figure L2 and G2) (In this case, the line current initially passes through the metering point then the *connection point*)

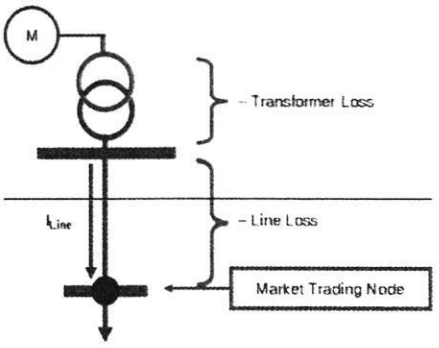



Figure L2

a. Loads

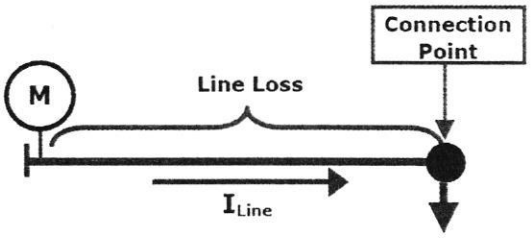



**Figure L2**

b. Generators

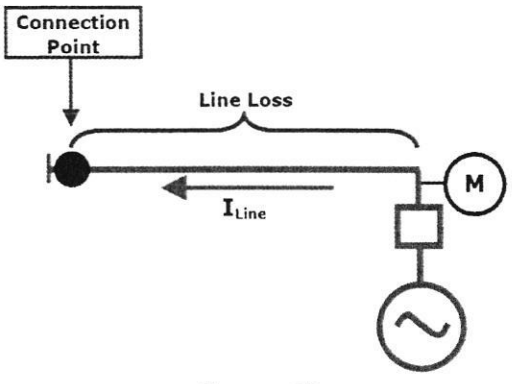



**Figure G2**

$$kW_{Meter} = \frac{kWh_{Meter}}{t}$$

$$kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$$

$$pf = \frac{kW_{Meter}}{\sqrt{(kW_{Meter})^2 + (kVAR_{Meter})^2}}$$

$$I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$$

$$Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$$

$$Total_{kW-Loss} = Line_{kW-Loss}$$

$$Adjusted_{kW} = kW_{Meter} - Total_{kW-Loss}$$

$$Adjusted_{kWh} = Adjusted_{kW} \times t$$

Transformer Loss Only

Case 1: A *connection* point is located before the *metering point* (Figure L3 and G3) (In this case, the line current initially passes through the *connection point* then the metering point)

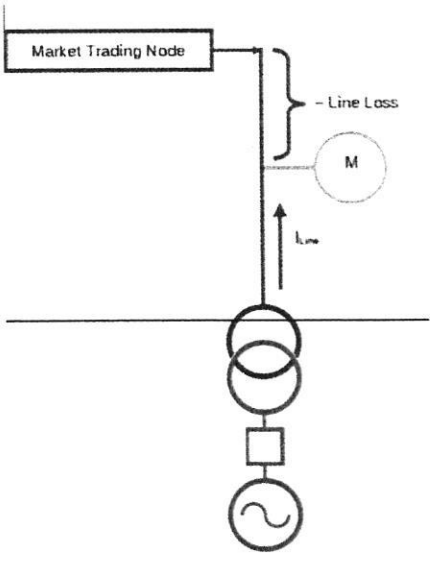



**Figure G1**

**ANNEX F**

a. Loads

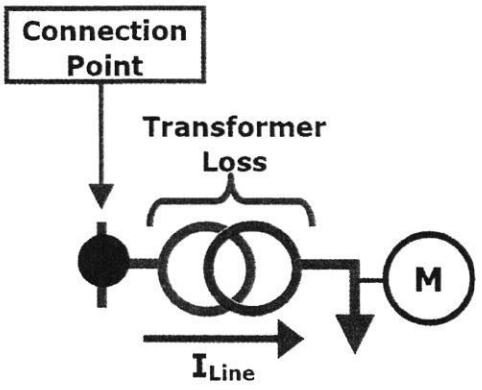



**Figure L3**

$$kW_{Meter} = \frac{kWh_{Meter}}{t}$$

$$kW_{P-Meter} = \frac{kW_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$$

$$Transformer_{kW-Loss} = kW_{P-Meter} - kW_{Meter}$$

$$Total_{kW-Loss} = Transformer_{kW-Loss}$$

$$Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$$

$$Adjusted_{kWh} = Adjusted_{kW} \times t$$

b. Generators

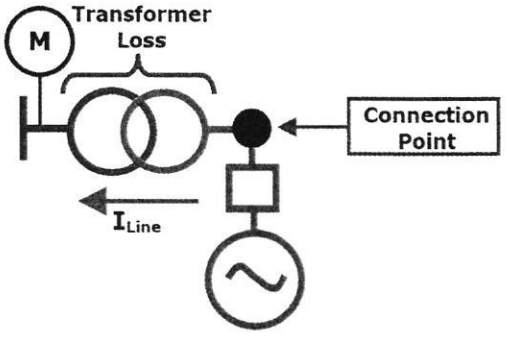



**Figure G3**

## ANNEX F

$$kW_{Meter} = \frac{kWh_{Meter}}{t}$$

$$kW_{P-Meter} = \frac{kW_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$$

$$Transformer_{kW-Loss} = kW_{P-Meter} - kW_{Meter}$$

$$Total_{kW-Loss} = Transformer_{kW-Loss}$$

$$Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$$

$$Adjusted_{kWh} = Adjusted_{kW} \times t$$

**ANNEX G**

## APPENDIX L

## SPECIFICATIONS FOR TRANSMISSION REVENUE METERS

| ITEMS | SPECIFICATIONS | | REFERENCE DOCUMENTS |
|---|---|---|---|
| | MAIN METER | BACK- UP METER | |
| Accuracy Class | IEC 687 Class 0.2 / ANSI 12.20 Class 0.3 or better | Same as the main meter | PGC 2016 GRM 9.2.3 |
| No. of Stators | Blondel's Theorem compliant /3-element | Same as the main meter | PGC 2016 GRM 9.2.2.1 |
| Rating | 115V<br>1 A or 5 A<br>60 Hz | Same as the main meter | The rating should be suitable to the secondary rating of the instrument transformers. |
| No. of Quadrants<br>(Measurement) | Active Energy/Power Measurement:<br>Bi-directional<br>Reactive Power Measurement:<br>4 Quadrant | Bi-directional or as required by its application | PGC 2016 GRM 9.2.2.2<br>PGC 2016 GRM 9.2.3.3 |
| Interval Data | Programmable to 1, 5, 15, 30, and 60 minute interval | Same as the main meter | PGC 2016 GRM 9.2.3.3 |
| No. of Channels | The 10-channels are as follows:<br>1. KWH (Del)<br>2. KWH (Rec)<br>3. KVARH (Del)<br>4. KVARH (Rec)<br>5. Voltage (Ph A)<br>6. Voltage (Ph B)<br>7. Voltage (Ph C)<br>8. Current (Ph A)<br>9. Current (Ph B)<br>10. Current (Ph C) | Minimum requirements of 4 channels as follows:<br>1. KWH (Delivered)<br>2. KWH (Received)<br>3. KVARH (Quadrant 1)<br>4. KVARH (Quadrant 2) | PGC 2016 GRM 9.2.2.2<br>PGC 2016 GRM 9.2.3.3 |
| Mass Memory | Minimum 60 day recording of a 5-minute time-stamped demand interval for 10 recording channels | Same as main meter | WESM 4.5.1 (g)<br>PGC 2016 GRM 9.2.3.3 |
| Meter Registers | The meter shall be capable of measuring, registering and recording | Minimum requirements<br>• KWH (Delivered) | PGC 2016 GRM 9.2.2.2 |

**ANNEX G**

| ITEMS | SPECIFICATIONS | | REFERENCE DOCUMENTS |
|---|---|---|---|
| | MAIN METER | BACK- UP METER | |
| | the following electrical parameters per dispatch interval:<br>• KWH (Delivered)<br>• KWH (Received)<br>• KVARH (Quadrant 1)<br>• KVARH (Quadrant 2)<br>• KVARH (Quadrant 3)<br>• KVARH (Quadrant 4)<br>• KVAH (Delivered)<br>• KVAH (Received)<br>• Max KW (Delivered)<br>• Max KW (Received)<br>• Power Factor<br>• Frequency<br>• Per Phase Current<br>• Per Phase Voltage | • KWH (Received)<br>• KVARH (Quadrant 1)<br>• KVARH (Quadrant 2)<br>• KVARH (Quadrant 3)<br>• KVARH (Quadrant 4)<br>• KVAH (Delivered)<br>• KVAH (Received)<br>• Max KW (Delivered)<br>• Max KW (Received) | PGC 2016 GRM 9.2.3.3 |
| Loss Compensation | Optional | Optional | WESM 4.5.2.2 |
| Security | The meter shall have provisions for securing the meter data, meter configurations and programs by electronic means and/or passwords. It shall also be secured physically by way of security seals. | Same as the main meter | WESM 4.5.6<br>PGC 2016 GRM 9.3.8.1<br>PGC 2016 GRM 9.3.8.2<br>PGC 2016 GRM 9.3.8.3 |
| Communication Capability | The meter shall have at least a minimum of two (2) independent communication ports that could operate independently. Each port can communicate simultaneously, with each one using a different protocol. It should be capable of a two-way communication. | Same as the main meter | WESM 4.5.7.1<br>WESM 4.5.1 (c)<br>PGC 2016 GRM 9.2.3.3 |
| Internal Clock | The meter shall have an internal clock with an allowable error of +/-1 second | Same as the main meter | WESM 4.5.8.1<br>PGC 2016 GRM 9.2.3.3 |
| Time Synchronization | Crystal synchronization. The internal clock shall be | Same as the main meter | WESM 4.5.8.1 |

## ANNEX G

| ITEMS | SPECIFICATIONS | | REFERENCE DOCUMENTS |
|---|---|---|---|
| | MAIN METER | BACK- UP METER | |
| | capable of being reset set by the data collection software during normal collection operations. | | PGC 2016 GRM 9.2.3.3 |
| Digital Display | The meter shall have a digital display with a minimum of 5 digits. | Same as the main meter | WESM 4.5.1 (c)<br>PGC 2016 GRM 9.2.3.3 |
| Codes and Standards Compliance | The meter shall adhere to established International Standards | Same as the main meter | PGC 2016 GCR 4.2.10<br>IEC, ANSI/IEEE |
| Applicable Compliance Tests | These tests shall include material tests and established practice and/or other approved standards.<br>Routine tests prescribed by the applicable standards shall be performed. In particular, the following tests shall be performed for the revenue meters:<br>a. Power frequency tests (insulation)<br>b. Impulse voltage test (insulation).<br>c. HF interference test<br>d. Surge withstand and fast transient tests | Same as the main meter | PGC 2016 GRM 9.2.5.2<br>PGC 2016 GRM 9.2.5.3<br>PGC 2016 GRM 9.2.8.1<br>IEC 255-1<br>IEC 255-A (Class III)<br>IEC 245-4 |
| Battery | Capable of retaining readings and time of day for at least two days without external power source | Same as the main meter | WESM 4.5.1 (g)<br>PGC 2016 GRM 9.2.3.3 |
| Enclosure | Minimum requirements<br>**Indoor**: Protected against dust limited ingress (no harmful deposit) and Protection against vertically falling drops of water e.g. condensation<br>**Outdoor**: | Same as the main meter | ANSI 12.1 4.3.4<br>PGC 2016 GRM 9.2.2.3<br>PGC 2016 GRM 9.2.2.4<br>PGC 2016 GRM 9.3.8 |

## ANNEX G

| ITEMS | SPECIFICATIONS | | REFERENCE DOCUMENTS |
|---|---|---|---|
| | MAIN METER | BACK- UP METER | |
| | For meter cover: Minimum Ingress Protection Rating of IP51 or NEMA 2 to protect the internal component against the harmful elements of environment that may affect its measuring circuit and operation.<br><br>For meter box: Minimum Ingress Protection Rating IP34 or NEMA Type 3. | | |

**ANNEX H**

## APPENDIX M

## SPECIFICATIONS FOR REVENUE METERS FOR EMBEDDED GENERATORS REGISTERED AS WESM PARTICIPANTS

| ITEMS | SPECIFICATIONS | | REFERENCE DOCUMENTS |
|---|---|---|---|
| | MAIN METER | BACK-UP METER | |
| Accuracy Class | IEC 687 Class 0.2 / ANSI 12.20 Class 0.3 or better | Same as the main meter | IEC 687 4.6<br>PDC 2016 7.2.7 |
| No. of Stators | Corresponds to the service type and complying with Blondel's Theorem | Same as the main meter | ANSI C12.1<br>PDC 2016 7.2.7 |
| Voltage Rating | Corresponds to the secondary voltage rating of voltage transformers used | Same as the main meter | PDC 2016 7.2.7 |
| Current Rating | Corresponds to the secondary current rating of current transformers used (typically 1A or 5A) | Same as the main meter | ANSI or IEC Standard<br>PDC 2016 7.2.7 |
| Frequency | 60 Hz | Same as the main meter | PDC 2016 7.2.7 |
| Measurement | Uni-directional active metering (delivered) and 2-quadrant reactive metering)<br>Or Bi-directional depending on the purpose | Same as the main meter | PDC 2016 7.2.7 |
| Interval Data | Programmable to 5, 15, 30 minute interval | Same as the main meter | PDC 2016 7.2.7 |
| No. of Channels | At least four (4) channels for bi-directional meters:<br>a. kWh (Delivered)<br>b. kVARh (Delivered)<br>c. kWh (Received)<br>d. kVARh (Received) | Same as the main meter | This satisfies the minimum requirements as stated under: PDC 2016 7.2.7 |

## ANNEX H

| ITEMS | SPECIFICATIONS | | REFERENCE DOCUMENTS |
|---|---|---|---|
| | MAIN METER | BACK-UP METER | |
| | At least two (2) channels for unidirectional meters:<br>a. kWh (Received)<br>b. kVARh (Received) | | |
| Mass Memory | Minimum of 60-day recording of a 5-minute time-stamped demand interval for 4 recording channels for bi-directional meters or 2 recording channels for uni-directional meters | Same as the main meter | PDC 2016 7.2.7 |
| Recording Billing Quantities | Display and record TOU energy and power parameters (kWh, kVarh, max. kW & cum. kW) for all rates | Same as the main meter | PDC 2016 7.2.7 |
| Loss Compensation | Optional | Optional | WESM 4.5.2.2 |
| Security | The meter shall have provisions for securing the meter data, meter configurations and programs by electronic means and/or passwords. It shall also be secured physically by way of security seals. | Same as the main meter | WESM 4.5.6<br>PDC 2016 7.4.7 |
| Communication Capability | The meter shall have one (1) independent communication port in addition to the optical port. | Minimum requirements:<br>Optical port | WESM 4.5.7.1<br>WESM 4.5.1(c)<br>PDC 2016 7.2.7 |
| Internal Clock/Battery | With long life lithium battery for clock/ calendar maintenance | Same as the main meter | WESM 4.5.8.1<br>PDC 2016 7.2.1 |

## ANNEX H

| ITEMS | SPECIFICATIONS | | REFERENCE DOCUMENTS |
|---|---|---|---|
| | MAIN METER | BACK-UP METER | |
| Time Synchronization | Shall be crystal synchronization time-based. The internal clock shall be capable of being reset/set by the data collection software during normal collection operations. | Same as the main meter | |
| Digital Display | The meter shall have a digital display with a minimum of 5 digits. | Same as the main meter | WESM 4.5.1 (c)<br>PDC 2016 7.2.7 |
| Codes and Standards Compliance | The meter shall adhere to established International Standards | Same as the main meter | IEC, ANSI/IEEE<br>PDC 2016 7.2.7 |
| Enclosure | The meter shall be provided with the necessary cover to protect the internal component against the harmful elements of environment that may affect its measuring circuit and operation. | Same as the main meter | ANSI 12.1 4.3.4 |

**ANNEX I**

## APPENDIX N

## SPECIFICATIONS FOR CURRENT TRANSFORMERS

| ITEMS | SPECIFICATIONS | REFERENCE DOCUMENTS |
|---|---|---|
| Type | Outdoor Type; Minimum oil filled, Dry Type or Gas-filled | |
| Cooling | Oil immersed, Self-cooled; Butyl, Cast resin | |
| Construction | Single phase, wound type, free standing | |
| Accuracy Class | See section 2.5.4.1 | PGC 2016 GRM 9.2.3.2<br>PGC 2016 Appendix 2 |
| Burden | See section 2.5.4.1 | PGC 2016 GRM 9.2.3.2 (c)<br>PGC 2016 Appendix 2 |
| Rated Primary Current | The thermal rating factor shall not be less than 1.0. | |
| Secondary Current | 1A or 5A | PGC 2016 GRM 9.2.3.2<br>IEC 4.2 Standard values of rated secondary currents |
| Rating Factor | Minimum of 1.0 at 30°C | |
| Frequency | 60 Hz | |
| Ambient Air Temperature | -5°C and 50°C for very hot climate | IEC 3.2.1 1996 |
| BIL | Refer to Table 2 for applicable BIL | |
| Creepage Distance | Refer to Table 3 for applicable creepage distance | |
| Number of Core | Preferably Two (2) metering cores | PGC 2016 GRM 9.2.3.2 |
| Mounting | Depend on the applications | |
| Grounding | | PGC 2016 GCR 4.4.1.3.2<br>PGC GRM 9.2.2.1 (g) |

## ANNEX I

| ITEMS | SPECIFICATIONS | REFERENCE DOCUMENTS |
|---|---|---|
| Security | Seal holder shall be provided to the CT secondary terminal box (see Figure 1) | PGC 2016 GRM 9.3.8.2<br>PGC 2016 GRM 9.2.4.1 |

**ANNEX J**

## APPENDIX O

## SPECIFICATIONS FOR VOLTAGE TRANSFORMERS

| ITEMS | SPECIFICATIONS | REFERENCE DOCUMENTS |
|---|---|---|
| Type | Outdoor Type; Minimum oil filled, Dry Type or Gas-filled | |
| Cooling | Oil immersed, Self-cooled; Butyl, Cast resin | |
| Construction | Single phase, Inductive type, single bushing | |
| Termination | Line-to-Ground (3-element metering)<br><br>Line-to-Line (2-element metering) | PGC 2016 GRM 9.2.2.1 |
| Accuracy Class | See section 2.5.4.2 | PGC 2016 GRM 9.2.3.1 (a)<br><br>PGC 2016 Appendix 2 |
| Burden | See section 2.5.4.2 | PGC 2016 GRM 9.2.3.1 (b)<br><br>PGC 2016 Appendix 2 |
| Ratio | See Table 5 | |
| Secondary Voltage | See Table 5 | |
| Frequency | 60 Hz | |
| Operating Temperature | 55°C average ambient temperature, with max ambient temperature not exceeding 65°C | |
| BIL | Refer to Table 2 for applicable BIL | |
| Creepage distance | Refer to Table 3 for applicable creepage distance | |
| Number of Core | Preferably Two (2) | |
| Mounting | Depend on the applications | |
| Grounding | | PGC 2016 GCR 4.4.1.3.2<br><br>PGC GRM 9.2.2.1 (g) |
| Security | Seal holder shall be provided to the CT secondary terminal box (see Figure 1) | PGC 2016 GRM 9.3.8.2<br><br>PGC 2016 GRM 9.2.4.1 |

**ANNEX K**

## APPENDIX P

## SPECIFICATIONS FOR CURRENT TRANSFORMERS FOR EMBEDDED GENERATORS

| ITEMS | SPECIFICATIONS | REFERENCE DOCUMENTS |
|---|---|---|
| Type | Minimum oil filled, Dry Type or Gas-filled | |
| Cooling | Oil immersed, Self-cooled; Butyl, Cast resin | |
| Accuracy Class | 0.2 (IEC) or 0.3 (ANSI), or better | PDC 2016 7.2.6.2 (b) |
| Burden | 5VA, guaranteed accurate from 0% to 100% | |
| Rated Primary Current | The thermal rating factor shall not be less than 1.0 | |
| Secondary Current | 1A or 5A | IEC 4.2 Standard values of rated secondary currents |
| Rating Factor | Minimum of 1.0 at 30°C | |
| Frequency | 60 Hz | |
| Ambient Air Temperature | -5°C and 50°C for very hot climate | IEC 3.2.1 1996 |
| BIL | Refer to Table 2 for applicable BIL | |
| Creepage Distance | Refer to Table 3 for applicable creepage distance | |
| Mounting | Depend on the applications | |

**ANNEX K**

| | | |
|---|---|---|
| Security | Seal holder shall be provided to the<br><br>CT secondary terminal box (see Figure 1) | WESM Market Manual on Metering Standards and Procedures Section 2.9.1.3 |

**ANNEX L**

## APPENDIX Q

## SPECIFICATIONS FOR VOLTAGE TRANSFORMERS FOR EMBEDDED GENERATORS

| ITEMS | SPECIFICATIONS | REFERENCE DOCUMENTS |
|---|---|---|
| Type | Minimum oil filled, Dry Type or Gas-filled | |
| Cooling | Oil immersed, Self-cooled; Butyl, Cast resin | |
| Termination | Line-to-Ground (3-element metering)<br>Line-to-Line (2-element metering) | |
| Accuracy Class | 0.3 (ANSI) or 0.2 (IEC) | PDC 2016 7.2.6.1 (a) |
| Burden | 75VA, guaranteed accurate from 0% to 100% | |
| Ratio | See Table 5 | |
| Secondary Voltage | See Table 5 | |
| Frequency | 60 Hz | |
| BIL | Refer to Table 2 for applicable BIL | |
| Creepage distance | Refer to Table 3 for applicable creepage distance | |
| Mounting | Depend on the applications | |
| Security | Seal holder shall be provided to the CT secondary terminal box (see Figure 1) | WESM Market Manual on Metering Standards and Procedures Section Manual 2.9.1.3 |