Annex B

Proposed Amendments to the WESM Manual on Metering Standards and Procedures Issue 12.0

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
Instrument Transformers	2.5	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 primary tap multiplied by the primary factor of the current transformer; and b. The minimum sustained primary current during normal operation shall not be less than 10% of the primary tap.	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 ~~tap~~ **current** multiplied by the ~~primary~~ **current rating** factor of the current transformer; and b. The minimum sustained primary current during normal operation shall not be less than ~~10% of the primary tap~~ **the lowest primary current that the current transformer can measure wherein the measurement accuracy is still guaranteed**	▪ To be consistent with the terms used by ANSI and IEC standards ▪ To consider the improvements in measurement range of new designs of extended range current transformers which can already measure down to 1% of rated current at guaranteed accuracy In reference to RCC-RESO-19-10 (19 July 2019)		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
Instrument Transformers	2.5	2.5.3.2. Selection of Current Transformer Ratios Current transformer ratios shall be selected according to the following factors: c. The maximum sustained primary current in a current transformer shall not exceed the primary tap multiplied by the primary factor of the current transformer; and d. The minimum sustained primary current during normal operation shall not be less than 10% of the primary tap.	2.5.3.2. Selection of Current Transformer Ratios Current transformer ratios shall be selected according to the following factors: c. The maximum sustained primary current in a current transformer shall not exceed the **rated** primary ~~tap~~ **current** multiplied by the ~~primary~~ **current rating** factor of the current transformer; and d. The minimum sustained primary current during normal operation shall not be less than ~~10% of the primary tap~~ **the lowest primary current that the current transformer can measure wherein the measurement accuracy is still guaranteed**	▪ To be consistent with the terms used by ANSI and IEC standards To consider the improvements in measurement range of new designs of extended range current transformers which can already measure down to 1% of rated current at guaranteed accuracy ▪ In reference to RCC-RESO-19-10 (19 July 2019)		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
Instrument Transformers	2.5	2.5.5.1. Burden Calculation – All Current Transformers The burden calculation for a current transformer shall include: a. the impedance of the secondary wiring; b. the impedance of all devices connected to the current transformer; c. the apparent impedance associated with the interconnection of current transformer secondaries; d. the apparent impedance associated with the sharing of a common current path through a measuring device with another current transformer; e. the apparent impedance associated with the sharing of an approved common-return conductor; f. the apparent impedance associated with the impedance of any other current transformer(s) connected in parallel with subject instrument transformer; g. burden under balanced power system conditions; and	2.5.5.1. Burden ~~Calculation~~ **Measurement** – All Current Transformers The **actual connected** burden ~~calculation for a current transformer~~ shall ~~include~~ **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; b. the impedance of all devices connected to the current transformer; ~~c. the apparent impedance associated with the interconnection of current transformer secondaries;~~ ~~d. the apparent impedance associated with the sharing of a common current path through a measuring device with another current transformer;~~ ~~e. the apparent impedance associated with the sharing of an approved common-return conductor;~~ ~~f. the apparent impedance associated with the~~	▪ To recommend an alternative and easier method in determining the connected burden using test equipment ▪ Items c-h are recommended for deletion as most of the conditions are no longer present in existing metering facilities i.e., common return conductor, parallel connected CT etc. Also, for consistency with Section 2.7.3.7. of this WESM Manual prescribing separate conductors for each secondary terminal of each instrument transformer ▪ In reference to RCC-RESO-19-10 (19 July 2019)		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
		h. worst-case unbalance, including single-phase power	~~impedance of any other current transformer(s) connected in parallel with subject instrument transformer;~~ ~~g. burden under balanced power system conditions; and~~ ~~h. worst-case unbalance, including single-phase power~~			
Instrument Transformers	2.5	2.5.5.3. Burden Calculations – All Voltage Transformers The burden calculation for a voltage transformer shall include the apparent power and power factor at the secondary terminals of the instrument transformer.	2.5.5.3. Burden ~~Calculations~~ **Measurement** – All Voltage Transformers The **actual connected** burden ~~calculation for a voltage transformer~~ shall ~~include the~~ **be measured using a VT burden measuring instrument. If manual calculation will be employed, the calculation shall consider the following:** **a)** the apparent power and power factor at the secondary terminals of	▪ To have an alternative and easier option in determining the connected burden using test equipment In reference to RCC-RESO-19-10 (19 July 2019)		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			the instrument transformers.			
Instrument Transformers	2.5	2.5.6. General Requirements for Grounding System 2.5.6.1. The installation shall be in accordance but not limited to the following provisions of the Philippine Electrical Code: a. … b. … c. … d. … e. … f. The minimum size of copper conductor to be used for metering grounding shall be 8 mm^2. g. Connections to all bonded parts shall be made in accordance to Article 2.50.1.8 of the Philippine Electrical Code 2009 Part 1.	2.5.6. General Requirements for Grounding System 2.5.6.1. The installation shall be in accordance but not limited to the following provisions of the Philippine Electrical Code: a. … b. … c. … d. … e. … f. **For voltage level 69kV and higher,** the minimum size of copper conductor to be used for metering **instrument transformer** grounding shall be ~~8~~ **125** mm^2. **g. For voltage lower than 69kV the minimum size of copper conductor to be used for metering instrument transformer grounding shall be 70 mm2.**	▪ To provide clarity on the application of the requirements for minimum size of equipment grounding. (The selected values were based on the prescribed minimum size in the Philippine Electrical Code. PEC in no case requires the equipment grounding conductor to be larger than the circuit conductors supplying the equipment) ▪ In reference to RCC-RESO-19-10 (19 July 2019)		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			h. The minimum size of copper conductor to be used for the secondary circuits of instrument transformers shall be 3.5mm2. ~~g~~**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.			
Instrument Transformers	2.5	2.5.7. Current Transformer Requirements Current Transformers installed as the main metering shall adhere to the prevailing requirements of the Philippine Grid Code. The current specifications are provided as Appendix N of this Manual.	~~2.5.7. Current Transformer Requirements~~ ~~Current Transformers installed as the main metering shall adhere to the prevailing requirements of the Philippine Grid Code.~~ ~~The current specifications are provided as Appendix N of this Manual.~~	▪ The revision is being proposed since it will be replaced by additional provision under Section 2.5.1.1 as approved by the RCC-RESO-19-10 (19 July 2019)		
Instrument Transformers	2.5	2.5.8. Voltage Transformer Requirements Voltage Transformers installed as the main metering shall adhere to the prevailing requirements of the Philippine Grid Code.	~~2.5.8. Voltage Transformer Requirements~~ ~~Voltage Transformers installed as the main metering shall adhere to the prevailing requirements of the Philippine Grid Code.~~	The revision is being proposed since it will be replaced by additional provision under Section 2.5.1.1 as approved by the RCC-RESO-19-10 (19 July 2019) ▪		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
		The current specifications are provided as Appendix O of this Manual.	~~The current specifications are provided as Appendix O of this Manual.~~			
Secondary Connections for Instrument Transformers	2.7	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 for the IEC 0.2 or ANSI 0.3 accuracy class is not exceeded when current, equivalent to the rated current, flows in the secondary winding.	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 ~~for the IEC 0.2 or ANSI 0.3~~ **specified in Sec. 2.5.4.1** accuracy class is not exceeded when current, equivalent to the rated current, flows in the secondary winding.*	▪ The revision is being proposed to refer appropriate section of the WESM manual for amendment ▪ In reference to RCC-RESO-19-10 (19 July 2019)		
Site Equipment Identification	Section 3	Section 3 Site Equipment Identification (SEIN)	Section 3. Site Equipment Identification **Label** (SEIL~~N~~)	▪ To change SEIN to SEIL, in all affected clause, as standard term for labelling Metering equipment, where L stands for Label. N stands for Number ▪ In reference to RCC-RESO-19-10 (19 July 2019)		
Site Equipment Identification	3.2	General Procedures The assignment of the Site Equipment Identification Number	General Procedures The assignment of the Site Equipment Identification **Label**	▪ To clarify responsibility in the assignment of SEIL.		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
		(SEIN) shall be done by the Metering Service Provider. For embedded generators and load customers to be registered in the WESM, the responsibility to assign the SEIN is with the Market Operator.	~~Number~~ (SEI**L**~~N~~)**, in general,** shall be done by the Metering Service Provider. **However,** for embedded generators ~~and load customers to be registered in the WESM~~, **with the concerned DU as their MSP,** the responsibility to assign the SEI**L**~~N~~ is with the Market Operator.	▪ To recommend the use of SEIL instead of SEIN ▪ In reference to RCC-RESO-19-10 (19 July 2019)		
Requirements for Registration of Metering Installations	4.3		**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.**	▪ To provide additional provision to clarify the roles of the MSP and MO in the registration of a metering facility to the WESM While the Metering Service Provider is responsible for the assessment and certification of readiness of a WESM Metering Facility, the approval of registration is within the jurisdiction and function of the Market Operator. ▪ In reference to RCC-RESO-19-10 (19 July 2019) ▪		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
Metering Data Collection	5.3	5.3.3 Monthly Process XXX b. The *Market Operator* shall validate the monthly metering data relative to its format, the given SEINs, metering data and hourly 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*. XXX	5.3.3 Monthly Process XXX b. The *Market Operator* shall validate the monthly metering data relative to its format, the given SEINs, metering data and ***per dispatch*** ~~hourly~~ *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*. XXX	The revision is being proposed as a minor enhancement to reflect the transition to five-minute metering upon the implementation of the enhanced WESM design and operations.		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
Data Validation, Estimation and Editing	6.2	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, uncertain values, or exceeds the maximum or minimum of the daily hourly load profile values of the registered meter, such metering data shall undergo estimation and editing wherein substitution of metering data shall be made using historical data.	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~~,~~ ~~uncertain values,~~ or exceeds the maximum ~~or minimum of the daily hourly load profile values of the registered meter~~, **capacity per dispatch interval,** such metering data shall undergo estimation and editing where~~in~~ substitution of metering data shall be made using historical **validated** data.	The revision is being proposed as a minor enhancement to reflect the transition to five-minute metering upon the implementation of the enhanced WESM design and operations.		
Data Validation, Estimation and Editing	6.3.1	6.3.1.2 Validation Checks 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 hour last week; ii. Value during the same dispatch interval of the same previous day of the same	6.3.1.2 Validation Checks 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 ~~hour~~ ***dispatch interval*** ~~last week~~ **previous week**;	The revision is being proposed as a minor enhancement to reflect the transition to five-minute metering upon the implementation of the enhanced WESM design and operations.		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
		type (i.e. weekday or weekend); and iii. Average values during the previous days or last week of the same hour. XXX	ii. Value during the same dispatch interval ~~of the same previous day of the same type~~ **for the previous similar day** (i.e. weekday or weekend); and iii. Average values during the previous days or ~~last week~~ **previous week** of the same ~~hour~~ ***dispatch interval***. XXX			
Meter Data Estimation and Editing	6.4.3	6.4.3.1 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 hour of the previous day or same day type (i.e. weekday or weekend) iii. Values of the same hour of the same day from the past 3 weeks as recorded on the same meter (i.e. Saturday, Sunday, Holidays)	6.4.3.1 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*** ~~hour~~ of the previous day or same day type (i.e. weekday or weekend) iii. Values of the same ***dispatch interval*** ~~hour~~ of the same day from the past 3 weeks as recorded on the same meter	The revisions are being proposed as a minor enhancement to reflect the transition to five-minute metering upon the implementation of the enhanced WESM design and operations. As recommended by NGCP, previous days with shutdown, days with shutdown, previous estimation and holidays, are not included in the meter data substitution under this Section.		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
		XXX g. Use of Meter Register Reading in VEE XXX The meter register readings shall be treated by the *Market Operator* in the following manner: i. The hourly 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 hourly equivalent meter data shall undergo site – specific loss adjustment for any equipment between the market trading node and the meter; XXX	***except for days with shutdown, previous estimation, holidays*** (i.e. Saturday, Sunday, Holidays) XXX g. Use of Meter Register Reading in VEE XXX The meter register readings shall be treated by the *Market Operator* in the following manner: i. The ~~hourly~~ **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*** ~~hourly~~ equivalent meter data shall undergo site – specific loss adjustment for			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
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			any equipment between the market trading node and the meter; XXX			
SITE-SPECIFIC LOSS ADJUSTMENT	8.2	This procedure shall be used to adjust the Customer *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 is physically located at the MTN.	This procedure shall be used to adjust the ~~Customer~~ *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 is physically located at the MTN.	The revision is being proposed to be consistent with the general principle that the revenue metering equipment for the market trading node shall be installed no more than 500 meters from the connection point. The application of SSLA methodology shall be applied therefore to all Trading Participants		
Loss Factor	8.3	There shall be a Site – Specific Loss Factor (SSLF) for every Metering Point, and for every dispatch interval, which represents the adjusted meter data of a Metering Point. The SSLF is a unit-less number that shall be multiplied to the original meter data corresponding to the dispatch interval. The product of the SSLF and the original meter data is the adjusted power or energy of the *Trading Participant* as seen from the MTN.	~~8.3 Loss Factor~~ ~~There shall be a Site – Specific Loss Factor (SSLF) for every Metering Point, and for every dispatch interval, which represents the adjusted meter data of a Metering Point.~~ ~~The SSLF is a unit-less number that~~ shall ~~be multiplied to the original meter data corresponding to the dispatch interval. The product of the SSLF and the original meter~~	The proposed harmonized methodology does not include the use of an SSLF.		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			~~data is the adjusted power or energy of the *Trading Participant* as seen from the MTN.~~			
Scope	8.4	This procedure applies to all Revenue Metering Installations of *Trading Participants* in the *WESM*, where the Metering Point is not physically located at the MTN.	~~8.4~~**3** SCOPE This procedure applies to all Revenue Metering Installations of *Trading Participants* in the *WESM*, where the Metering Point is ~~not~~ physically **located more than 500m from** ~~at~~ the ~~MTN~~ **Connection Point as determined by the *Metering Services Provider***.	In view of the amendment to Clause 3.2.2.2(c) of the WESM Rules under DOE DC2018-05-0015, it is proposed that SSLA only be applied if the metering point is more than the prescribed distance of 500 meters from the connection point. The MSP will determine the list of Trading Participants that will be subject to the application of SSLA. Re-numbered with the deletion of Section 8.3		
WESM MEMBERS INVOLVED IN PERFORMING SSLA	8.5	8.5 XXX	8.~~5~~**4** XXX	Re-numbered with the deletion of Section 8.3		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
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ROLES AND RESPONSIBILITIES	8.6	8.6. Roles and Responsibilities The involvement of the *Metering Services Provider, Network Service Providers* and *Trading Participants* are as follows: 8.6.1. Network Service Provider: 8.6.1.1. The *Network Service Provider* shall submit to the *Market Operator* every six months all significant conductor and power transformer data between the metering point and the market trading node and as often as it implements significant changes in the actual physical configuration of the conductor and power transformer between the metering point and the market trading node. a. Conductor Data i. Conductor size ii. Conductor Type iii. Number of conductors per circuit iv. Line Length (km) v. Line Voltage vi. Line Configuration b. Power Transformer Data i. Rated kVA ii. Core Loss (Open Circuit Test result)	8.6**5**. Roles and Responsibilities The involvement of the *Metering Services Provider, Network Service Providers* and *Trading Participants* are as follows: 8.6**5**.1. Network Service Provider: 8.6**5**.1.1. The *Network Service Provider* shall submit to the ***Metering Services Provider*** ~~*Market Operator*~~ **all data necessary in the preparation of the following information that may affect the SSLA computation** ~~every six months all significant conductor and power transformer data between the metering point and the market trading node and~~ **not later than 20 calendar days, upon implementation** of ~~as often as it implements significant changes~~ **modification** in the actual physical configuration of the conductor and power transformer between the metering point and the ~~market trading node~~ **Connection Point:** **a. Transformer Resistance, R (ohms)**	Prescribed timelines for the submission of data from the NSP to the MSP which are necessary in the preparation of information that affect the computation of SSLA. Re-numbered with the deletion of Section 8.3		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
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		iii. Full-load Copper Loss (Short-Circuit Test result) iv. Percent Impedance (% Z) v. xr ratio 8.6.1.2. In coordination with the *Metering Services Provider,* single-line diagrams that show the significant changes in the actual physical configuration of the conductor and power transformer shall also be submitted by the Network Service Provider(s) to the Market Operator. Significant changes refer to any changes in the network data as provided in Section 8.6.1.1. 8.6.2 Metering Services Provider:	**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** ~~a. Conductor Data~~ ~~i. Conductor size~~ ~~ii. Conductor Type~~ ~~iii. Number ofs conductors per circuit~~ ~~iv. Line Length (km)~~ ~~v. Line Voltage~~ ~~vi. Line Configuration~~ ~~b. Power Transformer Data~~ ~~i. Rated kVA~~ ~~ii. Core Loss (Open Circuit Test result)~~ ~~iii. Full-load Copper Loss (Short-Circuit Test result)~~ ~~iv. Percent Impedance (% Z)~~			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
		The *Metering Services Provider* shall submit to the *Market Operator* the meter data containing the daily energy consumption or delivery of all *Trading Participants.*	~~v. *xr* ratio~~ ~~8.6.1.2. In coordination with the *Metering Services Provider*, single-line diagrams that show the significant changes in the actual physical configuration of the conductor and power transformer shall also be submitted by the Network Service Provider(s) to the Market Operator.~~ ~~Significant changes refer to any changes in the network data as provided in Section 8.6.1.1.~~ 8.6~~5~~.2. Metering Service**s** 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**			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			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 **not later than 10 calendar days** the meter data **~~not later than 10 calendar days~~ 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*** ~~containing the daily energy consumption or delivery of all Trading Participants~~.			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
ROLES AND RESPONSIBILITIES – Trading Participant	8.6.3	8.6.3 Trading Participant: The *Trading Participant*, in coordination with the *Network Service Provider*, shall submit to the *Market Operator* 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. The *Trading Participant* shall submit the same type of data stated in Section 8.6.1.	8.6**5**.3 Trading Participant: The *Trading Participant* ~~, in coordination with the *Network Service Provider*, shall submit to the *Market Operator*~~ **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. ~~The *Trading Participant* shall submit the same type of data stated in Section 8.6.1.~~	Since the MSP is responsible for installing the meter and will make the decision on its location, it is proposed that the MSP provide the relevant inputs for the calculation of the SSLA. It is proposed that the trading participant ensure the submission of the required data. Re-numbered with the deletion of Section 8.3		
ROLES AND RESPONSIBILITIES – Market Operator	8.6.4.1	8.6.4 Market Operator 8.6.4.1 The *Market Operator* shall reconcile the data submitted by the *Network Service Provider*, *the Metering Services Provider*, and the *Trading Participant*. The reconciled data shall be agreed by the *Market Operator, Network Service Provider* and the *Trading Participants*. The *Market Operator* shall use the reconciled data	8.6**5**.4 Market Operator 8.6**5.**4.1 The *Market Operator* shall ~~reconcile the data submitted by the *Network Service Provider*, *the Metering Services Provider*, and the *Trading Participant*. The reconciled data shall be agreed by the *Market Operator, Network Service Provider* and the *Trading Participants*~~ **use**	Since the MSP is responsible for installing the meter and will make the decision on its location, it is proposed that the MSP be included in the determination of the data to be used for the calculation of the SSLA of trading participants. For clarity of process during conductor or power transformer data discrepancy.		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
		starting on the current billing month only, then progressively for the succeeding billing months until a new conductor and power transformer data is submitted. 8.6.4.2 XXX 8.6.4.3 XXX	**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 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. 8.6~~6~~**5**.4.2 XXX 8.6~~6~~**5**.4.3 XXX	Re-numbered with the deletion of Section 8.3		
Site Specific Loss Factor Calculation	8.7	8.7 Site Specific Loss Factor Calculation	8.7~~6~~ Site Specific Loss ~~Factor~~ **Adjustment** Calculation 8.7~~6~~.1 XXX	The proposed harmonized methodology does not include the use of an SSLF. Re-numbered with the deletion of Section 8.3		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
SITE SPECIFIC LOSS FACTOR CALCULATION – Historical Load Share	8.7.2	8.7.2. Historical Load Share Historical Load Share (HLS) is the fraction or ratio of a *metering point's* total energy, against the total energy of all *metering points* under the same transformer. The HLS for the current billing month shall be based on the energy of the last twelve (12) billing months.	~~8.7.2. Historical Load Share~~ ~~Historical Load Share (HLS) is the fraction or ratio of a *metering point's* total energy, against the total energy of all *metering points* under the same transformer. The HLS for the current billing month shall be based on the energy of the last twelve (12) billing months.~~	With the designation of connection points as market trading nodes, transmission facilities will not be shared by multiple metering points for the purpose of SSLA calculation. In view of this, loss sharing will not be performed anymore.		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
SITE SPECIFIC LOSS FACTOR CALCULATION – Loss Sharing	8.7.3	8.7.3. Loss Sharing 8.7.3.1. In cases where a single transformer supplies power to multiple *metering points*, the Transformer Load Loss and No-load Loss (e.g. Core loss) shall be shared by all meters proportionately according to: a. the energy consumed from each metering point, for the No-load Loss b. the accumulated energy as each *metering point* reaches the Transformer, for the Load Loss 8.7.3.2. If a meter registers a zero value, Loss Share shall be based on the Historical Load Share. 8.7.3.3. In cases where a line is shared among multiple metering points, the losses across the line shall	~~8.7.3. Loss Sharing~~ ~~8.7.3.1. In cases where a single transformer supplies power to multiple *metering points*, the Transformer Load Loss and No-load Loss (e.g. Core loss) shall be shared by all meters proportionately according to:~~ ~~a. the energy consumed from each metering point, for the No-load Loss~~ ~~b. the accumulated energy as each *metering point* reaches the Transformer, for the Load Loss~~ ~~8.7.3.2. If a meter registers a zero value, Loss Share shall be based on the~~	With the designation of connection points as market trading nodes, transmission facilities will not be shared by multiple metering points for the purpose of SSLA calculation. In view of this, loss sharing will not be performed anymore.		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
		be shared by all meters proportionately according to the energy consumed from each metering point plus the accumulated losses of each metering point before the line being shared.	~~Historical Load Share.~~ ~~8.7.3.3. In cases where a line is shared among multiple metering points, the losses across the line shall be shared by all meters proportionately according to the energy consumed from each metering point plus the accumulated losses of each metering point before the line being shared.~~			
SITE SPECIFIC LOSS FACTOR CALCULATION	8.7.4	Detailed loss calculations for sample cases are included in the Appendix of this Manual under "Site Specific Loss Adjustment"	**8**~~.7.4~~**6.2** Detailed loss calculations for sample cases are included in the Appendix of this Manual under "Site Specific Loss Adjustment"	Re-numbering with the proposed removal of Sections 8.3, 8.7.2 and 8.7.3.		
PROCEDURAL STEPS FOR SSLA	8.8	8.8 PROCEDURAL STEPS FOR SSLA XXX	~~8.8 PROCEDURAL STEPS FOR SSLA~~ ~~XXX~~	The procedural steps for SSLA is proposed to be deleted to provide flexibility on the detailed processes involved. The detailed processes are reflected in the		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
				internal business process being maintained by the market operator.		
Performance Standards	9.5	Performance Standards	Performance Standards	▪ The revision is being proposed to provide a more reflective measure of the important deliverables of the MSP as far as monthly billing and settlement in the WESM is concerned. The re-allocation in the percent weight would provide more emphasis on the parameters which are relatively significant in the billing and settlement process which is the end goal of an effective metering services. ▪ In reference to RCC-RESO-19-10 (19 July 2019)		

Annex B

<table>
<tr><th colspan="6">WESM Manual on Metering Standards and Procedures Issue 12.0</th></tr>
<tr><th>Title</th><th>Clause</th><th>Provision</th><th>Proposed Amendment</th><th>Rationale</th><th>Stakeholder Comments / Revisions</th><th>Stakeholder Rationale</th></tr>
<tr>
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<table>
<tr><th>Performance Indicator</th><th>Category</th><th>Performance Measures</th><th>Percent Weight</th><th>Percent Passing</th></tr>
<tr><td>Service Delivery</td><td>Daily Meter Data Delivery</td><td>Number of metering installations successfully retrieved</td><td>25</td><td>95</td></tr>
<tr><td></td><td>Integrity of Meter Data</td><td>Meter Data that passed the validation processes</td><td>25</td><td>95</td></tr>
<tr><td></td><td>Timeliness and Percentage Resolution to the Daily Meter Trouble Report</td><td>Resolution to the Meter Trouble Report within 10 calendar days</td><td>15</td><td>90</td></tr>
<tr><td></td><td>Timeliness and Percentage Resolution to the Monthly Meter Trouble Report</td><td>Resolution to the Meter Trouble Report within 2 business days</td><td>10</td><td>90</td></tr>
<tr><td></td><td>Timeliness of Monthly Meter Data Delivery</td><td>Complete delivery of all meter data within 3 calendar days after the billing period.</td><td>15</td><td>100</td></tr>
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<tr><th>Performance Indicator</th><th>Category</th><th>Performance Measures</th><th>Percent Weight</th><th>Percent Passing</th></tr>
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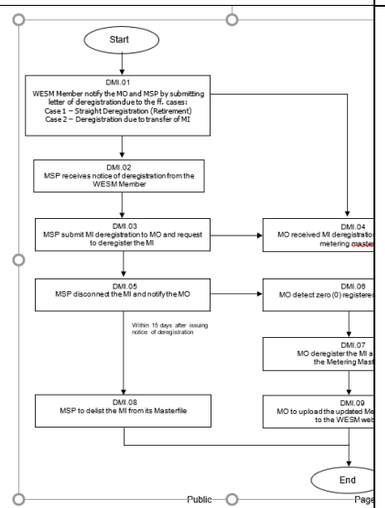
Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
Metering De-registration	10.0	10.3 Timeline for De-Registration The Metering Service Provider shall issue a notification to the Market Operator when de-registering a metering installation within the 15-day period before its 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.	10.3 Timeline for De-Registration The Metering Service 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.	▪ The revision is being proposed for the inclusion of de-registration in the provision since not all de-registration requires actual disconnection In the case of totalization of metering facilities, the metered trading participants have the option to retain the downstream metering facilities, subject to MSP charge, to serve as check metering facilities. ▪ In reference to RCC-RESO-19-10 (19 July 2019)		
Metering De-registration	10.0	10.5 Workflow for De-Registration of Metering Installation	10.5 Workflow for De-Registration of Metering Installation **(See attached Workflow)**	▪ To recommend deletion of steps involving the WESM Member initiating request for de-registration of MI. The MSP shall represent the WESM Member in the de-registration process (same as in the registration process in Section 4) Transactions between the WESM Member and the MSP is covered by Metering Service Agreements (MSA).		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
				▪ In reference to RCC-RESO-19-10 (19 July 2019) ▪		
Metering De-registration	10.0	10.6 Procedural Steps for De-Registration of Metering Installation **10.6 PROCEDURAL STEPS FOR DE-REGISTRATION OF METERING INSTALLATION** **Ref.** / **Task Name** / **Task Detail** / **When** / **Method** DMI.01 / WESM Member request to deregister its MI / WESM Member notify the MSP and MO by submitting letter of deregistration due to the fl. cases: Case 1 – Straight Deregistration (Retirement) Case 2 – Deregistration due to transfer of MI / WESM Member decided to deregister its MI / By e-mail, courier or fax and official letter address to MSP and MO DMI.02 / MSP receives notice of deregistration / WESM Member sends notice of deregistration to the MSP. Reason of deregistration must be specified in the notice / WESM Member sends notice of deregistration to MSP / By e-mail, courier or fax and official letter address to MSP DMI.03 / MSP submit MI deregistration to MO and request to deregister the MI / MSP sends MI deregistration letter to MO containing the reason of deregistration and other pertinent details / After DMI.02 / By e-mail, courier or fax and official letter address to MO	10.6 Procedural Steps for De-Registration of Metering Installation **(See attached Procedural Steps)**	▪ To provide detailed steps consistent with the proposed revisions on the workflow for de-registration ▪ In reference to RCC-RESO-19-10 (19 July 2019)		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
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		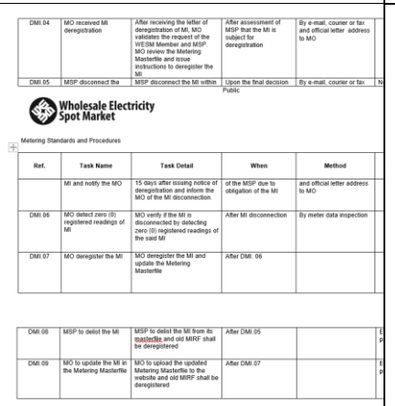				
Appendices	Appendix C	*Clause 4.4.3 If a Trading Participant is a Customer and also a Network Service Provider, the Trading Participant may register as a Metering Services Provider only for connection points that it does not own.*	Clause 4.4.3 If a Trading Participant is a Customer and also a Network Service Provider, the Trading Participant may register as a Metering Services Provider only for connection points that it does not own. **<u>If there are no other party interested, capable and legally authorized to assume the role of the Metering Services Provider, the Network Service Provider may be permitted to act as the MSP provided that it has a valid Certificate of Authority as WESM MSP granted by the ERC</u>**	▪ To provide an option in case there are no willing, capable and ERC Certified MSP which can assume the role ▪ In reference to RCC-RESO-19-10 (19 July 2019) ▪		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
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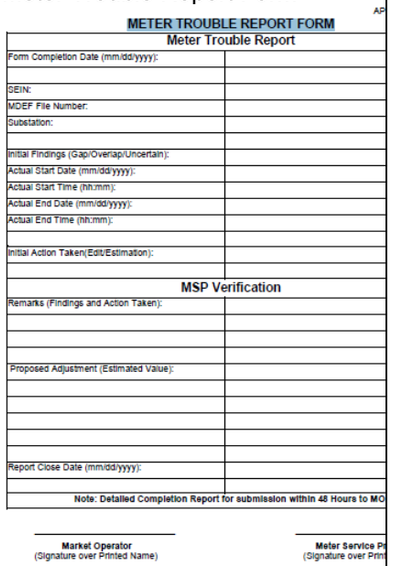
Appendices	Appendix F	Meter Trouble Report Form  METER TROUBLE REPORT FORM Meter Trouble Report Form Completion Date (mm/dd/yyyy): SEIN: MDEF File Number: Substation: Initial Findings (Gap/Overlap/Uncertain): Actual Start Date (mm/dd/yyyy): Actual Start Time (hh:mm): Actual End Date (mm/dd/yyyy): Actual End Time (hh:mm): Initial Action Taken(Edit/Estimation): MSP Verification Remarks (Findings and Action Taken): Proposed Adjustment (Estimated Value): Report Close Date (mm/dd/yyyy): Note: Detailed Completion Report for submission within 48 Hours to MO Market Operator (Signature over Printed Name)	**(see attached Appendix F)**	▪ To update the old Meter Trouble Report Form ▪ In reference to RCC-RESO-19-10 (19 July 2019)		
Site – Specific Loss Adjustment	Appendix K	A. General Equations The following are the equations to be used for calculating the Site Specific Loss Factor (SSLF): $Line_{kW\text{-}Loss} = (I_{Line})\ 2 * R_{Line} \div 1000$ $R_{Line} = r_a * L$ $Line_{kVar\text{-}Loss} = (I_{Line})\ 2 * X_{Line} \div 1000$	A. General Equations The following are the equations to be used for performing ~~calculating~~ the Site Specific Loss ~~Factor~~ **Adjustment** (SSL~~F~~**A**): ~~$Line_{kW\text{-}Loss} = (I_{Line})\ 2 * R_{Line} \div 1000$~~ ~~$R_{Line} = r_a * L$~~	The revisions are being proposed to harmonize the WESM's calculation of the Site-Specific Loss Adjustment with the method of NGCP in determining point-to-point losses		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
		$X_{Line} = X_l * L$ $Transformer_{kW\text{-}Loss} = kW_{meter} * \%\ Transformer_{Loss}$ $Total_{kW\text{-}Loss} = Line_{kW\text{-}Loss} + Transformer_{kW\text{-}Loss}$ $SSLF = 1 + (Total_{kW\text{-}Loss} \div kW_{Meter})$ $Adjusted_{kW} = SSLF * kW_{Meter} = Total_{kW\text{-}Loss} + kW_{Meter}$ $Adjusted_{kWh} = Adjusted_{kW} * t$ Where: kW_{Meter}: active power derived from the meter registration I_{Line}: current (Ampere) along the line $Line_{kW\text{-}Loss}$: the active loss (kW) along the line	~~$Line_{kVar\text{-}Loss} = (I_{Line})\ 2 * X_{Line} \div 1000$~~ ~~$X_{Line} = X_l * L$~~ ~~$Transformer_{kW\text{-}Loss} = kW_{meter} * \%\ Transformer_{Loss}$~~ ~~$Total_{kW\text{-}Loss} = Line_{kW\text{-}Loss} + Transformer_{kW\text{-}Loss}$~~ ~~$SSLF = 1 + (Total_{kW\text{-}Loss} \div kW_{Meter})$~~ ~~$Adjusted_{kW} = SSLF * kW_{Meter} = Total_{kW\text{-}Loss} + kW_{Meter}$~~ ~~$Adjusted_{kWh} = Adjusted_{kW} * t$~~ ~~Where:~~			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
		$Line_{kVar\text{-}Loss}$: the reactive loss (kVar) along the line R_{Line}: total resistance (ohm) of the line X_{Line}: total inductive reactance (ohm) of the line r_a: resistance per unit length (ohm/km) of the line X_l: total inductive reactance per unit length (ohm/km) of the line L: total line length (km) $Transformer_{kW\text{-}Loss}$: total loss (kW) in the transforme r $Total_{kW\text{-}Loss}$: total active loss (kW) for a metering point $kW_{CoreLoss}$: constant loss (kW) from the open-circuit test	~~kW_{Meter}: active power derived from the meter registration~~ ~~I_{Line}: current (Ampere) along the line~~ ~~$Line_{kW\text{-}Loss}$: the active loss (kW) along the line~~ ~~$Line_{kVar\text{-}Loss}$: the reactive loss (kVar) along the line~~ ~~R_{Line}: total resistance (ohm) of the line~~ ~~X_{Line}: total inductive reactance (ohm) of the line~~ ~~r_a: resistance per unit length (ohm/km) of the line~~ ~~X_l: total inductive reactance per unit length (ohm/km) of the line~~ ~~L: total line length (km)~~ ~~$Transformer_{kW\text{-}Loss}$: total loss (kW) in the~~			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
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		Adjusted$_{kW}$: adjusted (kW) active power SSLF: Site – Specific Loss Factor	~~transformer~~ ~~Total$_{kW\ Loss}$: total active loss (kW) for a metering point~~ ~~kW$_{CoreLoss}$: constant loss (kW) from the open-circuit test~~ ~~Adjusted$_{kW}$: adjusted (kW) active power~~ ~~SSLF: Site – Specific Loss Factor~~ **Calculation of Line Losses** $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$ $pf = \frac{kW_{Meter}}{\sqrt{(kW_{Meter})^2 + (kVAR_{Meter})^2}}$			

Annex B

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<tr><td></td><td></td><td></td><td>

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

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

Calculation of Transformer Losses:

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

<table>
<tr><th>pacity (kVA)</th><th>Percent Transfo
Loss ~~Factor~~ (%</th></tr>
<tr><td>1000</td><td>1.9</td></tr>
<tr><td>2000</td><td>1.8</td></tr>
<tr><td>3000</td><td>1.7</td></tr>
<tr><td>4000</td><td>1.6</td></tr>
<tr><td>5000</td><td>1.5</td></tr>
<tr><td>10000</td><td>1.4</td></tr>
</table>

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

When translating power (and energy) metered at the

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Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
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			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:** $kW_{S-Meter} = kW_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $kVAR_{S-Meter} = kVAR_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
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			$Transformer_{kW-Loss} = kW_{Meter} - kW_{S-Meter}$ **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:**			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			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			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
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			$kW_{P-Meter}$ = 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			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
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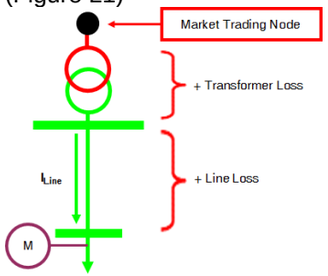
Site – Specific Loss Adjustment	Appendix K	B. Cases for Loss Calculation (Customer) Customer Case 1: A metering point is located after the market trading node (Figure L1)  Figure L1 $Line_{kW\text{-}Loss} = (I_{Line})^2 * R_{Line}$ $R_{Line} = r_a * L$ $Line_{kVar\text{-}Loss} = (I_{Line})^2 * X_{Line}$ $X_{Line} = X_l * L$ $Transformer_{kW\text{-}Loss} = kW_{Mi} * \%Transformer_{Loss}$ $Total_{kW\text{-}Loss} = Line_{kW\text{-}Loss} + Transformer_{kW\text{-}Loss}$ SSLF = 1 + ($Total_{kW\text{-}Loss}$ + kW_{Mi}) [*Note: $Total_{kW\text{-}Loss}$ and*	B. Cases for Loss Calculation ~~(Customer)~~ **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 ~~metering~~ ***connection point*** is located ~~after~~ before the metering point ~~market trading node~~ (Figure L1 **and G1**) **(In this case, the line current initially passes through the *connection point*, then the metering point)**			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
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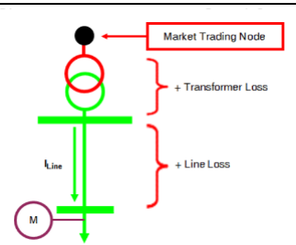
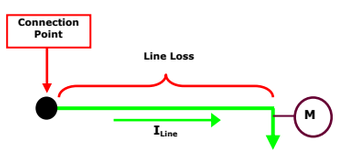
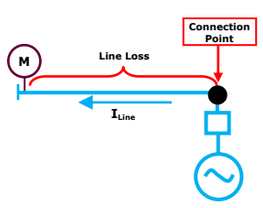
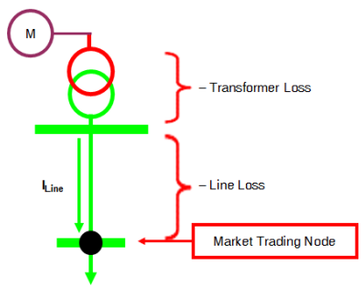
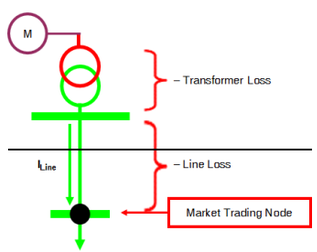
		kW_{Mi} will have positive values in this case] $Adjusted_{kW}$ = $Total_{kWLoss}$ + kW_{Mi} = SSLF * kW_{Mi} $Adjusted_{kWh}$ = $Adjusted_{kW}$ * t	 Figure L1 **a. Loads:**  Figure L1 **b. *Generators*:**  Figure G1			

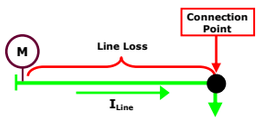
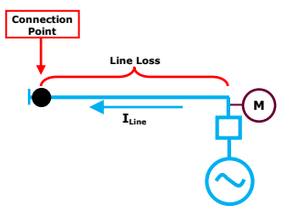
Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			~~$Line_{kW\text{-}Loss} = (I_{Line})^2 * R_{Line}$~~ ~~$R_{Line} = r_a * L$~~ ~~$Line_{kVar\text{-}Loss} = (I_{Line})^2 * X_{Line}$~~ ~~$X_{Line} = X_i * L$~~ ~~$Transformer_{kW\text{-}Loss} = kW_{Mi} * \%Transformer_{Loss}$~~ ~~$Total_{kW\text{-}Loss} = Line_{kW\text{-}Loss} + Transformer_{kW\text{-}Loss}$~~ ~~$SSLF = 1 + (Total_{kW\text{-}Loss} + kW_{Mi})$~~ ~~[*Note: $Total_{kW\text{-}Loss}$ and kW_{Mi} will have positive values in this case*]~~ ~~$Adjusted_{kW} = Total_{kWLoss} + kW_{Mi}$~~ ~~$= SSLF * kW_{Mi}$~~ ~~$Adjusted_{kWh} = Adjusted_{kW} * t$~~ $$kW_{Meter} = \frac{kWh_{Meter}}{t}$$ $$kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$$ $$pf = \frac{kW_{Meter}}{\sqrt{(kW_{Meter})^2 + (kVAR_{Meter})^2}}$$			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			$$I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$$ $$Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$$ $$Total_{kW-Loss} = Line_{kW-Loss}$$ $$Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$$ $$Adjusted_{kWh} = Adjusted_{kW} \times t$$			
Site – Specific Loss Adjustment	Appendix K	Case 2: A *metering point* is located before the *market trading node* (Figure L2)  Figure L2 $Line_{kW-Loss} = (I_{Line})^2 * R_{Line}$ $R_{Line} = r_a * L$	Case 2: A ~~metering~~ ***connection*** point is located ~~before~~ after the *metering point* ~~*market trading node*~~ (Figure L2 **and G2**) **(In this case, the line current initially passes through the metering point then the *connection point*)**  Figure L2			

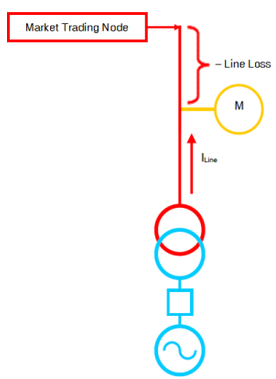
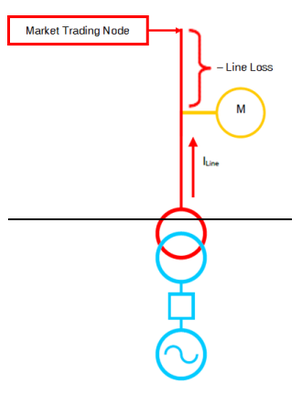
Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
		$Line_{kVar\text{-}Loss} = (I_{Line})^2 * X_{Line}$ $X_{Line} = X_l * L$ $Transformer_{kW\text{-}Loss} = kW_{Mi} * \%Transformer_{Loss}$ $Total_{kW\text{-}Loss} = Line_{kW\text{-}Loss} + Transformer_{kW\text{-}Loss}$ $SSLF = 1 + (Total_{kW\text{-}Loss} + kW_{Mi})$ [*Note: $Total_{kW\text{-}Loss}$ and kW_{Mi} will have negative values in this case*] $Adjusted_{kW} = Total_{kWLoss} + kW_{Mi}$ $= SSLF * kW_{Mi}$ $Adjusted_{kWh} = Adjusted_{kW} * t$	**a. Loads:**  Figure L2 **b. *Generators*:**  Figure G2 ~~$Line_{kW\text{-}Loss} = (I_{Line})^2 * R_{Line}$~~ ~~$R_{Line} = r_a * L$~~ ~~$Line_{kVar\text{-}Loss} = (I_{Line})^2 * X_{Line}$~~ ~~$X_{Line} = X_l * L$~~ ~~$Transformer_{kW\text{-}Loss} = kW_{Mi} * \%Transformer_{Loss}$~~			

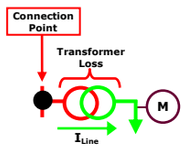
Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			~~$Total_{kW\text{-}Loss} = Line_{kW\text{-}Loss} + Transformer_{kW\text{-}Loss}$~~ ~~$SSLF = 1 + (Total_{kW\text{-}Loss} + kW_{Mi})$~~ ~~[*Note: $Total_{kW\text{-}Loss}$ and kW_{Mi} will have negative values in this case*]~~ ~~$Adjusted_{kW} = Total_{kWLoss} + kW_{Mi}$~~ ~~$= SSLF * kW_{Mi}$~~ ~~$Adjusted_{kWh} = Adjusted_{kW} * t$~~ $$kW_{Meter} = \frac{kWh_{Meter}}{t}$$ $$kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$$ $$pf = \frac{kW_{Meter}}{\sqrt{(kW_{Meter})^2 + (kVAR_{Meter})^2}}$$ $$I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$$ $$Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$$ $$Total_{kW-Loss} = Line_{kW-Loss}$$ $$Adjusted_{kW} = kW_{Meter} - Total_{kW-Loss}$$			

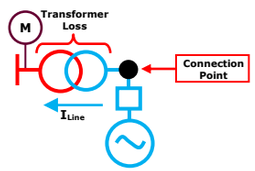
Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			$\boldsymbol{Adjusted_{kWh} = Adjusted_{kW} \times t}$			
Site – Specific Loss Adjustment	Appendix K	B. Cases for Loss Calculation (Customer) Generator Case 1: A *metering point* is located after the *market trading node* (Figure G1)  Figure G1 $Line_{kW\text{-}Loss} = (I_{Line})^2 * R_{Line}$	~~B. Cases for Loss Calculation (Customer)~~ ~~Generator~~ **Transformer Loss Only** Case 1: A ~~metering~~ ***connection*** point is located ~~after~~ before the *metering point* ~~*market trading node*~~ (Figure **L3 and G3**~~G1~~) **(In this case, the line current initially passes through the *connection point* then the metering point)**  Figure G1	The revisions are being proposed to reflect the application of the proposed new SSLA methodology to different cases for Loss calculation in the WESM.		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
		R_{Line} = r_a * L $Line_{kVar\text{-}Loss}$ = $(I_{Line})^2$ * X_{Line} X_{Line} = X_l * L $Transformer_{kW\text{-}Loss}$ = kW_{Mi} * $\%Transformer_{Loss}$ $Total_{kW\text{-}Loss}$ = $Line_{kW\text{-}Loss}$ + $Transformer_{kW\text{-}Loss}$ SSLF = 1 + ($Total_{kW\text{-}Loss}$ + kW_{Mi}) [*Note: $Total_{kW\text{-}Loss}$ and kW_{Mi} will have negative values in this case*] $Adjusted_{kW}$ = $Total_{kWLoss}$ + kW_{Mi} = SSLF * kW_{Mi} $Adjusted_{kWh}$ = $Adjusted_{kW}$ * t	**a. Loads:**  Figure L3 $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kW_{P-Meter} = \frac{kW_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$ $Transformer_{kW-Loss} = kW_{P-Meter} - kW_{Meter}$ $Total_{kW-Loss} = Transformer_{kW-Loss}$ $Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$			

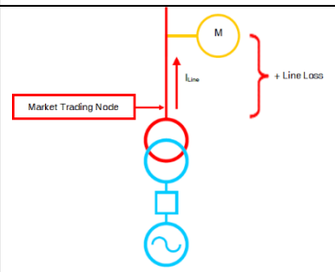
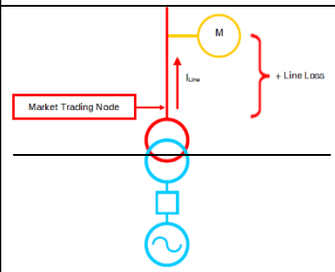
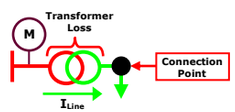
Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			b. *Generators*:  Figure G3 ~~$Line_{kW\ Loss} = (I_{Line})^2 * R_{Line}$~~ ~~$R_{Line} = r_a * L$~~ ~~$Line_{kVar\ Loss} = (I_{Line})^2 * X_{Line}$~~ ~~$X_{Line} = X_i * L$~~ ~~$Transformer_{kW\ Loss} = kW_{Mi} * \%Transformer_{Loss}$~~ ~~$Total_{kW\ Loss} = Line_{kW\ Loss} + Transformer_{kW\ Loss}$~~ ~~$SSLF = 1 + (Total_{kW\ Loss} + kW_{Mi})$ [*Note: $Total_{kW\ Loss}$ and kW_{Mi} will have negative values in this case*]~~ ~~$Adjusted_{kW} = Total_{kWLoss} + kW_{Mi}$~~ ~~$= SSLF * kW_{Mi}$~~ ~~$Adjusted_{kWh} = Adjusted_{kW} * t$~~			

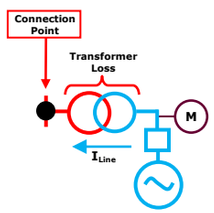
Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			$\boldsymbol{kW_{Meter} = \frac{kWh_{Meter}}{t}}$ $\boldsymbol{kW_{P-Meter} = \frac{kW_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}}$ $\boldsymbol{Transformer_{kW-Loss} = kW_{P-Meter} - kW_{Meter}}$ $\boldsymbol{Total_{kW-Loss} = Transformer_{kW-Loss}}$ $\boldsymbol{Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}}$ $\boldsymbol{Adjusted_{kWh} = Adjusted_{kW} \times t}$			
Site – Specific Loss Adjustment	Appendix K	Case 2: A *metering point* is located before the *market trading node* (Figure G2)	Case 2: A ~~metering~~ ***connection*** point is located ~~before~~ after the *metering point* ~~*market trading node*~~ (Figure **L4 and G4**~~G2~~) **(In this case, the line current initially passes through the metering point then the *connection point*)**	The revisions are being proposed to reflect the application of the proposed new SSLA methodology to different cases for loss calculation in the WESM.		

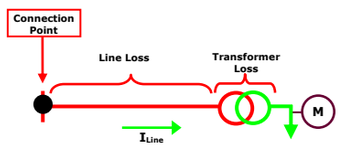
Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
		 Figure G2 $Line_{kW\text{-}Loss} = (I_{Line})^2 * R_{Line}$ $R_{Line} = r_a * L$ $Line_{kVar\text{-}Loss} = (I_{Line})^2 * X_{Line}$ $X_{Line} = X_l * L$ $Transformer_{kW\text{-}Loss} = kW_{Mi} * \%Transformer_{Loss}$ $Total_{kW\text{-}Loss} = Line_{kW\text{-}Loss} + Transformer_{kW\text{-}Loss}$ SSLF = 1 + ($Total_{kW\text{-}Loss} + kW_{Mi}$) [*Note: $Total_{kW\text{-}Loss}$ and kW_{Mi} will have positive values in this case*] $Adjusted_{kW} = Total_{kWLoss} + kW_{Mi}$ $= SSLF * kW_{Mi}$ $Adjusted_{kWh} = Adjusted_{kW} * t$	 Figure G2 **a. Loads:**  Figure L4 $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kW_{S-Meter} = kW_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $Transformer_{kW-Loss} = kW_{Meter} - kW_{S-Meter}$ $Total_{kW-Loss} = Transformer_{kW-Loss}$			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			$Adjusted_{kW} = kW_{Meter} - Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$ **b. *Generators*:**  Figure G4 $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kW_{S-Meter} = kW_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $Transformer_{kW-Loss} = kW_{Meter} - kW_{S-Meter}$ $Total_{kW-Loss} = Transformer_{kW-Loss}$ $Adjusted_{kW} = kW_{Meter} - Total_{kW-Loss}$			

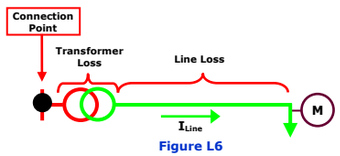
Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			$Adjusted_{kWh} = Adjusted_{kW} \times t$			
Site – Specific Loss Adjustment	Appendix K	N/A	**<u>Line Loss and Transformer Loss</u>** **<u>Case 1: A *connection point* is located before the *metering point* (Figure L5, L6, G5 and G6) (In this case, the line current initially passes through the *connection point* then the metering point)</u>** **<u>a. Loads: (Metering Point at the Transformer)</u>**  Figure L5 $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$	Provide new sample cases		

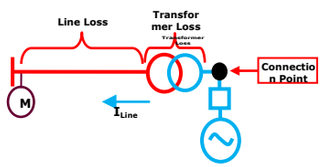
Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			$$kW_{P-Meter} = \frac{kW_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$$ $$kVAR_{P-Meter} = \frac{kVAR_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$$ $$Transformer_{kW-Loss} = kW_{P-Meter} - kW_{Meter}$$ $$pf = \frac{kW_{P-Meter}}{\sqrt{(kW_{P-Meter})^2 + (kVAR_{P-Met}}}$$ $$I_{Line} = \frac{kW_{P-Meter}}{\sqrt{3} \times V_{Rated} \times pf}$$ $$Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$$ $$Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$$ $$Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$$ $$Adjusted_{kWh} = Adjusted_{kW} \times t$$			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			b. Loads: (*Connection Point* at the Transformer)  Figure L6 $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$ $pf = \frac{kW_{Meter}}{\sqrt{(kW_{Meter})^2 + (kVAR_{Meter})^2}}$ $I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$ $Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$ $kW'_{Meter} = kW_{Meter} + Line_{kW-Loss}$ **(Note: For this case, $kW'_{Meter} = kW_{S-Meter}$)**			

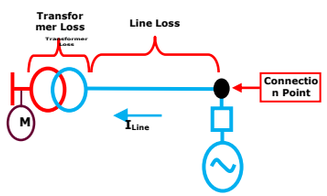
Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			$$kW_{P-Meter} = \frac{kW_{S-Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$$ $$Transformer_{kW-Loss} = kW_{P-Meter} - kW_{S-Meter}$$ $$Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$$ $$Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$$ $$Adjusted_{kWh} = Adjusted_{kW} \times t$$ **c. Generators: (*Connection Point* at the Transformer)**  Figure G5			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			$kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$ $pf = \frac{kW_{Meter}}{\sqrt{(kW_{Meter})^2 + (kVAR_{Meter})^2}}$ $I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$ $Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$ $kW'_{Meter} = kW_{Meter} + Line_{kW-Loss}$ **(Note: For this case,** $kW'_{Meter} = kW_{S-Meter}$**)** $kW_{P-Meter} = \frac{kW_{S-Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$ $Transformer_{kW-Loss} = kW_{P-Meter} - kW_{S-Meter}$ $Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$			

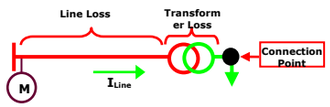
Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			$Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$ **d. Generators: (Metering Point at the Transformer)**  Figure G6 $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$ $kW_{P-Meter} = \frac{kW_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$ $kVAR_{P-Meter} = \frac{kVAR_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$			

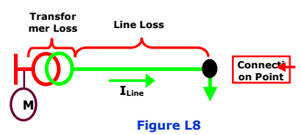
Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			$$Transformer_{kW-Loss} = kW_{P-Meter} - kW_{Meter}$$ $$pf = \frac{kW_{P-Meter}}{\sqrt{(kW_{P-Meter})^2 + (kVAR_{P-Met}}$$ $$I_{Line} = \frac{kW_{P-Meter}}{\sqrt{3} \times V_{Rated} \times pf}$$ $$Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$$ $$Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$$ $$Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$$ $$Adjusted_{kWh} = Adjusted_{kW} \times t$$ **Case 2: A *connection point* is located after the *metering point* (Figure L7, L8, G7 and G8) (In this case, the line current initially passes through the metering point then the *connection point*)**			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			a. Loads: (*Connection Point* at the Transformer)  Figure L7 $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$ $pf = \frac{kW_{Meter}}{\sqrt{(kW_{Meter})^2 + (kVAR_{Meter})^2}}$ $I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$ $Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$ $kW'_{Meter} = kW_{Meter} - Line_{kW-Loss}$ **(Note: For this case, $kW'_{Meter} = kW_{P-Meter}$)**			

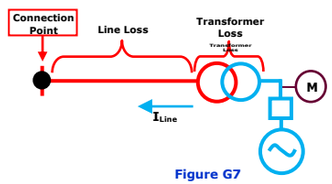
Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			$kW_{S-Meter} = kW_{P-Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $Transformer_{kW-Loss} = kW_{P-Meter} - kW_{S-Meter}$ $Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$ $Adjusted_{kW} = kW_{Meter} - Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$ **b. Loads: (Metering Point at the Transformer)**  Figure L8 $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$			

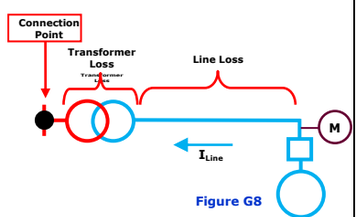
Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			$$kW_{S-Meter} = kW_{Meter}\left(1 - \frac{\%Transformer_{Loss}}{100}\right)$$ $$kVAR_{S-Meter} = kVAR_{Meter}\left(1 - \frac{\%Transformer_{Loss}}{100}\right)$$ $$Transformer_{kW-Loss} = kW_{Meter} - kW_{S-Meter}$$ $$pf = \frac{kW_{S-Meter}}{\sqrt{(kW_{S-Meter})^2 + (kVAR_{S-Mete}}$$ $$I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$$ $$Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$$ $$Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$$ $$Adjusted_{kW} = kW_{Meter} - Total_{kW-Loss}$$ $$Adjusted_{kWh} = Adjusted_{kW} \times t$$			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			c. Generators: (Metering Point at the Transformer)  Figure G7 $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$ $kW_{S-Meter} = kW_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $kVAR_{S-Meter} = kVAR_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $Transformer_{kW-Loss} = kW_{Meter} - kW_{S-Meter}$			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			$$pf = \frac{kW_{S-Meter}}{\sqrt{(kW_{S-Meter})^2 + (kVAR_{S-Mete}}$$ $$I_{Line} = \frac{kW_{S-Meter}}{\sqrt{3} \times V_{Rated} \times pf}$$ $$Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$$ $$Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$$ $$Adjusted_{kW} = kW_{Meter} - Total_{kW-Loss}$$ $$Adjusted_{kWh} = Adjusted_{kW} \times t$$ **d. *Generators*: (*Connection Point* at the Transformer)**  Figure G8			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			$kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$ $pf = \frac{kW_{Meter}}{\sqrt{(kW_{Meter})^2 + (kVAR_{Meter})^2}}$ $I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$ $Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$ $kW'_{Meter} = kW_{Meter} - Line_{kW-Loss}$ **(Note: For this case,** $kW'_{Meter} = kW_{P-Meter}$**)** $kW_{S-Meter} = kW_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $Transformer_{kW-Loss} = kW_{P-Meter} - kW_{S-Meter}$ $Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$			

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
			$\boldsymbol{Adjusted_{kW} = kW_{Meter} - Total_{kW-Loss}}$ $\boldsymbol{Adjusted_{kWh} = Adjusted_{kW} \times t}$			
SPECIFICATIONS FOR CURRENT TRANSFORMERS Burden	Appendix N	Shall not exceed the rated burden limit of 12.5 VA for the IEC 44-1 Class 0.2 /ANSI C57.13 Class 0.3 (see Table 1)	**Shall be based on the standard rated burden as specified in the latest revision of IEC 61869-2 or ANSI/IEEE C57.13, or their latest equivalent standards.**	To consider the latest revision of International Standard IEC 61869-2 (2012) which cancels and replaces the first edition of IEC 60044-1 published in 1996 and to update the term “ANSI” to “IEEE”. Installation of a higher accuracy and functionality than the standards set by the PGC and WESM and its conformance to IEC and IEEE standards are supported by Sections 2.1.1 and 2.5.4.1 of WESM Metering Standards and Procedures which is also consistent with PEMC-TC’s opinion issued last April 2019 to Mactan Electric Corp. in which “the TC is of the opinion that the specifications of MECO’s current transformer comply with the metering accuracy class of 0.3 as well as the rated burden of B-1 (25VA), which is higher and therefore better than the burden		

Annex B

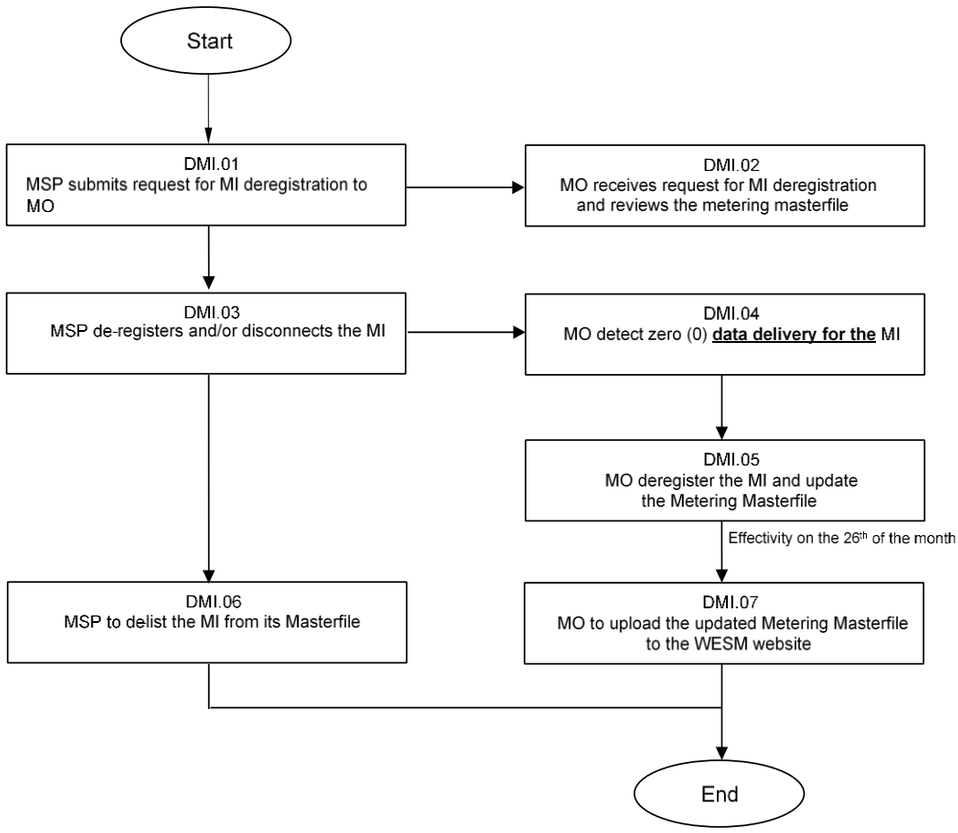
WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
				B-0.2 (5VA) specified in PGC Appendix 2." Refer to the attached letter (Annex "A"). Refer also to the attached Factory Test Reports (FAT) and MERALCO acceptance tests that certifies that the CT maintains its accuracy within specified limits when tested at different primary current and burden. Factory Test Reports (FAT) also certifies that it conforms to IEC 61869-1, IEC 61869-2 and IEEE C57.13 Standard requirements. The rules change should also be reflected in the WESM Metering Standards and Procedures Issue 12.0, Appendix "N".		
SPECIFICATIONS FOR TRANSMISSION REVENUE METERS	APPENDIX L	[See pages 70-74 of this Annex]	[See pages 70-74 of this Annex]	Document Reference for consistency with the Philippine Grid Code 2016 Edition		
SPECIFICATIONS FOR REVENUE METERS FOR EMBEDDED GENERATORS	APPENDIX M	[See pages 74-77 of this Annex]	[See pages 74-77 of this Annex]	Document Reference for consistency with the Philippine Distribution Code 2016 Edition		

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0						
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**	**Stakeholder Comments / Revisions**	**Stakeholder Rationale**
REGISTERED AS WESM PARTICIPANTS						
SPECIFICATIONS FOR CURRENT TRANSFORMERS	APPENDIX N	[See pages 77-78 of this Annex]	[See pages 77-78 of this Annex]	Document Reference for consistency with the Philippine Grid Code 2016 Edition		
SPECIFICATIONS FOR VOLTAGE TRANSFORMERS	APPENDIX O	[See pages 78-80 of this Annex]	[See pages 78-80 of this Annex]	Document Reference for consistency with the Philippine Grid Code 2016 Edition		

Annex B

Workflow for De-Registration of Metering Installation



Annex B

Procedural Steps for De-Registration of Metering Installation

Ref.	Task Name	Task Detail	When	Method	Completion Events
~~DMI.01~~	~~WESM Member request to deregister its MI~~	~~WESM Member notify the MSP and MO by submitting letter of deregistration due to the ff. cases:~~ ~~Case 1 – Straight Deregistration (Retirement)~~ ~~Case 2 – Deregistration due to transfer of MI~~	~~WESM Member decided to deregister its MI~~	~~By e-mail, courier or fax and official letter address to MSP and MO~~	~~Notice to MSP and MO~~
~~DMI.02~~	~~MSP receives notice of deregistration~~	~~WESM Member sends notice of deregistration to the MSP. Reason of deregistration must be specified in the notice~~	~~WESM Member sends notice of deregistration to MSP~~	~~By e-mail, courier or fax and official letter address to MSP~~	
DMI.01 ~~DMI.03~~	MSP submit**s request for** MI deregistration to MO and request to deregister the MI	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** ~~After DMI.02~~	By e-mail, courier or fax and official letter address to MO	Notice to MO
DMI.02 ~~DMI.04~~	MO received~~d~~**s** MI deregistration	After receiving the letter of deregistration of MI, MO ~~validates~~ reviews the request of the ~~WESM Member through the~~ MSP. MO review the Metering Masterfile and issue instructions to deregister the MI	~~After assessment of MSP that the MI is subject for deregistration~~ **After DMI. 01**	By e-mail, courier or fax and official letter address to MO	

Annex B

Ref.	Task Name	Task Detail	When	Method	Completion Events
DMI.03 ~~DMI.05~~	MSP **de-registers and/or** disconnect**s** the MI and notify the MO	MSP **de-registers and/or** disconnect**s** the MI **on the agreed schedule.** ~~within 15 days after issuing notice of deregistration and inform the MO of the MI disconnection.~~ **MSP to cease sending of data of de-registered MI to the MO**	**At the agreed de-registration or disconnection schedule**	~~**By e-mail, courier or fax and official letter address to MO**~~	~~**Notice to MO**~~
DMI.04 ~~DMI.06~~	MO detect zero (0) ~~registered readings of~~ **data delivery for the MI**	MO verify if the MI **is de-registered and/or disconnected** by detecting zero (0) ~~registered readings of~~ **data delivery for** the said MI	After MI **de-registration and/or** disconnection	By meter data inspection	
DMI.05 ~~DMI.07~~	MO deregister**s** the MI	MO deregister the MI and update the Metering Masterfile **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~~		
DMI.06 ~~DMI.08~~	MSP to delist the MI	MSP to delist the MI from its masterfile and old MIRF shall be deregistered	After **DMI.05** ~~DMI.07~~		End of deregistration process of MI
DMI.07 ~~DMI.09~~	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** ~~DMI.08~~		End of deregistration process of MI

Annex B

Appendix F

METER TROUBLE REPORT FORM

Day, Month Date, Year	MTR SUMMARY	TOTAL MTR:	63	TOTAL REMAINING MTR:		REMARKS
		INC DATA	3	INC DATA		
MTR_2019-02-13_(1ST ISSUE)	TD TOTAL DATA / TM TOTAL MISSING / TU TOTAL UNCERTAIN	INC DATA & UNCERTAIN	1	INC DATA & UNCERTAIN		
		NO DATA	45	NO DATA		
		UNCERTAIN	14	UNCERTAIN		

			KWH DEL			KVARH DEL			KWH REC			KVARH REC			REMARKS		REMARKS	
No.	TP NAME	SEIN	TD	TM	TU	TD	TM	TU	TD	TM	TU	TD	TM	TU	WESM		MSG	CLOSED/C
1																		
2																		
3																		
4																		
5																		
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Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)

Provision

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	Grid Code 9.2.3.3
No. of Stators	Blondel's Theorem compliant /3-element	Same as the main meter	Grid Code 9.2.2.1
Rating	115V 1 A or 5 A 60 Hz	Same as the main meter	The rating should be suitable to the secondary rating of the instrument transformers.
No. of Quadrants (Measurement)	Active Energy/Power Measurement: Bi-directional Reactive Power Measurement: 4 Quadrant	Bi-directional or as required by its application	Grid Code 9.2.2.2 Grid Code 9.2.3.3
Interval Data	Programmable to 1, 5, 15, 30, and 60 minute interval	Same as the main meter	Grid Code 9.2.3.3
No. of Channels	The 8-channels are as follows: 1. KWH (Delivered) 2. KWH (Received) 3. KVARH (Quadrant 1) 4. KVARH (Quadrant 2) 5. KVARH (Quadrant 3) 6. KVARH (Quadrant 4) 7. KVAH (Delivered) 8. KVAH (Received)	Minimum requirements of 4 channels as follows: 1. KWH (Delivered) 2. KWH (Received) 3. KVARH (Quadrant 1) 4. KVARH (Quadrant 2)	Grid Code 9.2.2.2 Grid Code 9.2.3.2
Mass Memory	Minimum 60 day recording of a 5-minute time-	Same as main meter	WESM 4.5.1 (g) Grid Code 9.2.3.3

Proposed Amendment

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** ~~Grid Code 9.2.3.3~~
No. of Stators	Blondel's Theorem compliant /3-element	Same as the main meter	**PGC 2016 GRM 9.2.2.1** ~~Grid Code 9.2.2.1~~
Rating	115V 1 A or 5 A 60 Hz	Same as the main meter	The rating should be suitable to the secondary rating of the instrument transformers.
No. of Quadrants (Measurement)	Active Energy/Power Measurement: Bi-directional Reactive Power Measurement: 4 Quadrant	Bi-directional or as required by its application	~~Grid Code 9.2.2.2~~ ~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.2.2** **PGC 2016 GRM 9.2.3.3**
Interval Data	Programmable to 1, 5, 15, 30, and 60 minute interval	Same as the main meter	~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.3.3**
No. of Channels	The 8-channels are as follows: 9. KWH (Delivered) 10. KWH (Received) 11. KVARH (Quadrant 1) 12. KVARH (Quadrant 2) 13. KVARH (Quadrant 3) 14. KVARH (Quadrant 4) 15. KVAH (Delivered)	Minimum requirements of 4 channels as follows: 1. KWH (Delivered) 2. KWH (Received) 3. KVARH (Quadrant 1) 4. KVARH (Quadrant 2)	~~Grid Code 9.2.2.2~~ ~~Grid Code 9.2.3.2~~ **PGC 2016 GRM 9.2.2.2** **PGC 2016 GRM 9.2.3.3**

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)			
Provision			
	stamped demand interval for 8 recording channels		
Meter Registers	The meter shall be capable of measuring, registering and recording the following electrical parameters per dispatch interval: • KWH (Delivered) • KWH (Received) • KVARH (Quadrant 1) • KVARH (Quadrant 2) • KVARH (Quadrant 3) • KVARH (Quadrant 4) • KVAH (Delivered) • KVAH (Received) • Max KW (Delivered) • Max KW (Received) • Power Factor • Frequency • Per Phase Current • Per Phase Voltage	Minimum requirements • KWH (Delivered) • KWH (Received) • KVARH (Quadrant 1) • KVARH (Quadrant 2) • KVARH (Quadrant 3) • KVARH (Quadrant 4) • KVAH (Delivered) • KVAH (Received) • Max KW (Delivered) • Max KW (Received)	Grid Code 9.2.2.2 Grid Code 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 Grid Code 9.3.8.1 Grid Code 9.3.8.2 Grid Code 9.3.8.3

Proposed Amendment			
	16. KVAH (Received)		
Mass Memory	Minimum 60 day recording of a 5-minute time-stamped demand interval for 8 recording channels	Same as main meter	WESM 4.5.1 (g) ~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.3.3**
Meter Registers	The meter shall be capable of measuring, registering and recording the following electrical parameters per dispatch interval: • KWH (Delivered) • KWH (Received) • KVARH (Quadrant 1) • KVARH (Quadrant 2) • KVARH (Quadrant 3) • KVARH (Quadrant 4) • KVAH (Delivered) • KVAH (Received) • Max KW (Delivered) • Max KW (Received) • Power Factor • Frequency • Per Phase Current • Per Phase Voltage	Minimum requirements • KWH (Delivered) • KWH (Received) • KVARH (Quadrant 1) • KVARH (Quadrant 2) • KVARH (Quadrant 3) • KVARH (Quadrant 4) • KVAH (Delivered) • KVAH (Received) • Max KW (Delivered) • Max KW (Received)	~~Grid Code 9.2.2.2~~ ~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.2.2** **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	Same as the main meter	WESM 4.5.6 ~~Grid Code 9.3.8.1~~ ~~Grid Code 9.3.8.2~~ ~~Grid Code 9.3.8.3~~ **PGC 2016 GRM 9.3.8.1** **PGC 2016 GRM 9.3.8.2**

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)			
Provision			**Proposed Amendment**
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 WESM 4.5.1 (c) Grid Code 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 Grid Code 9.2.3.3
Time Synchronization	Crystal synchronization. The internal clock shall be capable of being reset set by the data collection software during normal collection operations.	Same as the main meter	WESM 4.5.8.1 Grid Code 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) Grid Code 9.2.3.3
Codes and Standards Compliance	The meter shall adhere to established International Standards	Same as the main meter	Grid Code 4.2.10.1 IEC, ANSI/IEEE
Applicable Compliance Tests	These tests shall include material tests and established practice and/or other approved standards. Routine tests prescribed by the applicable standards shall be performed. In particular,	Same as the main meter	Grid Code 9.2.5.2 Grid Code 9.2.5.3 Grid Code 9.2.8.1 IEC 255-1 IEC 255-A (Class III) IEC 245-4
	physically by way of security seals.		**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 WESM 4.5.1 (c) ~~Grid Code 9.2.3.3~~ **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 ~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.3.3**
Time Synchronization	Crystal synchronization. The internal clock shall be capable of being reset set by the data collection software during normal collection operations.	Same as the main meter	WESM 4.5.8.1 ~~Grid Code 9.2.3.3~~ **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) ~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.3.3**
Codes and Standards Compliance	The meter shall adhere to established International Standards	Same as the main meter	~~Grid Code 4.2.10.1~~ **PGC 2016 GCR 4.2.10** IEC, ANSI/IEEE

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)			
Provision			**Proposed Amendment**
	the following tests shall be performed for the revenue meters: a. Power frequency tests (insulation) b. Impulse voltage test (insulation). c. HF interference test d. Surge withstand and fast transient tests		
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) Grid Code 9.2.3.3
Enclosure	Minimum requirements **Indoor**: Protected against dust limited ingress (no harmful deposit) and Protection against vertically falling drops of water e.g. condensation **Outdoor**: Totally protected against dust and Protection against vertically falling drops of water e.g. condensation	Same as the main meter	ANSI 12.1 4.3.4 Grid Code 9.2.2.3 Grid Code 9.2.2.4 Grid Code 9.3.8
Applicable Compliance Tests	These tests shall include material tests and established practice and/or other approved standards. Routine tests prescribed by the applicable standards shall be performed. In particular, the following tests shall be performed for the revenue meters: e. Power frequency tests (insulation) f. Impulse voltage test (insulation). g. HF interference test h. Surge withstand and fast transient tests	Same as the main meter	~~Grid Code 9.2.5.2~~ ~~Grid Code 9.2.5.3~~ ~~Grid Code 9.2.8.1~~ **PGC 2016 GRM 9.2.5.2** **PGC 2016 GRM 9.2.5.3** **PGC 2016 GRM 9.2.8.1** IEC 255-1 IEC 255-A (Class III) 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) ~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.3.3**
Enclosure	Minimum requirements **Indoor**: Protected against dust limited ingress (no harmful deposit) and Protection against vertically falling drops of water e.g. condensation **Outdoor**: Totally protected against dust and Protection against	Same as the main meter	ANSI 12.1 4.3.4 ~~Grid Code 9.2.2.3~~ ~~Grid Code 9.2.2.4~~ ~~Grid Code 9.3.8~~ **PGC 2016 GRM 9.2.2.3** **PGC 2016 GRM 9.2.2.4** **PGC 2016 GRM 9.3.8**

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)

Provision

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
No. of Stators	Corresponds to the service type and complying with Blondel's Theorem	Same as the main meter	Dist. Code 8.4.3.1 ANSI C12.1
Voltage Rating	Corresponds to the secondary voltage rating of voltage transformers used	Same as the main meter	Dist. Code 5.5.1.1
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
Frequency	60 Hz	Same as the main meter	Dist. Codes 3.2.2.1
Measurement	Uni-directional active metering (delivered) and 2-quadrant reactive metering) Or Bi-directional depending on the purpose	Same as the main meter	Dist Codes 8.3.3.1 Dist. Codes 8.3.4.2 Dist. Code 8.4.3.2
Interval Data	Programmable to 5, 15, 30 minute interval	Same as the main meter	Dist. Code 8.4.4.1

Proposed Amendment

	vertically falling drops of water e.g. condensation		

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 **PDC 2016 7.2.7**
No. of Stators	Corresponds to the service type and complying with Blondel's Theorem	Same as the main meter	~~Dist. Code 8.4.3.1~~ ANSI C12.1 **PDC 2016 7.2.7**
Voltage Rating	Corresponds to the secondary voltage rating of voltage transformers used	Same as the main meter	~~Dist. Code 5.5.1.1~~ **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 **PDC 2016 7.2.7**
Frequency	60 Hz	Same as the main meter	~~Dist. Codes 3.2.2.1~~ **PDC 2016 7.2.7**
Measurement	Uni-directional active metering (delivered) and 2-quadrant reactive metering) Or Bi-directional depending on the purpose	Same as the main meter	~~Dist Codes 8.3.3.1~~ ~~Dist. Codes 8.3.4.2~~ ~~Dist. Code 8.4.3.2~~ **PDC 2016 7.2.7**

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)			
Provision			
No. of Channels	At least four (4) channels for bi-directional meters: a. kWh (Delivered) b. kVARh (Delivered) c. kWh (Received) d. kVARh (Received) At least two (2) channels for unidirectional meters: a. kWh (Received) b. kVARh (Received)	Same as the main meter	This satisfies the minimum requirements as stated under: Dist. Code 8.3.3.2 Dist. Code 8.3.4.3
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	Dist. Code 8.3.5.3
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	Dist. Code 8.4.3.1
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	Same as the main meter	WESM 4.5.6
Proposed Amendment			
Interval Data	Programmable to 5, 15, 30 minute interval	Same as the main meter	~~Dist. Code 8.4.4.1~~ **PDC 2016 7.2.7**
No. of Channels	At least four (4) channels for bi-directional meters: e. kWh (Delivered) f. kVARh (Delivered) g. kWh (Received) h. kVARh (Received) At least two (2) channels for unidirectional meters: c. kWh (Received) d. kVARh (Received)	Same as the main meter	This satisfies the minimum requirements as stated under: ~~Dist. Code 8.3.3.2~~ ~~Dist. Code 8.3.4.3~~ **PDC 2016 7.2.7**
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	~~Dist. Code 8.3.5.3~~ **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	~~Dist. Code 8.4.3.1~~ **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	Same as the main meter	WESM 4.5.6 **PDC 2016 7.4.7**

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)			
Provision			
	physically by way of security seals.		
Communication Capability	The meter shall have one (1) independent communication port in addition to the optical port.	Minimum requirements: Optical port	WESM 4.5.7.1 WESM 4.5.1(c) Dist. Code 8.4.4.2
Internal Clock/Battery	With long life lithium battery for clock/ calendar maintenance	Same as the main meter	WESM 4.5.8.1 Dist. Code 8.4.4.6
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) Dist. Code 8.4.3.1
Codes and Standards Compliance	The meter shall adhere to established International Standards	Same as the main meter	IEC, ANSI/IEEE
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

Proposed Amendment			
	means and/or passwords. It shall also be secured physically by way of security seals.		
Communication Capability	The meter shall have one (1) independent communication port in addition to the optical port.	Minimum requirements: Optical port	WESM 4.5.7.1 WESM 4.5.1(c) ~~Dist. Code 8.4.4.2~~ **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 ~~Dist. Code 8.4.4.6~~ **PDC 2016 7.2.1**
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) ~~Dist. Code 8.4.3.1~~ **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 **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	Same as the main meter	ANSI 12.1 4.3.4

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)

Provision

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	IEC 44-1 Class 0.2 /ANSI C57.13 Class 0.3 or better	Grid Code 9.2.3.2 Grid Code Appendix 2
Burden	Shall not exceed the rated burden limit of 12.5 VA for the IEC 44-1 Class 0.2 /ANSI C57.13 Class 0.3 (see Table 1)	Grid Code 9.2.3.2 Grid Code Appendix 2
Rated Primary Current	The thermal rating factor shall not be less than 1.0.	
Secondary Current	1A or 5A	Grid Code 9.2.3.2 IEC 4.2 Standard values of rated secondary currents
Rating Factor	Minimum of 1.0 at 30^{o}C	
Frequency	60 Hz	
Ambient Air Temperature	-5^{o}C and 50^{o}C for very hot climate	IEC 3.2.1 1996

Proposed Amendment

	measuring circuit and operation.		

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	IEC 44-1 Class 0.2 /ANSI C57.13 Class 0.3 or better	~~Grid Code 9.2.3.2~~ ~~Grid Code Appendix 2~~ **PGC 2016 GRM 9.2.3.2**
Burden	~~Shall not exceed the rated burden limit of 12.5 VA for the IEC 44-1 Class 0.2 /ANSI C57.13 Class 0.3 (see Table 1)~~ **Shall be based on the standard rated burden as specified in the latest revision of IEC 61869-2 or ANSI/IEEE C57.13, or their latest equivalent standards.**	~~Grid Code 9.2.3.2~~ ~~Grid Code Appendix 2~~ **PGC 2016 GRM 9.2.3.2**
Rated Primary Current	The thermal rating factor shall not be less than 1.0.	
Secondary Current	1A or 5A	~~Grid Code 9.2.3.2~~ **PGC 2016 GRM 9.2.3.2**

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)

Provision

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	Grid Code 9.2.3.2
Mounting	Depend on the applications	
Grounding		Grid Code 9.2.2.1 (g)
Security	Seal holder shall be provided to the CT secondary terminal box (see Figure 1)	Grid Code 9.2.4.1

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	Grid Code 9.3.1.
Accuracy Class	IEC 6044-2 Class 0.2 /ANSI C57.13 Class 0.3 or better	Grid Code 9.2.3.2 Grid Code Appendix 2
Burden	Shall not exceed the rated burden limit for the IEC 6044-2 Class 0.2 /ANSI C57.13 Class 0.3 or better. (see Table 4)	Grid Code 9.2.3.2 Grid Code Appendix 2

Proposed Amendment

		IEC 4.2 Standard values of rated secondary currents
Rating Factor	Minimum of 1.0 at 30ºC	
Frequency	60 Hz	
Ambient Air Temperature	-5ºC and 50ºC 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	~~Grid Code 9.2.3.2~~ **PGC 2016 GRM 9.2.3.2**
Mounting	Depend on the applications	
Grounding		~~Grid Code 9.2.2.1 (g)~~ **PGC 2016 GCR 4.4.1.3.2** **PGC GRM 9.2.2.1 (g)**
Security	Seal holder shall be provided to the CT secondary terminal box (see Figure 1)	~~Grid Code 9.2.4.1~~ **PGC 2016 GRM 9.3.8.2** **PGC 2016 GRM 9.2.4.1**

APPENDIX O

SPECIFICATIONS FOR VOLTAGE TRANSFORMERS

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)	
Provision	**Proposed Amendment**

Ratio	See Table 5	
Secondary Voltage	See Table 5	
Frequency	60 Hz	
Operating Temperature	55ºC average ambient temperature, with max ambient temperature not exceeding 65ºC	
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		Grid Code 9.2.2.1 (g)
Security	Seal holder shall be provided to the CT secondary terminal box (see Figure 1)	Grid Code 9.2.4.1

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	~~Grid Code 9.3.1.~~ **PGC 2016 GRM 9.2.3.1**
Accuracy Class	IEC 6044-2 Class 0.2 /ANSI C57.13 Class 0.3 or better	~~Grid Code 9.2.3.2~~ ~~Grid Code Appendix 2~~ **PGC 2016 GRM 9.2.3.1**
Burden	~~Shall not exceed the rated burden limit for the IEC 6044-2 Class 0.2 /ANSI C57.13 Class 0.3 or better. (see Table 4)~~ **Shall be compliant to the IEC 61869-3 or ANSI C57.13 Standard (or the latest version/s)**	~~Grid Code 9.2.3.2~~ ~~Grid Code Appendix 2~~ **PGC 2016 GRM 9.2.3.1**
Ratio	See Table 5	
Secondary Voltage	See Table 5	
Frequency	60 Hz	
Operating Temperature	55ºC average ambient temperature, with max ambient temperature not exceeding 65ºC	
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	

Annex B

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)	
Provision	**Proposed Amendment**
	<table><tr><td>Grounding</td><td></td><td>~~Grid Code 9.2.2.1 (g)~~ **PGC 2016 GCR 4.4.1.3.2** **PGC GRM 9.2.2.1 (g)**</td></tr><tr><td>Security</td><td>Seal holder shall be provided to the CT secondary terminal box (see Figure 1)</td><td>~~Grid Code 9.2.4.1~~ **PGC 2016 GRM 9.3.8.2** **PGC 2016 GRM 9.2.4.1**</td></tr></table>