Philippine Electricity Market Corporation

WHOLESALE ELECTRICITY SPOT MARKET
RULES CHANGE COMMITTEE

RESOLUTION NO. 2020-01

Proposed Amendments to the WESM Manual on Metering Standards and Procedures Issue 12.0 to Harmonize with the Site Specific Loss Adjustment Procedures of the Wholesale Metering Services Provider

WHEREAS, on 14 October 2019, the Independent Electricity Market Operator of the Philippines (IEMOP) submitted proposed amendments to the WESM Manual on Metering Standards and Procedures (WESM Metering Manual) to harmonize the procedure for the calculation of the Site-Specific Loss Adjustment (SSLA) with the procedure of the Wholesale Metering Services Provider (WMSP), the National Grid Corporation of the Philippines (NGCP), in its determination of point-to-point losses in cases when the revenue meter of a grid customer is not located at its connection point;

WHEREAS, the amendments reflect the provisions under the DOE Department Circular No. DC2018-05-0015, establishing that the location of the market trading node for determination of settled metered quantities in the WESM and by NGCP should be the same, such that if the meter of a trading participant is not at its connection point, loss adjustments to its raw metered quantity using the SSLA procedures provided in the WESM Metering Manual and as performed by NGCP should also be the same;

WHEREAS, during its 157th Meeting on 18 October 2019, the RCC approved the publication of the proposed amendments to the WESM Metering Manual in the PEMC website to solicit comments from industry stakeholders and interested parties;

WHEREAS, following the 30-working day commenting period from publication date on 22 October 2019, comments were received from the Technical Committee, Manila Electric Company (MERALCO), NGCP, and PEMC, which, together with the proponent's responses to these comments, were considered in the RCC's deliberation during its 159th meeting on 06 December 2019;

WHEREAS, the comments received were summarized as follows:

- Validation on historical meter data;
- Clerical and minor revisions to be reflected;

WHEREAS, the RCC adopted the NGCP's procedures for determining transformer losses and agreed for the same to be reflected under Appendix K of the WESM Metering Manual;

WHEREAS, the RCC likewise agreed to the proponent's response to adopt NGCP's recommended values for percent transformer losses as indicated in Appendix K – *A. General Equations* in the subject Manual;

WHEREAS, the RCC agreed to revise the number of days from 30 calendar days to 20 calendar days for the submission of all the data, which are necessary in the preparation of the SSLA computation, by the Network Service Provider (NSP) to the WMSP;

WHEREAS, the RCC also agreed to reflect not later than 10 calendar days as the schedule of the submission of meter data from all metering points by the WMSP to the Market Operator (MO);

WHEREAS, during its 160th Meeting on 24 January 2020, the RCC adopted for clarity further changes to the formula in calculating transformer losses under Appendix K – *A. General Equations*, specifically as regards translating of power (and energy) metered at primary side to secondary side and vice versa;

WHEREAS, the RCC approved the proposal, as amended, and its endorsement to the PEM Board;

NOW THEREFORE, we, the undersigned, in behalf of the sectors we represent, hereby resolve as follows:

RESOLVED, that the RCC approves the Proposed Amendments to the WESM Manual on Metering Standards and Procedures to harmonize with the SSLA procedures of the WMSP;

RESOLVED FURTHER, that the said Proposed Amendments to the WESM Manual on Metering Standards and Procedures (attached as Annex) are hereby endorsed to the PEM Board for approval and subsequent transmittal to the DOE for promulgation;

Done this 24 January 2020, Pasig City.

Approved by: **THE RULES CHANGE COMMITTEE**	
Independent Members:	
Maila Lourdes G. de Castro Chairperson	**Francisco L.R. Castro, Jr.**
Allan C. Nerves	**Concepcion F. Tanglao**
Generation Sector Members:	
Dixie Anthony R. Banzon Masinloc Power Partners Co. Ltd. (MPPCL)	**Abner B. Tolentino** Power Sector Assets and Liabilities Management Corporation (PSALM)
Cherry A. Javier Aboitiz Power Corp. (APC)	*(vacant seat)*
Distribution Sector Members:	
Virgilio C. Fortich, Jr. Cebu III Electric Cooperative, Inc. (CEBECO3)	**Ryan S. Morales** Manila Electric Company (MERALCO)
Ricardo G. Gumalal Iligan Light and Power, Inc. (ILPI)	**Jose P. Santos** Ilocos Norte Electric Cooperative, Inc. (INEC)

Supply Sector Member:
Lorreto H. Rivera TeaM (Philippines) Energy Corporation (TPEC)
Market Operator Member:
Isidro E. Cacho, Jr. Independent Electricity Market Operator of the Philippines (IEMOP)
System Operator Member:
Ambrocio R. Rosales National Grid Corporation of the Philippines (NGCP)

Annex A

Proposed Amendments to the WESM Manual on Metering Standards and Procedures to Harmonize with the Site Specific Loss Adjustment Procedures of Wholesale Metering Services Providers

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**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.
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 ~~wherein~~ 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.

Annex A

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
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 type (i.e. weekday or weekend); and iii. Average values during the previous days or last week of the same hour. XXX	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**; 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	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.
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 ***except for days with***	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.

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**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	***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 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

Annex A

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
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 data is the adjusted power or energy of the *Trading Participant* as seen from the MTN.~~	The proposed harmonized methodology does not include the use of an SSLF.
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 A

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
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) iii. Full-load Copper Loss (Short-Circuit Test result) iv. Percent Impedance (% Z) v. *xr* ratio	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)** **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~~	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

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			~~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)~~ ~~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.	~~8.6.1.2. 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: The *Metering Services Provider* shall submit to the *Market Operator* the meter data containing the daily energy consumption or delivery of all *Trading Participants*.	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 actual physical connections between the *metering point* and the *market trading node*.**	

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			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.	
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

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
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 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	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 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**5**.4.2 XXX 8.6**5**.4.3 XXX	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. 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
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	~~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~~	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 A

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
		billing month shall be based on the energy of the last twelve (12) billing months.	~~billing month shall be based on the energy of the last twelve (12) billing months.~~	
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 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.	~~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 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.~~	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.
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.

Annex A

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
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 internal business process being maintained by the market operator.
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): $Line_{kW\text{-}Loss} = (I_{Line})\ 2 * R_{Line} \div 1000$ $R_{Line} = r_a * L$ $Line_{kVar\text{-}Loss} = (I_{Line})\ 2 * X_{Line} \div 1000$ $X_{Line} = X_l * L$ $Transformer_{kW\text{-}Loss} = kW_{meter} * \%\ Transformer_{Loss}$ $Total_{kW\text{-}Loss} = Line_{kW\text{-}Loss} + Transformer_{kW\text{-}Loss}$ $SSLF = 1 + (Total_{kW\text{-}Loss} \div kW_{Meter})$ $Adjusted_{kW} = SSLF * kW_{Meter} = Total_{kW\text{-}Loss} + kW_{Meter}$ $Adjusted_{kWh} = Adjusted_{kW} * t$ Where: kW_{Meter}: active power derived from the meter registration	A. General Equations The following are the equations to be used for performing ~~calculating~~ the Site Specific Loss ~~Factor~~ **Adjustment** (SSLF**A**): ~~$Line_{kW\text{-}Loss} = (I_{Line})\ 2 * R_{Line} \div 1000$~~ ~~$R_{Line} = r_a * L$~~ ~~$Line_{kVar\text{-}Loss} = (I_{Line})\ 2 * X_{Line} \div 1000$~~ ~~$X_{Line} = X_l * L$~~ ~~$Transformer_{kW\text{-}Loss} = kW_{meter} * \%\ Transformer_{Loss}$~~ ~~$Total_{kW\text{-}Loss} = Line_{kW\text{-}Loss} + Transformer_{kW\text{-}Loss}$~~ ~~$SSLF = 1 + (Total_{kW\text{-}Loss} \div kW_{Meter})$~~ ~~$Adjusted_{kW} = SSLF * kW_{Meter} = Total_{kW\text{-}Loss} + kW_{Meter}$~~ ~~$Adjusted_{kWh} = Adjusted_{kW} * t$~~ ~~Where:~~ ~~$kW_{Meter}$: active power derived from the meter registration~~	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

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
		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 transformer $Total_{kW\text{-}Loss}$: total active loss (kW) for a metering point $kW_{CoreLoss}$: constant loss (kW) from the open-circuit test $Adjusted_{kW}$: adjusted (kW) active power	~~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 transformer~~ ~~$Total_{kW\text{-}Loss}$: 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	~~SSLF: Site – Specific Loss Factor~~ **Calculation of Line Losses** $kW_{Meter} = \frac{kWh_{Meter}}{t}$	

Annex A

<table>
<tr><th colspan="5">WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)</th></tr>
<tr><th>Title</th><th>Clause</th><th>Provision</th><th>Proposed Amendment</th><th>Rationale</th></tr>
<tr><td></td><td></td><td></td><td>

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

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

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

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

<u>**Calculation of Transformer Losses:**</u>

<u>**For the calculation of the transformer losses, the following percent transformer loss (%Transformer$_{Loss}$) shall be used to determine the total transformer losses.**</u>

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

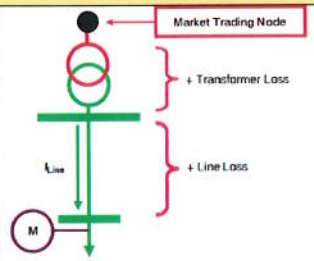
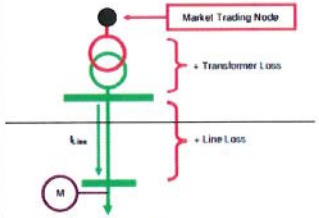
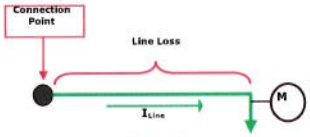
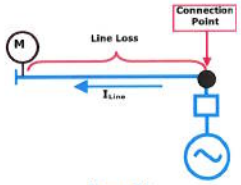
<u>**For in between capacities, interpolation shall be performed to calculate the Percent Transformer Loss.**</u>

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

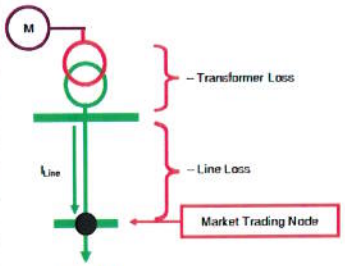
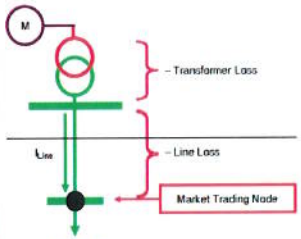
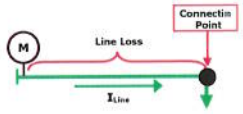
WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			When translating power (and energy) metered at the secondary side to the primary side, the following formula shall be used: $kW_{P-Meter} = \frac{kW_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$ $kVAR_{P-Meter} = \frac{kVAR_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$ $Transformer_{kW-Loss} = kW_{P-Meter} - kW_{Meter}$ **Conversely, power (and energy) that is metered at the primary side shall be translated to the secondary side using the formula:** $kW_{S-Meter} = kW_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $kVAR_{S-Meter} = kVAR_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $Transformer_{kW-Loss} = kW_{Meter} - kW_{S-Meter}$ **Calculation of Adjusted Energy** $Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$ $Adjusted_{kW} = kW_{Meter} \pm Total_{kW-Loss}$ **(+) = if the *connection point* is located before the metering point (i.e., the line current initially**	

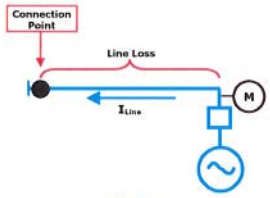
WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			passes through the *connection point* then the metering point) (-) = if the *connection point* is located after the metering point (i.e., the line current initially passes through the metering point then the *connection point*) $Adjusted_{kWh} = Adjusted_{kW} \times$ t Where: R_T = Total resistance of the line conductor per line, in ohms X_L = Total Reactance of the Line Conductor per line, in ohms pf = Power Factor kWh_{Meter} = Active energy derived from the *meter* registration, in kWh $kVARh_{Meter}$= Reactive energy derived from the *meter* registration, in kVARh kW_{Meter} = Demand (*Active Power*) derived from the *meter* registration, in kW $kVAR_{Meter}$ = *Reactive Power* derived from the *meter* registration, in kVAR I_{Line} = Current along the line, in Ampere V_{Rated} = Rated voltage of the line, in kV $Line_{kW-Loss}$ = the active loss along the line, in kW	

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			$kW_{P-Meter}$ = **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** $Transformer_{kW-Loss}$ = **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**	
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)	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**	

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
		 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 kW_{Mi} will have positive values in this case*] $Adjusted_{kW} = Total_{kWLoss} + kW_{Mi}$ $= SSLF * kW_{Mi}$ $Adjusted_{kWh} = Adjusted_{kW} * t$	Case 1: A ~~metering~~ ***connectionpoint*** 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)**  Figure L1 **a. Loads:**  Figure L1 **b. *Generators*:**  Figure G1	

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			~~$Line_{kW\text{-}Loss} = (I_{Line})^2 * R_{Line}$~~ ~~$R_{Line} = r_a * L$~~ ~~$Line_{kVar\text{-}Loss} = (I_{Line})^2 * X_{Line}$~~ ~~$X_{Line} = X_l * L$~~ ~~$Transformer_{kW\text{-}Loss} = kW_{Mi} * \%Transformer_{Loss}$~~ ~~$Total_{kW\text{-}Loss} = Line_{kW\text{-}Loss} + Transformer_{kW\text{-}Loss}$~~ ~~$SSLF = 1 + (Total_{kW\text{-}Loss} + kW_{Mi})$~~ ~~[*Note: $Total_{kW\text{-}Loss}$ and kW_{Mi} will have positive values in this case*]~~ ~~$Adjusted_{kW} = Total_{kWLoss} + kW_{Mi}$~~ ~~$= SSLF * kW_{Mi}$~~ ~~$Adjusted_{kWh} = Adjusted_{kW} * t$~~ $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$ $pf = \frac{kW_{Meter}}{\sqrt{(kW_{Meter})^2 + (kVAR_{Meter})^2}}$ $I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$ $Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$	

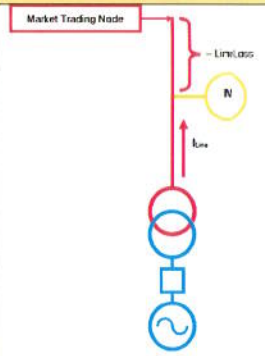
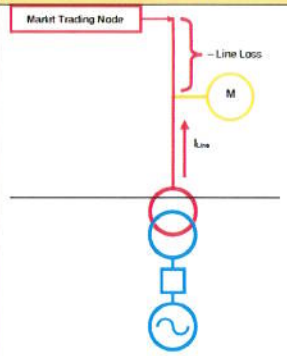
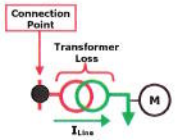
WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			$Total_{kW-Loss} = Line_{kW-Loss}$ $Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$	
Site – Specific Loss Adjustment	Appendix K	Case 2: A *metering point* is located before the *market trading node* (Figure L2)  Figure L2 $Line_{kW-Loss} = (I_{Line})^2 * R_{Line}$ $R_{Line} = r_a * L$ $Line_{kVar-Loss} = (I_{Line})^2 * X_{Line}$ $X_{Line} = X_l * L$ $Transformer_{kW-Loss} = kW_{Mi} * \%Transformer_{Loss}$ $Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$ SSLF = 1 + ($Total_{kW-Loss}$ + kW_{Mi}) [*Note: $Total_{kW-Loss}$ and kW_{Mi} will have negative values in this case*]	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 **a. Loads:**  Figure L2	

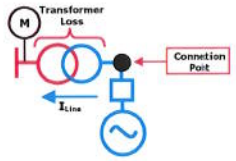
WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
		$Adjusted_{kW}$ = $Total_{kWLoss}$ + kW_{Mi} = SSLF * kW_{Mi} $Adjusted_{kWh}$ = $Adjusted_{kW}$ * t	**b. *Generators*:**  Figure 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} * %$Transformer_{Loss}$~~ ~~$Total_{kW\text{-}Loss}$ = $Line_{kW\text{-}Loss}$ + $Transformer_{kW\text{-}Loss}$~~ ~~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~~ $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$	

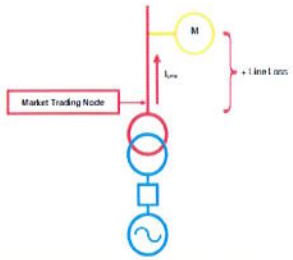
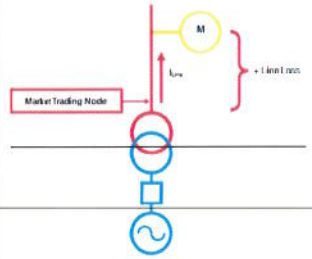
Annex A

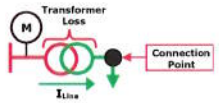
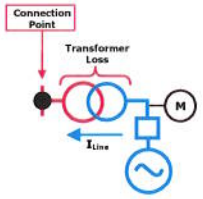
WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			$pf = \frac{kW_{Meter}}{\sqrt{(kW_{Meter})^2 + (kVAR_{Meter})^2}}$ $I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$ $Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$ $Total_{kW-Loss} = Line_{kW-Loss}$ $Adjusted_{kW} = kW_{Meter} - Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$	
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)	~~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)**	The revisions are being proposed to reflect the application of the proposed new SSLA methodology to different cases for Loss calculation in the WESM.

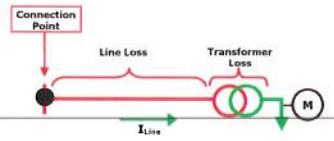
Annex A

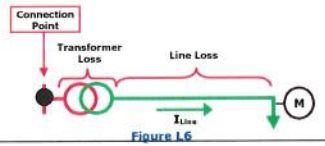
WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
		 Figure G1 $Line_{kW\text{-}Loss} = (I_{Line})^2 * R_{Line}$ $R_{Line} = r_a * L$ $Line_{kVar\text{-}Loss} = (I_{Line})^2 * X_{Line}$ $X_{Line} = X_l * L$ $Transformer_{kW\text{-}Loss} = kW_{Mi} * \%Transformer_{Loss}$ $Total_{kW\text{-}Loss} = Line_{kW\text{-}Loss} + Transformer_{kW\text{-}Loss}$ SSLF = 1 + ($Total_{kW\text{-}Loss}$ + kW_{Mi}) [*Note: $Total_{kW\text{-}Loss}$ and kW_{Mi} will have negative values in this case*] $Adjusted_{kW} = Total_{kWLoss} + kW_{Mi}$ $= SSLF * kW_{Mi}$ $Adjusted_{kWh} = Adjusted_{kW} * t$	 Figure G1 **a. Loads:**  Figure L3 $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kW_{P-Meter} = \frac{kW_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$ $Transformer_{kW-Loss} = kW_{P-Meter} - kW_{Meter}$ $Total_{kW-Loss} = Transformer_{kW-Loss}$	

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			$Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$ **b. *Generators*:**  Figure G3 ~~$Line_{kW-Loss} = (I_{Line})^2 * R_{Line}$~~ ~~$R_{Line} = r_a * L$~~ ~~$Line_{kVar-Loss} = (I_{Line})^2 * X_{Line}$~~ ~~$X_{Line} = X_l * L$~~ ~~$Transformer_{kW-Loss} = kW_{Mi} * \%Transformer_{Loss}$~~ ~~$Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$~~ ~~SSLF = 1 + ($Total_{kW-Loss}$ + kW_{Mi}) [*Note: $Total_{kW-Loss}$ and kW_{Mi} will have negative values in this case*]~~ ~~$Adjusted_{kW} = Total_{kWLoss} + kW_{Mi}$~~ ~~$= SSLF * kW_{Mi}$~~ ~~$Adjusted_{kWh} = Adjusted_{kW} * t$~~	

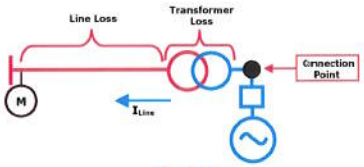
WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			$kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kW_{P-Meter} = \frac{kW_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$ $Transformer_{kW-Loss} = kW_{P-Meter} - kW_{Meter}$ $Total_{kW-Loss} = Transformer_{kW-Loss}$ $Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$	
Site – Specific Loss Adjustment	Appendix K	Case 2: A *metering point* is located before the *market trading node* (Figure G2)  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*)**  Figure G2	The revisions are being proposed to reflect the application of the proposed new SSLA methodology to different cases for loss calculation in the WESM.
		$Line_{kW\text{-}Loss} = (I_{Line})^2 * R_{Line}$ $R_{Line} = r_a * L$ $Line_{kVar\text{-}Loss} = (I_{Line})^2 * X_{Line}$		

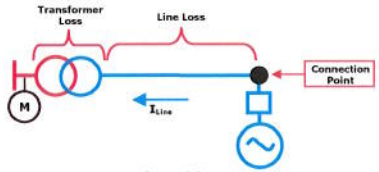
WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
		$X_{Line} = X_l * L$ $Transformer_{kW\text{-}Loss} = kW_{Mi} * \%Transformer_{Loss}$ $Total_{kW\text{-}Loss} = Line_{kW\text{-}Loss} + Transformer_{kW\text{-}Loss}$ 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} $Adjusted_{kWh}$ = $Adjusted_{kW} * t$	**a. Loads:**  Figure L4 $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kW_{S-Meter} = kW_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $Transformer_{kW-Loss} = kW_{Meter} - kW_{S-Meter}$ $Total_{kW-Loss} = Transformer_{kW-Loss}$ $Adjusted_{kW} = kW_{Meter} - Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$ **b. *Generators*:**  Figure G4	

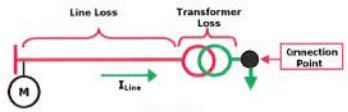
WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			$kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kW_{S-Meter} = kW_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $Transformer_{kW-Loss} = kW_{Meter} - kW_{S-Meter}$ $Total_{kW-Loss} = Transformer_{kW-Loss}$ $Adjusted_{kW} = kW_{Meter} - Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$	
Site – Specific Loss Adjustment	Appendix K	N/A	**Line Loss and Transformer Loss** **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)** **a. Loads: (Metering Point at the Transformer)**  Figure L5 $kW_{Meter} = \frac{kWh_{Meter}}{t}$	Provide new sample cases

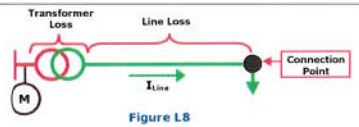
WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			$kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$ $kW_{P-Meter} = \frac{kW_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$ $kVAR_{P-Meter} = \frac{kVAR_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$ $Transformer_{kW-Loss} = kW_{P-Meter} - kW_{Meter}$ $pf = \frac{kW_{P-Meter}}{\sqrt{(kW_{P-Meter})^2 + (kVAR_{P\text{-}Meter})^2}}$ $I_{Line} = \frac{kW_{P-Meter}}{\sqrt{3} \times V_{Rated} \times pf}$ $Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$ $Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$ $Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$ **b. Loads: (*Connection Point* at the Transformer)**  Figure L6	

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**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, $kW'_{Meter} = kW_{S-Meter}$) $kW_{P-Meter} = \frac{kW_{S-Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$ $Transformer_{kW-Loss} = kW_{P-Meter} - kW_{S-Meter}$ $Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$	
			$Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$	

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			c. Generators: (*Connection Point* at the Transformer)  Figure G5 $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$ $pf = \frac{kW_{Meter}}{\sqrt{(kW_{Meter})^2 + (kVAR_{Meter})^2}}$ $I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$ $Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$ $kW'_{Meter} = kW_{Meter} + Line_{kW-loss}$ (Note: For this case, $kW'_{Meter} = kW_{S-Meter}$) $kW_{P-Meter} = \frac{kW_{S-Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$ $Transformer_{kW-Loss} = kW_{P-Meter} - kW_{S-Meter}$	

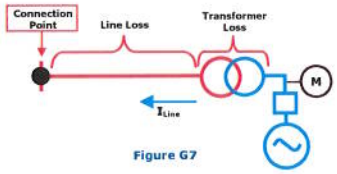
WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			$Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$ $Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$ **d. Generators: (Metering Point at the Transformer)**  Figure G6 $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$ $kW_{P-Meter} = \frac{kW_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$	
			$kVAR_{P-Meter} = \frac{kVAR_{Meter}}{(1 - \frac{\%Transformer_{Loss}}{100})}$ $Transformer_{kW-Loss} = kW_{P-Meter} - kW_{Meter}$	

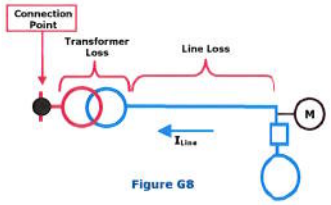
WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			$$pf = \frac{kW_{P-Meter}}{\sqrt{(kW_{P-Meter})^2 + (kVAR_{P\text{-}Meter})^2}}$$ $$I_{Line} = \frac{kW_{P-Meter}}{\sqrt{3} \times V_{Rated} \times pf}$$ $$Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$$ $$Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$$ $$Adjusted_{kW} = kW_{Meter} + Total_{kW-Loss}$$ $$Adjusted_{kWh} = Adjusted_{kW} \times t$$ **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*)** **a. Loads: (*Connection Point* at the Transformer)**  Figure L7 $$kW_{Meter} = \frac{kWh_{Meter}}{t}$$ $$kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$$	

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			$pf = \frac{kW_{Meter}}{\sqrt{(kW_{Meter})^2 + (kVAR_{Meter})^2}}$ $I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$ $Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$ $kW'_{Meter} = kW_{Meter} - Line_{kW-Loss}$ (Note: For this case, $kW'_{Meter} = kW_{P-Meter}$) $kW_{S-Meter} = kW_{P-Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $Transformer_{kW-Loss} = kW_{P-Meter} - kW_{S-Meter}$ $Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$ $Adjusted_{kW} = kW_{Meter} - Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$ **b. Loads: (Metering Point at the Transformer)**	
			 Figure L8 $kW_{Meter} = \frac{kWh_{Meter}}{t}$	

Annex A

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			$kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$ $kW_{S-Meter} = kW_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $kVAR_{S-Meter} = kVAR_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $Transformer_{kW-Loss} = kW_{Meter} - kW_{S-Meter}$ $pf = \frac{kW_{S-Meter}}{\sqrt{(kW_{S-Meter})^2 + (kVAR_{S-Meter})^2}}$ $I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$ $Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$ $Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$ $Adjusted_{kW} = kW_{Meter} - Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$	

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			c. Generators: (Metering Point at the Transformer)  Figure G7 $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$ $kW_{S-Meter} = kW_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $kVAR_{S-Meter} = kVAR_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $Transformer_{kW-Loss} = kW_{Meter} - kW_{S-Meter}$ $pf = \frac{kW_{S-Meter}}{\sqrt{(kW_{S-Meter})^2 + (kVAR_{S-Meter})^2}}$	
			$I_{Line} = \frac{kW_{S-Meter}}{\sqrt{3} \times V_{Rated} \times pf}$ $Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$ $Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$	

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			$Adjusted_{kW} = kW_{Meter} - Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$ **d. *Generators*: (*Connection Point* at the Transformer)**  Figure G8 $kW_{Meter} = \frac{kWh_{Meter}}{t}$ $kVAR_{Meter} = \frac{kVARh_{Meter}}{t}$ $pf = \frac{kW_{Meter}}{\sqrt{(kW_{Meter})^2 + (kVAR_{Meter})^2}}$ $I_{Line} = \frac{kW_{Meter}}{\sqrt{3} \times V_{Rated} \times pf}$ $Line_{kW-Loss} = \frac{(I_{Line})^2 \times R_T}{1000}$ $kW'_{Meter} = kW_{Meter} - Line_{kW-loss}$ **(Note: For this case, $kW'_{Meter} = kW_{P-Meter}$)**	

Annex A

WESM Manual on Metering Standards and Procedures (As revised under RCC Resolution No. RCC-RESO-19-10)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			$kW_{S-Meter} = kW_{Meter}(1 - \frac{\%Transformer_{Loss}}{100})$ $Transformer_{kW-Loss} = kW_{P-Meter} - kW_{S-Meter}$ $Total_{kW-Loss} = Line_{kW-Loss} + Transformer_{kW-Loss}$ $Adjusted_{kW} = kW_{Meter} - Total_{kW-Loss}$ $Adjusted_{kWh} = Adjusted_{kW} \times t$	