Wholesale Electricity Spot Market

WESM-WM-
(Manual)-CN - _____

REQUEST FOR AMENDMENTS OR CHANGES TO THE WESM MANUALS

Proposals made only under this prescribed form shall be accepted and considered as submitted:

This request for amendments to the WESM Rules can be submitted to:

PEM Board
Attention: **PEM Committee Secretariat**
Philippine Electricity Market Corporation
18/F Robinsons Equitable Tower
ADB Avenue, Ortigas Center
Pasig City, 1605 Philippines
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I. Proposer's Information

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II.WESM Manual Amendments Information

Title of WESM Manual being commented:
Price Determination Methodology

Nature of Request (please indicate with **x**)
☒ Addition ☒ Alteration ☒ Deletion ☒ Clarification ☒ Clerical Correction

III. Proposed Amendment

Title	Section	Provision	Proposed Amendment	Rationale
Foreword		FOREWORD The establishment of the Philippine Wholesale Electricity Spot Market (the "WESM") is mandated by Republic Act No. 9136, otherwise known as the "Electric Power Industry Reform Act of 2001" (the "EPIRA"). The WESM is to provide the mechanism for determining the price of electricity not covered by bilateral contracts between sellers and purchasers of electricity. Pursuant to the mandate of the EPIRA, the Department of Energy (the "DOE") jointly with the electric power industry participants formulated the detailed rules for the WESM, i.e., the WESM Rules. The WESM Rules were promulgated by the DOE on 28 June 2002. Among other things, the WESM Rules provided for the mechanism for determining the prices of electricity in the market not covered by bilateral contracts. This price determination methodology (the "PDM") contained in the WESM Rules is required by the EPIRA to be approved by the Energy Regulatory Commission (the "Commission"). The Price Determination Methodology for the WESM contained in this document was formulated compliant with the WESM Rules and in consultation with the industry participants. Such consultations were conducted through, initially, the WESM Technical Working Group (the "WESM-TWG"), later the Interim Rules Change Committee, and the Philippine Electricity Market Board (the "PEM Board"). This Price	~~FOREWORD~~ **Section 1 INTRODUCTION** **1.1 Background** **1.1.1** The establishment of the Philippine Wholesale Electricity Spot Market (the "WESM") is mandated by Republic Act No. 9136, otherwise known as the "Electric Power Industry Reform Act of 2001" (the "EPIRA"). ~~The WESM is to provide the mechanism for determining the price of electricity not covered by bilateral contracts between sellers and purchasers of electricity.~~ **1.1.2** Pursuant to the mandate of the EPIRA, the Department of Energy (the "DOE") jointly with the electric power industry participants formulated the ~~detailed rules for the WESM, i.e., the~~ WESM Rules~~. The WESM Rules were promulgated by the DOE on 28 June 2002. Among~~**, which, among**~~~~ the WESM Rules provided for~~ **provides** the mechanism for determining the prices of electricity in the market not covered by bilateral contracts. ~~This price determination methodology (the "PDM") contained in the WESM Rules is required by the EPIRA to be approved by the Energy Regulatory Commission (the "Commission").~~ **1.1.3** ~~The Price Determination Methodology for the WESM contained in this document was formulated compliant with the WESM Rules and in consultation with the industry participants. Such consultations were conducted through, initially, the WESM Technical Working Group (the "WESM-~~	• Rewording, for clarity • Renumbering to conform with the formatting for Market Manuals

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		Determination Methodology gives the specific details as to how dispatch schedules and locational marginal prices (i.e., nodal prices) are calculated in the Market Dispatch Optimization Model (the "MDOM") as provided for in WESM Rules clause 3.6.	~~TWG"), later the Interim Rules Change Committee, and the Philippine Electricity Market Board (the "PEM Board").~~ This Price Determination Methodology **Manual** ~~gives~~ **provides** the specific details ~~as to how dispatch schedules and locational marginal prices (i.e., nodal prices) are calculated in the Market Dispatch Optimization Model (the "MDOM"),~~ ~~as provided for in WESM Rules clause 3.6.~~**of such mechanism. It is formulated compliant with the WESM Rules, in consultation with the industry participants, and approved by the Energy Regulatory Commission (the "ERC").[1]** *(Footnote **1**: WESM Rules clause 3.2*)	
The Electricity Market Model of the WESM	3	3 The Electricity Market Model of the WESM The following characteristics and pricing principles are adopted: 3.1. The WESM adopts locational pricing to provide the correct economic signals to market participants when they properly account for the economic impact of losses and constraints that result from the operation of the electricity network. [1] *(Footnote 1*: *WESM Rules clause 3.6.1.3,3.6.1.4,3.6.1.5*) 3.2. The WESM adopts the gross pool concept where each generator submits offers	~~3 The Electricity Market Model of the WESM~~ **1.2 Purpose** **1.2.1** The **price determination methodology and settlement formula in this Market Manual shall ensure that the** following characteristics and pricing principles **of the WESM are achieved** ~~are adopted~~: ~~3.1. The WESM adopts locational pricing to provide the correct economic signals to market participants when they properly account for the economic impact of losses and constraints that result from the operation of the electricity network.~~ [1] ~~*(Footnote 1: WESM Rules clause 3.6.1.3,3.6.1.4,3.6.1.5*)~~ ~~3.2.~~ **a.** ~~The WESM adopts the gross~~ **Gross** pool ~~concept,~~ where each ~~generator~~ **scheduled generation company** ~~submits~~	• Rewording, for clarity • Renumbering to conform with the formatting for Market Manuals • Guiding principles under DOE DC 2015-10-0015 are adopted.

Title	Section	Provision	Proposed Amendment	Rationale
		for both price and quantity for energy for central scheduling and dispatch.[2] *(Footnote 2*: *WESM Rules clause 3.5.5*)	~~offers for both price and quantity~~ ~~for energy~~ **offer their maximum available capacity, non-scheduled generation company submit a standing nomination of loading levels, and Trading Participants with must dispatch generating units and priority dispatch generating units submit projected outputs** for central scheduling and dispatch~~.~~**, to ensure system security and a level-playing field among generators;**[2] *(Footnote 2*: *WESM Rules clauses 1.2.5 and 3.5.5*) **b. Net settlement, where bilateral contract quantities are settled outside the WESM;**[3] *(Footnote **3***: ***WESM Rules clause 3.13***) **c. Co-optimized energy and reserves, where the provision of energy and reserves are jointly optimized in the market dispatch optimization model;**[4] *(Footnote **4***: ***WESM Rules clause 3.6***)	
		3.3. The WESM adopts the principle of self-commitment whereby participants assume full responsibility for how and when their plants are operated.[3] *(Footnote 3*: *WESM Rules Section 3.5.5, 3.5.9, 3.5.10, 3.5.11*)	**d.** ~~3.3. The WESM adopts the principle of~~ ~~self-commitment~~ **Self-commitment,** ~~whereby~~ **where Trading Participants** ~~participants assume full responsibility~~ **are responsible** for ~~how and when~~ **the management of** their ~~plants are operated.~~ **technical operations, unit commitment decisions and other market risks through submission of bids and offers to the WESM;** ~~3~~[5] *(Footnote ~~3~~ **5***: *WESM Rules ~~Section 3.5.5, 3.5.9, 3.5.10, 3.5.11~~ **Clause 3.5***)	

Title	Section	Provision	Proposed Amendment	Rationale
		3.4. The WESM adopts a full nodal pricing regime for both generation and customers. Nodal pricing is a mechanism for revealing, at different points in the system, the cost incurred to ensure sufficient power flows to meet all loads in all locations.[4] *(Footnote 4*: *WESM Rules 3.2.2.3 (A), as amended. See DOE Circular DC-2004-07-008 in Annex B*)	**e. Prices are governed, as far as practicable, by commercial and market forces;[6]** *(Footnote **6***: ***WESM Rules clause 1.2.5***) 3.4.**f.** ~~The WESM adopts a full~~ **Full** nodal **or locational marginal** pricing regime **in energy** for both ~~generation~~ **generator market trading nodes** and ~~customers.~~ **customer market trading nodes** ~~Nodal pricing is a mechanism for revealing, at different points in the system, the cost incurred to ensure sufficient power flows to meet all loads in all locations~~ **to provide economic signals that properly account the economic impact of losses and constraints that resulted from the operation of the electricity market**.[4**7**] *(Footnote ~~4~~ **7**: WESM Rules ~~3.2.2.3 (A), as amended. See DOE Circular DC-2004-07-008 in Annex B~~ **clauses 3.2.2 and 3.6.1***)	
		3.5. The WESM adopts the scheme of ex-ante and ex-post pricing to account for discrepancies between planned (ex-ante) and actual outcomes (ex-post).[5] *(Footnote 5*: *WESM Rules clause 3.10.1*)	3.5. **g.** ~~The WESM adopts the scheme of ex-ante and ex-post~~ **Zonal** pricing ~~to account~~ for **reserves** ~~discrepancies between planned (ex-ante) and actual outcomes (ex-post).~~**;**[5**8**] *(Footnote ~~5~~ **8**: WESM Rules clause ~~3.10.1~~ **3.6.1**) **h. Trading Participants are provided with regularly updated information on projected prices, dispatch and other market outcomes to ensure they can make informed commercial and technical decisions;[9] and**	

Title	Section	Provision	Proposed Amendment	Rationale
			*(Footnote **9**: WESM Rules clause 1.2.5*) **i. Other principles that are contained in the issuances of the DOE insofar as these principles are consistent with the objectives of applicable laws.** ~~1 Objectives of the Price Determination Methodology~~ **1.3 Scope** **1.3.1 This Market Manual provides** ~~The Price Determination Methodology (the "PDM") aims to –~~ ~~1.1. Provide the market participants with~~ the ~~specific~~ principles **and methodology** by which energy and reserves in the WESM ~~will~~ **shall** be priced**,[10] including the determination of prices when there is extreme price separation due to network congestion,[11] and determination of administered prices during market suspension and market intervention**.[12] *(Footnote **10**: **WESM Rules Clause 3.10**)* *(Footnote **11**: **WESM Rules Clause 3.12.7**)* *(Footnote **12**: **WESM Rules Clause 6.2.3**)* **1.3.2 This Market Manual provides the principles and methodology by which energy and reserves shall be settled in the WESM, including the cost recovery for reserves, the determination of additional compensation, as applicable, and the determination and allocation of net settlement surplus.[13]**	
Objectives of the Price Determination Methodology	1	1 Objectives of the Price Determination Methodology The Price Determination Methodology (the "PDM") aims to – 1.1. Provide the market participants with the specific principles by which energy and reserves in the WESM will be priced.		• To consolidate all principles and methodology for the pricing and settlement of energy and reserves.

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		1.2. Provide the specific computational formula that will enable the market participants to verify the correctness of the charges being imposed.	*(Footnote **13**:* **WESM Rules Clause 3.13**) **1.3.3 This Market Manual provides the principles and methodology by which energy and reserves shall be priced and settled in accordance with the market design principles as issued by the DOE.[14]** *(Footnote **14**: DOE Circular 2015-10-0015, "Providing Policies for further Enhancement of the Wholesale Electricity Spot Market (WESM) Design and Operations", dated 23 October 2015*) ~~1.2.~~ **1.3.4 This Market Manual** ~~Provide~~ **provides** the ~~specific~~ computational formula that will enable the ~~market~~ **WESM** participants to verify the correctness of the charges being imposed.	
General Guiding Principles	2	2 General Guiding Principles The EPIRA and the WESM Rules are the main guiding documents for this PDM.	~~2 General Guiding Principles~~ ~~The EPIRA and the WESM Rules are the main guiding documents for this PDM.~~	
Glossary of Terms		Glossary of Terms	~~Glossary of Terms~~ **SECTION 2 DEFINITIONS, REFERENCES AND INTERPRETATION** **2.1 Definitions** **2.1.1 Unless otherwise defined or the context implies otherwise, the italicized terms used in this Market Manual that shall bear the same meaning as defined in the WESM Rules and other Market Manuals.**	• To conform with the formatting for Market Manuals

Title	Section	Provision	Proposed Amendment	Rationale
			2.1.2 The following words and phrases as used in this Market Manual shall have the following meaning –	
Glossary of Terms		Act. xxx Administered Price Cap. xxx	~~Act. xxx~~ ~~Administered Price Cap. xxx~~	Already defined in the WESM Rules. Administered Price in WESM Rules bears same meaning as Administered Price Cap (in PDM).
Glossary of Terms		Algorithm. The process/processes applied by the MDOM in computing the dispatch schedules and prices.	**a.** Algorithm. The process/processes applied by the ~~MDOM~~ **market dispatch optimization model** in computing the dispatch schedules and prices.	Renumbering and edits for clarity
Glossary of Terms		Ancillary Services Provider. xxx Bilateral Contract. xxx Central Dispatch. xxx	~~Ancillary Services Provider. xxx~~ ~~Bilateral Contract. xxx~~ ~~Central Dispatch. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		NEW	**b. Constrained Solution. A solution produced by the market dispatch optimization model considering all constraints based on the price determination methodology.** **c. Constrained-on Generators. Generation units that were scheduled to run pursuant to the original market solution but would not have been cleared or cleared at a lower quantity based on the unconstrained solution.**	Added terminology used in the PSM.
Glossary of Terms		Constraint. xxx Constraint violation. xxx	~~Constraint. xxx~~ ~~Constraint violation. Xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Constraint Violation Coefficient Price. The price associated with the Constraint Violation Coefficients.	~~Constraint Violation Coefficient Price. The price associated with the Constraint Violation Coefficients.~~	Not used in the PDM.
Glossary of Terms		Constraint Violation Coefficients. xxx Contingency List. xxx	~~Constraint Violation Coefficients. Xxx~~ ~~Contingency List. xxx~~	• Already defined in the WESM Rules. • Contingency is defined in the Dispatch Protocol Manual.
Glossary of Terms		Customer Load Forecast. The hourly demand forecast provided by customers at their respective market trading node as defined in	~~Customer Load Forecast. The hourly demand forecast provided by customers at their respective market trading node as defined in~~	Not used in the PDM.

Title	Section	Provision	Proposed Amendment	Rationale
		the Market Network Model, which forecast is to be used in the determination of market projections and real time dispatch in accordance with WESM timetable.	~~the Market Network Model, which forecast is to be used in the determination of market projections and real time dispatch in accordance with WESM timetable.~~	
Glossary of Terms		Customer Pricing Zone. xxx	~~Customer Pricing Zone. Xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Day Ahead Dispatch Process. A pre-dispatch process covering the results obtained in the day-ahead projections.	~~Day Ahead Dispatch Process. A pre-dispatch process covering the results obtained in the day-ahead projections.~~	Not used in the PDM.
Glossary of Terms		Demand Bid. xxx Dispatch. xxx Dispatch Schedule. xxx Dispatchable load. Xxx DOE. xxx	~~Demand Bid. xxx~~ ~~Dispatch. xxx~~ ~~Dispatch Schedule. xxx~~ ~~Dispatchable load. xxx~~ ~~DOE. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Economic gain. The benefit that will be received by consumers in the economic dispatch optimization.	**d.** Economic gain. The **total** benefit that will be received by **the producers and** consumers **of electricity** in the **security-constrained** ~~economic~~ **dynamic** dispatch optimization.	Renumbering and edits for clarity
Glossary of Terms		Economic rental. xxx Emergency. xxx End-user. Xxx Energy. xxx	~~Economic rental. xxx~~ ~~Emergency. xxx~~ ~~End-user. xxx~~ ~~Energy. Xxx~~	Already defined in the WESM Rules.
Glossary of Terms		NEW	**e. Energy Administered Price. The price used in lieu of the nodal energy dispatch price during dispatch intervals under market suspension or market intervention.**	Added terminology used in the determining AP.
Glossary of Terms		Energy Balance Equation. xxx	~~Energy Balance Equation. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Energy Management System (EMS). A system of computer-aided tools used by the System Operator to monitor, control, and optimize the performance of the generation and transmission systems.	~~Energy Management System (EMS).~~ ~~A system of computer-aided tools used by the System Operator to monitor, control, and optimize the performance of the generation and transmission systems.~~	Not used in the PDM.
Glossary of Terms		Energy Regulatory Commission. xxx Ex-Ante. xxx	~~Energy Regulatory Commission. xxx~~ ~~Ex-Ante. Xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Ex-Ante Dispatch Process. Process where dispatch targets is set for the end of a trading	~~Ex-Ante Dispatch Process. Process where dispatch targets is set for the end of a trading~~	Deletion of terms, for consistency with the proposed

Title	Section	Provision	Proposed Amendment	Rationale
		interval, immediately preceding the beginning of that trading interval. Ex-Ante Energy Settlement Price. The ex-ante nodal energy price or the ex-ante zonal reserve price, as may be appropriate, determined in accordance with clause 3.10.2 or clause 3.10.3, both of the WESM Rules. Ex-Ante Energy Settlement Quantity. The gross amount determined by the Market Operator in accordance with WESM Rules clause 3.13.5, and adjusted for bilateral contracts in accordance with clause 3.13.7. Ex-Ante Energy Trading Amount. Determined as the ex-ante energy settlement price for a node in a trading interval multiplied by the ex-ante energy settlement quantity (in MWh) for that node in that trading interval. Ex-Ante Nodal Energy Price. The price determined by the Market Operator for a particular market network node and trading interval, immediately prior to commencement of that trading interval, directly from the dispatch optimization for that trading interval in accordance with WESM Rules clause 3.10.2. Ex-Post. A matter determined in relation to a trading interval after that trading interval concludes. Ex-Post Dispatch Process. Process where dispatch is set for the end of a trading interval, immediately after the trading interval concludes.	~~interval, immediately preceding the beginning of that trading interval.~~ ~~Ex-Ante Energy Settlement Price. The ex-ante nodal energy price or the ex-ante zonal reserve price, as may be appropriate, determined in accordance with clause 3.10.2 or clause 3.10.3, both of the WESM Rules.~~ ~~Ex-Ante Energy Settlement Quantity. The gross amount determined by the Market Operator in accordance with WESM Rules clause 3.13.5, and adjusted for bilateral contracts in accordance with clause 3.13.7.~~ ~~Ex-Ante Energy Trading Amount. Determined as the ex-ante energy settlement price for a node in a trading interval multiplied by the ex-ante energy settlement quantity (in MWh) for that node in that trading interval.~~ ~~Ex-Ante Nodal Energy Price. The price determined by the Market Operator for a particular market network node and trading interval, immediately prior to commencement of that trading interval, directly from the dispatch optimization for that trading interval in accordance with WESM Rules clause 3.10.2.~~ ~~Ex-Post. A matter determined in relation to a trading interval after that trading interval concludes.~~ ~~Ex-Post Dispatch Process. Process where dispatch is set for the end of a trading interval, immediately after the trading interval concludes.~~	implementation of single settlements, i.e. no ex-post. Note: revised definition in WESM Rules were proposed

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		Ex-Post Energy Settlement Price. The ex-post nodal energy price or the ex-post zonal energy price, as appropriate, determined in accordance with WESM Rules clause 3.10.9 Ex-Post Energy Settlement Quantity. The amount determined by the Market Operator accordance with WESM Rules clause 3.13.6. Ex-Post Energy Trading Amount. The ex-post energy settlement price for a node in a trading interval multiplied by the ex-post energy settlement quantity for that node in that trading interval (in MWh); minus the ex-post energy settlement price for that node in that trading interval multiplied by the ex-ante energy settlement quantity for that node in that trading interval (in MWh). Ex-Post Nodal Energy Price. The price determined by the Market Operator for a particular market node and trading interval, after the end of that trading interval in accordance with WESM Rules clause 3.10.6.	~~Ex-Post Energy Settlement Price. The ex-post nodal energy price or the ex-post zonal energy price, as appropriate, determined in accordance with WESM Rules clause 3.10.9~~ ~~Ex-Post Energy Settlement Quantity. The amount determined by the Market Operator accordance with WESM Rules clause 3.13.6.~~ ~~Ex-Post Energy Trading Amount. The ex-post energy settlement price for a node in a trading interval multiplied by the ex-post energy settlement quantity for that node in that trading interval (in MWh); minus the ex-post energy settlement price for that node in that trading interval multiplied by the ex-ante energy settlement quantity for that node in that trading interval (in MWh).~~ ~~Ex-Post Nodal Energy Price. The price determined by the Market Operator for a particular market node and trading interval, after the end of that trading interval in accordance with WESM Rules clause 3.10.6.~~	
Glossary of Terms		Facility. xxx	~~Facility. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Financial Transmission Right. The right to financial compensation based on differences between nodal energy prices at different market trading nodes.	~~Financial Transmission Right. The right to financial compensation based on differences between nodal energy prices at different market trading nodes.~~	"Transmission right" is already defined in the WESM Rules.
Glossary of Terms		Formulation. xxx	~~Formulation. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Generating facility. A facility, consisting of one or more generating units, where electric energy is produced from some other form of energy by means of a suitable apparatus.	~~Generating facility. A facility, consisting of one or more generating units, where electric energy is produced from some other form of energy by means of a suitable apparatus.~~	Not used in the PDM.
Glossary of Terms		Generating unit. xxx Generation. xxx Generation offer. Xxx	~~Generating unit. xxx~~ ~~Generation. xxx~~ ~~Generation offer. Xxx~~	• Already defined in the WESM Rules. (Generator node is "generator market trading

Title	Section	Provision	Proposed Amendment	Rationale
		Generator node. xxx Grid. xxx	~~Generator node. xxx~~ ~~Grid. xxx~~	node" in the WESM Rules, as revised)
Glossary of Terms		Gross Pool. The dispatch model where all energy is traded through the WESM.	~~Gross Pool. The dispatch model where all energy is traded through the WESM.~~	Term is a widely accepted term used in electricity markets.
Glossary of Terms		Intervention. xxx	~~Intervention. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Linear Programming. A mathematical procedure for minimizing or maximizing a linear function of several variables, subject to a finite number of linear restrictions on these variables.	~~Linear Programming. A mathematical procedure for minimizing or maximizing a linear function of several variables, subject to a finite number of linear restrictions on these variables.~~	Term is a widely used mathematical procedure.
Glossary of Terms		Line rental. xxx Load. xxx Load Forecast. xxx	~~Line rental. xxx~~ ~~Load. xxx~~ ~~Load Forecast. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Load Pattern. Represents the relative magnitudes of MW and MVar values on individual loads. The load pattern data is used to distribute system/zonal load to individual loads, i.e. nodal load.	~~Load Pattern. Represents the relative magnitudes of MW and MVar values on individual loads. The load pattern data is used to distribute system/zonal load to individual loads, i.e. nodal load.~~	Not used in the PDM.
Glossary of Terms		Locational Marginal Price (LMP). This is the marginal value of the objective function at each bus at the solution of the optimization problem.	**f.** Locational Marginal ~~Price (LMP)~~ **Pricing**. ~~This is the~~ marginal value of the objective function at each bus at the solution of the optimization problem. **The mechanism by which the nodal energy dispatch price is determined.**	• Renumbering • For clarity
Glossary of Terms		Marginal Plant. The generating unit or plant whose price offer corresponds to the system marginal price for a given trading interval.	~~Marginal Plant. The generating unit or plant whose price offer corresponds to the system marginal price for a given trading interval.~~	Not used in the PDM.
Glossary of Terms		Market Dispatch Optimization Model (MDOM). xxx Market Network Model. xxx Market Offer. xxx Market Operator. xxx Market Price. xxx Market Suspension. xxx Market Trading Nodes. xxx Market Transaction. xxx Meter. xxx Metering Point. xxx	~~Market Dispatch Optimization Model (MDOM). xxx~~ ~~Market Network Model. xxx~~ ~~Market Offer. xxx~~ ~~Market Operator. xxx~~ ~~Market Price. xxx~~ ~~Market Suspension. xxx~~ ~~Market Trading Nodes. xxx~~ ~~Market Transaction. Xxx~~ ~~Meter. xxx~~ ~~Metering Point. xxx~~	Already defined in the WESM Rules.

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Glossary of Terms		MW block. Represents the quantity portion of the market offers/bids of the trading participants.	~~MW block. Represents the quantity portion of the market offers/bids of the trading participants.~~	Already explained in the PDM.
Glossary of Terms		Net Load Forecast. xxx Net Settlement Surplus. Xxx	~~Net Load Forecast. xxx~~ ~~Net Settlement Surplus. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		NEW	**g. Network Congestion. Refers to the congestion at a line or transformer that is connected in a meshed network.**	Added terminology used in the determining PSM.
Glossary of Terms		Network Data. These are electrical parameters used to represent the transmission system or network.	**h.** Network Data. ~~These are~~ **The** electrical parameters used to represent the transmission system or network **in the market network model.**	Renumbering and clerical edits.
Glossary of Terms		Network Service Provider. xxx	~~Network Service Provider. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Nodal Energy Price. The energy price at a node determined ex ante or ex-post. This is also the Locational Marginal Price (the "LMP") in the WESM.	~~Nodal Energy Price. The energy price at a node determined ex ante or ex-post. This is also the Locational Marginal Price (the "LMP") in the WESM.~~	Deleted, for consistency with the proposed amendments to the WESM Rules.
Glossary of Terms		Node. xxx	~~Node. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Non Dispatchable Load Energy. The MW energy requirement of non-dispatchable load.	~~Non Dispatchable Load Energy. The MW energy requirement of non-dispatchable load.~~	Not used in the PDM.
Glossary of Terms		Objective Function. Function to be minimized or maximized, representing, e.g., cost or profit.	~~Objective Function. Function to be minimized or maximized, representing, e.g., cost or profit.~~	Already described in the PDM.
Glossary of Terms		Opportunity Cost. xxx	~~Opportunity Cost. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Outage Schedules. Schedule for shutting down or de-rating of generation and transmission facilities.	~~Outage Schedules. Schedule for shutting down or de-rating of generation and transmission facilities.~~	Outage is already defined in the WESM Rules.
Glossary of Terms		Over generation. Constraint Violation Coefficient for the system condition whereby the generation in the system exceeds the total demand. This also corresponds to system energy balance constraint. This condition is also known as excess generation.	~~Over generation. Constraint Violation Coefficient for the system condition whereby the generation in the system exceeds the total demand. This also corresponds to system energy balance constraint. This condition is also known as excess generation.~~	CVCs are described under the CVC Manual.
Glossary of Terms		PEM Board. xxx Plant. xxx Power System. xxx	~~PEM Board. xxx~~ ~~Plant. xxx~~ ~~Power System. xxx~~	Already defined in the WESM Rules.

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Glossary of Terms		Price Curve. The price curve of a generator energy offer is defined by up to ten (10) blocks as follows: the nth block (P/MW) defines the price between the nth and (n+1st) MW points. The last non-zero MW break point and slope (P/MW) defines the price until the maximum generation. The blocks must be monotonically non-decreasing.	~~Price Curve. The price curve of a generator energy offer is defined by up to ten (10) blocks as follows: the nth block (P/MW) defines the price between the nth and (n+1st) MW points. The last non-zero MW break point and slope (P/MW) defines the price until the maximum generation. The blocks must be monotonically non-decreasing.~~	Already described in the PDM.
Glossary of Terms		Price Determination Methodology. A document which provides specific details as to how dispatch schedules and locational marginal prices (nodal prices) are calculated in the Market Dispatch Optimization Model (MDOM) as provided in clause 3.6 of the WESM Rules.	~~Price Determination Methodology. A document which provides specific details as to how dispatch schedules and locational marginal prices (nodal prices) are calculated in the Market Dispatch Optimization Model (MDOM) as provided in clause 3.6 of the WESM Rules.~~	Definition is already provided in the Introduction.
Glossary of Terms		Receiving node. xxx	~~Receiving node. Xxx~~	Already defined in the WESM Rules.
Glossary of Terms		NEW	**i. Reserve Administered Price. The price used in lieu of the reserve prices during dispatch intervals under market suspension or market intervention.**	Added terminology used in the determining AP.
Glossary of Terms		Regional Reserve Price. The price for reserve in a particular supply zone, and trading interval, determined in accordance with WESM Rules clause 3.10.10. Also known as zonal reserve price.	~~Regional Reserve Price. The price for reserve in a particular supply zone, and trading interval, determined in accordance with WESM Rules clause 3.10.10. Also known as zonal reserve price.~~	Reserve Price is already defined in the WESM Rules.
Glossary of Terms		Reserve Category. xxx Reserve Offer. xxx	~~Reserve Category. xxx~~ ~~Reserve Offer. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Reserve Requirements. Demands for regulation reserve, contingency reserve and other relevant types of reserves. They are determined based on system loading, maximum generator tripping and other considerations	**j.** Reserve Requirements. ~~Demands for regulation reserve, contingency~~ ~~reserve and other relevant types~~ **MW level to be met for the various categories** ~~of~~ reserves. ~~They are determined based on system loading, maximum generator tripping and other considerations~~	• Renumbering • Updated definition to align with proposed amendments regarding reserve categories.
Glossary of Terms		Reserve Region or Reserve Zone. xxx Run. xxx	~~Reserve Region or Reserve Zone. xxx~~ ~~Run. xxx~~	Already defined, as amended, in the WESM Rules.
Glossary of Terms		Scenario. xxx Scheduled Load. xxx	~~Scenario. xxx~~ ~~Scheduled Load. xxx~~	Already defined, as amended, in the WESM Rules.

Title	Section	Provision	Proposed Amendment	Rationale
Glossary of Terms		Security-constrained economic dispatch. Process of apportioning the total load on a system between the various generating plants to achieve the greatest economy of operation and taking account of the limitations of the power system.	**k.** Security-constrained ~~economic~~ **dynamic** dispatch. Process of apportioning the total load on a system between the various generating ~~plants~~ **units over a certain time period** to achieve the greatest economy of operation and taking account of the limitations of the power system.	• Renumbering • Minor correction
Glossary of Terms		Security limits. Limits imposed by the System Operator on generation and transmission equipment to maintain system security and reliability.	**l.** Security limits. Limits imposed by the System Operator on generation and transmission equipment to maintain system security and reliability.	Renumbering
Glossary of Terms		Self-commitment. The principle whereby participants assume full responsibility for how and when their plants are operated.	~~Self-commitment. The principle whereby participants assume full responsibility for how and when their plants are operated.~~	Definition is already provided in the Introduction.
Glossary of Terms		NEW	**m. Self-scheduled energy. Refers to projected outputs of must dispatch and priority dispatch generating units, and nomination of loading levels of non-scheduled generating units.**	Term to describe resources that do not submit offers.
Glossary of Terms		Sending node. xxx Settlement. xxx Settlement Amount. xxx Settlement Price. xxx Settlement Quantity. xxx Settlement Surplus. xxx Spot Market. xxx Standing Bid / Offer. xxx	~~Sending node. xxx~~ ~~Settlement. xxx~~ ~~Settlement Amount. xxx~~ ~~Settlement Price. xxx~~ ~~Settlement Quantity. xxx~~ ~~Settlement Surplus. xxx~~ ~~Spot Market. xxx~~ ~~Standing Bid / Offer. xxx~~	Already defined, as amended, in the WESM Rules.
Glossary of Terms		State Estimator. A system forming part of the Energy Management System of the System Operator which determines the status of the power system through system snapshots.	~~State Estimator. A system forming part of the Energy Management System of the System Operator which determines the status of the power system through system snapshots.~~	Not used in the PDM
Glossary of Terms		Supplier. xxx Supply. xxx	~~Supplier. xxx~~ ~~Supply. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		System marginal price. The price set by the marginal plant scheduled in any trading period or interval.	**n.** System marginal price. The **shadow** price ~~set by the marginal plant scheduled in any trading period or interval.~~ **for which energy is priced.**	• Renumbering • For clarity
Glossary of Terms		System Operator. xxx	~~System Operator. xxx~~	Already defined in the WESM Rules.

Title	Section	Provision	Proposed Amendment	Rationale
Glossary of Terms		System Snapshot. The power system status at a certain time and is generated by the state estimator in the Energy Management System of the System Operator.	~~System Snapshot. The power system status at a certain time and is generated by the state estimator in the Energy Management System of the System Operator.~~	Already defined in the Dispatch Protocol Manual
Glossary of Terms		Tie Breaking Rules. Prorating rules which are based on the size of the MW Block of the price curves containing the non-unique schedules.	~~Tie Breaking Rules. Prorating rules which are based on the size of the MW Block of the price curves containing the non-unique schedules.~~	Provided in the PDM.
Glossary of Terms		Timetable. Xxx Trading Amount. xxx	~~Timetable. xxx~~ ~~Trading Amount. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Trading interval. A 1-hour period commencing on the hour.	~~Trading interval. A 1-hour period commencing on the hour.~~	Deletion of terms, for consistency with the proposed implementation of 5-minute dispatch interval.
Glossary of Terms		Trading Participant. xxx	~~Trading Participant. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Transmission Constraint Group. xxx	~~Transmission Constraint Group. xxx~~	Constraints are described under the CVC Manual.
Glossary of Terms		Transmission limits. Generally, thermal limits of individual transmission facilities.	~~Transmission limits. Generally, thermal limits of individual transmission facilities.~~	Already described in the PDM.
Glossary of Terms		Transmission Line. xxx	~~Transmission Line. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		Transmission Loss Factor. Scaling factors applied on the nodal prices to account for the network loss associated with the delivery or consumption of energy at different locations in the system.	**o.** Transmission Loss Factor. Scaling factors applied on the nodal **energy dispatch** prices to account for the network loss associated with the delivery or consumption of energy at different locations in the system.	Renumbering
Glossary of Terms		Transmission Network. xxx Transmission System. xxx	~~Transmission Network. xxx~~ ~~Transmission System. xxx~~	Already defined in the WESM Rules.
Glossary of Terms		NEW	**p. Unconstrained Solution. A co-optimized solution of the market dispatch optimization model that does not take into consideration the thermal limits of lines and transformers.**	Added terminology used in the PSM.
Glossary of Terms		Under generation. xxx	~~Under generation. xxx~~	CVCs are described under the CVC Manual.
Glossary of Terms		Voltage. xxx	~~Voltage. xxx~~	Already defined in the WESM Rules.

Title	Section	Provision	Proposed Amendment	Rationale
Glossary of Terms		Week Ahead Dispatch Process. A pre-dispatch process covering the results obtained in the week ahead projections.	~~Week Ahead Dispatch Process. A pre-dispatch process covering the results obtained in the week ahead projections.~~	Not used in the PDM
Glossary of Terms		WESM Rules. xxx	~~WESM Rules. xxx~~	Already defined in the WESM Rules.
		NEW	**2.2 References** **2.2.1 This Manual shall be read in association with the following –** **a. WESM Rules** **b. Dispatch Protocol Manual** **c. Constraint Violation Coefficients and Pricing Re-Runs Manual** **d. Market Operator Information Disclosure and Confidentiality Manual** **2.3 Interpretation** **2.3.1 Any reference to a clause in any section of this Market Manual shall refer to the particular clause of the same section in which the reference is made, unless otherwise specified or the context provides otherwise.** **2.3.2 Standards and policies appended to, or referenced in, this Market Manual shall provide a supporting framework.**	To conform with the formatting for Market Manuals
		NEW	**SECTION 3 RESPONSIBILITIES** **3.1 Market Operator** **3.1.1 The Market Operator shall be responsible for the development, validation, maintenance, publication, and revision of this Market Manual in**	• To conform with the formatting for Market Manuals • To provide the responsibilities of the MO, SO and WESM Members in the development, implementation, and review of the PDM.

Title	Section	Provision	Proposed Amendment	Rationale
			coordination with Trading Participants and the System Operator. **3.1.2 The Market Operator shall implement the principles and processes provided in this Market Manual.** **3.2 System Operator** **3.2.1 The System Operator shall provide the necessary information and references for the implementation and subsequent revisions and validation of this Market Manual.** **3.3 Trading Participants** **3.3.1 The Trading Participants shall provide the necessary information and references for the implementation and subsequent revisions and validation of this Market Manual.**	
DISPATCH AND PRICING ALGORITHM	4	4 DISPATCH AND PRICING ALGORITHM	**SECTION** ~~4~~ DISPATCH AND PRICING ALGORITHM **4.1 Scope** **4.1.1 This section provides an overview of the dispatch and pricing algorithm for energy and reserves in the WESM. The detailed formulation of the algorithm is provided for in Appendix A of this Market Manual.**	• Addition to provide the scope of the dispatch and pricing algorithm.
Description of the Market Dispatch Optimization Model	4.1	4.1. Description of the Market Dispatch Optimization Model The Market Dispatch Optimization Model (the "MDOM") performs market-clearing	**4.2** ~~4.1.~~ ~~Description of the~~ Market Dispatch Optimization Model **4.2.1** ~~The Market Dispatch Optimization Model (the "MDOM") performs market-~~	• Renumbering • Rewording for clarity

Title	Section	Provision	Proposed Amendment	Rationale
		computations. It receives information on system conditions and requirements from the System Operator as well as market offers and bids from trading participants. It then processes this information to come up with an optimum scheduling of energy and reserves that will maximize economic gains for the trading participants taking into consideration the physical limitations of the transmission network and of the facilities of the trading participants. It utilizes linear programming techniques to create a security constrained economic dispatch and calculate nodal energy prices for all market trading nodes in the Market Network Model (the "MNM") and reserve prices for all reserve regions. The nodal energy prices are the locational marginal prices used to compute charges and payments while the dispatch schedules is used to dispatch generators to maintain balance in the power system.	~~clearing computations. It receives information on system conditions and requirements from the System Operator as well as market~~**, The WESM shall employ a gross pool dispatch model where all submitted generation** offers**, reserve offers, projected outputs, nomination of loading levels,** and **demand** bids ~~from trading participants~~ **are scheduled based on the mathematical optimization algorithm of the market dispatch optimization model.** **4.2.2 The market dispatch optimization model shall perform computations in determining the market clearing price based on the information it receives on system conditions and constraints from the System Operator; generation and reserve offers, nomination of loading levels, projected output and demand bids from Trading Participants; and load forecasts from the Market Operator.** **4.2.3** It **shall process** ~~then processes this~~ **these** information to come up with an optimum scheduling of energy and reserves that will maximize economic gains for the **Trading Participants** ~~trading participants~~ taking into consideration the physical limitations of the transmission network and of the facilities of the trading participants. **4.2.4** It ~~utilizes~~ **shall utilize** linear programming techniques to ~~create a security constrained economic~~ **determine** dispatch **schedules** and calculate nodal energy **dispatch** prices for all market trading nodes in the ~~Market Network Model (the "MNM")~~	

Title	Section	Provision	Proposed Amendment	Rationale
			market network model and reserve prices for all reserve regions. ~~The nodal energy prices are the locational marginal prices used to compute charges and payments while the dispatch schedules is used to dispatch generators to maintain balance in the power system.~~	
Required Inputs to the MDOM	4.3	4.3. Required Inputs to the MDOM The MDOM receives input data from three sources, namely, the System Operator, the trading participants and the Market Operator. The information provided is as required in the WESM Rules. System Operator Network data; System snapshot; Reserve requirements for each type of reserve in a reserve region; Outage schedules; Contingency List; Transmission limits; Security limits; and Load pattern. Trading Participants Registration Data; Generation Offers; Reserve Offers; Demand Bids; and Optional Load Forecast. Market Operator Market Network Model; Load Forecast; and	4.3. Required Inputs to the MDOM **4.3.1** The ~~MDOM~~ **market dispatch optimization model shall receive** ~~receives~~ input data from three sources, namely, the System Operator, the ~~trading participants~~ **Trading Participants** and the Market Operator. The information provided is as required in the WESM Rules.[15] *(Footnote* **15**: ***WESM Rules clause* 3.5**) **4.3.2** System Operator **Inputs:** **a.** Network data; **b.** System snapshot; ~~Reserve requirements for each type of reserve in a reserve region;~~ **c.** Outage schedules; **d.** Contingency List; **and** ~~Transmission limits;~~ **e. Over-riding constraints** • Security limits~~; and~~ ➢ **Generation Limits** ➢ **Branch Group Limits** • **Must-Run Generation** ~~Load pattern.~~ **4.3.3** Trading Participant~~s~~ **Inputs:** **a.** Registration Data; **b.** Generation Offers;	For clarity.

Title	Section	Provision	Proposed Amendment	Rationale
		Constraint Violation Coefficient. Appendix A.1 of the WESM Rules details the information to be supplied with offers to supply and to buy electricity while Appendix A.2 provide details on the information to be supplied by network service provider.	**c. Demand Bids;** **d.** Reserve Offers; **e. Schedule of loading levels;** **f. Projected output;** ~~Demand Bid~~s; and **g.** Optional Load Forecast. **4.3.4** Market Operator **Inputs** **a.** Market Network Model; **b. Reserve requirements;** **c. Nodal** Load Forecast; and **d.** Constraint Violation Coefficient. ~~Appendix A.1 of the WESM Rules details the information to be supplied with offers to supply and to buy electricity while Appendix A.2 provide details on the information to be supplied by network service provider.~~	
Basic Algorithm of the MDOM	4.2	4.2. Basic Algorithm of the MDOM The MDOM aims to maximize the economic gain derived from electricity trades in the market, considering the constraints imposed by existing system conditions. The objective of the MDOM is to maximize: Value of dispatched load based on demand bids, Minus the cost of dispatched generation based on generation offers, Minus the cost of dispatched reserves based on reserve offers, Minus the cost of constraint violation based on constraint violation coefficients.	**4.4** ~~4.2. Basic Algorithm of the MDOM~~ **Objective Function** **4.4.1** The ~~MDOM~~ **market dispatch optimization model** ~~aims to~~ **shall** maximize the economic gain derived from electricity trades in the market~~, considering the constraints imposed by existing system conditions~~. ~~The objective of the MDOM is to maximize:~~ **This is defined to be the maximization of the value** ~~Value~~ of dispatched load based on demand bids, **minus** ~~Minus~~ the cost of dispatched generation based on generation offers, **minus** ~~Minus~~ the cost of dispatched reserves based on reserve offers, **minus**	For clarity.

Title	Section	Provision	Proposed Amendment	Rationale
		The algorithm of the MDOM is given in the mathematical formulation below.[6] The detailed formulation is contained in Appendix III-2. *(Footnote* 6: WESM Rules clause 3.6.1.3) OBJECTIVE FUNCTION Maximize the economic gain from trade, where:	~~Minus~~ the cost of constraint violation based on constraint violation coefficients.**[16]** *(Footnote* **16**: **WESM Rules clause 3.6.1.3**) **It is represented by the following formulation:** ~~The algorithm of the MDOM is given in the mathematical~~ formulation**:** ~~below.[6] The detailed formulation is contained in Appendix III-2.~~ ~~(Footnote 6: WESM Rules clause 3.6.1.3)~~ ~~OBJECTIVE FUNCTION~~ Maximize the economic gain from trade, where:	
Economic Gain = $\left\{\sum_{i}^{E_D}\sum_{j}\left[\left(DB_{i,j}\right)\left(PDB_{i,j}\right)\right]-\sum_{i}^{E_G}\sum_{j}\left[\left(G_{i,j}\right)\left(PG_{i,j}\right)\right]-\sum_{i}^{E_R}\sum_{k}^{N_K}\sum_{j}\left[\left(R_{i,j,k}\right)\left(PR_{i,j,k}\right)\right]-\left(CVP\right)\right\}$			Economic Gain = $\sum_{i}^{n}\left\{\sum_{b}^{E_D}[(\mathrm{DB}_{b,i})(\mathrm{PDB}_{b,i})]-\sum_{k}^{E_G}[(\mathrm{G}_{k,i})(\mathrm{PG}_{k,i})]-\sum_{r}^{N_R}\sum_{j}^{E_R}[(\mathrm{R}_{j,r,i})(\mathrm{PR}_{j,r,i})]-\sum_{c}^{E_C}\left[\left(\mathrm{CQ}_{c,i}\right)\left(\mathrm{CP}_{c,i}\right)\right]-\sum \mathrm{CVP}\right\}$	
		i ∈ resources (generators and dispatchable loads) j ∈ energy and reserve offer blocks k ∈ reserve types Where: E_D Total number of dispatchable loads with energy demand bids. E_G Total number of generators with energy offers. E_R Total number of resources (generators or dispatchable load) with reserve offers.	**Where:** i ~~∈ resources (generators and dispatchable loads)~~ **refers to a specific dispatch interval** ~~j ∈ energy and reserve offer blocks~~ ~~k ∈ reserve types~~ ~~Where:~~ **n refers to the number of dispatch intervals involved in the solution** E_D ~~Total~~ **refers to the** number of ~~dispatchable loads with energy~~ **demand** ~~bids~~ **bid blocks in a dispatch interval i** E_G ~~Total~~ **refers to the** number of ~~generators with energy offers~~ **generation offer blocks in a dispatch interval i**	• For clarity and consistency in the variables of the equations in the PDM. • To address the audit findings under the Procedure Review Report from the 2nd MO Audit, where: N_k is defined incorrectly and should be defined as number of reserve types

Title	Section	Provision	Proposed Amendment	Rationale
		N_K Total number of reserve resources for each reserve type "k" $DB_{i,j}$ The MW quantity of the "jth" Energy Bid block of the ith Dispatchable Load. $PDB_{i,j}$ The price per quantity element of the j^{th} Energy Bid block of the i^{th} Dispatchable Load. Gi,j The MW quantity of the jth Energy Offer block of the ith Generator (or dispatchable load). $PG_{i,j}$ The price per quantity element of the j^{th} Energy Offer block of the i^{th} Generator (or dispatchable load). $R_{i,j,k}$ The MW quantity of the jth Reserve Offer block of the kth Reserve Type of the ith Resource. $PR_{i,j,k}$ The price per quantity element of the j^{th} Reserve Offer block of the k^{th} Reserve Type of the i^{th} Resource.	E_R ~~Total~~ **refers to the** number of ~~resources (generators or dispatchable load) with~~ **reserve offer** ~~offers~~ **blocks in a dispatch interval I** ~~N_K~~ ~~Total number of reserve resources for each reserve type "k"~~ **N_R refers to the number of reserve categories** $DB_{b,i,j}$ ~~The MW~~ **refers to the demand bid block** quantity **b** ~~of the "jth" Energy Bid block of the ith Dispatchable Load~~ **at dispatch interval i** $PDB_{b,i,j}$ ~~The~~ **refers to the demand bid block** price **b** ~~per quantity element of the jth Energy Bid block of the ith Dispatchable Load~~ **at dispatch interval i** $G_{k,i,j}$ ~~The MW~~ **refers to the generation offer block** quantity **k** of the ~~jth Energy Offer block of the ith Generator (or dispatchable load)~~ **at dispatch interval i** $PG_{k,i,j}$ ~~The~~ **refers to the generation offer block** price **k** ~~per quantity element of the j^{th} Energy Offer block of the i^{th} Generator (or dispatchable load)~~ **at dispatch interval i** $R_{i,j,k,r,i}$ ~~The MW~~ **refers to the reserve offer block** quantity **j** ~~of the j^{th} Reserve Offer block~~ **for** ~~of the k^{th}~~ reserve ~~Type~~ **category r** ~~of the i^{th} Resource~~ **at dispatch interval i** $PR_{i,j,k,r,i}$ ~~The~~ **refers to the reserve offer block** price **j** ~~per quantity element of the j^{th} Reserve Offer block for of the k^{th}~~ **reserve** ~~Type~~ **category**	

Title	Section	Provision	Proposed Amendment	Rationale
		CVP The sum of penalty costs for soft constraints violations based on the constraint violation coefficients, where: CVP = $\sum_t [CVC_t * Q_t]$ CVC_t = Constraint violation penalty cost for Constraint Violation Type "t" Q_t = Constraint violation quantity for Constraint Violation Type "t"[7] *(Footnote* 7: Refer to section 4.9 for the types of constraint violation and Appendix III-1 for additional details on the formulation of constraint violation coefficients.)	**r** ~~of the i[th] Resource~~ **at dispatch interval i** **$CQ_{c,i}$ refers to the curtailment quantity c at dispatch interval i** **$CP_{c,i}$ refers to the curtailment price c at dispatch interval i** CVP **refers to constraint violation penalties** ~~The sum of penalty costs for soft constraints violations based on the constraint violation coefficients, where:~~ ~~CVP = $\sum_t [CVC_t * Q_t]$~~ ~~CVC_t = Constraint violation penalty cost for Constraint Violation Type "t"~~ ~~Q_t = Constraint violation quantity for Constraint Violation Type "t"[7]~~ ~~*(Footnote* 7: Refer to section 4.9 for the types of constraint violation and Appendix III-1 for additional details on the formulation of constraint violation coefficients.)~~	
		NEW	**4.4.2 The objective function may be comprised of a solution for only one dispatch interval, or a set of dispatch intervals.** **4.4.3 Market projections shall employ a security-constrained dynamic dispatch, wherein the economic gain from trade for each execution of a market projection is maximized for the entire set of dispatch intervals in the covered study period of that market projection.**	For clarity.

Title	Section	Provision	Proposed Amendment	Rationale
			4.4.4 The real time dispatch shall employ a security-constrained dynamic dispatch and is solved per dispatch interval. **4.4.5 If there are no prices and schedules determined during the real time dispatch, then the results of the corresponding hour ahead projection shall be used for that dispatch interval.[17]** *(Footnote **17**: **WESM Rules Clause 3.4.1.2**)*	
		Subject to the following constraints: xxx	**4.5 Dispatch Constraints** ~~Subject to the following constraints:~~ ~~xxx~~ **4.5.1The objective function in Section 4.4 of this Market Manual shall be subject to the following constraints:** **a. System Constraints** **i. System power balance, including power balance during islanding operation** **ii. Reserve region requirements, including ancillary services cascading** **iii. Reserve provider capacity cap** **iv. AC power flow, including the network loss model and line power flow limits** **v. HVDC capacity limit** **vi. Nodal energy balance constraint** **b. Resource Constraints** **i. Generator resource energy constraint** **ii. Load resource energy constraint**	Deletion of details since these are provided in the detailed formulation (Appendix A).

Title	Section	Provision	Proposed Amendment	Rationale
			iii. Reserve resource constraint • **Reserve capacity limit** • **Combined reserve ramping limit** **iv. Combined energy and reserve capacity limit** **v. Combined energy and reserve ramping** **vi. Constraints that pertain to the operational modes of generators, loads or similar facilities** **c. Generic Constraints** **i. Over-riding Constraints** • **Security Limit** • **Transmission Limit** **ii. Outage schedule** **iii. Contingency list**	
Tie breaking/ Handling of Equivalent Offers	4.10	4.10. Tie breaking/Handling of Equivalent Offers In cases where two or more schedules are optimal, the MDOM will pro-rate the dispatch to the affected trading participants while observing equipment limitations. The pro-rating rules will be based on the size of the MW block of the price curves containing the non-unique schedules[12]. *(Footnote 12: See Appendix III-2 for the sample application of the tie-breaking rules.)* Appendix III-2 presents two examples of the application of the pro-rating rules.	**4.6** ~~4.10.~~ Tie ~~breaking/Handling~~ **Breaking** of Equivalent Offers[18] **4.6.1** In cases where two or more schedules are optimal, the ~~MDOM~~ **market dispatch optimization model** ~~will~~ **shall** pro-rate the ~~dispatch~~ **schedule** to the affected ~~trading participants~~ **Trading Participants** while observing equipment limitations~~. The pro-rating rules will be~~ based on the **generation offer/demand bid** ~~size of the MW~~ block ~~of the price curves containing the non-unique schedules~~ **quantity**[12]. *(Footnote ~~12~~ **18**: See Appendix ~~III-2~~ **B** for the sample application of the tie-breaking rules.*) ~~Appendix III-2 presents two examples of the application of the pro-rating rules.~~	For clarity.

Title	Section	Provision	Proposed Amendment	Rationale
			4.6.2 In case of a tie between a demand bid and a generator offer, the generation offer shall be maximized to meet the load requirement.	
		NEW	**4.7 Priority-Scheduling** **4.7.1 When restricting dispatch targets under WESM Rules Clause 3.6.1.7, the market dispatch optimization model shall consider the following hierarchy when a combination of the groups are to be restricted:[19]** *(Footnote* **19**: **WESM Rules clause 3.6.1.8**) **a. Market offers of scheduled generating units** **b. Non-scheduled generating units** **c. Priority dispatch generating units** **d. Must dispatch generating units.**	For clarity and consistency with the management of Pmin via offers under DOE DC 2015-15-0010.
Constraint Violation Coefficients	4.9	4.9. Constraint Violation Coefficients The constraint violation coefficients (the "CVCs") listed in WESM Rules clauses 3.6.1.3 (c) and 3.6.2 correspond to soft constraints in the MDOM and are associated with constraint violation prices. The CVCs are incorporated in the MDOM to ensure that, if constraints shall be violated, the violation will occur in an appropriate priority order that takes account of the security and reliability of the power system and the implementability of the resulting dispatch schedule.	~~4.9.~~ **4.8** Constraint Violation Coefficients **4.8.1** The constraint violation coefficients ~~(the "CVCs") listed in WESM Rules clauses 3.6.1.3 (c) and 3.6.2~~ **shall** correspond to soft constraints in the ~~MDOM~~ **market dispatch optimization model** and are associated with constraint violation prices.[20] *(Footnote* ***20***: ***WESM Rules clauses 3.6.1.3 and 3.6.2***) **4.8.2 Some constraints in the market dispatch optimization model shall be set up with one or more non negative violations variables and associated constraint violation coefficients to ensure that the market dispatch optimization**	• To harmonize with clause 3.6 of the WESM Rules, as amended. • Note that the hierarchy of CVCs are under the CVC Manual.

Title	Section	Provision	Proposed Amendment	Rationale
			model will always find a solution which satisfies all constraints, if such a solution exists. It shall also ensure that, if constraints are ~~The CVCs are incorporated in the MDOM to ensure that, if constraints shall be~~ violated, the violation will occur in an appropriate priority order that takes account of the **system** security and reliability of the power system and the ~~implementability~~ **feasibility** of the resulting dispatch schedule.	
		The following are the types of CVCs incorporated in the MDOM: - Deficit Interruptible Load Reserve - Deficit Dispatchable Reserve - Deficit Regulating Reserve - Deficit Contingency Reserve - Nodal Value of Lost Load - Contingency - Under-generation/Over-generation - Base Case Constraint - Transmission Constraint Group (TCG) constraint	**4.8.3** The following are the types of ~~CVCs~~ **constraint violation coefficients** incorporated in the ~~MDOM~~ **market dispatch optimization model**: ***a.*** ~~-~~ Deficit ~~Interruptible Load~~ Reserve **for each reserve category;** ~~- Deficit Dispatchable Reserve~~ ~~- Deficit Regulating Reserve~~ ~~- Deficit Contingency Reserve~~ **b.** ~~-~~ Nodal Value of Lost Load**;** **c.** ~~-~~ **N-x** contingency **thermal constraint;** **d.** ~~-~~ Under-generation**;** **e.** ~~/~~Over-generation**; and** **f.** ~~-~~ Base case **thermal** constraint. ~~- Transmission Constraint Group (TCG) constraint~~ **g. Self-scheduled generation constraint**	
		If any of these CVCs are encountered by the MDOM, the associated CVC prices will be	**4.8.4 The constraint violation coefficients shall be set for:** **a. market projections and dispatch schedules, and** **b. market pricing reruns when the market projections and dispatch schedules have resulted in a non-zero violation variable.**	

Title	Section	Provision	Proposed Amendment	Rationale
		reflected in the nodal prices to signal the risks to the power system of violating the constraint/s. If CVCs are indicated in the ex-ante nodal prices or when the resulting prices are believed to be in error, the Market Operator may issue a pricing error notice in which case the ex-post prices calculated at the end of that the relevant trading interval shall be substituted to the ex-ante prices. This is pursuant to clause 3.10.5 of the WESM Rules. [11] *(Footnote 11*: *See in Annex H, Constraint Violation Coefficients*)	~~If any of these CVCs are encountered by the MDOM, the associated CVC prices will be reflected in the nodal prices to signal the risks to the power system of violating the constraint/s.~~ ~~If CVCs are indicated in the ex-ante nodal prices or when the resulting prices are believed to be in error, the Market Operator may issue a pricing error notice in which case the ex-post prices calculated at the end of that the relevant trading interval shall be substituted to the ex-ante prices. This is pursuant to clause 3.10.5 of the WESM Rules.~~[11] ~~*(Footnote 11: See in Annex H, Constraint Violation Coefficients)*~~ **4.8.5 The constraint violation coefficients shall be set for market pricing re-runs so as to ensure that the dispatch of all network elements, loads, and generating units produced by the market optimization algorithm are approximately the same as the original market dispatch. It shall also be set to ensure that the prices produced by the market optimization algorithm will be appropriate in all the circumstances for settlement purposes, taking into consideration the processes provided for in Section 5 of this Market Manual.**	
The Output of the MDOM	4.4	4.4.The Output of the MDOM The optimization process will produce the following outputs: System Marginal Price;	~~4.4.~~**4.9** ~~The Output~~ **Outputs from** ~~of~~ the ~~MDOM~~ **Market Dispatch Optimization Model** **4.9.1** The optimization process ~~will~~ **shall** produce the following outputs **for the market projections and real time dispatch**:	For clarity.

Title	Section	Provision	Proposed Amendment	Rationale
		Generation output levels for each generating resource; Scheduled load for each dispatchable load; Reserve schedule for each generating resource; Transmission line flows; Transmission losses; Energy prices at each market trading node; and Regional reserve prices.	**a. Cost of the solution or economic gain;** **b. Transmission line flows;** **c. Losses by each equipment and in aggregate;** **d. Dispatch schedules;** **e. Market prices;** **i.** System Marginal Price; **ii. Nodal energy dispatch price;** ~~Generation output levels for each generating resource;~~ ~~Scheduled load for each dispatchable load;~~ ~~Reserve schedule for each generating resource;~~ ~~Transmission line flows;~~ ~~Transmission losses;~~ ~~Energy prices at each market trading node; and~~ **iii.** ~~Regional reserve~~ **Reserve** prices **for each reserve category and reserve region; and** **f. Non-zero violation variables.**	
Determination of the Dispatch Schedule	4.5	4.5 Determination of the Dispatch Schedule xxx	~~4.5 Determination of the Dispatch Schedule~~ ~~xxx~~	Deletion of explanatory provisions.
Determination of Nodal Prices	4.6	4.6. Determination of Nodal Prices The price at a particular node in the system (i.e. nodal price), signals the economic value of the electricity given the supply and demand interaction at that node. It represents the benefit of supplying electricity or the cost of consuming electricity at that location under the specific system conditions that were considered in the dispatch scheduling process.	~~4.6~~. **4.10** ~~Determination of Nodal Prices~~ **Locational Marginal Pricing** **4.10.1** ~~The price at a particular node in the system (i.e. nodal price), signals the economic value of the electricity given the supply and demand interaction at that node. It represents~~ **Locational marginal pricing shall reflect** the benefit of supplying electricity or the cost of consuming electricity at that location under the specific system conditions that were considered in the dispatch scheduling process.	Deletion of explanatory provisions.

Title	Section	Provision	Proposed Amendment	Rationale
		Nodal prices will differ across nodes in the network due to the presence of physical losses or network constraints (i.e., congestion). In an unconstrained system, the market price is set by one marginal plant (i.e., the system marginal price). This price is adjusted for each node to consider transmission losses, and the resulting value is the locational marginal price (the "LMP"). Where the system is constrained, the relevant flows of electricity are affected as the line limitations arising from the constraint may impede the supply of cheaper electricity from one area to another. In such cases, there may be more than one marginal plant setting the marginal price for the different nodes on either side of the constraint.	~~Nodal prices will differ across nodes in the network due to the presence of physical losses or network constraints (i.e., congestion).~~ ~~In an unconstrained system, the market price is set by one marginal plant (i.e., the system marginal price). This price is adjusted for each node to consider transmission losses, and the resulting value is the locational marginal price (the "LMP").~~ ~~Where the system is constrained, the relevant flows of electricity are affected as the line limitations arising from the constraint may impede the supply of cheaper electricity from one area to another. In such cases, there may be more than one marginal plant setting the marginal price for the different nodes on either side of the constraint.~~	
Price Adjustment to Reflect Transmission Losses and Congestion	4.7	4.7.Price Adjustment to Reflect Transmission Losses and Congestion The nodal prices are to be adjusted to reflect changes in power flows and losses as well as any congestion in the system, and signal to the market the relevant cost to produce and purchase electricity at the relevant market trading nodes. Specifically, the various nodal prices are to be adjusted by considering transmission loss factors and cost of congestion in each location in the system, thus, resulting in the locational marginal prices. Locational marginal prices are the economic value of energy at each node considering the marginal price of generation, transmission	~~4.7.Price Adjustment to Reflect Transmission Losses and Congestion~~ ~~The nodal prices are to be adjusted to reflect changes in power flows and losses as well as any congestion in the system, and signal to the market the relevant cost to produce and purchase electricity at the relevant market trading nodes. Specifically, the various nodal prices are to be adjusted by considering transmission loss factors and cost of congestion in each location in the system, thus, resulting in the locational marginal prices.~~ Locational marginal prices ~~are the economic value of energy at each node considering~~ **shall consider** the marginal price of	Deletion of explanatory provisions.

Title	Section	Provision	Proposed Amendment	Rationale
		losses and congestion, as given by the following formula:	generation, transmission losses and congestion, ~~as given by the following formula~~ **and is represented as follows**:	
		LMPi = Marginal Generator Price + Marginal Transmission Loss Price + Marginal Congestion Price	LMP_j = System Marginal Price + Marginal Cost of Losses + Marginal Cost of Congestion	
		In mathematical form: $LMPi = \lambda + \left[\left(\frac{1}{TLF_i} - 1\right) * \lambda\right] + \sum \mu_j a_{ij}$	~~In mathematical form~~ **The locational marginal pricing formula is as follows**: $LMP_j = \lambda + \left[\left(\frac{1}{TLF_j} - 1\right) * \lambda\right] + \sum \mu_o * a_{j,o}$	
		Where: LMP_i = Locational Marginal Price at location "i" λ = The system marginal price based on marginal plant offer TLF_i = Transmission Loss Factor at location "i" u_j = Price corresponding to j^{th} transmission constraint[9] a_{ij} = Sensitivity factor relating the contribution of generation at location "i" to the energy flow related to constraint "j"[10] *(Footnote 9: u_j is the price associated with the change of the schedules of the generators within the optimization process to prevent overloading a constrained transmission line or lines.*	Where: LMP_{ij} = **refers to the** locational marginal price at location ~~"i"~~ **j** λ = **refers to the** system marginal price ~~based on marginal plant offer~~ TLF_{ij} = **refers to the** transmission loss factor at location ~~"i"~~ **j** u_{jo} = **refers to the** price corresponding to ~~j~~**o^{th}** transmission constraint[9] $a_{ij,o}$ = **refers to the** sensitivity factor relating the contribution of generation at location ~~"i"~~ **j** to the energy flow related to constraint ~~"j"~~**o**[10] ~~*(Footnote 9: u_j is the price associated with the change of the schedules of the generators within the optimization process to prevent overloading a constrained transmission line or lines.*~~	• For consist use of subscripts. • Deletion of redundant and explanatory provisions

Title	Section	Provision	Proposed Amendment	Rationale
		Footnote 10: The sensitivity factor a_{ij} represents the amount of power (MW) flow change in a constrained line or lines due to the change of the schedules of the generators to prevent overloading the constrained line or lines.) The three terms defined in the mathematical equation are - • The first term is the system marginal price which is the price set by the marginal generator scheduled in any trading interval or period. • The second term is the change in the system marginal price due to losses and location. • The third term is the change in the system marginal price due to transmission constraints. For an unconstrained optimization, the u_j has a zero value, thus: $$LMPi = \lambda + \left[\left(\frac{1}{TLF} - 1\right) * \lambda\right]$$ Simplifying further: $$LMPi = \left[\frac{\lambda}{TLF_i}\right]$$ 4.8. Transmission Loss Factors	~~*Footnote 10: The sensitivity factor a_{ij} represents the amount of power (MW) flow change in a constrained line or lines due to the change of the schedules of the generators to prevent overloading the constrained line or lines.)*~~ ~~The three terms defined in the mathematical equation are -~~ ~~• The first term is the system marginal price which is the price set by the marginal generator scheduled in any trading interval or period.~~ ~~• The second term is the change in the system marginal price due to losses and location.~~ ~~• The third term is the change in the system marginal price due to transmission constraints.~~ ~~For an unconstrained optimization, the u_j has a zero value, thus:~~ ~~$$LMPi = \lambda + \left[\left(\frac{1}{TLF} - 1\right) * \lambda\right]$$~~ ~~Simplifying further:~~ ~~$$LMPi = \left[\frac{\lambda}{TLF_i}\right]$$~~ ~~4.8.~~ ~~Transmission Loss Factors~~	• Deletion of redundant and explanatory provisions • Deleted sentence is now provided under Definitions.

Title	Section	Provision	Proposed Amendment	Rationale
		Transmission loss factors (the "TLF") are scaling factors applied on the nodal prices to account for the network loss associated with the delivery or with the consumption of energy at different locations in the system. Transmission loss factors are dynamically computed within the MDOM to fully account for the dynamic change in the losses due to a change in load at the various nodes. The transmission loss factor at location "i" is defined as follows: $TLF_i = \left[1 - \frac{\partial P_{loss}}{\partial P_i}\right]$	**4.10.2** ~~Transmission loss factors (the "TLF") are scaling factors applied on the nodal prices to account for the network loss associated with the delivery or with the consumption of energy at different locations in the system.~~ Transmission loss factors ~~are~~ **shall be** dynamically computed within the ~~MDOM~~ **market dispatch optimization model** to fully account for the dynamic change in the losses due to a change in load at the various nodes. The transmission loss factor at location ~~"i"~~ **j** is ~~defined~~ as follows: $\mathrm{TLF_j} = \frac{1}{1 - \frac{\partial \mathrm{P_{Loss}}}{\partial \mathrm{P_j}}}$	
		Where: TLF_i = Transmission loss factor applied at location "i" $\frac{\partial P_{loss}}{\partial P_i}$ = The incremental change in loss due to the incremental change of power at location "i".	Where: TLF_{ij} ~~= Transmission~~ **refers to the transmission** loss factor applied at location ~~"i"~~ **j** $\frac{\partial P_{Loss}}{\partial P_{ij}}$ ~~= The~~ **refers to the** incremental change in loss due to the incremental change of power at location ~~"i"~~ **j**	For consist use of subscripts.
		NEW	**4.10.3 Congestion cost shall reflect the restriction imposed on energy dispatches due to the thermal limitations of affected transmission equipment. When a market trading node is affected by one or more congestions in the system, specific congestion costs shall be measured for such market trading node based on its sensitivity relative to the constrained equipment multiplied by the price**	For clarity.

Title	Section	Provision	Proposed Amendment	Rationale
			corresponding to the transmission constraint. The sensitivity shall be measured based on power flow, wherein a market trading node's injection/withdrawal is evaluated if it affects the loading of the constrained equipment. **The congestion cost formula is as follows:** Congestion Cost = $\sum [\mu_o * a_{j,o}]$ **Where:** **u_o refers to the price corresponding to o^{th} transmission constraint** **$a_{i,j}$ refers to the sensitivity factor relating the contribution of generation at location j to the energy flow related to constraint o**	
Relevant Market Timetable	5	5. Relevant Market Timetable xxx	~~5. Relevant Market Timetable~~ ~~xxx~~	Deletion of redundant and explanatory provisions
Market Network Model	6	6. Market Network Model xxx	~~6. Market Network Model~~ ~~xxx~~	Deletion of redundant and explanatory provisions
Market Trading Nodes	7	7. Market Trading Nodes xxx	~~7. Market Trading Nodes~~ ~~xxx~~	Deletion of redundant and explanatory provisions
Reserve Categories	9	9. Reserve Categories Four reserve categories have been defined for co-optimization in the MDOM, consistent with WESM Rules clause 3.6.1.1. The reserve categories are as follows - • Regulation Reserve (REG) - the ability to respond to small fluctuations in system frequency including but not limited to	~~9~~ **4.11** ~~Reserve Categories~~ **Reserves** **4.11.1 Reserve and energy dispatch schedules shall be determined in a co-optimized manner in the market dispatch optimization model.[21]** *(Footnote **21**: **WESM Rules clause 3.6**)*	Harmonize with WESM Rules clause 3.6, as amended.

Title	Section	Provision	Proposed Amendment	Rationale
		those caused by load or generation changes. This is also termed as “Load Following and Frequency Regulation.” • Contingency Reserve (CON) - the ability to respond to a significant decrease in system frequency including but not limited to a decrease in system frequency in an interconnected AC network as a result of a credible contingency affecting one (or more) generation companies within that network, or transmission flows into that network. This is also termed as “Spinning Reserve.” • Dispatchable Reserve (DIS) - the ability to respond to a re-dispatch performed by the System Operator during a trading interval, on either a regular or an ad hoc basis. This is also termed as “Back-up Reserve.” • Interruptible Load (ILD) - the ability of a Customer to disconnect loads from the Grid within a very short notice in response to a frequency deviation or a request of the System Operator. Prior to the commencement of the spot market for ancillary services, procurement of reserves can be facilitated by the System Operator outside the market through competitive bidding or negotiated contracts. The procedures and related cost recovery mechanisms for reserve trading in WESM will be submitted to the Commission for approval in a separate and independent filing.	**4.11.2 The Market Operator, in consultation with the System Operator, shall determine an appropriate set of reserve categories to be traded in the spot market in conformance to the relevant provisions of the Grid Code.[22]** *(Footnote **22**: **WESM Rules clause 3.3.4.2**)* **4.11.3 The** ~~Four~~ reserve categories **shall correspond to mutually distinct responses to an increase or decrease in system frequency with different response timeframes. These shall be technology neutral to allow responses from any facility certified to be capable of providing the requisite response, and shall define responses for frequency regulation and contingency reserves.** ~~have been defined for co-optimization in the MDOM, consistent with WESM Rules clause 3.6.1.1. The reserve categories are as follows -~~ ~~• Regulation Reserve (REG) - the ability to respond to small fluctuations in system frequency including but not limited to those caused by load or generation changes. This is also termed as “Load Following and Frequency Regulation.”~~ ~~• Contingency Reserve (CON) - the ability to respond to a significant decrease in system frequency including but not limited to a decrease in system frequency in an interconnected AC network as a result of a credible contingency affecting one (or more) generation companies within that network, or transmission flows into that network. This is also termed as “Spinning Reserve.”~~ ~~• Dispatchable Reserve (DIS) - the ability to respond to a re-dispatch performed by the System Operator during a trading~~	

Title	Section	Provision	Proposed Amendment	Rationale
			~~interval, on either a regular or an ad hoc basis. This is also termed as "Back-up Reserve."~~ ~~ Interruptible Load (ILD) - the ability of a Customer to disconnect loads from the Grid within a very short notice in response to a frequency deviation or a request of the System Operator.~~ ~~Prior to the commencement of the spot market for ancillary services, procurement of reserves can be facilitated by the System Operator outside the market through competitive bidding or negotiated contracts. The procedures and related cost recovery mechanisms for reserve trading in WESM will be submitted to the Commission for approval in a separate and independent filing.~~ **4.11.4 The Market Operator, in consultation with the System Operator, shall determine an appropriate set of reserve regions that will be used for the purpose of setting reserve requirements, and determining reserve prices and reserve cost recovery charges.[23]** *(Footnote **23**: **WESM Rules clause 3.3.7.1**)* **4.11.5 The reserve regions shall initially consist of the Luzon, Visayas, and Mindanao grids.** **4.11.6 The reserve price for each reserve region and reserve category shall be determined as the shadow price on the relevant reserve requirement constraint in the dispatch optimization for that dispatch interval.[24]**	

Title	Section	Provision	Proposed Amendment	Rationale
			*(Footnote **24**: **WESM Rules clauses 3.6.1.4 and 3.10.7**)*	
		NEW	**4.12 Application of WESM Prices** **4.12.1 In general, the nodal prices resulting from the real time dispatch market run as determined in Section 4.4.4, and, as applicable, Section 4.4.5, shall be used in the calculation of settlement prices except if there are non-zero constraint violation variable values or pricing error notices:** **a) If there are one or more non-zero constraint violation variable values, then automatic pricing re-run prices in accordance with Section 5.2 shall apply; and** **b) If there are pricing errors, prices from market pricing re-runs under Section 5.3 shall apply.** **4.12.2 If conditions for extreme price separation due to network congestion exist, prices as determined in Section 4.12.1 shall be replaced in accordance with Section 6.** **4.12.3 If conditions for price mitigation exist, prices as determined in Sections 4.12.1 and 4.12.2 shall be replaced in accordance with the methodology as approved by the ERC.** **4.12.4 Notwithstanding Sections 4.12.1, 4.12.2 and 4.12.3, if the dispatch interval is under market intervention or market**	For clarity on the application of WESM prices.

Title	Section	Provision	Proposed Amendment	Rationale
			suspension, administered prices as determined under Section 7 shall apply.	
Pricing Zones Reserve Pricing Zones	8	8. Pricing Zones 8.1. Reserve Pricing Zones The Market Operator shall group the market trading nodes into reserve pricing zones. Initially, the reserve pricing zones shall consist of three (3) separate zones, namely, Luzon grid, Visayas grid, and Mindanao grid. Whenever appropriate, this definition of reserve pricing zones may be modified or amended subject to further validation. 8.2.Customer Pricing Zones Originally, WESM Rules clause 3.2.3 provided that customer market trading nodes may be grouped into customer pricing zones and all customers within a customer pricing zone shall pay the same price for electricity consumed within the zone at the same time interval. The WESM Rules were, however, amended such that nodal pricing shall be adopted for customers and customer zonal pricing shall become optional and not mandatory.	~~8. Pricing Zones~~ ~~8.1. Reserve Pricing Zones~~ ~~The Market Operator shall group the market trading nodes into reserve pricing zones. Initially, the reserve pricing zones shall consist of three (3) separate zones, namely, Luzon grid, Visayas grid, and Mindanao grid. Whenever appropriate, this definition of reserve pricing zones may be modified or amended subject to further validation.~~ ~~8.2.Customer Pricing Zones~~ ~~Originally, WESM Rules clause 3.2.3 provided that customer market trading nodes may be grouped into customer pricing zones and all customers within a customer pricing zone shall pay the same price for electricity consumed within the zone at the same time interval.~~ ~~The WESM Rules were, however, amended such that nodal pricing shall be adopted for customers and customer zonal pricing shall become optional and not mandatory.~~	Already covered under proposed section 8.2.1 (c).
		NEW	**SECTION 5 MARKET PRICING RE-RUNS** **5. Scope** **5.1.1 This section provides the automatic pricing re-run, which shall be performed automatically by the market system software of the Market Operator should the market dispatch optimization**	Consistent with the proposed WESM Rules clause 3.6.7. Note that violation and delta values are provided under the CVC Manual.

Title	Section	Provision	Proposed Amendment	Rationale
			model result in one or more non-zero constraint violation variable values.[25] *(Footnote **25**: **WESM Rules clauses 3.6.7**)* **5.1.2 This section also provides the market pricing re-run, which shall be performed by the Market Operator upon issuance of a pricing error notice, notwithstanding the application of an automatic pricing re-run. [26]** *(Footnote **26**: **WESM Rules clause 3.10.5**)* **5.2 Automatic Pricing Re-run** **5.2.1 Automatic pricing reruns for market projections and real time dispatch shall ensure that the energy and reserve prices reflect the following:** **a. marginal costs of supplying energy at each node;** **b. marginal costs of supplying reserve;** **c. shortage pricing when there is a shortage of supply at a node or regional level, as determined in accordance with Section 5.4; and** **d. excess pricing when there is an excess of supply at a node or regional level, as determined in accordance with Section 5.4.** **5.2.2 The automatic pricing re-run of the market dispatch optimization model shall determine the prices for energy and reserves with relaxed constraints and**	

Title	Section	Provision	Proposed Amendment	Rationale
			approximately the same dispatch schedules. **5.2.3 During the automatic pricing re-run, the soft constraint that was violated shall be relaxed corresponding to the resulting non-zero violation variable, including a very small value (delta) to allow the market dispatch optimization model to find a feasible price.** **5.2.4 In case of over-generation and under-generation, the soft constraint shall be relaxed by a value (delta) to allow the market dispatch optimization model to find a feasible price. When the results of the market dispatch optimization model reflect a violation greater than delta, then the automatic pricing re-run shall reflect the shortage price for under-generation and excess pricing for over-generation.** **5.2.5 The delta shall be set as little as possible for each CVC so that the automatic pricing re-run is reflective of the most accurate price considering the original dispatch schedules.** **5.2.6 The following table shows each type of constraints with their corresponding constraint relaxation formulas during pricing re-runs:**	

Title	Section	Provision	Proposed Amendment	Rationale

Soft Constraint	Violation	Constraint Relaxation during Pricing Re-Run	Re-run Price[27]
Thermal Base Case	x	x + delta	EDP AND RP
Transmission Group	x	x + delta	EDP AND RP
Self-scheduled Generation Constraint	x	x + delta	EDP AND RP
System Energy Balance	x	delta	Excess Price if Over-generation Shortage Price if Under-generation
Nodal Value of Lost Load or Nodal Energy Balance	x	x + delta	EDP AND RP
Thermal Contingency	x	x + delta	EDP AND RP
Reserve Requirement	x	x + delta	EDP AND RP

Title	Section	Provision	Proposed Amendment	Rationale
			*(Footnote **27**: **EDP refers to nodal energy dispatch price; and RP refers to reserve price**)*	
			5.2.7 The market projections and real time dispatch runs shall be reflective of prices determined from automatic pricing re-runs. **5.3 Market Pricing Re-Run to address Pricing Errors** **5.3.1 In the event where no real time dispatch prices can be determined or communicated as specified by the timetable or the calculated prices are believed to be in error due to erroneous, inconsistent, or inappropriate input data, notwithstanding the application of automatic pricing re-run, the Market Operator shall issue a pricing error notice and perform a market pricing re-run.[28]** *(Footnote **28**: **WESM Rules clause 3.10.5**)* **5.3.2 The Market Operator shall perform the market pricing re-run using the same set of input data used in the original real time dispatch market run and the appropriate solution while taking into consideration the applicable solutions for the various causes of erroneous, inconsistent and inappropriate input data.** **5.4 Shortage and Excess Prices** **5.4.1 In the event of under-generation, the shortage price shall be determined as the offer price cap.**	• To further detail WESM Rules clause 3.10.5 • Proposed methodology in setting scarcity and excess pricing is based on the historical impact of congestion on market prices.

Title	Section	Provision	Proposed Amendment	Rationale
			5.4.2 In the event of over-generation, the excess price shall be determined as the offer price floor.	
		NEW	**SECTION 6 PRICE SUBSTITUTION METHODOLOGY DUE TO CONGESTION** **6.1 Scope** **6.1.1 This section provides the price substitution methodology, which shall be implemented by the Market Operator to address the undesirable market pricing situations that arise from the effects of network congestion in the power system, in particular, the occurrence of extreme nodal price separation.[29]** *(Footnote **29**: **WESM Rules clause 3.12.7**)* **6.2 Criteria for Determining Extreme Nodal Price Separation Arising Due To Network Congestion** **6.2.1 If a dispatch interval is reflective of extreme nodal price separation due to network congestion, then prices shall be substituted for the affected generators and customers.** **6.2.2 The following constraints shall not be considered as network congestion:** **a. Constraint indicated in the market run is caused by erroneous input data.** **b. Localized constraint, such as but not limited to, constraint on a radially-connected line or load-end transformer,**	• Consolidate the provisions of the PSM Manual in the PDM, which will abolish the PSM Manual. • Reflect current proposed changes to WESM Rules clause 3.12.7.

Title	Section	Provision	Proposed Amendment	Rationale
			which is the source of the load connected to it or of the step-up transformer in a generating plant. **6.2.3 A dispatch interval shall be identified to be reflective of extreme nodal price separation through the use of a trigger factor, which is formulated as follows:**	
			$\text{Price Trigger Factor}_i = \frac{\sum_{j \in J} \left[\text{EDS}_{j,i} * \right.}{\sum_{j \in}}$	
			Where: **J refers to the set of all resources** **$\text{EDS}_{j,i}$ refers to the energy dispatch schedule of resource j at dispatch interval i** **$\text{EDP}_{j,i}$ refers to the nodal energy dispatch price of resource j at dispatch interval i** **NWAP_i refers to the weighted average price of all resources and computed as:**	
		NEW	$\text{NWAP}_i = \frac{\sum_{j \in J} \left(\text{EDP}_{j,i} * \text{EDS}_{j,i} \right)}{\sum_{j \in J} \left(\text{EDS}_{j,i} \right)}$	
		NEW	**6.2.4 The price substitution methodology set forth in this section shall apply to a dispatch interval when the trigger factor reaches the threshold of 1.40.** **6.3 Price Substitution Methodology for Generator Energy Prices**	• Ensure price certainty, near real-time

Title	Section	Provision	Proposed Amendment	Rationale
			6.3.1 An unconstrained solution shall be used for determining the generator energy prices. **6.3.2 Constrained-on generators shall be paid at their offer price, while all the other generating units shall be paid at the unconstrained solution's marginal price.** **6.4 Price Substitution Methodology for Customer Energy Prices** **6.4.1 All loads shall have the same price and shall be calculated as follows:**	
			$$SEDP_{b,\,i} = \frac{\sum_{k \in K} \left(SEDP_{k,\,i} * EDS_{k,\,i} \right)}{\sum_{b \in B} \left(EDS_{b,\,i} \right)}$$	
		NEW	**Where:** **$SEDP_{b,\,i}$ refers to the substitute nodal energy dispatch price for of customer b in the affected pricing region atat dispatch interval i** **$SEDP_{k,\,i}$ refers to the substitute nodal energy dispatch price of generator k at dispatch interval i** **$EDS_{k,\,i}$ refers to the energy dispatch schedule of generator k in the constrained solution at dispatch interval i** **$EDS_{b,\,i}$ refers to the energy dispatch schedule of customer b at dispatch interval i**	Ensure price certainty, near real-time and mitigate impact of congestion to the congestion affected region/s.

Title	Section	Provision	Proposed Amendment	Rationale
			6.4.2 In cases where the HVDC is on outage or there is no interconnection between the Luzon, Visayas, and Mindanao regions, Section 6.4.1 will apply only to the region/s with congestion. **6.5 Price Substitution Methodology for Reserve Prices** **6.5.1 Aside from normalizing the energy prices due to the congestion, the price substitution methodology shall also consider the impact of the extreme nodal price separation on the resulting reserve prices.** **6.5.2 In cases where price substitution methodology is applied, the reserve price for a certain reserve category in a reserve region shall be calculated as the sum of the constrained solution's marginal reserve offer price and the opportunity cost calculated based on the unconstrained solution. It shall be calculated as follows:**	
			$SRP_{j, r, a, i} = MROP_{CONS\text{-}r, a, i} + OppCost_{UNCD\text{-}r, a, i}$	
			Where: **$SRP_{j, r, a, i}$ refers to the substitute reserve price of reserve category r in reserve region a for dispatch interval i** **$MROP_{CONS\text{-}r, a, i}$ refers to the marginal reserve offer price in**	

Title	Section	Provision	Proposed Amendment	Rationale
			reserve category r in reserve region a for dispatch interval i during the constrained solution **$OppCost_{UNCD\text{-}r,\ a,\ i}$** **refers to the opportunity cost based on the unconstrained solution in reserve category r in reserve region a for dispatch interval i**	
Administered Price Cap	14	14. Administered Price Cap The WESM Rules authorizes the Market Operator to impose an administered price cap during market suspension or intervention. The administered price cap is to be used as basis for settlements. The term administered price cap implies that a price ceiling will be imposed. More appropriately, however, what should be imposed is the price itself that will be used for settlement purposes, rather than merely a ceiling. The methodology for determining the administered prices are being developed and will be presented for approval by the Commission in a separate, independent filing.	~~14.~~ **SECTION 7** Administered ~~Price Cap~~ **PRICES** **7.1 Scope** ~~The WESM Rules authorizes the Market Operator to impose an administered price cap during market suspension or intervention. The administered price cap is to be used as basis for settlements.~~ ~~The term administered price cap implies that a price ceiling will be imposed. More appropriately, however, what should be imposed is the price itself that will be used for settlement purposes, rather than merely a ceiling.~~ ~~The methodology for determining the administered prices are being developed and will be presented for approval by the Commission in a separate, independent filing.~~ **7.1.1 This section provides the administered price determination methodology, which shall be implemented by the Market Operator to impose administered prices on dispatch intervals**	• Consolidate the provisions of the APDM Manual in the PDM, which will abolish the APDM Manual.

Title	Section	Provision	Proposed Amendment	Rationale
			under market suspension or market intervention. [30] *(Footnote **30**: **WESM Rules clause 6.2.3**)* **7.1.2 The administered price shall be established by the Market Operator in accordance with the following guiding principles:** **a. The administered price shall be fair and reasonable to both the suppliers and consumers of electricity.** **b. Administered prices shall be determined and shall replace market prices for energy, i.e. energy administered prices shall replace the nodal energy dispatch prices, and reserves, i.e. reserve administered prices shall replace the reserve prices.** **c. The process for determining the administered price shall be transparent to the Trading Participants and administratively simple to implement.** **d. The process for determining the administered price shall be based on the market information available prior to market intervention or market suspension.** **e. The administered price shall be applied in the region where the market suspension or market intervention is declared. For this purpose, the regions are Luzon, Visayas and Mindanao.** **f. Where market suspension or market intervention is declared in an island**	

Title	Section	Provision	Proposed Amendment	Rationale
			grid ("grid islanding"), the administered prices shall be applied only to the resources in the island grid where the market suspension or market intervention was declared. **g. The administered price will apply only to transactions above the declared bilateral contract quantities.**	
Administered Price Cap	14	NEW	**7.2 Generator Energy Administered Price** **7.2.1 For each generator resource, the energy administered price shall be computed as the dispatch schedule-weighted average of the nodal energy dispatch prices of the four most recent similar trading day and similar dispatch intervals that have not been administered.** **7.2.2 For each generator resource k, the energy administered price is computed as follows:**	Timely provision of administered prices using available and historical market information.
Administered Price Cap	14	NEW	$EAP_{k,D,i} = \frac{\sum_{d=D-n}^{D-4}(NEDP_{k,d,i} * EDS_{k,d,i})}{\sum_{d=D-n}^{D-4} EDS_{k,d,i}}$	
Administered Price Cap	14	NEW	**Where:** **$EAP_{k,D,i}$ refers to the energy administered price for generator resource k at dispatch interval i within trading day D** **$EDP_{k,d,i}$ refers to the nodal energy dispatch price for generator resource k for dispatch interval i within trading day d**	

Title	Section	Provision	Proposed Amendment	Rationale
			$EDS_{k,d,i}$ refers to the energy dispatch schedule for generator resource k at dispatch interval i within trading day d **D refers to the current trading day** **d=D– n refers to the nth most recent non-administered similar trading day of D**	
Administered Price Cap	14	NEW	**7.2.3 Similar trading days refer to each day of the week (i.e., Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday) while similar dispatch intervals refer to the same five (5) minute period within the same settlement interval.** **7.2.4 In case the energy dispatch schedule for a generator resource at a similar trading day and similar dispatch interval is negative, the energy dispatch schedule for that similar trading day and similar dispatch interval shall be set to zero during the calculation of the energy administered price for that generator resource.** **7.2.5 If no energy administered price can be determined for a generator resource because the generator resource had no energy dispatch schedule for the previous four (4) similar trading days and similar dispatch intervals, the energy administered price for that generator resource shall be determined as follows:** **a. The nodal energy dispatch price of the immediately preceding similar trading day, similar dispatch interval, non-administered price, with positive energy**	• For clarity

Title	Section	Provision	Proposed Amendment	Rationale
			dispatch schedule within one (1) year prior to the trading day and dispatch interval being considered shall be set as the energy administered price of that generator resource; and **b. In case a generator resource does not have a positive energy dispatch schedule during similar trading days and similar dispatch intervals that were not administered for the past year, the energy administered price for that generator resource shall be computed by obtaining the simple average of the nodal energy dispatch prices of four (4) immediately preceding similar trading day, similar dispatch intervals that have not been administered. This is set out in the following formula:** $$EAP_{k,\,D,\,i} = \frac{\sum_{d=D-n}^{D-4} EDP_{k,\,d,\,i}}{4}$$ **$EAP_{k,\,D,\,i}$ refers to the energy administered price for generator resource k for dispatch interval i within trading day D** **$EDP_{k,\,d,\,i}$ refers to the nodal energy dispatch price for generator resource k for dispatch interval i within trading day d** **D refers to the trading day with dispatch interval under market intervention or market suspension**	

Title	Section	Provision	Proposed Amendment	Rationale
			d=D- n refers to the nth most recent non-administered similar trading day and similar dispatch interval **c. In case a generator resource does not have nodal energy dispatch prices from four (4) immediately preceding similar trading day, similar dispatch intervals that have not been administered, the energy administered price for that generator resource shall be calculated as follows:**	• To determine administered prices for new generator resources, which scenario was brought up in the hearing on the refinements to the APDM manual. The ERC required PEMC to formulate a methodology.
		NEW	$EAP_{k,D,i}=\frac{\sum_{k'\in K_i,k'\neq k}\left(EAP_{k',D,i} * E\right.}{\sum_{k'\in K_i,k'\neq k} EDS_{k',D}$	
Administered Price Cap	14	NEW	**Where:** **$EAP_{k,D,i}$ refers to the energy administered price for generator resource k for dispatch interval i within trading day D** **$EAP_{k',D,i}$ refers to the energy administered price for generator resource k' for dispatch interval i within trading day D** **$EDS_{k',D,i}$ refers to the energy dispatch schedule for generator resource k' at dispatch interval i within trading day d** **D refers to the trading day with dispatch interval under market intervention or market suspension** **K_i refers to the set of generator resources with positive energy dispatch quantities at dispatch interval i**	

Title	Section	Provision	Proposed Amendment	Rationale
			7.3 Customer Energy Administered Price **7.3.1 The energy administered price for all customer resources shall be calculated as follows:** $$EAP_{b,i} = \frac{\sum_{k \in K_i} (EAP_{k,i} * EDS_{k,i})}{\sum_{b \in B} EDS_{b,i}}$$ **Where:** $EAP_{b,i}$ **refers to the energy administered price for customer resource b for dispatch interval i** $EAP_{k,i}$ **refers to the energy administered price for generator resource k at dispatch interval i** $EDS_{k,i}$ **refers to the energy dispatch schedule for generator resource k at dispatch interval i** $EDS_{b,i}$ **refers to the energy dispatch schedule for customer resource b at dispatch interval i** K_i **refers to the set of generator resources with positive energy dispatch quantities at dispatch interval i** **B refers to the set of all customer resources**	
			7.3.2 In case only one region is under market suspension or market intervention and the said region is importing power from the other region, the energy administered price for all customer resources within the region under market	

Title	Section	Provision	Proposed Amendment	Rationale
			suspension or market intervention shall be calculated as follows:	
Administered Price Cap	14	NEW	$EAP_{b,i} = \frac{\sum_{k \in K_i}(EAP_{k,i} * EDS_{k,i}) + (EDS}{\sum_{b \in B_i} EDS_{b}}$	
Administered Price Cap	14	NEW	**Where:** **$EAP_{b,i}$ refers to the energy administered price for customer resource b for dispatch interval i** **$EAP_{k,i}$ refers to the energy administered price for generator resource k for dispatch interval i** **$EDS_{k,i}$ refers to the energy dispatch schedule for generator resource k for dispatch interval i** **$EDS_{HVDC,i}$ refers to the energy dispatch schedule of the HVDC interconnection for dispatch interval i** **$GWAP_{NAR,i}$ refers to the generator weighted average price in the non-administered region using energy dispatch schedule for dispatch interval i** **$EDS_{b,i}$ refers to the energy dispatch schedule for customer resource b at dispatch interval i** **K_i refers to the set of generator resources in the region under market suspension or market intervention with positive energy dispatch schedule for dispatch interval i** **B_i refers to the set of all customer resources in the region under market suspension or market intervention at dispatch interval i**	

Title	Section	Provision	Proposed Amendment	Rationale
			7.3.3 In case only one region is under market suspension or market intervention and the said region is exporting power to the other region, the energy administered price for all customer resources within the region under market suspension or market intervention shall be calculated as follows:	
		NEW	$EAP_{b,i} = \frac{\sum_{k \in K_i} (EAP_{k,i} * EDS_{k,i}) - (EDS}{\sum_{b \in B_i} EDS_b}$	
		NEW	**Where:** **$EAP_{b,i}$** refers to the energy administered price for customer resource b for dispatch interval i **$EAP_{k,i}$** refers to the energy administered price for generator resource k for dispatch interval i **$EDS_{k,i}$** refers to the energy dispatch schedule for generator resource k at dispatch interval i **$EDS_{HVDC,i}$** refers to the energy dispatch schedule of the HVDC interconnection at dispatch interval i **$GWAEAP_i$** refers to the generator weighted average energy administered price using energy dispatch schedule for dispatch interval i **$EDS_{b,i}$** refers to the energy dispatch schedule (in MW) for customer resource b for dispatch interval i **K_i** refers to the set of generator resources in the region under market suspension or market	

Title	Section	Provision	Proposed Amendment	Rationale
			intervention with positive energy dispatch schedule for dispatch interval i **B_i refers to the set of all customer resources in the region under market suspension or market intervention for dispatch interval i** **7.3.4 In case only one region is under market suspension or market intervention and the said region is exporting power to the other region and the nodal energy dispatch prices in the region that is not under market suspension or market intervention were determined in accordance with WESM Rules Clause 3.6, the nodal energy dispatch prices for the customer resources within the region that is not under market suspension or market intervention shall be adjusted by adding the following:**	
Administered Price Cap	14	NEW	$NARAPA_{b\text{-}NAR,\,i} = \frac{EDS_{HVDC,\,i} * (GWA}{\sum_{b \in B\text{-}NAR_i}}$	
Administered Price Cap	14	NEW	**Where:** **$NARAPA_{b\text{-}NAR,i}$ refers to the non-administered region administered price adjustment for a customer resource within the non-administered region for dispatch interval i** **$EDS_{HVDC,i}$ refers to the energy dispatch schedule of the HVDC**	

Title	Section	Provision	Proposed Amendment	Rationale
			interconnection for dispatch interval i **$GWAP_{NAR,i}$ refers to the generator weighted average price at the non-administered region using energy dispatch schedule for dispatch interval i** **$WAGEAP_i$ refers to the generator weighted average energy administered price using energy dispatch schedule for dispatch interval i** **$EDS_{b\text{-}NAR,i}$ refers to the energy dispatch schedule of a customer resource within the non-administered region for dispatch interval i** **$B\text{-}NAR_i$ refers to the set of all customer resources within the non-administered region for dispatch interval i** **b-NAR refers to a customer resource within the non-administered region**	
Administered Price Cap	14	NEW	**7.4 Generator Reserve Administered Price** **7.4.1 For each generator resource, the reserve administered price for each reserve category shall be computed as the dispatch schedule-weighted average of the reserve prices for each reserve category of the four (4) most recent similar trading day and similar dispatch intervals that have not been administered, as follows:**	To provide for the determination of administered prices for reserves.

Title	Section	Provision	Proposed Amendment	Rationale
		NEW	$RAP_{k,r,D,i} = \frac{\sum_{d=D-n}^{D-4}(RDP_{k,r,d,i} * RDS_{k,r}}{\sum_{d=D-n}^{D-4} RDS_{k,r,d,i}}$	
Administered Price Cap	14	NEW	**Where:** **$RAP_{k,r,D,i}$ refers to the reserve administered price for generator resource k for reserve category r at dispatch interval i within trading day D** **$RDP_{k,r,d,i}$ refers to the reserve dispatch price for generator resource k for reserve category r at dispatch interval i within trading day d** **$RDS_{k,r,d,i}$ refers to the reserve dispatch schedule for generator resource k for reserve category r at dispatch interval i within trading day d** **D refers to the trading day with dispatch interval under market intervention or market suspension** **D – n refers to the nth most recent non-administered similar trading day and similar dispatch interval** **7.4.2 For each generator resource, the reserve dispatch schedule shall be set to the reserve schedules determined by the System Operator for the dispatch interval under market suspension or market intervention.** **7.4.3 Similar trading days refer to each day of the week (i.e., Sunday, Monday, Tuesday, Wednesday, Thursday, Friday,**	

Title	Section	Provision	Proposed Amendment	Rationale
			Saturday) while similar dispatch intervals refer to the same five (5) minute period within the same settlement interval. **7.4.4 If no reserve administered price can be determined for a generator resource because the generator resource had no reserve dispatch schedule for the previous four (4) similar trading days and similar dispatch intervals, the reserve administered price for that generator resource shall be determined as follows:** **a. The reserve price of the immediately preceding similar trading day, similar dispatch interval, non-administered price, with reserve dispatch schedule within one (1) year prior to the trading day and dispatch interval being considered shall be set as the reserve administered price of that generator resource; and** **b. In case a generator resource does not have a reserve dispatch schedule for a reserve category during similar trading days and similar dispatch intervals that were not administered for the past year, the reserve administered price for that generator resource for that reserve category shall be computed by obtaining the simple average of the reserve prices for that reserve category for the reserve region which includes the generator resource of four (4) immediately preceding similar trading day, similar dispatch intervals that have not been administered. This is as set out in the following formula:**	

Title	Section	Provision	Proposed Amendment	Rationale
			$$RAP_{k,r,D,i} = \frac{\sum_{d=D-n}^{D-4} RDP_{k,r,d,i}}{4}$$ **Where:** **$RAP_{k,r,D,i}$ refers to the reserve administered price for reserve category r for the reserve region which includes generator resource k for dispatch interval i within trading day D** **$RDP_{k,r,d,i}$ refers to the reserve price for generator resource k for reserve category r for dispatch interval i within trading day d** **D refers to the trading day with dispatch interval under market intervention or market suspension** **D-n refers to the nth most recent non-administered similar trading day and similar dispatch interval** **7.4.5 No reserve administered prices are calculated for customers within the region under market suspension or market intervention.**	
Billings and Settlements	13	13. Billings and Settlements The Market Operator shall determine the settlement amount for each trading participant based on the settlement formula described in WESM Rules clause 3.13.14. The settlement process involves the determination of ex-ante energy trading amount and ex-post energy trading amount,	~~13.~~ **SECTION 8** ~~Billings and Settlements~~ **BILLING AND SETTLEMENT** **8.1 Scope** **8.1.1** ~~The Market Operator shall~~ **This section provides the formula used to** determine the **trading and** settlement amount**s** for ~~each trading participant based on the settlement formula described in WESM Rules clause~~	For clarity.

Title	Section	Provision	Proposed Amendment	Rationale
		adjusted for bilateral contract quantities in accordance with WESM Rules clause 3.13.7. The methods of calculations are described below. Particular details on the timeline and implementation of the settlement provisions of the WESM Rules are detailed in the Billings and Settlement Manual.	~~3.13.14~~ **for energy and reserves for each Trading Participant.[31]** *(Footnote **31**: **WESM Rules clause 3.13**)* ~~The settlement process involves the determination of ex-ante energy trading amount and ex-post energy trading amount, adjusted for bilateral contract quantities in accordance with WESM Rules clause 3.13.7. The methods of calculations are described below. Particular details on the timeline and implementation of the settlement provisions of the WESM Rules are detailed in the Billings and Settlement Manual.~~ **8.1.2 This section also provides the formula to determine the costs of reserves to be recovered through the settlement amounts calculated.[32]** *(Footnote **32**: **WESM Rules clause 3.3.5.2**)* **8.1.3 This section also provides the provision of additional compensation for Trading Participants affected by market suspension or market intervention or are designated as must-run units.**	
		NEW	**8.2 Settlement Prices** **8.2.1 Energy Settlement Price[33]** *(Footnote **33**: **WESM Rules clause 3.10.6**)* **Energy settlement prices shall be determined for every settlement interval[34] and are calculated as follows:** *(Footnote **34**: **WESM Rules clause 3.4.2**)*	Reflect current proposed changes to WESM Rules clause 3.10.6.

Title	Section	Provision	Proposed Amendment	Rationale
			a. For a generator, it is the generator dispatch schedule-weighted average of the nodal energy dispatch prices for the set of dispatch intervals corresponding to that settlement interval determined for that generator market trading node, as provided in the following formula: $$ESP_{k,h} = \frac{\sum_{i \in n}(EDP_{k,h,i} * EDS_{k,h,i})}{\sum_{i \in N} EDS_{k,h,i}}$$ **However, if:** $$\sum_{i \in N} EDS_{k,h,i} = 0$$ **Then:** $$ESP_{k,h} = \frac{\sum_{i \in N} EDP_{k,h,i}}{n}$$ **Where:** **n refers to the number of dispatch intervals at settlement interval h** **$ESP_{k,h}$ refers to the energy settlement price of generator resource k (generator or load) at settlement interval h** **$EDP_{k,h,i}$ refers to the nodal energy dispatch price for generator resource k at dispatch interval i of settlement interval h**	

Title	Section	Provision	Proposed Amendment	Rationale
			$EDS_{k,h,i}$ refers to the energy dispatch schedule for generator resource k at dispatch interval i of settlement interval h **b. For customers, it is the customer dispatch schedule-weighted average of the nodal energy dispatch prices for the set of dispatch intervals corresponding to that settlement interval determined for that customer market trading node, as provided in the following formula:** $$ESP_{b,h}=\frac{\sum_{i\in n}\left(EDP_{b,h,i} * EDS_{b,h,i}\right)}{\sum_{i\in N} EDS_{b,h,i}}$$ **However, if:** $$\sum_{i\in N} EDS_{b,h,i} = 0$$ **Then:** $$ESP_{b,h}=\frac{\sum_{i\in N} EDP_{b,h,i}}{n}$$ **Where:** **n refers to the number of dispatch intervals at settlement interval h** **$ESP_{b,h}$ refers to the energy settlement price of customer resource b (generator or load) at settlement interval h**	

Title	Section	Provision	Proposed Amendment	Rationale
			$EDP_{b,h,i}$ refers to the nodal energy dispatch price for customer resource b at dispatch interval i of settlement interval h **$EDS_{b,h,i}$ refers to the energy dispatch schedule for customer resource b at dispatch interval i of settlement interval h.**	
		NEW	**c. For customers that have been approved by the ERC to use zonal pricing, the zonal energy settlement price is the customer dispatch schedule-weighted average of the ex-ante zonal energy prices for the set of dispatch intervals within that settlement interval determined for that customer market trading node, as provided in the following formula:** **i. Zonal Energy Price** $$ZEP_{b,h,i} = \frac{\sum_{b \in B_z} (EDP_{b,h,i} * EDS_{b,h,i})}{\sum_{b \in B_z} EDS_{b,h,i}}$$ However, if: $$\sum_{b \in B_z} EDS_{b,h,i} = 0$$ Then: $$ZEP_{b,h,i} = \frac{\sum_{b \in B_z} EDP_{b,h,i}}{n_z}$$ **Where:**	For completeness, provide for proposed zonal pricing in accordance with clause 3.10.3.

Title	Section	Provision	Proposed Amendment	Rationale
			n_z refers to the number of customer resources within customer pricing zone z **$ZEP_{b,h,i}$ refers to the zonal energy price for customer resource b at dispatch interval i of settlement interval h** **$EDP_{b,h,i}$ refers to the nodal energy dispatch price for customer resource b at dispatch interval i of settlement interval h** **$EDS_{b,h,i}$ refers to the energy dispatch schedule for customer resource b at dispatch interval i of settlement interval h.** **B_z set of all customer resources within customer pricing zone z** **ii. Energy Settlement Price** $$ESP_{b,h}=\frac{\sum_{i\in n}(ZEP_{b,h,i} * EDS_{b,h,i})}{\sum_{i\in N} EDS_{b,h,i}}$$ **However, if:** $$\sum_{i\in N} EDS_{b,h,i} = 0$$ **Then:** $$ESP_{b,h}=\frac{\sum_{i\in N} ZEP_{b,h,i}}{n}$$ **Where:**	

Title	Section	Provision	Proposed Amendment	Rationale
			n refers to the number of dispatch intervals at settlement interval h **$ESP_{b,h}$ refers to the energy settlement price of customer resource b (generator or load) at settlement interval h** **$ZEP_{b,h,i}$ refers to the zonal energy price for customer resource b at dispatch interval i of settlement interval h** **$EDS_{b,h,i}$ refers to the energy dispatch schedule for customer resource b at dispatch interval i of settlement interval h.**	
		NEW	**8.2.2 Reserve Settlement Price[35]** *(Footnote **35**: **WESM Rules clause 3.10.7**)* **a. When applicable, the reserve settlement price of an Ancillary Services Provider for each reserve region and reserve category in each settlement interval shall be determined as the dispatch schedule-weighted average of the corresponding reserve prices for that reserve category for that Ancillary Services Provider, as provided in the following formula:**	Provide formula for the determination of reserve settlement prices in accordance with WESM Rules clause 3.10.7.
		NEW	$$RSP_{j,r,a,h} = \frac{\sum_{i \in n}(RDP_{j,r,a,i} * RDS_{j,}}{\sum_{i \in N} RDS_{j,r,a,i}}$$ However, if: $$\sum_{i \in N} RDS_{j,r,a,i} = 0$$	

Title	Section	Provision	Proposed Amendment	Rationale
			Then: $RSP_{j, r, a, h} = \frac{\sum_{i \in N} RDP_{j, r, a, i}}{n}$	
		NEW	**Where:** **n refers to the number of dispatch intervals at settlement interval h** **$RSP_{j, r, a, h}$ refers to the reserve settlement price of resource j for reserve category r and reserve region a at settlement interval h** **$RDP_{j, r, a, i}$ refers to the reserve dispatch price for resource j for reserve category r and reserve region a at dispatch interval i** **$RDS_{j, r, a, i}$ refers to the reserve dispatch schedule for resource j for reserve category r and reserve region a at dispatch interval i**	
		NEW	**8.3 Reserve Cost Recovery** **8.3.1 Cost Recovery for Regulation Service** **a. The hourly reserve cost attributed to the regulation service shall be recovered from all resources (generators or loads) by pro-rating the regulation reserve cost based on their respective metered quantities.**	Provide formula for the determination of reserve cost recovery charges in accordance with WESM Rules clause 3.3.5.

Title	Section	Provision	Proposed Amendment	Rationale
			$RRCost_{j,\ REG\text{-}r,\ a,\ h} = \frac{RTA_{REG\text{-}r,\ a,\ h}}{\sum_{j \in J} MQ_{j,\ a,\ h}} * MQ_{j,\ a,\ h}$	
		NEW	**Where:** **$RRCost_{j,\ REG\text{-}r,\ a,\ h}$ refers to the regulation reserve cost to be paid by resource j for regulation reserve category REG-r in reserve region a at settlement interval h** **$RTA_{REG\text{-}r,\ a,\ h}$ refers to the reserve trading amount for the regulation service in reserve region a for regulation reserve category REG-r at settlement interval h** **$MQ_{j,\ a,\ h}$ refers to the actual quantity of energy delivered or consumed by resource j based on a valid metering point(s) in reserve region a at settlement interval h** **8.3.2 Cost Recovery for Contingency Service** **a. The reserve costs for contingency service shall be allocated among generators using a "runway model". [36]** *(Footnote **36**:* **See Appendix C for explanatory examples on the runway model.**)	

Title	Section	Provision	Proposed Amendment	Rationale
			b. The reserve cost attributable to a generator is calculated using the following formula:	
		NEW	$$CRCost_{k, r, a, h} = RTA_{r, a, h} * \sum_{p \in P} \left[\frac{GA_{p, r, a, h} * SQTY_{k, p, r, a, h}}{\sum_{j \in J} RDS_{j, r, a, h}} \right]$$	
		NEW	**Where:** **$CRCost_{k, r, a, h}$ refers to the reserve cost to be paid by generator k in reserve region a for reserve category r at settlement interval h** **$RTA_{r, a, h}$ refers to contingency reserve trading amount in reserve region a for reserve category r at settlement interval h** **$SQTY_{k, p, r, a, h}$ refers to the MW quantity shared by generator k in the common block p for reserve category r in reserve region a at settlement interval h** **$RDS_{j, r, a, h}$ refers to the total reserve dispatch schedule of resource j in reserve region a for reserve category r at settlement interval h** **$GA_{p, r, a, h}$ refers to the generator allocation per common block p in reserve region a at**	

Title	Section	Provision	Proposed Amendment	Rationale
			settlement interval h. It is the inverse of the number of generating units in a common block p as represented by the following formula:	
			$GA_{p, r, a, h} = \frac{1}{\text{No. of Generators sharing in block p in reserve area a for } r \text{ at settlement interval h}}$	
		13.2. Determination of Ex-Post Energy Trading Amount xxx	~~13.2. Determination of Ex-Post Energy Trading Amount~~ ~~xxx~~	Deletion of provisions consistent with the ex-ante only pricing under DOE DC 2015-10-0015.
		13.1. Determination of Ex-Ante Trading Amount The ex-ante energy trading amount for each trading node and trading interval is determined as the ex-ante energy settlement price for that node in that trading interval multiplied by the ex-ante energy settlement quantity for that node in that trading interval.[24] The ex-ante nodal energy prices and quantities are outputs of the MDOM representing the expected prices and quantities at the market trading nodes and are scheduled by the Market Operator prior to actual dispatch by the System Operator. Their values depends on generation offers, reserve offers, and demand bids submitted by the trading participants at the times set in the market timetable[25] , and the net load forecast prepared by the Market Operator.[26] (*Footnote* 24: See WESM Rules Clause 3.13.8)	~~13.1. **8.4** Determination of Ex-Ante~~ Trading ~~Amount~~ **Amounts** **8.4.1 Energy Trading Amount** **a. The energy settlement quantity for any market trading node in any settlement interval shall be determined by the Market Operator as the metered quantity as determined under WESM Rules clause 3.13.6 and adjusted for bilateral contracts under WESM Rules clause 3.13.7.** **b.** The ~~ex-ante~~ energy trading amount for **a** ~~each~~ **market** trading node and ~~trading~~ **settlement** interval ~~is~~ **shall be** determined as the ~~ex-ante~~ energy settlement price for that node in that ~~trading~~ **settlement** interval multiplied by the ~~ex-ante~~ energy settlement quantity**, in MWh,** for that node in ~~that~~ **the same settlement** ~~trading~~ interval[37] **and is calculated for generators and customers as follows:** ~~The ex-ante nodal energy prices and quantities are outputs of the MDOM representing the expected prices and~~	For clarity.

Title	Section	Provision	Proposed Amendment	Rationale
		(*Footnote* 25: See Annex E, Dispatch Protocol, for the timeline on the submission of offers/bids into the WESM.) (*Footnote* 26: See WESM Rules Clause 3.5.4)	~~quantities at the market trading nodes and are scheduled by the Market Operator prior to actual dispatch by the System Operator. Their values depends on generation offers, reserve offers, and demand bids submitted by the trading participants at the times set in the market timetable[25], and the net load forecast prepared by the Market Operator.[26]~~ *(Footnote ~~24~~ **37***: WESM Rules Clause 3.13.8) ~~(*Footnote* 25: See Annex E, Dispatch Protocol, for the timeline on the submission of offers/bids into the WESM.)~~ ~~(*Footnote* 26: See WESM Rules Clause 3.5.4)~~ ~~The working formulations for determining trading amounts of generators and customers are~~ as follows~~: xxx~~	
		The working formulations for determining trading amounts of generators and customers are as follows:		
For Generators: $EAETA_{k,h}^{m} = (EAESP_{h}^{m} \times (EAQSI_{k,h}^{m} - BCQ_{k,b,h}^{m}))$			**i. Generators** $$ETA_{k,h} = \left(ESP_{k,h} * GESQ_{k,h}\right) - \sum_{b \in B}\left(ESP_{k,b,h} * BCQ_{k,b,h}\right)$$	
		Where: $EAETA_{k,h}^{m}$ represents the ex-ante energy trading amount for Generator "k" at trading interval "h" and metering point "m"; $EAESP_{h}^{m}$ is the ex-ante energy settlement price for the trading interval "h" and metering point "m", which is the market clearing price for the trading node where the generator is connected;	Where: **B refers to the total number of counter-party resources** ~~$EAETA_{k,h}^{m}$~~ **$ETA_{k,h}$ refers to the** ~~represents the ex-ante~~ energy trading amount ~~for Generator "k"~~ **of resource k** at ~~trading~~ **settlement interval h** ~~"h" and metering point "m"~~ ~~$EAESP_{h}^{m}$~~ **$ESP_{k,h}$ refers to the** ~~is the ex-ante~~ energy settlement price **of**	

Title	Section	Provision	Proposed Amendment	Rationale
		$EAQSI_{k,h}^{m}$ is the ex-ante quantity of energy that is scheduled for injection by the generator "k" for trading interval "h" and metering point "m"; and	~~for the trading interval "h" and metering point "m", which is the market clearing price for the trading node where the~~ generator **resource k at settlement interval h** ~~is connected;~~	
			~~$EAQSI_{k,h}^{m}$~~ **$GESQ_{k,h}$ refers to the gross** ~~is the ex-ante quantity of~~ energy **settlement quantity for generator resource k at settlement** ~~that is scheduled for injection by the generator "k" for trading~~ interval **h** ~~"h" and metering point "m"; and~~	
		$EAQSI_{k,h}^{m}=0.5 \times (XAGQ_{k,h}^{m}+XAIGQ_{k,h}^{m})$[27]	~~$EAQSI_{k,h}^{m}=0.5 \times (XAGQ_{k,h}^{m}+XAIGQ_{k,h}^{m})$~~[27]	
		(*Footnote* 27: See WESM Rules Clause 3.13.5.1)	~~(Footnote 27: See WESM Rules Clause 3.13.5.1)~~	
		$XAGQ_{k,h}^{m}$ is the ex-ante target quantity for generator "k" at trading interval "h" and metering point "m";	~~$XAGQ_{k,h}^{m}$ is the ex-ante target quantity for generator "k" at trading interval "h" and metering point "m";~~	
		$XAIGQ_{k,h}^{m}$ is the ex-ante initial quantity for generator "k" at trading interval "h" and metering point "m";	~~$XAIGQ_{k,h}^{m}$ is the ex-ante initial quantity for generator "k" at trading interval "h" and metering point "m";~~	
		and	~~and~~	
		$BCQ_{k,b,h}^{m}$ is the bilateral contract quantity associated with generator "k", and the corresponding buyer or customer "b" for trading interval "h" and metering point "m".	**$ESP_{k,b,h}$ refers to the reference energy settlement price for the bilateral contract quantity between generator resource k and load resource b at settlement interval h (default is generator ESP)**	
			$BCQ_{k,b,h}^{m}$ ~~is the~~ **refers to the** bilateral contract quantity ~~associated with~~ **for** generator **resource k to** ~~"k", and the corresponding buyer or customer~~	

Title	Section	Provision	Proposed Amendment	Rationale
			~~"b"~~ **counterparty load resource b** ~~for trading~~ **at settlement** interval **h** ~~"h" and metering point "m".~~	
For Buyers: $EAETA_{b,h}^{m}=(EAESP_{h}^{m} \times (EAQSW_{b,h}^{m}-BCQ_{k,b,h}^{m}))$			**ii. Customers/Buyers** $$ETA_{b,h} = \left(ESP_{b,h} * GESQ_{b,h}\right) - \sum_{k \in K}\left(ESP_{b,k,h} * BCQ_{b,k,h}\right)$$	
		Where: $EAETA_{b,h}^{m}$ is the ex-ante energy trading amount for buyer/customer "b" for trading interval "h" and metering point "m"; $EAESP_{h}^{m}$ is the ex-ante energy settlement price in trading interval "h" and metering point "m" which is the market clearing price for the trading node where the buyer/customer is connected; $EAQSW_{b,h}^{m}$ is the ex-ante quantity of energy that is withdrawn from the system by the buyer/customer "b" for trading interval "h" and metering point "m"; $EAQSW_{b,h}^{m}=0.5 \times (XALQ_{b,h}^{m}+XAILQ_{b,h}^{m})$ $XALQ_{b,h}^{m}$ is the ex-ante target quantity for buyer/customer "b" for trading interval "h" and metering point "m"; $XAILQ_{b,h}^{m}$ is the ex-ante initial quantity for buyer/customer "b" for trading interval "h" and metering point "m"; and	Where: **K refers to the total number of generator resources that resource b has a contracted with at settlement interval h** ~~$EAETA_{b,h}^{m}$~~ **$ETA_{b,h}$ refers to the** ~~is the ex-ante~~ energy trading amount ~~for buyer/customer~~ **of load resource b at settlement** ~~"b" for trading~~ interval **h** ~~"h" and metering point "m";~~ ~~$EAESP_{h}^{m}$~~ **$ESP_{b,h}$ refers to the** ~~is the ex-ante~~ energy settlement price **of load resource b** ~~in trading~~ **at settlement** interval **h** ~~"h" and metering point "m" which is the market clearing price for the trading node where the buyer/customer is connected;~~ **$GESQ_{b,h}$ refers to the gross energy settlement quantity for load resource b at settlement interval h** ~~$EAQSW_{b,h}^{m}$ is the ex-ante quantity of energy that is withdrawn from the system by the buyer/customer "b" for trading interval "h" and metering point "m";~~ ~~$EAQSW_{b,h}^{m}=0.5 \times (XALQ_{b,h}^{m}+XAILQ_{b,h}^{m})$~~	

Title	Section	Provision	Proposed Amendment	Rationale
		$BCQ_{k,b,h}^{m}$ is the bilateral contract quantity associated with buyer/customer "b", and the corresponding generator "k" for trading interval "h" and metering point "m".	~~$XALQ_{b,h}^{m}$ is the ex-ante target quantity for buyer/customer "b" for trading interval "h" and metering point "m";~~ ~~$XAILQ_{b,h}^{m}$ is the ex-ante initial quantity for buyer/customer "b" for trading interval "h" and metering point "m";~~ ~~and~~ **$ESP_{b,k,h}$ refers to the reference energy settlement price for the bilateral contract quantity between generator resource k and load resource b at settlement interval h (default is generator ESP)** **$BCQ_{b,k,h}$** ~~$BCQ_{k,b,h}^{m}$ is the~~ **refers to the** ~~bilateral contract quantity associated with buyer/customer~~ **for load resource b** ~~"b", and the corresponding generator "k"~~ **to counter-party generator resource k** ~~for trading~~ **at settlement interval h** ~~"h" and metering point "m"~~	
		NEW	**8.4.2 Reserve Trading Amount** **a. The gross reserve settlement quantity for any market trading node in any settlement interval shall be determined by the Market Operator as the average of the reserve schedule for each facility.[38]** *(Footnote **38**:* **WESM Rules Clause 3.13.5**) $GRSQ_{j,\,r,\,a,\,h} = \frac{\sum_{i \in N} RDS_{j,\,r,\,a,\,i}}{n}$ **Where:** **$GRSQ_{j,\,r,\,a,\,h}$ refers to the gross reserve settlement quantity of**	Provide formula for the determination of reserve settlement quantity under WESM Rules clause 3.13.5 and reserve trading amounts under WESM Rules clause 3.13.9.

Title	Section	Provision	Proposed Amendment	Rationale
			resource j for reserve category r and reserve region a at settlement interval h **$RDS_{j, r, a, i}$ refers to the reserve dispatch schedule for resource j for reserve category r and reserve region a at dispatch interval i** **n refers to the number of dispatch intervals at settlement interval h** **b. The reserve settlement quantity for any market trading node in any settlement interval shall be determined by the Market Operator as the gross reserve settlement quantity less reserve contracted quantities.** [39] *(Footnote **39**:* **WESM Rules Clause 3.13.5**) $RSQ_{j, r, a, h} = (GRSQ_{j, r, a, h} - RBCQ_{j, r, a, h})$ **Where:** **$RSQ_{j, r, a, h}$ refers to the reserve settlement quantity of resource j for reserve category r and reserve region a at settlement interval h** **$GRSQ_{j, r, a, h}$ refers to the gross reserve settlement quantity of resource j for reserve category r and reserve region a at settlement interval h** **$RBCQ_{j, r, a, h}$ refers to the bilateral contract quantity for resource j for**	

Title	Section	Provision	Proposed Amendment	Rationale
			reserve category r and reserve region a at settlement interval h **c. For settlement purposes, the reserve trading amount for each Trading Participant who supplies reserve to a particular reserve region in a settlement interval shall be determined as the reserve settlement price for that reserve region in that settlement interval multiplied by the reserve settlement quantity for that Trading Participant in that reserve region for that settlement interval. [40]** *(Footnote **40**:* **WESM Rules Clause 3.13.9**) $RTA_{j, r, a, h} = RSP_{j, r, a, h} * RSQ_{j, r, a, h}$ **Where:** **$RTA_{j, r, a, h}$ refers to the reserve trading amount of resource j for reserve category r and reserve region a at settlement interval h** **$RSP_{j, r, a, h}$ refers to the reserve settlement price of resource j for reserve category r and reserve region a at settlement interval h** **$RSQ_{j, r, a, h}$ refers to the reserve settlement quantity of resource j for reserve category r and reserve region a at settlement interval h**	

Title	Section	Provision	Proposed Amendment	Rationale
		NEW	**8.4.3 Aggregate Trading Amount** **a. The aggregate trading amount for a Trading Participant for a settlement interval is determined as follows: [41]** *(Footnote **41**:* **WESM Rules Clause 3.13.13.2**) **i. Energy trading amount, which may be positive or negative for any Trading Participant; plus** **ii. Reserve trading amount for each reserve region, which will always be positive for both Generation Companies and Customers; plus** **iii. Upon approval of the trading of financial transmission rights, the transmission right trading amounts for each transmission right held by the WESM Participant; less** **iv. The reserve cost recovery charge determined for that Trading Participant with respect to any reserve cost recovery zone, which will be positive for any Trading Participant.** **b. This is provided in the following formula:**	For clarity and provide formula for aggregate trading amount in accordance with WESM Rules clause 3.13.13.2.
		NEW	$$\mathrm{TA}_{p,h} = \sum_{j \in J_p} \mathrm{ETA}_{j,h} + \sum_{j \in J_p} \sum_{r \in R_j} \mathrm{RTA}_{j,r,a,h} + \sum_{t \in T_p} \mathrm{TRTA}_{t,h} - \sum_{j \in J_p} \mathrm{RCRA}_{j,h}$$	

Title	Section	Provision	Proposed Amendment	Rationale
		NEW	**Where:** **$TA_{p,h}$ refers to the aggregate trading amount of trading participant p for settlement interval h** **$ETA_{j,h}$ refers to the energy trading amount of resource j at settlement interval h** **$RTA_{j, r, a, h}$ refers to the reserve trading amount of resource j for reserve category r and reserve region a at settlement interval h** **$TRTA_{j,h}$ refers to the transmission rights trading amount of transmission right t at settlement interval h** **$RCRA_{j,h}$ refers to the reserve cost recovery amount of resource j for settlement interval h computed as the sum of resource $RRCost_{j, REG-r, a, h}$ and $CRCost_{k, r, a, h}$** **J_p refers to the set of all resources associated with trading participant p** **R_j refers to the set of all reserve categories which resource j participate in** **T_p refers to the set of all transmission rights associated with trading participant p**	
		13.2. Determination of Ex-Post Energy Trading Amount xxx	~~13.2. Determination of Ex-Post Energy Trading Amount~~ ~~xxx~~	
		NEW	**8.5 Additional Compensation** **8.5.1 A Trading Participant may be entitled to additional compensation when**	Provide for additional compensation which may be availed by MRU and resources

Title	Section	Provision	Proposed Amendment	Rationale
			the costs incurred in complying with dispatch instructions are not sufficiently covered by the trading amounts related to settlement intervals with dispatch intervals: **a. Under market suspension or market intervention; or** **b. In which the same Trading Participant was designated as must-run unit.** **8.5.2 A Trading Participant may also be entitled to additional compensation when the costs incurred in providing reserves based on capacity fees are not sufficiently covered by the trading amounts related to settlement intervals with dispatch intervals under market suspension or market intervention.** **8.5.3 Trading Participants shall submit sufficient proof regarding the following costs incurred:** **a. fuel costs; and** **b. variable operating and maintenance costs, which may include start-up cost and shut-down costs.** **8.5.4 The additional compensation for dispatch intervals under market suspension or market intervention shall not be more than the difference of the total costs in Section 7.5.3 and the amount of the energy administered price or reserve administered price, as applicable, already paid or payable, subject to the**	affected by market intervention or market suspension.

Title	Section	Provision	Proposed Amendment	Rationale
			determination and approval of the Market Operator. **8.5.1 Should a generating unit be designated as must-run unit, the Market Operator shall determine the must-run unit quantity/volume that shall be considered for additional compensation. This must-run units volume is the total metered quantity of that generating unit minus the bilateral contract quantity declared for that unit, as provided in the following formula:** $\text{MRU Quantity}_{k,h} = MQ_{k,h} - BCQ_{k,h}$ **Where:** **$MQ_{k,h}$ refers to the metered quantity for generator resource k at settlement interval h** **$BCQ_{k,h}$ refers to the bilateral contract quantity declared for generator resource k at settlement interval h** **a. If a generating unit was scheduled beyond the minimum limit declared by the System Operator in the security limit, then the MRU Volume is zero (0).** **b. In cases where the calculated MRU Volume is less than zero, then the MRU Volume is equal to zero.** **c. The additional compensation shall be pro-rated to the customers in the same region based on metered quantities.**	
		NEW	**8.6 Settlement Amounts**	For clarity and to provide formula for determining the

Title	Section	Provision	Proposed Amendment	Rationale
			8.6.1 For each billing period, the Market Operator shall determine the settlement amount for each Trading Participant as follows: [42] *(Footnote **42**:* **WESM Rules Clause 3.13.13**) **a. The sum of the aggregate trading amounts for the settlement intervals in that billing period; plus** **b. Any amount payable by the Market Operator to that Trading Participant in respect of that billing period and not accounted for in the aggregate trading amounts; less** **c. The sum of any market fees which that Trading Participant is required to pay in respect of that billing period.** **8.6.2 This is provided in the following formula:** $$\mathrm{SA}_{\mathrm{p,m}} = \sum_{\mathrm{h}\in\mathrm{H}_{\mathrm{m}}} \mathrm{TA}_{\mathrm{p,h}} + \mathrm{OTA}_{\mathrm{p,m}} + \mathrm{MF}_{\mathrm{p,m}}$$ **Where:** **$\mathrm{SA}_{\mathrm{p,m}}$ refers to the settlement amount of trading participant p for billing period m** **$\mathrm{TA}_{\mathrm{p,h}}$ refers to the aggregate trading amount of trading participant p for settlement interval h** **$\mathrm{OTA}_{\mathrm{p,m}}$ refers to other trading amounts of trading participant p for billing period m**	settlement amount of a Trading Participant in a billing period in accordance with WESM Rules clause 3.13.13.

Title	Section	Provision	Proposed Amendment	Rationale
			$MF_{p,m}$ refers to the market fee payments of trading participant p for billing period m	
Allocation of Net Settlement Surplus	13.3	13.3. Allocation of Net Settlement Surplus xxx	~~13.3.~~ **SECTION 9** Allocation of Net Settlement Surplus ~~xxx~~ **9.1 Scope** **9.1.1 This section provides the formula used to determine and allocate the net settlement surplus, which refers to the difference between the collections from and payments to Trading Participants.[43]** *(Footnote **43: WESM Rules Clause 3.13.14**)* **9.1.2 This section shall only apply to energy transactions since the reserve market implements a cost recovery that does not result to any net settlement surplus.**	• To provide for provisions and formula for the determination and allocation of NSS in accordance with WESM Rules clause 3.13.14. • Consolidate provisions under the NSS Manual in the PDM Manual, which abolishes the NSS Manual.
			9.2 Calculation of Net Settlement Surplus **9.2.1 The net settlement surplus amount shall be calculated on an hourly basis as follows:** $NSS_h = Collectibles_h - Payables_h$ **Where:** **NSS_h refers to the net settlement surplus at settlement interval h**	

Title	Section	Provision	Proposed Amendment	Rationale
			Collectibles$_h$ refers to the total amount to be collected by the Market Operator from the Trading Participants for energy transactions in the WESM at settlement interval h. **Payables$_h$ refers to the total amount to be paid by the Market Operator to the Trading Participants for energy transactions in the WESM at settlement interval h** **h refers to the settlement interval** **9.2.2 In case the collectibles are less than the payables resulting to a net settlement deficit, the deficit shall be recovered from the Trading Participants. In this case, the net settlement surplus referred to would be a negative amount and the rebate referred to shall also be a negative amount.** **9.3 Recipient of Net Settlement Surplus** **9.3.1 WESM Trading Participants that paid for the loss and congestion charge shall receive a share in the net settlement surplus.** **9.3.2 The allocation mechanism shall only be up to the level of the registered Trading Participants.** **9.4 Flow Back of Net Settlement Surplus**	

Title	Section	Provision	Proposed Amendment	Rationale
			9.4.1 The net settlement surplus shall be allocated to each WESM Participant based on each recipient's share in the total amount of loss and congestion charges. **9.4.2 The amount to be returned shall be equal to the ratio of the recipient's loss and congestion charges to the total loss and congestion charges of all recipients multiplied by the total net settlement surplus amount, as represented by the following formula:** $$R_{p,h} = NSS_h * \frac{LLCC_{p,h}}{\sum_{p \in P} LLCC_{p,h}}$$ **Where:** **$R_{p,h}$ refers to the rebate amount or net settlement surplus allocation for Trading Participant p at settlement interval h** **NSS_h refers to the net settlement surplus at settlement interval h** **$LLCC_{p,h}$ refers to the line loss and congestion charges payments of Trading Participant p at settlement interval h** **P refers to the set of all Trading Participants** **p refers to any Trading Participant paying line loss congestion charges to which a pro-rated amount of the net settlement surplus will be returned** **h refers to the settlement interval**	

Title	Section	Provision	Proposed Amendment	Rationale
			a. The line loss and congestion charge payment is determined as follows:	
			$$LLCC_{p,h} = \sum_{n \in N_p} \left(LLCP_{n,h} * \sum_{j \in J_{n,p}} GESQ_{j,n,h} \right) - \sum_{c \in C_p} \left(LLCP_{p,c,h} * BCQ_{p,c,h} \right)$$	
			Where: **$LLCC_{p,h}$ refers to the line loss and congestion charges payments of Trading Participant p at settlement interval h** **$LLCP_{n,h}$ refers to the line loss and congestion price at market trading node n at settlement interval h** **N_p refers to the set of market trading nodes assigned to WESM Participant p** **$J_{n,p}$ refers to the set of resources of Trading Participant p at market trading node n** **$GESQ_{j,n,h}$ refers to the gross energy settlement quantity of resource j in market trading node n at settlement interval h** **$LLCP_{p,c,h}$ refers to the line loss and congestion price at the reference bilateral nodal energy dispatch price between Trading Participant p and counterparty c at settlement interval h** **$BCQ_{p,c,h}$ refers to the declared bilateral contract quantity between WESM Participant p and**	

Title	Section	Provision	Proposed Amendment	Rationale
			counterparty c at settlement interval h **Cp refers to the set of counterparties of Trading Participant p** **b. In case the line loss and congestion charge payment for a settlement interval of a trading participant is a positive value, the line loss and congestion charge payment for the Trading participant for that settlement interval shall be set to zero (0).** **c. The line loss and congestion price for a settlement interval for each resource is calculated as follows.**	
			$LLCP_{n,h}=\frac{\sum_{i\in I_h}\{[(MLC_{n,h,i}+MCC_{n,h,i})-(M}{\sum_{i\in I_h} EDS_j}$	
			Where: **$LLCP_{n,h}$ refers to the line loss and congestion price at market trading node n at settlement interval h** **$MLC_{n,h,i}$ refers to the marginal loss cost at market trading node n at dispatch interval i within settlement interval h** **$MCC_{n,h,i}$ refers to the marginal congestion cost at market trading node n at dispatch interval i within settlement interval h**	

Title	Section	Provision	Proposed Amendment	Rationale
			$(MCC+MLC)_{h,i}^{lowest}$ refers to the lowest aggregated marginal loss cost and marginal congestion cost for dispatch interval i within settlement interval h **$EDS_{j,h,i}$ refers to the energy dispatch schedule of resource j at dispatch interval i within settlement interval h** **I_h refers to the set of dispatch intervals within settlement interval h** **d. In case the nodal energy dispatch prices were not determined using the market dispatch optimization model in accordance with WESM Rules Clause 3.6, the line loss and congestion cost price of each resource shall be set to zero (0).** **9.4.3 In case the nodal energy dispatch prices of all resources in all dispatch intervals of a settlement interval were not determined using the market dispatch optimization model in accordance with WESM Rules Clause 3.6, the net settlement surplus for that settlement interval shall be allocated to customer resources on a pro-rata basis depending on each customer resource's share in the total metered quantities of all customer resources. The allocation shall be performed on a per customer resource basis associated to the WESM Participants. Generator resources will not have an allocation of the net settlement surplus during this case.**	

Title	Section	Provision	Proposed Amendment	Rationale
			The amount to be returned will be equal to the ratio of the customer resource's metered quantity to the total metered quantity of all customer resources multiplied by the total net settlement surplus amount, as represented by the following formula: $$R_{b,h} = NSS_h * \frac{MQ_{b,h}}{\sum_{b \in B} MQ_{b,h}}$$ **Where:** **$R_{b,h}$ refers to the rebate amount or net settlement surplus allocation for customer resource b at settlement interval h** **NSS_h refers to the net settlement surplus at settlement interval h** **$MQ_{b,h}$ refers to the metered quantity of customer resource b at settlement interval h** **B refers to the set of all customer resources**	
Bilateral Contracts	10	10. Bilateral Contracts 10.1. Treatment of Bilateral Contracts xxx 10.2. Line Rental Amounts for Bilateral Contracts xxx	~~10. Bilateral Contracts~~ ~~10.1. Treatment of Bilateral Contracts~~ ~~xxx~~ ~~10.2. Line Rental Amounts for Bilateral Contracts~~ ~~xxx~~	Already covered in section 8.
Treatment of New and Renewable Energy with	11	11. Treatment of New and Renewable Energy with Intermittent Energy Resource xxx	~~11. Treatment of New and Renewable Energy with Intermittent Energy Resource~~ ~~xxx~~	Already covered in section 4.

Title	Section	Provision	Proposed Amendment	Rationale
Intermittent Energy Resource				
		NEW	**SECTION 10 AMENDMENT, PUBLICATION AND EFFECTIVITY** **10.1 Review and Update** **10.1.1 The Market Operator shall review and update this Market Manual, as necessary.** **10.1.2 Any amendment or revision to this Market Manual shall be approved in accordance with Chapter 8 of the WESM Rules and corresponding Market Manual and by the ERC.** **10.2 Publication and Effectivity** **10.2.1 The publication and effectivity of this Market Manual shall be in accordance with the resolution of the ERC.**	In accordance with the format of WESM Manuals and to provide that the final approving authority of the PDM is the ERC.
Detailed Formulation of the Market Dispatch Optimization Model	Appendix III-1	Appendix III-1 Detailed Formulation of the Market Dispatch Optimization Model xxx	**SECTION 11 APPENDICES** Appendix **A** ~~III-1~~ Detailed Formulation of the Market Dispatch Optimization Model ~~xxx~~	Revised to reflect the details of the MDOM formulation.
Tie-Breaking Policy- Illustrative Example	Appendix III-2	Appendix III-2 - Tie-Breaking Policy- Illustrative Example xxx	Appendix **B** ~~III-2 -~~ Tie-Breaking ~~Policy-~~ Illustrative Example ~~xxx~~	For clarity.
		NEW	**Appendix C Runway Model**	For clarity.

Note: For convenience, please underline and put in bold letters the proposed changes to the WESM Manual.

IV. Proposed Scheme to Monitor the Effectiveness of the Proposed Changes to the WESM Manual

V. Referral

MAG Date Received: _____

Proposed Amendment: ☐ Urgent ☐ Minor ☐ General

A. For Urgent Amendment (For the use of PEMC President only)

Date Referred to PEMC President	☐ Yes	☐ No
Certifies as urgent	☐ Yes	☐ No
Convene the RCC within 48 hrs.		
Remarks:		

B. For Minor and General Amendment (For the use of RCC only)

Date Referred to RCC:	
Remarks:	
Action taken:	
Request for comments:	☐ Yes ☐ No
	Request written comments from: ☐ DRG ☐ MSC ☐ PA ☐ MO ☐ ECO ☐ RCC ☐ TC ☐ Other PEM Board Committees ☐ Other Interested Parties
For further review of the Technical Sub-Committee:	☐ Yes Assigned to: ☐ SO Sub-Committee ☐ MO Sub-Committee ☐ Metering Sub-Committee ☐ Billing and Settlement Sub-Committee ☐ Legal and Regulatory Sub-Committee
	☐ No
For public consultation:	☐ Yes ☐ No
RCC Resolution:	☐ Approved ☐ Disapproved
RCC Resolution No.:	
Date of Resolution:	
RCC Meeting No.	
Date of endorsement to the PEM Board:	