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**
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I. Proposer's Information

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II.WESM Manual Amendments Information

Title of WESM Manual being commented:
Constraint Violation Coefficients

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

III. Proposed Amendment[1]

Title	Section	Provision	Proposed Amendment	Rationale
	Title Page	Constraint Violation Coefficients	Constraint Violation Coefficients **and Pricing Re-Runs**	Conduct of pricing re-runs is one of the main contents of the Manual.
Introduction	1	1.1 About this Document xxx	~~1.1 About this Document~~ ~~xxx~~	Deleted section is moved to Section 1.2, in accordance with the format of WESM Manuals.
Introduction	1	1.2 Purpose xxx	~~1.2 Purpose~~ ~~xxx~~	Deleted section is moved to Section 1.2, in accordance with the format of WESM Manuals.
Introduction	1	1.3 Scope xxx	~~1.3 Scope~~ ~~xxx~~	Deleted section is moved to Section 1.3, in accordance with the format of WESM Manuals.
Introduction	1	1.4 Intended Audience xxx	~~1.4 Intended Audience~~ ~~xxx~~	Unnecessary section
Introduction	1	1.5 Conventions xxx	~~1.5 Conventions~~ ~~xxx~~	Deleted section is covered in Section 2, as revised.
Introduction	1	1.6 Background The MDOM determines the optimal dispatch schedule and nodal prices considering the different inputs from the MO (load forecast, network model, etc.), SO (snapshot, reserve requirement, etc.) and Trading Participants (offers, bids,	~~1.6~~ **1.1** Background **1.1.1** The ~~MDOM~~ **market dispatch optimization model** determines the optimal dispatch schedule and nodal prices considering the different inputs from the ~~MO~~ **Market Operator** ~~(load forecast, network model, etc.)~~, ~~SO~~	• Consistent with the proposed amendments to the WESM Rules on WESM enhancements to design and operations • Clerical corrections • Renumbering

[1] Column on PEMC Comments is provided for internal information/reference only. This will not be included in the version to be submitted to the Rules Change Committee.

Title	Section	Provision	Proposed Amendment	Rationale
		etc.). In some instances, combination of these inputs does not allow the MDOM to produce a feasible solution. Under WESM Rules 3.6.2.1, to allow the MDOM to find a solution which satisfies all constraints, if such a solution exists, constraint violation coefficients (CVCs) will be incorporated in the MDOM. As provided for in the objective of the MDOM (WESM Rules 3.6.1.3), CVCs are the basis for the cost of constraint violation. xxx	~~(snapshot, reserve requirement, etc.)~~ **System Operator,** and **from the** Trading Participants ~~(offers, bids, etc.)~~ **using linear programming**~~. In some instances,~~ **The** combination of these inputs ~~does~~ **may** not allow the ~~MDOM~~ **market dispatch optimization model** to produce a feasible solution **thus constraint violation variables and associated constraint violation coefficients are necessary to ensure that the market dispatches and market pricing re-runs always** ~~Under WESM Rules 3.6.2.1, to allow the MDOM to~~ find a solution ~~which satisfies all constraints,~~ if such a solution exists~~, constraint violation coefficients (CVCs) will be incorporated in the MDOM. As provided for in the objective of the MDOM (WESM Rules 3.6.1.3), CVCs are the basis for the cost of constraint violation~~. ~~xxx~~	• Deletion of explanatory provisions
Purpose	1.2	This document aim to: 1.2.1 Provide the criteria in determining CVC. 1.2.2 Provide the mechanism in the revision, publication and approval of the CVC penalty price values. 1.2.3 Define the responsibilities of the Market Operator (MO), System Operator	~~This document aim to:~~ 1.2.1 ~~Provide the criteria in determining CVC.~~ **The systems, processes, and procedures set out in this Market Manual on the determination of constraint violation coefficients and market pricing re-runs shall ensure**	For clarity

Title	Section	Provision	Proposed Amendment	Rationale
		(SO) and Trading Participants in relation to the CVC to be used in the MDOM.	**that results of market projections and the real-time dispatch in the WESM are:** **a. Providing economic signals that properly account the economic impact of losses and constraints that resulted from the operation of the electricity market;[1] and** (*Footnote* **1: WESM Rules Clauses 3.2.2 and 3.6.1**) **b. Updated and made available to WESM Participants to ensure they can make timely and informed commercial and technical decisions.[2]** (*Footnote* **2: WESM Rules Clause 1.2.5**) ~~1.2.2 Provide the mechanism in the revision, publication and approval of the CVC penalty price values.~~ ~~1.2.3 Define the responsibilities of the Market Operator (MO), System Operator (SO) and Trading Participants in relation to the CVC to be used in the MDOM.~~	
Scope	1.3	This document covers the determination of the CVC and the basic procedures	~~This document covers the determination of the CVC and the basic procedures~~	For clarity.

Title	Section	Provision	Proposed Amendment	Rationale
		and policies to be applied regarding the CVC's.	~~and policies to be applied regarding the CVC's.~~ **1.3.1 This Market Manual provides the values of the constraint violation coefficients in order to establish an appropriate priority order for soft constraints.** [3] (*Footnote* **3: WESM Rules Clauses 10.4.11.1 and 3.6.2.4**) **1.3.2 This Market Manual provides the procedures, the criteria and conditions necessary for the execution of automatic pricing re-runs.** [4] (*Footnote* **4: WESM Rules Clause 3.6.7.8**) **1.3.3 This Market Manual provides the guidelines and procedures for the execution of a market pricing re-run upon the issuance of pricing error notice.** [5] (*Footnote* **5: WESM Rules Clause 3.10.5.4**)	

Title	Section	Provision	Proposed Amendment	Rationale
			1.3.4 This Market Manual shall apply to the Market Operator, the System Operator, and the Trading Participants in the WESM.	
Definition of Terms	2	2 Definition of Terms xxx 2.13 Soft Constraints – constraints pertaining to system and nodal energy balance requirement, regional energy import/export, regional reserve and transmission line limit which are allowed to be violated in the market dispatch optimization model such that the optimization process will produce a solution. xxx	2 Definition**s** ~~of Terms~~ **2.1.1 Unless otherwise defined or the context implies otherwise, the italicized terms used in this Market Manual shall bear the same meaning as defined in the WESM Rules and other Market Manuals.** **2.1.2 The following as used in this Market Manual shall have the following meaning –** ~~xxx~~ ~~2.13~~ **a.** Soft Constraints – constraints ~~pertaining to system and nodal energy balance requirement, regional energy import/export, regional reserve and transmission line limit which are allowed to be violated in the market dispatch optimization model such that the optimization process will produce a solution~~ **which are allowed to be violated in the market dispatch optimization model such that the**	• Deletion of defined terms that are already defined in the body of the Market Manual. • For clarity • Other terms were deleted since these are also provided in Section 4.

Title	Section	Provision	Proposed Amendment	Rationale
			optimization process will produce a solution. ~~xxx~~	
		NEW	**2.2. References** **This Manual shall be read in association with the following –** **a. WESM Rules** **b. WESM Price Determination Methodology** **c. WESM Dispatch Protocol** **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. Where there is a discrepancy or conflict between this Manual and the WESM Rules, the WESM Rules shall prevail.** **2.3.3. Standards and policies appended to, or referenced in, this**	For clarity and in accordance with the format for WESM Manuals.

Title	Section	Provision	Proposed Amendment	Rationale
			Manual shall provide a supporting framework.	
Responsibilities	3	3.1 The MO will be responsible for the development, validation, maintenance, publication and revision of this document in coordination with Trading Participants and the System Operator. 3.2 The SO will provide the necessary information and references for subsequent revisions and validation of this document. 3.3 Trading participants will provide the necessary information and references for subsequent revisions and validation of this document. 3.4 The PEM Board will be responsible for the approval of this document and subsequent revisions and issuances.	3.1 **Market Operator** **3.1.1** The ~~MO~~ **Market Operator shall** ~~will~~ be responsible for the development, validation, maintenance, publication and revision of this ~~document~~ **Market Manual** in 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 ~~SO will~~ **System Operator shall** provide the necessary information and references for **the implementation and** subsequent revisions and validation of this ~~document~~ **Market Manual**. 3.3 **Trading Participants** **3.3.1** Trading participants ~~will~~ **shall** provide the necessary information and references for **the implementation and** subsequent revisions and validation of	• For clarity. • Deleted provision on the PEM Board's approval of this Market Manual since this is covered in Section 7, as revised.

Title	Section	Provision	Proposed Amendment	Rationale
			this ~~document~~ **Market Manual, particularly in the establishment of nodal load shedding or nodal value of loss load (VOLL) values**. ~~3.4 The PEM Board will be responsible for the approval of this document and subsequent revisions and issuances.~~	
Constraint Violation Coefficient in the MDOM	4	4 Constraint Violation Coefficient in the MDOM	4 Constraint Violation Coefficient ~~in the MDOM~~ **4.1 Scope** **4.1.1. This section provides the values of the constraint violation coefficients and the priority order of soft constraints that can be relaxed considering their constraint violation coefficients so that the market dispatch optimization model will always find a solution** **4.1.2. The constraint violation coefficients shall be set for market dispatches so as to ensure that the market dispatch optimization model will always find a solution which satisfies all constraints, if such a solution exists; and the violated constraints are prioritized, such that the network elements, loads and**	• Provide details on soft constraints, for clarity • Renumbering

Title	Section	Provision	Proposed Amendment	Rationale
			generating units are physically feasible and reflect the priorities or how the System Operator should manage system security and reliability. [6] (*Footnote* **6: WESM Rules Clause 3.6.2.1**) **4.1.3. The constraint violation coefficients shall also be set for market pricing re-runs so as to ensure that the dispatches of all network elements, loads and generating units produced by the market optimization algorithm are approximately the same as the original market dispatches; and the prices produced by the market optimization algorithm shall be appropriate in all the circumstances, taking into consideration the processes defined in WESM Rules Clauses 3.6.7 and 3.10 to adjust or override those prices for market projection, dispatch, and settlement purposes when there are instances of non-zero constraint violation variable values.** [7]	

Title	Section	Provision	Proposed Amendment	Rationale
		The following will constitute the CVC in the MDOM: (a) Deficit Interruptible Load Reserve - This signals insufficient Interruptible Load reserve, when the Interruptible Load reserve that may be scheduled is below the Interruptible Load requirements. Operationally interruptible loads can be compensated by sufficient dispatchable reserves and hence will not provide significant risk in the power system even if the interruptible load requirement is not met. (b) Deficit Dispatchable Reserve - This signals insufficient dispatchable reserve, when the dispatchable reserve that may be scheduled is below the dispatchable reserve requirements. Deficit dispatchable reserve may be compensated by sufficient interruptible load. (c) Deficit Regulating Reserve – This signals insufficient regulation reserve when the regulation reserve that may be scheduled is below the regulation	(*Footnote* **7: WESM Rules Clause 3.6.2.2**) **4.2 Soft Constraints** The following ~~will constitute the CVC~~ **soft constraints may be relaxed** in the ~~MDOM~~ **market dispatch optimization model and shall have an associated constraint violation coefficient**: ~~(a) Deficit Interruptible Load Reserve - This signals insufficient Interruptible Load reserve, when the Interruptible Load reserve that may be scheduled is below the Interruptible Load requirements. Operationally interruptible loads can be compensated by sufficient dispatchable reserves and hence will not provide significant risk in the power system even if the interruptible load requirement is not met.~~ ~~(b) Deficit Dispatchable Reserve - This signals insufficient dispatchable reserve, when the dispatchable reserve that may be scheduled is below the dispatchable reserve requirements. Deficit dispatchable reserve may be~~	

Title	Section	Provision	Proposed Amendment	Rationale
		requirements. It is of utmost importance that this type of service be always available, even in cases of insufficient supply in compensating for the energy requirement. (d) Deficit Contingency reserve – This signals insufficient contingency reserve, when the contingency reserve that may be scheduled is below the contingency requirements. (e) Contingency Constraint - This signals the risk resulting from transmission line overflow during single outage conditions. Similar to Base Case Constraint, deficiency leading to a line flow violation could alternatively result in an artificial nodal violation. (f) Over Generation – This signals the risk of shutting down generators to avoid system over frequency. WESM defines excess generation as generation which may be scheduled to occur in excess of load requirements, even though market energy prices have fallen to the market price floor, and will be dealt with in accordance with clause 3.9.8 of the WESM Rules. Over generation is the opposite of deficit or under generation.	~~compensated by sufficient interruptible load.~~ ~~(c) Deficit Regulating Reserve – This signals insufficient regulation reserve when the regulation reserve that may be scheduled is below the regulation requirements. It is of utmost importance that this type of service be always available, even in cases of insufficient supply in compensating for the energy requirement.~~ ~~(d) Deficit Contingency reserve – This signals insufficient contingency reserve, when the contingency reserve that may be scheduled is below the contingency requirements.~~ **a. Reserve Requirement Constraint, where the total reserve schedules should meet the reserve requirement for a certain reserve category in a certain reserve region. Should this constraint be violated, it signifies that the reserve schedules were unable to meet the reserve requirement. It should be noted that it applies for all reserve types.** **Should these constraints be violated, it signifies that the reserve schedules**	

Title	Section	Provision	Proposed Amendment	Rationale
		(g) Under Generation – This signals the risk of load shedding in the system, as this signifies load is greater than the amount of energy injected to the system. (h) Base Case Constraint – This signals the security risk resulting from transmission line or transformer overflow. Generally the deficiency leading to a line flow violation could alternatively result in a nodal violation – load could be shed at the receiving end rather than violating the flow limits. In reality, the best way to manage this risk is for load to be shed at the receiving end of the line rather than risking overloading the lines to a point where it is burnt out, resulting in greater disruption to the transmission system and the economy. (i) Transmission Constraint Group (TCG) Constraint – This signals risks to the power transfer capability between regions in the transmission system. TCGs pertain branch groups or interconnection between regions in the power system.	**were unable to meet the reserve requirement.** ~~(e)~~ **b. Thermal** Contingency Constraint - ~~This signals the risk resulting from~~ **where the power flow through a** transmission ~~line overflow~~ **equipment should be within its thermal contingency limit** during ~~single~~ **N-1** outage conditions. **Should this constraint be violated, it means that the results reflect that the power flow through a transmission equipment exceeded its contingency limit during N-1 outage conditions.** ~~Similar to Base Case Constraint, deficiency leading to a line flow violation could alternatively result in an artificial nodal violation.~~ **c. Self-Scheduled Generation Constraint, where the dispatch target of preferential dispatch and non-scheduled generating units shall be equal to their projected output or schedule of loading level, respectively. Should this constraint be violated, it means that the projected output or schedule of loading level of the relevant generating unit(s) shall be curtailed. If**	

Title	Section	Provision	Proposed Amendment	Rationale
		(j) Nodal VoLL - This signals risks to localized shedding of load due to line or transformer loading limitations.	**there is more than one generating unit to be curtailed, the curtailment scheme shall follow the methodology defined in the WESM Price Determination Methodology.** **d. Thermal Base Case Constraint, where the power flow through a transmission equipment should be within its normal (base case) limit. Should this constraint be violated, it means that the results reflect that the power flow through a transmission equipment exceeded its normal limit.** ~~(i)~~ **e.** Transmission ~~Constraint~~ Group ~~(TCG)~~ Constraint – ~~This signals risks to the power transfer capability between regions in the transmission system. TCGs pertain~~ , **where the power flow through a** branch ~~groups~~ **group** or **an** interconnection ~~between regions in the power system~~ **equipment between grids (i.e. HVDC links) should be within its normal limits. Should this constraint be violated, it means that the power flow through a branch group or HVDC link exceeded its normal limits.**	

Title	Section	Provision	Proposed Amendment	Rationale
			~~(f) Over Generation – This signals the risk of shutting down generators to avoid system over frequency. WESM defines excess generation as generation which may be scheduled to occur in excess of load requirements, even though market energy prices have fallen to the market price floor, and will be dealt with in accordance with clause 3.9.8 of the WESM Rules. Over generation is the opposite of deficit or under generation.~~ ~~(g) Under Generation – This signals the risk of load shedding in the system, as this signifies load is greater than the amount of energy injected to the system.~~ **f. System Energy Balance Constraint, where the total generation scheduled should meet the demand requirement. Should this constraint be violated, it could be either that the total generation scheduled is beyond the demand requirement (over-generation), or there is a generation deficit or the total generation scheduled is unable to meet the demand requirement (under-generation).**	

Title	Section	Provision	Proposed Amendment	Rationale
			~~(h) Base Case Constraint – This signals the security risk resulting from transmission line or transformer overflow. Generally the deficiency leading to a line flow violation could alternatively result in a nodal violation – load could be shed at the receiving end rather than violating the flow limits. In reality, the best way to manage this risk is for load to be shed at the receiving end of the line rather than risking overloading the lines to a point where it is burnt out, resulting in greater disruption to the transmission system and the economy.~~ ~~(j)~~ **g.** Nodal VoLL **or Nodal Energy Balance Constraint** ~~- This signals risks to~~ **, where the power going into a node should be equal to the power going outside of the same node. This constraint also refers to the nodal energy balance constraint, which may vary from node to node, and/or be set so as to reflect load shedding priorities.[8] Should this constraint be violated, it means that the node is reflective of** ~~localized~~ **load** shedding ~~of load due to line or transformer loading limitations~~ **due to either a deficit in**	

Title	Section	Provision	Proposed Amendment	Rationale
			generation, or due to a thermal constraint. **(***Footnote* **8: WESM Rules Clause 3.6.2.3)**	
Constraint Violation Coefficient for Nodal Energy Balance Equations (Nodal VoLL)	5	5 Constraint Violation Coefficient for Nodal Energy Balance Equations (Nodal VoLL) xxx	~~5 Constraint Violation Coefficient for Nodal Energy Balance Equations (Nodal VoLL)~~ ~~xxx~~	Deleted section, which is already covered in Section 4.1
Constraint Violation Coefficient Development	6	6 Constraint Violation Coefficient Development 6.1 Based on Section 4 above and in consultation with SO, the following will be the revised priority order of the CVCs in an ascending manner: 6.1.1 Base Case Constraint 6.1.2 TCG Constraint 6.1.3 Deficit Regulating Reserve 6.1.4 Under Generation / Over Generation 6.1.5 Nodal VoLL 6.1.6 Contingency Constraint 6.1.7 Deficit Contingency Reserve 6.1.8 Deficit Dispatchable Reserve 6.1.9 Deficit Interruptible Load	~~6~~ **4.3 Priority Order of** Constraint Violation Coefficient**s** ~~Development~~ **4.3.1 The priority order of soft constraints shall be set such that constraints resulting in the lowest reduction in the capability of the network, load or generating units will occur first. A soft constraint with a higher priority shall be the last constraint to be violated.** ~~6.1~~ **4.3.2** ~~Based on Section 4 above and in consultation with SO, the~~ **The** following ~~will be the revised~~ priority order **of soft constraints, from highest to lowest priority,** ~~of the CVCs in an ascending manner~~ **shall be as follows**:	Assumption of the hierarchy includes the modelling of distribution networks that affect market outcomes.

Title	Section	Provision	Proposed Amendment	Rationale
			~~6.1.1~~ **a. Thermal** Base Case Constraint ~~6.1.2~~ **b.** ~~TCG~~ **Transmission Group** Constraint ~~6.1.3~~ **c.** ~~Deficit~~ Regulating Reserve **Requirement Constraint** **d. Thermal Contingency Constraint** **e. Self-scheduled Generation Constraint** ~~6.1.4 Under- Generation / Over Generation~~ ~~6.1.5 Nodal VoLL~~ **f. System Energy Balance Constraint** ~~6.1.6 Contingency Constraint~~ **g. Nodal VoLL or Nodal Energy Balance Constraint** ~~6.1.7~~ **h.** ~~Deficit~~ **Fast** Contingency Reserve **Requirement Constraint** ~~6.1.8~~ **i.** ~~Deficit Dispatchable~~ **Slow Contingency** Reserve **Requirement Constraint** ~~6.1.9~~ **j.** ~~Deficit Interruptible Load~~ **Delayed Contingency Reserve Requirement Constraint**	
Gradation Levels between CVCs	6.2	6.2 Gradation Levels between CVCs The initial value of the Deficit Interruptible Load, which is of the lowest priority, was set at CVC of 100,000, an assigned value that is far from any values that may be derived in the WESM. As such, the priority order shall start at the original value for Deficit Interruptible Load with 100,000.	~~6.2 Gradation Levels between CVCs~~ **4.3.3 The priority order of soft constraints shall be established in the market dispatch optimization model**	For clarity

Title	Section	Provision	Proposed Amendment	Rationale
		Sufficient grading in between CVCs are made so that the pre-defined order of violation priority is maintained, and to resolve possible dispatch conflicts between the different constraint types should they occur simultaneously. Section 8 details the priority order of the CVC and their corresponding CVC values.	**through the values of the constraint violation coefficients, which shall be set as far from any market clearing price values that may be derived in the WESM.** ~~The initial value of the Deficit Interruptible Load, which is of the lowest priority, was set at CVC of 100,000, an assigned value that is far from any values that may be derived in the WESM. As such, the priority order shall start at the original value for Deficit Interruptible Load with 100,000.~~ **4.3.4 There shall be sufficient** ~~Sufficient~~ grading in between ~~CVCs~~ **constraint violation coefficients** ~~are made so that~~ **to maintain** the pre-defined order of ~~violation~~ priority ~~is maintained,~~ and ~~to~~ resolve possible dispatch conflicts between the different constraint types should they occur simultaneously. ~~Section 8 details the priority order of the CVC and their corresponding CVC values.~~	
Constraint Violation Coefficient Application	7	7 Constraint Violation Coefficient Application Strategy in the WESM xxx	~~7 Constraint Violation Coefficient Application Strategy in the WESM~~ ~~xxx~~	Deleted obsolete provisions.

Title	Section	Provision	Proposed Amendment	Rationale
Strategy in the WESM				
Constraint Violation Coefficients Table	8	8 Constraint Violation Coefficients Table The following table lists the Constraint Violation Coefficient names and their corresponding price and order of priority. The corresponding action by SO regarding the CVC is also indicated.	~~8 Constraint Violation Coefficients Table~~ **4.3.5** The following table ~~lists~~ **provides** the ~~Constraint Violation Coefficient names~~ **different soft constraints,** ~~and~~ their corresponding ~~price and order~~ **constraint violation coefficients, which is reflective** of **the** priority **order established in this Market Manual** ~~The~~ **the** corresponding action by **the System Operator.** ~~SO regarding the CVC is also indicated.~~ **Table 1. Priority Order and Constraint Violation Coefficients of Soft Constraints**	• Renumbering • For clarity

Provision					Proposed Amendment				
Priority	Constraint Violation Coefficient Name	CVC	Definition	Action to be Undertaken	Priority	**Soft** Constraint ~~Violation Coefficient Name~~	CVC	~~Definition~~	**SO** Action ~~to be Undertaken~~
1	Base Case Constraint	1,500,000	Thermal loading limit violations of lines or transformers	Possible overloading should be addressed by Re-dispatch generation and	1	**Thermal** Base Case Constraint	~~1,500,000~~ **3,000,000**	~~Thermal loading limit violations of lines or transformers~~	~~Possible overloading should be addressed by~~ Re-dispatch

Provision					Proposed Amendment				
Priority	Constraint Violation Coefficient Name	CVC	Definition	Action to be Undertaken	Priority	**Soft** Constraint ~~Violation Coefficient Name~~	CVC	~~Definition~~	**SO** Action ~~to be Undertaken~~
				drop load if necessary.					generation and**/or** drop load ~~if~~ **as** necessary.
2	TCG Constraint	1,400,000	Import/Export constraints between areas.	Possible overloading should be addressed by Re-dispatch generation and drop load if necessary.	2	~~TCG~~ **Transmission Group** Constraint	~~1,400,000~~ **2,900,000**	~~Import/Export constraints between areas.~~	~~Possible overloading should be addressed by~~ Re-dispatch generation and**/or** drop load ~~if~~ **as** necessary.
3	Deficit Regulating Reserve	1,300,000	Insufficient capacity to meet Regulating Reserve Requirements	Larger frequency excursions are expected without regulating reserve. Lower power quality of service.	3	~~Deficit~~ Regulating Reserve **Requirement**	~~1,300,000~~ **2,800,000**	~~Insufficient capacity to meet Regulating Reserve Requirements~~	Larger frequency excursions are expected without regulating reserve. ~~Lower power quality of service.~~
					~~6~~**4**	**Thermal** Contingency **Constraint**	400,000 **2,400,000**	~~Violation in pre-defined contingency limits during single-outage conditions (n-1)~~	**Re-dispatch generation and/or drop load as necessary.** ~~Implement necessary re-dispatch and possible manual~~

Provision					Proposed Amendment				
Priority	Constraint Violation Coefficient Name	CVC	Definition	Action to be Undertaken	Priority	**Soft** Constraint ~~Violation Coefficient Name~~	CVC	~~Definition~~	**SO** Action ~~to be Undertaken~~
									~~load dropping to prevent overloading on the remaining lines or transformers~~
					5	**Self-Scheduled Generation Constraint**	**1,400,000**		**Curtail generation and/or drop load as necessary.**
4	Over Generation	(1,000,000)	The total minimum generation in the system exceeds the total demand	Identify generating units to be shutdown to eliminate excess capacity.					
	Under Generation	1,000,000	The demand exceeds the total maximum generation in the system	Implement Manual load dropping to ensure the balance of supply and demand.					
5	Nodal Value of Lost Load	800,000	Deficiency in supply due to localized violations on	Marginal overloads (i.e., <110% for 1 hour) should be					

Provision					Proposed Amendment				
Priority	Constraint Violation Coefficient Name	CVC	Definition	Action to be Undertaken	Priority	**Soft** Constraint ~~Violation Coefficient Name~~	CVC	~~Definition~~	**SO** Action ~~to be Undertaken~~
			line or transformer loading limitations	addressed to eliminate possible overloading on the remaining lines or transformers during contingency occurrence, otherwise, drop local loads.					
					~~4~~**6**	~~Over Generation~~ **System Energy Balance Constraint**	~~(1,000,000)~~ **1,300,000**	~~The total minimum generation in the system exceeds the total demand~~	**For over-generation, identify generating units** ~~Identify generating units~~ to be shut down to eliminate excess capacity.
						~~Under Generation~~	~~(1,000,000)~~	~~The demand exceeds the total maximum generation in the system~~	**For under-generation, identify** ~~Implement Manual~~ **must-run units that can be dispatched or drop** load

Provision					Proposed Amendment				
Priority	Constraint Violation Coefficient Name	CVC	Definition	Action to be Undertaken	Priority	**Soft** Constraint ~~Violation Coefficient Name~~	CVC	~~Definition~~	**SO** Action ~~to be Undertaken~~
									~~dropping to ensure the balance of supply and demand.~~ **as necessary**
6	Contingency	400,000	Violation in pre-defined contingency limits during single-outage conditions (n-1)	Implement necessary re-dispatch and possible manual load dropping to prevent overloading on the remaining lines or transformers					
					~~5~~ **7**	Nodal Value of Lost Load **or Nodal Energy Balance Constraint**	800,000	~~Deficiency in supply due to localized violations on line or transformer loading limitations~~	**Re-dispatch generation and/or drop load as necessary.** ~~Marginal overloads (i.e., <110% for 1 hour) should be addressed to eliminate possible overloading on the remaining~~

Provision					Proposed Amendment				
Priority	Constraint Violation Coefficient Name	CVC	Definition	Action to be Undertaken	Priority	**Soft** Constraint ~~Violation Coefficient Name~~	CVC	~~Definition~~	**SO** Action ~~to be Undertaken~~
									~~lines or transformers during contingency occurrence, otherwise, drop local loads.~~
7	Deficit Contingency Reserve	300,000	Insufficient capacity to meet Contingency Reserve Requirements	Delayed restoration of affected automatic load dropping (ALD) feeders due to loss of generation if contingency reserve is insufficient.	~~7~~ **8**	~~Deficit~~ **Fast** Contingency Reserve **Requirement**	~~300,000~~ **400,000**	~~Insufficient capacity to meet Contingency Reserve Requirements~~	~~Delayed restoration of affected automatic~~ **Automatic** load dropping ~~(ALD) feeders due~~ to **cover for** loss of generation if contingency reserve is insufficient.
8	Deficit Dispatchable Reserve	200,000	Insufficient capacity to meet Dispatchable Reserve Requirements	The contingency reserve when depleted cannot be replenished by Dispatchable Reserve if not sufficient	~~8~~ **9**	~~Deficit Dispatchable~~ **Slow Contingecy** Reserve **Requirement**	200,000	~~Insufficient capacity to meet Dispatchable Reserve Requirements~~	~~The contingency reserve when depleted cannot be replenished by Dispatchable Reserve if not sufficient~~

Provision					Proposed Amendment				
Priority	Constraint Violation Coefficient Name	CVC	Definition	Action to be Undertaken	Priority	**Soft** Constraint ~~Violation Coefficient Name~~	CVC	~~Definition~~	**SO** Action ~~to be Undertaken~~
									Automatic load drop to cover for loss of generation if contingency reserve is insufficient.
9	Deficit Interruptible Load Reserve	100,000	Insufficient capacity to meet the Interruptible Reserve Requirement	Same function as Dispatchable reserve	~~9~~ **10**	~~Deficit Interruptible Load~~ **Delayed Contingency** Reserve **Requirement**	100,000	~~Insufficient capacity to meet the Interruptible Reserve Requirement~~	~~Insufficient capacity to meet the Interruptible Reserve Requirement~~ **Automatic load drop to cover for loss of generation if contingency reserve is insufficient.**

Title	Section	Provision	Proposed Amendment	Rationale
Constraint Violation	8		**4.3.6. The Market Operator shall publish all non-zero constraint**	For transparency.

Title	Section	Provision	Proposed Amendment	Rationale
Coefficients Table			**violation variables in the market information website.**	
Constraint Violation Coefficient Review and Audit	9	9 Constraint Violation Coefficient Review and Audit xxx	~~9 Constraint Violation Coefficient Review and Audit~~ ~~xxx~~	Audit of CVC is already covered in the market audits under Clause 5.2.6 of the WESM Rules.
		NEW	**5 Automatic Pricing Re-runs**	Consistent with the proposed amendments to the WESM Rules on WESM enhancements to design and operations
		NEW	**5.1. Rationale for Automatic Pricing Re-Runs** **5.1.1. At all times, the market dispatch optimization model shall find a solution considering the priority order of the constraint violation coefficients in Section 4 of this Market Manual.** **5.1.2. Should the market dispatch optimization model result in one or more non-zero constraint violation variable values, then the dispatch schedules shall remain the same, but the prices for energy and reserves shall be determined from an automatic re-run of the market**	Consistent with the proposed amendments to the WESM Rules on WESM enhancements to design and operations

Title	Section	Provision	Proposed Amendment	Rationale
			dispatch optimization model with relaxed constraints[9]. *(Added footnote **9**:* **WESM Rules Clause 3.6.7.1**) **5.1.3. The purpose of the automatic pricing re-runs is to ensure that the energy and reserve prices reflect:[10]** *(Added footnote **10**:* **WESM Rules Clause 3.6.7.2**) **a. the marginal costs of supplying energy at each node;** **b. the marginal costs of supplying reserves;** **c. shortage pricing when there is a shortage of supply at a node or regional level; and** **d. excess pricing when there is an excess of supply at a node or regional level.**	
		NEW	**5.2. Process for Automatic Pricing Re-Runs** **5.2.1. During the automatic pricing re-run, the soft constraint that was violated shall be relaxed using the resulting non-zero violation variable,**	Consistent with the proposed amendments to the WESM Rules on WESM enhancements to design and operations

Title	Section	Provision	Proposed Amendment	Rationale
			considering a very small value (delta), to allow the market dispatch optimization model to be able to find a feasible price. **5.2.2. In case of over-generation and under-generation, the soft constraint shall be relaxed by a very small 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 price for over-generation.** **5.2.3. The delta shall be set as little as possible for each constraint violation coefficient so that the automatic pricing re-run is reflective of the most accurate price considering the original dispatch schedules.** **5.2.4. An example related to Section 5.2.1, is provided below:**	

Title	Section	Provision	Proposed Amendment	Rationale
			Should a thermal contingency constraint violation occur: **Contingency Power flow < Thermal contingency limit + x** **Where:** **Contingency Power flow refers to the power flow through an equipment during an N-1 outage scenario** **x refers to the violation amount in MW** **Thermal contingency limit refers to the maximum transmission limit during an N-1 outage scenario** **Then, its constraint shall be relaxed during the automatic pricing re-run similar to the formulation below:** **Contingency Power flow < Thermal contingency limit + x + delta** **5.2.5. The resulting prices during an automatic pricing re-run shall be produced in the real time dispatch, along with the original real time**	

Title	Section	Provision	Proposed Amendment	Rationale
			dispatch schedules produced prior to the relaxation.	
			5.3. Automatic Pricing Re-Run Parameters **5.3.1. Soft constraints shall have their corresponding constraint relaxation formulas during pricing re-runs as provided in Table 2 below:** **Table 2. Automatic Pricing Re-Run Parameters**	Consistent with the proposed amendments to the WESM Rules on WESM enhancements to design and operations

Priority	Soft Constraint	CVC	Violation	Delta	Constraint Relaxation during Pricing Re-Run	CVC Value in Pricing Re-Run[11]
1	Thermal Base Case Constraint	3,000,000	x	0.1	x + delta	EDP AND RP
2	Transmission Group Constraint	2,900,000	x	0.1	x + delta	EDP AND RP
3	Regulating Reserve Requirement Constraint	2,800,000	x	0.1	x + delta	EDP AND RP
4	Thermal Contingency Constraint	2,400,000	x	0.1	x + delta	EDP AND RP

Priority	Soft Constraint	CVC	Violation	Delta	Constraint Relaxation during Pricing Re-Run	CVC Value in Pricing Re-Run[11]
5	Self-Scheduled Generation Constraint	1,400,000	x	0.1	x + delta	EDP AND RP
6	System Energy Balance Constraint	1,300,000	x	0	delta	Excess Price for over-generation Shortage Price for under-generation
7	Nodal Energy Balance Constraint	800,000	x	0.1	x + delta	EDP AND RP
8	Fast Contingency Reserve Requirement Constraint	400,000	x	0.1	x + delta	EDP AND RP
9	Slow Contingency Reserve Requirement Constraint	200,000	x	0.1	x + delta	EDP AND RP
10	Delayed Contingency Reserve Requirement Constraint	100,000	x	0.1	x + delta	EDP AND RP

Title	Section	Provision	Proposed Amendment	Rationale
			(Footnote **11**: **EDP refers to nodal energy dispatch price; and RP refers to reserve price**)	For clarity
		NEW	**6 Market Pricing Re-Runs to Address Pricing Errors**	• Consistent with the proposed amendments to the WESM Rules on WESM enhancements to design and operations • To provide process for price discovery during pricing errors due to bad input data.
			6.1. Guidelines for Issuance of Pricing Error Notices and Conduct of Manual Pricing Re-Runs **6.1.1. In the event where no dispatch prices can be determined or communicated within the timeframe specified by the timetable or the calculated prices are believed to be in error, notwithstanding the application of automatic pricing re-run under clause WESM Rules Clause 3.6.7.1, the Market Operator may issue a pricing error notice[12].** *(Added footnote 12:* **WESM Rules Clause 3.10.5.1**)	• Consistent with the proposed amendments to the WESM Rules on WESM enhancements to design and operations • To provide process for price discovery during pricing errors due to bad input data.

Title	Section	Provision	Proposed Amendment	Rationale
			6.1.2. Upon issuance of a pricing error notice, the Market Operator shall, as soon as practicable, implement a market pricing re-run[13] which is also referred to as manual pricing re-run in this Market Manual. *(Added footnote 13:* **WESM Rules Clause 3.10.5.2**) **6.2 Issuance and Publication of Pricing Error Notices** **6.2.1. When the pricing error occurs, the Market Operator shall issue pricing error notices to the Trading Participants, within the trading day. Pricing error notices shall be issued to Trading Participants by electronic means, or other alternative means where such electronic means is unavailable for any reason.** **6.2.2. Within two (2) working days after the trading day when the pricing error occurred, the Market Operator shall publish in the market information website a summary of the pricing error notices issued for that**	

Title	Section	Provision	Proposed Amendment	Rationale
			trading day pursuant to this Market Manual. **6.2.3 Where a pricing error notice has been issued but the Market Operator determines after validation that no pricing error actually occurred as the criteria set forth in this Market Manual is not met, the Market Operator shall issue an advisory to all Trading Participants informing them of the correction.** **6.2.4 Likewise, where no pricing error notice has been issued but the Market Operator determines after validation that pricing error actually occurred, the Market Operator shall issue the pricing error notice prior to the issuance of the preliminary settlement statement for the relevant billing period.** **6.3 Process for Manual Pricing Re-Runs** **6.3.1. The Market Operator shall perform the manual pricing re-run using the same set of input data used in the original real time dispatch**	

Title	Section	Provision	Proposed Amendment	Rationale
			market run, with corresponding adjustments or corrections as may be appropriate depending on the cause of the pricing error. **6.3.2. In performing the manual pricing re-run, the Market Operator shall determine the appropriate solution that shall be applied in the manual pricing re-run taking into consideration the applicable solutions for the various causes of erroneous, inconsistent and inappropriate input data, as provided in Table 3 below:** **Table 3. Manual Pricing Re-run Conditions and Solutions**	

No.	Condition	Description	Solution
1	Bad and non-updating system snapshot/state estimator data (breaker status, load levels, etc.)	Bad breaker status may cause isolation of loads and generators or islanding of a group of nodes. The system snapshot/ state estimator data normally contains bad data thus only intervals with isolated loads exceeding the forecast tolerance limits with respect to the total demand or those that result to congestion is issued with pricing error.	Identify the affected load, generator or equipment and reflect the actual generation/load values or status (as necessary) in the market pricing re-run.

2	**Errors resulting from limitations of Market Network modelling**	**Arise when there is inconsistency between the Market Network Model and the actual power system network**	**Identify the affected load, generator or equipment and reflect the actual generation/load values or status (as necessary) in the market pricing re-run.**

Title	Section	Provision	Proposed Amendment	Rationale
			6.3.3. If the results of the manual pricing re-run indicate nodal price separation that is due to congestion, then the methodology provided for in the relevant Market Manual shall apply. Otherwise, the prices from the manual pricing re-run shall be used for settlement pursuant to WESM Rules Clause 3.10.5. **6.3.4. Manual pricing re-runs shall be performed and completed within a reasonable time after the relevant dispatch interval, provided that all pricing re-runs shall be completed before the issuance of the final settlement statement for the affected billing period.** **6.4 Publication of Manual Pricing Re-Run Results**	For transparency.

Title	Section	Provision	Proposed Amendment	Rationale
			6.4.1. After each billing period and upon completion of all manual pricing re-runs, the following information shall be published by the Market Operator in the market information website and disseminated to all Trading Participants: **a. Complete list of the pricing errors that occurred during the billing period, indicating clearly the affected dispatch intervals, including those instances where no pricing error was issued within the timetable; and** **b. Results of the manual pricing re-run, including the resulting market prices.**	
		NEW	**SECTION 7 AMENDMENT, PUBLICATION AND EFFECTIVITY** **7.1 Review and Update** **7.1.1. The Market Operator, in coordination with the System Operator, and in consultation with the WESM Members shall regularly review the appropriateness and applicability of constraint violation variables and their associated constraint violation coefficients levels and revise as**	Consistent with the DOE-approved changes to the rules change process under Chapter 8 of the WESM Rules.

Title	Section	Provision	Proposed Amendment	Rationale
			maybe necessary to ensure that it reflects the actual conditions of the network.[14] *(Added footnote **14**:* **WESM Rules Clause 3.6.2.5**) **7.1.2. The Market Operator shall, from time to time, review and update the automatic pricing re-run parameters provided in Table 2 of this Market Manual.** **7.1.3. The Market Operator shall, from time to time, review and update the list and description of the solutions being applied for various causes of pricing errors provided in Table 3 of this Market Manual.** **7.2 Publication and Effectivity** **7.2.1. Any amendment or revision to this Market Manual shall be approved, published, and deemed effective in accordance with Chapter 8 of the WESM Rules and corresponding Market Manual.**	
Constraint Violation	10	10. Constraint Violation Coefficient Publication and Application	~~10. Constraint Violation Coefficient Publication and Application~~	• Deleted obsolete provisions.

Title	Section	Provision	Proposed Amendment	Rationale
Coefficient Publication and Application		10.1 During the Market Trials and Prior to the start of the commercial operation of the WESM, the MO will notify all participants of the CVCs used in the MDOM and publish the CVCs in the WESM website. 10.2 Reports pertaining to the review and audit of the CVCs will be published in the WESM website upon completion. 10.3 Should the PEM Board approve any changes in the CVCs, the MO will publish the approval and resolution of the PEM Board in the WESM website. 10.4 Any revision or changes pertaining to the CVCs in the MDOM will take effect 7 days after its publication in the WESM website.	~~10.1 During the Market Trials and Prior to the start of the commercial operation of the WESM, the MO will notify all participants of the CVCs used in the MDOM and publish the CVCs in the WESM website.~~ ~~10.2 Reports pertaining to the review and audit of the CVCs will be published in the WESM website upon completion.~~ ~~10.3 Should the PEM Board approve any changes in the CVCs, the MO will publish the approval and resolution of the PEM Board in the WESM website.~~ ~~10.4 Any revision or changes pertaining to the CVCs in the MDOM will take effect 7 days after its publication in the WESM website.~~	• Provision on the approval and revision of CVCs are covered in Section 7.

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:	