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

DEPARTMENT CIRCULAR NO. DC2022-11-0036

ADOPTING FURTHER AMENDMENTS TO THE WHOLESALE ELECTRICITY SPOT MARKET (WESM) RULES AND MARKET MANUALS ON SYSTEM SECURITY AND RELIABILITY GUIDELINES (SSRG) AND DISPATCH PROTOCOL FOR THE IMPLEMENTATION OF THE RESERVE MARKET

WHEREAS, Sections 30 and 37(f) of Republic Act No. 9136 or the Electric Power Industry Reform Act (EPIRA) of 2001 provides that the Department of Energy (DOE), jointly with the electric power industry participants, shall establish the Wholesale Electricity Spot Market (WESM) and formulate the detailed rules governing the operations thereof;

WHEREAS, on 28 June 2002, the DOE, with the endorsement of the electric power industry participants, promulgated the WESM Rules through Department Circular No. DC2002-06-0003;

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

WHEREAS, on 24 June 2016, the DOE promulgated Department Circular No. 2016-06-0009 providing the WESM Market Manual on System Security and Reliability Guidelines (SSRG);

WHEREAS, in a letter dated 03 June 2022, the Philippine Electricity Market (PEM) Board after due deliberation, formally endorsed to the DOE, for final approval, the proposed amendments to WESM Rules and WESM Manuals on System Security and Reliability Guidelines and Dispatch Protocol for the Implementation of the Reserve Market;

WHEREAS, on 25 June 2022, the proposal was posted on the DOE website to solicit comments from stakeholders and other interested parties;

WHEREAS, the DOE conducted the following public consultations:

Leg	Date	Venue
Luzon	19 July 2022	Taguig City
Visayas	26 July 2022	Bacolod City
Mindanao	02 August 2022	General Santos City

NOW, THEREFORE, after careful review of the PEM Board-endorsed proposal and the comments and recommendations received on the same, the DOE, pursuant to its authority under the EPIRA and the WESM Rules, hereby adopts, issues, and

promulgates the following amendments to the WESM Rules and Market Manuals on SSRG and Dispatch Protocol:

Section 1. Amendments to the WESM Rules. The following provisions of the WESM Rules are hereby amended to read as:

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Chapter 11 Glossary

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Automatic Generation Control (AGC). Equipment that automatically adjusts the generation to maintain its *generation dispatch*, interchange schedule plus its share of *frequency* regulation. AGC is a combination of secondary control for a control area/control block and real-time operation of the *generation dispatch* function (based on generation scheduling). Secondary control is operated by the *System Operator* while generation scheduling is operated by the respective *Generation Companies*.

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Normal State. The *grid* operating condition when the *power system frequency*, voltage, and transmission line and equipment loading are within their normal operating limits, the Operating Margin is sufficient, and the *grid* configuration is such that any fault current can be interrupted, and the faulted equipment isolated from the *grid*.

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Reliability. The performance of the elements of the bulk electric system that results in electricity being delivered to customers within accepted standards and in the amount desired. *Reliability* may be measured by the *frequency*, duration, and magnitude of adverse effects on the electric supply.

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Section 2. Amendments to the Market Manual on SSRG. The following provisions of the Market Manual on SSRG are hereby amended to read as:

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2.0 Definition of Terms

Unless otherwise defined or the context implies otherwise, the italicized terms used in this *Market Manual* which are defined in the *WESM Rules* or Philippine Grid Code shall bear the same meaning as defined in the *WESM Rules* or Philippine Grid Code.

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Automatic Generation Control (AGC). Equipment that automatically adjusts the generation to maintain its *generation dispatch*, interchange schedule plus its share of

frequency regulation. AGC is a combination of secondary control for a control area /control block and real-time operation of the *generation dispatch* function (based on generation scheduling). Secondary control is operated by the *System Operator* while generation scheduling is operated by the respective *Generation Companies*.

Automatic Load Dropping (ALD). The process of automatically and deliberately removing pre-selected loads from a *power system* in response to an abnormal condition to maintain the integrity of the *power system*. It can be classified as Under-Frequency Load Shedding (UFLS) and Under-Voltage Load Shedding (UVLS).

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Contingency. The outage of a single component of the *grid* that cannot be predicted in advance but excludes scheduled maintenance.

Contingency Reserve. The synchronized generation capacity from qualified *generating units* and qualified *interruptible loads* allocated to cover the loss or failure of a synchronized *generating unit* or a transmission element or the power import from a circuit interconnection.

Continuous Rating. The rating of a component or equipment which defines the substantially constant conditions which can be tolerated for an indefinite time without significant reduction of service life. It is also the maximum constant load that can be carried by a piece of electric equipment without exceeding a designated temperature rise.

Critical Loading. The condition when the loading of transmission lines or substation equipment is between 90 percent and 100 percent of the *continuous rating*.

Demand Control. The reduction in demand for the control of the *frequency* when the *grid* is in an *emergency state.* This includes *Automatic Load Dropping*, *Manual Load Dropping*, demand reduction upon instruction by the *System Operator*, and voluntary demand management.

Dispatchable Reserve. The generating capacity that is readily available for *dispatch* to replenish the *Contingency Reserve* service whenever a *generating unit* trips or a loss of a single transmission interconnection occurs.

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Imminent Overloading. The condition when the loading of transmission lines or substation equipment is above 100 percent up to 110 percent of the *continuous rating*.

Island also known as Island Grid. A generating plant or a group of generating plants and its associated load, which is isolated from the rest of the *grid* but is capable of generating and maintaining a stable supply of electricity to customers within an isolated area.

Islanding Operation. The isolated operation of certain portions of the *grid* as a result of forced outages or *contingency* action by the *System Operator*.

Manual Load Dropping (MLD). The process of manually and deliberately removing preselected loads from a *power system* in response to an abnormal condition, to maintain the integrity of the *power system*.

Multiple Outage Contingency. An event caused by the failure of two (2) or more components of the *grid*.

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Operating Margin also known as Gross Operating Margin. The available generating capacity in excess of the sum of the system demand plus losses within a specified period.

Regulating Reserve. The readily available and dispatchable generating capacity that is allocated exclusively to correct deviations from the acceptable nominal *frequency* caused by unpredicted variations in demand or generation output.

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Security. The continuous operation of a *power system* in the *normal state*, ensuring a safe and adequate supply of power to end-users, even when some parts or components of the system are on outage.

Single Outage Contingency (N-1). An event caused by the outage of one component of the *grid* including:

a) Loss of a single-circuit transmission line, except those radial circuits which connect loads using a single line or cable;

b) Loss of one circuit of a double-circuit transmission line including the point-to-point connection of a generating plant to the *grid*;

c) Loss of submarine cable;

d) Loss of a single transformer, except those which connect loads using a single radial transformer;

e) Loss of a *generating unit*; and

f) Loss of compensating devices (i.e. capacitor/reactor/SVC).

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System Integrity Protection Scheme (SIPS). A protection system that is designed to detect abnormal or predetermined system conditions and take automatic corrective actions other than and/or in addition to the isolation of faulted components to preserve the integrity of the *power system* or strategic portions thereof.

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Voltage Control. Any actions undertaken by the *System Operator* or user to maintain the voltage of the *grid* within the limits prescribed by the Philippine Grid Code such as, but not limited to, adjustment of generator reactive output, adjustment in transformer taps, or switching of capacitors or reactors.

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3.0 Objective

Preservation of system reliability and security is the primary objective of these guidelines and is the responsibility of the *System Operator.* This mandate is clearly vested under Clause 3.8.2.1 (c) of the *WESM Rules* which stipulates that, during each *dispatch interval*, the *System Operator* shall use its reasonable endeavors to maintain system security consistent with the requirements of the *Grid Code*. Minimization of customer service interruptions and quick restoration of the *power system* to the *normal state* are secondary objectives of these guidelines.

This document prescribes general guidelines that must be followed by all *WESM Participants* to maintain the *security* and *reliability* of the Luzon, Visayas, and Mindanao *power systems*. These guidelines are based on existing practices and the *Grid Code* and *Distribution Code* requirements and developed in accordance with Clause 6.6.1.1 of the *WESM Rules* which states that the *System Operator*, in consultation with *WESM Participants* and the *Market Operator*, shall develop and periodically update system security and reliability guidelines, subject to the approval of the *PEM Board*. These guidelines provide supplementary provisions for the improvement of WESM operations in ensuring the *security* and *reliability* of the *grid.* However, in case of conflict in the achievement of the objectives of the *Grid Code*, the provisions of the *Grid Code* shall prevail.

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5.3 Emergency State

The *grid* shall be considered in the *emergency state* when either a *Single Outage Contingency* or a *Multiple Outage Contingency* has occurred without resulting in a Total System Blackout, and any one of the following conditions exists:

a) There is generation deficiency or Operating Margin is zero;

b) The *grid* transmission voltage is outside the limits of 0.90 or 1.10 pu of the nominal value; or

c) The *loading level* of any transmission line or substation equipment is above 115% of its Operational Thermal Limit Capacity.

5.4 Single Outage Contingency (N-1) Criterion

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b) Credible *single outage contingency* (N-1)
The N-1 Criterion is related to one of the following contingencies:

i) Loss of a single-circuit transmission line, except those radial circuits which connect loads using a single line or cable;

ii) Loss of one circuit of a double-circuit transmission line, including point-to-point connection of a generating plant to the *grid*;

iii) Loss of submarine cable;

iv) Loss of a single transformer, except those which connect loads using a single radial transformer;

v) Loss of a *generating unit*; and

vi) Loss of compensating devices, i.e., capacitor/reactor/SVC

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d) The *power system* shall be operated at all times in such a manner that system instability, *islanding operation*, cascading outages, or voltage collapse will not occur as a result of the most severe single *contingency*. A single *contingency* may generally be assumed to mean the loss of a single system element; however, the outage of multiple system elements should be treated as a single *contingency* if caused by a single event of sufficiently high likelihood.

e) *Multiple contingency outages* of a credible nature shall be examined, and the system shall be operated to protect against system instability, i*slanding operation*, or cascading outages for these contingencies.

f) A planned activity notice or request for shutdown shall be issued by a *grid* user to the *System Operator*, *Transmission Network Provider*, and *Market Operator* for any planned activity such as a planned shutdown or scheduled maintenance of its equipment at least seven (7) days prior to the actual shutdown or maintenance. This is to allow the *System Operator* sufficient time to evaluate if the planned outage can be accommodated by the *power system* and to coordinate the outage with other affected *grid* users. The *System Operator* shall notify the user, *Transmission Network Provider*, *Market Operator*, and the affected *grid* users of its approval or disapproval of the user's request at least five (5) days before the actual work commences.

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5.6 Voltage and Reactive Power Control

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b) In *normal state*, the control of voltage shall be achieved by managing the reactive power supply in the *grid*. These include the operation of the following equipment:

i) Synchronous *generating units*;

ii) Synchronous condensers;

iii) Shunt capacitors and reactors;

iv) Static VAR compensators; and

v) On-load tap-changing transformers.

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5.7 Frequency

a) The grid frequency shall be controlled by the *Regulating Reserve* during normal conditions, and timely use of *Contingency Reserve*, *Dispatchable Reserve*, and *demand control* during alert or emergency conditions.

b) A *generating unit* providing *Regulating* and/or *Contingency Reserves* may be operated either in an automatic frequency-sensitive mode (also known as free governor mode) as a primary response or in an *automatic generation control* (AGC) mode as a secondary response.

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f) Governors shall not be blocked and shall not be operated with excessive deadbands. To provide an equitable and coordinated system response to generation-load imbalances, speed-droop shall be set at 5% or better.

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5.8 System Reserve Requirements

a) Sufficient system *reserves* shall be available at all times to maintain the acceptable system frequency, necessary to cope with any load variations and errors in load forecasting and to replace generating capacity lost due to forced outages of generation and transmission equipment. Adequate *Regulating Reserve*, *Contingency Reserve*, and *Dispatchable Reserve* shall be available to stabilize the system and facilitate the restoration to the *normal state* following a *multiple outage contingency*.

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c) The required system *reserves* for *Regulating*, *Contingency*, and *Dispatchable Reserve* shall be in accordance with the latest *ERC*-approved *ancillary service* procurement plan.

5.9 Demand Control

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e) In the event of a protracted shortage in generation and when a demand reduction is envisioned by the *System Operator* to be prolonged, the *System Operator* shall notify the user of the expected duration at least one (1) hour before the extension.

f) The user shall abide by the instruction of the *System Operator* with regard to the restoration of demand. The restoration of demand shall be achieved as soon as possible, and the process of restoration shall begin within two (2) minutes after the instruction is given by the *System Operator.*

g) Demand Control shall be implemented to reduce the demand for the *grid* when:

   i) The *System Operator* has issued a Red Alert notice due to generation deficiency or when a *Multiple Outage Contingency* resulted in an *islanding operation*;

   ii) The *System Operator* has issued *Demand Control* Imminent Warning Notice due to generation deficiency; or

   iii) There is an *Imminent Overloading* of a line or equipment following the loss of a line, equipment, or generating plant that poses threat to system security.

h) Demand Control shall include the following:

   i) *Automatic Load Dropping*;

   ii) *Manual Load Dropping*;

   iii) Demand reduction on instruction by the *System Operator*; and

   iv) Voluntary Demand Management.

5.10 Automatic Load Dropping (ALD) and Manual Load Dropping (MLD)

a) Automatic Load Dropping

   i) The *System Operator* shall establish the level of demand required for Under-Frequency Load Shedding (UFLS) and Under-Voltage Load Shedding (UVLS) to limit the consequences of significant incidents or a major loss of generation in the *grid.* The *System Operator* shall conduct the appropriate technical studies to justify the targets and/or to refine them as necessary.

   ii) A UFLS program shall be planned and implemented in coordination with other UFLS programs, if any, within the *grid* and, where appropriate, with neighboring *grids*. The UFLS program shall be coordinated with

generation control and protection systems, under-voltage and other *load-shedding* programs, load restoration programs, and transmission protection and control systems.

iii) The user shall prepare its UFLS program in consultation with the *System Operator*. The user demand that is subject to UFLS shall be split into rotating discrete MW blocks. The *System Operator* shall specify the number of blocks and the under-frequency setting for each block.

iv) If the user does not implement a UFLS program, the *Transmission Network Provider* shall install the under-frequency relay at the main feeder and the *System Operator* shall drop the total user demand as a single block if the need arises.

v) To ensure that a subsequent fall in *frequency* will be contained by the operation of UFLS, additional *Manual Load Dropping* shall be implemented so that the loads that were dropped by UFLS can be reconnected.

vi) If a UFLS has taken place, the affected users shall not reconnect their feeders without clearance from the *System Operator*. The *System Operator* shall issue the instruction to reconnect once the *frequency* of the *grid* has recovered. Subject to available generation, the first circuit to trip shall be the first to be energized.

vii) The user shall notify the *System Operator* of the actual demand that was disconnected by UFLS, or the demand that was restored in the case of reconnection, within five (5) minutes after the reconnection of the last affected load.

viii) A UVLS program shall be planned and implemented in coordination with other UVLS programs in the *grid* and, where appropriate, with neighboring *grids*.

ix) All UVLS programs shall be coordinated with generation control and protection systems, UFLS programs, load restoration programs, and transmission protection and control programs.

x) The user shall notify the *System Operator* of the actual demand that was disconnected by UVLS, or the demand that was restored in the case of reconnection, within five (5) minutes of the load dropping or reconnection.

b) Manual Load Dropping

i) The user shall make an arrangement that will enable it to disconnect its customer immediately following the issuance by the *System Operator* of an instruction to implement MLD.

ii) Distribution Utilities shall, in consultation with the *System Operator*, establish a priority scheme for MLD based on equitable load allocation.

iii) If the *System Operator* has determined that the MLD carried out by the user is not sufficient to contain the decline in grid frequency, the *System Operator* may disconnect the total demand of the user to preserve the integrity of the *grid*.

iv) If a user disconnected its customers upon the instruction of the *System Operator*, the user shall not reconnect the affected customers until instructed by the *System Operator* to do so.

5.11 System Restoration

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b) Following a significant incident that makes it impossible to avoid *islanding operation*, the *System Operator* shall separate the *grid* into several self-sufficient *islands*, which shall be resynchronized to restore the *grid* to the *normal state*.

c) If a part of the *grid* is not connected to the rest of the *grid*, but there is no blackout in that part of the *grid*, the *System Operator* shall undertake the resynchronization of that part to the *grid*.

d) Adequate *Contingency Reserve* and *Regulating Reserves* shall be available to stabilize the *power system* and facilitate the restoration to the *normal state* following a *Multiple Outage Contingency*.

e) Sufficient black start and fast start capacity shall be available at strategic locations to facilitate the restoration of the *grid* to the *normal state* following a total system blackout. At least two (2) black start plants shall be available at each power restoration highway or sub-grid. Each black start *generating unit* shall be tested to verify that it can be started and operated without being connected to the system.

f) The *System Operator* shall issue instructions for the generating plants with Black Start Capability to initiate the Start-Up. The generation company providing Black Start shall then inform the *System Operator* that its generating plants are dispatchable within 30 minutes for the restoration of the *grid*.

g) The overall strategy in the restoration of the *grid* after a Total System Blackout shall, in general, include the following:

i) Overlapping phases of Blackout restoration of *islands*;

ii) Step-by-step integration of the *Islands* into larger subsystems; and

iii) Eventual restoration of the *grid*.

h) The *System Operator* shall inform the Users of the *grid*, after completing the Black Start procedure and the restoration of the *grid*, that the Blackout no longer exists and that the *Grid* is back to the *Normal State*.

i) Emergency drills shall be conducted at least once a year to familiarize all personnel responsible for emergency and *grid* restoration activities with the emergency and restoration procedures. The drills shall simulate realistic emergency situations. A drill evaluation shall be performed and deficiencies in procedures and responses shall be identified and corrected.

5.12 Grid Protection Requirements

a) *Grid* protection shall be designed, wired, set, and coordinated such that operation will not occur for external faults or non-fault conditions.
Redundant protection systems shall be installed in identified critical transmission lines. The two mainline protection systems must preferably utilize different schemes and communication media.

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c) Circuit breaker failure protection system shall be designed to initiate the tripping of all the electrically adjacent circuit breakers and to interrupt the fault current within fifty (50) milliseconds after the primary protection system fails to clear the fault within the prescribed fault clearance time.

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i) *System Integrity Protection Scheme* (SIPS) shall be installed to preserve the integrity of the *Grid* or strategic portions thereof lacking *Single Outage Contingency* (N-1) *security*, determined to be exposed to a high degree of probability of a secondary *Contingency* (N-1-1), and subsequent *Multiple Outage Contingency* (N-k) during abnormal system conditions such as instability, thermal overloading, and voltage collapse. The prescribed action automatically performed by the schemes to protect system integrity may require the opening of one or more lines, tripping of generators, intentional shedding of Loads, or other mitigation measures that will alleviate the problem.

The application of SIPS shall be coordinated with the concerned Users of the *Grid* and shall only be specific to parts of the system determined to be exposed to a high degree of likelihood for a secondary *Contingency* (N-1-1) or a subsequent multiple *Contingency* (N-k) such that the risk of cascaded blackout is avoided.

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5.13 Telecommunications Requirements

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c) Separate telecommunication channels shall be provided for SCADA, protective relaying, special protection systems, voice, and data where appropriate.

jj) System Integrity Protection Scheme (SIPS). A protection system that is designed to detect abnormal or predetermined system conditions and take automatic corrective actions other than and/or in addition to the isolation of faulted components to preserve the integrity of the *power system* or strategic portions thereof.

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Section 4. Separability Clause. If for any reason, any section or provision of this Circular is declared unconstitutional or invalid, such parts that are not affected shall remain valid and subsisting.

Section 5. Repealing Clause. Except insofar as may be manifestly inconsistent herewith, nothing in this Circular shall be construed as to repeal any mechanisms already existing or responsibilities already provided for under existing rules.

Section 6. Effectivity. This Circular shall take effect fifteen (15) days following its complete publication in at least two (2) newspapers of general circulation and shall remain in effect until otherwise revoked. Copies of this Circular shall be filed with the University of the Philippines Law Center – Office of National Administrative Register (UPLC-ONAR).

Issued on NOV 21 2022 2022 at the DOE, Energy Center, Rizal Drive, Bonifacio Global City, Taguig City, Metro Manila.

RAPHAEL P.M. LOTILLA
Secretary