

## RULES CHANGE COMMITTEE

### Proposed Amendments to WESM Rules and WESM Manuals on System Security and Reliability Guidelines and Dispatch Protocol for the Implementation of Reserve Market



Effective Date : 20 May 2022

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**WHEREAS**, the WESM Rules and System Security and Reliability Guidelines Issue 1.0 (SSRG Manual) provide the general guidelines that must be followed by all WESM Participants to maintain the security and reliability of the Luzon, Visayas and Mindanao power systems, while the Dispatch Protocol Issue 16.0 (DP Manual) sets out the timetable and procedures on dispatch scheduling and implementation in the WESM;

**WHEREAS**, on 10 December 2021, the National Grid Corporation of the Philippines (NGCP) submitted the proposed amendments to the WESM Rules, SSRG Manual and DP Manual to update and enhance the manuals, consistent with the various DOE and ERC policies and issuances, to preserve system security and reliability in view of the implementation of the Reserve Market;

**WHEREAS**, the RCC, during its 188<sup>th</sup> meeting on 17 December 2021, gave due course to the proposal and approved its publication in PEMC website to solicit comments for 30-working days or from 22 December 2021 until 04 February 2022;

**WHEREAS**, comments received from the PEMC, WESM Technical Committee (TC), Independent Electricity Market Operator of the Philippines (IEMOP), Millennium Energy Inc. (MEI), Panasia Energy Inc. (PEI), SN Aboitiz Power Corporation (SNAP), SPC Power Corporation (SPC)/SPC Island Power (SPIC), and Manila Electric Company (MERALCO) were responded to by the proponent and was taken up by the RCC during its 192<sup>nd</sup>, 195<sup>th</sup> and 196<sup>th</sup> Regular Meetings;

**WHEREAS**, the RCC, during its 192<sup>nd</sup> meeting on 18 March 2022, noted that the proposal also aims to align the definition of terms under the WESM Rules and SSRG and DP Manuals with Philippine Grid Code 2016 (PGC 2016) and agreed on the following:

1. Reflect the definition of terms in the SSRG and DP Manuals that were already defined in Philippine Grid Code (PGC) 2016 for easy reference of the readers and indicate the phrase *“consistent with the Philippine Grid Code”* at the end of the definition to refer to the PGC in case of changes;
2. Reflect the definition of terms as specified in the relevant DOE issuances; and
3. Add the following terms:
  - a) *“Critical Loading. This refers to the condition where the loading of transmission lines or substation equipment is between 90 percent and 100 percent of the continuous rating.”*

- b) *“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.”*

**WHEREAS**, the RCC, during its 195<sup>th</sup> meeting on 15 April 2022, noted the following and agreed to wait for the responses of the concerned agencies/organizations to resolve the pending issues:

1. NGCP’s proposal on Section 5.5 regarding Grid Operation Notices is not in accordance with the PGC 2016, which uses the levels of Primary Reserve and Secondary Reserve as basis for declaring alerts. The proposal refers to the use of net operating margin, a concept not yet defined in PGC 2016 but is being implemented by the SO, as basis in declaring alerts. As this is not consistent with the PGC, an ERC approval for derogation is deemed necessary. Noting that the period for derogation has already lapsed, however, the RCC requested NGCP to confer with ERC on the matter and as necessary, secure clearance from them to allow the use of a process that is not in the PGC, i.e., the use of net operating margin as basis for issuing alert levels notices; and
2. There is inconsistency among the following PGC provisions on allowable loading levels of transmission lines and substation equipment in the Normal State and Alert State and the definitions of loading levels, as follows:
  - PGC GO 6.2.2.1 states that the grid shall be considered in the Normal State when the loading levels are below 100% of the operational thermal limit capacity (which is interpreted by NGCP to be the same as continuous rating) of the lines and transformers.
  - On the other hand, PGC GO 6.2.2.2 states that the Grid shall be considered in the Alert State when there is critical loading or imminent overloading of transmission lines and substation equipment.
  - However, “critical loading” is defined as the condition where the loading of transmission lines or substation equipment is between 90 percent and 100 percent of the continuous rating, while “imminent overloading” is defined as the condition when the loading of transmission lines or substation Equipment is above 100 percent up to 110 percent of the continuous rating.

The Normal State under PGC GO 6.2.2.1 apparently covers part of loading levels of transmission lines or substation equipment that are considered as “critical loading”, i.e. at 90 percent to 100 percent of the continuous rating. Further, the grid is already at Alert State under PGC GO 6.2.2.2 at critical loading. The matter has been referred to the PEMC-Technical Committee for interpretation and further study.

**WHEREAS**, during its 196<sup>th</sup> meeting on 20 May 2022, the RCC noted the following:

1. In reference to NGCP’s proposed inclusion of loading levels of transmission lines and substation equipment in the provision on Normal State Operation under SSRG Manual Section

5.1, and the query on how the MO considers the said loading levels in the market network model, the MO clarified that they will retain their current practice of reflecting in the market network model 100% of the loading level data provided to them by the SO;

2. The Technical Committee's (TC) opinion on the queries raised by the RCC:
  - a) On the application of PGC 2016 GO 6.2.2.1 (e) to Section 5.1 (Normal State) and Section 5.2 (Alert State)
    - i. It is an obvious relaxation of performance/requirements from the Network Service Provider;
    - ii. Tightening network constraints in Market Network Model may lead to sub-optimal dispatch and higher nodal prices although marginal losses can be lowered; and
    - iii. It may result to higher frequency of the Market Intervention by the System Operator due to lower network standard for "Normal" operation.
  - b) On the technical feasibility of the proposed introduction of net operating margin in the implementation of Yellow and Red Alert Notices
    - i. There are discrepancies in the PGC 2016 and SSRG Manual with DOE DC 2019-12-0018 that need to be harmonized;
    - ii. The technical feasibility of using the term "net operating margin" in Yellow or Red Alert is moot because it is already the current practice of the System Operator; and
    - iii. The more important concern for TC is how to reconcile the diverse documents for reserve market implementation.

**WHEREAS**, during the said meeting, the RCC finalized the proposal and approved its endorsement to the PEM Board, with agreements as follows:

1. Provisions related to net operating margin are not adopted due to its inconsistency with PGC 2016 GO 6.4.1.1 (a). The NGCP will seek guidance from ERC on their current use of net operating margin as basis for issuance of alert and likewise inform the DOE that such requirements under PGC 2016 GO 6.4.1.1 (a) cannot be complied with. As necessary, they will also seek exemption or derogation from ERC on the said PGC provision. Currently, the NGCP is implementing the concept of net operating margin in declaring Yellow or Red Alert Grid Status;
2. With the inconsistency between allowable loading levels of transmissions lines and substation equipment in the Normal State and Alert State, as prescribed in PGC 2016 GO 6.2.2.1 and 6.2.2.2 in relation to Critical Overloading and Imminent Overloading, the original provision of SSRG Manual Section 5.1 is retained;
3. With the majority vote, retain the definition of dispatchable reserve consistent with DOE DC 2019-12-0018 as adopted to be incorporated in the WESM Rules under RCC Resolution No. 2021-14 dated 21 October 2021 and as endorsed by the PEM Board to the DOE under PEM Board Resolution No. 2021-34-09 dated 31 March 2021 and 2021-41-04 dated 27 October 2021 (Urgent and General Amendments regarding Enhancements to the Market Operator and System Operator Procedures);

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4. Adopt NGCP's proposal that the required deadband under Section 6 (f) of the SSRG Manual shall be uniform for each generator providing ancillary services, as applicable, in accordance with the technical specifications as set forth in relevant DOE and ERC issuances;
5. A new provision to state that the definition of terms adopted is consistent with the PGC and DOE DC is inserted in the SSRG Manual Glossary: "Unless otherwise defined or the context implies otherwise, the italicized terms used in this 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;" and
6. Adopt the minor and clerical corrections presented by the Secretariat.

**NOW THEREFORE**, we, the undersigned, on behalf of the sectors we represent, hereby resolve *via* electronic communication platform, as follows:

**RESOLVED**, that the RCC approves the proposed amendments to the WESM Rules and WESM Manuals on System Security and Reliability Guidelines Issue 1.0 and Dispatch Protocol Issue 16.0 ;

**RESOLVED FURTHER**, that the said Proposed Amendments (Annex) to the following documents are hereby endorsed to the PEM Board for approval and subsequent transmittal to the DOE for promulgation:

1. WESM Rules;
2. WESM Manuals on System Security and Reliability Guidelines (SSRG Manual) Issue 1.0;  
and
3. WESM Manuals on Dispatch Protocol Issue 16.0 (DP Manual).

Done this 20<sup>th</sup> day of May 2022 *via* Microsoft Teams.

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and Dispatch Protocol for the Implementation of Reserve Market

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| Approved by:<br><b>THE RULES CHANGE COMMITTEE</b>  |   |
| Independent Members:   |   |
| <br><b>Concepcion I. Tanglao</b>  | <br><b>Jesusito G. Morillos</b>  |
| <br><b>Fernando Martin Y. Roxas</b>   | <br><b>Jose Roderick F. Fernando</b>  |
| Generation Sector Members:   |   |
| <br><b>Dixie Anthony R. Banzon</b><br>Masinloc Power Partners Co. Ltd.<br>(MPPCL)            | <br><b>Cherry A. Javier</b><br>Aboitiz Power Corp.<br>(APC)   |
| <br><b>Carlito C. Claudio</b><br>Millennium Energy, Inc./ Panasia Energy, Inc.<br>(MEI/PEI) | <br><b>Mark D. Habana</b><br>Vivant Corporation - Philippines<br>(Vivant)                                 |
| Distribution Sector Members:   |   |
| <br><b>Virgilio C. Fortich, Jr.</b><br>Cebu III Electric Cooperative, Inc.<br>(CEBECO III)  | <br><b>Ryan S. Morales</b><br>Manila Electric Company<br>(MERALCO)  |
| <br><b>Ricardo G. Gumalal</b><br>Iligan Light and Power, Inc.<br>(ILPI)                     | <br><b>Nelson M. Dela Cruz</b><br>Nueva Ecija II Area 1 Electric Cooperative, Inc.<br>(NEECO II – Area 1) |

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|---|
| Supply Sector Member:   |
| <div><br/><b>Lorreto H. Rivera</b><br/>TeaM (Philippines) Energy Corporation<br/>(TPEC)</div>                         |
| Market Operator Member:   |
| <div><br/><b>Isidro E. Cacho, Jr.</b><br/>Independent Electricity Market Operator of the Philippines<br/>(IEMOP)</div> |
| System Operator Member:   |
| <div><br/><b>Ambrosio R. Rosales</b><br/>National Grid Corporation of the Philippines<br/>(NGCP)</div>               |



| WESM Manual on System Security and Reliability Guidelines Issue 1.0 |           |  |  |  |
|---|-----------|--|--|--|
| Title   | Clause    | Provision  | Proposed Amendment   | Rationale  |
| Definition of Terms   | Section 2 | NEW  | <b><u>Unless otherwise defined or the context implies otherwise, the italicized terms used in this 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.</u></b>  | <p>To provide a general provision stating that the definition of terms provided are consistent with the PGC and WESM Rules. Should there be updates/amendments on PGC and WESM Rules after DOE's adoption of the proposed definitions, it shall be followed pending the updating of definition of terms herein.</p> <p>Definitions in PGC 2016 are propagated in the WESM Manuals on SSRG and DP for ease of reference of non-engineers.</p> |
| Definition of Terms   | Section 2 | Automatic Generation Control (AGC). The regulation of the power output of generating units within a prescribed area in response to a change in system frequency, tie-line loading, or the relation of these to each other, so as to maintain the system frequency or the established interchange with other areas within the predetermined limits or both. | <p>Automatic Generation Control (AGC). <del>The regulation of the power output of generating units within a prescribed area in response to a change in system frequency, tie-line loading, or the relation of these to each other, so as to maintain the system frequency or the established interchange with other areas within the predetermined limits or both.</del></p> <p><b><u>An 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</u></b></p> | <p>For consistency with the definition in the PGC 2016 Edition.</p>  |





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| Title | Clause | Provision   | Proposed Amendment  | Rationale   |
|-------|--------|---|---|---|
|       |        |   | <b><u>scheduling is operated by the respective generation companies.</u></b>  |   |
|       |        | Automatic Load Dropping (ALD). The process of automatically and deliberately removing pre-selected loads from a power system in response to an abnormal condition in order to maintain the integrity of the system.   | Automatic Load Dropping (ALD). The process of automatically and deliberately removing pre-selected loads from a power system in response to an abnormal condition in order to maintain the integrity of the system. <b><u>It can be classified as Under-Frequency Load Shedding (UFLS) and Under-Voltage Load Shedding (UVLS).</u></b>  | For consistency with the definition on PGC2016 and Dispatch Protocol Issue 16.0.        |
|       |        | Backup Reserve (also called cold standby reserve). Refers to a generating unit that has fast start capability and can synchronize with the grid to provide its declared capacity for a minimum period of eight (8) hours.   | <del>Backup Reserve (also called cold standby reserve). Refers to a generating unit that has fast start capability and can synchronize with the grid to provide its declared capacity for a minimum period of eight (8) hours.</del>  | This reserve classification is no longer used in PGC 2016 Edition.                      |
|       |        | Contingency. The unexpected failure or outage of a system component, such as a generator, transmission line, power transformer, bus, circuit breaker, or other electrical element. A contingency may also include multiple components, which are related by situations leading to simultaneous component outages. | <del>Contingency. The unexpected failure or outage of a system component, such as a generator, transmission line, power transformer, bus, circuit breaker, or other electrical element. A contingency may also include multiple components, which are related by situations leading to simultaneous component outages.</del><br><br><b><u>The outage of a single component of the grid that cannot be predicted in advance, but which excludes scheduled maintenance.</u></b> | For consistency with the definition in the PGC 2016.                                    |
|       |        | Contingency Reserve. The generating capacity that is intended to take care of the loss of the largest synchronized generating unit or the power import from a single grid interconnection, whichever is larger. Contingency reserve includes spinning reserve and backup reserve.                                 | Contingency Reserve. The <b><u>synchronized generation capacity from qualified generating units and qualified interruptible loads allocated to cover</u></b> <del>that is intended to take care of the loss</del> <b><u>or failure</u></b> <del>of the largest a</del> synchronized generating unit or <b><u>a transmission element or</u></b>  | For consistency with the definition of Contingency Reserve based on DOE DC2021-03-0009. |



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|       |        |           | <u>the power import from a circuit interconnection</u> the power import from a single grid interconnection, whichever is larger. Contingency reserve includes spinning reserve and backup reserve.   |  |
|       |        | NEW       | <u>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.</u>   | For clarity since it has been used frequently for the NSP to commit on. This will also serve as reference on what should be observed by the MO and SO for dispatch and pricing.<br><br>To clarify “Critical Loading” as proposed to be defined also. |
|       |        | NEW       | <u>Critical Loading. The condition when the loading of transmission lines or substation equipment is between 90 percent and 100 percent of the continuous rating.</u>  | For consistency with PGC2016.  |
|       |        | NEW       | <u>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.</u>  | For consistency with PGC2016.  |
|       |        | NEW       | <u>Dispatchable Reserve. Generating capacity that is not scheduled for regular energy supply, regulating reserve, contingency reserve, or interruptible loads not scheduled for contingency reserve, and that are is readily available for dispatch in order to replenish the contingency reserve service whenever a generating unit trips or a loss of a single transmission interconnection occurs</u> | For consistency with DOE DC2019-12-0018 as used in Urgent and General Amendments regarding Enhancements to the Market Operator and System Operator Procedures under PEM Board Resolution No. 2021-34-09 dated 31 March 2021 and 2021-41-04 dated     |



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|       |        |  |   | 27 October 2021. The said General Amendments were submitted to the DOE on 29 November 2021. |
|       |        | NEW  | <b><u>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.</u></b>   | For consistency with PGC2016.   |
|       |        | Island Grid. A portion of a power system or several power systems that is electrically separated from the interconnection due to the disconnection of transmission system elements.  | Island Grid <b><u>also known as Island Grid. A portion of a power system or several power systems that is electrically separated from the interconnection due to the disconnection of transmission system.</u></b><br><b><u>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.</u></b> | For consistency with PGC2016 and in reference to its usage in Section 5.11.                 |
|       |        | NEW  | <b><u>Islanding Operation. The isolated operation of certain portions of the grid as a result of forced outages or contingency action by the System Operator.</u></b>   | For consistency with PGC2016 and in reference to its usage in Sections 5.9 and 5.11.        |
|       |        | Load Following and Frequency Regulating (LFFR) Reserve. The amount of generating capacity that provides for following the moment-to-moment variations in demand or supply in a power system and for maintaining acceptable system frequency. | <del>Load Following and Frequency Regulating (LFFR) Reserve. The amount of generating capacity that provides for following the moment-to-moment variations in demand or supply in a power system and for maintaining acceptable system frequency.</del><br><b><u>These are readily available and dispatchable generating capacity that is allocated exclusively to correct deviations</u></b>   | For consistency with the Regulating Reserve definition of the DOE DC2021-03-0009.           |

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|       |        |   | <b><u>from the acceptable nominal frequency caused by unpredicted variations in demand or generation output.</u></b>  |  |
|       |        | Manual Load Dropping (MLD). The process of manually and deliberately removing preselected loads from a power system in response to an abnormal condition in order to maintain the integrity of the system.  | Manual Load Dropping (MLD). The process of manually and deliberately removing preselected loads from a power system in response to an abnormal condition in order to maintain the integrity of the <b>power</b> system.   | For consistency with PGC 2016 definition.                            |
|       |        | Multiple Outage Contingency. An event caused by the failure of two (2) or more components of the grid including generating units, transmission lines, and transformers.   | Multiple Outage Contingency. An event caused by the failure of two (2) or more components of the grid <del>including generating units, transmission lines, and transformers.</del>  | For consistency with the definition in PGC 2016.                     |
|       |        | Operating Margin. The margin of generation over the total demand plus losses that is necessary for ensuring power quality and the security of the grid. Operating margin is the sum of the load following and frequency regulating reserve and the contingency reserve. | Operating Margin <b><u>also known as Gross Operating Margin.</u></b><br><del>The margin of generation over the total demand plus losses that is necessary for ensuring power quality and the security of the grid. Operating margin is the sum of the load following and frequency regulating reserve and the contingency reserve</del><br><b><u>The available generating capacity in excess of the sum of the system demand plus losses within a specified period of time.</u></b> | For consistency with the definition of operating margin in PGC 2016. |
|       |        | Security. The ability of the electric system to withstand sudden disturbances such as electric short circuits or unanticipated loss of system elements.   | <del>Security. The ability of the electric system to withstand sudden disturbances such as electric short circuits or unanticipated loss of system elements.</del><br><b><u>The continuous operation of a power system in the normal state, ensuring safe and adequate supply of power to end-</u></b>  | For consistency with the definition used in PGC 2016 Edition.        |

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| Title   | Clause | Provision   | Proposed Amendment   | Rationale  |
|   |        |   | <b><u>users, even when some parts or components of the system are on outage.</u></b>   |  |
|   |        | Single Outage (N-1) Contingency. An event caused by the failure of one component of the grid including a generating unit, transmission line, or transformer.                  | <del>Single Outage (N-1) Contingency</del> <b><u>(N-1)</u></b> . An event caused by the failure <b><u>outage</u></b> of one component of the grid including: a generating unit, transmission line, or transformer.”<br><br><b><u>(a) Loss of a single-circuit transmission line, except those radial circuits which connect Loads using a single line or cable;</u></b><br><b><u>(b) Loss of one circuit of a double-circuit transmission line including the point-to-point connection of a Generating Plant to the Grid;</u></b><br><b><u>(c) Loss of submarine cable;</u></b><br><b><u>(d) Loss of a single Transformer, except those which connect Loads using a single radial Transformer;</u></b><br><b><u>(e) Loss of a Generating Unit; and</u></b><br><b><u>(f) Loss of compensating devices (i.e. Capacitor/Reactor/SVC).</u></b> | For consistency with the definition and Section 6.2.1.1 of the PGC 2016. |
|   |        | Spinning Reserve (also called hot standby reserve). The component of contingency reserve which is synchronized to the grid and ready to take on load.                         | <del>Spinning Reserve (also called hot standby reserve). The component of contingency reserve which is synchronized to the grid and ready to take on load.</del>   | This reserve type is no longer used in PGC 2016 edition.                 |
|   |        | System Integrity Protection Scheme (SIPS). A protection system that is designed to detect abnormal or predetermined system conditions, and take automatic corrective actions. | System Integrity Protection Scheme (SIPS). A protection system that is designed to detect abnormal or predetermined system conditions, and take automatic corrective actions <b><u>other than and/or in addition to the isolation of faulted components in order to preserve the integrity of the power system or strategic portions thereof.</u></b>  | For consistency with the definition under the PGC 2016.                  |
|   |        | Voltage Control. The control of transmission voltages through adjustments in generator reactive output and transformer taps   | <del>Voltage Control. The control of transmission voltages through adjustments in generator reactive output and transformer taps</del>   | For consistency with the definition on the PGC2016.                      |



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|   |           | and by switching capacitor and reactors on the transmission and distribution systems.   | <del>and by switching capacitor and reactors on the transmission and distribution systems.</del><br><br><b><u>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.</u></b>   |  |
| OBJECTIVE   | Section 3 | <p>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 (b) of the WESM Rules which stipulates that, during each trading 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.</p> <p>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 approval of the PEM Board. These guidelines provide supplementary provisions for the improvement of WESM operations in ensuring the security</p> | <p>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 <del>(b)</del> <b>(c)</b> of the WESM Rules which stipulates that, during each trading <b>dispatch</b> 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.</p> | For consistency with the provisions of the WESM Rules. |



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|   |        | 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.  |   |  |
| Emergency State   | 5.3    | <p>The grid shall be considered in the emergency state when:</p> <p>(a) Single outage contingency (N-1) criterion is not met. Imminent threat in system security would exist should a credible n-1 contingency occur that would result in the cascading outages of lines and equipment if not corrected immediately;</p> <p>(b) There is generation deficiency or operating margin is zero;</p> <p>(c) Grid transmission voltage is outside the limits of -10% or +10% of the nominal value;</p> <p>(d) The loading levels of all transmission lines and substation equipment are beyond the threshold as set by the Grid Code; and</p> <p>(e) The grid frequency is beyond the limits of 59.4 Hz and 60.6 Hz.</p> | <p>The grid shall be considered in the emergency state when <b><u>either a Single Outage Contingency or a Multiple Outage Contingency has occurred without resulting in Total System Blackout, and any one of the following conditions exists:</u></b></p> <p><del>(a) Single outage contingency (N-1) criterion is not met. Imminent threat in system security would exist should a credible n-1 contingency occur that would result in the cascading outages of lines and equipment if not corrected immediately;</del><br/><b><u>There is generation deficiency or Operating Margin is zero;</u></b></p> <p><del>(b) There is generation deficiency or operating margin is zero;</del><br/><b><u>The grid transmission voltage is outside the limits of 0.90 or 1.10 pu of the nominal value; or</u></b></p> <p><del>(c) Grid transmission voltage is outside the limits of -10% or +10% of the nominal value;</del><br/><b><u>The loading level of any transmission line or substation Equipment is above 115% of its Operational Thermal Limit Capacity.</u></b></p> <p><del>(d) The loading levels of all transmission lines and substation equipment are beyond the threshold as set by the Grid Code; and</del></p> | <p>For consistency with PGC2016 GO 6.2.2.3</p> <p>For consistency with PGC2016 GO 6.2.2.3 (a).</p> <p>For consistency with PGC2016 GO 6.2.2.3 (b).</p> <p>For consistency with PGC2016 GO 6.2.2.3 (c).</p> |



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| Title   | Clause | Provision  | Proposed Amendment   | Rationale  |
|   |        |  | (e) The grid frequency is beyond the limits of 59.4 Hz and 60.6 Hz.”   |  |
| Single Outage (N-1) Contingency Criterion                           | 5.4    | <p>Single Outage (N-1) Contingency Criterion</p> <p>Xxx</p> <p>(b) Credible single outage contingency (N-1) contingencies</p> <p>The N-1 Criterion is related to one of the following contingencies:</p> <p>(i) Loss of a single-circuit transmission line, except those radial circuits which connect loads using a single line or cable;</p> <p>(ii) Loss of one circuit of a double-circuit transmission line;</p> <p>(iii) Loss of submarine cable;</p> <p>(iv) Loss of a single transformer, except those which connect loads using a single radial transformer;</p> <p>(v) Loss of a generating unit, whether grid-connected or embedded; and</p> <p>(vi) Loss of compensating devices, i.e., capacitor / reactor / SVC</p> <p>(c) xxx</p> | <p>Single Outage <del>(N-1)</del> Contingency <b>(N-1)</b> Criterion</p> <p>xxx</p> <p>(b) Credible single outage contingency (N-1) <del>contingencies</del></p> <p>The N-1 Criterion is related to one of the following contingencies:</p> <p>(i) Loss of a single-circuit transmission line, except those radial circuits which connect loads using a single line or cable;</p> <p>(ii) Loss of one circuit of a double-circuit transmission line;; <b><u>including point-to-point connection of a generating plant to the grid;</u></b></p> <p>(iii) Loss of submarine cable;</p> <p>(iv) Loss of a single transformer, except those which connect loads using a single radial transformer;</p> <p>(v) Loss of a generating unit, <del>whether grid-connected or embedded;</del> and</p> <p>(vi) Loss of compensating devices, i.e., capacitor / reactor / SVC</p> <p>(c) xxx</p> <p>(d) The power system shall be operated at all times in such a manner that system instability, islanding <b>operation</b>, 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</p> | <p>For consistency with PGC2016 provisions.</p> <p>For consistency with PGC2016 GO 6.2.1</p> <p>For consistency with the use of “islanding operation” in PGC 2016.</p> |





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| Title                              | Clause | Provision  | Proposed Amendment   | Rationale  |
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|                                    |        | <p>(d) The power system shall be operated at all times in such a manner that system instability, islanding, 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.</p> <p>(e) Multiple contingency outages of a credible nature shall be examined, and the system shall be operated to protect against system instability, islanding or cascading outages for these contingencies.</p> <p>(f) A planned activity notice or request for shutdown shall be issued by a grid user to the System 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 of its approval or disapproval of the user's request at least five (5) days before the actual work commences.</p> | <p>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.</p> <p>(e) Multiple contingency outages of a credible nature shall be examined, and the system shall be operated to protect against system instability, islanding <u>operation</u> or cascading outages for these contingencies.</p> <p>(f) A planned activity notice or request for shutdown shall be issued by a grid user to the System Operator, <u>Transmission Network Provider, and Market Operator</u> 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, <u>Transmission Network Provider, the Market Operator and the affected grid users</u> of its approval or disapproval of the user's request at least five (5) days before the actual work commences."</p> | <p>For consistency with PGC2016 GO 6.4.1.3. – It requires that the Planned Activity Notice shall also be issued by the grid user to the Transmission Network Provider.</p> |
| Voltage and Reactive Power Control | 5.6    | <p>xxx</p> <p>(b) The control of voltage shall be achieved by managing the reactive power supply in the grid. These include the operation of the following equipment:</p> <p>(i) Synchronous generating units;</p> <p>(ii) Synchronous condensers;</p>   | <p>xxx</p> <p>(b) <b>In normal state</b>, the control of voltage shall be achieved by managing the reactive power supply in the grid. These include the operation of the following equipment:</p> <p>(i) Synchronous generating units;</p> <p>(ii) Synchronous condensers;</p>   | <p>For consistency with PGC2016 GO 6.7.1.1</p>   |

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|                   |        | (iii) Shunt capacitors;<br>(iv) Shunt reactors;<br>(v) Static var compensators (SVCs); and<br>(vi) On-load tap-changing transformers<br><br>xxx   | (iii) Shunt capacitors <b>and reactors</b> ;<br>(iv) <del>Shunt reactors</del> ;<br>iv <b>(iii)</b> Static var <b>VAR</b> compensators (SVCs); and<br>v <b>(iv)</b> On-load tap-changing transformers<br><br>xxx  |  |
| Frequency Control | 5.7    | (a) The grid frequency shall be controlled by the timely use of frequency regulating reserve, contingency reserve, and demand control such as automatic load dropping (ALD) and/or manual load dropping (MLD) during emergency conditions.<br><br>(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) with primary response or in an automatic generation control (AGC) mode with secondary response.<br><br>(c) xxx<br>(d) xxx<br>(e) xxx<br><br>(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, governor droop shall be set at 5%.<br><br>(g) xxx | (a) The grid frequency shall be controlled by the <del>timely use of frequency</del> regulating reserve <b>during normal conditions, and timely use of contingency reserve, dispatchable reserve</b> and demand control <del>such as automatic load dropping (ALD) and/or manual load dropping (MLD)</del> during <b>alert or</b> emergency conditions.<br><br>(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) <b>with as</b> primary response or in an automatic generation control (AGC) mode <del>with</del> <b>as</b> secondary response.<br><br>(a) xxx<br>(d) xxx<br>(e) xxx<br><br>(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, <del>governor</del> <b>speed</b> -droop shall be set at 5% <b>or better</b> . | For consistency with PGC2016 GO 6.2.3.5. PR, SR and TR were changed to CR, RR and DR, respectively, in view of the reserve categories used in DC2021-03-0009.<br><br>For clarity.<br><br>For consistency with PGC GCR 4.4.2.4.4. |

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| Title                       | Clause | Provision   | Proposed Amendment  | Rationale   |
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|                             |        | (h) xxx   | (g) xxx<br>(h) xxx  |   |
| System Reserve Requirements | 5.8    | <p>(a) Sufficient system reserves shall be available at all times to maintain 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 frequency regulating reserve and contingency reserve shall be available to stabilize the system and facilitate the restoration to the normal state following a multiple outage contingency.</p> <p>(b) xxx</p> <p>(c) The required system reserves for regulating and contingency shall be in accordance with the latest ERC approved ancillary service procurement plan.</p> | <p>(a) Sufficient system reserves shall be available at all times to maintain 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 <del>frequency</del> regulating reserve, <del>and</del> contingency reserve, <b><u>and dispatchable reserve</u></b> shall be available to stabilize the system and facilitate the restoration to the normal state following a multiple outage contingency.</p> <p>(b) xxx</p> <p>(c) The required system reserves for regulating, <del>and</del> contingency <b><u>and dispatchable reserve</u></b> shall be in accordance with the latest ERC approved ancillary service procurement plan.</p> | For inclusion of DR, and consistency with the reserve categories used in DC2021-03-0009.  |
| Demand Control              | 5.9    | <p>xxx</p> <p>(e) 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.</p> <p>(f) The demand control shall include the following:</p>  | <p>xxx</p> <p>(e) <del>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.</del></p>  | <p>For consistency with PGC2016 GO 6.6.8, 6.6.8.6, 6.6.8.4</p> <p>For 5.9 (e) - For item (e), if notification will be issued 4 hours before, the basis will be less accurate. Possible notification is at</p> |

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|   |        | (i) Automatic load dropping;<br>(ii) Manual load dropping;<br>(iii) Demand reduction on instruction by the System Operator;<br>and<br>(iv) Voluntary demand management. | <p>(e) <u>In the event of a protracted shortage in generation and when a reduction in demand 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.</u></p> <p><del>(f) The demand control shall include the following:<br/>(i) Automatic load dropping;<br/>(ii) Manual load dropping;<br/>(iii) Demand reduction on instruction by the System Operator;<br/>and<br/>(iv) Voluntary demand management.</del></p> <p><u>(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.</u></p> <p><del>(f)</del><u>(g) Demand Control shall be implemented to reduce the Demand of the Grid when:</u></p> <p><u>(i) The System Operator has issued a Red Alert notice due to generation deficiency or when a Multiple Outage Contingency resulted in islanding operation;</u></p> <p><u>(ii) The System Operator has issued Demand Control Imminent Warning Notice due to generation deficiency; or</u></p> | <p>least one (1) hour before extension, using latest DAP as basis for more accurate assessment. Since DAP is released hourly, better to have notification one (1) hour prior extension.</p> <p>For clerical revision of letters (enumeration) to avoid inadvertent deletion of provisions.</p> <p>Re-numbered due to addition of items (e) and (g).</p> |



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| Title   | Clause | Provision  | Proposed Amendment   | Rationale  |
|   |        |  | <p><b><u>(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.</u></b></p> <p><b><u>(h) The demand control shall include the following:</u></b><br/><b><u>(i) Automatic load dropping;</u></b><br/><b><u>(ii) Manual load dropping;</u></b><br/><b><u>(iii) Demand reduction on instruction by the System Operator; and</u></b></p>  |  |
| Automatic Load Dropping (ALD) and Manual Load Dropping (MLD)        | 5.10   | <p>(a) Adequate load shedding facilities initiated automatically by frequency conditions outside the normal operating frequency excursion band shall be available and in service to restore the frequency to normal following the loss of one (1) or more generating units or other significant contingency events. A load shedding program shall be implemented to drop the necessary amount of load to arrest frequency decay, minimize loss of load, and permit timely system restoration.</p> <p>(b) The level of demand required for ALD shall be established by the System Operator in order to limit the consequences of a major loss of generation in the grid. Appropriate technical studies shall be conducted by the system Operator to justify the targets and/or to refine them as necessary.</p> <p>(c) Loads that are subject to ALD shall be split into rotating discrete MW blocks. The number of blocks and the under frequency setting for each block shall be specified by the System Operator.</p> <p>(d) If an ALD has taken place, the affected users shall not reconnect their feeders without clearance from the System</p> | <p><del>(a) Adequate load shedding facilities initiated automatically by frequency conditions outside the normal operating frequency excursion band shall be available and in service to restore the frequency to normal following the loss of one (1) or more generating units or other significant contingency events. A load shedding program shall be implemented to drop the necessary amount of load to arrest frequency decay, minimize loss of load, and permit timely system restoration.</del></p> <p><del>(b) The level of demand required for ALD shall be established by the System Operator in order to limit the consequences of a major loss of generation in the grid. Appropriate technical studies shall be conducted by the system Operator to justify the targets and/or to refine them as necessary.</del></p> <p><del>(c) Loads that are subject to ALD shall be split into rotating discrete MW blocks. The number of blocks and the under frequency setting for each block shall be specified by the System Operator.</del></p> <p><del>(d) If an ALD has taken place, the affected users shall not reconnect their feeders without clearance from the System</del></p> | For consistency with PGC2016 GO 6.6.9 (Automatic Load Dropping) and GO 6.6.10 (Manual Load Dropping) |



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|   |        | <p>Operator. The System Operator shall issue the instructions to reconnect once the frequency of the grid has recovered.</p> <p>(e) To ensure that a subsequent fall in frequency will be contained by the operation of ALD, additional manual load dropping (MLD) shall be implemented so that the loads that were dropped by ALD can be reconnected.</p> <p>(f) MLD shall be conducted by distributors, as directed by the System Operator, in response to an overall shortage of energy at a node or in a region specified in the network market model, or other network conditions as determined by the System Operator in accordance with the procedures established under the Grid Code and Distribution Code.</p> <p>(g) To prepare for a generation deficiency situation, a priority scheme for MLD based on equitable load allocation shall be established by distributors in consultation with the System Operator.</p> <p>(h) Immediately following the issuance by the System Operator of an instruction to implement MLD, distributors shall make arrangement that will enable it to disconnect its scheduled Customers.</p> <p>(i) MLD may also be initiated by the System Operator in response to any other circumstances which it reasonably considers necessitate such action under the Grid Code or Distribution Code or any other applicable regulatory instrument.</p> | <p><del>Operator. The System Operator shall issue the instructions to reconnect once the frequency of the grid has recovered.</del></p> <p><del>(e) To ensure that a subsequent fall in frequency will be contained by the operation of ALD, additional manual load dropping (MLD) shall be implemented so that the loads that were dropped by ALD can be reconnected.</del></p> <p><del>(f) MLD shall be conducted by distributors, as directed by the System Operator, in response to an overall shortage of energy at a node or in a region specified in the network market model, or other network conditions as determined by the System Operator in accordance with the procedures established under the Grid Code and Distribution Code.</del></p> <p><del>(g) To prepare for a generation deficiency situation, a priority scheme for MLD based on equitable load allocation shall be established by distributors in consultation with the System Operator.</del></p> <p><del>(h) Immediately following the issuance by the System Operator of an instruction to implement MLD, distributors shall make arrangement that will enable it to disconnect its scheduled Customers.</del></p> <p><del>(i) MLD may also be initiated by the System Operator in response to any other circumstances which it reasonably considers necessitate such action under the Grid Code or Distribution Code or any other applicable regulatory instrument.</del></p> <p><del>(j) Customers affected by the MLD shall not be reconnected by distributors until instructed by the System Operator to do so.</del></p> |           |



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|   |        | (j) Customers affected by the MLD shall not be reconnected by distributors until instructed by the System Operator to do so. | <p><b><u>(a) Automatic Load Dropping</u></b></p> <p><b><u>(i) The System Operator shall establish the level of Demand required for Under-Frequency Load Shedding (UFLS) and Under-Voltage Load Shedding (UVLS) in order 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.</u></b></p> <p><b><u>(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.</u></b></p> <p><b><u>(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.</u></b></p> <p><b><u>(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.</u></b></p> |           |





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|   |        |           | <p><u>(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.</u></p> <p><u>(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.</u></p> <p><u>(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.</u></p> <p><u>(viii) A UVLS programs shall be planned and implemented in coordination with other UVLS programs in the grid and, where appropriate, with neighboring grids.</u></p> <p><u>(ix) All UVLS programs shall be coordinated with generation control and protection systems, UFLS programs, load restoration programs and transmission protection and control programs.</u></p> |           |



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|   |        |           | <p><u>(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.</u></p> <p><u>(b) Manual Load Dropping</u></p> <p><u>(i) The user shall make arrangement that will enable it to disconnect its customer immediately following the issuance by the System Operator of an instruction to implement MLD.</u></p> <p><u>(ii) Distribution Utilities shall, in consultation with the System Operator, establish a priority scheme for MLD based on equitable Load allocation.</u></p> <p><u>(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 in an effort to preserve the integrity of the grid.</u></p> <p><u>(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.</u></p> |           |



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| System Restoration | 5.11   | <p>xxx</p> <p>(b) Following a significant incident that makes it impossible to avoid island grid operation, the grid shall separate into several self-sufficient island grids, which shall be resynchronized to restore the grid to the normal state.</p> <p>(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 resynchronization of that part to the grid shall be undertaken by the System Operator.</p> <p>(d) 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.</p> <p>(e) 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.</p> | <p>xxx</p> <p>(b) Following a significant incident that makes it impossible to avoid island<del>ing</del> grid operation, the grid <b><u>System Operator</u></b> shall separate <b><u>the Grid</u></b> into several self-sufficient islands<del>s</del> grids, which shall be resynchronized to restore the grid to the normal state.</p> <p>(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 <b><u>System Operator shall undertake the</u></b> resynchronization of that part to the grid shall <del>be undertaken by the System Operator.</del></p> <p><b><u>(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.</u></b></p> <p><del>(d)</del> <b><u>(e)</u></b> 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.</p> <p><b><u>(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.</u></b></p> | <p>For consistency with PGC2016 GO 6.2.3.8</p> <p>For clarity and consistency with PGC GO 6.8.4.2</p> <p>For consistency with PGC2016 GO 6.2.3.7 and DC2021-03-009.</p> <p>Re-numbering</p> <p>For consistency with PGC2016 GO 6.8.3.2</p> |



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|                              |        |   | <p><b><u>(g) The overall strategy in the restoration of the Grid after a Total System Blackout shall, in general, include the following:</u></b></p> <p><b><u>(i) Overlapping phases of Blackout restoration of islands;</u></b></p> <p><b><u>(ii) Step-by-step integration of the Islands into larger subsystems; and</u></b></p> <p><b><u>(iii) Eventual restoration of the Grid.</u></b></p> <p><b><u>(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.</u></b></p> <p><del>(e)</del> <b><u>(i)</u></b> 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.</p> | <p>For consistency with PGC2016 GO 6.8.3.4</p> <p>For consistency with PGC2016 GO 6.8.3.6</p> <p>Re-numbering</p> |
| Grid Protection Requirements | 5.12   | <p>xxx</p> <p>(a) Grid protection shall be designed, coordinated, tested and maintained to achieve the desired level of speed, sensitivity, and selectivity in fault clearing and to minimize the impact of faults on the grid.</p> | <p>xxx</p> <p>(a) Grid protection shall be designed, <b>wired, set and coordinated</b> <b><u>such that operation will not occur for external faults or non-fault conditions.</u></b> <del>tested and maintained to achieve the desired level of speed, sensitivity, and selectivity in fault clearing and to minimize the impact of faults on the grid."</del></p>  | For consistency with PGC2016 GPR 7.2.3  |
|                              |        | (b) The grid shall have adequate and coordinated primary (Main 1 and Main 2) and local and remote backup protection at all times to limit the magnitude of grid disturbances when a   | <del>(b) The grid shall have adequate and coordinated primary (Main 1 and Main 2) and local and remote backup protection at all times to limit the magnitude of grid disturbances when a fault or</del>   | For clarity and consistency with PGC2016 GPR 7.2.4  |



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|       |        | fault or equipment failure occurs. Preferably, the Main 1 and Main 2 protection should be of different types (e.g. distance relay for Main 1 and current differential relay for Main 2) and use different teleprotection media (e.g. power line carrier or optical fiber for Main 1 and microwave for Main 2).   | equipment failure occurs. Preferably, the Main 1 and Main 2 protection should be of different types (e.g. distance relay for Main 1 and current differential relay for Main 2) and use different teleprotection media (e.g. power line carrier or optical fiber for Main 1 and microwave for Main 2).<br><b><u>Redundant protection systems shall be installed in identified critical transmission lines. The two main line protection systems must preferably utilize different schemes and communication media.”</u></b>   |   |
|       |        | (d) Circuit breaker fail protection shall be designed to initiate the tripping of all the necessary electrically adjacent circuit breakers and to interrupt the fault current within the next fifty (50) milliseconds, in the event that the primary protection system fails to interrupt the fault current within the prescribed fault clearance time.  | (d) Circuit breaker failure protection <b>system</b> shall be designed to initiate the tripping of all the necessary electrically adjacent circuit breakers and to interrupt the fault current within the next fifty (50) milliseconds, in the event that <b>after</b> the primary protection system fails to interrupt <b>clear</b> the fault current within the prescribed fault clearance time.   | For consistency with PGC2016 GPR 7.3.3.2.1.           |
|       |        | (i) Following a credible N-1 contingency where the Rules for a minimum grid performance are compromised, a temporary security measure such as the system integrity protection scheme (SIPS) shall be employed to avoid subsistence and spreading of the disturbance. The temporary employment of SIPS shall be coordinated with the concerned users and shall only be applied 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-x) such that the risk of cascaded blackout is avoided. | <del>“(i) Following a credible N-1 contingency where the Rules for a minimum grid performance are compromised, a temporary security measure such as the system integrity protection scheme (SIPS) shall be employed to avoid subsistence and spreading of the disturbance. The temporary employment of SIPS shall be coordinated with the concerned users and shall only be applied 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-x) such that the risk of cascaded blackout is avoided.</del> | For consistency with PGC2016 GPR 7.7.1 and GPR 7.7.5. |

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| Title                           | Clause | Provision  | Proposed Amendment  | Rationale  |
|---------------------------------|--------|--|---|--|
|                                 |        | Information on all available SIPS shall be provided to the Grid Management Committee and at the same time, it shall be coordinated with the concerned users.   | <p><del>Information on all available SIPS shall be provided to the Grid Management Committee and at the same time, it shall be coordinated with the concerned users</del></p> <p><b><u>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.</u></b></p> <p><b><u>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.</u></b></p> |  |
| Telecommunications Requirements | 5.13   | <p>xxx</p> <p>(c) Separate telecommunication channels shall be provided for SCADA, automatic generation control (AGC), protective relaying, special protection systems, voice and data where appropriate.</p> <p>xxx</p> | <p>xxx</p> <p>(c) Separate telecommunication channels shall be provided for SCADA, <del>automatic generation control (AGC)</del>, protective relaying, special protection systems, voice and data where appropriate.”</p> <p>xxx</p>  | AGC doesn't require a separate telecom channel to operate. It sends AGC setpoint commands to the generating units and receives feedback signals using the SCADA channel or Data Acquisition and Control (DAC) network. |



| WESM Manual on System Security and Reliability Guidelines Issue 1.0 |           |   |  |   |
|---|-----------|---|--|---|
| Title   | Clause    | Provision   | Proposed Amendment   | Rationale                               |
| Responsibilities  | Section 6 | <p>The System Operator shall:</p> <p>(a) xxx</p> <p>(b) Initiate, upon the existence of a credible N-1 contingency, any or a combination of manual corrective interventions as follows:</p> <p>(i) Switch off, or re-route, energy delivery from a Generation Company;</p> <p>(ii) Call equipment into service;</p> <p>(iii) Take transmission line or equipment out of service;</p> <p>(iv) Commence operation of generating units or maintain, increase or reduce active or reactive power output of the same;</p> <p>(v) Increase, reduce output of generating units or shut down or otherwise vary operation of the same; and shed or restore load;</p> | <p>xxx</p> <p>(a) xxx</p> <p>(b) <b><u>In case a credible N-1 Contingency occurs in the system and where no temporary System Integrity Protection Scheme (SIPS) are employed to avoid spreading of the disturbance, initiate, upon the existence of a credible N-1 contingency, any or a combination of manual corrective interventions as follows <u>below, following a credible N-k Contingency in anticipation of a probable secondary outage, in order to stabilize the system:</u></u></b></p> <p><del>(i) Switch off, or re-route, energy delivery from a Generation Company</del> <b><u>Generating Unit re-Dispatching;</u></b></p> <p><del>(ii) Call equipment into service</del> <b><u>Usage of Voltage and/or power flow control on regulation Transformers;</u></b></p> <p><del>(iii) Take transmission line or equipment out of service</del> <b><u>Network re-configuration;</u></b></p> <p><del>(iv) Commence operation of generating units or maintain, increase or reduce active or reactive power output of the same</del> <b><u>Manual Load Dropping (MLD); or</u></b></p> <p><del>(v) Increase, reduce output of generating units or shut down or otherwise vary operation of the same; and shed or restore load</del> <b><u>Generating Unit Tripping</u></b></p> | For consistency with PGC2016 GO 6.2.3.3 |





## WESM Manual on System Security and Reliability Guidelines Issue 1.0

| Title | Clause | Provision   | Proposed Amendment  | Rationale   |
|-------|--------|---|---|---|
|       |        | (d) Constrain-on / constrain-off or make use of MRUs whenever all available ancillary reserves are depleted or exhausted; | (d) Constrain-on / constrain-off <b><u>generators using the WESM Merit Order Table (WMOT)</u></b> or make use of MRUs <b><u>re-dispatched out-of-merit</u></b> whenever all available ancillary reserves are depleted or exhausted;                         | To clarify the use of WMOT for constrain-on/ constrain-off (based on Dispatch Protocol Issue 16.0 Section 10.6.1) while MRUs are dispatched out-of-merit (based on Dispatch Protocol Issue 16.0 Section 11.6.5) |
|       |        | (f) Propose a uniform required deadband applicable to all generators; and   | (f) Propose a uniform required deadband <del>to all</del> <b><u>for each</u></b> generators <b><u>providing ancillary services, as applicable, in accordance with the technical specifications as set forth in relevant DOE and ERC issuances</u></b> ; and | For consistency with PGC 2016 GCR 4.4.2.4.2 and DC2021-03-009.  |
|       |        | (g) Issue necessary alert notices upon existence of qualifying threat.  | (g) Issue necessary alert notices upon existence of qualifying threat; <b><u>and</u></b>  | For clarity   |
|       |        | NEW   | <b><u>(I) Maintain the Frequency Response Obligation (FRO) as indicated in the Philippine Grid Code, intended to be the minimum frequency response for preserving the reliability of the Grid.</u></b>  | For consistency with PGC 2016, GO 6.6.3   |



## WESM Manual on Dispatch Protocol Issue 16.0

| Title                                      | Clause    | Provision   | Proposed Amendment  | Rationale  |
|--|-----------|---|---|--|
| Definitions, References and Interpretation | Section 2 | Automatic Generation Control (AGC). The regulation of the power output of generating units within a prescribed area in response to a change in system frequency, tie-line loading, or the relation of these to each other, so as to maintain the system frequency or the established interchange with other areas within the predetermined limits or both.            | Automatic Generation Control (AGC). <del>The regulation of the power output of generating units within a prescribed area in response to a change in system frequency, tie-line loading, or the relation of these to each other, so as to maintain the system frequency or the established interchange with other areas within the predetermined limits or both</del><br><b><u>It is an 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.</u></b> | For consistency with the definition in the PGC 2016 Edition. |
|  |           | Demand Control. The reduction in demand for the control of <i>frequency</i> when the <i>grid</i> is in an <i>emergency state</i> . This includes <i>automatic load dropping, manual load dropping, demand reduction upon instruction by the System Operator, demand disconnection initiated by users, customer demand management, and voluntary load curtailment.</i> | 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, <del>demand disconnection initiated by users, customer demand management, and voluntary load curtailment.</del> <b><u>and voluntary demand management.</u></b>  | For consistency with the definition in PGC 2016.             |
|  |           | NEW   | <b><u>Islanding Operation. The isolated operation of certain portions of the grid as a result of forced outages or contingency action by the System Operator."</u></b>  |  |
|  |           | Multiple Outage Contingency. An event caused by the failure of two (2) or more components of the grid including generating units, transmission lines, and transformers.   | Multiple Outage Contingency. An event caused by the failure of two (2) or more components of the grid <del>including generating units, transmission lines, and transformers.</del>  | For consistency with the definition in PGC 2016.             |



| WESM Manual on Dispatch Protocol Issue 16.0 |        |   |  |  |
|---|--------|---|--|--|
| Title                                       | Clause | Provision   | Proposed Amendment   | Rationale  |
|   |        | NEW   | <b><u>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.</u></b>                  | For reference in its use in Sections 7.7.1, 11.5.3, 12.1.3, 12.4.1(c), and Table A of Section 16.13.2. |
|   |        | Security. The ability of the electric system to withstand sudden disturbances such as electric short circuits or unanticipated loss of system elements.                       | <del>Security. The ability of the electric system to withstand sudden disturbances such as electric short circuits or unanticipated loss of system elements.</del><br><b><u>The continuous operation of a power system in the normal state, ensuring safe and adequate supply of power to end-users, even when some parts or components of the system are on outage.</u></b> | For consistency with the definition used in PGC 2016 Edition.  |
|   |        | System Integrity Protection Scheme (SIPS). A protection system that is designed to detect abnormal or predetermined system conditions, and take automatic corrective actions. | System Integrity Protection Scheme (SIPS). A protection system that is designed to detect abnormal or predetermined system conditions, and take automatic corrective actions <b><u>other than and/or in addition to the isolation of faulted components in order to preserve the integrity of the power system or strategic portions thereof.</u></b>                        | For consistency with the definition under the PGC 2016.  |



| WESM RULES |            |  |  |  |
|------------|------------|--|--|--|
| Title      | Clause     | Provision  | Proposed Amendment   | Rationale  |
| Glossary   | Chapter 11 | AGC. Automatic Generation Control  | AGC. Automatic Generation Control <b><u>(AGC). An 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."</u></b>  | For consistency with the definition in the PGC 2016 Edition.     |
|            |            | Normal State. The grid operating condition when:<br><br>(a) The operating margin is sufficient;<br>(b) System frequency is within the limits as set in the <i>Grid Code</i> ;<br>(c) Voltages at all connection points are within the limits of 0.95 and 1.05 of the nominal value;<br>(d) The loading levels of all transmission lines and transformers are below the limit as set in the <i>Grid Code</i> ;<br>(e) The grid configuration is such that any potential fault current can be interrupted and the faulted equipment can be isolated from the grid;<br>(f) The static and dynamic stability of the power system is maintained; and<br>(g) The Single Outage Contingency (N-1) Criterion is met. | Normal State. The grid operating condition when <b><u>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.</u></b><br><br><del>(a) The operating margin is sufficient;</del><br><del>(b) System frequency is within the limits as set in the <i>Grid Code</i>;</del><br><del>(c) Voltages at all connection points are within the limits of 0.95 and 1.05 of the nominal value;</del><br><del>(d) The loading levels of all transmission lines and transformers are below the limit as set in the <i>Grid Code</i>;</del><br><del>(e) The grid configuration is such that any potential fault current can be interrupted and the faulted equipment can be isolated from the grid;</del><br><del>(f) The static and dynamic stability of the power system is maintained; and</del> | For consistency with the definition of normal state in PGC 2016. |

| WESM RULES |        |  |  |   |
|------------|--------|--|--|---|
| Title      | Clause | Provision  | Proposed Amendment   | Rationale   |
|            |        |  | (g) The Single Outage Contingency (N-1) Criterion is met.  |   |
|            |        | Reliability. The probability of a system, device, plant or equipment performing its function adequately for the period of time intended, under the operating conditions encountered. | Reliability. <del>The probability of a system, device, plant or equipment performing its function adequately for the period of time intended, under the operating conditions encountered."</del><br><b><u>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.</u></b> | For consistency with the definition of Reliability in PGC 2016. |

