

Republic of the Philippines
ENERGY REGULATORY COMMISSION
San Miguel Avenue, Pasig City



RESOLUTION NO. 15, Series of 2013

**A RESOLUTION ADOPTING THE PHILIPPINE SMALL GRID
GUIDELINES**

WHEREAS, Section 2(b) of the Republic Act No. 9136, also known as the Electric Power Industry Reform Act of 2001, provides the policy objective of the government to ensure the quality, reliability, security and affordability of electric power supply;

WHEREAS, pursuant to Section 1.2.2.2 of the Philippine Grid Code, the Energy Regulatory Commission (ERC) shall issue rules and regulations applicable to the Small Grids not connected to the National Grid;

WHEREAS, to ensure the safe, reliable and efficient operation of the Small Grid systems in the Philippines, there is a need to establish rules and procedures therefor;

WHEREAS, the Distribution Management Committee (DMC) and the Grid Management Committee (GMC) agreed in its joint meeting dated 11 June 2010, that the DMC would continue the studies of the operations of the Distribution Utilities (DUs) in the Small Grid to be proposed to the ERC;

WHEREAS, the DMC proposed a framework for the basic rules, procedures, requirements and standards governing the operation, maintenance and development of the Small Grid systems;

WHEREAS, expository presentations and public consultation were conducted to enable the stakeholders in the off-grid areas to present their comments;

WHEREAS, the proposed Philippine Small Grid Guidelines underwent several revisions incorporating comments, in particular,

from the Department of Energy (DOE), the National Power Corporation – Small Power Utility Group (NPC-SPUG), the Association of Isolated Electric Cooperatives, Inc. (AIEC), and the New Power Providers (NPPs);

WHEREAS, on 06 February 2013, the DMC submitted the final draft of the proposed “Philippine Small Grid Guidelines” to the ERC for its approval;

WHEREAS, the ERC found the proposed “Philippine Small Grid Guidelines” to be in order, consistent with the policy of the State to ensure quality, reliability, security and affordability of electric power supply;

NOW THEREFORE, the ERC hereby **RESOLVES** to **APPROVE** and **ADOPT**, the “Philippine Small Grid Guidelines”, attached hereto and made integral part hereof as **Annex “A”**.

This Resolution shall take effect fifteen (15) days upon its publication in a newspaper of general circulation.

Let copies of this Resolution be furnished the University of the Philippines Law Center-Office of the National Administrative Register (UPLC-ONAR).

SO ORDERED.

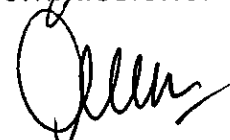
Pasig City, 25 February 2013.


ZENAIDA G. CRUZ-DUCUT
Chairperson *gms*


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Commissioner


JOSE C. REYES
Commissioner


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PHILIPPINE SMALL GRID GUIDELINES

SECTION 1

1. SMALL GRID GENERAL CONDITIONS

1.1. OBJECTIVES

The objectives of these Guidelines are to:

- (a) Set a standard for Small Grid Operations;
- (b) Describe the planning and operational responsibility of all Small Grid Users;
- (c) Facilitate the monitoring of compliance with these Guidelines at the operations level;
- (d) Ensure that the Small Grid will be operated in a safe and efficient manner;
- (e) Ensure that the basic rules for connection to the Small Grid or to a Small Grid User System are fair and non-discriminatory for all Small Grid Users;
- (f) Specify the operating states, operating criteria and protection scheme that will ensure the safety, reliability, security and efficiency of the Small Grid.

1.2. SCOPE OF APPLICATION

1.2.1. These Guidelines shall apply to the following entities within the Small Grid:

- (a) NPC-SPUG;
- (b) Small Grid Owner;
- (c) Distribution Utility;
- (d) Generators; and
- (e) Any other entity with a User System connected to the Small Grid.

1.2.2. The Small Grids shall be classified into the following categories:

1.2.2.1. **Category 1** – Small Grid having more than one (1) Distribution Utility utilizing a High Voltage line to transmit power generated by more than one (1) Generating Company.

1.2.2.2. **Category 2** – Small Grid having only one (1) Distribution Utility utilizing a High Voltage line to transmit power generated by more than one (1) Generating Company.

1.2.2.3. **Category 3** – Small Grid having only one (1) Distribution Utility utilizing its Medium Voltage line to transmit power generated by more than one (1) Generating Company.

1.2.2.4. **Category 4** – Small Grid having only one (1) Distribution Utility or Local Government Unit (LGU) utilizing its Medium Voltage line to transmit power generated by only one (1) Generating Company.

1.2.2.5. **Category 5** – Small Grid not covered by any of the above categories, Qualified Third Party (QTP) NPC-SPUG or Distributor's Waived Areas.

Refer to Appendix "A" for the list of Distribution Utilities under each category.

1.3. ENFORCEMENT AND SUSPENSION OF PROVISIONS

1.3.1. Enforcement

1.3.1.1. The ERC shall promulgate these Guidelines in accordance with Section 1.2.2.2 of the PGC, as amended.

1.3.1.2. The ERC shall mandate the DMC to monitor compliance to the Philippine Small Grid Guidelines (PSGG).

1.3.1.3. The DMC shall initiate an enforcement process for any perceived violation of the PSGG and recommend to the ERC the appropriate fines and penalties for such violation.

1.3.2. Suspension of Provisions

Any provision of the PSGG may be suspended, in whole or in part, when the Small Grid is not operating in the Normal State or pursuant to any directive given by the ERC or any competent government agency.

1.4. DATA, NOTICES AND CONFIDENTIALITY

1.4.1. Data and Notices

1.4.1.1. The submission of any data under the PSGG shall be in electronic format and submitted online (i.e. through email).

In case online submission is not possible, the data in electronic format and saved in a compact disc or Universal Serial Bus (USB) should be submitted to the Office of the DMC.

1.4.1.2. Written notices under the PSGG shall be served either by personal delivery, registered first-class mail, electronic mail or facsimile transfer.

1.4.2. Confidentiality

1.4.2.1. All data submitted by any Small Grid User to the Small Grid Owner or Distributor in compliance with the data requirements of the PSGG shall be treated as highly confidential. These include data requirements for connection to the Small Grid and those that are required in the planning, operation and maintenance of the Small Grid.

1.4.2.2. Aggregate data shall be made available by the Small Grid Owner or Distributor upon request (or upon written request) of the Small Grid User, specifying the purpose thereof. The data shall be used solely for the purpose specified in the request and shall be treated by the Small Grid User as confidential.

1.5. DEFINITIONS

In the PSGG, the following words and phrases shall, unless more particularly defined in a Section or Subsection have the following meaning:

Accountable Person. A person who has been duly authorized by the Small Grid Owner or Distributor or a Small Grid User to sign the Fixed Asset Boundary Documents on behalf of the Small Grid Owner or the Small Grid User.

Active Energy. The integral of the Active Power with respect to time, measured in Watt-hour (Wh) or multiples thereof. Unless otherwise qualified, the term “Energy” refers to Active Energy.

Active Power or Real Power. Consider an AC source connected at a pair of terminals to an otherwise isolated network. The real power, equal to the average power, is the power dissipated by the source in the network.

Connection Agreement. For purposes of these Guidelines, an agreement between a Small Grid User and the Small Grid Owner (or the Distributor), which specifies the terms and conditions pertaining to the connection of the Small Grid User System or Equipment to a new Connection Point in the Small Grid.

Connection Point. For purposes of these Guidelines, the point of connection of the User System or Equipment to the Small Grid.

Demand. The Active Power and/or Reactive Power required by a load at any given time.

Dispatch. The process of apportioning the total Demand of the Small Grid through the issuance of Dispatch Instructions to the Scheduled Generating Units and the Generating Units providing Ancillary Services in order to achieve the operational requirements of balancing Demand with generation that will ensure the security of the Small Grid.

Dispatcher. Has the same meaning as System Operator, unless otherwise specified.

Dispatch Instruction. Refers to the instruction issued by the System Operator to the Generators with Scheduled Generating Units and the Generators whose Generating Units will provide Ancillary Services to implement the final Dispatch Schedule in real time.

Dispatch Schedule. The target loading levels in MW or kW for each scheduled Generating Unit or scheduled loads and for each reserve facility through the use of a dispatch optimization model.

Distribution System. For the purpose of this Guidelines, the system of wires and associated facilities belonging to a franchised Distribution Utility, extending between the delivery points on the High Voltage (HV) or Medium Voltage (MV) Systems or Generating Plant connection and the point of connection to the premises of the End-User.

Distribution Utility. An Electric Cooperative, private corporation, government-owned utility or existing local government unit that has an exclusive franchise to operate a Distribution System.

Energy Regulatory Commission (ERC). The independent, quasi-judicial regulatory body created pursuant to Republic Act No. 9136, which is mandated to promote competition, encourage market development, ensure customer choice and penalize abuse of market power in the restructured electricity industry and among other functions, promulgate and enforce the PGC Amendment¹ and PDC.

Generating Plant. A facility, consisting of one or more Generating Units, where electric energy is produced from some other form of energy by means of a suitable apparatus.

Generating Unit. A conversion apparatus, including auxiliaries and associated Equipment, functioning as a single unit, which is used to produce electric energy from some other form of energy.

Generation Company. Any person or entity authorized by the ERC to operate a facility used in the generation of electricity.

Generator. Has the same meaning as Generation Company.

High Voltage (HV). A voltage level exceeding 34.5 kV up to 230 kV.

Load Following. The ability to adjust generation continuously in response to small frequency changes, so as to cover load fluctuations or minor breakdowns.

Medium Voltage (MV). A voltage level exceeding one (1) kV up to 34.5 kV.

Metering Equipment. The apparatus necessary for measuring electrical real and reactive power and energy, inclusive of a multi-function meter and the necessary instrument potential, current and phase shifting transformers and all wiring and communication devices as provided.

Metering Equipment Owner. A person or entity that owns the revenue Metering Equipment in accordance with a Connection Agreement.

Metering Services Provider. A person or entity authorized by the ERC to provide metering services.

Missionary Electrification Plan (MEP). Refers to the 10-year outline of the operational and capital programs required to fulfill the missionary electrification function of the NPC-SPUG for the succeeding ten (10) years, funded from its sales revenues in its service areas and availments from the Universal Charge for Missionary Electrification (UC-ME), and annually submitted to the Department of Energy (DOE), ERC, through DMC.

National Grid. Has the same meaning as Grid in the PGC.

National Power Corporation – Small Power Utility Group (NPC-SPUG). Refers to the functional unit of the National Power Corporation (NPC) created to pursue the missionary electrification function.

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

Philippine Distribution Code (PDC). The set of rules, requirements, procedures and standards governing Distribution Utilities and Users of Distribution System in the operation, maintenance and development of the Distribution System. It also defines and establishes the relationship of the Distribution System with the facilities or installations of the parties connected thereto.

Philippine Grid Code (PGC). The set of rules, requirements, procedures and standards to ensure the safe, reliable, secured and efficient operation, maintenance and development of the high voltage backbone Transmission System and its related facilities.

Planned Activity Notice. A notice issued either by a Small Grid User, Small Grid Owner or Generator 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.

Power Supply Agreement (PSA). The agreement between a Power Producer (or Supplier) and a Distribution Utility (or Customer) for supply of electric power and energy or any other equivalent agreement.

Qualified Third Party (QTP). The alternative electric service provider authorized to serve remote and unviable areas pursuant to Section 59 of the EPIRA and Rule 14 of its Implementing Rules and Regulation (IRR).

Reactive Energy. The integral of the reactive power with respect to time, measured in VARh or multiples thereof.

Reactive Power. The component of electrical power representing the alternating exchange of stored Energy (inductive or capacitive) between sources and loads or between two systems, measured in VAR or multiples thereof. For AC circuits or systems, it is the product of the RMS value of the voltage and the RMS value of the quadrature component of the alternating current. In a three-phase system, it is the sum of the Reactive Power of the individual phases.

Safety Coordinator. A person designated and authorized by the Distributor (or the Small Grid User or Small Grid Owner) to be responsible for the coordination of Safety Precautions at the Connection Point when work or testing is to be carried out on a system, which requires the provision of Safety Precautions for electrical equipment.

Safety Precautions. The isolation and grounding of electrical equipment when work or testing is to be done on the Small Grid or the Small Grid User System.

Scheduled Generating Unit. A generating unit offered by the Generation Company for Dispatch.

Significant Incident. An event that threatens the integrity of the power system or affects the security of the Small Grid.

Small Grid. The backbone system of interconnected High Voltage (HV) lines or Medium Voltage (MV) lines, substations and other related facilities not connected to the National Grid in Luzon, Visayas and Mindanao. Refer to Appendix "A" – Category.

Small Grid Owner. The party that owns the backbone High Voltage line (for Category 1, Category 2) or the Medium Voltage line (for other Categories) and is responsible for planning, operations and maintaining adequate capacity.

Small Grid User. A person or entity that uses the Small Grid and related facilities to which these Guidelines apply.

Small Power Utilities Group (SPUG). Has the same meaning as NPC-SPUG.

System Loss. For purposes of these Guidelines, the total energy injected into the Small Grid minus the total energy delivered to distributors and/or end-users.

System Operator. The party responsible for generation dispatch, or the implementation of the Generation Dispatch Schedule based on the nomination of the Distribution Utilities from its PSAs with the Generators, the provision of Ancillary Services and operation to ensure safety, power quality, stability, reliability and security of the Small Grid.

Universal Charge – Missionary Electrification (UC-ME) or Missionary Electrification Universal Charge. The Missionary Electrification component of the Universal Charge, expressed in Pesos per Kilowatt-hour, determined, fixed and approved by the ERC and applied to all electricity End-Users, as provided for in Section 34 of the EPIRA.

User. Has the same meaning as Small Grid User unless otherwise specified.

Voltage Unbalance. The maximum deviation from the average of the three phase voltages divided by the average of the three phase voltages, expressed in percent.

Voltage Variation. The deviation of the Root-Mean-Square (RMS) value of the voltage from its normal value, express in percent.

Waived Area. An area within the franchise area of a Distribution Utility (DU) declared as unviable and cannot be served for any reason by the DUs.

SECTION 2

2. SMALL GRID MANAGEMENT

2.1. DISTRIBUTION MANAGEMENT COMMITTEE

2.1.1. Functions of the Distribution Management Committee

In addition to the functions of the DMC as prescribed in the PDC and any amendments thereto, the following functions shall be carried out:

- (a) Monitor the implementation of the PSGG;
- (b) Monitor, evaluate and make recommendations on Small Grid operations;
- (c) Review and recommend standards, procedures, and requirements for Small Grid connection, operation, maintenance and development;
- (d) Coordinate PSGG dispute resolution and make appropriate recommendations to the ERC;
- (e) Initiate the PSGG enforcement process and make recommendations to the ERC;
- (f) Initiate and coordinates revision of the PSGG and make recommendations to the ERC; and
- (g) Prepare regular and special reports for submission to the ERC, or as required by the appropriate government agency, or when requested by a Small Grid User.

SECTION 3

3. PERFORMANCE STANDARDS FOR SMALL GRID

3.1. PERFORMANCE STANDARDS

The following standards shall be complied with by concerned parties of the Small Grid to ensure that the Small Grid will operate in a safe and optimum manner.

3.1.1. PERFORMANCE STANDARDS FOR GENERATORS AND SMALL GRID OWNER

For all **Categories**, the Generators and Small Grid Owner shall ensure that at any Connection Point in the Small Grid, the following standards shall be complied with:

3.1.1.1. Frequency Variations

3.1.1.1.1. For **Category 1** and **Category 2**

The nominal fundamental frequency shall be 60 Hz and shall be maintained within the limits of 59.4 Hz and 60.6 Hz during normal conditions.

3.1.1.1.2. For **Category 3**, **Category 4** and **Category 5**

The nominal fundamental frequency shall be 60 Hz and shall be maintained within the limits of 59.2 Hz and 60.8 Hz during normal conditions.

3.1.1.2. Voltage Variations

3.1.1.2.1. For the purpose of this Section, Voltage Variation shall be defined as the deviation of the root-mean-square (RMS) value of the voltage from its nominal value, expressed in percent. Voltage Variation will either be of short duration or long duration.

3.1.1.2.2. A Short Duration Voltage Variation shall be defined as a variation of the RMS value of the voltage from nominal voltage for a time greater than one-half cycle of the power frequency but not exceeding one minute. A Short Duration Voltage Variation is a Voltage Swell if the RMS value of the voltage increases to between 110 percent and 180 percent of the nominal value. A Short Duration Voltage Variation is a Voltage Sag (or Voltage Dip) if the RMS value of the voltage decreases to between 10 percent and 90 percent of the nominal value.

3.1.1.2.3. A Long Duration Voltage Variation shall be defined as a variation of the RMS value of the voltage from nominal voltage for a time greater than one minute. A Long Duration Voltage Variation is an Undervoltage if the RMS value of the voltage is less than or equal to 90 percent of the nominal voltage. A Long Duration Voltage Variation is an Overvoltage if the RMS value of the voltage is greater than or equal to 110 percent of the nominal value.

3.1.1.2.4. The Small Grid Owner and the System Operator shall ensure that the Long Duration Voltage Variations result in RMS values of the voltages that are greater than 90 percent but less than 110 percent of the nominal voltage at any Connection Point during normal conditions.

3.1.1.3. Voltage Unbalance

The maximum Voltage Unbalance at the Connection Point of any Small Grid User or any Generator shall not exceed 2.5 percent during normal operation conditions.

3.1.1.4. Reliability Standards

3.1.1.4.1. The ERC shall impose a uniform system of recording and reporting of Small Grid reliability performance.

3.1.1.4.2. The ERC shall develop reliability indices appropriate for Small Grids, which shall be complied with by the Small Grid Owner.

3.1.1.5. Submission of Reliability Reports and Performance Targets

3.1.1.5.1. The Small Grid Owner shall submit the monthly interruption reports for its Small Grid every three (3) months, using the format prescribed by the ERC.

3.2. SAFETY STANDARDS FOR GENERATORS AND SMALL GRID OWNER

For all **Categories**, the Generators and Small Grid Owner shall ensure that at any Connection Point in the Small Grid, the following standards shall be complied with:

3.2.1. Adoption of PEC and OSHS

3.2.1.1. The Small Grid Owner and the System Operator shall develop, operate, and maintain the Small Grid in a safe manner and shall always ensure a safe work environment for their employees. In this regard, the ERC adopts the Philippine Electrical Code (PEC) Part 1 and Part 2 set by the Professional Regulations Commission and the Occupational Safety and Health Standards (OSHS) set by the Bureau of Working Conditions of the Department of Labor and Employment.

3.2.1.2. The Philippine Electrical Code (PEC) Parts 1 and 2 govern the safety requirements for electrical installation, operation, and maintenance. Part 1 of the PEC pertains to the wiring system in the premises of End Users. Part 2 covers electrical Equipment and associated work practices employed by the electric utility. Compliance with these Codes is mandatory. Hence, the Small Grid Owner and the System Operator shall at all times ensure that all provisions of these safety codes are not violated.

3.2.1.3. The OSHS aims to protect every workingman against the dangers of injury, sickness, or death through safe and healthful working conditions.

3.2.2. Measurement of Performance for Personnel Safety

Rule 1056 of the OSHS specifies the rules for the measurement of performance for personnel safety that shall be applied to the Small Grid Owner and the System Operator. The pertinent portions of this rule are reproduced as follows:

- (a) Exposure to work injuries shall be measured by the total number of hours of employment of all employees in each establishment or reporting unit.
- (b) Employee-hours of exposure for calculating work injury rates are intended to be the actual hours worked. When actual hours are not available, estimated hours may be used.
- (c) The Disabling Injury/Illness Frequency Rate shall be based upon the total number of deaths, permanent total, permanent partial, and temporary total disabilities, which occur during the period covered by the rate. The rate relates those injuries/illnesses to the employee-hours worked during the period and expresses the number of such injuries in terms of a million man-hour units.
- (d) The Disabling Injury/Illness Severity Rate shall be based on the total of all scheduled charges for all deaths, permanent total, and permanent partial disabilities, plus the total actual days of the disabilities of all temporary total disabilities, which occur during the period covered by the rate. The rate relates these days to the total employee-hours worked during the period and expresses the loss in terms of million man-hour units.

3.2.3. Submission of Safety Records and Reports

The Small Grid Owner and System Operator shall submit to ERC copies of records and reports required by OSHS as amended. These shall include the measurement of performance specified in Section 3.2.2 (*Measurement of Performance for Personnel Safety*).

3.3. PERFORMANCE STANDARDS FOR DISTRIBUTION UTILITIES

The Distribution Utilities shall comply with the provision of Chapter 3 (*Performance Standards for Distribution and Supply*) of the PDC and any amendments thereto.

SECTION 4

4. SMALL GRID CONNECTION REQUIREMENTS

4.1. SMALL GRID TECHNICAL, DESIGN AND OPERATIONAL CRITERIA

For **Category 3**, **Category 4** and **Category 5**, refer to Section 5.2 (*Distribution Technical, Design and Operational Criteria*), Chapter 5 of the PDC and any amendments thereto.

For DUs under **Category 1** and **Category 2**, shall comply to Section 5.2 (*Distribution Technical, Design and Operational Criteria*), Chapter 5 of the PDC and any amendments thereto.

For **Category 1** and **Category 2**, the Small Grid Owner and all Small Grid Users other than DUs shall ensure that at any Connection Point in the Small Grid, the following standards shall be complied with:

4.1.1. Frequency Variations

During normal operating conditions, the Small Grid frequency shall be within the limits specified in Section 3.1.1.1 (*Frequency Variations*).

4.1.2. Voltage Unbalance

The maximum Voltage Unbalance at the Connection Point of any Small Grid User and any Generators shall be within the limits specified in Section 3.1.1.2 (*Voltage Unbalance*) during normal operating conditions.

4.1.3. Grounding Requirements

The Small Grid Owner shall specify the grounding requirements and the applicable Earth Fault Factor at the Connection Point.

4.1.4. Equipment Standards

4.1.4.1. All Equipment at the Connection Point shall comply with the requirements of the IEC Standards or their equivalent national standards.

4.1.4.2. The prevailing standards at the time when the Connection Point was designed or modified rather than the Test and Commissioning date or the Asset Transfer Date, shall apply to all Equipment at the Connection Point.

4.1.5. Maintenance Standards

4.1.5.1. All Equipment at the Connection Point shall be operated and maintained in accordance with international standards or its equivalent national standards and in a manner that shall not pose a threat to the safety of any personnel or cause damage to the Equipment of the Small Grid Owner or the Small Grid User.

4.1.5.2. The Small Grid User shall maintain a log containing the test results and maintenance records relating to its Equipment at the Connection Point and shall make this log available when requested by the Small Grid Owner.

4.2. PROCEDURES FOR SMALL GRID CONNECTION OR MODIFICATION

For **Category 3**, **Category 4** and **Category 5**, refer to Section 5.3 (*Procedures for Distribution Connection or Modification*), Chapter 5 of the PDC and any amendments thereto.

For DUs under **Category 1** and **Category 2**, shall comply to Section 5.3 (*Procedures for Distribution Connection or Modification*), Chapter 5 of the PDC and any amendments thereto.

For **Category 1** and **Category 2**, the Small Grid Owner and all Small Grid Users other than DUs shall ensure that at any Connection Point in the Small Grid, the following standards shall be complied with:

4.2.1. Connection Agreement

4.2.1.1. Any Small Grid User seeking a new connection to the Small Grid shall secure the required Connection Agreement with the Small Grid Owner prior to the actual connection to the Small Grid.

4.2.1.2. The Connection Agreement shall include provisions for the submission of information and reports, Safety Rules, Test and Commissioning programs, Electrical Diagrams, statement of readiness to connect, certificate of approval to connect, and other requirements prescribed by the ERC.

4.2.2. Amended Connection Agreement

4.2.2.1. Any Small Grid User seeking a modification of an existing connection to the Small Grid shall secure the required Amended Connection Agreement with the Small Grid Owner prior to the actual modification of the existing connection to the Small Grid.

4.2.2.2. The Amended Connection Agreement shall include provisions for the submission of additional information and reports required by the Small Grid Owner and other requirements prescribed by the ERC.

4.2.3. Processing of Application

4.2.3.1. The Small Grid Owner shall process the application for connection or modification to an existing connection within thirty (30) days from the submission of the completed application form.

4.2.3.2. After evaluating the application submitted by the Small Grid User, the Small Grid Owner shall inform the Small Grid User whether the proposed Small Grid User Development is acceptable or not.

4.2.3.3. If the application of the Small Grid User is acceptable, the Small Grid Owner and the Small Grid User shall sign a Connection Agreement or an Amended Connection Agreement, as the case may be.

4.2.3.4. If the application of the Small Grid User is not acceptable, the Small Grid Owner shall notify the Small Grid User of the same, stating the reasons therefor. The Small Grid Owner shall include in the notification its proposed modifications to the application, if any, to make the acceptable to the Small Grid Owner.

- 4.2.3.5. The Small Grid User shall accept the proposal of the Small Grid Owner within fifteen (15) days, or a longer period specified in the Small Grid Owner's proposal, after which the period for accepting the proposal automatically lapses.
- 4.2.3.6. The acceptance by the Small Grid User of the Small Grid Owner's proposal shall lead to the signing of a Connection Agreement or an Amended Connection Agreement.
- 4.2.3.7. If the Small Grid Owner and the Small Grid User cannot reach an agreement on the proposed connection or modification to an existing connection, the Small Grid Owner or the Small Grid User may bring the matter before the ERC for resolution.
- 4.2.3.8. If a Connection Agreement or an Amended Connection Agreement is signed, the Small Grid User shall submit to the Small Grid Owner, within fifteen (15) days from signing or a longer period agreed to by the Small Grid Owner and the Small Grid User, the Detailed Planning Data pertaining to the proposed Small Grid User Development, as specified in Section 5.4 (*Detailed Planning Data*).

4.2.4. Submissions Prior to the Commissioning Date

- 4.2.4.1. The following shall be submitted by the Small Grid User prior to the Commissioning Date, pursuant to the terms, conditions and schedules specified in the Connection Agreement:
- (a) Specifications of major Equipment not included in the Standard Planning Data and Detailed Planning Data;
 - (b) Details of the protection arrangements and settings referred to in Section 4.3.9 (*Protection Arrangements - Generator*) for Generating Units and in Section 4.4.2 (*Protection Arrangements - Distributor and Other Small Grid Users*) for Distributors and other Small Grid Users;
 - (c) Information to enable the Small Grid Owner to prepare the Fixed Asset Boundary Document referred to in Section 4.6 (*Fixed Asset Boundary Document Requirements*), including the name(s) of the Accountable Person(s);
 - (d) Electrical Diagrams of the Small Grid User's Equipment at the Connection Point as described in Section 4.7 (*Electrical Diagram Requirements*);
 - (e) Information that will enable the Small Grid Owner to prepare the Connection Point Drawings referred to in Section 4.8 (*Connection Point Drawing Requirements*);
 - (f) Copies of all Safety Rules and Local Safety Instructions applicable to the Small Grid User's Equipment and a list of Safety Coordinators, pursuant to the requirements of Section 6.7 (*Safety Coordination*);
 - (g) A list of the names and contact numbers of authorized representatives, including the confirmation that they are fully authorized to make binding decisions on behalf of the Small Grid

User in case of Significant Incidents, pursuant to the procedures specified in Section 6.6.2 (*Significant Incident Procedures*);

- (h) Proposed Maintenance Program; and
- (i) Test and Commissioning procedures for the Connection Point and the Small Grid User Development.

4.2.5. Commissioning of Equipment and Physical Connection to the Small Grid

- 4.2.5.1. Upon completion of the Small Grid User Development, including work at the Connection Point, the Equipment at the Connection Point and the Small Grid User Development shall be subjected to the Test and Commissioning procedures specified in Section 4.2.4 (*Submissions Prior to the Commissioning Date*).
- 4.2.5.2. The Small Grid User shall then submit to the Small Grid Owner a statement of readiness to connect, which shall include the Test and Commissioning reports.
- 4.2.5.3. Upon acceptance of the Small Grid User's statement of readiness to connect, the Small Grid Owner shall, within seven (7) days, issue a certificate of approval to connect.
- 4.2.5.4. The physical connection to the Small Grid shall be made only after the certificate of approval to connect has been issued by the Small Grid Owner to the Small Grid User.

4.3. REQUIREMENTS FOR GENERATORS

4.3.1. Requirements Relating to the Connection Point

- 4.3.1.1. The Generator's Equipment shall be connected to the Small Grid at the voltage level(s) agreed to by the Small Grid Owner and the Generator based on the Small Grid Impact Studies.
- 4.3.1.2. The Connection Point shall be controlled by a circuit breaker that is capable of interrupting the maximum short circuit current at the point of connection.
- 4.3.1.3. Disconnect switches and other isolating means shall also be provided and arranged to isolate the circuit breaker for maintenance purposes.

4.3.2. Generating Unit Power Output

- 4.3.2.1. The Generating Unit shall be capable of continuously supplying its Active Power output, as specified in the Generator's Declared Data, within the Power System Frequency range of 59.7 to 60.3 Hz. Any decrease of power output occurring in the frequency range of 59.7 to 57.6 Hz shall not be more than the required proportionate value of the frequency decay.
- 4.3.2.2. The Generating Unit shall be capable of supplying its Active Power and Reactive Power outputs, as specified in the Generator's Declared Data, within the Voltage Variations specified in Section 3.2.3 (*Voltage Variations*), Chapter 3 of the PDC and any amendments thereto, during normal operating conditions.

4.3.2.3. The Generating Unit shall be capable of supplying its Active Power output, as specified in the Generator's Declared Data, within the limits of 0.85 Power Factor lagging and 0.90 Power Factor leading at the Generating Unit's terminals, in accordance with its Reactive Power Capability Curve.

4.3.3. Frequency Withstand Capability

4.3.3.1. If the Power System frequency momentarily rises to 62.4 Hz or falls to 57.6 Hz, all Generating Units shall remain in synchronism with the Small Grid for at least five (5) seconds, as specified in Section 3.1.1.1 (*Frequency Variations*). The Small Grid Owner may waive this requirement, if there are sufficient technical reasons to justify the waiver.

4.3.3.2. The Generator shall be responsible for protecting its Generating Units against damage from frequency excursions outside the range of 57.6 Hz and 62.4 Hz. The Generator shall decide whether or not to disconnect its Generating Unit from the Small Grid.

4.3.4. Unbalance Loading Withstand Capability

4.3.4.1. The Generating Unit shall meet the requirements for Voltage Unbalance as specified in Section 3.1.1.2 (*Voltage Unbalance*).

4.3.4.2. The Generating Unit shall also be required to withstand without tripping, the unbalance loading during clearance by the backup protection of a close-up phase-to-phase fault on the Small Grid.

4.3.5. Speed-Governing System

4.3.5.1. The Generating Unit shall be capable of contributing to Frequency Control by continuous regulation of the Active Power supplied to the Small Grid.

4.3.5.2. The Generating Unit shall be fitted with a fast-acting speed-governing system to provide Frequency Control under normal operating conditions in accordance with Section 6.5 (*Frequency Control and Voltage Control*). The speed-governing system shall have an overall speed-droop characteristic of five percent (5%) or less. Unless waived by the Small Grid Owner in consultation with the Distributor, the speed-governing system shall be capable of accepting raise and lower signals.

4.3.5.3. When a Generating Unit becomes isolated from the Small Grid, the speed governing system shall provide Frequency Control to the resulting Island Grid. Exemptions from this requirement shall be specified in the Connection Agreement or Amended Connection Agreement.

4.3.6. Excitation Control System

4.3.6.1. The Generating Unit shall be capable of contributing to Voltage Control by continuous regulation of the Reactive Power supplied to the Small Grid.

4.3.6.2. The Generating Unit shall be fitted with a continuously acting automatic excitation control system to control the terminal voltage without instability over the entire operating range of the Generating Unit.

4.3.6.3. The performance requirements for excitation control facilities, including power system stabilizers, where necessary for power system operations shall

be specified in the Connection Agreement or Amended Connection Agreement.

4.3.7. Black Start Capability

4.3.7.1. The Small Grid shall have Black Start Capability at a number of strategically located Generating Plants.

4.3.7.2. The Generator shall specify in its application for a Connection Agreement or Amended Connection Agreement if its Generating Unit has a Black Start capability.

4.3.8. Fast Start Capability

4.3.8.1. The Generator shall specify in its application for a Connection Agreement or Amended Connection Agreement if its Generating Unit has a Fast Start capability.

4.3.8.2. The Generating Unit shall automatically start-up in response to frequency level relays with settings in the range of 57.6 Hz to 62.4 Hz.

4.3.9. Protection Arrangements

4.3.9.1. The protection of Generating Units and Equipment and their connection to the Small Grid shall be designed, coordinated, and tested to achieve the desired level of speed, sensitivity, and selectivity in fault clearing and to minimize the impact of faults on the Small Grid.

4.3.9.2. The Small Grid Owner and the Small Grid User shall be solely responsible for the protection system of the electrical equipment and facilities at their respective sides of the Connection Point.

4.3.9.3. The Fault Clearance Time shall be specified in the Connection Agreement or Amended Connection Agreement. The Fault Clearance Time for a fault on the Small Grid where the Generator's Equipment are connected, or on the Generator's system where the Small Grid Owner's Equipment are connected, shall be indicated in the Connection Agreement.

4.3.9.4. A circuit breaker shall be provided by the Generator at the Connection Point to interrupt the fault current at any side of the Connection Point, a circuit breaker fail protection shall also be provided by the Generator.

4.3.9.5. The 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.

4.3.9.6. Where the automatic recloser of a circuit breaker is required following a fault on the Small Grid User System, automatic switching Equipment shall be provided in accordance with the requirements specified in the Connection Agreement or Amended Connection Agreement.

4.3.9.7. The ability of the protection scheme to initiate the successful tripping of the circuit breakers that are associated with the faulty Equipment, measured by the System Protection Dependability Index, shall be not less than ninety nine percent (99%).

4.3.9.8. Disconnect switches shall be provided to isolate the Generating Plant from the Small Grid when it is not operating to avoid the input to the Small Grid revenue meter to operate.

4.3.10. Transformer Connection and Grounding

4.3.10.1. If the Generator's Equipment are connected to the Small Grid, the high-voltage side of the transformer shall be connected in Wye, with the neutral available for connection to ground.

4.3.10.2. The Small Grid Owner shall specify the connection and grounding requirements for the low-voltage side of the transformer in accordance with the provisions of Section 4.1.3 (*Grounding Requirements*).

4.4. REQUIREMENTS FOR DISTRIBUTOR AND OTHER SMALL GRID USERS

For **Category 1** and **Category 2** only

4.4.1. Requirements Relating to the Connection Point

4.4.1.1. The DU's or other Small Grid User's Equipment shall be connected to the Small Grid at voltage level(s) agreed to by the Small Grid Owner and the DU or other Small Grid User based on Small Grid Impact Studies.

4.4.1.2. The Connection Point shall be controlled by a three-phase circuit breaker that is capable of interrupting the maximum short circuit current at the point of connection.

4.4.1.3. Disconnect switches shall also be provided and arranged to isolate the circuit breaker for maintenance purposes.

4.4.2. Protection Arrangements

4.4.2.1. The protection of the DU's or other Small Grid User's Equipment at the Connection Point shall be designed, coordinated and tested to achieve the desired level of speed, sensitivity and selectivity in fault clearing and to minimize the impact of faults on the Small Grid.

4.4.2.2. The Small Grid Owner and the Small Grid User shall be solely responsible for the protection systems of electrical equipment and facilities at their respective sides of the Connection Point. The Small Grid Owner, upon the request of the Small Grid User, shall provide the technical data at the Connection Point necessary for the Small Grid User to design its protection system.

4.4.2.3. The Fault Clearance Time shall be specified in the Connection Agreement or Amended Connection Agreement.

4.4.2.4. Where the DU's or other Small Grid User's Equipment are connected to the Small Grid and a circuit breaker is provided by the DU or other Small Grid User or by the Small Grid Owner to interrupt fault currents at any side of the Connection Point, a circuit breaker fail protection shall also be provided by the DU or other Small Grid User or the Small Grid Owner.

4.4.2.5. The 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.

4.4.2.6. Where the automatic recloser of a circuit breaker is required following a fault on the Small Grid User System, automatic switching Equipment shall be provided in accordance with the requirements specified in the Connection Agreement or Amended Connection Agreement.

4.4.2.7. The ability of the protection scheme to initiate the successful tripping of the circuit breakers that are associated with the faulty equipment, measured by the System Protection Dependability Index, shall be not less than ninety nine percent (99%).

4.4.2.8. The Small Grid Owner may require specific Small Grid Users to provide other protection schemes, designed and developed to maintain Small Grid security, or to minimize the risk and/or impact of disturbances on the Small Grid.

4.4.3. Transformer Connection and Grounding

4.4.3.1. If the DU's or other Small Grid User's Equipment is connected to the Small Grid at a voltage of 69 kV and above, the Wye side shall be connected to ground.

4.4.3.2. The Small Grid Owner shall specify the connection and grounding requirements for the low-voltage side of the transformer, in accordance with the provisions of Section 4.1.3 (*Grounding Requirements*).

4.4.4. Underfrequency Relays for Automatic Load Dropping

For **Category 1** and **Category 2** only

4.4.4.1. The Connection Agreement or Amended Connection Agreement shall specify the manner in which Demand, subject to Automatic Load Dropping (ALD) will be split into discrete MW or kW blocks to be actuated by underfrequency relays.

4.4.4.2. The underfrequency relays to be used in Automatic Load Dropping shall be fully digital with the following characteristics:

- (a) Frequency setting range: 57.0 to 62.0 Hz in steps of 0.1 Hz, preferably 0.05 Hz;
- (b) Adjustable time delay: 0 to 60 s in steps of 0.1 s;
- (c) Rate of frequency setting range: 0 to ± 10 Hz/s in steps of 0.1 Hz/s;
- (d) Operating time delay: less than 0.1s;
- (e) Voltage lock-out: selectable within 55% to 90% of nominal voltage;
- (f) Facility stages: minimum of three (3) stages operation; and
- (g) Output contacts: minimum of three (3) output contacts per stage.

4.4.4.3. The voltage supply to the underfrequency relays shall be sourced from the primary system at the supply point to ensure that the input frequency to the underfrequency relay is the same as that of the primary system.

4.4.4.4. The tripping facility shall be designed and coordinated in accordance with the following reliability considerations:

- (a) Dependability: Failure to trip at any one particular Demand shedding point shall not harm the overall operation of the scheme. The overall dependability of the scheme shall not be lower than ninety percent (90%); and
- (b) Outages: The amount of Demand under control shall not be reduced significantly during the outage or maintenance of the equipment.

4.5. COMMUNICATION EQUIPMENT REQUIREMENTS AND METHODS

4.5.1. Communication System for Monitoring and Control

4.5.1.1. A communication system shall be established so that the Small Grid Owner, DUs and other Small Grid Users can communicate with one another as well as exchange data signals for monitoring and controlling the Small Grid during normal and emergency conditions.

4.5.1.2. Each Small Grid User shall provide the complete communication equipment required for the monitoring and control of the Connection Point and the Generating Units.

4.5.1.3. The System Operator may use a combination of communication media as agreed upon by all Small Grid Users. An official communication media, such as UHF/VHF hand-held or base radios and/or cellular phone, shall be provided by each Small Grid User and shall be assigned as a dedicated equipment (or dedicated communication line), used only for Small Grid operations. Each Small Grid User shall submit to the System Operator, the names of the official and authorized personnel assigned for Small Grid operations with their corresponding means of communication or mobile phone numbers.

4.5.2. Methods of Transmitting Dispatch Instructions

4.5.2.1. Each Small Grid User must provide a communications facility manned during its hours of operations and capable of receiving Dispatch Instructions issued by the System Operator.

4.5.2.2. The System Operator shall issue Dispatch Instructions by means of the communication equipment agreed upon by the Small Grid Users.

4.5.2.3. Each Small Grid User must maintain a dedicated communication line available during its hours of operations for immediate access by the Dispatcher.

4.5.2.4. The Dispatch Instructions and all information associated with it shall be logged and recorded by the Dispatcher as soon as practical after issuing each Dispatch Instruction.

4.5.3. Contents of Dispatch Instructions

Dispatch Instructions shall include the following information as appropriate:

- (a) Exchange of operator names;
- (b) Specific resource being dispatched;
- (c) Specific MW or kW value of the resource being dispatched;

- (d) Specific type of instruction (action required);
- (e) Operating level point to which the resource is being dispatched;
- (f) Time the resource is required to begin initiating the Dispatch Instruction;
- (g) Time the resource is required to achieve the Dispatch Instruction;
- (h) Time of notification of the Dispatch Instruction; and
- (i) Any other information which the System Operator considers relevant.

4.5.4. Acknowledgement of Dispatch Instructions

The recipient of a verbal Dispatch Instruction shall confirm the Dispatch Instruction by reiterating the Dispatch Instruction to the System Operator.

4.5.5. Information Management

The System Operator shall provide all Small Grid Users with non-discriminatory access to information concerning the status of the Small Grid by posting such information on the web or other similar computer communications device or by telephone or facsimile in the event of computer systems failure.

4.6. FIXED ASSET BOUNDARY DOCUMENT REQUIREMENTS

For **Category 3**, **Category 4** and **Category 5**, refer to Section 5.6. (*Fixed Asset Boundary Document Requirements*), Chapter 5 of the PDC and any amendments thereto.

For DUs under **Category 1** and **Category 2**, shall comply to Section 5.6 (*Fixed Asset Boundary Document Requirements*), Chapter 5 of the PDC and any amendments thereto.

For **Category 1** and **Category 2**, the Small Grid Owner and all Small Grid Users other than DUs shall ensure that the following standards shall be complied with:

4.6.1 Fixed Asset Boundary Document

4.6.1.1 The Fixed Asset Boundary Documents for any Connection Point shall provide the information and specify the operational responsibilities of the Small Grid Owner and the Small Grid User for the following:

- (a) High Voltage (HV) equipment;
- (b) Medium Voltage (MV) equipment, and
- (c) Communications and Metering Equipment.

4.6.1.2. For the Fixed Asset Boundary Document referred to in item (a) above, the responsible management unit shall be shown, in addition to the Small Grid Owner or the Small Grid User. In the case of the Fixed Asset Boundary Documents referred to in items (b) and (c) above, with the exception of protection equipment and inter-trip equipment operation, it is sufficient to indicate the responsible Small Grid User or the Small Grid Owner.

4.6.1.3. The Fixed Asset Boundary Document shall show precisely the Connection Point and shall specify the following:

- (a) Equipment and their ownership;
- (b) Accountable Persons;

- (c) Safety Rules and Procedures, including Local Safety Instructions and the Safety Coordinator(s) or any other persons responsible for safety;
- (d) Operational procedures and the responsible party for operation and control;
- (e) Maintenance requirements and the responsible party for undertaking maintenance; and
- (f) Any agreement pertaining to emergency conditions.

4.6.1.4. The Fixed Asset Boundary Documents shall be available at all times for the use of the operations personnel of the Small Grid Owner and the Small Grid User.

4.6.2. Accountable Persons

4.6.2.1. Prior to the Completion Date specified in the Connection Agreement or Amended Connection Agreement, the Small Grid User shall submit to the Small Grid Owner a list of Accountable Persons who are duly authorized to sign the Fixed Asset Boundary Documents on behalf of the Small Grid User.

4.6.2.2. Prior to the Completion Date specified in the Connection Agreement or Amended Connection Agreement, the Small Grid Owner shall provide the User the name of the Accountable Person who shall sign the Fixed Asset Boundary Documents on behalf of the Small Grid Owner.

4.6.2.3. Any change to the list of Accountable Persons shall be communicated to the other party at least six (6) weeks before the change becomes effective. If the change was not anticipated, it must be communicated as soon as possible to the other party, with an explanation why the change had to be made.

4.6.2.4. Unless specified otherwise in the Connection Agreement or the Amended Connection Agreement, the construction, Test and Commissioning, control, operation and maintenance of Equipment, accountability, and responsibility shall follow ownership.

4.6.3. Preparation of Fixed Asset Boundary Document

4.6.3.1. The Small Grid Owner shall establish the procedure and forms required for the preparation of the Fixed Asset Boundary Documents.

4.6.3.2. The Small Grid User shall provide the information that will enable the Small Grid Owner to prepare the Fixed Asset Boundary Document in accordance with the schedule specified in the Connection Agreement or Amended Connection Agreement.

4.6.3.3. The Small Grid Owner shall prepare the Fixed Asset Boundary Documents for the Connection Point at least two (2) weeks prior to the Completion Date.

4.6.3.4. The Fixed Asset Boundary Document for the Equipment at the Connection Point shall include the details of the lines or cables emanating from the Small Grid Owner's and the Small Grid User's sides of the Connection Point.

4.6.3.5. The date of issue and the issue number shall be included in every page of the Fixed Asset Boundary Document.

4.6.4. Signing and Distribution of Fixed Asset Boundary Document

4.6.4.1. Prior to the signing of the Fixed Asset Boundary Document, the Small Grid Owner shall send a copy of the completed Fixed Asset Boundary Document to the Small Grid User for any revision or for confirmation of its accuracy.

4.6.4.2. The Accountable Persons designated by the Small Grid Owner and the Small Grid User shall sign the Fixed Asset Boundary Document after confirming its accuracy.

4.6.4.3. Once signed but not less than two (2) weeks before the implementation date, the Small Grid Owner shall provide two (2) copies of the Fixed Asset Boundary Document to the Small Grid User, with a notice indicating the date of issue, the issue number and the implementation date of the Fixed Asset Boundary Document.

4.6.5. Modifications of an Existing Fixed Asset Boundary Document

4.6.5.1. When a Small Grid User has determined that a Fixed Asset Boundary Document requires modification, it shall inform the Small Grid Owner at least eight (8) weeks before implementing the modification. The Small Grid Owner shall then prepare a revised Fixed Asset Boundary Document at least six (6) weeks before the implementation date of the modification.

4.6.5.2. When the Small Grid Owner has determined that a Fixed Asset Boundary Document requires modification, it shall prepare a revised Fixed Asset Boundary Document at least six (6) weeks prior to the implementation date of the modification.

4.6.5.3. When the Small Grid Owner or a Small Grid User has determined that a Fixed Asset Boundary Document requires modification to reflect an emergency condition, the Small Grid Owner or the Small Grid User, as the case may be, shall immediately notify the other party. The Small Grid Owner and the Small Grid User shall meet to discuss the required modification to the Fixed Asset Boundary Document, and shall decide whether the change is temporary or permanent in nature. Within seven (7) days after the conclusion of the meeting between the Small Grid Owner and the Small Grid User, the Small Grid Owner shall provide the Small Grid User a revised Fixed Asset Boundary Document.

4.6.5.4. The procedure specified in Section 4.6.4 (*Signing and Distribution of Fixed Asset Boundary Document*) for signing and distribution shall be applied to the revised Fixed Asset Boundary Document. The Small Grid Owner's notice shall indicate the revision(s), the new issue number and the new date of issue.

4.7. ELECTRICAL DIAGRAM REQUIREMENTS

For **Category 3**, **Category 4** and **Category 5**, refer to Section 5.7 (*Electrical Diagram Requirements*), Chapter 5 of the PDC and any amendments thereto.

For DUs under **Category 1** and **Category 2**, shall comply to Section 5.7 (*Electrical Diagram Requirements*), Chapter 5 of the PDC and any amendments thereto.

For **Category 1** and **Category 2**, the Small Grid Owner and all Small Grid Users other than DUs shall ensure that the following standards shall be complied with:

4.7.1. Responsibilities of the Small Grid Owner and Small Grid Users

4.7.1.1. The Small Grid Owner shall specify the procedure and format to be followed in the preparation of the Electrical Diagrams for any Connection Point.

4.7.1.2. The Small Grid User shall prepare and submit to the Small Grid Owner an Electrical Diagram for all the Equipment on the Small Grid User's side of the Connection Point in accordance with the schedule specified in the Connection Agreement or Amended Connection Agreement.

4.7.1.3. The Small Grid Owner shall provide the Small Grid User with an Electrical Diagram for all the Equipment on the Small Grid Owner's side of the Connection Point in accordance with the schedule specified in the Connection Agreement or Amended Connection Agreement.

4.7.1.4. If the Connection Point is at the Small Grid User's Site, the Small Grid User shall prepare and distribute a composite Electrical Diagram for the entire Connection Point. Otherwise, the Small Grid Owner shall prepare and distribute the composite Electrical Diagram for the entire Connection Point.

4.7.2. Preparation of Electrical Diagrams

Refer to Section 5.7.2 (*Preparation of Electrical Diagrams*), Chapter 5 of the PDC and any amendments thereto.

4.7.3. Changes to Electrical Diagrams

4.7.3.1. If the Small Grid Owner or a Small Grid User decides to add new Equipment or change an existing Equipment Identification, the Small Grid Owner or the Small Grid User, as the case may be, shall provide the other party a revised Electrical Diagram, at least one (1) month prior to the proposed addition or change.

4.7.3.2. If the modification involves the replacement of existing Equipment, the revised Electrical Diagram shall be provided to the other party in accordance with the schedule specified in the Amended Connection Agreement.

4.7.3.3. The revised Electrical Diagram shall incorporate the new Equipment to be added, the existing Equipment to be replaced or the change in Equipment Identification.

4.7.4. Validity of Electrical Diagrams

4.7.4.1. The composite Electrical Diagram prepared by the Small Grid Owner or the Small Grid User, in accordance with the provisions of Section 4.7.1

(Responsibilities of the Small Grid Owner and Small Grid Users), shall be the Electrical Diagram to be used for all operation and planning activities associated with the Connection Point.

4.7.4.2. If a dispute involving the accuracy of the composite Electrical Diagram arises, a meeting between the Small Grid Owner and the Small Grid User shall be held as soon as possible to resolve the dispute.

4.8. CONNECTION POINT DRAWING REQUIREMENTS

For **Category 3**, **Category 4** and **Category 5**, refer to Section 5.8 (*Connection Point Drawing Requirements*), Chapter 5 of the PDC and any amendments thereto.

For DUs under **Category 1** and **Category 2**, shall comply to Section 5.8 (*Connection Point Drawing Requirements*), Chapter 5 of the PDC and any amendments thereto.

For **Category 1** and **Category 2**, the Small Grid Owner and all Small Grid Users other than DUs shall ensure that the following standards are complied with:

4.8.1. Responsibilities of the Small Grid Owner and Small Grid Users

4.8.1.1. The Small Grid Owner shall specify the procedure and format to be followed in the preparation of the Connection Point Drawing for any Connection Point.

4.8.1.2. The Small Grid User shall prepare and submit to the Small Grid Owner the Connection Point Drawing for the Small Grid User's side of the Connection Point, in accordance with the schedule specified in the Connection Agreement or Amended Connection Agreement.

4.8.1.3. The Small Grid Owner shall provide the Small Grid User with the Connection Point Drawing for the Small Grid Owner's side of the Connection Point in accordance with the schedule specified in the Connection Agreement or Amended Connection Agreement.

4.8.1.4. If the Connection Point is at the Small Grid User Site, the Small Grid User shall prepare and distribute a composite Connection Point Drawing for the entire Connection Point. Otherwise, the Small Grid Owner shall prepare and distribute the composite Connection Point Drawing for the entire Connection Point.

4.8.2. Preparation of Connection Point Drawings

Refer to Section 5.8.2 (*Preparation of Connection Point Drawings*), Chapter 5 of the PDC and any amendments thereto.

4.8.3. Changes to Connection Point Drawings

4.8.3.1. If the Small Grid Owner or a Small Grid User decides to add new Equipment or change an existing Equipment Identification, the Small Grid Owner or the Small Grid User, as the case may be, shall provide the other party a revised Connection Point Drawing, at least one month prior to the proposed addition or change.

4.8.3.2. If the modification involves the replacement of existing Equipment, the revised Connection Point Drawing shall be provided to the other party in accordance with the schedule specified in the Amended Connection Agreement.

4.8.3.3. The revised Connection Point Drawing shall incorporate the new Equipment to be added, the existing Equipment to be replaced, or the change in Equipment Identification.

4.8.3.4. The Small Grid Owner and the Small Grid User shall, if they have agreed to do so in writing, modify their respective copies of the Connection Point Drawings to reflect the change that they have agreed on in accordance with the schedule specified in the Connection Agreement or Amended Connection Agreement.

4.8.4. Validity of the Connection Point Drawings

4.8.4.1. The composite Connection Point Drawing prepared by the Small Grid Owner or the Small Grid User in accordance with Section 4.8.1(*Responsibilities of the Small Grid Owner and Small Grid Users*), shall be the Connection Point Drawing to be used for all operation and planning activities associated with the Connection Point.

4.8.4.2. If a dispute involving the accuracy of the composite Connection Point Drawing arises, a meeting between the Small Grid Owner and the Small Grid User shall be held as soon as possible to resolve the dispute.

4.9. SMALL GRID DATA REGISTRATION

4.9.1. Data to be Registered

4.9.1.1. The data relating to the Connection Point and the Small Grid User Development that are submitted by the Small Grid User to the Small Grid Owner shall be registered according to the following data categories:

- (a) Forecast Data;
- (b) Estimated Equipment Data; and
- (c) Registered Equipment Data.

4.9.1.2. The Forecast Data, including Demand and Active Energy, shall contain the User's best estimate of the data being projected for the five (5) succeeding years.

4.9.1.3. The Estimated Equipment Data shall contain the Small Grid User's best estimate of the values of parameters and information about the Equipment for the five (5) succeeding years.

4.9.1.4. The Registered Equipment Data shall contain validated actual values of parameters and information about the Equipment that are submitted by the Small Grid User to the Small Grid Owner at the connection date. The Registered Equipment Data shall include the Connected Project Planning Data which shall replace any estimated values of parameters and information about the Equipment previously submitted as Preliminary Project Planning Data and Committed Project Planning Data.

4.9.2. Stages of Data Registration

4.9.2.1. The data relating to the Connection Point and the Small Grid User Development that are submitted by a Small Grid User applying for a Connection Agreement or an Amended Connection Agreement shall be registered in three (3) stages and classified accordingly as:

- (a) Preliminary Project Planning Data;
- (b) Committed Project Planning Data; and
- (c) Connected Project Planning Data.

4.9.2.2. The data that are submitted at the time of application for a Connection Agreement or an Amended Connection Agreement shall be considered as Preliminary Project Planning Data. These data shall contain the Standard Planning Data specified in Section 5.3 (*Standard Planning Data*), and the Detailed Planning Data specified in Section 5.4 (*Detailed Planning Data*), when required ahead of the schedule specified in the Connection Agreement or Amended Connection Agreement.

4.9.2.3. Once the Connection Agreement or the Amended Connection Agreement is signed, the Preliminary Project Planning Data shall become the Committed Project Planning Data, which shall be used in evaluating other applications for Small Grid connection or modification of existing Small Grid connection and in preparing the Missionary Electrification Plan (MEP).

4.9.2.4. The Estimated Equipment Data shall be updated, confirmed, and replaced with validated actual values of parameters and information about the Equipment at the time of connection, which shall become the Connected Project Planning Data. These data shall be registered in accordance with the categories specified in Section 4.9.1 (*Data to be Registered*) and shall be used in evaluating other applications for Small Grid connection or modification of existing Small Grid connection and in preparing the MEP.

4.9.3. Data Forms

The Small Grid Owner, in consultation with the System Operator shall develop the forms for all data to be submitted in accordance with an application for a Connection Agreement or an Amended Connection Agreement.

SECTION 5

5. SMALL GRID PLANNING

5.1. SMALL GRID PLANNING RESPONSIBILITIES AND PROCEDURES

For **Category 1** and **Category 2** only.

For DUs under **Category 1** and **Category 2**, shall comply to Section 6.2 (*Distribution Planning Responsibilities and Procedures*), Chapter 6 of the PDC and any amendments thereto.

For **Category 3**, **Category 4** and **Category 5**, refer to Section 6.2 (*Distribution Planning Responsibilities and Procedures*), Chapter 6 of the PDC and any amendments thereto.

5.1.1. Small Grid Owner Planning Responsibilities

5.1.1.1. The Small Grid Owner shall have lead responsibility for Small Grid Planning, including;

- (a) Analyzing the impact of the connection of new facilities such as Generating Plants, loads, distribution lines or substations;
- (b) Planning the expansion of the Small Grid to ensure its adequacy to meet forecasted demand and the connection of new Generating Plants; and
- (c) Identifying and correcting problems on the Power Quality, System Loss and Reliability of the Small Grid.

5.1.1.2. The Small Grid Owner shall be responsible for planning the expansion of communications and other facilities.

5.1.1.3. The Generators and other Small Grid Users shall cooperate with the Small Grid Owner in maintaining a Small Grid planning data bank, reviewing planning proposal as necessary and in improving the Small Grid Planning procedures.

5.1.2. Submission of Planning Data

5.1.2.1. If required by the Small Grid Owner, any Small Grid User applying for connection or a modification of an existing connection to the Small Grid shall submit to the Small Grid Owner the relevant Standard Planning Data specified in Section 5.3 (*Standard Planning Data*) and the Detailed Planning Data specified in Section 5.4 (*Detailed Planning Data*), in accordance with the requirements prescribed in Section 4.2 (*Procedures for Grid Connection or Modification*).

5.1.2.2. If required by the Small Grid Owner, all Small Grid Users shall submit annually to the Small Grid Owner the relevant historical planning data for the previous year and the forecast planning for the five (5) succeeding years by calendar week 27 of the current year. These shall include the updated Standard Planning Data and the Detailed Planning Data.

5.1.2.3. The required Standard Planning Data specified in Section 5.3 (*Standard Planning Data*) shall consist of information necessary for the Small Grid Owner to evaluate the impact of any Small Grid User Development on the Small Grid or to the Power System of other Small Grid Users.

5.1.2.4. The Detailed Planning Data specified in Section 5.4 (*Detailed Planning Data*) shall include additional information necessary for the conduct of a more accurate Small Grid planning study.

5.1.2.5. The Standard Planning Data and Detailed Planning Data shall be submitted by the Small Grid User to the Small Grid Owner according to the following categories:

- (a) Forecast Data;
- (b) Estimated Equipment Data; and
- (c) Registered Equipment Data.

5.1.2.6. The Forecast Data shall contain the Small Grid User's best estimate of the data, including Energy and Demand, being projected for the five (5) succeeding years.

5.1.2.7. The Estimated Equipment Data shall contain the Small Grid User's best estimate of the values of parameters and information pertaining to its equipment.

5.1.2.8. The Registered Equipment Data shall contain validated actual values of parameters and information about the Small Grid User's Equipment, which are part of the Connected Project Planning Data submitted by the Small Grid User to the Small Grid Owner at the time of connection.

5.1.3. Consolidation and Maintenance of Planning Data

5.1.3.1. The Small Grid Owner shall consolidate and maintain the Small Grid planning data according to the following categories:

- (a) Forecast Data;
- (b) Estimated Equipment Data; and
- (c) Registered Equipment Data.

5.1.3.2. If there is any change to its planning data, the Small Grid User shall notify the Small Grid Owner of the change as soon as possible. The notification shall contain the time and date when the change took effect, or is expected to take effect, as the case may be. If the change is temporary, the time and date when the data is expected to revert to its previous registered value shall also be indicated in the notification.

5.1.4. Evaluation of Small Grid Expansion Project

5.1.4.1. The Small Grid Owner shall conduct Grid Impact Studies to assess the effect of any proposed Grid expansion project on the Small Grid and the Power System of other Small Grid Users.

5.1.4.2. The Small Grid Owner shall notify the Small Grid User of the results of the Small Grid Impact Studies.

5.1.4.3. The Small Grid Owner shall notify the Small Grid User of any planned development in the Small Grid that may have an impact on the Small Grid User System.

5.1.5. Evaluation of Proposed Small Grid User Development

5.1.5.1. The Small Grid Owner shall conduct Grid Impact Studies to assess the effect of any proposed Small Grid User Development on the Grid and the Power System of other Small Grid Users.

5.1.5.2. The Small Grid Owner shall notify the applicant Small Grid User of the results of the Grid Impact Studies.

5.1.6. Preparation of Missionary Electrification Plan (MEP)

(For all categories)

5.1.6.1 The NPC-SPUG shall collate and process the planning data submitted by the Small Grid User into a cohesive forecast for the preparation of the MEP.

5.1.6.2. If a Small Grid User believes that the cohesive forecast data prepared by the NPC-SPUG does not accurately reflect its assumptions on the planning data, it shall promptly notify the NPC-SPUG of its concern. The NPC-SPUG and the Small Grid User shall promptly meet to address the concern of the Small Grid User.

5.2. SMALL GRID PLANNING STUDIES

For **Category 1** and **Category 2** only.

For DUs under **Category 1** and **Category 2**, shall comply to Section 6.3 (*Distribution Planning Responsibilities and Procedures*), Chapter 6 of the PDC and any amendments thereto.

For **Category 3**, **Category 4** and **Category 5**, refer to Section 6.3 – (*Distribution Planning Studies*), Chapter 6 of the PDC and any amendments thereto.

5.2.1. Grid Planning Studies to be Conducted

5.2.1.1. The Small Grid Owner shall conduct Small Grid planning studies to ensure the safety, reliability, security and stability of the Small Grid for the following:

- (a) Evaluation of Small Grid reinforcement projects; and
- (b) Evaluation of any proposed Small Grid User Development, which is submitted to Small Grid Owner in accordance with an application for a Connection Agreement or an Amended Connection Agreement.

5.2.1.2. The Small Grid planning studies shall be conducted to assess the impact on the Small Grid or to any Small Grid User System of any Demand Forecast or any proposed addition or change of Equipment or facilities in the Small Grid or the Small Grid User System, and to identify corrective measures to eliminate the deficiencies in the Small Grid or the Small Grid User System.

5.2.1.3. The Small Grid planning studies shall be conducted periodically to assess:

- (a) The behavior of the Small Grid during normal and Outage contingency conditions; and

- (b) The behavior of the Small Grid during the electromechanical or electromagnetic transient induced by disturbances or switching operations.

5.2.1.4. The relevant technical studies described in Sections 5.2.2 (*Load Flow Studies*) to Section 5.2.8 (*Reliability Analysis*) and the required planning data specified in Section 5.3 (*Standard Planning Data*) and Section 5.4 (*Detailed Planning Data*) shall be used in the conduct of the Small Grid planning studies.

5.2.2. Load Flow Studies

5.2.2.1. Load Flow Studies shall be performed to evaluate the behavior of the Small Grid for the existing and planned Small Grid facilities under forecasted maximum and minimum load conditions and to study the impact on the Small Grid of the connection of new Generating Plants, Loads, or High Voltages (HV) lines.

5.2.2.2. For new High Voltage (HV) lines, the load condition that produces the maximum power flows through the existing and new lines shall be identified and evaluated.

5.2.3. Short Circuit Studies

5.2.3.1. Short Circuit Studies shall be performed to evaluate the effect on Small Grid Equipment of the connection of new Generating Plants, High Voltage (HV) lines, and other facilities that will result in increased fault duties for Small Grid Equipment. These studies shall identify the Equipment that could be damaged when the current exceeds the design limit of the Equipment such as switchyard devices and substation buses. The studies shall also identify the circuit breakers and fuses, which may fail when interrupting possible short circuit currents.

5.2.3.2. Three-phase short-circuit studies shall be performed for all nodes of the Small Grid for the maximum and minimum generation scenarios of the Small Grid and for different system circuit configurations. Single-phase short-circuit studies shall also be performed for critical Small Grid nodes. These studies shall identify the most severe conditions that the Small Grid Equipment may be exposed to.

5.2.3.3. Alternative Grid circuit configurations shall be studied to reduce the short circuit currents within the limits of existing Equipment. Such changes in circuit configuration shall be subjected to load flow and stability analysis to ensure that the changes do not cause steady state load flow or stability problems.

5.2.3.4. The results shall be considered satisfactory when the short-circuit currents are within the design limits of Equipment and the proposed Small Grid configurations are suitable for flexible and safe operation.

5.2.4. Steady-State Stability Analysis

5.2.5.1. Periodic studies shall be performed to determine if the Small Grid is vulnerable to Steady-State Stability problems. Such problems occur on heavy-loaded systems, where small disturbances may cause steady-state oscillations that can lead to major disturbances. The studies shall identify solutions, such as the installation of power system stabilizers or the identification of safe operating conditions.

5.2.5.2. Studies shall be conducted to determine the possibility that Dynamic Instability problems may occur in the Small Grid.

5.2.5. Voltage Stability Analysis

5.2.6.1. Periodic studies shall be performed to determine if the Small Grid is vulnerable to voltage collapse under heavy loading conditions. A voltage collapse can proceed very rapidly if the ability of system's Reactive Power supply to support system voltages is exhausted. The studies shall identify solutions such as the installation of dynamic and static Reactive Power compensation devices to avoid vulnerability to voltage collapse. In addition, the studies shall identify safe Small Grid operating conditions where vulnerability to voltage collapse can be avoided until solutions are implemented.

5.2.6.2. Studies shall be conducted to determine the possibility that Voltage Instability problems may occur in the Small Grid.

5.2.6. Reliability Analysis

Reliability Analysis shall be performed to determine the generation deficiency of the Small Grid using a probabilistic method such as Loss of Load Probability (LOLP) or Expected Energy Not Supplied (EENS).

5.3. STANDARD PLANNING DATA

For **Category 1** and **Category 2** only.

For DUs under **Category 1** and **Category 2**, shall comply to Section 6.4 (*Standard Planning Data*), Chapter 6 of the PDC and any amendments thereto.

For **Category 3**, **Category 4** and **Category 5**, refer to Section 6.4 (*Standard Planning Data*), Chapter 6 of the PDC and any amendments thereto.

5.3.1. Historical Energy and Demand

5.3.1.1. The Small Grid User shall provide the Small Grid Owner its actual monthly Energy and Demand consumption at each Connection Point for the immediate past year.

5.3.1.2. The Small Grid User shall also provide the Small Grid Owner with actual hourly load profiles for a typical weekday, weekend, and holiday.

5.3.2. Energy and Demand Forecast

5.3.2.1. The Small Grid User shall provide the Small Grid Owner with its Energy and Demand forecasts at each Connection Point for the five (5) succeeding years. Where the Small Grid User System is connected to the Small Grid at more than one Connection Point, the Demand data to be provided by the Small User shall be the coincident peak Active Power Demand.

5.3.2.2. The Forecast Data for the first year shall include monthly Energy and Demand forecasts while the remaining four (4) years shall include only the annual Energy and Demand forecasts.

5.3.2.3. The Small Grid User shall also provide the Small Grid Owner with forecasted hourly load profiles for a typical weekday, weekend, and holiday.

5.3.2.4. Distributors (and other Small Grid Users) shall provide the net values of Energy and Demand forecast for the Distribution System (or the Small Grid User System) at each Connection Point after any deductions to reflect the output of Generating Plants. Such deductions shall be stated separately in the Forecast Data.

5.3.2.5. Generators shall submit to the Small Grid Owner the projected Energy and Demand to be generated by each Generating Plant. Forecast Data for Generating Units and Generating Plants shall be submitted through the Distributor.

5.3.2.6. In order to avoid the duplication of Forecast Data, each Small Grid User shall indicate the Energy and Demand requirements that it shall meet under a contract. Where the Small Grid User shall meet only a portion of the Energy and Demand requirements, it shall indicate in the Forecast Data that portion of the requirements and/or the portion of the forecast period covered by the contract.

5.3.2.7. If the Small Grid User System is connected to the Small Grid at a Connection Point with a bus arrangement which is, or may be operated in separate sections, the Energy and Demand forecasts for each bus section shall be separately stated.

5.3.3. Generating Unit Data

5.3.3.1. The Generator shall provide the Small Grid Owner with data relating to the Generating Units of its Generating Plant.

5.3.3.2. The Distributor (or other Small Grid User) shall provide the Small Grid Owner with data relating to the Generating Units of each Generating Plant.

5.3.3.3. The following information shall be provided for the Generating Units of each Generating Plant:

- (a) Rated Capacity (MVA and MW);
- (b) Rated Voltage (kV);
- (c) Type of Generating Unit and expected running mode(s);
- (d) Direct axis sub-transient reactance (percent); and
- (e) Rated capacity, voltage and impedance of the Generating Unit's step-up transformer.

5.3.3.4. If the Generating Unit is connected to the Small Grid at a Connection Point with a bus arrangement which is, or may be operated in separate sections, the bus section to which each Generating Unit is connected shall be identified.

5.3.4. Small Grid User System Data

5.3.4.1. The Small Grid User shall provide the Electrical Diagrams and Connection Point Drawings of the Small Grid User System and the Connection Point, as specified in Section 4.7 (*Electrical Diagram Requirements*) and Section 4.8 (*Connection Point Drawing Requirements*), respectively. The diagrams and drawings shall indicate the quantities, ratings, and operating parameters of the following:

- (a) Equipment (e.g., Generating Units, power transformers, and Circuit Breakers);
- (b) Electrical circuits (e.g., overhead lines and underground cables);
- (c) Substation bus arrangements;
- (d) Grounding arrangements;
- (e) Phasing arrangements; and
- (f) Switching facilities.

5.3.4.2. The Small Grid User shall provide the values of the following circuit parameters of the overhead lines and/or underground cables from the Small Grid User System substation to the Connection Point in the Small Grid:

- (a) Rated and operating voltage (kV);
- (b) Positive sequence resistance and reactance (ohm);
- (c) Positive sequence shunt susceptance (Siemens or ohm-1);
- (d) Zero sequence resistance and reactance (ohm); and
- (e) Zero sequence susceptance (Siemens or ohm-1).

5.3.4.3. If the Small Grid User System is connected to the Small Grid through a step-up transformer, the following data for the power transformers shall be provided:

- (a) Rated MVA;
- (b) Rated voltages (kV);
- (c) Winding arrangement;
- (d) Positive sequence resistance and reactance (at max, min, and nominal tap);
- (e) Zero sequence reactance for three-legged core type transformer;
- (f) Tap changer range, step size and type (on-load or off-load); and
- (g) Basic Lightning Impulse Insulation Level (kV).

5.3.4.4. The Small Grid User shall provide the following information for the switchgear, including circuit breakers, load break switches, and disconnect switches at the Connection Point and at the substation of the Small Grid User:

- (a) Rated voltage (kV);
- (b) Rated current (A);
- (c) Rated symmetrical RMS short-circuit current (kA); and
- (d) Basic Lightning Impulse Insulation Level (kV).

5.3.4.5. The Small Grid User shall provide the details of its System Grounding. This shall include the rated capacity and impedances of the Grounding Equipment.

5.3.4.6. The Small Grid User shall provide the data on independently-switched Reactive Power compensation Equipment at the Connection Point and/or at the substation of the Small Grid User System. This shall include the following information:

- (a) Rated Capacity (MVAR);
- (b) Rated Voltage (kV);
- (c) Type (e.g., shunt inductor, shunt capacitor, static var compensator); and
- (d) Operation and control details (e.g. fixed or variable, automatic, or manual).

5.3.4.7. If a significant portion of the Small Grid User's Demand may be supplied from alternative Connection Point(s), the relevant information on the Demand transfer capability shall be provided by the Small Grid User including the following:

- (a) The alternative Connection Point(s);
- (b) The Demand normally supplied from each alternative Connection Point;
- (c) The Demand which may be transferred from or to each alternative Connection Point; and
- (d) The control (e.g., manual or automatic) arrangements for transfer including the time required to effect the transfer for Forced Outage and planned maintenance conditions.

5.3.4.8. If a Distribution System (or other Small Grid User System) has Generating Plants and significantly large motors, the short circuit contribution of the Generating Units and the large motors at the Connection Point shall be provided by the Distributor (or the other Small Grid User). The short circuit current shall be calculated in accordance with the IEC Standards or their equivalent national standards.

5.4. DETAILED PLANNING DATA

For **Category 1** and **Category 2** only.

For DUs under **Category 1** and **Category 2**, shall comply to Section 6.5 (*Detailed Planning Data*), Chapter 6 of the PDC and any amendments thereto.

For **Category 3** and **Category 4**, refer to Section 6.5 (*Detailed Planning Data*), Chapter 6 of the PDC and any amendments thereto.

5.4.1. Generating Unit and Generating Plant Data

5.4.1.1. The following additional information shall be provided for the Generating Units of each Generating Plant:

- (a) Derated Capacity (MW) on a monthly basis if applicable;
- (b) Additional capacity (MW) obtainable from Generating Units in excess of Net Declared Capability;
- (c) Minimum Stable Loading (MW);
- (d) Reactive Power Capability Curve;

- (e) Stator armature resistance;
- (f) Direct axis synchronous, transient and subtransient reactances;
- (g) Quadrature axis synchronous, transient and subtransient reactances;
- (h) Direct axis transient and subtransient time constants;
- (i) Quadrature axis transient and subtransient time constants;
- (j) Turbine and Generating Unit inertia constant (MWsec/MVA);
- (k) Rated field current (amps) at rated MW and MVAR output and at rated terminal voltage; and
- (l) Short circuit and open circuit characteristic curves.

5.4.1.2. The following information for Step-up Transformers shall be provided for each Generating Unit:

- (a) Rated MVA;
- (b) Rated Frequency (Hz);
- (c) Rated voltage (kV);
- (d) Voltage ratio;
- (e) Positive sequence reactance (maximum, minimum and nominal tap);
- (f) Positive sequence resistance (maximum, minimum and nominal tap);
- (g) Zero sequence reactance;
- (h) Tap changer range;
- (i) Tap changer step size; and
- (j) Tap changer type: on load or off circuit.

5.4.1.3. The following excitation control system parameters shall be provided for each Generating Unit:

- (a) DC gain of Excitation Loop;
- (b) Rated field voltage;
- (c) Maximum field voltage;
- (d) Minimum field voltage;
- (e) Maximum rate of change of field voltage (rising);
- (f) Maximum rate of change of field voltage (falling);
- (g) Details of Excitation Loop described in diagram form showing transfer functions of individual elements;
- (h) Dynamic characteristics of overexcitation limiter; and
- (i) Dynamic characteristics of underexcitation limiter.

5.4.1.4. The following speed-governing system parameters shall be provided for each reheat steam Generating Unit:

- (a) High pressure governor average gain (MW/Hz);
- (b) Speeder motor setting range;
- (c) Speed droop characteristic curve;
- (d) High pressure governor valve time constant;
- (e) High pressure governor valve opening limits;
- (f) High pressure governor valve rate limits;
- (g) Reheater time constant (Active Energy stored in reheater);
- (h) Intermediate pressure governor average gain (MW/Hz);
- (i) Intermediate pressure governor setting range;
- (j) Intermediate pressure governor valve time constant;

- (k) Intermediate pressure governor valve opening limits;
- (l) Intermediate pressure governor valve rate limits; intermediate pressure governor loop; and
- (m) A governor block diagram showing the transfer functions of individual elements.

5.4.1.5. The following speed-governing system parameters shall be provided for each non-reheat steam, gas turbine, geothermal and hydro Generating Unit:

- (a) Governor average gain;
- (b) Speeder motor setting range;
- (c) Speed droop characteristic curve;
- (d) Time constant of steam or fuel governor valve or water column inertia;
- (e) Governor valve opening limits;
- (f) Governor valve rate limits; and
- (g) Time constant of turbine.

5.4.1.6. The following plant flexibility performance data shall be submitted for each Generating Plant:

- (a) Rate of loading following weekend shutdown (Generating Unit and Generating Plant);
- (b) Rate of loading following an overnight shutdown (Generating Unit and Generating Plant);
- (c) Block load following synchronizing;
- (d) Rate of load Reduction from normal rated MW;
- (e) Regulating range; and
- (f) Load rejection capability while still synchronized and able to supply load.

5.4.1.7. The following auxiliary Demand data shall be submitted:

- (a) Normal unit-supplied auxiliary load for each Generating Unit at rated MW output; and
- (b) Each Generating Plant auxiliary load other than (a) above and where the station auxiliary load is supplied from the Small Grid.

5.4.2. Small Grid User System Data

5.4.2.1. The Small Grid Owner and the Small Grid User shall exchange information, including details of physical and electrical layouts, parameters, specifications, and protection, needed to conduct an assessment of transient overvoltage effects in the Small Grid or the Small Grid User System.

5.4.2.2. The Small Grid User shall provide additional planning data that may be requested by the Small Grid Owner.

SECTION 6

6. SMALL GRID OPERATIONS

6.1. SMALL GRID OPERATING STATES, OPERATING CRITERIA AND PROTECTION

6.1.1. Small Grid Operating States

6.1.1.1. The Small Grid shall be considered to be in the normal state when:

- (a) The Operating Margin is sufficient;
- (b) The Small Grid frequency is within the limits as specified in Section 3.1.1.1 (*Frequency Variation*);
- (c) The voltages at all Connection Points are within the limits of the nominal value, as specified in Section 3.2.3 (*Voltage Variations*), Chapter 3 of the PDC and any amendments thereto;
- (d) The loading levels of the High Voltage (HV) lines and substation Equipment are below ninety nine percent (90%) of the maximum continuous ratings of phase conductors and transformers as certified and submitted by the Small Grid Owner. Deviations may only be acceptable on contingency that depends on the condition of the facility subject to monitoring by the DMC.
- (e) The Small Grid configuration is such that any potential fault current can be interrupted and the faulted Equipment can be isolated from the Small Grid.

6.1.1.2. Small Grid shall be considered to be in the alert state when any one of the following conditions exists:

- (a) There is Critical Loading or Imminent Overloading of High Voltage (HV) lines or substation Equipment;
- (b) A weather disturbance has entered the Philippine area of responsibility, which may affect Small Grid operations; or
- (c) Peace and order problems which may pose a threat to Small Grid operations.

6.1.1.3. The Small Grid shall be considered to be in the emergency state when a Multiple Outage Contingency has occurred without resulting in Total System Blackout, and any one of the following conditions exists:

- (a) There is generation deficiency;
- (b) System Grid voltages are outside the limits of 0.90 and 1.10; or
- (c) The loading level of any High Voltage (HV) line or substation Equipment is above 110% of its continuous rating.

6.1.2. Small Grid Operating Criteria

- 6.1.2.1. The Small Grid shall be operated so that it remains in the normal state.
- 6.1.2.2. The Small Grid Voltage shall be operated at safe level to reduce the vulnerability of the Small Grid to Transient Instability, Dynamic Instability and Voltage Instability problems.

6.1.3. Small Grid Protection

- 6.1.3.1. The Small Grid shall have adequate and coordinated primary and backup protection at all times to limit the magnitude of Small Grid disturbances when a fault or Equipment failure occurs.
- 6.1.3.2. The Small Grid User shall design, coordinate, and maintain its protection system to ensure the desired speed, sensitivity and selectivity in clearing faults on the Small Grid User's side of the Connection Point. Such protection system shall be coordinated with the Small Grid Owner's protection system.

6.2. OPERATIONAL RESPONSIBILITIES

For all **Categories** other than DUs.

For DUs in all **Categories**, shall comply to Section 7.2.1 (*Operational Responsibilities of the Distributor*), Chapter 7 of the PDC and any amendments thereto.

6.2.1. Operational Responsibilities of the System Operator

- 6.2.1.1. The System Operator is responsible for operating and maintaining the Small Grid during normal conditions, in accordance with these Guidelines, and in proposing solutions to problems.
- 6.2.1.2. The System Operator is responsible for ensuring that load-generation balance is maintained during emergency conditions and for directing Small Grid recovery efforts following these emergency conditions.
- 6.2.1.3. The System Operator is responsible for controlling Small Grid Voltage Variations during emergency conditions through a combination of direct control and timely instructions to Generators and other Small Grid Users.
- 6.2.1.4. The System Operator is responsible for preparing the Small Grid Operating and Maintenance Program.
- 6.2.1.5. The System Operator is responsible for performing all necessary studies to determine the safe operating limits that will protect the Small Grid against any instability problems, including those due to Multiple Outage Contingencies.

6.2.2. Operational Responsibilities of the Small Grid Owner

- 6.2.2.1. The Small Grid Owner is responsible for providing and maintaining all Small Grid Equipment and facilities.
- 6.2.2.2. The Small Grid Owner is responsible for designing, installing, and maintaining the Small Grid's protection system that will ensure the timely disconnection of faulted facilities and Equipment.

- 6.2.2.3. The Small Grid Owner is responsible for ensuring that safe and economic Small Grid operating procedures are always followed.
- 6.2.2.4. The Small Grid Owner is responsible for preparing, together with the System Operator, the Small Grid Operating and Maintenance Program.
- 6.2.2.5. The Small Grid Owner is responsible for executing the instructions of the System Operator during emergency conditions.

6.2.3. Operational Responsibilities of Generators

- 6.2.3.1. The Generator is responsible for maintaining its Generating Units to fully deliver the capabilities declared in its Connection Agreement or Amended Connection Agreement.
- 6.2.3.2. The Generator is responsible for providing accurate and timely planning and operations data to the Small Grid Owner and/or System Operator.
- 6.2.3.3. The Generator shall be responsible for ensuring that its Generating Units will not disconnect from the Small Grid during disturbances except when the Frequency and Voltage Variation would damage Generator's Equipment and when the System Operator has agreed for the Generator to do so.
- 6.2.3.4. The Generator is responsible for executing the instructions of the System Operator during emergency conditions.

6.2.4. Operational Responsibilities of Other Small Grid Users

- 6.2.4.1. The Small Grid User is responsible for assisting the System Operator in maintaining power quality in the Small Grid during normal conditions by correcting any Small Grid User facility that causes power quality problems.
- 6.2.4.2. The Small Grid User shall be responsible for ensuring that its power system will not cause the degradation of the Small Grid. It shall also be responsible for undertaking all necessary measures to remedy any degradation of the Small Grid that its system has caused.
- 6.2.4.3. The Small Grid User is responsible for providing and maintaining voltage-control Equipment on its system to support the voltage at the Connection Point.
- 6.2.4.4. The Small Grid User is responsible for providing and maintaining Reactive Power supply facilities on its system to meet its own Reactive Power Demand.
- 6.2.4.5. The Small Grid User is responsible for executing the instructions of the System Operator during emergency conditions.

6.3. SMALL GRID OPERATIONS NOTICES AND REPORTS

For **Category 1** and **Category 2** only.

For DUs under **Category 1** and **Category 2**, shall comply to Section 7.4 (*Distribution Operations Communications, Notices, and Reports*), Chapter 7 of the PDC and any amendments thereto.

For **Category 3**, **Category 4** and **Category 5**, refer to Section 7.4 (*Distribution Operations Communications, Notices, and Reports*), Chapter of the PDC and any amendments thereto.

6.3.1. Small Grid Operations Notices

6.3.1.1. The following notices shall be issued, without delay, by the System Operator to notify all Small Grid Users of an existing alert state:

- (a) When the Contingency Reserve is less than ten percent (10%) of the total Synchronized Generating Unit;
- (b) Weather Disturbance Alert when a weather disturbance has entered the Philippine area of responsibility;
- (c) Blue Alert when a tropical disturbance is expected to make a landfall within 24 hours; and
- (d) Security Alert when peace and order problems exist, which may affect Small Grid operations.

6.3.1.2. A Significant Incident Notice shall be issued by the System Operator, the Small Grid Owner or any Small Grid User if a Significant Incident has transpired on the Small Grid or the power system of the User, as the case may be. The notice shall be issued within fifteen (15) minutes from the occurrence of the Significant Incident, and shall identify its possible consequences on the Small Grid and/or the other Small Grid Users, and any initial corrective measures that were undertaken by the System Operator, the Small Grid Owner, or the Small Grid User, as the case may be.

6.3.1.3. Planned Activity Notice shall be issued by a Small Grid User to the Small Grid Owner and 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. The System Operator shall notify the Small Grid User of its approval or disapproval of the Small Grid User's request at least (5) days before the actual work commences.

6.3.2. Small Grid Monthly Operations Reports

6.3.2.1. The Small Grid Owner and the System Operator shall prepare monthly operations report and submit to the DMC on a quarterly basis. These reports shall include an evaluation of the events and other problems that occurred within the Small Grid for the previous week, the measures undertaken by the Small Grid Owner and the System Operator to address them, and the recommendations to prevent their recurrence in the future.

6.3.2.2. The System Operator shall submit to the DMC the Significant Incident Reports.

6.4. SMALL GRID OPERATING AND MAINTENANCE PROGRAMS

For **Category 1** and **Category 2** only.

For DUs under **Category 1** and **Category 2**, shall comply to Section 7.5 (*Distribution Maintenance Program*), Chapter 7 of the PDC and any amendments thereto.

For **Category 3**, **Category 4** and **Category 5**, refer to Section 7.5 (*Distribution Maintenance Program*), Chapter 7 of the PDC and any amendments thereto.

6.4.1. Small Grid Operating Program

6.4.1.1. System Operator, in consultation with the Small Grid Owner, shall prepare the following Operating Programs that specify the availability and aggregate capability of the Generating Plants to meet the forecasted Demand:

- (a) Three-year Operating Program;
- (b) Annual Operating Program;
- (c) Monthly Operating Program;
- (d) Weekly Operating Program; and
- (e) Daily Operating Program.

6.4.1.2. The three-year Operating Program shall be developed annually for the three (3) succeeding years based on the Small Grid User's historical Energy and Demand data as specified in Section 5.3.1 (*Historical Energy and Demand*), the five-year Forecast Data submitted by the Small Grid Users as specified in Section 5.3.2 (*Standard Planning Data*) and the three-year Maintenance Program developed in accordance with Section 6.4.2 (*Small Grid Maintenance Program*).

6.4.1.3. The annual Operating Program shall be developed using the first year of the three-year Operating Program and the annual Maintenance Program developed in accordance with Section 6.4.2 (*Small Grid Maintenance Program*).

6.4.1.4. The monthly Operating Program shall specify the details of the Operating Program for each week of the month.

6.4.1.5. If a Small Grid User has determined that its Demand pattern or forecast has changed or will change significantly from the data previously submitted, the Small Grid User shall immediately provide the System Operator with the updated data so that the Small Grid Operating Program can be adjusted accordingly.

6.4.2. Small Grid Maintenance Program

6.4.2.1. The Small Grid Owner, in consultation with the System Operator, shall prepare the following Small Grid Maintenance Programs based on the forecasted Demand, the Small Grid User's provisional Maintenance Program, and requests for maintenance schedule:

- (a) Three-Year Maintenance Program;
- (b) Annual Maintenance Program;
- (c) Monthly Maintenance Program;
- (d) Weekly Maintenance Program; and
- (e) Daily Maintenance Program.

6.4.2.2. The three-year Maintenance Program shall be prepared annually for the three (3) succeeding years. The annual Maintenance Program shall be

developed based on the maintenance schedule for the first year of the three-year Maintenance Program. The monthly, weekly, and daily Maintenance Programs shall provide details for the preparation of the Small Grid Operating.

6.4.2.3. The Small Grid Maintenance Programs shall be developed taking into account the following:

- (a) The forecasted Demand;
- (b) The Maintenance Program actually implemented;
- (c) The requests by Small Grid Users for changes in their maintenance schedules;
- (d) The requirements for the maintenance of the Small Grid;
- (e) The need to minimize the total cost of the required maintenance; and
- (f) Any other relevant factor.

6.4.2.4. The Small Grid User shall provide the Small Grid Owner and/or the System Operator by week 27 of the current year a provisional Maintenance Program for the three (3) succeeding years. The following information shall be included in the Small Grid User's provisional Maintenance Program or when the Small Grid User requests for a maintenance schedule for its System or Equipment:

- (a) Identification of the Equipment and the MW or kW capacity involved;
- (b) Reasons for the maintenance;
- (c) Expected duration of the maintenance work;
- (d) Preferred start date for the maintenance work and the date by which the work shall have been completed; and
- (e) If there is flexibility in dates, the earliest start date and the latest completion date.

6.4.2.5. The Small Grid Owner shall endeavor to accommodate the Small Grid User's request for maintenance schedule at particular dates in preparing the Small Grid Maintenance Program.

6.4.2.6. The Small Grid Owner shall provide the Small Grid User a written copy of the Small Grid User's approved Maintenance Program.

6.4.2.7. If the Small Grid User is not satisfied with the Maintenance Schedule allocated to its Equipment, it shall notify the Small Grid Owner to explain its concern and to propose changes to the Maintenance Program. The Small Grid Owner and the Small Grid User shall discuss and resolve the problem. The Maintenance Program shall be revised by the Small Grid Owner based on the resolution of the Small Grid User's concerns.

6.5. FREQUENCY CONTROL AND VOLTAGE CONTROL

For **Category 1** and **Category 2** only.

For DUs under **Category 1** and **Category 2**, shall comply to Section 7.6 (*Demand and Voltage Control*), Chapter 7 of the PDC and any amendments thereto.

For **Category 3**, **Category 4** and **Category 5**, refer to Section 7.6 (*Demand and Voltage Control*), Chapter 7 of the PDC and any amendments thereto.

6.5.1. Automatic Load Dropping

6.5.1.1. The System Operator shall establish the level of Demand required for ALD in order to limit the consequences of a major loss of generation in the Small

Grid. The System Operator shall conduct the appropriate technical studies to justify the targets and/or to refine them as necessary.

6.5.1.2. The Small Grid User shall prepare its ALD program in consultation with the System Operator. The Small Grid User Demand that is subject to ALD shall be split into rotating discrete MW or kW blocks. The System Operator shall specify the number of blocks and the under frequency setting for each block.

6.5.1.3. If the Small Grid User does not implement an ALD program, the Small Grid Owner shall install the underfrequency relay at the main feeder and the System Operator shall drop the total Small Grid User Demand as a single block, if the need arises.

6.5.1.4. 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.

6.5.1.5. If an ALD has taken place, the affected Small Grid 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 Small Grid has recovered.

6.5.1.6. The Small Grid User shall notify the System Operator of the actual Demand that was disconnected by ALD, or the Demand that was restored in the case of reconnection, within five (5) minutes of the load dropping or reconnection.

6.5.2. Manual Load Dropping

6.5.2.1. The Small Grid User shall make arrangements that will enable it to disconnect its customers immediately following the issuance by the System Operator of an instruction to implement MLD.

6.5.2.2. Distributors shall establish a priority scheme for MLD based on equitable load allocation.

6.5.2.3. If the System Operator has determined that the MLD carried out by the Small Grid User is not sufficient to contain the decline in Grid Frequency, the System Operator may disconnect the total Demand of the Small Grid User in an effort to preserve the integrity of the Small Grid.

6.5.2.4. If a Small Grid User disconnected its customers upon the instruction of the System Operator, the Small Grid User shall not reconnect the affected customers until instructed by the System Operator to do so.

6.5.3. Demand Control Initiated by a Small Grid User

6.5.3.1. If a Small Grid User intends to implement for the following day Demand Control through a Demand disconnection at the Connection Point, it shall notify the System Operator of the hourly schedule before 0900 hours of the current day. The notification shall contain the following information:

- (a) The proposed (in the case of prior notification) and actual (in the case of subsequent notification) date, time, and duration of implementation of the Demand Disconnection; and
- (b) The magnitude of the proposed reduction by the use of Demand Disconnection. The Small Grid User shall provide the System Operator

with the amount of Demand reduction actually achieved by the use of the Demand Disconnection.

6.5.3.2. If a Small Grid User intends to implement for the following day Demand Control through Customer Demand Management, it shall notify the System Operator of the hourly schedule before 0900 hours of the current day. The notification shall contain the following information:

- (a) The proposed (in the case of prior notification) and actual (in the case of subsequent notification) date, time, and duration of implementation of the Customer Demand Management; and
- (b) The magnitude of the proposed reduction by use of the Customer Demand Management. The Small Grid User shall provide the System Operator with the amount of Demand reduction actually achieved by the use of the Customer Demand Management.

6.5.3.3. If the Demand Control involves the disconnection of an industrial circuit, Voluntary Load Curtailment (VLC) or any similar scheme shall be implemented wherein the Customers are divided into VLC Weekday groups (e.g. Monday Group, Tuesday Group, etc.). Customers participating in the VLC shall voluntarily reduce their respective Demands for a certain period of time depending on the extent of the generation deficiency. Industrial Customers who implemented a VLC shall provide the System Operator with the amount of Demand reduction actually achieved through the VLC scheme.

6.6. EMERGENCY PROCEDURES

For **Category 1** and **Category 2** only.

For DUs under **Category 1** and **Category 2**, shall comply to Section 7.7 (*Emergency Procedures*), Chapter 7 of the PDC and any amendments thereto.

For **Category 3**, **Category 4** and **Category 5**, refer to Section 7.7 (*Emergency Procedures*), Chapter 7 of the PDC and any amendments thereto.

6.6.1. Preparation for Small Grid Emergencies

6.6.1.1. The System Operator shall give an instruction or a directive to any Small Grid User for the purpose of mitigating the effects of the disruption of electricity supply attributable to any of the following:

- (a) Natural disaster;
- (b) Civil disturbance; or
- (c) Fortuitous event.

6.6.1.2. The Small Grid Owner and the System Operator shall develop, maintain, and distribute a Manual of Small Grid Emergency Procedures, which lists all parties to be notified, including their business and home phone numbers, in case of an emergency. The manual shall also designate the location(s) where critical personnel shall report for Small Grid restoration duty.

6.6.1.3. Emergency drills shall be conducted at least once a year to familiarize all personnel responsible for emergency and Small Grid restoration activities with the emergency and restoration procedures. The drills shall simulate realistic emergency situations. The Manual of Small Grid Emergency Procedures shall be followed. A drill evaluation shall be performed and deficiencies in procedures and responses shall be identified and corrected.

6.6.2. Significant Incident Procedures

- 6.6.2.1. The Small Grid Owner and all Small Grid Users shall provide the System Operator, in writing, the telephone numbers of persons who can make binding decisions when there is a Significant Incident.
- 6.6.2.2. Following the issuance of a Significant Incident Notice by the System Operator, the Small Grid Owner, or a Small Grid User, any Small Grid User may file a written request for a joint investigation of the Significant Incident. If there have been several Significant Incidents, the joint investigation may include the other Significant Incidents.
- 6.6.2.3. A joint investigation of the Significant Incident shall be conducted only when the System Operator, the Small Grid Owner, and the Small User involved have reached an agreement to conduct the joint investigation.
- 6.6.2.4. The System Operator shall submit a written report to the DMC and the ERC detailing all the information, findings, and recommendations regarding the Significant Incident.
- 6.6.2.5. The following minimum information shall be included in the written report following the joint investigation of the Significant Incident:
 - (a) Time and date of the Significant Incident;
 - (b) Location of the Significant Incident;
 - (c) Equipment directly involved and not merely affected by the event;
 - (d) Description of the Significant Incident;
 - (e) Demand (in MW) and generation (in MW) interrupted and the duration of the interruption;
 - (f) Generating Unit: Frequency response (MW correction achieved subsequent to the Significant Incident); and
 - (g) Generating Unit: MVAR performance (change in output subsequent to the Significant Incident).

6.6.3. Black Start Procedures

- 6.6.3.1. If a Significant Incident resulted in a Partial System Blackout or a Total System Blackout, the System Operator shall inform the Small Grid Users that it intends to implement a Black Start.
- 6.6.3.2. The System Operator shall issue instructions for the Generating Plants with Black Start Capability to initiate the start-up. The Generator providing Black Start shall then inform the System Operator that its Generating Plants are dispatchable within thirty (30) minutes for the restoration of the Small Grid.
- 6.6.3.3. Upon receipt of the instruction from the System Operator, Generating Plants providing Black Start shall start-up immediately to energize a part of the Small Grid and/or synchronize to the Small Grid.

6.6.3.4. The overall strategy in the restoration of the Small Grid after a Total System Blackout shall, in general, include the following:

- (a) Overlapping phases of blackout restoration of Island Small Grids;
- (b) Eventual restoration of the Small Grid.

6.6.3.5. The System Operator shall inform the Small Grid Users, after completing the Black Start procedure and the restoration of the Small Grid, that the blackout no longer exists and that the Small Grid is back to the normal state.

6.6.4. Resynchronization of Island Grids

6.6.4.1. When parts of the Small Grid are not synchronized with each other, the System Operator shall instruct Small Grid Users to regulate Generation and/or Demand to enable the isolated Island Small Grids to be resynchronized.

6.6.4.2. If a part of the Small Grid is not connected to the rest of the Small Grid, but there is no blackout in that part of the Small Grid, the System Operator shall undertake the resynchronization of that part to the Small Grid.

6.7. SAFETY COORDINATION

For **Category 1** and **Category 2** only.

For DUs under **Category 1** and **Category 2**, shall comply to Section 7.8 (*Safety Coordination*), Chapter 7 of the PDC and any amendments thereto.

For **Category 3**, **Category 4** and **Category 5**, refer to Section 7.8 (*Safety Coordination*), Chapter 7 of the PDC and any amendments thereto.

6.7.1. Safety Coordination Procedures

6.7.1.1. The Small Grid Owner and Small Grid Users shall adopt and use a set of Safety Rules and Local Safety Instructions for implementing Safety Precautions on secondary voltage and primary voltage equipment. The respective Safety Rules and Local Safety Instructions of the Small Grid Owner and the Small Grid User shall govern any work or testing on the Small Grid or the Small Grid User System.

6.7.1.2. The Small Grid Owner shall furnish the Small Grid User a copy of its Safety Rules and Local Safety Instructions relating to the Safety Precautions on its secondary voltage and primary voltage equipment.

6.7.1.3. The Small Grid User shall furnish the Small Grid Owner a copy of its Safety Rules and Local Safety Instructions relating to the Safety Precautions on its secondary voltage and primary voltage equipment.

6.7.1.4. Any party who wants to revise any provision of its Local Safety Instructions shall provide the other party a written copy of the revisions.

6.7.1.5. Safety coordination procedures shall be established for the coordination, establishment, maintenance and cancellation of Safety Precautions on secondary voltage and primary voltage equipment when work or testing is to be carried out on the Small Grid or the Small Grid User System.

- 6.7.1.6. Work or testing on any Equipment at the Connection Point shall be carried out only in the presence of the representatives of the Small Grid Owner and the Small Grid User.
- 6.7.1.7. The Small Grid User (or Small Grid Owner) shall seek authority from the Small Grid Owner (or the Small Grid User) if it wishes to access any Small Grid Owner (or Small Grid User) Equipment.
- 6.7.1.8. When work or testing is to be carried out on the Small Grid and Safety Precautions are required on the secondary voltage and primary voltage equipment of several Small Grid User Systems, the Small Grid Owner shall ensure that the Safety Precautions on the Small Grid and on the Power System of all Small Grid Users involved are coordinated and implemented.
- 6.7.1.9. Where work or testing is to be carried out on the Small Grid and the Small Grid User becomes aware that Safety Precautions are also required on the power system of other Small Grid Users, the Small Grid Owner shall be promptly informed of the required Safety Precautions on the System of the other Small Grid Users. The Small Grid Owner shall ensure that Safety Precautions are coordinated and implemented on the Small Grid and all Small Grid User Systems.

6.7.2. Safety Coordinator

- 6.7.2.1. The Small Grid Owner and the Small Grid User shall assign a Safety Coordinator who shall be responsible for the coordination of Safety Precautions on the secondary voltage and primary voltage equipment at their respective sides of the Connection Point. Any party who wants to change its Safety Coordinator shall notify the other party of the change.
- 6.7.2.2. For purposes of safety coordination, the Safety Coordinator requesting that a Safety Precaution be applied on the power system of the other party shall be referred to as the Requesting Safety Coordinator while the Safety Coordinator that will implement the requested Safety Precaution shall be referred to as the Implementing Safety Coordinator.
- 6.7.2.3. If work or testing is to be carried out on the Small Grid (or the Small Grid User System) that requires Safety Precautions on the secondary voltage and primary voltage equipment of the Small Grid User System (or the Small Grid), the Requesting Safety Coordinator shall contact the Implementing Safety Coordinator to coordinate the necessary Safety Precautions.
- 6.7.2.4. If a Safety Precaution is required for the secondary voltage and primary voltage equipment of other Small Grid Users who were not mentioned in the request, the Implementing Safety Coordinator shall promptly inform the Requesting Safety Coordinator.
- 6.7.2.5. When a Safety Precaution becomes ineffective, the concerned Safety Coordinator shall inform the other Safety Coordinator(s) about it without delay stating the reason(s) why the Safety Precaution has lost its integrity.

6.7.3. Safety Logs and Record of Inter-System Safety Precautions

- 6.7.3.1. The Small Grid Owner and the Small Grid User shall maintain Safety Logs to record, in chronological order, all messages relating to Safety Coordination. The Safety Logs shall be retained for at least one (1) year.

6.7.3.2. The Small Grid Owner shall establish a record of inter-system Safety Precautions to be used by the Requesting Safety Coordinator and the Implementing Safety Coordinator in coordinating the Safety Precautions on secondary voltage and primary voltage equipment. The record of intersystem Safety Precautions shall contain the following information:

- (a) Site and Equipment Identification of secondary voltage and primary voltage equipment where Safety Precaution is to be established or has been established;
- (b) Location and the means of implementation of the Safety Precaution;
- (c) Confirmation of the Safety Coordinator that the Safety Precaution has been established; and
- (d) Confirmation of the Safety Coordinator that the Safety Precaution is no longer needed and has been cancelled.

6.7.4. Location of Safety Precautions

6.7.4.1. When work or testing is to be carried out on the Small Grid (or the Small Grid User System) and Safety Precautions are required on the Small Grid User System (or the Small Grid), the Requesting Safety Coordinator shall contact the concerned Implementing Safety Coordinator to agree on the location(s) at which the Safety Precautions will be implemented or applied. The Requesting Safety Coordinator shall specify the proposed locations at which Isolation and/or Grounding are to be established.

6.7.4.2. In the case of Isolation, the Implementing Safety Coordinator shall promptly notify the Requesting Safety Coordinator of the following:

- (a) The identification of each Point of Isolation using the Site and Equipment Identification specified in Section 6.10 (*Site and Equipment Identification*); and
- (b) The means of implementing Isolation as specified in Section 6.7.5 (*Implementation of Safety Precautions*).

6.7.4.3. In the case of Grounding, the Implementing Safety Coordinator shall promptly notify the Requesting Safety Coordinator of the following:

- (a) The identification of each Point of Grounding using the Site and Equipment Identification specified in Section 6.10 (*Site and Equipment Identification*); and
- (b) The means of implementing Grounding as specified in Section 6.7.5 (*Implementation of Safety Precautions*).

6.7.4.4. If the Requesting Safety Coordinator and the Implementing Safety Coordinator do not agree on the location(s), Grounding shall be established at the available points on the infeeds closest to the secondary voltage and primary voltage equipment.

6.7.5. Implementation of Safety Precautions

6.7.5.1. Once the location(s) of Isolation and Grounding have been agreed upon, the Implementing Safety Coordinator shall ensure that the Isolation is implemented.

6.7.5.2. Isolation shall be implemented by any of the following:

- (a) A disconnect switch that is secured in an open position by a lock and affixing a Safety Tag to it or by such other method in accordance with the Local Safety Instructions of the Small Grid Owner or of the Small Grid User, as the case may be; or
- (b) An adequate physical separation (e.g. Grounding Cluster) in accordance with the Local Safety Instructions of the Small Grid Owner or of the Small Grid User. In addition, a Safety Tag shall be placed at the switching points.

6.7.5.3. The Implementing Safety Coordinator, after establishing the required Isolation in all locations on his system, shall notify the Requesting Safety Coordinator that the required Isolation has been implemented.

6.7.5.4. After receiving the confirmation of Isolation, the Requesting Safety Coordinator shall inform the Implementing Safety Coordinator of the establishment of Isolation on his system and request, if required, the implementation of Grounding.

6.7.5.5. The Implementing Safety Coordinator shall ensure the implementation of Grounding and notify the Requesting Safety Coordinator that Grounding has been established on his system.

6.7.5.6. Grounding shall be implemented by any of the following:

- (a) A Grounding switch secured in a closed position by a lock and affixing a Safety Tag to it or by such other method in accordance with the Local Safety Instructions of the Small Grid Owner or the Small Grid User, as the case may be; or
- (b) An adequate physical connection (e.g. Grounding Cluster) which shall be in accordance with the methods set out in the Local Safety Instructions of the Small Grid Owner or those of the Small Grid User. In addition, a Safety Tag shall be placed at this point of connection and all related switching points.

6.7.5.7. If the disconnect switch or the Grounding switch is locked with its own locking mechanism or with a padlock, the key shall be secured in a key cabinet.

6.7.6. Authorization of Testing

Refer to Section 7.8.6 (*Authorizing of Testing*), Chapter 7 of the PDC and any amendments thereto.

6.7.7. Cancellation of Safety Precautions

Refer to Section 7.8.7 (*Cancellation of Safety Precaution*), Chapter of the PDC and any amendments thereto.

6.8. SYSTEM TEST

For **Category 1** and **Category 2** only.

For DUs under **Category 1** and **Category 2**, shall comply to Section 7.10 (*System Test*), Chapter 7 of the PDC and any amendments thereto.

For **Category 3**, **Category 4** and **Category 5**, refer to Section 7.10 (*System Test*), Chapter 7 of the PDC and any amendments thereto.

6.8.1. System Test Requirements

6.8.1.1. System Test, which involves the simulation of conditions or the controlled application of unusual or extreme conditions that may have an impact on the Small Grid or the Small Grid User System, shall be carried out in a manner that shall not endanger any personnel or the general public.

6.8.1.2. The threat to the integrity of Equipment, the Security of the Small Grid, and the detriment to the Small Grid Owner and other Small Grid Users shall be minimized when undertaking a System Test on the Small Grid or the Small Grid User System.

6.8.2. System Test Request

6.8.2.1. If the Small Grid Owner (or a Small Grid User) wishes to undertake a System Test on the Small Grid (or the Small Grid User System), it shall submit to the System Operator a System Test Request that contains the following:

- (a) The purpose and nature of the proposed System Test;
- (b) The extent and condition of the Equipment involved; and
- (c) A proposed System Test Procedure specifying the switching sequence and the timing of the switching sequence.

6.8.2.2. The Test Proponent shall provide sufficient time for the System Operator to plan the proposed System Test. The System Operator shall determine the time required for each type of System Test.

6.8.2.3. The System Operator may require additional information before approving the proposed System Test if the information contained in the System Test Request is insufficient or the proposed System Test Procedure cannot ensure the safety of personnel and the Security of the Small Grid.

6.8.2.4. The System Operator shall determine and notify other Small Grid Users, other than the System Test Proponent, that may be affected by the proposed System Test.

6.8.2.5. The System Operator may also initiate a System Test if it has determined that the System Test is necessary to ensure the safety, stability, security and reliability of the Small Grid.

6.8.3. System Test Group

6.8.3.1. Within one (1) month after the acceptance of a System Test Request, the System Operator shall notify the System Test Proponent, the Small Grid Owner (if it is not the System Test Proponent) and the affected Small Grid

Users of the proposed System Test. The notice shall contain the following:

- (a) The purpose and nature of the proposed System Test, the extent and condition of the Equipment involved, the identity of the System Test Proponent, and the affected Small Grid Users;
- (b) An invitation to nominate representative(s) for the System Test Group to be established to coordinate the proposed System Test; and
- (c) If the System Test involves work or testing on secondary voltage or primary voltage equipment, the Safety Coordinators and the safety procedures specified in Section 6.7 (*Safety Coordination*).

6.8.3.2. The System Test Proponent, the Small Grid Owner (if it is not the System Test Proponent) and the affected Users shall nominate their representative(s) to the System Test Group within one (1) month after receipt of the notice from the System Operator. The System Operator may decide to proceed with the proposed System Test even if the affected Small Grid Users fail to reply within that period.

6.8.3.3. The System Operator shall establish a System Test Group and appoint a System Test Coordinator, who shall act as chairman of the System Test Group. The System Test Coordinator may come from the System Operator or the System Test Proponent.

6.8.3.4. The members of the System Test Group shall meet within one (1) month after the Test Group is established. The System Test Coordinator shall convene the System Test Group as often as necessary.

6.8.3.5. The agenda for the meeting of the System Test Group shall include the following:

- (a) The details of the purpose and nature of the proposed System Test and other matters included in the System Test Request;
- (b) Evaluation of the System Test Procedure as submitted by the System Test Proponent and making the necessary modifications to come up with the final System Test Procedure;
- (c) The possibility of scheduling simultaneously the proposed System Test with any other test and with Equipment Maintenance which may arise pursuant to the Maintenance Program requirements of the Small Grid or Small Grid Users; and
- (d) The economic, operational, and risk implications of the proposed System Test on the Small Grid, the Power System of the other Small Grid Users, and the Scheduling and Dispatch of the Generating Plants.

6.8.3.6. The System Test Proponent, the Grid Owner (if it is not the System Test Proponent) and the affected Small Grid Users (including those which are not represented in the System Test Group) shall provide the System Test Group, upon request, with such details as the System Test Group reasonably requires to carry out the proposed System Test.

6.8.4. System Test Program

6.8.4.1. Within two (2) months after the first meeting and at least one (1) month prior to the date of the proposed System Test, the System Test Group shall submit to the System Operator, the System Test Proponent, the Small Grid Owner (if it is not the System Test Proponent), and the affected Small Grid Users a proposed System Test Program which shall contain the following:

- (a) Plan for carrying out the System Test;
- (b) System Test Procedure to be followed during the test including the manner in which the System Test is to be monitored;
- (c) List of responsible persons, including Safety Coordinators when necessary, who will be involved in carrying out the System Test;
- (d) An allocation of all testing costs among the affected parties; and
- (e) Such other matters as the System Test Group may deem appropriate and necessary and are approved by the management of the affected parties.

6.8.4.2. If the proposed System Test Program is acceptable to the System Operator, the System Test Proponent, the Small Grid Owner (if it is not the System Test Proponent), and the affected Small Grid Users, the final System Test Program shall be constituted and the System Test shall proceed accordingly. Otherwise, the System Test Group shall revise the System Test Program.

6.8.4.3. If the System Test Group is unable to develop a System Test Program or reach a decision in implementing the System Test Program, the System Operator shall determine whether it is necessary to proceed with the System Test to ensure the Security of the Small Grid.

6.8.4.4. The System Test Coordinator shall be notified in writing as soon as possible of any proposed revision or amendment to the System Test Program prior to the day of the proposed System Test. If the System Test Coordinator decides that the proposed revision or amendment is meritorious, he shall notify the System Operator, the System Test Proponent, the Small Grid Owner (if it is not the System Test Proponent), and the affected Small Grid Users to act accordingly for the inclusion thereof. The System Test Program shall then be carried out with the revisions or amendments if the System Test Coordinator received no objections.

6.8.4.5. If system conditions are abnormal during the scheduled day for the System Test, the System Test Coordinator may recommend a postponement of the System Test.

6.8.5. System Test Report

6.8.5.1. Within two (2) months or a shorter period as the System Test Group may agree after the conclusion of the System Test, the System Test Proponent shall prepare and submit a System Test Report to the System Operator, the Small Grid Owner (if it is not the System Test Proponent), the affected Small Grid Users, and the members of the System Test Group.

6.8.5.2. After the submission of System Test Report, the System Test Group shall be automatically dissolved.

6.8.5.3. The System Operator shall submit the System Test Report to the DMC for its review and recommendations.

6.9. GENERATING UNIT CAPABILITY TESTS

6.9.1. Test Requirements

6.9.1.1. Tests shall be conducted in accordance with the agreed procedure and standards to confirm the compliance of Generating Units for the following:

- (a) Capability of Generating Units to operate within their registered Generation parameters;
- (b) Capability of the Generating Units to meet the applicable requirements of the Small Grid Guidelines;
- (c) Capability to deliver the Ancillary Service that the Generator had agreed to provide; and
- (d) Availability of Generating Units in accordance with their capability declaration.

6.9.1.2. All tests shall be recorded and witnessed by the authorized representatives of the Small Grid Owner, Generator, and/or Small Grid User.

6.9.1.3. The Generator shall demonstrate to the Small Grid Owner the reliability and accuracy of the test instruments and Equipment to be used in the test.

6.9.1.4. The Small Grid Owner may at any time issue instructions requiring tests to be carried out on any Generating Unit. All tests shall be of sufficient duration and shall be conducted no more than twice a year except when there are reasonable grounds to justify the necessity for further tests.

6.9.1.5. If a Generating Unit fails the test, the Generator shall correct the deficiency within an agreed period to attain the relevant registered parameters for that Generating Unit.

6.9.1.6. Once the Generator achieves the registered parameters of its Generating Unit that previously failed the test, it shall immediately notify the Small Grid Owner. The Small Grid Owner shall then require the Generator to conduct a retest in order to demonstrate that the appropriate parameter has already been restored to its registered value.

6.9.1.7. If a dispute arises relating to the failure of a Generating Unit to pass a given test, the Small Grid Owner, the Generator and/or Small Grid User shall seek to resolve the dispute among themselves.

6.9.1.8. If the dispute cannot be resolved, one of the parties may submit the issue to the DMC.

6.9.2. Tests to be Performed

- 6.9.2.1. The Reactive Power test shall demonstrate that the Generating Unit meets the registered Reactive Power Capability requirements specified in Section 4.3.2 (*Generating Unit Power Output*). The Generating Unit shall pass the test if the measured values are within ± 5 percent of the Capability as registered with the Small Grid Owner.
- 6.9.2.2. The Fast Start capability test shall demonstrate that the Generating Unit has the capability to automatically Start-Up, synchronize with the Small Grid within fifteen (15) minutes and be loaded up to its offered capability, as specified in Section 4.3.8 (*Fast Start Capability*). The Generating Unit shall pass the test if it meets the Fast Start capability requirements.
- 6.9.2.3. The Black Start test shall demonstrate that the Generating Plant with Black Start Capability can implement a Black Start procedure, as specified in Section 6.6.3 (*Black Start Procedures*). To pass the test, the Generating Unit shall start on its own, synchronize with the Small Grid and carry Load without the need for external power supply.
- 6.9.2.4. The Declared Data capability test shall demonstrate that the Generating Unit can be scheduled and dispatched in accordance with the Declared Data. To pass the test, the unit shall satisfy the ability to achieve the Declared Data.
- 6.9.2.5. The Dispatch accuracy test shall demonstrate that the Generating Unit meets the relevant Generation Scheduling and Dispatch Parameters. The Generating Unit shall pass the test if:
- (a) In the case of synchronization, the process is achieved within ± 5 minutes of the registered synchronization time;
 - (b) In the case of synchronizing generation (if registered as a Generation Scheduling and Dispatch Parameters), the synchronizing generation achieved is within an error level equivalent to 2.5% of Net Declared Capability;
 - (c) In the case of meeting ramp rates, the actual ramp rate is within $\pm 10\%$ of the registered ramp rate;
 - (d) In the case of meeting Load reduction rates, the actual Load reduction rate is within $\pm 10\%$ of the registered Load reduction rate; and
 - (e) In the case of all other Generation Scheduling and Dispatch Parameters, values are within $\pm 1.5\%$ of the declared values.
- 6.9.2.6. The Ancillary Service acceptability test shall determine the committed services in terms of parameter quantity or volume, timeliness, and other operational requirements. Generators providing Ancillary Services shall conduct the test or define the committed service. However, monitoring by the Small Grid Owner of Ancillary Service performance in response to power system-derived inputs shall also be carried out.

6.10. SITE AND EQUIPMENT IDENTIFICATION

For **Category 1** and **Category 2** only.

For DUs under **Category 1** and **Category 2**, shall comply to Section 7.12 (*Site and Equipment Identification*), Chapter 7 of the PDC and any amendments thereto.

For **Category 3**, **Category 4** and **Category 5**, refer to Section 7.12 (*Site and Equipment Identification*), Chapter 7 of the PDC and any amendments thereto.

6.10.1. Site and Equipment Identification Requirements

6.10.1.1. The Small Grid Owner shall develop and establish a standard system for Site and Equipment Identification to be used in identifying any Site or Equipment in all Electrical Diagrams, Connection Point Drawings, Small Grid operations instructions, notices, and other documents.

6.10.1.2. The identification for the Site shall include a unique identifier for each substation and switchyard where a Connection Point is located.

6.10.1.3. The identification for Equipment shall be unique for each transformer, High Voltage (HV) line, High Voltage (HV) tower or pole, bus, circuit breaker, disconnect switch, grounding switch, capacitor bank, reactor, lightning arrester, CCPD, and other secondary voltage and primary voltage equipment at the Connection Point.

6.10.2. Site and Equipment Identification Label

6.10.2.1. The Small Grid Owner shall develop and establish a standard labeling system, which specifies the dimension, sizes of characters, and colors of labels, to identify the Sites and Equipment.

6.10.2.2. The Small Grid Owner or the Small Grid User shall be responsible for the provision and installation of a clear and unambiguous label showing the Site and Equipment Identification at their respective System.

SECTION 7

7. SCHEDULING AND DISPATCH

7.1. SCHEDULING AND DISPATCH RESPONSIBILITIES

7.1.1. Responsibilities of Small Grid Owner

7.1.1.1. The Small Grid Owner shall be responsible for providing the System Operator with the data on the availability and operating status of the Small Grid facilities and Equipment to be used in determining the constraints of the Small Grid for Scheduling and Dispatch.

7.1.1.2. The Small Grid Owner is responsible for the Small Grid operations necessary to implement the Dispatch Instructions of the System Operator.

7.1.1.3. The Small Grid Owner shall be responsible for ensuring that all Dispatch Instructions from the System Operator are implemented within the Dispatch Tolerances.

7.1.1.4. The Small Grid Owner is responsible for implementing the Demand Control during an emergency situation.

7.1.2. Responsibilities of Generators

7.1.2.1. The Generator is responsible for submitting the Capability and Availability Declaration, Dispatch Scheduling and Dispatch Parameters, and other data for its Scheduled Generating Units to the System Operator.

7.1.2.2. The Generator with a Scheduled Generating Unit shall be responsible for ensuring that all Dispatch Instructions from the System Operator are implemented within the Dispatch Tolerances.

7.1.2.3. The Generator shall be responsible for ensuring that its Generating Units can provide the necessary services when scheduled or instructed by the System Operator to do so.

7.1.3. Responsibilities of Distribution Utility

7.1.3.1. The DUs shall be the System Operator since they are the off-taker of the Generators.

7.1.3.2. The DU, as a System Operator, shall be responsible for issuance of Dispatch Instructions for all the Scheduled Generating Units and other Small Grid users.

7.1.3.3. The DU, as a System Operator, shall be responsible for the preparation and issuance of the Dispatch Schedule and shall publish and make accessible to all Small Grid Users, relevant information on dispatch.

7.1.3.4. The DUs are responsible for implementing the Demand Control during an emergency situation.

7.1.3.5. The DUs, as a System Operator, shall prepare written Dispatch Protocol Manual and/or Procedure applicable to the Small Grid system. The draft dispatch protocol manual and/or procedure shall be submitted to the ERC, through the DMC, for review and approval three months after the effectivity of the PSGG prior to signing by concerned parties.

7.1.4. Responsibilities of Other Small Grid Users

7.1.4.1. Other Small Grid Users are responsible for submitting to the System Operator their Demand data for the Small Grid Operations and Maintenance Program to be used in Scheduling and Dispatch.

7.1.4.2. Other Small Grid Users are responsible for implementing all Dispatch Instructions pertaining to Demand Control during an emergency situation.

7.2. DISPATCH

7.2.1. Dispatch Principles

7.2.1.1. The reliability and security of the Small Grid shall always be observed in all aspects of scheduling and dispatch consistent with Section 6 (*Small Grid Operations*).

- 7.2.1.2. Real-time dispatch scheduling shall be undertaken by the System Operator.
- 7.2.1.3. The System Operator shall undertake the day-ahead load forecasting and dispatch scheduling based on the operational criteria that the synchronized generating capacity shall be sufficient to match, at all times, the forecasted Small Grid Demand and the required 2.8% Load Following.
- 7.2.1.4. The System Operator shall undertake the implementation of the dispatch schedules through issuance of Dispatch Instructions to all Small Grid Users, and shall monitor the Small Grid to ensure compliance.
- 7.2.1.5. Small Grid Users shall submit scheduling and dispatch information that will enable the System Operator to prepare a timely and accurate Dispatch Schedule.
- 7.2.1.6. Small Grid Users shall follow all Dispatch Instructions issued to them.
- 7.2.1.7. Complaints regarding non-compliance to Dispatch Instructions by any Small Grid Users or unreasonable Dispatch Instructions by the System Operator shall be reported to the ERC for resolution.

7.2.2. Dispatch Scheduling

- 7.2.2.1. The System Operator shall prepare a system load forecast for each Schedule Day based on best available information.
- 7.2.2.2. The Generators shall submit their generation scheduling and dispatch information to the System Operator in an accurate and timely manner, with the following details:
- (a) Nominations of available generating capacities for dispatch of energy and reserve.
 - (b) Forced and scheduled outages including de-rating of facilities which will prevent Generating Units from delivering energy or providing Ancillary Service to the Small Grid.
 - (c) Other information which will pose additional constraints in the operation of their Generating Units.
- 7.2.2.3. Other Small Grid Users shall submit the following scheduling and dispatch information to the System Operator in an accurate and timely manner:
- (a) Hourly load forecasts of the Scheduling Day.
 - (b) Constraints on its Distribution System (or Small Grid User System) which the System Operator may need to take into account in Scheduling and Dispatch.
- 7.2.2.4. The System Operator shall prepare the Dispatch Schedule using the available scheduling and dispatch information submitted by all Small Grid Users considering the operational criteria.

7.2.3. Dispatch Implementation

- 7.2.3.1. The System Operator shall issue Dispatch Instructions to the Small Grid Users to ensure timely and accurate implementation of the Dispatch Schedule. Unless otherwise instructed by the System Operator, the Generators shall linearly ramp to their target schedules issued by the System Operator.
- 7.2.3.2. The System Operator shall continuously coordinate with all Small Grid Users in the implementation of the real-time Dispatch Schedule to help ensure the reliability and security of the Small Grid.
- 7.2.3.3. The following information shall be provided by the Generators to the System Operator in the implementation of the dispatch:
 - (a) Status of the Generating Units, High Voltage lines or Medium Voltage lines and substation facilities
 - (b) Planned and forced outages
 - (c) Reserve requirements and allocations, if any
 - (d) Security constraints and contingency, if any
 - (e) System emergencies
- 7.2.3.4. Generators and other Small Grid Users connected to the Small Grid shall acknowledge and comply with Dispatch Instructions issued by the System Operator.
- 7.2.3.5. The System Operator shall take into account the following factors in re-dispatching Generating Units and in satisfying needs for imbalance Energy in real time:
 - (a) Power Agreement between Parties
 - (b) The Dispatch Schedule;
 - (c) The Demand requirements of the Users;
 - (d) Small Grid congestion problems; and
 - (e) System Loss.
- 7.2.3.6. The System Operator shall continuously monitor the Small Grid to ensure compliance with Dispatch Instructions by Small Grid Users. All non-compliance to Dispatch Instructions shall be reported to the ERC.

SECTION 8

8. METERING

For **Category 3**, **Category 4** and **Category 5**, refer to Chapter 8 (*Distribution Revenue Metering Requirements*) of the PDC and any amendments thereto.

For DUs under **Category 1** and **Category 2**, shall comply to Section 8 (*Distribution Revenue Metering Requirements*), of the PDC and any amendments thereto.

For **Category 1** and **Category 2**, the Small Grid Owner and all Small Grid Users other than DUs shall ensure that at any Connection Point in the Small Grid, the following standards shall be complied with:

8.1. METERING REQUIREMENTS

8.1.1. Metering Equipment

The Metering Equipment at the Connection Point shall consist of:

- (a) Revenue class meters;
- (b) Instrument transformers;
- (c) Lightning protection;
- (d) All interconnecting cables, wires, and associated devices, i.e., test blocks, connectors, security seals, etc.; and
- (e) Mounting structures, metering cabinet and/or ground wires, as may be applicable.

8.1.2. Metering Responsibility

8.1.2.1. The Metering Services Provider (MSP) shall supply the revenue metering, instruments transformers and its accessories and responsible to erect the mounting structures.

8.1.2.2. It shall be the responsibility of the MSP to demonstrate that its Metering Equipment meets all the technical requirements and standards set forth in this Section.

8.1.3. Active Energy and Active Power Metering

8.1.3.1. Active Energy and Active Power Revenue metering shall be required at every Connection Point. The metering point shall be as close as possible to the Connection Point, otherwise, a separate procedure shall be established to adjust energy loss between the point of metering and the Connection Point.

8.1.3.2. The Active Energy and Active Power Revenue metering shall be provided independently for input to and output from the Small Grid. It shall measure all quadrants in which Active Power flow is possible.

8.1.4. Reactive Energy and Reactive Power Metering

8.1.4.1. Reactive Energy and Reactive Power Revenue metering shall be required at every Connection Point. The metering point shall be as close as possible to the Connection Point, otherwise, a separate procedure shall be established to adjust energy loss between the point of metering and the Connection Point.

8.1.4.2. The Reactive Energy and Reactive Power metering shall be provided independently for input to and output from the Small Grid. It shall measure all quadrants in which Reactive Power flow is possible.

8.2. METERING EQUIPMENT STANDARDS

8.2.1. Voltage Transformers

8.2.1.1. The voltage transformers shall comprise three (3) units for a three-phase, four-wire circuit, each of which complies as a minimum of 0.3 accuracy class based on the applicable ANSI standard, or 0.2 accuracy class based on the applicable IEC standard. These voltage transformers shall be connected Wye-Wye with both star points grounded to a grounding Small Grid of acceptable resistance and shall provide a four-wire secondary connection.

8.2.1.2. The total burden of each secondary circuit of the voltage transformers must not exceed the rated burden of the voltage transformer. In no case shall the voltage drop from the voltage transformer secondary terminal to the input voltage terminal of the billing meter be more than 0.17% of the nominal secondary voltage rating of the voltage transformer.

8.2.2. Current Transformers

8.2.2.1. The current transformers shall comprise three (3) units for a three-phase set, each current transformer shall be certified to have been tested for ratio and phase deviation to be within the ANSI accuracy class of 0.3 or better over the entire measuring range of the metering facility.

8.2.2.2. Provisions shall be made for another secondary winding if a check metering current supply is requested by the Small Grid User. The current transformer's rated secondary current shall be either 1 or 5 amperes. The neutral conductor shall be effectively grounded at a single point. The total burdens of each secondary circuit of the current should not exceed the rated burden of the current transformer.

8.2.2.3. The use of "totalizing", back-up and/or series current transformer connections shall not be allowed for revenue metering service.

8.2.3. Meters

8.2.3.1. Meters shall be of the three-element type rated for the required site, comply with the appropriate international standards or equivalent national standards, for static watt-hour meter and other types of meters, and be of 0.3 accuracy class based on the applicable ANSI standard, or 0.2 accuracy class based on the applicable IEC standard. The meters shall measure and locally display at least the kW, kWh, kVAR, kVARh, and cumulative Demand.

8.3. METERING EQUIPMENT TESTING AND MAINTENANCE

8.3.1. Instrument Transformer Testing

8.3.1.1. Test on the Instrument Transformers shall be done by the ERC or a party authorized by the ERC, to be witnessed by the concerned Small Grid User. Test shall be done at least once every five (5) years or as the need arises. The tests shall be carried out in accordance with these Guidelines or equivalent international standards.

8.3.1.2. The tests to be performed on the revenue metering instrument transformers shall include, but not limited to:

- (a) Ratio Accuracy
- (b) Insulation Resistance
- (c) Phase Deviation
- (d) Burden Rating Verification

8.3.1.3. All tests to be performed on instrument transformers shall be done with the use of measuring and testing instruments with an unexpired calibration and an established traceability to national and/or international standards of measurement.

8.3.1.4. A copy of all test reports conducted on the instruments transformers shall be furnished to all Parties.

8.3.2. Meter Testing

The MSP and Small Grid User, through the ERC or an independent party authorized by the ERC, shall test and seal the meters in accordance with ERC rules and procedures for the test and maintenance of electric Meters of Distribution Utilities.

8.3.2.1. All Small Grid revenue meters shall undergo accuracy testing and appropriate functionality tests at commissioning to service by the ERC or by an entity authorized by the ERC and at least once a year thereafter. The accuracy test shall conform to the method prescribed in the applicable international standard.

8.3.2.2. The accuracy tests shall be performed with the use of measuring and testing instruments with an unexpired calibrations and an established traceability to national and/or international standards of measurement.

8.3.2.3. The Metering Equipment Owner (Distributor), in coordination with the Distribution Utility (Metering Equipment Owner), shall perform the annual accuracy testing of revenue meters. However, if the ERC – installed meter seal is broken in the process of meter accuracy testing/calibration by the Metering Equipment Owner (Distributor), then it shall have the meter re-tested and re-sealed by ERC.

8.3.2.4. Meters that are found by test to be outside their accuracy specifications shall be replaced immediately. The replaced meter shall be submitted for testing and sealing by the ERC prior to reinstallation.

8.3.2.5. The tolerance limits to be used for declaring a revenue meter to be in compliance with its accuracy specifications during accuracy testing shall be within the prescribed limits set by the ERC.

8.3.3. Request for Test

8.3.3.1. A Small Grid User, Distributor, or Generator may request a test of the installed Metering Equipment if it has reason to believe that the performance of the Equipment is not within the accuracy limits set forth in these Guidelines. The test shall be done by the ERC or by a party authorized by the ERC.

8.3.3.2. If the Metering Equipment fails the test, the Metering Equipment Owner shall pay for the cost of the test. If the Meter Equipment is found to have complied with the accuracy limits, the party who requested for the test shall pay for the test cost.

8.3.4. Maintenance of Metering Equipment

8.3.4.1. The Metering Equipment at the Connection Point shall be maintained by the Metering Equipment Owner. All test results, maintenance programs, and sealing records shall be kept for the life of the Equipment. The Equipment data and test records shall be made available to authorized parties.

8.3.4.2. The Metering Equipment Owner shall repair the metering System as soon as practical and in any event within two (2) days if a metering System malfunctions or maintenance occurs. The Metering Equipment Owner shall be allowed to charge the metering services, subject to the approval of the ERC.

8.3.5. Metering Equipment Security

8.3.5.1. The Disconnect Switches and other devices that can de-energize the revenue metering circuit shall be under the control of the Metering Equipment Owner.

8.3.5.2. The Metering Equipment Owner shall take all reasonable steps to prevent unauthorized interference with the Equipment. The Metering Equipment Owner shall provide seals and other appropriate devices to prevent unauthorized alteration on meter settings and calibrations. The Metering Equipment cubicle shall be completely and securely locked and sealed, provided that, any register on Equipment is visible and accessible. The Metering Equipment Owner shall also provide appropriate security against unauthorized access and against corruption of data in High Voltage (HV) line.

8.4. METER READING AND METERING DATA

8.4.1. Meter Reading and Recording Responsibility

8.4.1.1. The meter reading, recording and downloading shall be done by the authorized representative of the MSP and witnessed by the authorized representative of the Distributor and/or Small Grid User on the agreed date and time.

SECTION 9

9. SMALL GRID TRANSITORY PROVISIONS

9.1. TRANSITIONAL COMPLIANCE PLANS

9.1.1. Statement of Compliance

Within six (6) months from the effectivity of the PSGG, the Small Grid Owner and Small Grid Users shall submit to the ERC, through the DMC, a statement of their compliance with the technical specifications and the performance standards prescribed in the Small Grid Guidelines.

9.1.2. Submission of Compliance Plan

9.1.2.1. Where the Small Grid Owner and Small Grid Users does not comply with specific provisions of the PSGG, it submit to the ERC, through the DMC, a plan to comply with said provisions.

9.1.2.2. The DUs which do not comply with any of the prescribed technical specifications and performance standards of the PSGG shall submit to the ERC, through the DMC, a plan to comply.

9.4.3. Failure to Submit Plan

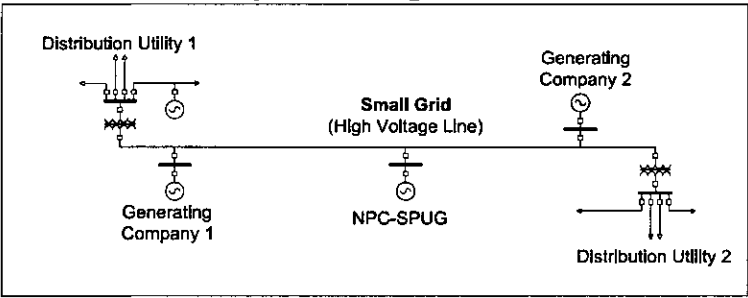
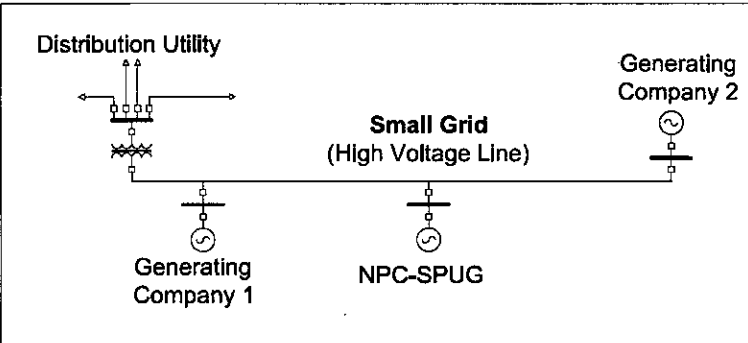
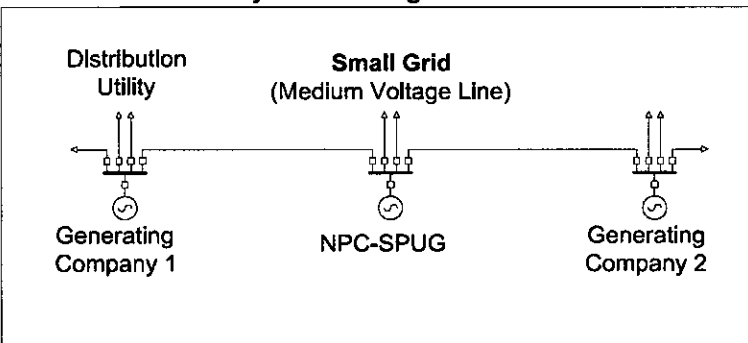
Failure to submit a feasible and credible plan and/or failure to implement the same shall serve as grounds for the imposition of appropriate sanctions, fines, or penalties as prescribed by ERC.

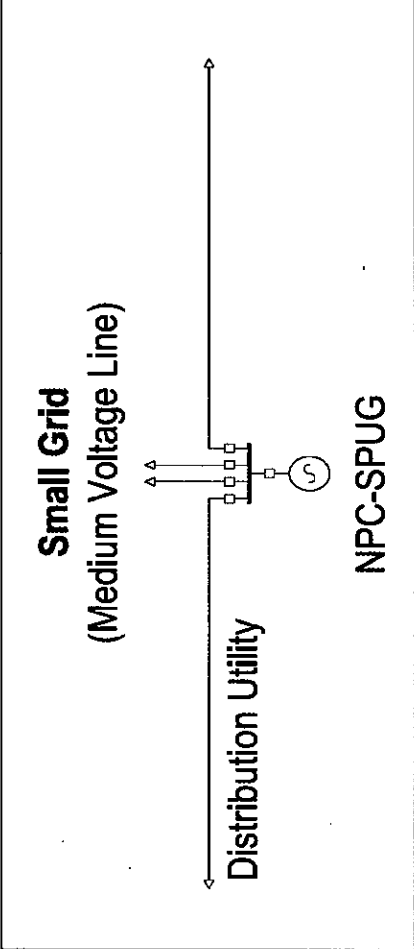
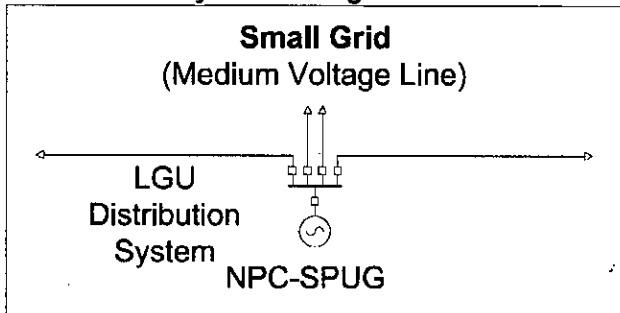
9.4.4. Evaluation and Approval of Plans

The ERC, through the DMC, shall, upon receipt of such plan, evaluate the same and notify the NPC-SPUG, Small Grid Generators and DU of its action.

Appendix A – Category

The Small Grid § shall be classified into the following categories:

Category	Generating Company			Transmissi on System	Distribution System	Coverage	DUs
	DUs	Private	NPG- SPUG	NPC- SPUG	DUs		
1	1	More than 1	1	1*	More than 1	Mindoro Area Note * – Portion of the High Voltage line owned by DU.	OMECO and ORMECO
System Configuration 							
2	None	More than 1	1	1	1	Palawan Area	PALECO
System Configuration 							
3	None	More than 1	1	None	1	Catanduanes Area Marinduque Area	FICELCO MARELCO
System Configuration 							

Category	Generating Company			Transmission System	Distribution System	Coverage	DUs
	DUs	Private	NPG-SPUG	NPC-SPUG	DUs		
4	None	None	1	None	1	Albay Islands Area Caluya, Antique Area Casiguran, Aurora Area Bantayan Island Area Basilan Area Batanes Area Tingloy, Batangas Area Maripipi, Biliran Area Busuanga Island Area Calayan, Cagayan Area Cagayan de Sulu, Tawi-tawi Area Camotes Island Area Talicud, Davao del Norte Area Some Areas in Davao del Sur Dinagat Island Area Gigantes, Iloilo Area Palanan, Isabela Area Kabugao, Apayao Area Lubang Island Area Masbate Area Some Areas in Northern Samar Province of Siquijor Area Some Areas in Quezon Romblon Area Some Areas in W. Samar Zumarraga, Samar Area Siasi Island Area Limasawa, Leyte Area Some Areas in Sultan Kudarat Sulu Area Hikdop, Surigao del Norte Area Tawi-tawi Area Tablas Island Area Ticao Island Area	ALECO ANTECO AURELCO BANELCO BASELCO BATANELCO BATELEC II BILECO BISELCO CAGELCO CASELCO CELCO DANECO DASURECO DIELCO ILECO III ISELCO KAELECO LUBELCO MASELCO NORSAMELCO PROSIELCO QUEZELCO II ROMELCO SAMELCO I SAMELCO II SIASELCO SOLECO SUKELCO SULECO SURNECO TAWELCO TIELCO TISELCO
	System Configuration 						
5	None	None	1	None	1	Others	Romblon LGU
	System Configuration 						

Note: § - Categorization as of December 2011. Categorization may vary depending on the changes in the configuration of the system.