

Upgrading Energy Regulations for the Energy Regulatory Commission (ERC) of the Philippines

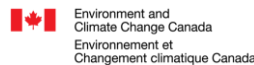
Focus Group Discussion Amendment to PSSG

02 Mar 2023

09:00-15:15 hours



The ETP brings together a range of partners focused on supporting the energy transition in Southeast Asia including:





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Presentation of Ricardo: Summary of Proposed Amendments

General changes

- 1) PSSG aligned to PDC, International Practice, IEC and IEEE
- 2) USAID proposed changes to PGC and PDC to ensure:
 - a) Alignment to IEEE 2800 – 2022
 - b) Alignment to IEEE 1547-2018

Specific proposed changes

- 1) Energy Storage including Inverter Based Energy Storage System added
- 2) Power Plant Classification and Reclassification
- 3) Removal of Generator Connection Conditions – refer to PDC
- 4) Power Quality and Measurement
- 5) Small Grid Planning Studies
- 6) Variable Renewable Energy and Operating Reserve Forecast
- 7) Generating Unit and Generating Plant Data
- 8) Generating Unit Capability Test requirements
- 9) Scheduling and Dispatch requirements

Inclusion of Conventional Energy Storage Systems (ESS) & Inverter Based Energy Storage Systems (IBESS)



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Energy Storage Systems alignment to DOE circular No. 2019-08-0012 and Draft ESS policy 20 Jan 2023 and split into:

- 1) Conventional synchronous energy storage which includes:
 - Pumped-Storage Hydropower,
 - Compressed Air Storage, and
 - future hydrogen storage
- 2) Inverter Based Energy Storage Systems (IBESS) which includes
 - Battery Energy Storage Systems (BESS)
 - Flywheel
 - Variable Speed Generators

Generation Plant classification



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The Generation Plant is proposed to be classified according to the PDC

Category	Installed Capacity and Characteristics
Large Conventional	Generation Plant with an aggregated Installed Capacity of 10 MW or more.
Large VRE	VRE Generation Plant with an aggregated Installed Capacity of 10 MW or more.
Medium	Conventional or VRE Generation Plant with Installed Capacity larger than 1 MW which do not qualify as Large Generating Plant.
Intermediate	Conventional or VRE Generation Plant with Installed Capacity larger than 100 kW and equal to or less than 1 MW; and Conventional Generation Plant with Installed Capacity lower or equal to 100 kW connected to MV networks.
Small	Generation Plant including Conventional ESS and IBESS with Installed Capacity larger than 10 kW and equal to or less than 100 kW connected to LV networks.
Micro	Generation Plant including Conventional ESS and IBESS with Installed Capacity lower or equal to 10 kW connected to LV networks.
Conventional Energy Storage Systems (ESS)	Generation Plant with the capability to store Energy and use electrical Energy to charge and discharge the stored Energy.
Inverter Based Energy Storage System (IBESS)	Inverter Based Energy Storage System with Installed Capacity larger than 100 kW.

It is proposed that the following reclassification is performed:

- 1) Medium Conventional / VRE Power Plants which are greater than 10% of the maximum Demand of the Small Grid, at the time of applying to connect, shall meet the requirements for Large Conventional / VRE Generating Plants
- 2) Intermediate Conventional and VRE Power Plants which are greater than 10% of the maximum Demand of the Small Grid, at the time of applying to connect, shall meet the requirements for Large Conventional / VRE Generating Plants.
- 3) Small and Micro Conventional and VRE Power Plants which are greater than 10% of the maximum Demand of the Small Grid, at the time of applying to connect, shall meet the requirements for Large Conventional / VRE Generating Plants.
- 4) Conventional Energy Storage Systems which are greater than 10% of the maximum Demand of the Small Grid, at the time of applying to connect, shall meet the requirements for Large Conventional / VRE Generating Plants and the requirements for Large Embedded Conventional Energy Storage Systems.
- 5) Inverter Based Energy Storage Systems less 100 kW but which are greater than 5% of the maximum Demand of the Small Grid, at the time of applying to connect, shall meet the requirements for PDC Chapter 4.11 Embedded Inverter Based Energy Storage Systems

Generator Connection Conditions



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Generator connection conditions in the PDC are proposed to be in the PDC and not duplicated in PSSG, paragraphs deleted are:

- ~~4.3.2 — Generating Unit Power Output~~
- ~~4.3.3 — Frequency Withstand Capability~~
- ~~4.3.4 — Unbalance Loading Withstand Capability~~
- ~~4.3.5 — Speed Governing System~~
- ~~4.3.6 — Excitation Control System~~
- ~~4.3.9 — Protection Arrangements~~

Power Quality and Power Measurement

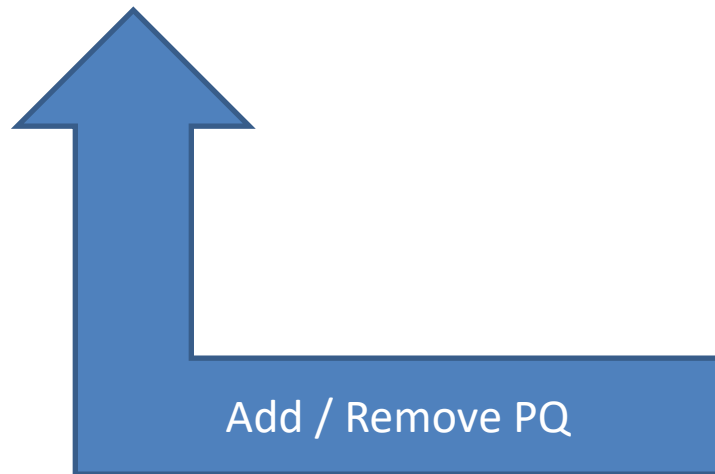


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Proposed updates to power quality based on IEC 61000 Series and IEEE 1547-2018

- 1) Harmonics
- 2) Flicker severity
- 3) Rapid Voltage changes
- 4) Voltage dips and swells



PDC proposed changes for power quality

Proposed updates to power quality based on IEC 61000 Series and IEEE 1547-2018

- 1) Power Quality Instrumentation, assessment period, retained values and exclusions
- 2) Harmonics
- 3) Flicker severity
- 4) Rapid Voltage changes
- 5) Voltage dips and swells
- 6) Proposed enter into service or return to service when the frequency is in the range 59.4 Hz to 60.3 Hz and voltage is in the range 0.9 p.u. to 1.05 p.u.
- 7) DC current injection limitations
- 8) Protection from electromagnetic interference (EMI)
- 9) Voltage Phase Angle Changes Ride-Through
- 10) Exemption for Embedded Generating Units for emergency systems

Proposed additions to Small Grid Planning Studies to be Conducted:

- 1) The Small Grid planning studies shall be conducted to ensure there is sufficient operating reserve in the Small Grid to mitigate the variability and uncertainty for the total VRE Generators in the Small Grid.
- 2) The Small Grid planning studies shall be conducted to ensure there is sufficient inertia and fast frequency control to ensure the rate of change of frequency for credible contingencies is less than 1 Hz/s measured over a rolling average of 500 ms.

Proposed additions to Variable Renewable Energy and Operating Reserve Forecast

- 1) Large VRE Generators shall provide the Small Grid Owner with its Monthly Energy and the uncertainty of the forecast
- 2) Large VRE Generators shall provide the Small Grid Owner typical second to second variability forecasts for each month at each Connection Point for the five (5) succeeding years
- 3) The Small Grid Owner shall estimate the Monthly Energy and the uncertainty for the total medium, small and micro VRE Generators in the Small Grid.
- 4) The Small Grid Owner shall estimate the second-to-second variability forecasts for each month for the total medium, small and micro VRE Generators in the Small Grid.

Proposed additions to Generating Unit and Generating Plant Data

- 1) The information requirements in original text are for Large Conventional Generating Units except for Transformer, auxiliary power and performance data.
- 2) Large VRE and ESS information requirements added from PDC

Generating Unit Capability Tests



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Proposed to align Generating Unit Capability Test requirements to PDC

- 1) Test Requirements for Large and Medium Generators
- 2) Tests to be Performed for Large and Medium Generators
- 3) Test Requirements for Intermediate, Small and Micro Generating Units

Proposed changes to Scheduling and Dispatch requirements are:

- 1) Responsibilities of **Large** Generators
- 2) The System Operator shall ensure there is sufficient operating reserve in the Small Grid to mitigate the variability and uncertainty for the total VRE Generators in the Small Grid.
- 3) The System Operator shall ensure there is sufficient inertia and fast frequency control to ensure the rate of change of frequency for credible contingencies is less than 1 Hz/s measured over a rolling average of 500 ms.
- 4) 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 Operating Reserve requirements to mitigate Generator, VRE and demand variability;**
 - e) **Small Grid inertia requirements;**
 - f) Small Grid congestion problems; and
 - g) System Loss.



Thank You

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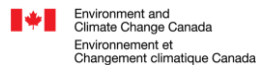
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The ETP brings together a range of partners focused on supporting the energy transition in Southeast Asia including:



1) Capability test

- **To be included in the PSGG**

2) MGSP – category 5 requirement not covered in PSGG

3) DER to be integrated in the PSGG

4) Harmonisation of generator size – PSGG and MGSP (conflict with Microgrid Act)

5) Scope of PSGG

- **To be developed as separate guideline/code for off-grid systems**
- **Only includes transmission and not distribution**
- **Minimum technical performance and services for microgrids will be separate**

6) Role of system operator

- **To be aligned with DOE circular – 2021-11-0039**

7) Operating reserves for small grids

- **reserve requirement for small grids needs to be studied – requirements are significant**

8) Classification of ESS categories

- **To be aligned with draft DOE circular**

9) Interconnection of off-grid to grid

- **Impact on the PSA for incoming IPPs**

10) Summary of codes

- **Stand alone small grid code**
- **Stand alone microgrid rules**

11) Include in the definition: Connection Asset/Connection Facilities/ Established Ownership

- **Recommended Connection Scheme to be adopted by Small Grid User**