Single Buyer

Power System Study (PSS) for Transmission Connected Generator

by TNB Transmission Planning Department

NEDA Workshop for PPA/SLA, Expired PPA/SLA & Large Merchant Generators on 9 May 2017

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Power System Study (PSS) is to be carried out by participants at own cost

- **Three main objectives of PSS**
  i. To assess the impact to the grid system due to power injection from Generator
  ii. Impact to the Generator due to disturbance in the grid system
  iii. To identify mitigation options to ensure compliance

- PSS results will be used to consider **whether grid connection is allowed**

- **Scope of the PSS includes**
  - Steady state analysis - Power flow
    - To identify any violations on thermal limits of transmission elements
    - To ensure voltage are within limits
  - Fault Analysis – to ensure no equipment exceeds limits due to addition of Generator
  - Transient Analysis
    - Ability of Generator to remain connected to the grid system due to disturbance in the grid
  - Identify mitigation options for compliance to MGC
    - All associated cost related to mitigation is to be borne by the Generator

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Steps leading to PSS

Step 1	Generator appoint Consultant for PSS
Step 2	Generator formally inform Grid Owner (GO) on the appointment of Consultant • To append company /consultant profile and team for PSS • Past experience with regard to the PSS
Step 3	NDA between GO and Consultant for grid data exchange for PSS
Step 4	Consultant perform PSS (refer to Guideline) • Inception report to be submitted and agreed upon prior to proceeding with PSS
Step 5	Consultant present PSS findings to Approval Committee
Step 6	Grid Owner issue letter to Generator

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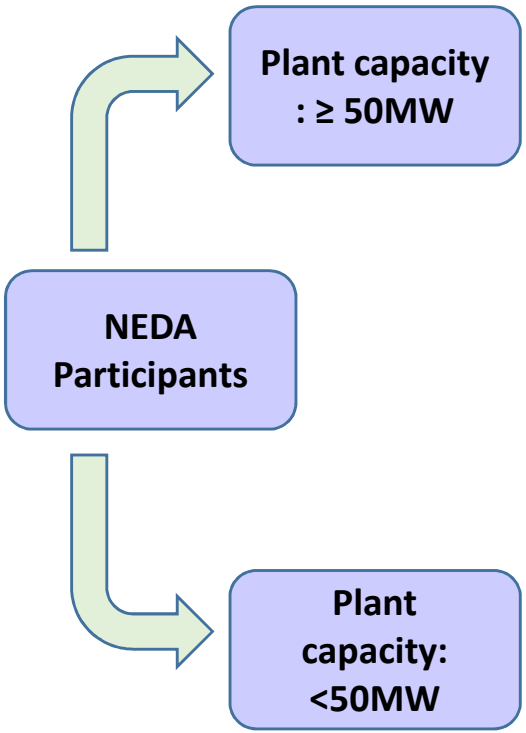
Scopes of PSS



STEADY-STATE ANALYSIS

i. Power flow study
ii. Voltage assessment
iii. Short-circuit analysis
iv. Contingencies analysis (N-1, N-2)

TRANSIENT ANALYSIS

i. Category A - No contingencies
ii. Category B – Event resulting in the loss of a single element
iii. Category C – Event resulting in the loss of two / multiple elements
iv. Critical Fault Clearing Time

STEADY-STATE ANALYSIS

i. Power flow study
ii. Voltage assessment
iii. Short-circuit analysis
iv. Contingencies analysis (N-1, N-2)

Notes: All scopes are to meet with related criteria as stated in MGC / TSRS

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NEDA Participants are to submit data and simulation models

- **Stage 1 – during PSS**
  - Single line diagrams related to the grid connection with associated ratings
  - Main parameters/data of generators
    - Number of installed generators
    - Generator ratings (MVA, impedances etc)
  - Intended maximum capacity in NEDA participation

- **Stage 2 – if grid connection is allowed/approved**
  - All of the data in stage 1
  - Simulation models of each generator (with associated parameters)
    - Models will be used for planning studies (operation & long term)