Central Electricity Authority

CEA (Standards for Grid Connectivity) Regulations

Central Electricity Authority (Technical Standards for Grid Connectivity), 2007

regulations need amendments to accommodate Renewables both at above and below 33 kV level

Application

These regulations apply to

- **The Requester,** (entity seeking grid connectivity)
- **The user** (entity already connected to grid)
- **CTU**
- **STU**

Objectives

- Objectives of changes proposed are to include the requirements of grid connectivity of the renewable energy resources seeking grid connectivity at 33kv and above as well as below 33kV level

Proposed Major Changes In The Existing Regulations For Grid Connectivity Standards

- Part – II of the Schedule to be changed to include generation from renewable energy sources with separate Para on wind generators and generator with inverter. (above 33 kV)
- For Distributed generation separate regulation has to be made because of its separate technical requirement (below 33 kV)

General connectivity standards

- The units shall be capable of supplying dynamically varying reactive power support so as to maintain power factor within the limits of 0.95 lagging to 0.95 leading.
- The units shall be capable of operating in the frequency range of 47.5 Hz to 52 Hz and shall be capable of delivering rated output in the frequency range of 49.5 Hz to 50.5 Hz.

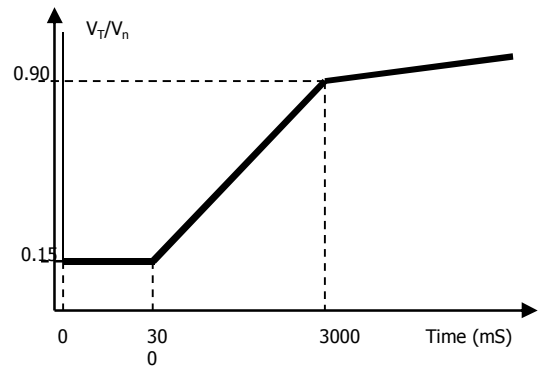
- The DC injection by the generator to the grid shall not be more than 0.5% of full rated output at the interconnection point.

Synchronization

- Every time the generating facility is synchronized to the Electricity System, it shall not-
  - cause voltage fluctuation greater than ± 5% at the point of connection and
  - Introduce objectionable flicker in the electricity system.

Voltage ride through

- All wind farms connected at 66 kV and above shall remain connected to the grid when voltage at the interconnection point on any or all phases dips to the levels depicted by the thick lines in the following curve:



Where

- VT/Vn is the ratio of the actual voltage to the nominal system voltage at the interconnection

- Wind generating stations connected at 66 kV and above shall have facility to control active power injection based on the directions of load despatch centres.

Grid Connectivity Standards applicable to Distributed Generation Resources (DGR):

- This regulation is for the DGRs being connected to below 33 kV level.

General connectivity conditions:

- The applicant shall make a formal request to the appropriate licensee for connection.
- The applicant shall be responsible for the planning, design, construction, reliability, protection and safe operation of its own equipment.
- Metering shall be as per prevailing CEA regulations for metering.

- For DGRs already connected to the electricity system on the date of commencement of these regulations, the generating company and the licensee of the electricity system shall mutually decide the measures which can be taken to meet the technical standards specified in these regulations

Data communication

- The applicant and user shall furnish data as prescribed by the appropriate licensee in a non-discriminatory manner.
- The applicant and user shall provide necessary facilities for communication and storage of data and parameters as may be stipulated by the appropriate licensee in a non-discriminatory manner.

- The appropriate licensee shall carry out the inter-connection study to determine point of inter-connection, interconnection facilities, modifications required on the existing electricity system, the maximum net capacity of the DGR at a particular location, imbalance in the power flows that DGR may cause, likely impact on the quality of service to consumers.

Coordination with Licensee

- The applicant and user shall coordinate with the appropriate licensee on the issues including but not limited to protection, safety, and metering.
- The Applicant shall comply with the Central Electricity Authority (Measures Relating to Safety and Electricity Supply) Regulations, 2010.
- Installation, operation and maintenance of the equipment by the Applicant shall conform to the relevant regulations specified by CEA.

Specific standards (for DGRs):

- Provisioning of Over and under voltage trip functions if voltage reaches above 110% or below 80% respectively with a clearing time of 2 seconds
- Provisioning of Over and under frequency trip functions, if frequency reaches 50.2 Hz and below 47.5 Hz with a clearing time of 0.2 seconds
- Harmonic current injections from a generating station shall not exceed the limits specified in IEEE 519.
- The DC current injection not to exceed 0.5% of the full rated output.
- Not to introduce flicker beyond the limits specified in IEC 61000

- Provisioning of a voltage and frequency sensing and time-delay function to prevent the DGR from energizing a de-energized circuit and to prevent the DGR from reconnecting with electricity system unless system voltage and frequency is within the prescribed limits and are stable for at least 60 seconds

Anti-islanding

- Provisions to prevent the DGR from contributing to the formation of an Unintended Island, and cease to energize the electricity system within two seconds of the formation of an Unintended Island.

Back-feed

- In case any fault is detected by the electricity system in the circuit to which DGR is connected, the DGR shall cease to energize the circuit.

Synchronization issues

- Every distributed generating resource will be equipped with automatic synchronisation device.
- Every time the generating station is synchronised to the electricity system, it shall not cause voltage fluctuation greater than ± 5% at the point of connection

THANK YOU