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Sent: Wed, 19 Oct 2022 13:03:32 +0530 (IST)
Subject: Comments/Suggestions on Draft Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2022

Dear Sir / Madam,

This has reference to CERC's public notice no. L-1/265/2022/CERC dated 29/09/2022, inviting suggestions / comments on Draft Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2022.

siemens Energy is a leading OEM and Solution Provider in Energy Transmission business - particularly in the areas of High Voltage Direct Current (HVDC) Systems, Flexible AC Systems (FACTS) and Energy Storage Systems. We have reviewed the Draft Regulations from the OEM perspective, and accordingly provided our comments in the Excel sheet attached for your kind consideration.

In case of any queries, please feel free to contact us.

Thanking you,

With best regards,
Niket Jain
HVDC Sales & Tender Management

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S. No.	Page No.	Clause No.	Current Clause	Amendment	Remarks
1	28	5.4		Please add: (c) Ancillary support capability of the transmission asset e.g. dynamic reactive power support & black start capability of HVDC VSC, frequency control capability of HVDC, power oscillation damping capability of HVDC / SVC / STATCOM, synthetic inertia, , etc.	In order to ensure optimum and fair comparison of different transmission options during planning, it is necessary that CTU and STU monetize the ancillary support capability of the different technologies e.g. HVDC, STATCOM, etc. Alternatively, suitable compensation / incentive may be provided to the transmission asset owner for providing these ancillary services.
2	48	24.7(b)		Please add: (v) DC Line Fault Clearing and Recovery Sequence test, in cases where DC transmission medium involves overhead line.	
3	65	30.4(b)		Please add: HVDC stations based on Voltage Sourced Converter (VSC) which offer black start capability to support grid restoration shall also be included.	
4	65	30.9		Please add: Special attention shall be given when renewable energy generators are connected radially to the grid through HVDC e.g. offshore wind park connected via HVDC to the main onshore grid, or large solar PV park connected directly to HVDC, etc. as the minimum inertia mentioned in the para above would not apply at the point of coupling of the renewable energy generators.	
5	67	30.10 Table 4	Source: Wind/Solar/Renewable Hybrid Energy Project Primary Response up to: 10% of the maximum Alternating Current active power capacity in case of frequency deviations in excess of 0.3 Hz	*<CERC to suitably define the requirement of synthetic intertia for RE generators>*	As the penetration of power electronics based RE generation (non-synchronous) will be significantly increased in the Indian Grid accompanied by the likely closure / ramping down of synchronous generators, it would be necessary to specify stringent requirements to address the frequency instability issue e.g. .....MWseconds of synthetic inertia for wind parks, etc. Globally, other Utilities / Regulators have started to specify such synthetic inertia requirements (with or without incentives) e.g. EirGrid, HydroQuebec, ONS etc. (please refer CIGRE TB 851).
6	159	Annexure 4		*<CERC to suitably define the incentives for providing* ***fast acting dynamic reactive power compensation capability*** *in case of faults / contingencies on per event basis e.g. Rs. ….. per kVAR per event.>*	This Annexure only considers incentive / penalty for steady state reactive power. It is also necessary to provide incentives for dynamic reactive power support which is required in case of faults / contingencies to maintain grid stability. Since these are fast acting and short duration VAr exchanges with the grid, the compensation should be based on amount of VAr support provided for each event.
7	173	3	Turbine Power Curve	Please amend: ~~**Turbine**~~ Power Curve	Please note that turbine is not applicable for solar PV applications.

8	1	**General Comments**	- Grid code may define the "minimum recovery time" of voltage during fault condition along with "V/Vn (in %) - time (in ms)" curve where V/Vn is the ratio of the actual voltage on one or more phases to the nominal voltage.
			Considering extensive injection of RE generation, the code may specify the time characteristics (i.e. active power response w.r.t time) of Active Power Primary Frequency response for Power Generating Modules without inertia. The code should also define the acceptable delay in initial Active Power Frequency response for Power Generating Modules without inertia.
			# The code may also specify the following regarding "Non-Synchronous Generating Unit" and "Invertor based generating unit":
			- Transient voltage control parameter like commencing operation in Xms and achieve 90% of MXAr in Yms and this response should be linearly in proportion to magnitude of step change
			- To demonstrate the Voltage Controller model for the Generating Unit, operating at Rated MW and unity power factor at the connection point to a X% (e.g. 2%) step increase in the voltage reference. The simulation study shall show the terminal voltage, Active Power, Reactive Power & output signal etc. as appropriate.
			It must be capable of maintaining zero transfer of Reactive Power at the Grid PCC at all Active Power output levels under steady state voltage conditions.
			- the tolerance on Reactive Power transfer to and from Grid PCC expressed in MVAr shall be no greater than X% (e.g. 5%) of the Rated MW
			- The max. acceptable impact on "short circuit ratio (SCR)" after addition of "Non-Synchronous Generating Unit". The code may also specify the inertia to be added in case of addition of such generating unit.
			Any requirement To withstand (without tripping) the negative phase sequence loading incurred during fault or Any other Grid condition