

From: Manas Kundu<<mailto:manas.kundu@copperalliance.org>>
Sent: Monday, 25 July 2022 15:52

Dear Sir/s,

I received information from my colleague that IEGC is under modification and discussions are on.

I felt it prudent to bring to your notice in case you have not kept tab on the same. Please have look and maybe consider giving your suggestions to CERC for incorporating provisions those are addressing PQ in effective manner.

Warm Regards,
Manas

From: Hemanth Kumar <hemanth.kumar@copperalliance.org>
Sent: 05 July 2022 18:37
To: Manas Kundu <manas.kundu@copperalliance.org>
Subject: Fwd: Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2022- Synopsis and Siemens Inputs

Dear Manas,

As discussed, please find attached the IEGC by CERC.

Regards
Hemanth

IEEMA -Copper alliance

The Indian Electricity Grid Code (IEGC) is a regulation made by the Central Commission in exercise of powers under clause (h) of subsection (1) of Section 79 read with clause (g) of sub-section (2) of Section 178 of the Act. The IEGC also lays down the rules, guidelines and standards to be followed by various persons and participants in the system to plan, develop, maintain and operate the power system, in the most secure, reliable, economic and efficient manner, while facilitating healthy competition in the generation and supply of electricity.

CERC has Shared Drafted fresh regulatory guidelines named **“Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2022”** for IEEMA members’ input. Chapter-wise highlights of the draft regulation are as follows:

CHAPTER 2

Resource planning code

This chapter refers to the Resource planning code.

The integrated resource planning shall include:

- (a) Demand to forecast as detailed in sub-regulation of this Regulation;
- (b) Generation resource adequacy planning to meet the projected demand as detailed in sub-regulation of this Regulation; and
- (c) Transmission resource planning as detailed in sub-regulation of this Regulation

CHAPTER 3

CONNECTION CODE

- This chapter covers the technical and design criteria for connectivity, procedure, and requirements for physical connection and integration of grid elements.
- The connectivity to the ISTS shall be granted by CTU in accordance with the GNA Regulations.
- Users seeking to get connected to the ISTS for the first time through new or modified power system elements shall fulfill the requirements and follow the procedures specified under this Code prior to obtaining the permission of the NLDC or RLDC or SLDC, as the case may be.. Transmission licensees including deemed transmission licensees or cross-border entities shall comply with the technical requirements specified under this Connection Code prior to being allowed by NLDC or RLDC or SLDC to energize a new or modified power system element.
- After granting of connectivity and prior to the trial run for declaration of commercial operation, the tests as specified under this Code shall be performed.

CHAPTER 4

PROTECTION CODE

This chapter covers the protection protocol, protection settings, and protection audit plan of electrical systems.

There shall be a uniform protection protocol for the users of the grid:

- (a) For proper co-ordination of protection system in order to isolate the faulty equipment and avoid the unintended operation of protection system;
- (b) to have a repository of the protection system, settings, and events at the regional level;
- (c) specifying timelines for submission of data;
- (d) to ensure healthiness of recording equipment including time synchronization; and
- (e) to provide for periodic audit of protection system.

CHAPTER 5

COMMISSIONING AND COMMERCIAL OPERATION CODE

This chapter covers aspects related to

- (i) Drawl of startup power from and injection of infirm power into the grid,
- (ii) Trial run operation
- (iii) Documents and tests required to be furnished before declaration of COD,
- (iv) Requirements for declaration of COD.

CHAPTER 6

OPERATING CODE

All entities such as NLDC, RLDCs, SLDCs, CTU, STUs, RPCs, power exchanges, QCAs, SNAs, licensees, generating stations, and other grid-connected entities shall at all times function in coordination to ensure stability and resilience of the grid and achieve maximum economy and efficiency in the operation of power system.

Covers Mostly all operational topics below:

- (i) System security
- (ii) Frequency control and reserves
- (iii) Operational planning
- (iv) Outage planning
- (v) Operational planning study
- (vi) System restoration
- (vii) Real-time operation
- (viii) Demand and load management

- (ix) Post-dispatch analysis
- (x) Periodic reports
- (xi) Reactive power management
- (xii) Field testing for model validation
- (xiii)** Capacity building and certification

CHAPTER 7

SCHEDULING AND DESPATCH CODE

This chapter deals with the procedure for scheduling injection and drawal of power by the regional entities and the modalities for exchange of information including scheduling for intra-state and cross-border entities transacting power through Inter-State Transmission System. This chapter also covers provisions in respect of control area jurisdiction

CHAPTER 8

CYBER SECURITY

This chapter deals with measures to be taken to safeguard the national grid from spyware, malware, cyber-attacks, network hacking procedure for security audits from time to time, up-gradation of system requirements, and keeping abreast of the latest developments in the area of cyber-attacks and cyber security requirements.

All users, NLDC, RLDCs, SLDCs, CTU and STUs shall have in place, a cyber-security framework in accordance with the Information Technology Act, 2000; CEA (Technical Standards for Connectivity) Regulations, 2007; CEA (Cyber Security in Power Sector) Guidelines, 2021 and any such regulations issued from time to time, by an appropriate authority, so as to support reliable operation of the grid.

The Grid Code apart from the provisions relating to the role of various statutory bodies and organizations and their linkages, contain extensive provisions pertaining to :

- (a) reliability and adequacy of resources;
- (b) technical and design criteria for connectivity to the grid including integration of new elements, trial operation, and declaration of commercial operation of generating stations and inter-state transmission systems;
- (c) protection setting and performance monitoring of the protection systems including protection audit;
- (d) operational requirements and technical capabilities for secure and reliable grid operation including load generation balance, outage planning and system operation;
- (e) unit commitment, scheduling and dispatch criteria for physical delivery of electricity;
- (f) integration of renewables;
- (g) ancillary services and reserves;
- (g) cyber security etc.

Page No.	Points	Description	Justification	Recommendation
	1	Can we specify temperature dependency on reactive power capability?	P-Q curve of inverters are tempature dependent. Temperature variation will impact active power and reactive power output of the inverters.	To incorporate temperature dependent P-Q capability.
	2	HVRT requirement-can the quantum of reactive power to be absorbed at POI be defined?	As per sub-clause (7) in CEA 2019 guidelines "The generating station connected to the grid, shall remain connected to the grid when voltage at the interconnection point, on any or all phases (symmetrical or asymmetrical overvoltage conditions) rises above the specified values". However, there is no mention of reactive power support to be provided at POI.	It is recommended to incorporate the quantum of reactive power to be absorbed at POI in the HVRT table mentioning Over-voltage and Minimum time duration to remain connected.
	3	LVRT requirement for 0.85 voltage case- Can the quantum of reactive power to be injected at POI be defined ?	If the grid voltage drops to 0.85 pu at POI but inverter voltage is such that LVRT is not triggered. In that case, the reactive power injection may not be observed at POI.	It is recommended to incorporate the quantum of reactive power to be injected at POI for the borderline cases like 0.85 pu.
	4	Grid Forming Technologies- can the provision to provide instantaneous active power and reactive power support be elaborated?		
59	-7	LVRT and HVRT Requirements Can the quantum of reactive power to be injected at POI be defined ?	As mentioned in the justification for LVRT and HVRT requirement from page-47	As mentioned in the recommendations for LVRT and HVRT requirement from page-47
68	^	We understand that BESS provides active power response either for an individual generating station or through a common pooling station. On similar lines, is this applicable for reactive power support also?	Since BESS system is equipped with STATCOM functionality which can provide voltage control, the system could be used for dual purpose- Frequency and Voltage control.	Statement to be modified as follows: "Wind/Solar/Hybrid plant commissioned after the date as specified in CEA Technical Standards for Connectivity shall have the option to provide primary active power and reactive power response individually through BESS or through a common BESS installed at its pooling station"
68	(h)	105 to 110% minimum- We observe that an additional BESS system can meet this requirement.	Additional requirements to be fulfilled to incorporate charging and discharging simulation scenarios for BESS.	
97	(2) and (3)	Reactive power- Instead of all generating stations providing individual reactive power support, can we include provision of single STATCOM/BESS to provide common reactive power support for multiple generating stations connected to a common pooling bus?	STATCOM/BESS requirements can be a pre-requisite provision when multiple generating stations are/will be connected to a common pooling bus (forming a park).	
101	Table	Non synchronous Generator (Solar/Wind) Field testing- Can the procedure for carrying out Fault Ride Through and Frequency Response be elaborated?	Presently, there is no standard operating procedure to conduct these tests when the generating station is in live condition.	All procedures for field test validation may be standardized for all developers.
159	1	Payment of reactive power - can we specify the conditions of control mode (Q control/V control/PF control)?	If plant is operating in fixed power factor mode, and also maintaining within ± 0.95 pf limits, the generating station would be expecting not to be penalized for grid side voltage variation.	
	3	We observe that BESS will provide active power and reactive power support for auxiliary/substation loads during lean periods/night time.	As mentioned in the justification for BESS requirements from page-68.	