APP comments on Draft CERC (Indian Electricity Grid Code) Regulations, 2022

Sl. No.	Section	Provision as per Draft IEGC Regulations 2022	Observations/ Comments
1.	Chapter 3 Clause 10	Technical Requirements *"(1) NLDC or RLDC, as the case may be, in consultation with CTU shall carry out a joint system study six (6) months before the expected date of first energization of a new power system element to identify operational constraints, if any. The connectivity grantee, transmission licensee and SLDC/STU shall furnish all technical data including that of its embedded generators and other elements to the CTU and NLDC or RLDC, as the case may be, for necessary technical studies."*	The following may be added: **"The system study should comprise load flow, short circuit and stability analysis. Power system studies comprising, transient over voltage analysis and insulation coordination should also be carried out."** (The above is in view of the recent problems faced after interconnection of 99 MW Singholi-Bhatwari HEP at Khandukhal S/S and flow of power of 99 MW Singholi-Bhatwari HEP through 400 kV lines between Vishnuprayag HEP of JPVL and Muzaffarnagar)
2.	Chapter 4 15(1)	Protection Audit Plan: *"(1) All users shall conduct internal audit of their protection systems annually, and any*	**It is suggested that this activity be done once in three years.** **Further, in the case of Users (IPPs) which are connected**

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		shortcomings identified shall be rectified and informed to their respective RPC."	**with CTU (Transmission utility), both the IPPs and Transmission Utility should conduct internal audit of their respective protection systems for BAY & LINE annually and share their studies with each other for co-ordination purposes.** This would help to create a more reliable 400kv grid systems and correct deficiencies, if any, with mutual consent, so that no relay coordination should mismatch. Essentially, audit in isolation will not be very effective.
3.	Chapter 4 15(2)	Protection Audit Plan: *"(2) All users shall also conduct third party protection audit of each sub-station at 220 kV and above (132 kV and above in NER) once in five years or earlier as advised by the respective RPC."*	**It is suggested that third party protection audit may be considered only when the protection settings are modified or as advised by RPC.**
4.	Chapter 4	Users shall submit protection indices details to RPC on monthly basis covering Dependability	It is suggested that detailed protection indices based on reliability index, security index, dependability index may be

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	15(6)	Index, Security Index, and Reliability index with explanation for details less than unity. For Non-compliance, RPC may approach commission for remedial action.	carried out only for particular relays which are operated on real time basis as required by the system; OR be carried out on yearly basis for protection system elements which are connected to Grid directly.
5.	Chapter 4 16(2)	*"(2) For the operational SPS, RPCs shall perform regular dynamic studies and mock testing for reviewing SPS parameters & functions, at least once in a year."*	The commercial impact of the Mock test of SPS needs to be addressed. Planning of export schedule during mock test of SPS also needs to be covered in Grid Code. Commercial settlement of under injection due to mock test of SPS also needs to be addressed under this section.
6.	Chapter 4 17(2)	Recording Instruments: The disturbance recorders shall have time synchronization and a standard format for recording analogue and digital signals which shall be included in the guidelines issued by the respective RPCs.	1. The following sub-clause may be added in this section for adequate clarity: ***"Provision of disturbance and event recording may be provided by either of the following methods:*** ***i) Separate disturbance and event recorder*** ***ii) As in-built feature of recording the disturbances and events on central PC, which is used for parametrization***

Sl. No.	Section	Provision as per Draft IEGC Regulations 2022	Observations/ Comments
			of numerical relays. ***iii) As in-built feature of numerical relays to record disturbances and events."*** 2. While most of the signals can be standardized, a few of them may be application / product specific. This may be appropriately clarified.
7.	Chapter 5 22(3)	Trial Run of Wind/Solar/Storage/Hybrid Generating station: *"a)……. For the trial run, a declaration shall be given by the generating company that no panel has been replaced or added or taken out or design of the plant has been altered:* *Provided that:* *(i) The output below the corroborated performance level with the solar irradiation of*	MNRE in its advisory/clarification dated 05.11.2019 w.r.t DC capacity of Solar PV power plants, has advised that design and installation of solar capacity on the DC side should be left to the generator/developer. Also, as per law, the setting up of generation capacity is an unlicensed activity therefore any person is entitled to set up any capacity which he desires to set up. Further, there is no clarity on the methodology to decide the "corroborated performance level with the solar radiation of the day" and procedure to demonstrate the rated capacity.

Sl. No.	Section	Provision as per Draft IEGC Regulations 2022	Observations/ Comments
		the day shall call for repeat of the trial run: *(ii) If it is not possible to demonstrate the rated capacity of the plant due to insufficient solar radiation, COD may be declared immediately when sufficient solar irradiation is available after COD.*	Solar plant has different AC and DC rated capacity. Generation on AC side is dependent on the DC capacity, module alignment i.e. Fixed tilt/Single axis Tracker/Dual axis tracker, Angle of alignment, inverter type, shadow effect, soiling loss, terrain, cable type and losses, other weather parameters like wind, humidity, temperature, etc. **With so many variables affecting actual generation, it is suggested to delete the requirement of "corroborated performance level" or "to demonstrate the rated capacity".** This would avoid unnecessary delays in commissioning of green power projects and would promote generation from renewable power. **Further, since the concept of declaration as specified in the Draft Grid Code is in contravention with above mentioned MNRE advisory, it is requested to delete the requirement of declaration also at the time of trial run.**

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8.	Chapter 5 23(1)	Trial Run of Inter-State Transmission Line: *"Trial run of a transmission system or an element thereof shall mean successful energization of the transmission system or the element thereof at its nominal system voltage through interconnection with the grid for continuous twenty-four (24) hours flow of power and communication signal from the sending end to the receiving end and with requisite metering system, telemetry and protection system. "*	After completion of trial run, provision may be kept for permitting to keep the line charged for anti-theft measures, wherein no power would flow in the system.
9.	Chapter 5 24(2)(b)	Documents and Test Reports prior to Declaration of Commercial Operation: (2) Documents and Tests Required for Thermal (coal/lignite) Generating Stations: (b) The following tests shall be performed:	**For supercritical units, operation should be tested at a control load of 55% in order to ensure stability of the unit.** **Rationale:** For supercritical units, Benson load is normally in the range of 37 % to 47% of TMCR. At Benson load, Boiler is operating on transition phase. Normally the unit operation

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		(i) Operation at a control load of fifty (50) percent of MCR as per the CEA Technical Standards for Construction for a sustained period of four (4) hours.	in the range between 37% and 47% of TMCR is considered as unstable operation (Phase change from wet to dry mode and vice versa) and continuous unit operation in this load is to be avoided. This type of frequent phase change can lead to abnormal change in metal temperatures, water in separator, and severe hammering (separator drain lines). Continuous operation in this range leads to fluctuation in MS/HRH temperature, pressure and metal temperature even with slight change in coal quality and feed water flow.
10.	Chapter 5 24(2)(b)	Documents and Test Reports prior to Declaration of Commercial Operation: (2) Documents and Tests Required for Thermal (coal/lignite) Generating Stations: (b) The following tests shall be performed: ….. (ii) Ramp-up from fifty (50) percent of MCR to	1. Ramp up must be tested from 55% and not from 50% of MCR. 2. Ramp up may be demonstrated for a particular small range only, and not from 55% to 100% MCR. 3. This ramp up capability test should not be part of COD and the same can be demonstrated separately. Depending on the unit condition (equipment /coal quality), ramp rate should be allowed to be declared by the generator.

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		MCR at a ramp rate of at least one (1) percent of MCR per minute and sustained operation at MCR for one (1) hour.	4. Further, with bio-mass Co-firing mandate, ramp rate capability may need to be reviewed.
11.	Chapter 5 24(2)(b)	Documents and Test Reports prior to Declaration of Commercial Operation: (2) Documents and Tests Required for Thermal (coal/lignite) Generating Stations: (b) The following tests shall be performed: ….. (v) Primary response through injecting a frequency test signal with a step change of ± 0.1 Hz at 60%, 75% and 100% load.	Primary frequency response depends on OEM logic configuration and testing may be difficult if such testing provisions not provided by OEM. This should not be part of COD and the same can be demonstrated separately.
12.	Chapter 5 24(2)(b)	Documents and Test Reports prior to Declaration of Commercial Operation: (2) Documents and Tests Required for Thermal	This should not be part of COD and the same can be demonstrated separately.

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		(coal/lignite) Generating Stations: (b) The following tests shall be performed: (vi) Reactive power capability as per the generator capability curve as provided by OEM considering over-excitation and under-excitation limiter settings.	
13.	Chapter 5 24(5)	Documents and Tests Required for the Generating Stations based on wind and solar resources:	NLDC/RLDC may be requested to issue clear & detailed guidelines for tests to be conducted before commissioning. Some of the tests like frequency response, reactive power response, etc may not be practically feasible to be conducted physically at site. However, these could be demonstrated through simulation models. To avoid unnecessary delay in commissioning, it is requested to accept & consider the test reports on simulation basis or OEM certificates for commissioning. Actual test at plant level may be conducted in due course as per feasibility and

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			availability of testing equipments at site.
14.	Chapter 5 26(4) (a)	**Declaration by Generating Company** *"The generating station based on wind and solar resources, the ESS and the hybrid generating station shall submit a certificate signed by the authorized signatory not below the rank of CMD or CEO or MD to the concerned RLDC and to the Member Secretary of the concerned RPC before declaration of COD,……"*	It is general practice that the employee/individual authorized through Board Resolution signed/approved by Director & company secretary sign the documents/declaration or any other documents required on behalf of the company. CMD or CEO or MD may not be appointed or available for signing. **In view of above it is requested to delete the requirement of declaration to be signed by authorized signatory not below the rank of CMD or CEO or MD.**
15.	Chapter 6 30(1)	Frequency Control and Reserve: The National Reference Frequency shall be 50.000 Hz and shall be measured with a resolution of +/-0.001 Hz. The frequency data	Present energy meters have resolution of 0.01 Hz. Compensation for replacement of interface meters may be decided.

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		measured at every second shall be archived by RLDCs.	
16.	Chapter 6 30(10)(k)	Primary Control: The PRAS shall start immediately (within two seconds) when the frequency deviates beyond the dead band as specified in clause (i) of this Regulation and provide its full PRAS capacity obligation within 30 seconds and shall sustain up to five (5) minutes.	Full Response within 30 seconds is not achievable. Full PRAS capacity obligation may be considered within 45 to 60 seconds.
17.	Chapter 7 45(6)	Adherence to Schedule: *"Each regional entity shall regulate its generation or demand or both, as the case may be, so as to adhere to schedule of net injection into or net drawal from the inter-State*	Generation from Solar or Wind sources is infirm/intermittent in nature and impossible to schedule with 100% accuracy since it is dependent on local weather conditions. Further, under DSM regulation solar and wind generators are allowed to revise schedule once in 1.5 Hr slot i.e. 16 revision in a day.

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		transmission system."	In view of above constraints and unavailability of accurate weather predictions, Solar and wind generation are very likely to deviate from the schedule. Further, being "Must Run" plants, their generation cannot be curtailed. **Therefore, it is requested to exempt renewable generating plants from the clause 45 (6).**
18.	Chapter 7 45(9)	Ramping Rate to be Declared for Scheduling: *"(a) The regional entity generating station shall declare the ramping rate along with the declaration of day-ahead declared capacity in the following manner, which shall be accounted for in the preparation of generation schedules:* *(i) Coal or lignite fired plants shall declare a ramp up or ramp down rate of not less than 1% of ex-bus capacity corresponding to MCR on bar per minute;"*	The ramp rate can vary depending on the equipment condition and coal quality. The generator should be allowed to declare ramp rate accordingly.

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19.	Chapter 7 45(11)(b)	(11) Scheduling of renewable energy generating station by QCA *"(b) NLDC shall notify a procedure for aggregation of pooling stations for the purpose of combined scheduling and deviation settlement for wind or solar or renewable hybrid generating stations within six (6) months of notification of these regulations."*	Procedure for aggregation of pooling stations may have impact on Annexure-5 (Procedure specifying data, forecasting and scheduling for renewable energy generating stations (REGS) at Inter-state level) and the CERC (Deviation Settlement Mechanism and Related Matters) Regulation 2022. **It is therefore requested to issue procedure for aggregation of pooling stations along with the Grid Code as Annexure and also provide corresponding amendments in the DSM Regulation 2022.**
20.	Chapter -7 45(12)	**Minimum turndown level for thermal generating stations** *"The minimum turndown level for operation in respect of a unit of a regional entity thermal generating station shall be 55% of MCR of the*	For super critical units, operation of units at minimum turndown level of 55% or lower may lead to the following technical issues: a. For supercritical units, Benson load is normally in the range of 37 % to 47% of TMCR. At Benson load, Boiler is operating on transition phase. Normally the unit operation in the range between 37% and 47% of TMCR is

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		said unit: *Provided that the Commission may fix through an order a different minimum turndown level of operation in respect of specific unit(s) of a regional entity thermal* *generating station"*	considered as unstable operation (Phase change from wet to dry mode and vice versa) and continuous unit operation in this load is to be avoided. This type of frequent phase change can lead to abnormal change in metal temperatures, water in separator, and severe hammering (separator drain lines). Continuous operation in this range leads to fluctuation in MS/HRH temperature, pressure and metal temperature even with slight change in coal quality and feed water flow. Control of MS/HRH temperature at lower load is difficult and may lead to frequent fluctuation in spray. The possibility exists that HRH temperature may not be achieved @ rated value b. Continuous low load operation may result poor heat transfer due to fouling because of non-operation of soot blowers. As per OEM suggestion, Soot blowing should be done @ boiler load>70%. Soot blowing at low load would affect flame stability and unit tripping possibility

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			exists. Any mill tripping at load below 55% would affect flame stability which increase probability of unsafe operation along with Unit tripping. It also leads unit operation into unstable transition operation zone. PA / FD fan systems run at minimum loading below 55% load, a situation could potentially lead to stalling, thereby unstable operations of the PA / FD fan systems. c. Metallurgical effects at load below @55% - Under these conditions, thermal fatigue rather than creep will be predominant mode of failure. This will result in cracks at tube-fin attachments in waterwalls and at header to stub weld joints. The thermal fluctuations will also accelerate the rate of dislodging of magnetite layer at lower thickness, hence the problem of exfoliation will increase in both Final superheater and final reheater sections. The increase in rate of boiler tube failures will directly reduce

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			plant reliability and availability. The present alloys of SA213T91 and SA213TP347H are more susceptible for exfoliation / oxide formation at low load and frequent load fluctuations. This will require immediate replacement by higher grade austenitics like S30432(Super 304H) and SA213TP310HCbN (HR3C) which will drastically increase the CAPEX. **The Commission is requested to consider the above technical submissions while finalizing the norms for Minimum Turndown level.**
21.	Chapter -7 45(12)	"Provided also that the regional entity thermal generating stations shall be compensated for generation below the normative level either as per the mechanism in the Tariff Regulations or in terms of the contract entered into by such generating station with the beneficiaries or buyers, as the case	The 4th Amendment to the IEGC Regulations in 2016 had provided a mechanism for compensation for degradation of Heat Rate, Aux Consumption and Secondary Fuel Oil Consumption due to part load operation and multiple start/stop of units, which were uniformly made applicable to PPAs executed under both Section-62 and Section-63 of the Electricity Act 2003, without any discrimination and demur.

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		may be."	Even the Report of the Expert Group constituted in 2020 under Shri Rakesh Nath had clearly stated that the compensation mechanism **"shall be applicable to all regional entity generating stations/ISGS whose tariff is determined under Section 62 or under Section 63".** Shifting the compensation provisions from the Grid Code to the Tariff Regulations will give rise to many potential adverse fallout effects: a. Regulatory vacuum and delays till CERC and SERCs incorporate the compensatory mechanism for partial load operations and multiple start/stops in their Tariff Regulations. b. In the interregnum, States will immediately stop paying any compensation claims. This will lead to a buildup of unpaid amounts which would need to be paid with carrying charges, therefore aggravating the stress in the sector.

Sl. No.	Section	Provision as per Draft IEGC Regulations 2022	Observations/ Comments
			c. Discriminatory in nature as it creates unwarranted differentiation in treatment between projects/PPAs under Section 62 and Section 63. d. Risk and uncertainty in case the SERCs do not follow the mechanism as laid out by CERC since the same is not binding on them and there may be different Regulations made by different SERCs. One cannot rule out a situation where different SERCs come up with different formulations creating inconsistencies between the CERC and SERC Regulations. **In view of the above, it is earnestly requested that compensation mechanism due to operation of a Thermal Generating Station below normative level may be applied uniformly on all the beneficiaries irrespective whether the PPAs are executed under Section-62 or Section-63 of the Electricity Act 2003 as already mandated in the earlier Grid Code based on CEA recommendations and seconded**

Sl. No.	Section	Provision as per Draft IEGC Regulations 2022	Observations/ Comments
			by the Shri Rakesh Nath Committee Report. **For this reason, the existing provisions with respect to compensation mechanism towards Part Load Operations of a Thermal Generating Stations as introduced vide 4th Amendment to CERC IEGC Regulations dated 06.04.2016 and subsequent detailed procedure approved by this Hon'ble Commission vide Order dated 05.05.2017 may be retained in the final CERC IEGC Regulations 2022**. **A detailed note on the above issues is enclosed with these comments.**
22.	Chapter -7 45(12)	"Provided also that the regional entity thermal generating stations shall be compensated for generation below the normative level either as per the mechanism in the Tariff Regulations or in terms of the contract entered into by such generating station	The current CERC norms do not compensate fully against the degradation in efficiency parameters due to part load operation on continuous basis. As per the present mechanism, the deviation from normative loading is calculated on monthly basis and cumulative up to last month of the financial year. Thus, the losses incurring on

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Accordingly, the losses need to be calculated based on each time block and the monthly figure shall be the sum of the losses incurred due to running below 85% on each day cumulative of each time block wise. This total loss needs to be compensated.

Further, since thermal power plants are designed for maximum efficiency at full load only, even at 85% loading, the machines actually run at higher heat rate and Aux Power Consumption as illustrated in the table below:

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<tr><th>Sl no</th><th>Unit loading</th><th>Increase in SHR (super critical units) – CERC norms</th><th>Increase in SHR (super critical units) – Actual likely degradation (%) as per different OEMs</th></tr>
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<tr><td>1</td><td>85-100</td><td>Nil</td><td>1.4 to 1.7</td></tr>
<tr><td>2</td><td>75-84.99</td><td>1.25</td><td>2.5 to 3.1</td></tr>
<tr><td>3</td><td>65-74.99</td><td>2</td><td>3.8 to 4.3</td></tr>
<tr><td>4</td><td>55-64.99</td><td>3</td><td>6.0</td></tr>
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<table>
<tr><th>Sl no</th><th>Unit loading</th><th>% Degradation admissible in AEC – CERC norms</th></tr>
<tr><td>1</td><td>85-100</td><td>Nil</td></tr>
<tr><td>2</td><td>75-84.99</td><td>0.35</td></tr>
<tr><td>3</td><td>65-74.99</td><td>0.65</td></tr>
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			4 55-64.99 1 **CERC is requested to consider the above in the norms for compensation for underloading.**
23.	Chapter 7 45(15)	*"A generating station including renewable energy generating station shall be allowed to draw power from ISTS during non-generation hours, whether before COD or after COD, only after obtaining schedule for such drawal of power in accordance with a valid contract entered into by it with a seller or distribution licensee or through power exchange."*	Drawl of Power by Solar generating plant during non-generating hours is mainly to keep the system in charged condition and minimize transformer losses. Drawl being less than 0.2% of the generation, CERC in its tariff order for Solar plants has ignored the same while calculating the Generic tariff. In view of above and to promote RE generation it is requested to allow drawal by RE generators during non-generating hours without the requirement of valid contract or drawl schedule.

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24.	Chapter 7 47(9)	Energy Metering and Accounting: *"Entities in whose premises the IEMs are installed shall be responsible for (i) monitoring the healthiness of the CT and PT inputs to the meters, (ii) taking weekly meter readings for the seven-day period ending on the preceding Sunday 2400 hours and transmitting them to the RLDC by Tuesday noon, in case such readings have not been transmitted through automatic remote meter reading (AMR) facility (iii) monitoring and ensuring that the time drift of IEM is within the limits as specified in CEA Metering Regulations 2006 and (iv) promptly intimating the changes in CT and PT ratio to RLDC."*	Many interface points covered under STU have dedicated CT / CVT installed in sealed condition. Grid Code should have provision to allow the asset owner to check the healthiness of CT / CVT once in every year for equipment safety. (e.g. Oil BDV, tan delta.)
25.	Annexure-5	Procedure specifying data, forecasting and scheduling for renewable energy generating	CERC (Deviation Settlement Mechanism and Related Matters) Regulation 2022 does not incorporate the provisions

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		stations (REGS) at Inter-state level	of the procedure. To avoid ambiguity and effective implementation, it is requested to issue suitable amendment in the DSM Regulation 2022 incorporating the provisions of Forecasting and Scheduling procedure proposed in the Grid Code along with the final Grid Code.