ಕರ್ನಾಟಕ ರಾಜ್ಯಪತ್ರ

ಅಧಿಕೃತವಾಗಿ ಪ್ರಕಟಿಸಲಾದುದು

ವಿಶೇಷ ರಾಜ್ಯ ಪತ್ರಿಕೆ

ಭಾಗ – ೩ Part – III	ಬೆಂಗಳೂರು, ಸೋಮವಾರ, ೨೧, ಜುಲೈ, ೨೦೨೫(ಆಷಾಢ , ೩೦ ಶಕವರ್ಷ, ೧೯೪೭) BENGALURU, MONDAY, 21, JULY , 2025(ASHADHA , 30, SHAKAVARSHA, 1947)	ನಂ. ೪೦೫ No. 405

KARNATAKA ELECTRICITY REGULATORY COMMISSION

No. 16 C-1, Miller Tank Bed Area, Vasanth Nagar, Bengaluru- 560 052.

NOTIFICATION

KERC/KEGC/2025-26/514, Dated: 17.07.2025.

KARNATAKA ELECTRICITY GRID CODE (KEGC), 2025

CONTENTS

Karnataka Electricity Grid Code (KEGC), 2025

Preamble:

The Karnataka Electricity Regulatory Commission in exercise of the powers under clause (h) of subsection (1) of Section 86 read with clause (zp) of sub-section (2) of Section 181 of the Act had notified the Karnataka Electricity Grid Code (KEGC) 2015 on 02.02.2016. Subsequently, the Commission had issued amendment to the said Regulations based on the KPTCL's request.

The Karnataka Electricity Grid Code lays down the rules, guidelines and standards to be followed by various persons and participants in the Intra-State Transmission system to plan, develop, maintain and operate the power system, in the most secure, reliable, economic and efficient manner, so as to meet the requirements of Integrated Operation with the Inter-State Transmission system of the Southern Regional Grid/ National Grid as per the provisions of the Indian Electricity Grid Code while facilitating healthy competition in the generation and supply of electricity.

Under clause (h) of sub-section (1) of Section 86 of the Act, the State Commissions are mandated to specify the State Grid Codes consistent with the Grid Code specified by the Central Commission under clause (h) of sub-section (1) of Section 79 of the Act. This has been duly recognized by the Hon'ble Supreme Court in its judgement dated 17.8.2007 in Civil Appeal No. 2104 of 2006 in the matter of Central Power Distribution Company & Others vs Central Electricity Regulatory Commission.

Meanwhile, the Central Electricity Regulatory Commission had notified the IEGC 2023 on 11.07.2023 duly repealing its earlier Regulations. The Commission vide its letter dated 20.09.2023 and 11.01.2023 had directed KPTCL to propose Clause-wise amendments in line with the IEGC Regulations, 2023 duly obtaining the recommendations of Grid Code Review Panel constituted under Clause 3.3 of KEGC 2015.

Accordingly, KPTCL has submitted the revision of the Grid Code for approval of the Commission. Keeping in view the mandate and statutory framework as envisaged in the Act for stable, reliable and secure grid operation in order to achieve maximum economy and efficiency of the power system, the KEGC lays down regulations to be followed by various persons and participants to plan, develop, maintain and operate power system in the State in a secure, economic, reliable, resilient and efficient manner. The regulations provide for integration of renewable energy resources in the grid, flexible operation of energy resources, optimum scheduling & despatch, open access, promoting competition in the generation sector and various measures including reserves necessary for grid stability. It seeks to create a robust framework for maintaining demand-supply balance under credible contingencies and an enabling framework for transition to clean energy sources.

The Commission, after carefully considering the submissions made by the KPTCL and Grid Code Review panel, had issued a draft Karnataka Electricity Regulatory Commission (Karnataka Electricity Grid Code) (KEGC), Regulations 2024 for inviting comments from stakeholders. The Commission also held Public Hearing in the matter on 08.04.2025. After considering the views/comments/suggestions of the Stakeholders in the matter and in exercise of the powers conferred by the Electricity Act, 2003 (36 of 2003), and all other powers enabling it in this behalf, the Karnataka Electricity Regulatory Commission hereby specifies the following Code:

NOTIFICATION

In exercise of the powers conferred under clause (h) of sub-section (1) of Section 86 read with clause (zp) of sub-section (2) of Section 181 of the Electricity Act, 2003 (36 of 2003), and all other powers enabling it in this behalf, the Karnataka Electricity Regulatory Commission hereby specifies the Grid Code as under:

Chapter -1: Preliminary

1.1. Short Title, Extent and Commencement:

a. These Regulations shall be called the **Karnataka Electricity Regulatory Commission (Karnataka Electricity Grid Code) Regulations, 2025.**

b. These Regulations shall come into force from the date of publication in the official Gazette of Karnataka.

c. These regulations shall supersede the Karnataka Electricity Grid Code, 2015 read with amendments thereof.

d. Provided further that in the absence of any provision or any condition not specified under KEGC 2025, but if covered under IEGC, such provisions of IEGC as amended from time to time shall be applicable.

1.2. Scope and Extent of Application:

These regulations shall apply to:

a. All generators in the State connected to In-STS;
b. Transmission licensee in the State including STU;
c. Karnataka SLDC, ALDC, DCC;
d. Distribution Licensees including Deemed Distribution Licensees, Special economic zones & Indian Railways;
e. Open access consumers, EHV consumers connected to In-STS;
f. All Renewable Energy generators, Solar/ wind Power Parks and RE Hybrid parks developers connected to In-STS;
g. Qualified Coordinating Agencies or Aggregator or Lead generator connected to In-STS;

Provided further that, the Commission may issue directions relieving any Transmission Licensee or User, either Suo-motu or based on an application submitted by such Transmission Licensee or User, of their obligations to implement or comply with the KEGC to the extent as may be stipulated in the directions. All Users who are connected to and/or use the In-STS shall comply with the provision of KEGC.

1.3. Structure of the KEGC:

The KEGC 2025 has been organized into the following chapters:

Chapter 1: Preliminary - This Chapter specifies the scope, definitions and application of these Regulations.

Chapter 2: Management of Grid Code and Role of Various Organizations-This chapter is to define the method of management of GRID CODE documents, encompassing all the Utilities connected to/or using In-STS and governs the relationship between various Users of In-STS, SLDC, as well as RLDC and the responsibilities of the Users to effect the change and review of the Grid Code in line with IEGC for stable operation of the Grid.

Chapter 3: Resource Planning Code - This Code deals with the planning of generation and transmission resources for reliably meeting the projected demand in compliance with specified reliability standards for serving the load with optimum generation mix with a focus on integration of environmentally benign technologies after taking into account the need, inter alia, for flexible resources, storage systems for energy shift and demand response measures for managing the intermittency and variability of renewable energy sources.

Chapter 4: Connection Code - This Code deals with Users connected to, or seeking connection to In-STS shall comply with Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, which specifies the minimum technical and design criteria and Karnataka Electricity Regulatory Commission (Terms and Conditions for Open Access) Regulations, 2025 as amended from time to time.

Chapter 5: Commission and Commercial Operation Code - This Code specifies the minimum technical and design criteria that shall be complied with by Transmission Licensee and User connected to or seeking connection with the In-STS.

Chapter 6: Operating Code - This chapter describes the operational philosophy, operational requirements, technical capabilities and procedures or methodologies to maintain secure and reliable grid operation including aspects related to real time operation, outage planning and system Restoration of In-STS. Integrated operation of the In-STS to ensure integrity, stability and resilience of the grid is to enhance the overall operational economy and reliability of the entire network spread over the geographical area of the State. As maintenance of load- generation balance is a vital aspect of reliable system operation and significant challenges are associated with increasing penetration of renewables (both wind and solar) in the Country, the chapter, thus, also deals with generation reserves estimation and frequency control.

Chapter 7: Scheduling and Despatch Code - This code deals with the procedures to be adopted for scheduling of Sellers connected to In-STS and assistance in scheduling of Inter- State generating stations (ISGS) through RLDC as per IEGC and net drawal of buyers on a day ahead basis and during intra-day operation and sets down the procedure for the flow of information between SLDC and RLDC, between SLDC and sellers and between SLDC and buyers of the In-STS system.

Chapter 8: Protection Code - This code covers the protection protocol, protection settings and protection audit plan of electrical systems, the provisions related to protection requirements to safeguard the In-STS and User's systems from faults or any other grid disturbance.

Chapter 9: Cyber Security and communication Code - This code deals with measures to be taken to safeguard the State grid from spyware, malware, cyber-attacks, network hacking, procedure for security audit from time to time, upgradation of system requirements and keeping abreast of latest developments in the area of cyber-attacks and cyber security requirements and provides for planning, implementation, operation and maintenance and up- gradation of the reliable communication system for all communication requirements including the exchange of data for integrated operation of State Grid.

Chapter 10: Monitoring and Compliance Code - This code deals with monitoring of compliance of these regulations by various entities in the grid by Grid Code Review Panel, STU, SLDC or any other person, and manner of reporting the instances of violations of these regulations and taking remedial steps or initiating appropriate action.

Chapter 11: Miscellaneous- This code specifies the miscellaneous aspects such as the power to amend, the power to remove difficulties and dispute resolution etc., and other miscellaneous provisions.

1.4. Definitions:

In these regulations unless the context otherwise requires:

Sl. No.	Particulars	Definition
1	**Act**	the Electricity Act, 2003 (36 of 2003) as amended from time to time;
2	**Alert state**	the state in which the operational parameters of the power system are within their respective operational limits, but a single N-1 contingency leads to violation of system security;

3	**Appropriate Load Despatch Centre**	'National Load Despatch Centre'(NLDC) or 'Regional Load Despatch Centre' (RLDC) or the 'State Load Despatch Centre' (SLDC) which includes any 'Area Load Despatch Centre' (ALDC) attached to SLDC as the case may be;
4	**Appropriate Transmission Utility**	the 'Central Transmission Utility' (CTU) or the 'State Transmission Utility' (STU), as the case may be;
5	**Area Load Despatch Centre (ALDC)**	the centre as established by the STU to carry out the instructions of SLDC for controlling system operation in its jurisdiction and performing all duties assigned to it as stated in this Karnataka Electricity Regulatory Commission Grid Code (KEGC);
6	**Automated Meter Reading System (AMR)**	the scheme to automate the task of data collection from each meter / location to Meter Data Acquisition System (MDAS) at the central location
7	**Automatic Generation Control (AGC)**	a mechanism that automatically adjusts the generation of a control area to maintain its interchange schedule plus its share of frequency response;
8	**Automatic Voltage Regulator (AVR)**	a continuously acting automatic excitation control system to control the voltage of a generating unit measured at the generator terminals;
9	**Available Transfer Capability (ATC)**	available power transfer capability between ISTS and State network or between STU & Distribution Licensee network declared by the concerned load despatch center for scheduling transactions in a specific direction with due consideration for the network security. Mathematically, ATC is the Total Transfer Capability less Transmission Reliability Margin;
10	**Ancillary Services**	in relation to power system operation, means the services necessary to support the grid operation in maintaining power quality, reliability and security of the grid and includes Primary Reserve Ancillary Service, Secondary Reserve Ancillary Service, Tertiary Reserve Ancillary Service, active power support for load following, reactive power support, black start and such other services as defined in these regulations;
11	**Ancillary Services Regulations (AS Regulations)**	Means the Karnataka Electricity Regulatory Commission (Ancillary Services) Regulations,2025 and its amendments issued from time to time;
12	**Auxiliary Energy Consumption" or 'AUX'**	in relation to a period in case of a generating station means the quantum of energy consumed by auxiliary equipment of the generating station, such as the equipment being used for the purpose of operating plant and machinery including switchyard of the generating station and the transformer losses within the generating station, expressed as a percentage of the sum of gross energy generated at the generator terminals of all the units of the generating station; Provided that auxiliary energy consumption shall not include energy consumed for supply of power to housing colony and other facilities at the generating station and the power consumed for construction works at the generating station and integrated coal mine; Provided further that auxiliary energy consumption for compliance of revised

		emission standards, sewage treatment plant and external coal handling plant (jetty and associated infrastructure) shall be considered separately;
13	**Backing Down**	reduction of generation by a generating unit on instructions from SLDC/ SRLDC;
14	**Beneficiary**	a licensee who has a share in an Inter-State Generating Station (ISGS) and/or Intra-State Generating Station (In-SGS);
15	**Bilateral Transaction**	a transaction, other than collective transaction, for exchange of power between a specified buyer and a specified seller directly or through a trading licensee or at a Power Exchange;
16	**Black Start Procedure**	the procedure necessary to recover the grid from partial or a total blackout in the State;
17	**Blackout State**	a condition at a specific time where a part or all the operations of the power system have got suspended;
18	**Bulk Consumer**	Shall have the same meaning as defined in CEA technical standards for connectivity;
19	**Buyer**	a person, including distribution licensee, deemed distribution licensees, open access consumer, purchasing electricity through a transaction scheduled in accordance with the Regulations applicable for STOA, MTOA, LTOA, GNA & T-GNA;
20	**Captive Power Plant**	a Power Plant set up by any person to generate electricity primarily for his own use and includes a power plant set up by any co- operative society or association of persons for generating electricity primarily for use of members of such co-operative society or association satisfying the criteria specified by MoP/GoI;
21	**CERC or Central Commission**	the Central Electricity Regulatory Commission constituted under section 76 (1) of the Electricity Act 2003;
22	**CEA**	The Central Electricity Authority of India (CEA) is a statutory organization constituted under section 70(1) of the Electricity Act 2003;
23	**Central Generating Station (CGS)**	the generating station owned by the companies that are owned or controlled by the Central Government;
24	**CEA Grid Standards**	the Central Electricity Authority (Grid Standards) Regulations, 2010;
25	**CEA Technical Standards for Communication**	the Central Electricity Authority (Technical Standards for Communication System in Power System Operation) Regulations, 2020;
26	**CEA Technical Standards for Connectivity**	the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007;
27	**CEA Technical Standards for Construction**	the Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022;
28	**Check Meter**	a meter, which shall be connected to the same core of the Current Transformer (CT) and Voltage Transformer (VT) to which main meter is connected and shall be used for accounting and billing of electricity in case of failure of main meter;

29	**Cold Start**	in relation to steam turbine means start up after a shutdown period exceeding 72 hours (turbine metal temperatures below approximately 40% of their full load values);
30	**Collective Transaction**	a set of transactions discovered in power exchange through anonymous, simultaneous competitive bidding by buyers and sellers;
31	**Communication System**	a collection of individual communication networks, communication media, relaying stations, tributary stations, terminal equipment usually capable of inter-connection and inter-operation to form an integrated communication backbone for power sector. It also includes existing communication system of Intra State and Inter State Transmission System, Satellite and Radio Communication System and their auxiliary power supply system, etc. used for regulation of intra-State and inter-State transmission of electricity;
32	**Congestion**	a situation where the demand for transmission capacity or power flow on any transmission corridor exceeds its Available Transfer Capability;
33	**Connection Agreement**	an Agreement between STU, intra-State transmission licensee(s) other than STU (if any) and any person setting out the terms relating to a connection to and/or use of the Intra- State Transmission System;
34	**Connection Point**	a point at which a plant (generating station or a substation or bulk consumer) and associated equipment connects to the Transmission System;
35	**Connectivity**	the state of getting connected to the Intra-State transmission system by a generating station, including a captive generating plant, a bulk consumer or Intra- State transmission licensee;
36	**Central Transmission Utility (CTU)**	any Government Company which the Central Government may so notify under sub-section (1) of Section 38 of the Act;
37	**Control Area**	an electrical system bounded by interconnections (tie lines), metering and telemetry which controls its generation and/or load to maintain its interchange schedule with other control areas whenever required to do so and contributes to frequency regulation of the synchronously operating system;
38	**Data Acquisition System (DAS)**	a system for recording the sequence of operation in time, of the relays or equipment as well as the measurement of pre- selected system parameters;
39	**Declared Capacity (DC)**	in relation to a generating station means, the capability to deliver ex-bus electricity in MW declared by such generating station in relation to any time-block of the day as defined in the Grid Code or whole of the day, duly taking into account the availability of fuel or water, and subject to further qualification as per provisions of these Regulations;
40	**Demand**	the demand of Power in MVA, Active Power in MW and Reactive Power in MVAr of electricity unless otherwise stated;

41	**Demand Response**	variation in electricity usage by the end consumers or by a control area manually or automatically, on standalone or aggregated basis, in response to the system requirements as identified by the State load Despatch centre;
42	**Despatch Schedule**	the ex-power plant net MW and MWh output of a generating station, for a time block, scheduled to be injected to the Grid from time to time;
43	**Deviation**	in a time-block for a seller means its total actual injection minus its total scheduled generation and for a buyer means its total actual drawal minus its total scheduled drawal;
44	**Device Language Message Specification (DLMS)**	the objective to provide an interoperable environment for structured modelling and meter data exchange. Applications like remote meter reading, remote control, and value-added services for metering any kind of energy like electricity are supported;
45	**Distribution Licence**	a Licence granted under Section 14 of the Act to distribute electricity;
46	**Disturbance Recorder (DR)**	a device provided to record the behavior of the preselected digital and analog values of the system parameters during an event (including a few cycles of pre-fault condition);
47	**Drawal Schedule**	the summation of the station-wise ex-power plant drawal schedules from all ISGS and In-SGS and drawal from / injection into the Distribution Licensee area (State grid) consequent to open access transactions;
48	**Emergency State**	the state in which one or more operational parameters are outside their operating limit or many of the equipment connected to the grid are operating above their respective loading limit;
49	**Energy Storage System" or 'ESS'**	in relation to the electricity system, means a facility where electrical energy is converted into any form of energy which can be stored, and subsequently reconverted into electrical energy and injected back into the grid;
50	**Event**	an unscheduled or unplanned occurrence on a Grid including faults, incidents and breakdowns;
51	**Event Logging Facilities**	a device provided to record the chronological sequence of operation, of the relays and other equipment;
52	**Ex-Power Plant Schedule**	net MW/MWh output of a generating station, after deducting auxiliary consumption and transformation losses within the generating station;
53	**Fault Locator (FL)**	a device provided at the end of a transmission line to measure/ indicate the distance at which a line fault may have occurred;
54	**Flat frequency control**	a mechanism for correcting ACE by factoring in only the frequency deviation and ignoring the deviation of net actual interchange from net scheduled interchange;
55	**Flat tie-line control**	a mechanism for correcting ACE by factoring in only the deviation of net actual interchange from net scheduled interchange ignoring frequency deviation;

56	**Flexible Alternating Current Transmission System" (FACTS)**	a power electronics-based system and other static equipment that provide control of one or more AC transmission system parameters to improve power system stability, enhance controllability and increase power transfer capability of transmission systems;
57	**Force Majeure**	any event which is beyond the control of the persons involved which they could not foresee or with a reasonable amount of diligence could not have foreseen or which could not be prevented and which substantially affects the performance by a person such as the following including but not limited to: Acts of God, natural phenomena, floods, droughts, earthquakes and epidemics; Enemy acts of any Government domestic or foreign, war declared or undeclared, hostilities, priorities, quarantines, embargoes; Riot or Civil Commotion; Grid failure not attributable to the person.
58	**Forced Outage**	an outage of a generating unit or a transmission/Major distribution facility due to a fault or any other reasons which have not been planned;
59	**Free Governor Mode of Operation**	the mode of operation of governor where machines are loaded or unloaded directly in response to grid frequency i.e., machine unloads when grid frequency is more than 50 Hz and loads when grid frequency is less than 50 Hz. The amount of loading or unloading is proportional to the governor droop.
60	**Frequency Response Obligation (FRO)**	the minimum frequency response a control area has to provide in the event of any frequency deviation;
61	**Frequency Response Performance (FRP)**	the ratio of actual frequency response with frequency response obligation;
62	**Frequency Stability**	the ability of the transmission system to maintain stable frequency in the normal state and after being subjected to a disturbance;
63	**Gaming**	in relation to this Code, shall mean an intentional mis-declaration of declared capacity by any Seller or intentional mis-declaration of drawal schedule by any Buyer in order to make an undue commercial gain through Charge for Deviations;
64	**Gate Closure**	the time at which the bidding for a specific delivery period closes at the power exchange and no further bidding or modification of already placed bids can take place for the said delivery period.
65	**Generating Unit**	a. an unit of a generating station (other than those covered in sub-clauses (b) and (c) of this clause) having electrical generator coupled to a prime mover within a power station together with all plant and apparatus at the power station which relate exclusively to operation of that turbo-generator; b. an inverter along with associated photovoltaic modules and other equipment in respect of generating station based on solar photo voltaic technology; c. a wind turbine generator with associated equipment, in respect of generating station based on wind energy; d. in respect of Renewable Hybrid Generating Station (RHGS),

		combination of hydro generator under sub-clause (a); or solar generator under sub-clause (b) or wind generator under sub-clause (c) of this clause;
66	**Good Utility Practices**	any of the practices, methods and acts engaged in or approved by a significant portion of the electric utility industry during the relevant time period which could have been expected to accomplish the desired results at a reasonable cost consistent with good business practices, reliably, safely and with expedition;
67	**Governor Droop**	in relation to the operation of the governor of a Generating Unit, the percentage drop in system frequency which would cause the Generating Unit under restricted or free governor action to change its output from zero to full load;
68	**Grid**	the high voltage backbone system of inter-connected transmission lines, sub-stations and generating plants;
69	**Grid Security**	the power system's capability to retain a normal state or to return to a normal state as soon as possible, and which is characterized by operational security limits;
70	**Grid Standards**	the standards specified by the Authority (CEA) under clause (d) of the Section 73 of the Act;
71	**Hot Start**	in relation to steam turbine, means the start up after a shutdown period of less than 10 hours (turbine metal temperatures below approximately 80% of their full load values);
72	**Independent Power Producer (IPP)**	a generating company not owned/controlled by the Central/State Government or not a captive power plant (CPP);
73	**Indian Electricity Grid Code (IEGC)**	the grid code specified by the CERC under sub section 1(h) of Section 79 of the Act; as amended from time to time;
74	**Indian Standards (IS)**	Those standards and specifications approved by the Bureau of Indian Standards (BIS);
75	**Inertia**	the contribution to the capability of the power system to resist changes in frequency by means of an inertial response from a generating unit, network element or other equipment that is coupled with the power system and synchronized to the frequency of the power system;
76	**Infirm Power**	the electricity injected into the grid prior to the date of commercial operation of a unit of the generating station;
77	**Installed Capacity**	the summation of the name plate capacities of all the units of the generating station or the capacity of the generating station as approved by the Commission from time to time (reckoned at the generator terminals) complying with the CEA Regulations;
78	**Instrument Transformer**	the 'Current Transformer'(CT), 'Voltage Transformer' (VT) and 'Capacitor Voltage Transformer' (CVT);
79	**Interconnecting Transformers (ICTs)**	Transformers connecting lines of different voltage;
80	**Inter-State Transmission System (ISTS)**	includes any system for the conveyance of electricity by means of a main transmission line from the territory of one State to another State: i. The conveyance of electricity across the territory of an intervening State as well as conveyance within the State which is incidental to such inter-state transmission of energy; ii. The transmission of electricity within the territory of the State on a system built, owned, operated, maintained or controlled by CTU;

81	**Interface Meter**	a meter complying to CEA/CERC/KERC Regulations used for accounting and billing of electricity, connected at the point of interconnection between electrical systems of generating company, licensee and consumers directly connected to the Inter-State Transmission System or In-STS, and have been permitted open access by the Appropriate Commission;
82	**Inter State Generating Station (ISGS)**	a Central Sector/other generating station in which two or more than two States have a share and whose scheduling is to be coordinated by RLDC;
83	**Intra State Generating Station (In-SGS)**	a generating station connected to intra-State Transmission System whose scheduling is to be coordinated by SLDC;
84	**Intra-State entity**	a person whose metering is done either by the State Transmission Utility or the Distribution Licensee, as the case may be, and energy accounting is done by the State Load Despatch Centre or any other agency so authorized by the Commission;
85	**Intra-State Transmission System (In-STS)**	a system of Transmission Lines and substations built, owned, operated and maintained or controlled by the STU or a transmission licensee for conveyance of electricity within the territory of the State excluding ISTS;
86	**Karnataka Electricity Grid Code (KEGC)**	the grid code specified by the KERC under sub section 1(h) of Section 86 of the Act, as amended from time to time;
87	**Karnataka State Energy Account (KSEA)**	the energy account of users within the State including transmission account, other accounts in compliance to KEGC/KERC Regulations/State Government directives prepared by KSLDC or any other entity assigned by State Government;
88	**Karnataka State Load Despatch Centre (SLDC)**	the Centre established under sub-section (1) of Section 31 of the Act;
89	**Load**	the active, reactive or apparent power consumed by a utility/installation of consumer;
90	**Long –term Access**	the right to use the intra-State transmission and distribution system as defined in the KERC (Open Access) Regulations, 2025, as amended from time to time;
91	**Long-term customer**	a person who has been granted long-term access in the State;
92	**Main Meter**	a meter, which would primarily be used for accounting and billing of electricity;
93	**Main Protection**	the protection equipment or system expected to have priority in initiating either a fault clearance or an action to terminate an abnormal condition in the power system;
94	**Maximum Continuous Rating (MCR)**	the maximum continuous output in MW at the generator terminals guaranteed by the manufacturer at rated parameters;
95	**Medium-term Open Access**	the right to use intra- State transmission and distribution system from any generating station for a period specified in KERC (Terms & Conditions for Open Access) or any other regulations;
96	**Medium-term customer**	a person who has been granted a medium- term open access;
97	**Merit Order**	the order of ranking of available electricity generation in ascending order from least energy charge to highest energy charge to be used for deciding despatch instructions to minimize the overall cost of generation;

98	**Meter Data Processing (MDP)**	data validation, processing, and generation of customized reports of received data manually or through from AMR at SLDC;
99	**Minimum Turndown Level**	the minimum output power expressed in percentage of maximum continuous power rating that the generating unit can sustain continuously; to be on bar and includes minimum power level as defined in **CEA (Flexible Operation of Coal based Thermal Power Generating Units) Regulations, 2023, as amended from time to time.**
100	**Nadir Frequency**	minimum frequency after a contingency in case of generation loss and maximum frequency after a contingency in case of load loss;
101	**National Grid**	the entire inter-connected electric power network of the country;
102	**Net Drawal Schedule**	the drawal schedule of a Distribution Licensee and any other Entity directly connected to In-STS after deducting the apportioned transmission losses (estimated);
103	**NLDC**	the National Load Despatch Centre established under subsection (1) of Section 26 of the Act;
104	**Near Miss Event**	an incident of multiple failures that has the potential to cause a grid disturbance, power failure or partial collapse but does not result in a grid disturbance;
105	**Normal State**	the state in which the operational parameters of the power system are within their respective operational limits and equipment are within their respective loading limits;
106	**Off-Bar Declared Capability**	the difference between Declared Capacity and On-Bar Declared Capacity in MW;
107	**On-Bar Declared Capacity**	in relation to a generating station means the capability to deliver ex-bus electricity in MW from the units on-bar declared by such generating station in relation to any time block of the day or whole of the day, duly taking into account the availability of fuel and water and subject to further qualification in the relevant regulations;
108	**On-Bar Installed Capacity**	the summation of name plate capacities or the capacities as approved by the Commission from time to time, of all units of the generating station in MW which are on- bar. In case of a combined cycle module of a gas or liquid fuel-based stations, the installed capacity of steam turbine shall be in proportion to the on-bar capacity of gas turbines of the module;
109	**Open Access**	the non-discriminatory provision for the use of transmission lines or distribution system or associated facility with such lines or system by any licensee or consumer or a person engaged in generation in accordance with the regulations specified by the Commission;
110	**Operation Coordination Committee (OCC)**	a sub-committee under Regulation 2.4 of these regulations with members from all the intra-state entities which decide the operational aspects of the state Grid;
111	**Operational Parameters**	the parameters for system security as specified by the system operator including frequency, voltage at station-bus, angular separation, damping ratio, short circuit level, inertia;

112	**Outage**	a total or partial reduction in availability due to repair and maintenance of the transmission or distribution or generation facility or defects in the auxiliary system;
113	**Partial Grid Disturbances**	a shutdown of part of the system, resulting in failure of power supply to that part of the system;
114	**Peak Load**	the simultaneous maximum demand of the system occurring under specific time duration (e.g. annual, monthly, daily etc.);
115	**Person**	shall include any company or body corporate or association or body of individuals, whether incorporated or not, or artificial juridical person;
116	**Power Exchange**	the power exchange established with the prior approval of the Central Electricity Regulatory Commission;
117	**Power System**	all aspects of generation, transmission, distribution and supply of electricity and includes one or more of the following, namely; (a) Generating stations; (b) Transmission or main transmission lines; (c) Sub-stations; (d) Tie-lines; (e) Load despatch activities; (f) Mains or distribution mains; (g) Electric supply lines; (h) Overhead lines; (i) Service lines; (j) Works;
118	**Primary Reserve**	the maximum quantum of power which will immediately come into service through governor action of the generator or frequency controller or through any other resource in the event of sudden change in frequency as specified in these regulations;
119	**Protection and Communication Coordination Committee (PCCC)**	a sub-committee under Regulation 2.4 of these regulations with members from all the intra-state entities which decide the Protection & Communication aspects of the state Grid;
120	**Qualified Coordinating Agency (QCA)**	the agency appointed by the Wind or Solar Energy Generators connected to a Pooling Sub-Station, or by an individual Generator connected directly to a Sub-Station, to perform the functions and discharge the obligations specified in these Regulations.
121	**Ramp Rate**	the rate of change of output power of a generating station, expressed in percentage of maximum continuous power rating, per minute
122	**Reactive Power**	the product of root mean square (rms) voltage, root mean square (rms) current and the sine of the electrical phase angle between the voltage complex and current complex, measured in ‘Volt – ampere reactive’ (VAr) and in standard multiples thereof;
123	**Regional Grid**	the high voltage backbone system of interconnected transmission lines, sub-stations and generating plants in a region;
124	**Regional Power Committee (RPC)**	a Committee established by resolution by the Central Government for a specific region for facilitating the integrated operation of the power systems in that region;

125	**Regional Energy Account or REA**	account of energy and other parameters issued by the respective RPC for the purpose of billing and settlement of charges of ISGS and other users of the concerned region;
126	**Regional Entity**	the entity which is in the RLDC control area and whose metering and energy accounting is done at the regional level;
127	**Rate of Change of Frequency or df/dt**	the time derivative of the power system frequency which negates short term transients and therefore reflects the actual change in synchronous network frequency;
128	**Restorative State**	a condition in which control action is being taken to reconnect the system elements and to restore system load;
129	**Regional Transmission Account or RTA**	accounts of transmission issued by the RPC for the purpose of billing and settlement of transmission charges of ISTS in the concerned region in accordance with the Sharing Regulations;
130	**Renewable Energy Generating Station or REGS**	means a generating station based on a renewable source of energy with or without Energy Storage System and shall include Renewable Hybrid Generating Station;
131	**Resilience**	the ability to withstand and reduce the magnitude or duration of disruptive events, which includes the capability to anticipate, absorb, adapt to, or rapidly recover from such an event.
132	**Secondary Reserve**	the maximum quantum of power which can be activated through secondary control signal by which injection or drawal or consumption of an SRAS provider is adjusted in accordance with Ancillary Service Regulations;
133	**Secondary Reserve Ancillary Service or SRAS**	the Ancillary Service comprising SRAS-Up and SRAS-Down, which is activated and deployed through secondary control signals;
134	**Secondary Reserve Ancillary Service Provider or SRAS Provider**	an entity which provides SRAS-Up or SRAS-Down service in accordance with Ancillary Service Regulations;
135	**Scheduled Drawal**	at any time or for a time block or any period means schedule of drawal for Buyer in MW or MWh given by the concerned Load Despatch Centre;
136	**Scheduled Generation**	at any time or for a time block or any period means schedule of generation in MW or MWh ex-bus given by the concerned Load Despatch Centre;
137	**Seller**	a person, including a generating station or unit of generating station, supplying electricity through a transaction scheduled in accordance with the Regulations applicable for STOA, MTOA, LTOA, GNA and T-GNA;
138	**Share**	percentage share of a beneficiary in an ISGS/In-SGS either notified by Government of India/State Government or agreed through contracts as the case may be, and implemented through long term/medium term access or through GNA/T-GNA;
139	**Short Term Open Access**	the right to use intra- State transmission and distribution system from any generating station for a period specified in KERC (Terms & Conditions for Open Access) or any other regulations.
140	**Special Energy Meters**	as per CEA metering Regulations and amendments thereon such meters, of not less than 0.2S class accuracy, as are capable of: i. Recording time-differentiated measurements of active energy and voltage differentiated measurement of reactive energy, at intervals of fifteen (15) minutes,

		and five (5) minutes; ii. On site configuration for 15 min. or 5 min. interval whichever is applicable. Meter configuration/programming shall be carried out by authorized representative of STU only. iii. storing such measurements for not less than fifteen (15) days for 5 min. interval and forty-five (45) days for 15 min. interval; iv. communication of such measurements at such intervals as may be required by the SLDC for balancing and settlement of energy transactions;
141	**Standby Meter**	a meter connected to CT and VT or CVT, other than those used for main meter and check meter and shall be used for accounting and billing of Electricity in case of failure of both main meter and check meter;
142	**State Commission or Commission**	Karnataka Electricity Regulatory Commission (KERC) established under sub-section (1) of Section 82 of the Act;
143	**State Grid**	synchronous grid inter-connecting generators, load centres and intra-state transmission lines in the State;
144	**State Periphery**	the periphery of electrical power system and its components thereof under operational supervision and under control area jurisdiction of SLDC covering In-STS;
145	**State Transmission Utility (STU)**	the Government Company specified as such by the State Government under sub-section (1) of Section 39 of the Act;
146	**Static VAR Compensator (SVC) or STATIC synchronous COMPENSATOR (STATCOM)**	an electrical facility designed for the purpose of dynamically generating or absorbing Reactive Power;
147	**Supplier**	any generating company or licensee from whose system electricity flows into the system of another generating company or licensee or consumer;
148	**Supervisory Control and Data Acquisition (SCADA)**	the communication links and data processing systems which provide information to enable implementation of requisite supervisory and control access.
149	**Surge Impedance Loading**	the unity power factor load over a resistive line such that series reactive loss (I^2X) along the line is equal to shunt capacitive gain (V^2Y);
150	**System Constraint**	a situation in which there is a need to prepare and activate a remedial action in order to respect operational security limits;
151	**System State**	the operational state of the power system in relation to the operational security limits which can be normal state, alert state, emergency state, extreme emergency state and restorative state;
152	**Tertiary Reserve**	the quantum of power which can be activated in order to take care of contingencies and to cater to the need for replacing secondary reserves;
153	**Tie-line bias control**	a mechanism of correcting ACE by factoring in deviation of net actual interchange from net scheduled interchange as well as frequency deviation;
154	**Time Block**	block of 15 minutes or any such shorter duration as may be notified by the Central Commission or the State Commission for

		which specified electrical parameters and quantities are recorded by Special Energy Meters with first time block starting from 00.00 hours;
155	**Time of the Day (TOD) Meter**	a meter suitable for recording and indicating consumption of electricity during specified time periods of the day
156	**Total Transfer Capability (TTC)**	the amount of electric power that can be transferred reliably by the In-STS under a given set of operating conditions;
157	**Trader**	a person who is granted a licence to undertake trading of electricity;
158	**Transmission Licence**	a Licence granted under Section 14 of the Electricity Act, 2003 to transmit electricity;
159	**Transmission Planning Criteria**	the policy, standards and guidelines issued by the CEA for the planning and design of the Transmission system;
160	**Transmission Reliability Margin or TRM**	the amount of margin earmarked in the total transfer capability to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in system conditions;
161	**Under Frequency Relay (UFR)**	a relay which operates when the system frequency falls below a specified limit and initiates load curtailment;
162	**User**	includes generating company, captive generating plant, energy storage system, transmission licensee including deemed transmission licensee, distribution licensee, solar park developer, wind park developer, wind- solar photo voltaic hybrid system, or bulk consumer which is or whose electrical plant is connected to the grid at voltage level 33 kV and above;
163	**Voltage Stability**	the ability of a transmission system to maintain steady acceptable voltages at all nodes in the transmission system in the normal situation and after being subjected to a disturbance;
164	**Warm Start**	the startup after a shutdown period between 10 hours and 72 hours (turbine metal temperatures between approximately 40% to 80% of their full load values) in relation to steam turbine;

Note:

1. Words and expressions used in these Regulations and not defined, but defined in the Act, or the CERC (Indian Electricity Grid Code) Regulations or Regulations of the Central Electricity Authority or any other Regulations of this Commission.
2. Reference to any Acts, Rules and any other Regulations include amendments or consolidation or re-enactment thereof.

Chapter- 2: Management of Grid Code and Role of Various Organizations

2.1 General:

This chapter is to define the method of management of GRID CODE documents, encompassing all the intra state entity(ies) connected to/or using In-STS and governs the relationship between various Users of In-STS, SLDC, as well as RLDC and the responsibilities of the Users to effect the change and review of the Grid Code in line with IEGC for stable operation of the Grid.

The objectives of these Regulations are:

a. Documentation of principles and procedures which define the relationship between various Users of In-STS, ISTS, SLDC as well as RLDC and NLDC to promote coordination amongst all Users, STU, SLDC, CTU, RLDC, NLDC, RPC and CEA in any proposed development of the In-STS and ISTS.

b. Facilitation of optimal operation of the grid, facilitation of coordinated and optimal maintenance planning of generation and transmission facilities in the grid and facilitation of development and planning of economic and reliable State Grid.

c. By specifying optimum design and operational criteria to assist Users in their requirement to comply with technical and operational requirement and hence ensure that a system of acceptable quality is maintained.

d. To manage a coordinated generation and transmission outage programme for the State/Regional grid, considering all the available resources and considering transmission constraints, as well as, irrigational requirements. To minimize surplus or deficits, if any, to operate the system within Security limits.

e. To set out and define the various procedures/mechanisms in line with IEGC, CERC DSM Regulations, State DSM regulations, other CERC/KERC Regulations and provisions of these Regulations such as Declared Capacity (DC) Demonstration, Commercial Operation Date (COD) declaration procedure, Reactive Power Pricing Mechanism and implementation of revised technical minimum.

f. To improve cooperation by providing a mechanism for clear and consistent disclosure of all applicable/ mandated information and establishment of the strong communication mechanism between STU, SLDC, ALDC, DCC, Transmission Licensees and In-STS Users.

g. To facilitate large-scale grid integration of Renewable Energy (RE)/RE hybrid while maintaining the grid stability and security envisaged under the KEGC through estimating, scheduling, and deviation settlement.

h. To set out a mechanism for accounting and settlement of Reactive Energy Charges in the State in line with provisions of these Regulations as amended from time to time.

2.2 Constitution of Grid Code Review Panel:

1. STU is required to implement and comply with the Grid Code and periodically review the same and its implementation.

A Grid Code Review Panel shall be re-constituted by STU within two (2) months from the date of notification of these Regulations.

Provided further that, the Grid Code Review Panel constituted under KEGC, 2015 shall continue to function till a new Grid Code Review Panel is constituted under these Regulations.

The Chairperson of the Grid Code Review Panel shall be Director (Operation), STU. The Panel shall consist of the following members:

Sl. No.	Chairperson & Members	Representative
1	Chairperson	Director (Operation) of STU
2	Member Secretary & Convener	Chief Engineer, Planning & Coordination, STU.
3	Members	a. Chief Engineer or Executive Director, SLDC. b. Chief Engineer or General Manager of the Karnataka Power Corporation Limited (KPCL). c. Senior representative from the Southern Regional Power Committee (SRPC). d. Representative at senior executive level from the National Thermal Power Corporation Limited (NTPC). e. Representative at senior executive level from the Neyveli Lignite Corporation India Limited (NLCIL). f. Representative at senior executive level from the Karnataka Renewable Energy Development Limited (KREDL). g. Representative at senior executive level from the Power Grid Corporation of India Limited (PGCIL). h. Representative at senior executive level from the Southern Regional Load Despatch Centre (SRLDC). i. Representative of the Indian Railways in the State. j. Representative at senior executive level from each Distribution Licensee & SEZ. k. Chief Engineer or Additional Director of the Power Company of Karnataka Limited. l. One Representative at senior executive level of Private- Owned Generating Companies including IPPs and CPPs in the State – All IPPs /CPPs generators having own installed capacity 500MW and above (excluding RE installed capacity portfolio). m. One representative from each Renewable Energy source such as wind, solar, small hydro, biomass, Co- generation, etc., of having own installed capacity 1000MW and above in the State on rotation basis for every two (2) year.

2. Any other member can be co-opted as a member of the Panel when directed by the Commission.
3. In addition, the core group of Grid Code Review panel may invite any stakeholder, expert, professional from academic or research institution as special invitee on case-to-case basis for the specific meeting.

2.3 Functions of Grid Code Review Panel:

1. The Grid Code Review Panel shall be the apex body responsible for implementation of KEGC under these Regulations and constitute functional committees as specified in these Regulations to coordinate various activities specified in these Regulations, and to carry out periodic review and seek for amendments of the same.
2. The Member Secretary shall inform all the Users, the names and addresses of the Panel Chairperson and the Member Secretary at least seven (7) days before the first meeting of the Panel. Any subsequent changes shall also be informed to all the users. Similarly, each User shall inform the names and designations of their representatives to the Member Secretary of the Panel, at least three (3) days before the first Panel meeting, and shall also inform the Member Secretary in writing regarding any subsequent changes.
3. Review the progress of the committee formed for coordination and monitoring of operation and planning functions for the State grid.
4. The Review Panel may hold as many number of meetings as required subject to the condition that at least one meeting shall be held in every six (6) months or as and when required. Sub-meetings may be held by the Grid Code Review Panel with the User to discuss individual requirements and with groups of Users to prepare proposals for Panel meeting for taking a decision.
5. The Grid Code Review panel shall review the GRID CODE provisions after proper examination taking in to account of all the comments received from the members of the Panel scrutinized and compiled by Member secretary. The comments, along with comments of GCRP shall be sent to all the members for their response in favour or otherwise, for the proposed change/modification. If necessary, the MS shall convene a meeting of the Panel for deliberations. The MS shall present all the proposed revisions of the Grid Code to the Panel for its consideration.
6. Based on the response received, the GCRP shall finalize its recommendation regarding the proposed modification / amendment and submit the same along with all the related correspondence to the Commission for approval. The Commission will approve the same after holding a Public Hearing.

7. The changes/revisions proposed by the Grid Code Review Committee shall be consistent/compatible with IEGC and amendments thereof.
8. The GCRP shall send the following reports to the Commission at the conclusion of each review meeting of the Panel:
   (i) Reports on the outcome of such review.
   (ii) Any proposed revision to the Grid Code as the GCRP reasonably thinks necessary for achievement of the objectives referred to in the relevant paragraphs.
   (iii) All written representations and objections submitted by the Users at the time of review.
9. The following are contemplated as exclusive functions of Grid Code Review Panel, namely:
   a. Facilitating the implementation of these Regulations and procedures developed under these Regulations for discharging its obligations with the Users.
   b. Assessing and recommending remedial measures for issues that arise during the implementation of these Regulations and procedures developed under these Regulations;

      Provided that, the Grid Code Review Panel shall formulate suitable procedures, code of operation, manual and guidelines or revise such procedures/guidelines/manuals/code under these Regulations by undertaking stakeholder consultation and shall submit the same to the Commission.
   c. Maintenance of the GRID CODE and its working under continuous scrutiny and review.
   d. Consideration of all requests for review made by any User and publication of their recommendations for changes to the GRID CODE together with reasons for such changes.
   e. Ensuring that the changes/modifications proposed in the GRID CODE are consistent and compatible with Indian Electricity Grid Code (IEGC).
   f. The Grid Code Review Panel shall examine the proposed changes/modifications, along with its written comments submitted by all members of the Committee and decide on the request. Intra State Entities/Users seeking an amendment to the KEGC shall send written requests to the convener of the Grid Code Review Panel with a copy to the Commission.

g. The non-compliance of grid code by the users & other concerned shall be reported to the Commission by Grid Code Review Panel to initiate the suitable action.
h. Other matters as may be directed by the Commission from time to time.

2.4 Functional Committees/Sub-Committees Under Grid Code Review Panel:

Grid Code Review Panel, in the succeeding meeting after notification of these Regulations, shall constitute following functional committees for implementation of the KEGC under the aegis of Grid Code Review Panel.

a. **Operation Coordination Committee (OCC):** The Committee shall be responsible for the implementation of provisions of Operation Code and Scheduling and Despatch Code of KEGC & IEGC.

b. **Protection and Communication Coordination Committee (PCCC):** The Committee shall be responsible for the implementation of provisions of Protection Code and Communication Code & related issues and Protection Coordination of In-STS.
Provided that Grid Code Review Panel may formulate any other functional Committee or sub- committees, as it deems fit for the implementation of the KEGC.

2.4.1 Operation Coordination Committee (OCC):

1. State Load Despatch Centre shall be responsible for managing and serving the State Grid in Safe, Secure and economically for In-STS of Karnataka with each Users of In-STS discharging respective obligations under the KEGC/IEGC in coordination with SRLDC/SRPC.
2. The Operation Coordination Committee shall be constituted by GCRP within two (2) months from the date of notification of these regulations.
3. OCC shall meet at least once every in two (2) months and coordinate on all technical aspects of system operation, load despatch and shall provide recommendations to the Grid Code Review Panel.
4. The Member Secretary shall inform all the Users, the names and addresses of the Panel Chairperson, Members and the Member Secretary at least seven (7) days before the first meeting of the Panel. Any subsequent changes shall also be informed to all the users. Similarly, each User shall inform the names and designations of their representatives to the Member Secretary of the Panel, at least

three (3) days before the first Panel meeting, and shall also inform the Member Secretary in writing regarding any subsequent changes.

5. OCC shall have following members:

Sl. No.	Chairperson & Members	Representative
1	Chairperson	Executive Director/ Chief Engineer of SLDC
2	Member Secretary & Convener	Superintending Engineer of SLDC.
3	Members	a. Chief Engineer, Planning & Co- ordination, STU. b. Superintending Engineer Project and Monitoring, STU. c. Chief Engineer, Protection wing, STU. d. Chief Engineers from all the Transmission Zones, KPTCL. e. Five Representative from the Generating Companies/IPPs in State having maximum generation capacity. f. One representative from each Transmission Licensee in the State. g. Chief Engineer/Chief General Manager from each Distribution Licensee in the State. h. One representative from each Renewable Energy source such as wind, solar, small hydro, biomass, Co-generation, etc., of having own installed capacity 1000MW and above in the State on rotation basis for every two (2) year.

6. Any other member can be co-opted as a member of the OCC as and when directed by the Grid Code Review Panel.
7. OCC shall perform the following functions:
   - (i) Review operational issues and system restoration procedure;
   - (ii) Review the reactive compensation mechanism for In-STS;
   - (iii) Review and finalize planned outage plan of In-STS;
   - (iv) Review the load curtailment mechanism;
   - (v) Review the installation of Under Frequency Relays (UFR), df/dt relays, ADMS, SPS, UVLS etc., in the In-STS;
   - (vi) Monitor implementation and performance of governor mode of operation for the generating stations in the State;
   - (vii) Review of Renewable Energy curtailment is as per approved procedures of KERC and formulate/recommend means of avoiding/reducing it;
   - (viii) Review the requirement of OCC Meetings of SRPC.
   - (ix) Ensure implementation and effective functioning of SAMAST.
   - (x) Periodic review of SCADA visibility of all Drawal & injection points; and any other function as directed by the Grid Code Review Panel.

(xi) Review of operation and Transmission Constraint cases noticed by SLDC and suggest recommendations; and

(xii) Optimize outage plan of generating units consistent with Outage Plan of SRPC.

(xiii) Review of reactive interchange of Users with In-STS and In-STS with ISTS.

(xiv) Need for reactive compensation to be recommended to STU and changes in reactive accounting to be refereed to Grid Code Review Panel.

(xv) Review of Load staggering, TOD and other measures.

(xvi) Any other function as directed by the Grid Code Review Panel.

(xvii) SLDC shall prepare the agenda points on clause (i) to (xvi) of this regulation and circulate with OCC members/posted to their website at least five (5) days before the meeting and Minutes of the Meeting shall be uploaded in SLDC website within seven (7) days from the meeting held date.

2.4.2 Protection and Communication Coordination Committee (PCCC):

1. The Protection and Communication Coordination Committee shall be constituted by GCRP within two (2) months from the date of notification of these regulations.
2. PCCC shall meet at least once in every three (3) months and coordinate regarding the implementation of Protection Code & Cyber security and Communication Code to ensure that Users of the In-STS discharge their obligations under the Protection Code and Communication Code and CEA Metering Regulations as amended from time to time.
3. The Member Secretary shall inform all the Users, the names and addresses of the Panel Chairperson, Members and the Member Secretary at least seven (7) days before the first meeting of the Panel. Any subsequent changes shall also be informed to all the users. Similarly, each User shall inform the names and designations of their representatives to the Member Secretary of the Panel, at least three (3) days before the first Panel meeting, and shall also inform the Member Secretary in writing regarding any subsequent changes.
4. PCCC shall have following members:

Sl. No.	Chairperson & Members	Representative
1	Chairperson	Chief Engineer, Protection Wing, STU
2	Member Secretary & Convener	Superintending Engineer (Ele.,) Protection wing, STU
3	Members	i. Chief Engineer or Executive Director, SLDC. ii. Chief Engineer or General Manager of the Karnataka Power Corporation Limited (KPCL).

		iii. The Superintending Engineer (Ele) of each Protection Circles of STU. iv. The Superintending Engineer, Ele. Communication Wing of STU. v. The Superintending Engineer, Ele. Technical Wing of STU. vi. One representative from each Transmission Licensee in the State. vii. One representative from each Distribution Licensee in the State. Five Representatives from the "Generating Companies / IPPs / User" in State connected to Grid at 220kV and above voltage level.

5. Any other member can be co-opted as a member of the PCCC as and when directed by the Grid Code Review Panel.

6. PCCC shall perform the following functions:
   a. Assist STU to prepare protection manual under Protection Code;
   b. Ensure compliance of Protection Code;
   c. Specify the minimum protection requirements for the User's system connected to the In- STS;
   d. Deliberate and decide various protection settings, testing procedure and periodicity;
   e. Review the requirement of upgradation of protection schemes and necessary switchgear equipment;
   f. Analyse the failure of protection system in case of major grid disturbance and suggest modifications and alterations;
   g. Review the installation of Disturbance Recorders, Event Loggers, Under Frequency Relays (UFR), df/dt relays etc., in the In-STS;
   h. Review the suggestion of Users for revision of protection code; and any other function as directed by the Grid Code Review Panel.
   i. Ensure compliance of CEA Metering Regulations as amended from time to time;
   j. Deliberate and decide the issues related to metering and metering failure for DSM account and energy account;
   k. Deliberate and decide the issues related to communication aspects of AMR/MRI;
   l. To issue guidance on the interpretation and implementation of the Protection Code.

m. Review and propose amendments in metering arrangement and CEA Metering Regulations as amended from time to time;
n. To publish recommendations for changes to the protection Code for In-STS together with the reason for the change and any objection if applicable
o. Coordination of Annual Protection Audit and third-Party Audit.
p. Review of PCCC and SRPC PCSC recommendations and Audit recommendations.
q. Review of performance indices in respect of In-STS & Users.
r. Recommendation on Protection aspects to STU.
s. Review the requirement of PCSC and Communication Meetings of SRPC.
t. STU shall prepare the agenda points on clause (a) to (s) of this regulation and circulate with PCCC members/posted to their websites at least five (5) days before the meeting and Minutes of the Meeting shall be uploaded in their website within seven (7) days from the meeting held date.

7. The Sub-Committee may be headed by the respective Superintending Engineers of the protection Circles who will conduct review meeting once in every month and bring the issues to the PCCC for deliberation and decisions.

2.5 Role of Various Organizations:

2.5.1 Role of SLDC:

In accordance with Section 32 of the Electricity Act, 2003, the State Load Despatch Centre (SLDC) shall have the following functions:

1. The State Load Despatch Centre shall be the apex body to ensure integrated operation of the power system in the State.
2. The State Load Despatch Centre shall:
   a. be responsible for optimum scheduling and despatch of electricity within the State, in accordance with the contracts entered into with the licensees or the generating companies operating in the State;
   b. monitor grid operations;
   c. keep accounts of the quantity of electricity transmitted through the State Grid;
   d. exercise supervision and control over the intra-State transmission system; and
   e. be responsible for carrying out real time operations for grid control and despatch of electricity within the State through secure and economic operation of the State grid in accordance with the Grid Standards and the Grid Code.

3. The following are contemplated as exclusive functions of SLDC:
    a. Data acquisition and supervisory control, state estimation and security analysis.
    b. System Operation and control of the state grid covering contingency analysis, contingency ranking and operational plan on real time basis by conducting operational load flow studies using real time data.
    c. Furnishing feedback to STU on planning, on the issues of transmission strengthening, system protection requirement, congestion /bottlenecks with a copy to Distribution licensees, Energy Department and the Commission.
    d. Responsible for consolidating the demand forecast within the State based on the demand forecast submitted by the distribution licensees in accordance with KERC Resource Adequacy Regulations, outage planning, coordination & operation and analysis of the grid security.
    e. Scheduling/ Re-scheduling of Generation.
    f. System restoration following grid disturbances.
    g. Metering and data collection of the energy transaction within the State Grid.
    h. Compiling and furnishing data pertaining to system operation.
    i. Maintain the Karnataka State Energy account and Operation of state Deviation Settlement Mechanism (DSM) pool account, State reactive energy account and other functions as directed by the Commission.
    j. Publish transmission line loadings, critical lines with contingent conditions and inform in writing to the STU on the transmission bottlenecks for remedial measures with a copy to the Commission.
    k. Display of power map with power flow in the critical lines.
    l. SLDC shall provide operational feedback to CTU and STU.
    m. Ensuring adequate primary, secondary and tertiary reserves.
    n. Ensuring must-run status of renewable sources of energy namely Solar, wind, mini-hydel and hybrid of wind/solar/mini-hydel sources contracted by the State as per KERC Regulations/approved procedure.
    o. Operate Real Time Operation Desk, carry out TTC/ATC computations for operational purpose, carry out resource adequacy and operational studies.
    p. Transmission Outage Coordination of In-STS and Users.

4. In accordance with Section 33 of the Electricity Act, 2003, the State Load Despatch Centre in the State may give such directions and exercise such supervision and control as may be required for ensuring the integrated grid operations and for achieving the

maximum economy and efficiency in the operation of power system in the State. Every licensee, generating company, generating station, sub-station and any other person connected with the operation of the power system shall comply with the directions issued by the State Load Despatch Centre under subsection (1) of Section 33 of the Electricity Act, 2003. The State Load Despatch Centre shall comply with the directions of the Regional Load Despatch Centre.

5. In case of inter-state bilateral and collective short-term open access transactions having a state utility or an intra-state entity as a buyer or a seller, SLDC shall accord concurrence or no objection or a prior standing clearance, as the case may be, in accordance with the Central Commission and State Commission's Regulations, as amended from time to time.
6. SLDC shall be the Nodal Agency for the integration of Communication System in the Intra-State network at SLDC end for monitoring, supervision, and control of power system.
7. From the date to be notified separately in consultation with Grid Code Review Panel, SLDC shall publish on its website daily report of availability of SCADA to ensure adequate data availability in real time covering interface points and highlight the deficient interface locations.
8. SLDC shall publish the report of RE curtailment in its website as per the KERC approved procedure or as per the Central Government / Central Commission.
9. Coordinate in outage management of Generating units, Transmission / Distribution System.

2.5.2 Role of ALDC:

The Area Load Despatch centre shall:

a. Comply with the directions of SLDC.
b. Coordinate in outage management of Transmission System.
c. Operational, transmission & distribution constraint feedback to SLDC. SLDC will further take it up with OCC or PCCC as per requirement.
d. Assist SLDC to ensure integrated operation of the power system in the State grid.
e. Assist SLDC for monitoring the grid operations within its control area.
f. Assist SLDC for supervision and control over the intra-State Transmission system, within its area and be responsible for carrying out real time operation.
g. Keep accounts of the quantity of electricity transmitted through its control area.

2.5.3 Role of DCC:

The Distribution control centre shall:

a. carry out the directions issued by the State Load Dispatch Centre in the matter of system operation and demand monitoring and control in his area of supply.

b. identify blocks of load to facilitate shedding of load in rotation as may be necessary for achieving control of frequency and ACE for load generation balance.

c. coordinate in outage management of Distribution System

d. monitor and account the drawal of energy by the Distribution Licensee in his area of supply.

e. assist SLDC to ensure integrated operation of the power system in the State grid.

f. assist SLDC for monitoring the grid operations within its control area to maintain the Deviation within the limit.

g. keep accounts of the quantity of electricity transmitted through its control area.

h. have the required communication facilities with all the interface points and the State Load Dispatch Centre.

2.5.4 Role of STU:

1. Section 39 of the Electricity Act, 2003, outlines that the functions of the State Transmission Utility (STU) shall be: -

   a. to undertake transmission of electricity through intra-State transmission system and inter State transmission under bilateral agreements;

   b. to discharge all functions of planning and co-ordination relating to intra-State transmission system with,

      (i) Central Transmission Utility;
      (ii) State Governments;
      (iii) Generating Companies;
      (iv) Regional Power Committees;
      (v) Central Electricity Authority (CEA);
      (vi) Licensees;
      (vii) Any other person notified by the State Government in this behalf;

   c. To ensure development of an efficient, coordinated, and economical In-STS for smooth flow of electricity from a generating station to the load centres;

   d. To provide non-discriminatory open access to its transmission system for use by-

(i) Any licensee or generating company on payment of the transmission charges; or

(ii) Any consumer as and when such open access is provided by the State Commission under sub-section (2) of section 42 of the Act, on payment of the transmission charges and a surcharge thereon, as may be specified by the State Commission.

e. STU shall be responsible for planning, coordination, and development of reliable communication system for data communication within the State including appropriate protection path among SLDC and ALDC/DCC thereunder including main and backup as applicable along with Intra state entity Generating Station and STU's substations.

f. STU shall also plan a redundant communication system up to the nearest ISTS wideband communication node for integration with the In-STS communication system at appropriate nodes.

g. STU shall discharge all functions of planning related to the State backbone communication system in consultation with CTU, State Government, Generating Companies, Transmission and Distribution Licensee in the State.

h. STU shall also provide access to its wideband Network for grid management by all the Users.

i. STU shall extend the required support to Control Centres for the integration of communication system at respective ends.

2. Until a Government Company or any Authority or Corporation is notified by the State Government, the State Transmission Utility shall operate the State Load Despatch Centre.

2.5.5 Role of Transmission Licensees:

Transmission Licensees shall build, maintain, and operate an efficient, coordinated, and economical In-STS or ISTS, as the case may be and discharge the other duties/functions assigned to it as per Section 40 of the Act, and these Regulations.

2.5.6 Role of Distribution Licensees:

1. Distribution Licensee shall discharge the functions as stated in Section 42 of the Act, such as to develop and maintain an efficient, coordinated, and economical distribution system in its area of supply; to provide non-discriminatory open access to its distribution system as specified in the KERC Open Access Regulations as amended from time to time.

Provided that, distribution licensee shall be responsible to provide and maintain adequate reactive power compensation at distribution level such as 33 kV substations, 11 kV lines to maintain the voltage and power factor within the specified limit.

2. All endeavor shall be such that no interchange of reactive power with In-STS. The distribution licensee shall ensure that, such reactive compensation (reactive drawal/injection) shall be as per the advice of SLDC.

   Provided further that, the distribution licensee shall ensure that, such reactive compensation shall remain in service.
3. Additional reactive compensation as advised by OCC through PCCC shall be ensured by Distribution Licensee.
4. All load relief schemes of UFR, df/dt, ADMS, SPS, load staggering, scheduled load shedding as per the directions of SLDC shall be complied with.
5. SCADA inputs as required by SLDC shall be ensured by Distribution Licensees to SLDC through ICCP.

2.5.7 Role of Users:

a. User including RE generators shall be responsible for the provision of compatible equipment along with an appropriate interface for uninterrupted communication with the concerned control centres at their own cost and shall be responsible for successful integration with the communication system provided by STU for data communication as per the guidelines issued by NLDC/RLDC/SLDC/STU.
b. Users may utilize the available transmission infrastructure for establishing communication up to the nearest wide band node for meeting communication requirements from their stations to concerned control centres. Users shall also be responsible for expansion/up- gradation as well as operation and maintenance of communication equipment owned by them.
c. All Users including RE generators will ensure Meter Data to SLDC for preparation of KSEA within the time schedule prescribed by SLDC.
d. All Users including RE generators shall ensure manual or automatic integration of all load relief measures, AGC, ADMS, reactive control, SPS etc., as and when directed by SLDC.
e. **Role of Generator:** Generator connected to and/or using the In-STS for evacuating its generation shall inform the STU and SLDC about the contracts entered into with

different parties for exporting power along with its schedule from individual generating station under the company. It shall follow the relevant provisions of the KEGC and assist the SLDC in real time operation and control of the system and scheduling of generation and to maintain adequate reactive power compensation.

f. **Role of RE Generator/RE Developer:** RE Generator/RE Developer connected (directly or through Pooling Station) to and/or using the In-STS for evacuating its generation shall inform the STU and SLDC about the contracts entered into with different parties for exporting power along with its individual schedule or at Pooling Station level, as the case may be. It shall follow the relevant provisions of the KEGC, KERC (Forecasting, Scheduling and Deviation Settlement for Solar and Wind Generation) Regulations, 2015 and its amendments thereof, Karnataka Electricity Regulatory Commission (Intra-State Deviation Settlement Mechanism and Related Matters) Regulations, 2025 and its amendments thereof, CERC DSM Regulations and assist the SLDC in real time operation and control of the system and scheduling of generation and to maintain adequate reactive power compensation. It shall also develop the transmission system including the pooling station within the premises of the park.

2.5.8 Role of Qualifying Co-ordinating Agency (QCA):

1. The roles and functions of QCA shall be as follows:
   a. To act as the nodal agency on behalf of the wind, solar and hybrid generators including energy storage system connected to one or more pooling stations represented by it for the purpose of Grid Code in general and operational and scheduling liaison in particular.
   b. To undertake generation forecasting, declaration of combined capability on behalf of generators, energy storage system at one or more pooling stations to the concerned load despatch centre for the purpose of scheduling.
   c. To undertake scheduling, metering and accounting of energy. QCA shall be responsible for pooling of declared availability, de-pooling of despatch schedule, DSM and Reactive account as necessary.
   d. To operate and maintain a co-ordination centre manned by qualified and competent personnel for round the clock operational co-ordination and information exchange with the concerned Load Despatch Centre and generating stations.

e. To settle all payments as per DSM Regulations arising out of deviations from its aggregated schedule given by SLDC and the reactive accounting.

2. Any instruction or direction given by the SLDC to QCA shall be deemed to have been given to the renewable generator represented by it.

   Provided QCA shall be reckoned as Intra State Entity and the powers, functions and role of the QCA shall be governed as per the provisions stipulated under KERC (Forecasting, Scheduling and Deviation Settlement for Solar and Wind Generation) Regulations, 2015 and its amendments thereof including Procedures formulated thereunder.

2.6 Dispute Settlement Procedures:

1. In the event of any dispute regarding interpretation of any part/section of the Grid Code provision between any User and STU, the matter may be referred to the Commission for its decision. The Commission's decision shall be final and binding.
2. In the event of any conflict between any provision of the Grid Code and any contract or agreement between STU and Users, the provision(s) of the Grid Code shall prevail.

2.7 Compatibility with Indian Electricity Grid Code:

This Grid Code is consistent/compatible with the IEGC. However, in matters relating to inter-State transmission, if any provision of the State Electricity Grid Code is inconsistent with the provisions of the IEGC, then the provisions of IEGC as notified by CERC shall prevail.

2.8 Monitoring of Compliance:

1. State Transmission Utility and State Load Despatch Centre shall be responsible for monitoring the compliance of Users and State Transmission Licensees with the provisions, contained in Karnataka Electricity Grid Code and with the procedures developed under such provisions:
   Provided that the State Transmission Utility and/ or State Load Despatch Centre shall not unduly discriminate against or unduly prefer any User or Transmission Licensee.
2. If any User fails to comply with any of the provision(s) of the Grid Code, it shall be required to inform STU without any delay, the reason for its non-compliance and shall remove its non- compliance promptly.

3. Wrong declaration of capacity, non-compliance of SLDC's instructions, non-compliance of SLDC's instructions for backing down without adequate reasons, non-furnishing data etc. shall constitute non-compliance of Grid Code and shall be subject to financial penalty as may be decided by the Commission.
4. In case of persistent non-compliance of the provisions of the Grid Code and/ or with the procedures developed under such provisions, such matter shall be reported to the Commission by SLDC. Consistent failure to comply with the Grid Code may lead to disconnection of the User's plant and/or facilities.
5. State Load Despatch Centre may give such directions and exercise such supervision and control as may be required for ensuring the integrated grid operations and for achieving the maximum economy and efficiency in the operation of power system in the State.
6. Every Transmission Licensee and User connected with the operation of the power system shall comply with the directions issued by the State Load Despatch Centre.
7. If any dispute arises with reference to the quality of electricity or safe, secure and integrated operation of the State grid or in relation to any direction given under the provisions of Karnataka Electricity Grid Code, it shall be referred to the Commission by SLDC for a decision:

   Provided that till the time the decision of the Commission is pending; the direction of the State Load Despatch Centre shall be complied with by the Transmission Licensee or User.
8. The Commission may order independent third-party compliance audit for any User, as deemed necessary based on the facts brought to the knowledge of the Commission.

Chapter – 3: Resource Planning Code

3.1. General:

1. This code mandates assessment of resource adequacy during the generation planning stage as well as during the operational planning stage in accordance with the guidelines/rules/regulations issued by the Appropriate Government/ Commission.
2. The Distribution Licensees shall formulate the Resource Adequacy Plan in accordance with KERC (Resource adequacy framework) Regulations 2024 and its amendments thereof, which shall be reviewed by the Commission.

3. This Code deals with the planning of generation and transmission resources for reliably meeting the projected demand in compliance with specified reliability standards for serving the load with optimum generation mix with a focus on integration of environmentally benign technologies after taking into account the need, inter alia, for flexible resources, storage systems for energy shift and demand response measures for managing the intermittency and variability of renewable energy sources and integrated resource planning including demand forecasting, generation resource adequacy planning and transmission resource adequacy assessment, required for secure grid operation.

3.2. Integrated Resource Planning:

The integrated resource planning shall include:

a. Demand forecasting as detailed in clause (3.3) of these Regulations;
b. Generation resource adequacy planning to meet the projected demand, Procurement planning, Monitoring and compliance as per clause (3.4) of these Regulations;
c. Transmission Resource Adequacy Assessment as per clause (3.5) of these Regulations.

3.3. Demand Forecasting:

The Demand Forecasting shall be in accordance with Karnataka Electricity Regulatory Commission, (Framework for Resource Adequacy) Regulations, 2024 and amendments thereof.

3.4. Generation Resource Adequacy, Power Procurement Planning, Monitoring and Compliance:

The Generation Resource Adequacy, Power Procurement Planning, Monitoring and compliance shall be in accordance with Karnataka Electricity Regulatory Commission, (Framework for Resource Adequacy) Regulations, 2024 and amendments thereof.

3.5. Transmission Resource Adequacy Assessment:

a. To match with the Demand Forecasting and Generation Resource Adequacy planned as per KERC (Framework for Resource Adequacy) Regulations and amendments thereof, STU shall undertake assessment and planning of the intra-State transmission system as per the provisions of the Act and shall inter alia take into account:

(i) import and export capability across ISTS and STU interface; and

(ii) adequate power transfer capability across each flow-gate.

b. The Planning Philosophy for the Intra-STS planning by the STU shall be as detailed in the guidelines of "Manual of Transmission Planning Criteria" issued by CEA from time to time.

Chapter 4: Connection Code

4.1 General:

1. All Users connected to, or seeking connection to In-STS shall comply with Connectivity and GNA, Open Access Regulations specified by KERC/CERC and Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, which specifies the minimum technical and design criteria.
2. In case of the Distributed Generation Resources connected to, or seeking connection to In-STS or Distribution Network, shall comply with the applicable CERC/KERC regulations and Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations.
3. The objective of the Gird Connectivity is as given below:
    a. To ensure safe reliable and integrated operation of the grid;
    b. That the basic rules for connectivity are complied with in order to treat all users in a non- discriminatory manner;
    c. Any new or modified connections, when established, shall neither suffer unacceptable effects due to its connectivity to the In-STS nor impose unacceptable effects on the system of any other connected User or STU;
    d. By specifying optimum design and operational criteria to assist Users in their requirement to comply with technical and operational requirement and hence ensure that a system of acceptable quality is maintained.
    e. Any user seeking a new connection to the grid should be aware of the procedure specified in clause 5.3 of these regulations for connectivity to the In-STS and the standards to be complied with by user for connectivity with the In-STS network.
    f. This code specifies the requirements to be fulfilled by the connectivity grantees prior to obtaining the permission of the SLDC for first time energizing of a new or modified power system element. In addition to above, this code specifies the technical requirements to be complied with by a transmission licensee including deemed transmission licensee's entity prior to being

allowed by SLDC to energize a new or modified power system element.

g. After grant of connectivity and prior to the declaration of commercial operation, the tests as specified under Chapter-5 of these regulations shall be performed.

4.2 Compliance with Rules and Regulations:

1. All Users connected to or seeking connection to the grid shall comply with all the applicable regulations as enacted or amended from time to time, such as:
   - (i) Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007;
   - (ii) Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013;
   - (iii) Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022;
   - (iv) Central Electricity Authority (Measures Relating to Safety & Electric Supply) Regulations,2023;
   - (v) Central Electricity Regulatory Commission (Communication System for Inter-State Transmission of Electricity) Regulations,2017;
   - (vi) Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006;
   - (vii) Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations, 2022;
   - (viii) Central Electricity Regulatory Commission (Fees and Charges for Regional Load Despatch Centres) Regulations, 2019;
   - (ix) Central Electricity Regulatory Commission (Furnishing of Technical Details by the Generating Companies) Regulations, 2009.
   - (x) Central Electricity Authority (Grid Standards) Regulations, 2010.
   - (xi) Central Electricity Authority (Cyber Security in Power Sector) Guidelines, 2021.
   - (xii) Central Electricity Authority (Flexible Operation of Coal based Thermal Power Generating Units) Regulations, 2023.
   - (xiii) Karnataka Electricity Regulatory Commission (Terms and Conditions for Open Access) Regulations, 2025;
   - (xiv) KERC (Ancillary Services) Regulations, 2025.
   - (xv) KERC (Intra-State Deviation Settlement Mechanism and Related Matters)

Regulations, 2025.

(xvi) KERC (Forecasting, Scheduling and Deviation Settlement for Solar and Wind Generation) Regulations, 2015

(xvii) KERC Connectivity and GNA Regulations, as and when notified.

4.3 Procedure for Connection:

1. **A User seeking to establish new or modified arrangement of connection to or for use of In-STS, shall submit an application as per Regulations of the Commission or in the Standard Format prepared by STU in consultation with GCRP and stakeholders with due information to the Commission, to STU in case the connection is sought to intra-State transmission system.**
2. The STU shall process the application for grant of connectivity in accordance with these regulations;
3. The grant of connectivity by STU to In-STS shall be governed by connectivity Regulations of the Commission, in the absence of connectivity Regulations, the standard format prepared by STU & approved by the Commission.
4. Post completion of all physical arrangements of connectivity and completing the necessary site tests, the connectivity grantee and/or licensee shall request the SLDC for permission of first energization in the specified format as per the procedure for first time energization of power system elements.
5. **SLDC, in coordination with STU and Grid Code Review Panel after due consultation of stakeholders, shall publish a detailed procedure covering modalities for first time energization and integration of new or modified power system element and finalize in line with NLDC first time energization/charging (FTC) procedure within sixty (60) days of notification of these Regulations and submit to the Commission for its approval.** The procedure shall specify requirements for integration with the grid such as protection, telemetry and communication systems, metering, statutory clearances and modelling data requirements for system studies.

   Provided further that no connection shall be made unless first time energization and integration of new or modified power system elements is prepared and signed by all concerned parties.

4.4 Connectivity Agreement:

1. A connection agreement, or the offer for a connection agreement shall include (but not limited) within its terms and conditions of the following:
   a. A condition requiring both Agencies to comply with the Grid Code.
   b. Details of connection technical requirements and commercial arrangements.
   c. Details of any capital related payments arising from necessary reinforcement or extension of the system, data communication, RTU etc., and demarcation of the same between the concerned parties.
   d. A Site Responsibility Schedule as per Annexure-1.
   e. General Philosophy, Guidelines etc., on protection and telemetry.
   f. In case of multiple transmission licensees connected at the same station, the Site Responsibility Schedule including the responsibility for operation & protection coordination and data sharing among the licensees, shall be specified in the Connectivity Agreement.
   g. In case of an intra-State transmission licensee, Connectivity Agreement shall be signed between such licensee and STU after the award of the project and before physical connection to In-STS.
   h. In case of intra-State transmission system getting connected to inter-State transmission system, Connectivity Agreement shall be signed between intra-State transmission licensee, CTU and inter-State transmission licensee after the award of the project and before physical connection to ISTS.

4.5 Model Connection Agreement:

a. **The standard connection agreement shall be prepared by the STU in consultation with the GCRP and submitted to the Commission for approval in line with Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter-State Transmission System) Regulations, within sixty (60) days from the date of publishing of Grid Code in the official Gazette of Karnataka. Till such time the new format is approved, the existing format shall be adopted incorporating necessary modifications to be consistent with these Regulations. Any such modification shall be approved by the Commission**.

b. The approved format shall be made available for the prospective users of the Grid and shall be hosted on STU’s website.

4.6 Technical Requirements:

a. SLDC in consultation with STU shall carry out a joint system study six (6) months before expected date of first energization of a new power system element to identify operational constraints, if any. The connectivity grantee, transmission licensee and STU shall furnish all technical data including that of its embedded generators and other elements to the SLDC for necessary technical studies.

b. SLDC shall publish a detailed Procedure covering modalities for carrying out interconnection studies.

4.7 Data and Communication Facilities:

1. Reliable speech and data communication systems on path diversified data links shall be provided to facilitate necessary communication and data exchange and supervision and control of the grid by the NLDC, RLDC and SLDC in accordance with CERC (Communication System for Inter-State Transmission of Electricity) Regulations, 2017 and CEA Technical standards for communication.
2. The associated communication system to facilitate data flow up to appropriate data collection point on STU system including inter-operability requirements shall also be established by the concerned user as specified by STU in the connectivity agreement.
3. The communication system along with data links provided for speech and real time data communication shall be monitored in real time by all users, STU, SLDC and RLDC shall ensure high reliability of the communication links.

Chapter-5: Commissioning and Commercial Operation Code

5.1 General:

The Intra State Entity connected to In-STS and any component of In-STS shall follow the procedures specified below for declaration of Commercial Operation Date (COD). This chapter covers aspects related to:

(i) Drawal 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.

5.2 Drawal of Start Up Power and Injection of Infirm Power:

1. A unit of a generating station including unit of a captive generating plant that has been granted connectivity to the In-STS in accordance with KERC Regulations shall be allowed to inter-change power with the grid during the commissioning period, including testing and full load testing before the COD, after obtaining prior permission of the State Load Despatch Centre:

   Provided that the State Load Despatch Centre while granting such permission shall keep grid security in view.

2. The period for which such inter-change shall be allowed shall be as follows:
   a. Drawal of start-up power shall not exceed fifteen (15) months prior to the expected date of first synchronization and one (1) year after the date of first synchronization; and.
   b. Injection of infirm power shall not exceed one (1) year from the date of first synchronization for generating stations other than REGS and ESS (except Hydro PSP ESS).
   c. Injection of infirm power shall not exceed forty-five (45) days from the date of FTC (First Time Charging) approval for REGS and ESS (except Hydro PSP ESS).

3. Notwithstanding the provisions of clause (2) of this Regulation, the Commission may allow extension of the period for inter-change of power beyond the stipulated period on an application made by the generating station at least two (2) months in advance of the completion of the stipulated period:

   Provided that for REGS and ESS **(except Hydro PSP ESS)** extension of period for injection of infirm power beyond the stipulated period may be allowed (a) for a period up to six (6) months by SRLDC on an application(s) made by such generating station or ESS **(except Hydro PSP ESS)** to SLDC along with detailed reasons, at least ten (10) days in advance of the completion of the stipulated period, (b) for a period beyond six (6) months by the Commission on an application(s) made by such generating station or ESS (except Hydro PSP ESS) along with detailed reasons, at least thirty (30) days in advance of the completion of the stipulated period".
4. Drawal of start-up power shall be subject to payment of transmission charges as applicable to STOA;
5. The charges for deviation for drawal of startup power or for injection of infirm

power shall be as per the Orders issued by the KERC from time to time;

6. Start-up power shall not be used by the generating station for construction activities;
7. The onus of proving that the interchange of infirm power from the unit(s) of the generating station is for the purpose of pre-commissioning activities, testing and commissioning, shall rest with the generating station, and the SLDC shall seek such information on each occasion of the interchange of power before COD. For this, the generating station shall furnish to the SLDC relevant details, such as those relating to the specific commissioning activity, testing, and full load testing, its duration and the intended period of interchange. The generating station shall submit a tentative plan for the quantum and time of injection of infirm power on day ahead basis to the SLDC.
8. In the case of multiple generating units of the same generating station or multiple generating stations owned by different entities connected at a common In-STS interface point, SLDC shall ensure segregation of firm power from generating units that have achieved COD from power injected or drawn by generating units which have not achieved COD through appropriate accounting of energy.
9. SLDC shall stop the drawal of the start-up power in the following events:
   (i) In case, it is established that the start-up power has been used by the generating station for construction activity;
   (ii) In the case of default in payment of monthly transmission charges, charges under deviation charges under the KERC notified rates and in absence of KERC rates, CERC DSM Regulations shall be utilized.

5.3 Data to be Furnished Prior to Notice of Trial Run:

The following details, as applicable, shall be furnished by each Intra-State entity generating station to the SLDC and the beneficiaries of the generating station, wherever identified, prior to notice of trial run:

Table 1: Details to Be Furnished by Generating Entity Prior to Trial Run

Description	Units
Installed Capacity of generating station	MW
Installed Capacity of generating station	MVA
MCR	MW
Number x unit size	No x MW
Time required for cold start	Minute
Time required for warm start	Minute
Time required for hot start	Minute
Time required for combined cycle operation under cold conditions	Minute

Time required for combined cycle operation under warm conditions	Minute
Ramping up capability	% per minute
Ramping down capability	% per minute
Minimum turndown level	% of MCR
Minimum turndown level	MW (ex-bus)
Inverter Loading Ratio (DC/AC capacity)	
Name of QCA (where applicable)	
Full reservoir level (FRL)	Metre
Design Head	Metre
Minimum draw down level (MDDL)	Metre
Water released at Design Head	M^3/ MW
Unit-wise forbidden zones	MW

5.4 Notice of Trial Run:

1. The generating company proposing its generating station or a unit thereof for trial run or repeat of trial run shall give a notice of not less than seven (7) days to the SLDC, and the beneficiaries of the generating stations, including intermediary procurers, wherever identified:

   Provided that in case the repeat trial run is to take place within forty-eight (48) hours of the failed trial run, fresh notice shall not be required.

2. The transmission licensee proposing its transmission system or an element thereof for trial run shall give a notice of not less than seven (7) days to the SLDC, STU, distribution licensees of the area and the owner of the inter-connecting system.
3. The SLDC shall allow commencement of the trial run from the requested date or in the case of any system constraints, not later than seven (7) days from the proposed date of the trial run. The trial run shall commence from the time and date as decided and informed by the SLDC.
4. A generating station shall be required to undergo a trial run in accordance with Regulation 5.5 of these regulations after completion of Renovation and Modernization for extension of the useful life of the project as per the applicable KERC regulations.

5.5 Trial Run of Generating Unit:

1. Trial Run of the Thermal Generating Unit shall be carried out in accordance with the following provisions:
   a. A thermal generating unit shall be in continuous operation at MCR for seventy-two (72) hours on designated fuel:

      Provided that:

      (i) short interruption or load reduction shall be permissible with the corresponding increase in duration of the test;

(ii) interruption or partial loading may be allowed with the condition that the average load during the duration of the trial run shall not be less than MCR, excluding the period of interruption but including the corresponding extended period;

(iii) cumulative interruption of more than four (4) hours shall call for a repeat of trial run.

b. Where, on the basis of the trial run, a thermal generating unit fails to demonstrate the unit capacity corresponding to MCR, the generating company has the option to de-rate the capacity of the generating unit or to go for a repeat trial run. If the generating company decides to de-rate the unit capacity, the de-rated capacity in such cases shall not be more than 95% of the demonstrated capacity, to cater to primary response.

2. **Trial Run of Hydro Generating Unit** shall be carried out in accordance with the following provisions:

a. A hydro generating unit shall be in continuous operation at MCR for twelve (12) hours:

Provided that-

(i) short interruption or load reduction shall be permissible with a corresponding increase in duration of the test;

(ii) interruption or partial loading may be allowed with the condition that the average load during the duration of trial run shall not be less than MCR excluding period of interruption but including the corresponding extended period;

(iii) cumulative interruption of more than four (4) hours shall call for a repeat of trial run;

(iv) if it is not possible to demonstrate the MCR due to insufficient reservoir or pond level or insufficient inflow, COD may be declared, subject to the condition that the same shall be demonstrated immediately when sufficient water is available after COD.

Provided that if such a generating station is not able to demonstrate the MCR when sufficient water is available, the generating company shall de-rate the capacity in terms of sub-clause (b) of this clause, and such de-rating shall be effective from COD.

b. Where, on the basis of the trial run, a hydro generating unit fails to demonstrate the unit capacity corresponding to MCR, the generating company shall have the option to either de- rate the capacity or go for a repeat trial run. If the generating company decides to de-rate the unit capacity, the de-rated capacity in such cases shall not be more than 90% of the demonstrated capacity to cater to primary response.

3. Trial Run of Wind / Solar / ESS / Hybrid Generating Station:

a. **Trial run of the solar inverter unit(s)** shall be performed for a minimum capacity aggregating to 5 MW.

Provided that in the case of a project having a capacity of more than 5 MW, the trial run for the balance capacity shall be performed in a maximum of four instalments with a minimum capacity of 1 MW.

Provided further in the case of a project having installed capacity of 250 MW or more, the trial run may be performed in instalments, with a minimum capacity of 50 MW in each instalment without any limit on the number of instalments.

b. **Successful trial run of a solar inverter unit(s)** covered under sub-clause (a) of this clause shall mean the flow of power and communication signal for not less than four (4) hours on a cumulative basis between sunrise and sunset in a single day with the requisite metering system, power plant controller, telemetry and protection system in service. The generating company shall record the output of the unit(s) during the trial run and shall corroborate its performance with the temperature and solar irradiation recorded at site during the day and plant design parameters:

Provided that:

(i) the output below the corroborated performance level with the solar irradiation of the day shall call for a repeat of the trial run;

(ii) if it is not possible to demonstrate the rated capacity of the plant due to insufficient solar irradiation, COD may be declared subject to the condition that the same shall be demonstrated immediately when sufficient solar irradiation is available after COD, within one (1) year from the date of COD.

Provided that if such a generating station is not able to demonstrate the rated capacity when sufficient solar irradiation is available after COD, the generating company shall de-rate the capacity in terms of sub-clause (h) of clause (3) of this Regulation.

c. **Trial run of a wind turbine(s)** shall be performed for a minimum capacity aggregating to 10 MW.

Provided that in the case of a project having a capacity of more than 10 MW, the trial run for wind turbine(s) above the capacity of 10 MW shall be performed in batch sizes of not less than 1 MW.

d. **Successful trial run of a wind turbine(s)** covered under sub-clause (c) of this clause shall mean the flow of power and communication signal for a period of not less than four (4) hours on a cumulative basis in a single day during periods of wind availability with the requisite metering system, power plant controller, telemetry and protection system in service. The generating company shall record the output of the unit(s) during the trial run and corroborate its performance with the wind speed recorded at the site(s) during the day and plant design parameters:

Provided that-

(i) the output below the corroborated performance level with the wind speed of the day shall call for a repeat of the trial run;

(ii) if it is not possible to demonstrate the rated capacity of the plant due to insufficient wind velocity, COD may be declared subject to the condition that the same shall be demonstrated immediately when sufficient wind velocity is available after COD, within one (1) year from the date of COD:

Provided that if such a generating station is not able to demonstrate the rated capacity when sufficient wind velocity is available after COD, the generating company shall de-rate the capacity in terms of sub-clause (h) of clause (3) this Regulation.

e. **Successful trial run of a standalone Energy Storage System (ESS)** shall mean one (1) cycle of charging and discharging of energy as per the design capabilities with the requisite metering, telemetry and protection system being in service.

f. **Successful trial run of a pumped storage plant** shall mean one (1) cycle of turbo- generator and pumping motor mode as per the design capabilities up to the rated water drawing levels with the requisite metering, telemetry and protection system being in service.

   Provided that if it is not possible to demonstrate the design capabilities up to the rated water drawing levels due to insufficient reservoir levels, the COD may be declared after demonstrating the capabilities at available water drawing levels, subject to the condition that design capabilities up to the rated water drawing levels shall be demonstrated immediately when sufficient reservoir level is available after COD.

   Provided further that if such a generating station is not able to demonstrate the design capabilities when sufficient water is available, the generating company shall have the option to either go for a repeat trial run or de-rate the capacity. If the generating company decides to de-rate the unit capacity in terms of sub-clause (b) of Clause (2) of Regulation 5.5 of these Regulations, such de-rating shall be effective from the COD.

g. **Successful trial run of a hybrid system** shall mean successful trial run of each individual source of the hybrid system in accordance with the applicable provisions of these regulations.

h. Where, on the basis of the trial run, solar / wind / storage / hybrid generating station fails to demonstrate its rated capacity, the generating company shall have the option to either go for a repeat trial run or de-rate the capacity subject to a minimum aggregated de-rated capacity of 5 MW or 1 MW, as the case may be.

i. Notwithstanding the provisions contained in this Regulation, where Power Purchase Agreement provides for a specific capacity that can be declared COD, trial run shall be allowed for such capacity in terms of such power purchase agreement.

5.6 Trial Run of Intra-State Transmission System:

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 a continuous twenty-four (24) hours flow of power and communication signal from the sending end to the receiving end and with the requisite metering system, telemetry and protection system.

Provided that under exceptional circumstances and with the prior approval of CEA, a transmission element can be energized at lower nominal system voltage level up to 220kV.

Provided further that the SLDC may allow anti-theft charging where the transmission line is not carrying any power.

5.7 Documents and Tests Prior to Declaration of Commercial Operation:

1. Notwithstanding the requirements in other standards, codes and contracts, for ensuring grid security, the tests as specified in the following clauses shall be scheduled and carried out in coordination with SLDC by the generating company or the transmission licensee, as the case may be, and relevant reports and other documents as specified shall be submitted to SLDC before a certificate of successful trial run is issued to such a generating company or the transmission licensee, as the case may be.
2. All thermal generating stations having a capacity of more than 200 MW and hydro generating stations having a capacity of more than 25 MW shall submit documents confirming the enablement of automatic operation of the plant from the appropriate load despatch centre by integrating the controls and tele-metering features of their system into the automatic generation control in accordance with the CEA Technical Standards for Construction and the CEA Technical Standards for Connectivity.
3. Documents and Tests Required for Thermal (coal/lignite) Generating Stations:
    a. The generating company shall submit the following OEM documents, namely-
        (i) startup curve for boiler and turbine including starting time of unit in cold, warm and hot conditions,
        (ii) capability curve of generator,
        (iii) design ramp rate of boiler and turbine.

    b. The following tests shall be performed:

(i) Operation at a load of fifty-five (55) percent of MCR as per the CEA Technical Standards for Construction for a sustained period of four (4) hours.

(ii) Ramp-up from fifty-five (55) percent of MCR to MCR at a ramp rate of at least one (1) percent of MCR per minute, in one step or two steps (with stabilization period of 30 minutes between two steps), and sustained operation at MCR for one (1) hour.

(iii) Demonstrate overload capability with the valve wide open as per the CEA Technical Standards for Construction and sustained operation at that level for at least five (5) minutes.

(iv) Ramp-down from MCR to fifty-five (55) percent of MCR at a ramp rate of at least one (1) percent of MCR per minute, in one or two steps (with stabilization period of 30 minutes between two steps).

(v) Primary response through injecting a frequency test signal with a step change of ± 0.1 Hz at 55%, 60%, 75% and 100% load.

(vi) Reactive power capability as per the generator capability curve as provided by OEM considering over-excitation and under-excitation limiter settings and prevailing grid condition.

4. **Documents and Tests Required for Hydro Generating Stations** including Pumped Storage Hydro Generating Station:

a. The generating company shall submit OEM documents for the turbine characteristics curve indicating the operating zone(s) and forbidden zone(s). In order to demonstrate the operating flexibility of the generating unit, it shall be operated below and above the forbidden zone(s).

b. The following tests shall be performed considering the water availability and head:

(i) Primary response through injecting a frequency test signal with a step change of ± 0.1 Hz for various loadings within the operating zone.

(ii) Reactive power capability as per the generator capability curve considering over- excitation and under-excitation limiter settings.

(iii) Black start capability, wherever feasible.

(iv) Operation in synchronous condenser mode wherever designed.

5. **Documents and Test Required for Gas Turbine based Generating Stations:**

a. The generating company shall submit OEM documents for (i) starting time of the unit in cold, warm and hot conditions (ii) design ramp rate.
b. The following tests shall be performed:
   (i) Primary response through injecting a frequency test signal with a step change of ± 0.1 Hz for various loadings within the operating zone.
   (ii) Reactive power capability as per the generator capability curve considering over- excitation and under-excitation limiter settings.
   (iii) Black start capability up to 100 MW capacity, wherever feasible.
   (iv) Operation in synchronous condenser mode wherever designed.

6. Documents and Tests Required for the Generating Stations based on wind and solar resources:

a. The generating company shall submit a certificate confirming compliance with CEA Technical Standards for Connectivity in accordance with sub-clause (a) of clause (4) of Regulation 5.9 of these regulations.
b. Type test report for Fault Ride through Test (LVRT and HVRT) for units commissioned after the specified date as per CEA Technical Standards for Connectivity mandating LVRT and HVRT capability shall be submitted.
c. The following tests shall be performed at the point of interconnection:

   (i) Frequency response of machines as per the CEA Technical Standards for Connectivity.
   (ii) Reactive power capability as per OEM rating at the available irradiance or the wind energy, as the case may be.

   Provided that the generating company may submit offline simulation studies for the specified tests, in case testing is not feasible before COD, subject to the condition that tests shall be performed within a period of one (1) year from the date of achieving COD.

7. Documents and Tests Required for Energy Storage Systems:

a. The ESS shall submit a certificate confirming compliance with the CEA Technical Standards for Connectivity in accordance with sub-clause (a) of clause (4) of Regulation 5.9 of these regulations.
b. The following tests shall be performed at the point of interconnection:
   (i) Power output capability in MW and energy output capacity in MWh.
   (ii) Frequency response of ESS.

(iii) Ramping capability as per design.

8. Documents and Tests Required for HVDC Transmission System:

a. The transmission licensee shall submit technical details including operating guidelines such as filter bank requirements at various operating loads and monopolar/ or bipolar configuration, reactive power controller, run-back features, frequency controller, reduced voltage mode of operation, circuit design parameters and power oscillation damping, as applicable.

b. The following tests shall be performed:

(i) Minimum load operation.

(ii) Ramp rate.

(iii) Overload capability, subject to grid condition.

(iv) Black start capability in the case of Voltage source convertor (VSC) HVDC wherever feasible.

(v) Dynamic Reactive Power Support (in the case of VSC based HVDC).

9. Documents and Tests Required for SVC or STATCOM:

a. The transmission licensee shall submit technical particulars including a single line diagram, V/I characteristics, the rating of coupling transformer, the rating of each VSC, MSR and MSC branch, different operating modes, the IEEE standard Model, **Power Oscillation Damping (POD)** enabled and tuned (if not, then reasons for the same) and the results of an Offline simulation-based study to validate the performance of POD.

b. The following tests shall be performed to validate the full reactive power capability of SVC and STATCOM in both directions i.e. absorption as well as injection mode:

(i) POD performance test.

(ii) Dynamic performance testing:

Provided that the transmission licensee may submit offline simulation studies for the specified tests, in case the conduct of tests is not feasible before COD, subject to the condition that tests shall be performed within a period of one (1) year from the date of achieving COD.

5.8 Certificate of Successful Trial Run:

1. In case any objection is raised by a beneficiary in writing to the SLDC with a copy to all concerned regarding the trial run within two (2) days of completion of such trial run, the SLDC shall, within five (5) days of receipt of such objection, in coordination with the concerned entity and the beneficiaries, decide if the trial run was successful or if there is a need for a repeat trial run.
2. After completion of a successful trial run and receipt of documents and test reports as per Regulation 5.7 of these regulations, the SLDC shall issue a certificate to that effect to the concerned generating station, ESS or transmission licensee, as the case may be, with a copy to their respective beneficiary(ies) and the STU, within three (3) days.

5.9 Declaration by Generating Company and Transmission Licensee:

1. Thermal Generating Station:

a. The generating company shall certify that:

(i) The generating station or unit thereof meets the relevant requirements and provisions of the CEA Technical Standards for Construction, CEA Technical Standards for Connectivity, CEA Technical Standards for Communication, CEA (Measures relating to Safety and Electricity Supply) Regulations, 2023, CEA (Flexible operation of thermal power plants) Regulations, 2023 and these regulations, as applicable.

(ii) The main plant equipment and auxiliary systems including the balance of the plant such as the fuel oil system, coal handling plant, DM plant, pre-treatment plant, fire-fighting system, ash disposal system and any other site specific system have been commissioned and are capable of full load operation of the units of the generating station on a sustained basis.

(iii) Permanent electric supply system including emergency supplies and all necessary instrumentation, control and protection systems and auto loops for full load operation of the unit has been put into service.

b. The certificates required under sub-clause (a) of this clause shall be signed by the authorized signatory not below the rank of CMD or CEO or MD of the generating company and shall be submitted to the SLDC before the declaration of COD.

2. Hydro Generating Station:

a. The generating company shall certify that:

(i) The generating station or unit thereof meets the requirement and relevant provisions of the CEA Technical Standards for Construction, CEA Technical Standards for Connectivity, CEA Technical Standards for Communication, CEA (Measures relating to Safety and Electricity Supply) Regulations,2023 and these regulations, as applicable.

(ii) The main plant equipment and auxiliary systems including the drainage de-watering system, primary and secondary cooling system, LP and HP air compressor and fire fighting system have been commissioned and are capable of full load operation of units on a sustained basis.

(iii) Permanent electric supply systems including emergency supplies and all necessary Instrumentations Control and Protection Systems and auto loops for full load operation of the unit are put into service.

b. The certificates required under sub-clause (a) of this clause shall be signed by the authorized signatory not below the rank of CMD or CEO or MD of the generating company and shall be submitted to the SLDC before the declaration of COD.

3. Transmission system:

The transmission licensee shall submit a certificate signed by the authorized signatory not below the rank of CMD or CEO or MD of the company to the SLDC before declaration of COD that the transmission line, sub-station and communication system conform to the CEA Technical Standards for Construction, CEA Technical Standards for Connectivity, CEA Technical Standards for Communication, CEA (Measures relating to Safety and Electricity Supply) Regulations,2023 and these regulations and are capable of operation to their full capacity.

4. Wind, Solar, Storage, and Hybrid Generating Station:

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 SLDC before declaration of COD, that the said generating station or the ESS as the case may be, including main plant equipment such as wind turbines or solar inverters or auxiliary systems, as the case may be, has complied with all relevant provisions of CEA Technical Standards for

Connectivity, CEA Technical Standards for Communication, CEA (Measures relating to Safety and Electricity Supply) Regulations, 2023 and these regulations.

5.10 Declaration of Commercial Operation (DOCO) And Commercial Operation Date (COD):

1. A generating station or unit thereof or a transmission system or an element thereof or ESS may declare commercial operation as follows and inform CEA, SLDC, RLDC, RPC and its beneficiaries:

a. Thermal Generating Station or a unit thereof:

(i) The commercial operation date in the case of a unit of the thermal generation station shall be the date declared by the generating company after a successful trial run at MCR or de-rated capacity as per sub-clause (b) of clause (1) of Regulation 5.5 of these regulations, as the case may be, and submission of a declaration as per clause (1) of Regulation 5.9 of these regulations.

(ii) In the case of the generating station, the COD of the last unit of the generating station shall be considered as the COD of the generating station.

b. Hydro Generating Station:

(i) The commercial operation date in the case of a unit of the hydro generating station including a pumped storage hydro generating station shall be the date declared by the generating station after a successful trial run at MCR or de- rated capacity as per sub-clause (b) of clause (2) of Regulation 5.5 of these Regulations, as the case may be, and submission of a declaration as per Regulation 5.9 of these Regulations.

(ii) In the case of the generating station, the COD of the last unit of the generating station shall be considered as the COD of the generating station.

c. Transmission System:

(i) The commercial operation date in the case of an In-STS or an element thereof shall be the date declared by the transmission licensee on which the Transmission System or an element thereof is in regular service at 0000 hours after successful trial operation for transmitting electricity and communication signals from the sending end to the receiving end as per Regulation 5.6 and submission of a declaration as per clause (3) of Regulation 5.9 of these regulations:

Provided that the commercial operation date of a transmission element that is a part of the Associated Transmission System (ATS) shall be declared only after a successful trial run of the last element of the said ATS:

Provided further that where only some of the transmission elements of the ATS have achieved a successful trial run and the transmission licensee seeks commercial operation of such elements for utilization by such licensee and is agreed upon by the State Transmission Utility, the commercial operation date of such transmission elements of the ATS may be declared by the transmission licensee as per this Regulation:

Provided also that where only some of the transmission element(s) of the ATS have achieved a successful trial run and if the operation of such transmission elements is certified by the SLDC for improving the performance, safety and security of the grid, the commercial operation date of such transmission element(s) of the ATS may be declared by the transmission licensee as per this Regulation:

Provided also that in case a transmission system or an element thereof executed under regulated tariff mechanism is prevented from regular service on or after the scheduled COD for reasons not attributable to the transmission licensee or its supplier or its contractors but is on account of the delay in commissioning of the concerned generating station or in commissioning of the upstream or downstream transmission system of other transmission licensee, the transmission licensee shall approach the Commission through an appropriate petition along with a certificate from the STU to the effect that the transmission system is complete as per the applicable CEA Standards, for approval of the commercial operation date of such transmission system or an element thereof:

Provided also that in the case of intra-State Transmission System executed through Tariff Based Competitive Bidding, the transmission licensee may declare deemed COD of the In-STS in accordance with the provisions of the Transmission Service Agreement after obtaining (a) a certificate from the STU to the effect that the transmission system is complete as per the specifications of the bidding guidelines and applicable CEA Standards and (b) no load charging certificate from the SLDC, where no load charging is possible.

(ii) The COD of a transmission element of the transmission system under Tariff Based Competitive Bidding shall be declared only after the declaration of the COD of all the pre-required transmission elements as per the Transmission Services Agreement:

Provided that in case any transmission element is required in the interest of the power system as certified by the SLDC, the COD of the said transmission element may be declared prior to the declaration of the COD of its pre- required transmission elements.

d. Communication System:

Date of commercial operation in relation to a communication system or an element thereof shall mean the date declared by the transmission licensee from 0000 hours of which a communication system or element thereof shall be put into service after completion of the site acceptance test including transfer of voice and data to the respective control centres as certified by the State Load Despatch Centre.

e. Generating Stations based on Wind and Solar resources;
ESS and Hybrid Generating Station:

(i) The commercial operation date in the case of units of a renewable generating station aggregating to 5 MW and above or such other limit as specified in clause (3) of Regulation 5.5 of these regulations, shall mean the date declared by the generating station after undergoing a successful trial run as per clause (3) of Regulation 5.5 of these regulations, submission of declaration as per clause (4) of Regulation 5.9 of these regulations, and subject to fulfilment of other conditions, if any, as per PPA.

(ii) In the case of a generating station as a whole, the commercial operation date of the last unit of the generating station shall be considered as the COD of the generating station.

2. On declaration of commercial operation date, scheduling of the generating station or unit thereof, shall start from 0000 hours of D+2 (where D is the date when a generating station intimates the commercial operation of the generating station or unit thereof) or the commercial operation date declared by the generating station or unit thereof, whichever is later.

Chapter 6: Operating Code

6.1 General:

1. The primary objective of the integrated operation of the In-STS to ensure integrity, stability and resilience of the grid is to enhance the overall operational economy and reliability of the entire network spread over the geographical area of the State. Users shall cooperate with each other and adopt good utility practices at all times to function in coordination to ensure integrity, stability and resilience of the grid and achieve economy and efficiency in the operation of power system of In-STS.
2. All Users, In-STS and Intra State Entity shall comply with this Operating Code, for deriving maximum benefits from the integrated operation and for equitable sharing of responsibilities.
3. All licensees, generating company and any other Users connected to the In-STS shall comply with the directions issued by the concerned load despatch centres to ensure integrated grid operation and for achieving the maximum economy and efficiency in the operation of the In-STS.

6.2 Operating Conditions:

1. SLDC shall supervise the overall operation of the In-STS.
2. **SLDC, in coordination with OCC formed under GCRP, detailed operating procedures for State grid shall be developed, maintained and updated by the SLDC, consistent with the detailed operating procedures of RLDC/NLDC for managing the In-STS. These operating procedures shall include the following:**

    a. **Black start procedures;**
    b. **System restoration procedures for partial grid failure;**
    c. **Load curtailment procedures;**
    d. **Renewable energy curtailment procedures;**
    e. **Islanding procedures; and**
    f. **Any other procedure considered appropriate by the SLDC.**

Provided that such procedures shall be developed in consultation with Users, licensees, renewable energy developers and RLDC within sixty (60) days from the date of notification of these Regulations.

Provided further that such procedures, after consulting in Grid Code Review Panel, shall be provided to all the Users. A copy of the same shall be uploaded on SLDC's website and submitted to the Commission for information.

3. The control rooms of the SLDC including Area load Despatch Centre, Generating Stations, Substations of 33 kV and above and any other control centres of Transmission Licensees and Users shall be managed Round the Clock by qualified and adequately trained personnel. Alternatively, the same may be operated round the clock from a remotely located control room, subject to the condition that such remote operation does not result in a delay in the execution of any switching instructions and information flow:

   Provided that a transmission licensee owning a transmission line but not owning the connected substation, shall have a coordination centre functioning round the clock, manned by qualified personnel for operational coordination with the concerned load despatch centres and equipped to carry out the operations as directed by concerned load despatch centres.

   Provided that the control centres of distribution licensees including deemed distribution licensees shall carry out functions such as demand forecasting, load management, power management and real time revisions in schedule, demand curtailment etc.

4. The control rooms shall have regular interaction with SLDC and act upon the instructions received from SLDC.

5. The distribution licensees shall also develop online tracking and monitoring system for distributed generation including rooftop solar PV systems above 50kW within its licence area for facilitating decisions of revision of drawal schedule during intra-day operation.

6. QCA shall have coordination centres functioning round the clock, manned by qualified personnel for operational coordination with the concerned load

despatch centres and generating stations. ESS and Bulk Consumers, which are Intra State entities shall have coordination centres functioning round the clock and manned by qualified personnel for operational coordination with the concerned load despatch centres.

6.3 System Security Aspects:

1. All Users and Transmission Licensees shall endeavour to operate their respective power systems and power stations in synchronization with each other at all times in coordination with the concerned load despatch centres.
2. All switching operations, manually or automatic, shall be based on guidelines of the following:
    a. KEGC / IEGC Regulations, and as amended from time to time;
    b. Instructions/Guidelines/Procedures issued by SLDC;
    c. Directives of the Commission; and
    d. Decisions/Recommendations made by Grid Code Review Panel.

3. No part of the In-STS shall be deliberately isolated from the rest of the grid, except:-
    a. Under an emergency and conditions in which such isolation will prevent a total grid collapse and/or will enable early restoration of power supply;
    b. When serious damage to the equipment is imminent and such isolation will prevent it;
    c. When such isolation is specifically instructed by the SLDC;
    d. On the operation of under frequency/ islanding scheme as approved by SLDC; For the safety of human and/or animal life.

    Any such isolation shall be reported to the respective SLDC within the next 15 minutes.

4. Complete synchronization of the In-STS shall be restored as soon as the conditions permit. The restoration process shall be supervised by SLDC, in coordination with ALDC in accordance with the operating procedures separately formulated by SLDC.

5. No important element of the In-STS shall be deliberately opened or removed from service at any time, except when specifically instructed by SLDC or with a specific and prior clearance of SLDC. **The list of such important grid elements including vital distribution elements on which the above stipulations apply shall be prepared and reviewed at least in every three (3) months by the SLDC in consultation with the**

Transmission Licensees and Users and shall be available on SLDC's website.

Provided that, in case of opening/removal of any important element of the In- STS under an emergency situation, the same shall be communicated to SLDC within fifteen (15) minutes after the event.

Provided further that any emergency tripping not advised or permitted by SLDC shall be put up before the PCCC, in the subsequent meeting.

6. Any tripping, whether manual or automatic, of any of the elements of the In-STS, referred in Regulation 6.3 (3), shall be precisely intimated by the concerned Transmission Licensee or User to the SLDC within fifteen (15) minutes. The reason, to the extent determined, and likely time of restoration shall also be intimated within half an hour. All reasonable attempts shall be made for the elements' restoration as soon as possible:

   Provided that the information/data from disturbance recorder, sequential event logger outputs, etc., containing the sequence of tripping and restoration or any other information as asked, shall be sent to SLDC for the purpose of analysis:

   Provided further that such information/data may be directly made available at SLDC through suitable communication media for faster post fault analysis during grid disturbances.

7. Maintenance of grid elements shall be carried out by the respective users in accordance with the provisions of the CEA Grid Standards. Outage of an element that is causing or likely to cause danger to the grid or sub-optimal operation of the grid shall be monitored by the SLDC. SLDC shall report such outages to the Commission and grid code review panel shall issue suitable instructions to restore such elements in a specified time period.

8. SLDC, in coordination with SRLDC, Users and Transmission Licensees shall make all possible efforts to ensure that frequency remains within the band of 49.90 Hz to 50.05 Hz as specified in CERC (IEGC) Regulations, and as amended from time to time.
9. Users and Transmission Licensees shall provide automatic under-frequency and df/dt relay-based load curtailment/islanding schemes in their respective systems, wherever applicable, to arrest frequency decline that could result in a collapse/disintegration of the In-STS, as per the directives of the Regional Power

Committee (RPC) and PCCC and shall ensure its effective application to prevent cascade tripping of generating units in case of any contingency.

10. Users and Transmission Licensees shall ensure that the under-frequency and df/dt relay- based load curtailment/islanding schemes, mentioned in Regulation 6.3 (9) are always functional:

    Provided that the relays may be temporarily kept out of service, in extreme contingencies, with the prior consent of SLDC.

11. Transmission licensees and Users shall carry out periodic inspection of the under - frequency relays and produce the report to SLDC. SLDC shall maintain the record of under frequency relay and/or df/dt relay operation details:

    Provided that SLDC shall decide and intimate the action required to the Users and Transmission Licensee to get required load relief from under frequency relay and/or df/dt relay operation:

    Provided also that SLDC shall keep comparative data of expected load relief and actual load relief obtained in real-time system operation.

12. **Users and Transmission Licensees shall facilitate identification, installation and commissioning of System Protection Schemes in the power system (including inter-tripping and runback) as finalized by PCCC, to operate the In-STS closer to their limits and protect against situations including voltage collapse, cascading and tripping of the important corridor:**

    Provided that such schemes shall always be kept in service. If any such scheme is to be taken out of service, prior permission of SLDC shall be obtained indicating the reasons and period of the anticipated outage from service.

    Provided further that such schemes shall be prepared by SLDC after due consultations with PCCC formed under GCRP.

13. SLDC, in consultation with the STU, users and transmission licensee, shall prepare detailed procedures in accordance with CEA (Grid Standards) Regulations, 2010 and as per the Restoration/Recovery procedures of these Regulations for restoration of the State grid under partial and total blackouts which shall be reviewed and updated annually by the SLDC. These procedures shall be followed by all the Users, STU and SLDC to ensure consistent, reliable, and quick restoration.

14. Each User and Transmission Licensee shall provide adequate and reliable communication facility internally and to SLDC, other Users and other Transmission Licensees to ensure the exchange of data/information necessary to maintain reliability and security of the In-STS. Wherever possible, redundancy and alternate path shall be maintained for communication along the important routes, e.g., Users to Distribution Licensee/respective entity to SLDC.
15. All Users and Transmission Licensees shall send the requested information/data including disturbance recorder/sequential event recorder output, etc., within 24 hours to SLDC for the purpose of analysis of any grid disturbance/event. No User or Transmission Licensee shall block any data/information required by the SLDC and/or RLDC for maintaining reliability and security of the State and/or Regional Grid and for analysis of an event.
16. A generating unit shall be capable of continuously supplying its normal rated active and/or reactive output at the rated system frequency and voltage, subject to the design limitations specified by the manufacturer.
17. A generating unit shall be provided with an Automatic Voltage Regulator (AVR), protective devices and safety devices, as set out in Connection Agreement and/or specified by the Authority.
18. All generating units shall be provided with an AVR, protective and safety devices, as set out in Connection Agreement. All generating units shall normally have their AVR in operation, with appropriate settings:

    Provided that in case a generating unit of over 100 MW is required to be operated without its AVR in service, the SLDC shall be immediately intimated about the reason and duration, and its permission is obtained.

19. The tuning of AVR, PSS, Voltage Controllers including for low and high voltage ride through capability of wind and solar generators or any other requirement as per CEA Technical Standards for Connectivity shall be carried out by the respective generating station:
    a. at least once every five (5) years;
    b. based on operational feedback provided by the SLDC after analysis of a grid event or disturbance; and
    c. in case of major network changes or fault level changes near the generating station as reported by STU or SLDC, as the case may be.
    d. in case of a major change in the excitation system of the generating station.

20. Power System Stabilizers (PSSs), AVRs of generating units and reactive power controllers shall be properly tuned by the generating station as per the plan and the procedure prepared by the RPC. In case the tuning is not complied with as per the plan and procedure, the SLDC shall issue notice to the defaulting generating station to complete the tuning within a specified time, failing which the SLDC may approach the Commission under Section 33 of the Act.
21. Provisions of protection and relay settings shall be coordinated periodically throughout the State grid, as per the plan finalized by the RPC/PCCC in accordance with the Protection Code of these regulations.
22. RPC will prepare the islanding schemes in accordance with the CEA Grid Standards for identified generating stations, cities and locations and ensure their implementation. The islanding schemes shall be reviewed and augmented depending on the assessment of critical loads at least once a year or earlier, if required.
23. The Mock drill of the islanding schemes which will be carried out annually by the RLDC in coordination with the SLDC and other users involved in the islanding scheme. In case mock drill with field testing is not possible to be carried out for a particular scheme, joint simulation testing shall be carried out by the RLDC, SLDC & STU.
24. All distribution licensees, transmission licensees and bulk consumers shall provide automatic under- frequency relays (UFR) and df/dt relays for load shedding in their respective systems to arrest frequency decline that could result in grid failure as per the plan given by the RPC from time to time. The default UFR settings shall be as specified in Table-2 below:

Table 2: Default UFR Settings

Sl. No.	Stage of UFR Operation	Frequency (Hz)
1	Stage-1	49.40
2	Stage-2	49.20
3	Stage-3	49.00
4	Stage-4	48.80
Note 1: STU shall plan UFR settings and df/dt load shedding schemes depending on their local load generation balance in coordination with and approval of the RPC.		
Note 2: Pumped storage hydro plants operating in pumping mode or ESS operating in charging mode shall be automatically disconnected before the first stage of UFR.		

The load shedding for each stage of UFR operation, in percentage of demand or MW shall be as finalized by the RPC.

25. The following shall be factored in while designing and implementing the UFR and df/dt relay schemes:
    a. The under-frequency and df/dt load shedding relays are always functional.
    b. Demand disconnection shall not be set with any time delay in addition to the operating time of the relays and circuit breakers.
    c. There shall be a uniform spatial spread of feeders selected for UFR and df/dt disconnection. SLDC shall ensure that telemetered data of feeders (MW power flow in real time and circuit breaker status) on which UFR and df/dt relays are installed is available at its control centre.
    d. SLDC shall monitor the combined load in MW of these feeders at all times.
    e. SLDC shall share the above data with the RLDC in real time and submit a monthly exception report to the RPC.
    f. RLDC will inform SLDC as well as the RPC on a quarterly basis, durations during the quarter when the combined load in MW of these feeders was below the level considered while designing the UFR scheme by the RPC.
    g. SLDC shall take corrective measures within a reasonable period and inform the RLDC and RPC, failing which suitable action may be initiated by the RPC.
    h. RPC will undertake a monthly review of the UFR and df/dt scheme and also carry out random inspection of the under-frequency relays. RPC will publish such a monthly review along with an exception report on its website.
    i. SLDC shall report the actual operation of UFR and df/dt schemes and load relief to the RLDC and RPCs and publish the monthly report on its website.
26. SLDC, STU or users may identify the requirement of System Protection Schemes (SPS) (including inter-tripping and run-back) in the power system to operate the transmission system within operating limits and to protect against situations such as voltage collapse, cascade tripping and tripping of important corridors/flow-gates. Any such SPS at the intra-State level shall be finalized after conducting system studies by the SLDC in consultation with PCCC. SPS shall be installed and commissioned by the concerned users. SPS shall always be kept in service. If any SPS at the intra-state level is to be taken out of service, the permission of the SLDC shall be required.

27. Special requirements for Renewable Energy:

a. System Operator shall make all efforts to evacuate the available Solar, wind, mini-hydel and hybrid of wind/solar/mini-hydel sources and treat the plants as must-run stations. However, SLDC may instruct such generator to back down generation in case grid security or safety of any equipment or personnel is likely to be endangered and such Renewable Energy (RE) sources shall comply with the same. For this, Data Acquisition System facility shall be provided by the generator for transfer of information to the SLDC. **The RE curtailment procedure shall be prepared by Grid Code Review Panel and same shall be implemented with due intimation to the Commission.**

(i) SLDC may direct a Wind/Solar//mini-hydel Generators to curtail its VAR drawal/injection in case the security of grid or safety of any equipment or personnel is endangered.

(ii) During the wind generator start-up, the wind generator shall ensure that the reactive power drawal (inrush currents in case of induction generators) shall not affect the grid performance.

6.4 Frequency Control and Reserves:

6.4.1 Frequency Control:

1. The National Reference Frequency is 50.000 Hz and the allowable band of frequency range 49.900-50.050 Hz or Specified by Central Commission from time to time. The frequency shall be measured with a resolution of +/-0.001 Hz by SLDC and such frequency data measured every second shall be archived by SLDC.
2. The SLDC shall endeavour that the grid frequency remains close to 50.000 Hz and in case frequency goes outside the allowable band, ensure that the frequency is restored within the allowable band of 49.900-50.050 Hz at the earliest in consultation with RLDC and NLDC.
3. All users shall adhere to their schedule of injection or drawal, as the case may be, and take such action as required under these regulations and as directed by Load Despatch Centres so that the grid frequency is maintained and remains within the allowable band.

6.4.2 Reserves:

4. There shall be reserves as under:

a. Primary, Secondary and Tertiary reserves:

(i) Primary, Secondary and Tertiary reserves shall be deployed for the purpose of frequency control, reducing area control error and relieving congestion.

(ii) The response under Primary reserve shall be provided as per these Regulations.

(iii) Secondary reserves including automatic generation control and demand response shall be deployed by the control area as per these regulations or the CERC Ancillary Services Regulations or the KERC (Ancillary Services) Regulations 2025 as the case may be.

(iv) Tertiary reserves shall be deployed by the control area as per these Regulations or the CERC Ancillary Services Regulations or the KERC (Ancillary Services) Regulations 2025, as the case may be.

b. Black Start reserves:

Generating stations having black start capability, ESS and HVDC Station based on VSC shall be identified by SLDC in consultation with RLDC at the State level, to act as black start reserves.

c. Voltage Control reserves:

Voltage Control reserves shall be deployed for controlling the voltage at a bus or sub-system through reactive power injection or drawal.

5. The reserves shall be operated as Ancillary Services, namely-
   (a) Primary Reserve Ancillary Service (PRAS);
   (b) Secondary Reserve Ancillary Service (SRAS);
   (c) Tertiary Reserve Ancillary Service (TRAS);
   (d) Black Start Ancillary Services; and
   (e) Voltage Control Ancillary Services.
6. The mechanism of procurement and deployment of PRAS, SRAS & TRAS shall be as specified in these regulations or in the CERC Ancillary Services Regulations or the KERC (Ancillary Services) Regulations 2025, as the case may be.
7. The primary response of the generating units shall be verified by the SLDC during grid events. The concerned generating station shall furnish the requisite data to the SLDC within two (2) days of notification of reportable event by the NLDC.

6.4.3 Control Hierarchy:

8. **Inertia:** The power system shall be operated at all times with a minimum inertia to be stipulated by SLDC so that the minimum nadir frequency post reference contingency stays above the threshold set for under frequency load shedding (UFLS). To maintain the minimum inertia, the SLDC may, if required, bring quick start generation (including synchronous generation) on bar and reschedule generation including curtailment of wind, solar and wind-solar hybrid generation, in coordination with the RLDC and NLDCs. **The compensation for such quick start generation (including synchronous generation) shall be included in the procedure to be prepared by SLDC and approved by the Commission.**

9. **Primary Control:**
   a. Primary control is local automatic control in a generating unit or energy storage system or demand side resource for the purpose of adjusting its active power output or consumption, as the case may be, in response to frequency excursion. Primary control is the immediate automatic control implemented through turbine speed governors or frequency controllers.
   b. Primary control shall be provided by the **Primary Reserves Ancillary Service (PRAS).**
   c. The minimum quantum of PRAS required for reference contingency will be declared by NLDC at the start of each financial year.
   d. The generating stations and units thereof shall have electronically controlled governing systems or frequency controllers in accordance with the CEA Technical Standards for Connectivity and are mandated to provide PRAS. The generating stations and units thereof with governors shall be under Free Governor Mode of Operation.
   e. SLDC may also identify other resources such as ESS and demand resource to provide PRAS in consultation with RLDC & NLDC for which PRAS Providers shall be compensated in accordance with the CERC Ancillary Services Regulations or the KERC (Ancillary Services) Regulations 2025, as the case may be.
   f. SLDC shall assess the frequency response characteristics (FRC) and Frequency Response Performance (FRP) for Intra state entity(ies) within the State control area as per procedure formulated by NLDC.

g. All the generating units shall have their governors or frequency controllers in operation all the time with droop settings of 3 to 6 % (for thermal generating units and WS Seller) or 0-10% (for hydro generating units) as specified in the CEA Technical Standards for Connectivity.

h. The primary response requirement shall be as mentioned in Table-3.

TABLE-3:

Primary Response of Various Types of Generating Units:

Fuel/ Source	Minimum unit size/Capacity	Up to
Coal/Lignite Based	200 MW and above	±5% of MCR
Hydro	25 MW and above	±10% of MCR
Gas based	Gas Turbine above 50 MW	±5% of MCR (corrected for ambience temperature)
WS Seller (commissioned after the date as specified in the CEA Technical Standards for Connectivity)	Capacity of Generating station more than 10 MW and connected at 33 kV and above	As per CEA Technical Standards for Connectivity

Provided that:

(i) WS Sellers commissioned after the date as specified in CEA Technical Standards for Connectivity shall have the option to provide primary response individually through ESS or through a common ESS installed at its pooling station.

(ii) Nuclear generating stations and hydro generating stations (with pondage up to 3 hours or Run-of-the river projects) shall be exempt from mandatory primary response. They may provide the primary response to the extent possible, considering the safety and security of machines and humans.

i. All generating stations mentioned in Table-3 (under sub-clause (g) of this clause) shall have the capability of instantaneously picking up to a minimum of 105% of their operating level and up to 105% or 110% of their MCR, as the case may be, when the frequency falls suddenly and thus providing primary response whenever conditions arise.

Any generating station not complying with the above requirements shall be kept in operation (synchronized with the State/regional grid) only after obtaining the permission of the SLDC.

Provided that, the provision shall not be applicable for the wind/solar/hybrid generators operating without BESS.

j. All generating stations, including the WS seller mentioned in Table-3 (under sub-clause (g) of this clause) shall have the capability of reducing output at least by 5% or 10%, as applicable, of their operating level and up to 5% or 10% of their MCR, as applicable, limited to the minimum turndown level when the frequency rises above the reference frequency and thus providing primary response, whenever condition arises. Any generating station not complying with the above requirements shall be kept in operation (synchronized with the State/regional grid) only after obtaining permission from the SLDC.

k. The normal governor action shall not be suppressed in any manner through load limiter, Automatic Turbine Run-up System (ATRS), turbine supervisory control or coordinated control system and no time delays shall be deliberately introduced. In the case of a renewable energy generating unit, a reactive power limiter or power factor controller or voltage limiter shall not suppress the primary frequency response within its capabilities. The inherent dead band of a generating unit or frequency controller shall not exceed +/- 0.03 Hz.

   The governor shall be set with respect to a reference frequency of 50.000 Hz and response outside the dead band shall be with respect to a total change in frequency.

l. The thermal and hydro generating units shall not resort to Valve Wide Open (VWO) operation to make available margin for providing governor action.

m. The PRAS shall start immediately when the frequency deviates beyond the dead band as specified in sub-clause (k) of this clause and shall be capable of providing its full PRAS capacity obligation within 45 seconds and sustaining at least for the next five (5) minutes.

n. SLDC shall assess its frequency response characteristics of its control area and share the assessment with the RLDC along with high resolution data of at least ten (10) seconds for Intra state entity Generating Stations and energy storage systems. Higher resolution data from GT terminal shall be furnished by Generators to SLDC, which shall be verified by SLDC and same will be furnished to SRLDC.

o. All intra state entity Generating Stations and Users (as applicable) connected to In-STS shall submit their frequency response characteristics (FRC) to SLDC on monthly basis to corroborate their self-certification regarding the compliance to governor mode of operation.

p. Except under an emergency, or to prevent imminent damage to the equipment, no User shall suddenly reduce his generating unit output by more than the limit as specified by the SLDC, without prior intimation to and consent of the SLDC. Similarly, no User shall cause a sudden variation in its load by more than the limit as specified by the SLDC, without prior intimation to and consent of the SLDC. All the Users shall ensure that temporary overvoltage due to sudden load rejection and the maximum permissible values of voltage unbalance shall remain within limits specified under IEGC or Authority as amended from time to time.

q. SLDC shall grade the median Frequency Response Performance annually, considering at least ten (10) reportable events. In case the median Frequency Response Performance is less than 0.75 as calculated as per the procedure of IEGC-2023, SLDC after analysing the FRP shall direct the concerned entities to take corrective action. All such cases shall be reported to the RPC for its review.

10. Secondary Control:

a. Secondary control is a centralized automatic function to regulate the generation or load in a control area to restore the frequency within the allowable band or replenish deployed primary reserves.

b. Secondary Control shall be provided by a generating station or an entity having energy storage resource or an entity capable of providing demand response, on a standalone or aggregated basis, connected to the inter-State transmission system or the intra-State transmission system, as a Secondary Reserve Ancillary Service (SRAS) Provider, as specified in the CERC Ancillary Services Regulations or KERC Ancillary Services Regulations.

c. Secondary control signals will be automatically generated from SLDC and will be transmitted to SRAS Providers for desired automated response when the Area Control Error (ACE) for State goes beyond the minimum threshold limit of ±10 MW, which may be reviewed from time to time based on the review of the performance of SRAS. However, the SRAS provider participating in National/Regional SRAS secondary control signals will be automatically generated from NLDC and will be transmitted to SRAS Providers through the RLDC exercising the control area jurisdictions for desired automated response when the Area Control Error (ACE) for each region goes beyond the minimum threshold limit of ±10 MW, which may be reviewed from time to time based on the review of the performance of SRAS. However, in this case the State DSM would be corrected in real time.

Provided that as and when the bi-directional communication system of National/Regional SRAS providers with RLDC is fully established, secondary control signals will be automatically generated from the respective RLDC.

d. ACE of State shall be auto calculated at the control centre of SLDC based on telemetered values, and external inputs, namely, the Frequency Bias Coefficient and Offset referred to in sub-clauses (f) and (g) respectively of this clause as per the following formula:

ACE = (Ia– Is) – 10 * Bf * (Fa – Fs) + Offset

Where,

Ia = Actual net interchange in MW (positive value for export)
Is = Scheduled net interchange in MW (positive value for export)
Bf = Frequency Bias Coefficient in MW/0.1 Hz (negative value).
Fa = Actual system frequency in Hz
Fs = Schedule system frequency in Hz
Offset = Provision for compensating measurement error

e. Frequency Bias Coefficient (Bf) shall be assessed and declared by NLDC for the State. Frequency Bias Coefficient shall normally be based on the median Frequency Response Characteristics (FRC) observed during the previous financial year of each control area and refined from time to time.

f. Offset shall be used to account for measurement errors and shall be decided by SLDC for its control area.

g. Secondary control may be operated under tie-line bias control, flat frequency control or flat tie-line control mode depending on grid requirements:

Provided that Secondary control may be suspended due to system maintenance or grid security or for any other reasons to be recorded in writing.

h. Schedule system frequency (Fs) shall be a reference frequency of 50 Hz unless otherwise specified by NLDC under certain conditions to be recorded in writing.

i. SLDC shall compute the ACE of the state control area in real time based on telemetered data. ACE data shall be archived at an interval of 10 seconds or less. SLDC shall share the data with the RLDC and NLDC.

j. The SRAS Providers shall start responding to SRAS signals within thirty (30) seconds of receipt of the signal and shall be capable of providing the entire SRAS capacity obligation within fifteen (15) minutes and sustaining it at least for the next thirty (30) minutes. The secondary reserves shall be gradually replaced by tertiary reserves within 30 minutes.

k. With due regard to the requirement of planning reserve margin and resource adequacy referred to in Chapter 3 of these regulations and based on the following methodologies, the secondary reserve capacity requirements shall be estimated by SLDC for State control areas:

   The positive and negative secondary reserve capacity requirements for any control area for a calendar year shall be equal to the 99 percentile of positive and negative ACE respectively of that control area during the previous financial year.

   OR

   The secondary reserve capacity requirement for any control area shall be equal to the 110% of the largest unit size in the respective regional control area or state control area plus load forecast error plus wind forecast error plus solar forecast error during the previous calendar year.

   OR

   Such other methodology as may be stipulated by NLDC after obtaining the due approval of the Central Commission.

l. Until specified by the State Commission, the methodology specified in sub-clause (k) of this clause shall be adopted by the SLDC to estimate the secondary reserve capacity requirement in State control areas.

m. The reserve capacity requirement as per the methodology mentioned in sub-clauses (l) of this clause shall be estimated by SLDC by 15th January every year for the next financial year and submitted to NLDC.

n. All India secondary reserve capacity requirement for the regional control area and the State control area will be estimated by NLDC based on reference contingency and other factors such as forecast errors.

o. NLDC will allocate such all India secondary reserves capacity, to be maintained at regional control area and at State control area, based on the estimated reserves as per sub-clauses (k) and (l) of this clause and publish the information on its website by 25th January every year.

p. NLDC through RLDC will re-assess the quantum of requirement of secondary reserves required at the state control area three (3) days before the day of scheduling and communicate the same to the SLDC. Same shall be apportioned to their control area of Distribution Licensee by SLDC.

q. SLDC shall ensure the availability of the quantum of secondary reserve at the State control area with due regard to the secondary reserves estimated and allocated for the State as published by NLDC in terms of sub-clauses (o) and (p) of this clause by allocating each Distribution Licensee/s, and inform the same to the RLDC and NLDC two (2) days before the day of scheduling. The modalities for information exchange and timelines in this respect shall be as per the detailed procedure to be issued by NLDC.

r. If a Distribution licensee/s falls short of maintaining secondary reserve capacity as allocated to it in terms of sub-clauses (o) or (p) of this clause, whichever is lower, the SLDC will procure such Secondary reserve capacity on behalf of the Distribution Licensee/s under advance intimation to the Distribution Licensee/s and allocate the cost of procurement of such capacity to that Distribution Licensee/s based on the assessment. SLDC may use the amount for procurement of secondary reserves from the DSM pool account, RE DSM pool account or any other pool account specified by the State Commission.

s. Further, if SLDC falls short of maintaining secondary reserve capacity as allocated to it in terms of sub-clauses (o) or (p) of this clause, whichever is lower, the NLDC through RLDC will procure such Secondary reserve capacity on behalf of the State under advance intimation to the State and allocate the cost of procurement of such capacity to that State based on the CERC Regulations & detailed procedures and its amendments from time to time. **The Procedure for cost allocation among Users/generating Stations shall be finalized by Grid Code Review Panel and approved by KERC.**

t. SLDC shall indicate the shortfall in secondary reserves, if any, and announce emergency alerts for such periods.

u. Secondary reserves will be procured by the SLDC from a generating station or an entity having energy storage resources or an entity capable of providing demand response, on a standalone or aggregated basis, connected to the intra-State transmission or Service provider in the inter-State transmission system in accordance with the CERC Ancillary Services Regulations or KERC Ancillary Services Regulations.

v. All thermal generating stations having a capacity of more than 200 MW and hydro generating stations having a capacity of more than 25 MW shall make arrangements to enable automatic operation of the plant from the Appropriate load despatch centre by integrating the controls and telemetering features of their system into the automatic generation control in accordance with the CEA Technical Standards for Construction and the CEA Technical Standards for Connectivity. The communication system shall be established in accordance with the CEA Communication Regulations.

w. All renewable energy generating stations and ESS shall be equipped with the facility to control active power injection in accordance with the CEA Connectivity Standards and the communication system shall be established in accordance with the CEA Technical Standards for Communication.

x. SRAS shall have a bi-directional communication system along with metering and SCADA telemetry in place, as per the requirements stipulated in the Detailed Procedure issued under the KERC Ancillary Service Regulations.

11. Tertiary Control:

a. Tertiary reserve requirement for the regional control area and the State control area, will be estimated by NLDC with due regard inter alia to the requirement of planning reserve margin and resource adequacy as referred to in IEGC and its amendments, so as to take care of contingencies and to cater to the need for replacing secondary reserves estimated as per clause 6.4.3(10) of this Regulation by 25th January every year, which will be implemented for the next financial year from 1st April onwards by the State control areas.

b. NLDC will allocate such tertiary reserve capacity, to be maintained at state control areas, based on the estimated reserves as per IEGC and publish the information on its website by 25th January every year.

c. NLDC through RLDC will re-assess the quantum of requirements for tertiary reserves required at the state control area three (3) days before the day of scheduling and communicate the same to the SLDC. Same shall be apportioned to their control area of Distribution Licensee by SLDC.

d. Distribution licensee/s shall ensure the availability of the quantum of tertiary reserve at their control area with due regard to the tertiary reserves estimated and allocated for the State as published by NLDC in terms of sub-clauses (b) and (c) of this clause, and inform the same to the SLDC two (2) days before the day of scheduling.

e. Distribution licensee/s shall ensure availability of the quantum of tertiary reserve at their control area on day ahead basis with due regard to the tertiary reserves estimated and allocated for its share by SLDC in terms of sub-clause (b) and (c) of this clause, and inform the same to the SLDC.

f. If a Distribution licensee/s falls short of maintaining tertiary reserve capacity as allocated to it in terms of sub-clauses (b) or (c) of this clause, whichever is lower, the SLDC will procure such tertiary reserve capacity on behalf of the Distribution Licensee/s under advance intimation to the Distribution Licensee/s and allocate the cost of procurement of such capacity to that Distribution Licensee/s based on the assessment. SLDC may use the amount for procurement of tertiary reserves from the DSM pool account, RE DSM pool account or any other pool account specified by the State Commission.

g. Further, if SLDC falls short of maintaining tertiary reserve capacity as allocated to it in terms of sub-clauses (b) or (c) of this clause, whichever is lower, the NLDC through RLDC will procure such tertiary reserve capacity on behalf of the said State under advance intimation to the State and allocate the cost of procurement of such capacity to that State based on the methodology as mandated in IEGC. **The Procedure for cost allocation among Users/generating Stations would be finalized by Grid Code Review Panel and approved by the Commission.**

h. Tertiary reserves will be procured by the SLDC/NLDC from a generating station or an entity having energy storage resources or an entity capable of providing demand response, on a standalone or aggregated basis, connected to the inter-State transmission system or the intra-State transmission system in accordance with the CERC/KERC Ancillary Services Regulations.

i. Tertiary reserves to be provided by the TRAS provider shall be capable of providing TRAS within fifteen (15) minutes of despatch instructions from SLDC/NLDC, and shall be capable of sustaining the service for at least the next sixty (60) minutes. TRAS shall be activated and deployed by the appropriate load despatch center on account of the following events:

(i) To replenish the secondary reserve, in case the secondary reserve has been deployed continuously in one direction for fifteen (15) minutes for more than 100 MW or in respect of the State such other volume limit as may be specified by the KERC;

(ii) Generating unit or transmission line outages;

(iii) Any such other event affecting the grid security.

12. The quantum of reserves procured for State control area shall be communicated by SLDC to the RLDC.

6.5 Operational Planning:

1. Time Horizon

a. Operational planning shall be carried out in advance by SLDC within control areas with Monthly and Yearly time horizons in co- ordination with STU, RPC or Users, as applicable.

b. Operational planning shall be carried out in advance by SLDC within control areas on Intra- day, Day Ahead, Weekly time horizons.

c. SLDC in consultation with RLDC/NLDC shall issue procedures and formats for data collection to carry out:

   (i) Operational planning analysis,

   (ii) Real-time monitoring,

   (iii) Real-time assessments.

2. Demand Estimation:

a. The SLDC shall set out the responsibilities for short term (one (1) day to 52 weeks) demand estimation of active as well as reactive power (MW, MVAr and MWh) for operational purpose. It shall also provide procedures, formats as well as timelines to be followed for exchange of information between the concerned entities for arriving at these estimates:

   Provided that SLDC shall refer to the demand estimate considered by the STU while developing the transmission system plan **under Resource Planning Code** of these Regulations.

b. Demand estimation by SLDC shall be for both active power and reactive power incidents on the transmission system based on the details collected from distribution licensees, grid- connected distributed generation resources, captive power plants and other bulk consumers embedded within the State.

c. SLDC shall also estimate peak and off-peak demand (active as well as reactive power) on a weekly and monthly basis for load - generation balance planning as well as for operational planning analysis, which shall be a part of the operational planning data. The demand estimates mentioned above shall have granularity of a time block. The estimate shall cover the load incident on the grid as well as the net load incident taking into account embedded generation in the form of roof-top solar and other distributed generation.

d. All Buyers shall be responsible for the estimation of their own demand. Buyers shall submit their demand estimation to SLDC for demand estimate of the State.

e. Each Buyer shall develop methodology for daily/weekly/monthly/yearly demand estimation in MW and MWh for operational analysis purposes as well resource adequacy. All Buyers shall also maintain historical database for demand estimation.

f. Each Buyer shall utilize state of the art tools, weather data, historical data, and any other data for getting effective demand estimate for operational use. Each Buyer shall compare the actual demand with forecast demand and compare the forecasting error for improvement. The Buyers shall maintain the data of forecast error for daily/day- ahead/weekly/monthly and yearly basis on their website.

g. The demand estimation shall cover the different time periods such as short term, medium term, and long term as applicable for operational purposes. The time period shall be decided after considering the requirements under other existing Regulations for furnishing demand estimate related information.

h. Each Buyer shall submit node-wise morning peak, evening peak, day shoulder and night off-peak estimated demand in MW and MVAr on monthly and quarterly basis at all nodes including and above 110 kV for preparation of scenarios for computation of ATC/TTC by SLDC.

i. Timeline for submission of demand estimate data by Distribution licensees/Buyer or other entities directly connected to In-STS, as applicable, to SLDC shall be as follows:

Table 4: Timeline for Demand Estimation

Daily Demand Estimation	09:00 hours of previous day
Weekly Demand Estimation	First working day of previous week (By 13:00hrs)
Monthly Demand Estimation	Fourth day of previous month
Yearly Demand Estimation	15^{th} September of the previous year

j. SLDC and Distribution licensee/Buyer shall compute forecasting error for intra-day, day- ahead, weekly, monthly and yearly forecasts and analyze the same in order to reduce forecasting error in the future. The computed forecasting errors shall be made available by SLDC and Distribution licensee/Buyer on their respective websites.

6.6 Outage Planning:

1. **Outage planning shall be prepared for the grid elements in a coordinated and optimal manner keeping in view the system operating conditions and grid security**. The coordinated generation and transmission outage plan for the national and regional grid shall take into consideration all the available generation resources, demand estimates, transmission constraints, and factor in water for irrigation requirements, if any. To optimize the transmission outages of

the national and regional grids, to avoid grid operation getting adversely affected and to maintain system security standards, the outage plan shall also take into account the generation outage schedule and the transmission outage schedule.

2. **Annual outage plan shall be prepared as follows:**
   a. Annual outage plan of grid elements under State control areas, shall be prepared in advance for the financial year by the SLDC in consultation with the users, STU, and reviewed before every quarter and every month.
   b. Annual outage plan shall be prepared in such a manner as to minimize the overall downtime, particularly where multiple entities are involved in the outage of any grid element(s).
   c. The outage plan of hydro generation plants, REGS and ESS and its associated evacuation network shall be prepared with a view to extracting maximum generation from these sources.

      Example: Outage of wind generator may be planned during lean wind season. Outage of solar generator, if required, may be planned during the rainy season. Outage of hydro generator may be planned during the lean water season.
   d. Protection relay related outages, auto–re-closure outages and SPS testing outages shall be planned on a monthly basis with the prior permission of the SLDC.

3. **Outage Planning Process shall be as follows:**
   a. All Users including buyers and sellers and Transmission Licensees shall provide SLDC with their proposed planned outage programmes in writing for the next financial year by 31st July of each year. These shall contain identification of each Generating Unit/Transmission Line/Interconnecting Transformer for which outage is being planned, reasons for the outage, the preferred date for each outage and its duration and where there is flexibility, the earliest start date and latest end date.

      SLDC shall prepare the outage programme for the next financial year by 31st August of each year for the In-STS.

Provided that outage plan shall be developed after considering system security and reliability and shall be developed such that the extent of unmet system demand on account of such a plan is kept to a minimum:

Provided further that in case of hydro generating stations such a plan shall also endeavour to maximize the utilization of water for the purpose of power generation subject to applicable constraints related to alternate use of such water.

b. All Users and STU shall follow annual outage plans published by SLDC. If any deviation is required, the same shall be obtained with the prior permission of SLDC (As Approved by SRPC for Applicable elements). The outage planning of run-of-the-river hydro plant, wind and solar power plant and its associated evacuation network shall be planned to extract maximum power from these renewable sources of energy.

c. Transmission Outage Planning shall be harmonized with Generation Outage Planning and Distribution System Outage Planning shall be harmonized with Generation and Transmission Outage Planning.

d. The final outage plan for next year shall be intimated to all Users and Transmission Licensee latest by 31st December of each year:

   Provided that SLDC shall prepare annual outage plan for generating units and transmission elements after carrying out necessary system studies in order to ensure system security and resource adequacy and finalize the outage plan in consultation with the Users and Transmission Licensee:

   Provided further that the above annual outage plan shall be reviewed by OCC(RPC)/SLDC on monthly basis in coordination with all concerned parties, and adjustments made wherever found necessary.

e. All users and STU, licensees shall follow the annual outage plan. If any deviation is required, the same shall be allowed only with the prior permission of the SLDC.

f. Each User or Transmission Licensee shall, at least D-3 prior to availing an outage as per the planned schedule, inform SLDC about the outage and obtain prior approval from it to avail outage.

g. SLDC shall have the authority to defer any planned outage in case of occurrence of following events:

(i) Major grid disturbances (e.g., partial/total blackout);

(ii) System isolation; and

(iii) Any other event in the system that may have an adverse impact on the system security by the proposed outage.

Provided that SLDC shall inform about the revised outage plan, with appropriate reasons for revisions in the outage plan, as soon as possible.

h. In case of emergency in the system, which may include events like loss of generation, breakdown of the transmission line, grid disturbances and system isolation, SLDC may appropriately review the situation before clearance of the planned outage:

Provided that scheduled outage of power stations of 10 MW capacity and above as notified by SLDC from time to time, will be subject to annual planning.

i. SLDC shall prepare and submit to RPC its outage plan in writing for the next financial year by 31st October for each year. These shall contain identification of each Generating Unit/Transmission Line/Interconnecting Transformer for which outage is being planned, reasons for the outage, the preferred date for each outage and its duration and where there is flexibility, the earliest start date and latest finishing date. SLDC shall submit Load Generation Balance Report for peak as well as off-peak scenario by 31st October for the next financial year to RPC. The annual plans for managing deficits/surpluses shall be clearly indicated in the Load Generation Balance Report (LGBR).

j. Scheduled outage of power stations and EHV transmission lines affecting regional power system shall be effected only with the approval of RLDC in coordination with SLDC.

k. SLDC shall upload quarterly, half-yearly, yearly outage reports on its website.

l. In respect of scheduled outage referred to in this Regulation, a calendar shall be formulated in respect of Annual Outage Planning for the ensuing financial year. Such outage plan shall be deliberated and finalized in the meeting of the OCC.

6.7 Operational Planning Study:

a. Based on the operational planning analysis data, operational planning study shall be carried out by various agencies for time horizons as under:

Table-5: Time Horizon for Operational Planning Study

Time horizon of operational planning Study	Agency	Means for carrying out study
Real time and Intra- day	SLDC	For various operating conditions using online/offline SCADA/EMS system
Day-ahead	SLDC	For various operating conditions using offline tools
Weekly	SLDC	For various operating conditions using offline tools
Monthly/Yearly	SLDC and STU	For various operating conditions using offline tools
Note: The transmission element outages shall not be processed without conducting the operational studies.		

b. SLDC shall utilize network estimation tool integrated in their EMS and SCADA systems for the real time operational planning study. All users shall make available at all times real time error free operational data for the successful execution of network analysis using EMS/SCADA. Failure to make available such data shall be immediately reported to the SLDC along with a firm timeline for restoration. The performance of online network estimation tools at SLDC shall be reviewed in the OCC meeting. Any telemetry related issues impacting the online network estimation tool shall be monitored by SLDC for their early resolution.

c. SLDC shall perform day-ahead, weekly, monthly and yearly operational studies for the State for:

(i) assessment and declaration of total transfer capability (TTC) and available transfer capability (ATC) for the import or export of electricity by the State. TTC and ATC shall be revised from time to time based on the commissioning of new elements and other grid conditions and shall be published on SLDC website with all the assumptions and limiting constraints;
(ii) planned outage assessment;
(iii) special scenario assessment;
(iv) system protection scheme assessment;
(v) natural disaster assessment; and
(vi) any other study relevant in operational scenario.

d. SLDC shall assess and declare the State TTC and ATC and submit to RLDC and NLDC. NLDC will declare TTC and ATC for import or export of electricity between regions including simultaneous import or export capability for a region, Eleven (11) months in advance for each month on a rolling basis. SLDC shall declare the revised TTC and ATC from time to time based on the commissioning of new elements and other grid conditions and shall be published on the websites of the SLDC with all the assumptions and limiting constraints.
e. Operational planning study shall be done to assess whether the planned operations shall result in deviations from any of the system operational limits defined under these regulations and applicable CEA Standards. The deviations, if any, shall be reviewed in the OCC meeting and significant deviations shall be monitored by SLDC for early resolution.
f. SLDC shall maintain records of the completed operational planning study, including date of specific power flow study results, the operational plan and minutes of meetings on operational study.
g. SLDC shall have operating plans to address potential deviations from system operational limit identified as a result of the operational planning study. These operating plans shall be communicated to users in advance so that they can take corrective measures and same would be furnished to RPC. In case any user is unable to adhere to such an operating plan, it shall inform the SLDC in advance with detailed reasons and explanations for the non-adherence. These detailed reasons and explanations shall be discussed in OCC meeting and a quarterly report shall be submitted by the SLDC to the Commission and RPC, CEA.
h. SLDC shall undertake a study on the impact of new elements to be commissioned in the intra-state system in the next six (6) months on the TTC and ATC for the State and share the results of the studies with RLDC. NLDC, RLDC will compare the results of the studies of the impact of new elements on the system and transfer capability addition with those of the interconnection and planning studies by CTU and STU, and any significant variations observed shall be communicated to CEA, RPCs, CTU and STU for immediate and long-term mitigation measures.
i. Defence mechanisms like system protection scheme, load-rejection scheme, generation run-back, islanding scheme or any other scheme for system security

shall be proposed by the concerned user or SLDC or RLDC or NLDC and shall be deployed as finalized by the RPC.

6.8 System Restoration/Recovery Procedures:

1. **Based on the template issued by SLDC of control area shall prepare restoration procedures for the grid, which shall be updated every year by the SLDC taking into account changes in the configuration of their respective power systems.**
2. **SLDC, in consultation with the RLDC, STU, users and RPC, shall prepare detailed procedures for restoration of the State grid under partial and total blackouts which shall be reviewed and updated annually by the SLDC.**
3. **Detailed plans and procedures for restoration after partial/total blackout of each User/ Transmission Licensee shall be finalized by the concerned Users and Transmission Licensees in coordination with SLDC.** The procedure should be reviewed, confirmed, and/or revised once every subsequent year. Mock trial runs of the procedure or different sub system shall be carried out by the User/Transmission Licensee at least once in a year under intimation to SLDC. Diesel generator sets and other standalone auxiliary supply source to be used for black start shall be tested on a weekly basis and the user shall send the test reports to the SLDC on a quarterly basis.

   Provided that Users shall agree to such plans and procedure and promptly inform SLDC in advance wherever they have difficulty in complying with the same.

4. Simulation studies shall be carried out by each user in coordination with SLDC for preparing, reviewing and updating the restoration procedures considering the following:
   (i) Black start capability of the generator;
   (ii) Ability of black start generator to build cranking path and sustain island;
   (iii) Impact of block load switching in or out;
   (iv) Line/transformer charging;
   (v) Reduced fault levels;
   (vi) Protection settings under restoration condition.

   Provided that such procedure shall consider the generation capabilities and operational constraints of ISTS and In-STS.

5. The thermal and nuclear generating stations shall prepare themselves for house load operation as per design. The concerned user and SLDC shall report the performance of house load operation of a generating station in the event where such operation was required.
6. List of generating stations with black start facility, intra-state/Inter State ties, synchronizing points and essential loads to be restored on priority, shall be prepared and will be available with SLDC. The list shall be reviewed and confirmed by Grid Code Review Panel.
7. During the restoration process following a blackout, SLDC is authorized to operate with reduced security standards for voltage and frequency and may direct the implementation of such operational measures, namely, suspension of secondary or tertiary frequency control, power market activities, defence schemes, reduced governor droop setting as necessary, in order to achieve the fastest possible recovery of the grid.
8. All communication channels required for restoration process shall be used for operational communication only, till grid normalcy is restored.
9. Distribution Licensees or Users with essential loads shall separately identify non-essential components of such loads, which may be kept off during system contingencies. Distribution Licensees shall draw up an appropriate schedule with corresponding load blocks in each case and assign relative priority in the restoration of essential loads. The non-essential loads shall be put on only when system normalcy is restored, as advised by SLDC.
10. All Users shall pay special attention to carry out the procedures so that secondary collapse due to undue haste or inappropriate loading is avoided. Despite the urgency of the situation, careful, prompt, and complete logging of all operations and operational messages shall be ensured by all the Users to facilitate subsequent investigation into the incident and the efficiency of the restoration process. Such investigation shall be conducted promptly after the incident.
11. SLDC shall carry out the post-disturbance analysis of all major grid disturbances resulting into total or partial system blackout or system split and desynchronization of any part of the State Grid. All Users shall coordinate and furnish the data pertaining to the system disturbance to enable SLDC to analyze the system disturbance and furnish a report to RLDC in accordance with the provisions of IEGC, as amended from time to time.

12. PCCC under Grid Code Review Panel shall also review the data collected and analyze the failure of protection system either of In-STS or any User and recommend modification and/or improvement in the protection system or relay setting schemes and, if necessary, of the islanding and restoration scheme of In-STS and Southern Region, to be carried out by the Grid Users.
13. Any entity extending black start support by way of injection of power as identified in clause (6) of this Regulation shall be paid for actual injection @ 110 % of the normal rate of charges for deviation in accordance with DSM Regulations for the last block in which the grid was available. The procedure in this regard shall be prepared by Grid Code Review panel in consultation with stakeholders and approved by the Commission.

6.9 Real Time Operation:

1. **System state:**

   Power system shall be categorized under normal, alert, emergency, extreme emergency and restoration state depending on the type of contingencies and value of operational parameters of the power system.

   a. **Normal state:**

      Power system shall be categorized under normal state when the power system is operating with operational parameters within their respective operational limits and equipment are within their respective loading limits. Under normal state, the power system is secure and capable of maintaining stability under contingencies defined in the CEA Transmission Planning Criteria.

   b. **Alert state:**

      Power system shall be categorized under alert sate when the power system is operating with operational parameters within their respective operational limits, but a single contingency ('N-1') leads to a violation of security criteria. The power system remains intact under such alert state. However, whenever the power system is under alert sate, the system operator shall take corrective measures to bring it back to a normal state.

   c. **Emergency state:**

      Power system shall be categorized under emergency state when the power system is operating with operational parameters outside their respective operational limits or equipment are above their respective loading limits.

Emergency state can arise out of multiple contingencies or any major grid disturbance in the system. The power system remains intact under such emergency state. However, whenever the power system is under emergency state, the system operator, to bring back the power system to alert/normal state shall take corrective measures such as:

- extreme measures such as load shedding, generation unit tripping, line tripping or closing;
- emergency control action such as HVDC Control, Excitation Control, HP-LP Bypass, tie line flow rescheduling on critical lines; and
- automated action such as system protection scheme, load curtailment scheme and generation run-back scheme.

d. Extreme Emergency state:

Power system shall be categorized under extreme emergency state if the control actions taken during the emergency state are not able to bring the system either to an alert state or a normal state and operational parameters are outside their respective operational limits or equipment are critically loaded. Extreme emergency state may arise due to high impact low frequency events like natural disasters. The power system may or may not remain intact (splitting may occur) and extreme events like generation plant tripping, bulk load shedding, **Under Frequency Load Shedding (UFLS)** and **Under Voltage Load Shedding (UVLS)** operation may occur.

e. Restorative State:

Power system shall be categorized under restorative state when control action is being taken to reconnect the system elements and restore system load. The power system transits from a restorative state to either an alert state or a normal state, depending on the system conditions.

2. **SLDC in consultation with STU and users shall carry out the study for the State Control Area and based on historical data and grid incidences evolve detailed criteria to categorize the power system in terms of the above states. The detailed criteria shall be included in the Detailed Operating Procedure to be issued by SLDC.**
3. SLDC shall maintain the grid in the normal state by taking suitable measures. In case the power system moves away from the normal state, appropriate measures shall be taken to bring the system back to the normal state. In case the

power system has moved to an extreme emergency state, SLDC shall take emergency action and initiate restorative measures immediately.

4. In the case of an event on the intra-State transmission system that may significantly impact the inter-State transmission system, the SLDC shall immediately inform the RLDC;
5. In the case of an event on the intra-State transmission system or relating to a State control area, the concerned entity shall immediately inform the SLDC.
6. Any planned operation activity in the In-STS system [such as generating unit synchronization or de-synchronization, transmission element opening or closing (including breakers), protection system outage, SPS outage and testing etc.] shall be done by taking operational code from SLDC. The operational code shall have validity period of sixty (60) minutes from the time of issue. In case such operation activity does not take place within the validity period of the code, the entity shall obtain a fresh operational code from SLDC.

6.10 Congestion Management:

STU in consultation with SLDC shall develop a procedure for relieving congestion in the In-STS within a period of One Hundred and Twenty (120) days from the notification of these Regulations:

Provided that till the time such procedures are developed, Congestion Management in real-time system shall be dealt with as per the Central Commission's relevant Regulations as amended from time to time:

Provided further that such procedure shall be reviewed by Grid Code Review Panel and shall be provided to all the Users and shall be kept on the website of SLDC as well as STU.

Provided also that congestion charges shall be applicable if determined by the Commission from time to time.

6.11 Demand and Load Management:

1. SLDC shall be responsible for reduction of demand in the event of insufficient generating capacity, inadequate transfers from external interconnections to meet demand, or in the event of breakdown or congestion in In-STS or ISTS or other operating problems (such as frequency, ACE, voltage levels beyond normal operating limit, or thermal overloads of the equipment and lines, etc.) or over

drawal of power vis-à-vis that of intra-state entities beyond the Volume limits specified in KERC Deviation Settlement Mechanism Regulations.

2. SLDC for the safety of In-STS may direct the Users to curtail their drawal from the In- STS. Such directions shall include the time period or the system conditions until which the issued directions shall be applicable:

   Provided that any non-compliance of such direction shall be dealt with as per the provisions of Monitoring and Compliance Code of these Regulations.

6.12 Demand Curtailment:

1. Buyers including distribution licensees and Users shall endeavour to restrict their actual drawal, from In-STS, of its control area within their respective drawal schedules.
2. SLDC, in coordination with STU and Distribution Licensee (s), shall develop Automatic Demand Management scheme with emergency controls at SLDC.
   Provided that if automatic demand management scheme is not available, the manual load curtailment shall occur to ensure that there is no over drawal.
3. The measures taken by the buyers including distribution licensee or User shall not be withdrawn as long as the frequency remains at a level lower than the limits specified or congestion continues unless specifically permitted by the SLDC.
4. **Each buyer including distribution licensee or user, or STU shall formulate contingency procedures and make arrangements that will enable demand disconnection to take place, as instructed by the SLDC, under normal and/or contingent conditions:**
   Provided that SLDC may direct to modify such procedures or arrangement, if required, in the interest of grid security and concerned Users shall abide by these directions.
5. SLDC through respective distribution licensees or Users may formulate and implement state-of-the-art demand management schemes for automatic or manual demand management like under frequency relays, rotational load curtailment, demand response within six (6) months from the notification of these Regulations:

   Provided that such schemes shall be duly prepared in coordination with OCC and approved by the Grid Code Review Panel.

6. Particulars of feeders or group of feeders at Transmission Licensee, distribution licensee and User substation which shall be tripped under under-frequency load curtailment scheme whether manually or automatic on a rotational basis or otherwise shall be displayed on their website for information of the Consumer(s).
7. SLDC shall devise standard, instantaneous, message formats to give directions in case of contingencies and/or threat to the system security to reduce over drawal by any User/distribution licensee at different over drawal conditions depending upon the severity of the over drawal:

   Provided that the concerned User or distribution licensee shall ensure immediate compliance with these directions of SLDC. In case of certain contingencies and/or threat to system security, the SLDC may direct Users to decrease their drawal and such Users shall act upon such directions immediately:

   Provided that such directions shall include the time period or the system conditions until which the issued directions shall be applicable:

   Provided further that SLDC and Transmission Licensees shall ensure that requisite load curtailment is carried out by buyers including distribution licensees/Users in its control area so that there shall not be any over drawal:

   Provided further that any non-compliance with such directions shall be dealt with as per the provisions of Monitoring and Compliance Code of these Regulations.

6.13 Load Crash:

1. In the event of load crash due to weather disturbance or any other reasons, SLDC shall control the situation by getting the following methods implemented from Distribution Licensee(s) and other Users in descending priorities:
   (i) Lifting of the load restrictions, if any;
   (ii) Instructing Buyer or Distribution Licensee/s or Users as the Case may be, to explore market mechanism in optimum and economical manner;
   (iii) Exporting the power to neighbouring regions/ States provided the same does not endanger the security of the ISTS and is in economical and optimal manner;
   (iv) Backing down/Unit Shut Down (USD) of thermal stations of ISGS/In-SGS/LTA/MTOA contracts subject to Merit order Despatch. The Backing

down of LTA/MTOA contracts shall be as per the respective terms and conditions of respective contracts;

(v) Closing down of hydel units (subject to non-spilling of water and effect on irrigation and Major Hydro plant kept as secondary ancillary reserves/hot reserves to maintain DSM and ACE within the limits) keeping in view the inflow of water into canals and safety of canals/hydel channels;

(vi) Renewable Energy (RE) Back down.

Provided that any other instructions issued by RLDC shall assume priority over such methods:

Provided further that such methods shall be reviewed from time to time by Grid Code Review Panel.

6.14 Post-Despatch Analysis:

1. Operational analysis:

a. SLDCs shall analyze the following:

(i) Pattern of demand met, under drawals and over drawals, frequency profile, voltage and tie-line flows, angular spread, area control error, reserve margin, load and RE forecast errors, ancillary services dispatched, transmission congestion and (N-1) violations;

(ii) Generation mix in terms of source and station wise generation;

(iii) Irregular pattern in any of the system parameters mentioned in sub-clauses (a)(i) and (a)(ii) of this clause and reasons thereof; and

(iv) Extreme weather events or any other event affecting grid security.

b. Such analysis shall be disclosed on their respective websites in formats issued by SLDC.

c. SLDC shall prepare a quarterly report that shall bring out the system constraints, reasons for not meeting the requirements, if any, of security standards and quality of service, along with details of actions taken, including by those responsible for causing disturbances in the system parameters.

d. SLDC shall also provide such a report to the RPC.

e. For the purpose of analysis and reporting, telemetered data shall be archived with a granularity of not more than five (5) minutes and higher granularity for special events. Such data shall be stored by SLDC for at least fifteen (15) years and reports shall be stored for twenty-five (25) years for operational analysis.

2. **Event reporting:**

Event reporting shall make available adequate data to facilitate event analysis.

a. Immediately following an event (grid disturbance or grid incidence as defined in the CEA Grid Standards) in the system, the concerned user or transmission licensee shall inform the SLDC through voice message.
b. Written flash report shall be submitted to SLDC by the concerned user within the time line specified in Table 6 below.
c. Disturbance Recorder (DR), station Event Logger (EL), Data Acquisition System (DAS) shall be submitted within the time line specified in Table 6 below.
d. SLDC shall report the event (grid disturbance or grid incidence) to CEA, RPC and all intra state entities within twenty-four (24) hours of receipt of the flash report.
e. After a complete analysis of the event, the user shall submit a detailed report in the case of grid disturbance or grid incidence within one (1) week of the occurrence of event to SLDC and RPC.
f. RLDCs and NLDC (for events involving more than one region) will prepare a draft report of each grid disturbance or grid incidence including simulation results and analysis which will be discussed and finalized at the Protection sub- committee of RPC as per the timeline specified in Table-6 below.

Table 6: Report submission timeline

SL. No	Grid Event^ (Classification)	Flash report submission deadline (users/ SLDC)	Disturbance record and station event log submission deadline (users/SL DC)	Detailed report and data submission deadline (users/SL DC)	Draft report submission deadline (RLDC/ NLDC)	Discussion in protection committee meeting and final report submission deadline (RPC)
1	GI-1/GI-2	8 hours	24 hours	+7 days	+7 days	+60 days
2	Near miss event	8 hours	24 hours	+7 days	+7 days	+60 days
3	GD-1	8 hours	24 hours	+7 days	+7 days	+60 days
4	GD-2/GD- 3	8 hours	24 hours	+7 days	+21 days	+60 days
5	GD-4/GD- 5	8 hours	24 hours	+7 days	+30 days	+60 days

^ The classification of Grid Disturbance (GD)/Grid Incident (GI) shall be as per the CEA Grid Standards.

g. The implementation of the recommendations of the final report will be monitored by the protection sub-committee of the RPC. SLDC shall disseminate the lessons learnt from each event to the RPC for necessary action in the control area.

h. Any additional data such as single line diagram (SLD) of the station, protection relay settings, HVDC transient fault record, switchyard equipment and any other relevant station data required for carrying out analysis of an event by SLDC shall be furnished by the users, within forty-eight (48) hours of the request. All users shall also furnish high-resolution analog data from various instruments including power electronic devices like HVDC, FACTS, renewable generation (inverter level or WTG level) on the request of SLDC.

i. Triggering of STATCOM, TCSC, HVDC run-back, HVDC power oscillation damping, generating station power system stabilizer and any other controller system during any event in the grid shall be reported to the concerned RLDC and RPC if connected to ISTS and to the concerned SLDC if connected to an intra-state system. The transient fault records and event logger data shall be submitted to the concerned RLDC or SLDC within 24 hours of the occurrence of the incident. Generating stations shall submit 1 second resolution active power and reactive power data recorded during oscillations to the concerned RLDC or SLDC within 24 hours of the occurrence of the oscillations.

3. Major Grid Incidence:

a. Following a major grid incident, SLDC and other Users shall co-operate to enquire and establish the cause of such failure and make appropriate recommendations. SLDC shall report the occurrence of such major grid failure to the SRPC \ Commission in writing as well as SRLDC immediately for information and shall submit the enquiry report to the Commission within two (2) months of the incident. Analysis of major grid disturbance in the Intra-State Power System soon after their occurrence shall be done by a PCCC constituted under Grid Code Review Panel. If the disturbance is of major nature the SRPC will also conduct detailed analysis of the incident. The User, the generator, the distribution licensee and the transmission licensees shall furnish required data to STU and SRPC.

b. **Periodic Reports**: STU/Transmission licensee shall send a weekly report to SLDC on the performance of their respective systems which should cover the following information:

(i) Voltage profile at all Substations – 66kV/110kV and above.
(ii) Average, maximum, minimum demand (both MW and MVAR) met at such Substations.
(iii) Quantum and duration of load shed, with reasons.
(iv) Outage of major elements.
(v) Network constraints.
(vi) Daily energy consumed and energy exchanged by the Distribution Licensee.

c. The SLDC shall post on its website a monthly performance report of the State as a whole covering:

(i) Hourly demand met and generation for peak and minimum demand met on every day. Also, the average daily off-peak and peak demands met.
(ii) Daily average consumption.
(iii) Station wise daily maximum, minimum and average generation (MW), together with daily energy generation.
(iv) Instances of non-compliance of the State Grid Code.
(v) Progress of construction of new generating units, lines and transformers.
(vi) Details of generation and transmission outages during the month.

4. Warnings:

a. An oral warning shall be issued by SLDC and confirmed in writing as well, to the STU/ Transmission Licensee and the users, who may be affected when SLDC knows that there is a risk of widespread and serious disturbance to the whole, or part of the total system.

Provided that sufficient time is available, the warning shall contain such information as the SLDC considers reasonable, to explain the nature, extent of the anticipated disturbance, to the user and STU/ Transmission Licensee, provided that such information is available to SLDC.

b. Each user and STU/ Transmission Licensee, on receipt of such a warning, shall take necessary steps to warn the operational staff and maintain their plant and apparatus in the condition in which it is best able to withstand the anticipated disturbance for the duration of the warning.
c. Scheduling and despatch may be affected during the period covered by such a warning.

5. **Loss of communication with SLDC:**
   a. In the event of loss of communication with SLDC, the provision made as above shall not apply; instead, the following provision shall apply:
   b. Each generating station shall continue to operate in accordance with the last despatch instruction issued by SLDC, but shall use all reasonable endeavour to maintain the system frequency at the target of 50 Hz, plus or minus 0.05 Hz by monitoring frequency, until such time the new despatch instructions are received from SLDC.

6. **Accident Reporting:**

   Report of accidents shall be in accordance with the Section 161 of the Electricity Act, 2003 and the Rules framed thereunder. Reporting of accident and failure of supply or transmission of electricity shall be in the specified form to the Commission and the Electrical Inspector.

6.15 Periodic Reports:

1. A daily report covering the performance of the In-STS shall be prepared by SLDC based on the inputs from Users and shall be put on its website. This report shall also cover the wind and solar power generation and injection into the Grid.

2. A weekly and monthly report covering the performance of the In-STS shall be prepared by SLDC. Such weekly report shall be available on the SLDC website for at least 12 weeks.
3. The reports shall, inter-alia, contain the following:
   (i) Frequency profile;
   (ii) Voltage profile of selected substations normally having low/high voltages;

(iii) Demand and Supply situation;
(iv) Major Generation and Transmission Outages;
(v) Transmission constraints;
(vi) Instances of persistent/significant non-compliance of the KEGC;
(vii) Instances of congestion in In-STS;
(viii) Instances of inordinate delays in restoration of transmission elements and generating units;
(ix) Source wise generation;
(x) ISTS Drawal from the grid and area control error;
(xi) Demand met (peak, off-peak and average);
(xii) Demand/Energy unserved in MW and MWh;
(xiii) Instances and quantum of curtailment of renewable energy;
(xiv) Constraints and instances of congestion in the transmission system;
(xv) Status of reservoirs.
(xvi) Non-compliance of instructions of SLDC by Users resulting in non-compliance of these Regulations;
(xvii) Total Declared Capacity/scheduled and actual generation/drawal of the Intra State Entities;
(xviii) Lines/Substations operating near thermal rating or rated capacity; and
(xix) Lines/Substations drawing/injecting excessive reactive power.
(xx) Summary of ISTS transactions and In-STS Open Access transactions.
(xxi) Any other report as stipulated by the Commission from time to time.

Provided that the weekly and monthly report may categorize the grid incidents (GI) as GI-1 to GI-2 and grid disturbance (GD) as GD-1 to GD-5 based on the severity of tripping as per the provisions of CEA (Grid Standards) Regulations, 2010, as amended from time to time.

4. A monthly report covering the performance of the In-STS including Monthly CPD/NCPD shall be prepared by SLDC and made available on its website.
5. SLDC shall prepare a quarterly report which shall bring out the system constraints, reasons for not meeting the requirements, if any, of security standards and quality of service, along with the details of various actions taken by different Users/Transmission Licensees, and the Users/Transmission Licensees responsible for causing the constraints.

6. The SLDC shall also provide information/report to the RLDC as per the provisions of IEGC in the interest of smooth operation of ISTS.
7. The SLDC shall provide the operational feedback to the STU with a copy to the Commission, once in every three (3) months with regard to under/over voltage issues / overloading of various transmission elements and may suggest suitable remedial measures to be taken.

6.16 Procedure for Operational Liaison:

1. In case the State Grid may or will, experience an operational effect while carrying out any operation on the Transmission system, the concerned User or a Transmission Licensee, shall inform to the SLDC before carrying out such operation with details of the operation to be carried out.
2. The User or a Transmission Licensee shall, immediately following an event on its system, inform the SLDC, in case the State Grid may or will, experience an operational effect following the event, and give details of what happened in the event.
3. Forced outages of important network elements in the State Grid shall be closely monitored by the concerned Licensee/User. Licensee/User shall send a monthly report of prolonged outage of generators or transmission facilities to the SLDC.
4. All operational instructions given by SLDC shall have unique codes which shall be recorded and maintained as specified by the Authority.
5. Any planned operation activity in the In-STS system [such as generating unit synchronization or de-synchronization, transmission element opening or closing (including breakers), protection system outage, SPS outage and testing etc.] shall be done by taking operational code from SLDC. The operational code shall have validity period of sixty (60) minutes from the time of issue. In case such operation activity does not take place within the validity period of the code, the entity shall obtain a fresh operational code from SLDC.
6. Forced outages of important network elements in the State Grid shall be closely monitored at SLDC level and necessary actions/restorations instructions will be issued by SLDC to Users/Transmission Licensees.
7. Any operation in a State having an impact on other state(s)/region(s) shall be intimated by the SLDC to RLDC.

6.17 Voltage Control and Reactive Power Management:

a. All generating stations shall be capable of supplying reactive power support so as to maintain power factor at the point of interconnection within the limits of 0.95 lagging to 0.95 leading as per the CEA Connectivity Standard Regulations amended from time to time.

b. Reactive power compensation and/or other facilities shall be provided by the Distribution Licensee/Users, as far as possible, in the areas prone to low or high voltage systems close to the load points thereby avoiding the need for exchange of Reactive Power to/from the In-STS and to maintain the In-STS voltage within the specified range at all the times. Their healthiness and operation as per real time requirement shall be ensured by the Distribution Licensee/User/STU.

c. Switchable Line Reactors may be provided to control temporary over voltage within the limits set out in connection agreements.

d. The additional reactive compensation to be provided by the User shall be indicated by the STU in the Connection Agreement for implementation.

e. Any additional reactive compensation to be provided by the Distribution Licensee /User shall be directed by the SLDC/STU which needs to be complied with by Distribution Licensee/User.

f. Users shall endeavour to minimize the Reactive Power drawal at an interchange point when the voltage at that point is below 97% of rated voltage and shall not inject Reactive Power when the voltage is above 103% of rated voltage. Interconnecting Transformer taps at the respective drawal points may be changed to control the Reactive Power interchange as per a User's request to the SLDC, but only at reasonable intervals.

g. Reactive power compensation should ideally be provided locally, by generating Reactive Power as close to the Reactive Power consumption as possible. The intra-State entities are therefore expected to provide local VAr compensation/generation, such that they do not draw VArs from the State grid, particularly under low-voltage conditions. To discourage VAr drawal by intra-State entities, VAr exchanges with Intra-State Transmission System shall be priced as follows:

   (i) The intra-State entity pays for VAr drawal when voltage at the metering point is below 97%.

   (ii) The intra-State entity gets paid for VAr return when voltage is below 97%.

(iii) The intra-State entity gets paid for VAr drawal when voltage is above 103%.

(iv) The intra-State entity pays for VAr return when voltage is above 103%. Where all voltage measurements are at interface point with In-STS.

h. The charge for VArh shall be at the rate of 5 paise/kVArh w.e.f. the date of effect of these Regulations. This rate shall be escalated at 0.5 Paise/ kVArh per year thereafter, unless otherwise revised.

i. All the Inverter Based Resources (IBRs) covering wind, solar and energy storage shall ensure that they have the necessary capability, as per CEA Connectivity Standards, all the time including non-operating hours and night hours for solar. The active power consumed by these devices for purpose of providing reactive power support, when operating under synchronous condenser/night-mode, shall not be charged under deviations and shall be treated as transmission losses in the In-STS.

j. For IBRs of capacity 10 MW and below not coming directly to the point of interconnection but through the pooling at the Power Park Developer end, the Power Park Developer or QCA shall act as aggregator for the Reactive Energy Charges for payments to and from the Pool Account at SLDC. The de-pooling of Reactive Energy charges amongst the individual wind and solar shall be done by the Power Park Developer or QCA or aggregator.

k. SLDC shall finalize Methodology & Procedure for carrying out Reactive Energy accounting of intra state entity(ies) within 15 days of notification of these Regulations and submit to the Commission for information.

l. SLDC shall issue the monthly statement for VAr charges, to all intra state entities.

m. The concerned intra state entities shall pay the amounts into State Pool Account operated by the SLDC within ten (10) days of issue of statement.

n. The intra state entities who have to receive the money on account of VAr charges would then be paid out from the Karnataka State Energy Account, within two (2) working days from the receipt of payment in the Pool Account.

o. If payments against the above VAr charges are delayed by more than two (2) days, i.e., beyond twelve (12) days from issue of the statement by SLDC, the defaulting intra state entity shall pay simple interest @ 0.04% for each day of delay. The interest so collected shall be paid to the intra state entities who had to receive the amount, payment of which got delayed.

p. Persistent payment defaults, if any, shall be reported by the SLDC to the Commission, for initiating remedial action.

q. Wind generating stations and solar generating stations shall have fault ride through the capability of not less than 300 milliseconds so that the grid is not destabilized due to sudden outage of generation in the event of grid disturbance. The provisions of the CEA's Regulations for Low Voltage Ride Through (LVRT) and High Voltage Ride Through (HVRT) shall be applicable to the Wind and Solar Generators as amended from time to time.

r. Hydro and gas generating units having this capability shall operate in synchronous condenser mode operation as per instructions of the SLDC. Standalone synchronous condenser units shall operate as per the instructions of SLDC. The compensation for such synchronous condenser mode operation shall be the rate as may be specified by the State Commission. In the absence of such rate determined by the State Commission, the rates determined by the Central Electricity Regulatory Commission for inter-State transactions will be applicable.

s. SLDC shall take appropriate measures to maintain the voltage within limits, inter-alia, using the following facilities, and the facility owner shall abide by the instructions of SLDC:

   (i) shunt reactors,
   (ii) shunt capacitors (excluding HVDC automatic control),
   (iii) TCSC,
   (iv) VSC based HVDC,
   (v) synchronous/non-synchronous generator voltage control including inverter based reactive power support,
   (vi) synchronous condenser,
   (vii) static VAr compensators (SVC), STATCOM and other FACTS devices,
   (viii) HVDC power order or HVDC controller selection to optimize filter bank,
   (ix) transformer tap change: generator transformer and inter- connecting transformer.

   Provided that, for the purpose of tap changing, voltage of local bus shall be considered as reference voltage.

t. The generating station shall change generator transformer taps and generate/absorb Reactive power as per the instructions of SLDC within the capability limits of the respective generating units, i.e., without sacrificing the active generation required at that time.

u. All Users shall attempt to ensure that grid voltages always remain within the limits specified in CEA (Grid Standards) Regulations, 2010 as amended from time to time and as mentioned in Table -7 below:

Table -7

Voltage - (kV rms)		
Nominal	**Maximum**	**Minimum**
765	800	728
400	420	380
220	245	198
132	145	122
110	121	99
100	110	90
66	72	60
33	36	30

v. SLDC shall carry out operational load flow studies to identify voltage problems encountered based on the operational data and identify appropriate measures to ensure that voltages remain within the defined limits. On the basis of these studies, SLDC may issue specific instructions to Users to maintain voltage level at interconnecting points within permissible limits.

w. SLDC shall take appropriate measures to control In-STS voltages, which may include but not limited to power transformer tap changing, capacitor/reactor switching including capacitor switching by the distribution licensees at 33 kV and below substations:

Provided that generators shall inform SLDC of their reactive reserve capability promptly on request.

Provided further that the generating station shall inject/absorb the reactive energy into/from the In-STS on the basis of their Unit capability as per the directions of SLDC.

x. Generating Stations shall provide capability curves for all Generating Units to the SLDC indicating any restrictions to allow accurate system studies and effective operation of the In-STS:

Provided that CPPs shall similarly furnish the net reactive capability that will be available for Export/Import to/from In-STS.

y. All Distribution Licensees/Users and STU shall provide adequate voltage control as specified by Grid Code Review Panel or operational committee thereunder, to prevent voltage collapse and shall ensure its effective application to prevent voltage collapse/cascade tripping. Voltage fluctuation limits and voltage wave-form quality shall be maintained as specified by CEA**. STU may carry out voltage stability studies for sensitive nodes having low voltages and lesser fault level and ensure that voltages at these nodes are much above knee point.**

z. All Distribution Licensees/Users shall provide local VAr compensation/generation to maintain the voltage within the specified limits:

Provided that there shall not be any drawal of VArs from the EHV grid under Minimum- voltage condition.

aa. Notwithstanding the above, SLDC may direct all Users to curtail its VAr drawal/injection in case the security of In-STS is endangered.

bb. Reactive power facilities specified under this regulation sub clause (s) connected to In- STS shall be in operation at all times and shall not be taken out without the permission of SLDC.

cc. Periodic/seasonal tap changing of inter-connecting transformers and generator transformers shall be carried out to optimize the voltages and if required other options such as tap staggering may be carried out in the network.

dd. Generating stations connected to In-STS shall generate/absorb reactive power as per the grid requirement and instructions of SLDC, within the capability limits of the respective generating units.

ee. Wind Generators, during the start-up, shall ensure that reactive power drawal shall not affect the grid performance:

Provided that SLDC may direct the wind generator to curtail VAr drawal/injection for the security of the grid.

ff. If voltages are outside the limit as specified in clause (u) of this regulation and the means of voltage control set out in clause (s) of this Regulation are exhausted, SLDC shall take all reasonable actions necessary to restore the voltages so as to be within the relevant limits including switching ON or OFF of lines / generations / loads considering the security of the system.

6.18 Periodic Testing:

1. There shall be periodic tests, as required under clause (3) of this Regulation, carried out on power system elements for ascertaining the correctness of mathematical models used for simulation studies as well as ensuring desired performance during an event in the system.
2. General provisions
   a. The owner of the power system element shall be responsible for carrying out tests as specified in these regulations and for submitting reports to STU and SLDC for intra-State elements.
   b. All equipment owners shall submit a testing plan for the next year to the SLDC by 31st July to ensure proper coordination during testing as per the schedule. In case of any change in the schedule, the owners shall inform the SLDC in advance.
   c. The tests shall be performed once every five (5) years or whenever major retrofitting is done. If any adverse performance is observed during any grid event, then the tests shall be carried out even earlier, if so, advised by SLDC/RLDC.
   d. The owners of the power system elements shall implement the recommendations, if any, suggested in the test reports in consultation with SLDC and STU.
3. **Testing requirements:**

   The following tests shall be carried out on the respective power system elements as per Table-8 below:

Table 8: Tests Required for Power System Elements

Power System	**Elements Tests**	**Applicability**
Synchronous Generator	(1) Real and Reactive Power Capability assessment. (2) Assessment of Reactive Power Control Capability as per CEA Technical Standards for Connectivity (3) Model Validation and verification test for the complete Generator and Excitation System model including PSS. (4) Model Validation and verification of Turbine/Governor and Load Control or Active Power/ Frequency Control Functions. (5) Testing of Governor performance and Automatic Generation Control.	Individual Unit of rating 100MW and above for Coal/lignite, 50MW and above for gas turbine and 25 MW and above for Hydro.
Non synchronous Generator (Solar/Wind)	(1) Real and Reactive Power Capability for Generator (2) Power Plant Controller Function Test (3) Frequency Response Test (4) Active Power Set Point change test. (5) Reactive Power (Voltage / Power Factor / Q) Set Point change test	Applicable as per CEA Technical Standards for Connectivity.

HVDC/FACTS Devices	(1) Reactive Power Controller (RPC) Capability for HVDC/FACTS Filter bank adequacy assessment based on present grid condition, in consultation with NLDC. (2) Validation of response by FACTS devices as per settings.	To Intra-State HVDC/FACTS, as applicable

6.19 Capacity Building and Certification:

1. Capacity building, skill upgradation, and certification of the personnel deployed in load despatch centres shall be done periodically under an institutional framework through accredited certifying agency (ies).
2. Training and certification of personnel engaged for operation and maintenance at load despatch centres shall be done as mandated in CEA regulations.
3. The certification shall be done by certifying agency(ies) as designated and accredited by CEA/Central Government from time to time.

Chapter -7: Scheduling and Despatch Code

7.1. General:

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

b. The procedure for submission of capability declaration by each Intra- State entity Generating Station and submission of requisition / drawal schedule by other Intra State entity(ies) is intended to enable SLDC to prepare the Despatch Schedule for each Generating station and drawal schedule for each Distribution Licensee.

7.2. Applicability:

This Scheduling and Despatch Code shall be applicable to:

1. All Seller(s)/Generator(s), captive generators, open access generators, RE generators other than WS seller connected to In-STS having installed generating capacity of 5 MW and above of Unit or Combined capacity of all units in the generating station (or such other threshold capacity specified by the Commission from time to time).
2. Forecasting, scheduling and deviation settlement related matters regarding wind and solar generation shall be governed as per the provisions of "Karnataka Electricity Regulatory Commission (Forecasting, Scheduling and Deviation

Settlement for Solar and Wind Generation) Regulations, 2015" and its amendments thereof.

3. All Buyer(s) including distribution licensee(s), deemed distribution licensee(s) located in the state and open access consumers connected to In-STS.
4. This Scheduling and Despatch code shall apply to all Intra State Entity(ies) i.e., Buyers and Sellers connected to or using In-STS under its control area as defined in Regulation 7.3 of these Regulations.

7.3. Control Area Jurisdiction of Load Despatch Center:

1. The SLDC shall be responsible for optimum scheduling and despatch of electricity, monitoring of real time grid operations and management of the reserves including energy storage systems and demand response within its State control area, supervision and control over the intra-State transmission system, processing of interface energy meter data and coordinating the accounting and the settlement of State pool account, as may be specified by the State Commission.
2. The entities connected exclusively to the inter-State transmission system shall be under the control area jurisdiction of RLDC for scheduling and despatch of electricity for such entities.
3. The entities connected exclusively to the intra-State transmission systems shall be under the control area jurisdiction of SLDC for scheduling and despatch of electricity.
4. Entities connected to both inter-State transmission systems and intra-State transmission systems shall be under the control area jurisdiction of RLDC, if more than or equal to 50% of the quantum of connectivity is with ISTS, and if more than 50% of the quantum of connectivity is with intra-State transmission system, it shall be under the control area jurisdiction of SLDC.
5. In case an entity is connected to both inter-State transmission systems and intra-State transmission systems, the load despatch centre responsible for scheduling such entities shall coordinate with the RLDC or SLDC, as the case may be, for ensuring grid security.
6. Unless otherwise decided by the Commission, the entities that have already declared COD as on the date of coming into force of these regulations, shall continue to remain under the control area of the SLDC or the RLDC, as the case may be, as existing before the date of coming into force of these regulations:

   Provided that Notwithstanding anything contained in clauses (1) to (6) of this

Regulation, change in the control area jurisdiction of any entity is subject to IEGC provisions.

7.4. Roles and Responsibilities of SLDC:

1. In accordance with Section 33 of the Act, SLDC in the State may give such directions and exercise such supervision and control as may be required for ensuring the integrated grid operations and for achieving the maximum economy and efficiency in the operation of power system in that State.
2. Every licensee, generating company, generating station, substation, User and any other person connected with In-STS shall comply with the directions issued by the SLDC under subsection (1) of Section 33 of the Act. The SLDC shall comply with the directions of the RLDC.
3. Maintain Reactive Energy Account and any other account as specified by the Commission.
4. Forecasting demand for its control area under 6.5 (2) of these regulations for each time block on day-ahead and intra-day basis;
5. Forecasting of generation from wind and solar generating stations under its jurisdiction for each time block on day-ahead and intra-day basis:
6. Declaring Total Transfer Capability and Available Transfer Capability in respect of import and export of electricity of its control area with inter-State transmission systems in coordination with the Central Transmission Utility, State Transmission Utility, and RLDC and revising the same from time to time based on grid conditions. Assessment of TTC and ATC shall be done on a continuous basis at least three (3) months in advance and revised based on contingencies from time to time.

7. **Scheduling of electricity within the State which includes:**
   (i) Injection and drawal schedules for intra state entities, regional entities, in accordance with the contracts;
   (ii) Incorporation of schedules for intra state entities under collective transactions;
   (iii) Incorporation of schedules under the Ancillary Services Regulations.
   (iv) Optimization of scheduling inter-alia through Security Constrained Economic Despatch (SCED) as and when the Commission issues the regulations/orders on SCED;
8. Secure operation of the grid by:
   (i) balancing demand and supply to minimize Area Control Error (ACE);

(ii) maintaining and dispatching reserves in accordance with these regulations and Ancillary Services Regulations.

9. Running a Security Constraint Unit Commitment (SCUC) for intra state entity generating stations as and when the Commission issues the regulations/orders on SCUC.
10. The SLDC shall coordinate the scheduling of all such generating stations in the State, which are not scheduled by RLDC under CERC Regulations as notified from time to time. The SLDC shall be responsible for such generating stations for:

    i. Follow the Merit Order Stack for Day Ahead/Intraday scheduling process by considering the MOD principles specified in KERC (Merit Order Despatch and Optimization of Power Purchase Cost) Regulations 2024 as amended from time to time.

    ii. Real-time monitoring of the Seller's/Buyer's injection/ drawal and deviation,
    iii. Checking that there is no gaming in its declared capacity or forecasting,
    iv. Revision of injection schedule,
    v. Revision of drawal schedule
    vi. metering and energy accounting;
    vii. issuance of deviation (as per DSM) accounts in its control area;
    viii. Collections / disbursements of deviation (as per DSM) payments in its area;

c. SLDC shall take all decisions regarding the despatch of generating stations after evaluating all the possible network parameters, constraints, congestions in the transmission network and in the eventuality of any such network condition. Instructions of SLDC relating to despatch and drawal shall be binding on all Intra State Entities.

d. SLDC shall be responsible for time block-wise computation of deviation for Intra State Entities, based on the actual meter readings made available by STU/Users and the implemented schedule for the Intra State Entities and preparation of **State DSM Pool Account and Karnataka State Energy Account (KSEA).**

e. Inter-State Open Access injection/ drawal schedule or any other matter affecting regional power system or matter between two (2) or more States, SLDC shall comply with procedures and instructions of RLDC.

f. The generation availability of ISGS generating stations are on ex-power plant basis. The transmission loss of regional system shall be taken into account as per RLDC procedure for working out ex-power plant generation schedule of ISGS.

g. SLDC shall develop and maintain a dynamic web-based application for the purpose of day ahead and intraday scheduling, revision of schedules and display of real-time information.

h. In case, the Sellers/Buyers fail to furnish declared capacity / schedule within the prescribed time limits to SLDC, the SLDC may treat declared capacity/ schedule of such Sellers/Buyers as Zero.

7.5. Roles and Responsibilities of Sellers & Buyers:

1. **Sellers:**
    a. Sellers shall be responsible for power generation/power injection as per the time block wise schedules finalized by SLDC in accordance with the provisions of these Regulations and KERC (Intra-State Deviation Settlement Mechanism and Related Matters) Regulations, 2025.
    b. Captive generating stations or Unit connected to In-STS shall submit its Schedule separately for its own captive consumption and schedule for injection of energy into the grid as per the Scheduling Process detailed out in this code.
    c. Captive Consumers with in-situ Captive Generating Stations having installed capacity 1MW and above shall provide Net Schedule of their consumption to Distribution Licensee(s) to facilitate Distribution Licensees plan their demand forecast and schedule of power requirement accordingly.

2. **Buyers:**
    a. Provisions of this scheduling and despatch code and KERC (Intra-State Deviation Settlement Mechanism and Related Matters) Regulations, 2025 shall be applicable for all Buyer(s) including distribution licensee(s), deemed distribution licensee(s), located in the State, and full open access consumers connected to Intra-State transmission system.
    b. Buyers shall operate their loads in a manner consistent with the provisions of the IEGC and the provisions of these Regulations as amended from time to time.
    c. Buyer(s) or Seller(s) may request for revision of their schedule during intra-day operation in accordance with these regulations.
    d. Buyers shall enter into Connection Agreement/Open Access Agreement with the concerned transmission licensee, which shall specify physical and operational requirements for reliable operation and gain physical access and connection to the In-STS, enter into Connection Agreement/Open Access Agreement with concerned Distribution Licensee for use of distribution system, as the case may be in accordance with Central Commission and State Commission's Regulations from time to time and its

amendments thereof.

e. Buyers shall inform to SLDC, details of all contracts they have entered into for exchange of energy.
f. While preparing the Day ahead load forecast, the Buyers shall take into consideration the load requirements of the Open Access Users located within their licence area as well. While furnishing the overall Load forecast schedule to SLDC, Buyers shall consider forecast load requirement of 'Partial Open Access Users.'
g. Buyers including Distribution Licensees shall regularly carry out the necessary exercises regarding short-term Load estimation for their respective area, to enable them to plan in advance as to how they would meet their consumers' load without overdrawing from the grid.
h. Buyers including Distribution licensees shall furnish details of bilateral power they have contracted on short term, medium term, and long-term basis.
i. Buyers shall furnish the details of their bi-lateral purchases and sources of power supply to SLDC.
j. Buyers shall forecast the generation requirement for day ahead on 15-minute time block basis considering the availability declared by the Sellers with whom they have contractual arrangement.
k. Buyers shall submit their drawal schedule to SLDC as per the timelines specified in this scheduling code.
l. Buyers shall adhere to their schedule, if any deviation from it, SLDC may impose the restriction on drawal during system contingencies.
m. Wheeling transactions of captive and open access consumers shall be dispatched subject to transmission constraints and system emergency conditions.
n. Buyers shall submit their revised drawal schedule to SLDC, if they undertake any bilateral contracts or participate in the Power Exchange Transactions.

7.6. General Provisions:

1. Details of Intra State generating stations to be published by SLDC:

a. SLDC shall publish a list of all Intra State generating stations within State control area, which shall be updated quarterly on their website along with details such as station capacity, allocated share of beneficiaries, contracted quantum by buyers, and balance available capacity.

b. SLDC shall also publish details, as applicable, for intra State generating stations other than renewable generating stations, as submitted by such generating stations in accordance with Regulation 5.3 of these regulations.

c. The Intra state generating stations and the entities participating in Ancillary Services must be capable of receiving the load set point signals from the SLDC or RLDC or the NLDC as per CEA Technical Standards for Connectivity, or in terms of Ancillary Service Regulations, as applicable.

2. List of Drawee Intra State Entities:

SLDC shall update on a quarterly basis the list of all drawee Intra State entities within control area and post the same on SLDC websites along with the allocated or contracted quantum from all entities.

3. Entitlement of a buyer and beneficiary:

a. In cases of allocation of power from a generating station/seller, each beneficiary shall be entitled to MW despatch out of the declared capacity of such a generating station/seller, in proportion to its share allocation.

b. For all other cases not covered under sub-clause (a) of this Clause, the buyer shall be entitled to MW despatch out of the declared capacity of Intra state entity Generating Station as per its contracts.

c. The entitlement from the Intra state entity Generating Station shall be rounded off up to two (2) decimal points for the purposes of scheduling and accounting.

4. Adherence to Schedule:

Each Intra State Entity shall regulate its generation or demand or both, as the case may be, so as to adhere to the schedule of net injection into or net drawal from the In-STS/ISTS.

5. Area Control Error:

The State Load Despatch Centre and other drawee Intra State entities shall keep their Area Control Error close to zero (0) by rescheduling, deploying reserves and automatic demand management scheme.

6. Declaration of Declared Capacity by Intra state entity Generating Station:

a. The Intra state entity Generating Station other than the WS seller shall declare ex- bus Declared Capacity limited to 100% MCR less auxiliary power consumption, on day ahead basis as per the provisions of Regulation 7.9 of these regulations:

Provided that the hydro generating stations may declare ex-bus Declared Capacity more than 100% MCR less auxiliary power consumption limited to overload capability in terms of sub-clause (a) of clause (8) of this Regulation during high inflow periods:

Provided further that a high inflow period for this purpose shall be notified by the SLDC.

b. Intra State entity WS Seller shall declare the available capacity on day ahead basis, as per the provisions of Regulations 7.9 of these regulations.
c. The Intra State entity with generating stations other than WS sellers may be required to demonstrate the declared capacity of their generating stations as and when directed by the SLDC. For this purpose, SLDC in coordination with the beneficiaries, shall schedule the Intra state entity Generating Station up to its declared capacity as declared on day ahead basis.
d. The schedule issued by the SLDC shall be binding on the beneficiaries for such testing of the declared capacity of the Intra state entity Generating Station. In case the generating station fails to demonstrate the declared capacity, it shall be treated as a mis-declaration for which charges shall be levied on the generating station by SLDC as follows:
e. The charges for the first mis-declaration for a block or multiple blocks in a day shall be the charges corresponding to two (2) days' fixed charges at normative availability. For the second mis-declaration, the charges shall correspond to four (4) days' fixed charges at normative availability, and for subsequent mis-declarations, the charges shall increase in a geometric progression over a period of a month.
f. In the event of the Intra state entity Generating Station failing to demonstrate the declared capability, such reduction in capacity shall be informed by SLDC to the respective Distribution licensee who has PPA with such generator and the concerned Distribution licensee shall reduce the capacity charges on pro-rata basis due to the generator as a measure of penalty.

7. Ramping rate to be Declared for Scheduling:

The Intra state 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;

(ii) Gas power plants shall declare a ramp up or ramp down rate of not less than 3% of ex-bus capacity corresponding to MCR on bar per minute;

(iii) Hydro power plants shall declare a ramp up or ramp down rate of not less than 10% of ex-bus capacity corresponding to MCR on bar per minute;

(iv) Renewable Energy generating stations shall declare a ramp up or ramp down rate as per CEA Connectivity Standards.

8. Optimum Utilization of Hydro Energy:

a. During high inflow and water spillage conditions, for Storage type generating station and Run-of-River Generating Stations with or without Pondage, the declared capacity for the day may be up to the installed capacity plus overload capability (up to 10% or such other limit as certified by the OEM and approved by CEA) minus auxiliary consumption, corrected for the reservoir level. In case, the overload capability of such a station is more than 10% as approved, such a station shall declare the overload capability in advance.

b. During high inflow and water spillage conditions, the SLDC shall allow scheduling of power from hydro generating stations for overload capability up to 10% of Installed Capacity or any other limit as per sub-clause (a) of this clause, subject to the availability of margins in the Intra State transmission system.

9. Minimum turndown level for Intra state entity thermal generating stations:

The minimum turndown level for operation in respect of a unit of a Intra State/regional entity thermal generating station shall be 55% of the MCR of the said unit or such other minimum power level as specified in the CEA (Flexible Operation of coal based Thermal Generating Units) Regulations, 2023, as amended from time to time, whichever is lower:

Provided that the Commission may fix through an order a different minimum turndown level of operation in respect of specific unit(s) of a thermal generating station:

Provided further that such generating station on its own option may declare a minimum turndown level below the minimum turndown level specified in this Clause:

Provided further that the intra state entity thermal generating stations whose tariffs are adopted under Section 63 of the Act shall be compensated for part load operation, that is, for generation below the normative level of operation, in terms of the provisions of the contract entered into by such generating stations with the beneficiaries or buyers, or in the absence of such provision in the contract, as per the mechanism already in force under the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010 shall continue in operation:

Provided further that the thermal generating stations whose tariffs are determined under Section 62 of the Act by the Commission, shall be compensated for part load operation as per the provisions of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2024 and its amendments thereof.

10. Requirement for Commencement of Scheduling:

a. The following documents shall be submitted to the SLDC by the seller or the buyer, as the case may be, before commencement of the scheduling:
   (i) Declaration by the sellers and the buyers about the existence of valid contracts for the transactions.
   (ii) Copies of the valid contracts signed by the sellers and the buyers, for transactions other than collective transactions.

b. In case of allocation of power from the central generating stations by the Central government and State generating stations by the State Government, the SLDC shall obtain the share allocation of each beneficiary from state government through the appropriate agency/Department.

c. The copy of contracts once submitted by sellers and buyers need not be submitted again before every scheduling request and the copy of the contract can be linked with a unique ID by SLDC for reference before scheduling request:

Provided that in case of any change in terms of the contract or termination of contract, the seller as well as the buyer shall inform the same, along with a copy of the modified contract, as applicable, within a day, to the SLDC.

d. Each Intra State Entity including Buyers and Sellers in the State shall nominate a dedicated person/cell to coordinate and communicate with SLDC for the purpose of Scheduling and Despatch. The name, designation, contact address and contact telephone numbers of such nominated person shall be informed to SLDC and all concerned.
e. The Seller shall make an advance declaration of ex-power plant MW and MWh capabilities foreseen for the next day, i.e., from 0000 hrs to 2400 hrs. The seller while making Ex-power plant foreseen generation capability in MW & MWh is also required to take into account availability of fuel & water along with foreseen Day ahead capability.
f. While making or revising its declaration of capability, except in case of run-off-river (with up to three-hour pondage) hydro stations, the Intra state entity Generating Station shall ensure that the declared capability during peak hours is not less than that during other hours. However, exception to this rule shall be allowed in case of tripping/re- synchronization of units as a result of forced outage of units.
g. In case of Inter-State bilateral and collective transactions having a State utility or an Intra- State Entity as a Buyer or Seller, SLDC shall accord concurrence or no objection certificate or a prior standing clearance, as the case may be, in accordance with the Central Commission and State Commission regulations notified from time to time.

11. Load generation balance during day ahead scheduling:

a. SLDC shall follow the MOD principles as specified in KERC Regulations and as amended from time to time, for respective buyers while preparing Load Generation balance during Day Ahead Scheduling.
b. SLDC shall prepare the separate Merit Order Stack for each Buyer considering the contracts of respective Buyer and least cost MOD principles as specified in KERC Regulations as amended from time to time.
c. SLDC shall prepare the Load Generation balance considering the Ex-Bus generation availability of the Sellers, entitlement of ISGS and Load forecast

by the Buyers, MOD principle and RE Generation forecasted as per the procedure under KERC (Forecasting, Scheduling, Deviation settlement and related matters for wind and solar Generation sources) Regulations 2015, as amended from time to time.

d. While giving the Schedule to Generators as per MOD principles, the SLDC shall maintain the reserve margin in the Generator as specified in these Regulations for management of ramp as per the requirement of the Grid.
e. Through secured credentials, SLDC shall publish 15-minute block wise surplus power availability or power shortage of the distribution licensee(s), if any, by 10:00 hrs.
f. Based on the information furnished by SLDC, Distribution Licensee being a deemed trader may undertake any short-term contracts or Inter-State trade transactions or may participate in the power exchange transactions to meet its drawal shortfall or optimize its power procurement cost, as the case may be.
g. As the Sellers have contracted their generation capacity through long term/medium term contract with Buyers, such exchange of available surplus capacity shall be effected inter- se amongst Buyers without the need to amend the existing PPAs with their respective Sellers.
h. SLDC shall maintain and publish separate account of exchange of surplus power capacity if any amongst the Buyers/Distribution licensees.
i. Buyers shall submit their revised drawal schedule to SLDC, if they undertake any bilateral contracts or participate in the Power Exchange Transactions.
j. Based on the revised information received from the Buyers and Sellers, SLDC shall run revised Load–Generation balance for finalizing the despatch schedules for all Sellers, Wind and Solar Generators (QCAs), RE generators connected to In-STS and drawal schedule of Buyers and publish on the SLDC's website by 14:00hrs.
k. Through secured credentials, SLDC shall also publish 15-minute block wise final availability of surplus power if any to the distribution licensee(s) by 14:30 hrs.

7.7. Unit Shut Down (USD):

1. The generating stations or units thereof, identified by SLDC in co-ordination with beneficiaries or Buyer, shall have the option to operate at a level below the minimum turn down level or to go under Unit Shut Down (USD).
2. In case a generating station, or unit thereof, opts to go under unit shut down (USD), the generating company owning such generating station or unit thereof shall fulfil its obligation to supply electricity to its beneficiaries who had made requisition from the said generating station prior to it going under USD, by arranging supply either (a) by entering into a contract(s) covered under the Power Market Regulation; or (b) by arranging supply from any other generating station or unit thereof owned by such generating company subject to honouring of rights of the original beneficiaries of the said generating station or unit thereof from which supply is arranged;
3. In case of emergency conditions, for reasons of grid security, a generating station or unit thereof, which is under USD may be directed by SLDC or RLDC, as the case may be to come on bar, and in such event the generating station or unit thereof shall come on bar under hot, warm and cold conditions as per the time period to be specified in these regulations.
4. **Once a generating station is brought on bar as per clause (3) of this Regulation, it shall be compensated as per CERC Part Load Compensation and SCUC procedures till Grid Code Review Panel finalizes the Procedure which is to be approved by KERC.**

7.8. Scheduling from Alternate Source of Power by a Generating Station:

1. A generating station may supply power from alternate source in case of (i) USD in terms of clause (1) of Regulation 7.7 of these regulations or (ii) forced outage of unit(s) or (iii) a generating station other than REGS replacing its scheduled generation by power supplied from REGS irrespective of whether such identified sources are located within or outside the premises of the generating station or at a different location.
2. The methodology for scheduling of power from alternate sources covered under sub - clauses (i) and (ii) of clause (1) of this regulation shall be as per the following steps:
    a. The generating station may enter into contract with alternate supplier under bilateral transaction or collective transaction.
    b. In case of bilateral transaction, the generating station shall request SLDC or RLDC, as the case may be, to schedule power from such alternate supplier

to its beneficiaries which shall become effective from 7th or 8th time blocks, as the case may be.

c. The power scheduled from alternate supplier shall be reduced from the schedule of the generating station.

d. In case of alternate supply is arranged through collective transactions, the transacted quantum shall be reduced from the scheduled generation of the generating station.

e. The Regional entity generating station may also request the RLDC to arrange alternate supply through SCED under IEGC.

f. The generating station shall not be required to pay the transmission charges and losses for such purchase of power to supply to the buyer from alternate sources.

3. The methodology for scheduling of power from alternate sources covered under sub - clause (iii) of clause (1) of this regulation, shall be as per the following steps:

   a. The generating station shall enter into contract with REGS for supply of power from alternate sources.

   b. The Intra-State entity generating station shall request SLDC to schedule power from such alternate source to its beneficiaries which shall become effective from 7th or 8th time blocks, as the case may be.

   c. The Regional entity generating station shall request RLDC to schedule power from such alternate source to its beneficiaries which shall become effective from 7th or 8th time blocks, as the case may be.

   d. The power scheduled from alternate source shall be reduced from the schedule of the generating station.

   e. The generating station shall not be required to pay the transmission charges and losses for such purchase and supply from alternate sources to the buyer.

   f. In case of a generating station whose tariff is determined by the Commission under Section 62 of the Act, supply of power by such generating station to its buyer from an alternate source, in terms of sub-clauses (a) to (d) of this clause, shall be subject to sharing of net savings as specified in the KERC Tariff Regulations:

   Provided that until a provision is made in the Tariff Regulations, sharing of net savings shall be in accordance with the detailed procedure to be prepared by Grid Code Review Panel and approved by the Commission.

g. In case of a generating station other than whose tariff is determined by the Commission under Section 62 of the Act, supply of power by such generating station to its buyer from an alternate source in terms of sub-clauses (a) to (d) of this clause shall be in accordance with the contract with the buyer and in the absence of a specific provision in the contract, in terms of mutual consent including on sharing of net savings between the generating station and the buyer.

7.9. Procedure for Scheduling and Despatch Timelines for Intra State Transactions:

1. The following scheduling related activities shall be carried out daily for Intra state entity Generating Station, on day ahead basis, 'D-1' day, for supply of power on 'D' day, Declaration of Declared Capacity by generating stations as follows:

a. The generating station based on coal and lignite shall submit the following information for 0000 hours to 2400 hours of the 'D' day, by 6 AM on 'D-1' day:
(i) Time block-wise On-bar Declared Capacity (MW) for on-bar unit wise and a Station wise;
(ii) Time block-wise Off-bar Declared Capacity (MW) for off-bar unit wise and a Station wise;
(iii) Time block-wise Ramp up rate (MW/min) for on-bar capacity of each unit;
(iv) Time block-wise Ramp down rate (MW/min) for on-bar capacity of each unit;
(v) MWh capability for the day;
(vi) Minimum turndown level (MW) and in percentage (%) of ex-bus capacity on-bar of each unit;

b. The generating station based on hydro energy shall submit the following information for 0000 hours to 2400 hours of the 'D' day, by 6 AM on 'D-1' day:
(i) Time block-wise ex-bus declared capacity;
(ii) MWh capability for the day;
(iii) Ex-bus peaking capability in MW and MWh;
(iv) Time block-wise Ramp up rate (MW/min) for on-bar capacity;
(v) Time block-wise Ramp down rate (MW/min) for on-bar capacity;
(vi) Unit-wise forbidden zones in MW and percentage (%) of ex-bus installed capacity;

(vii) Minimum MW and duration corresponding to requirement of water release for irrigation, drinking water and other considerations.

(viii) Unit wise maximum MW along with probable combination of unit maximum in case adequate water is not available.

c. The generating station based on gas or combined cycle generating station shall submit the following for 0000 hours to 2400 hours of the ‘D’ day, by 6 AM on ‘D- 1’ day:

   (i) Time block-wise On-bar Declared Capacity (DC) for the station in MW separately for each fuel such as domestic gas, RLNG or liquid fuel and On- bar units;

   (ii) Time block wise Off-bar Declared Capacity (MW) and off-bar units;

   (iii) MWh capability (fuel-wise) for the next day;

   (iv) Time block wise Ramp up rate (MW/min) for on-bar capacity;

   (v) Time block wise Ramp down rate (MW/min) for on-bar capacity;

   (vi) Minimum turndown level (MW) and in percentage (%) of ex-bus capacity on- bar.

d. The renewable energy generating station i.e., wind & solar, individually or represented by a lead generator or QCA, shall submit aggregate available capacity of the pooled generation and aggregate schedule along with contract- wise breakup for each time block for 0000 hours to 2400 hours of the ‘D’ day, by 6 AM on ‘D-1’ day. The source wise breakup of aggregate available capacity of the pooled generation shall also be furnished.

e. ESS including pumped storage plant, individually or represented by the lead ESS or QCA on their behalf, shall submit aggregate available capacity of the pooled generation and aggregate schedule along with contract-wise breakup for each time-block for 0000 hours to 2400 hours of the ‘D’ day, by 6 AM on ‘D-1’ day.

f. The availability declaration by State/regional entity generating station shall have a resolution of two decimal (0.01) MW and three decimal (0.001) MWh.

g. By 0600 hrs every day, the ISGS shall advice the RLDC, the station-wise ex-power plant MW and MWh availability for the next day, i.e. from 0000 hrs to 2400 hrs of the following day on 15-minute time block as per IEGC.

h. By 0600 hrs every day, each Seller connected to In-STS, shall furnish to SLDC, its unit-wise generation availability in MW and MWh taking into consideration any outage of its generating unit for the next day, i.e., from 0000 hrs to 2400 hrs of the following day on 15-minute time block.

i. By 0600 hrs every day, Pooling Sub-Station-wise QCAs, connected to In-STS, shall furnish to SLDC, their generation availability in MW and MWh taking into consideration any outage of its generating unit for the next day, i.e., from 0000 hrs to 2400 hrs of the following day on 15-minute time block.

j. By 0700 hrs every day, RLDC will advise (available on RLDC website) the station-wise ex- power plant MW and MWh availability for the next day of regional entities, i.e. from 0000 hrs to 2400 hrs of the following day on 15-minute time block to SLDC for the Beneficiaries in the State as per IEGC.

k. By 0715 hrs every day, SLDC shall advice the station-wise ex-power plant MW and MWh availability of ISGS & each Seller connected to In-STS and Pooling Sub-Station wise QCAs, connected to In-STS for the next day, i.e. from 0000 hrs to 2400 hrs of the following day on 15-minute time block to Beneficiaries in the State.

l. By 0730 hrs every day, Beneficiaries in the State shall inform their requisition of ISGS & In-SGS drawal to the SLDC in accordance with contracts.

m. By 0800 hrs every day, SLDC shall inform the consent of the Beneficiary to RLDC for the ISGS capabilities.

n. The SLDC on behalf of the intra-State entities, as well as regional entities while furnishing time block-wise requisition under this Regulation shall subject to technical constraints, duly factor in merit order of the generating stations with which it has entered into contract(s):

   Provided that the specific renewable energy generating stations namely wind/solar/mini-hydel and hybrid of wind/solar/mini-hydel shall not be subjected to merit order despatch, and subject to technical constraints shall be requisitioned first followed by requisition from other generating stations in merit order.

o. Allocation of corridors by RLDC for GNA grantees as per IEGC.

   (i) RLDC will check if drawal schedules as requisitioned by drawee GNA grantees can be allowed based on available transmission capability:

   Provided that in case of constraint in transmission system, the available transmission corridor shall be allocated to the drawee GNA grantees in proportion to their GNA within the region or from outside region, depending upon the transmission constraint, whether it is within the region or from outside the region, as the case may be. The same will be intimated to SLDC/ drawee GNA grantees by 8.15 AM on 'D-1' day.

(ii) SLDC shall revise their requisition for drawal schedule based on availability of transmission corridors for such grantee by 8.30 AM on 'D-1' day.

(iii) RLDC will advise final drawal schedules and injection schedules for drawee and injecting GNA grantees by 9 AM on 'D-1' day.

(iv) For the purpose of "Use of GNA by other GNA grantees" as specified in the GNA Regulations, the GNA shared with other entity shall be considered as GNA of the new entity.

p. In case a generating station other than REGS intends to replace its schedule by power supplied from REGS, it shall intimate the quantum and source of power by which it intends to replace the power already scheduled under this Regulation by 9.15 am on 'D-1' day.

q. SLDC shall incorporate by 9.45 am of 'D-1' day, the request from such generating station, in the injection schedule of the REGS and the said generating station, and the drawal schedule of the buyer.

r. Requisition of schedule by STOA /T-GNA grantees:

(i) Based on the entitlement or otherwise, intra-State entities which are STOA/T-GNA grantees, shall furnish time block-wise requisition for drawal, to the SLDC in accordance with contracts by 9.00 AM of 'D-1' day.

(ii) Allocation of corridors by SLDC for STOA/T-GNA grantees: SLDC shall check if drawal schedules as requisitioned by STOA/T-GNA grantees can be granted based on available transmission capability after allocating corridors to the LTA /MTOA/GNA grantees.

Provided that in case of constraint in transmission system, the available transmission corridor shall be allocated to the T-GNA/STOA grantees in proportion to their T-GNA/STOA.

(iii) SLDC shall issue final drawl schedules for STOA/T-GNA grantees by 9.30 AM of 'D-1' day.

s. SLDC shall release the balance corridors after finalization of schedules for LTA&MTOA/GNA and STOA/T-GNA grantees for day ahead collective transactions.

t. The generating station whose tariff is determined under Section 62 of the Act, may sell its un-requisitioned surplus as available at 9.45 AM in the day ahead market, without the consent of beneficiary(ies). The sharing of net savings shall be as per provisions of Tariff Regulations and until a provision is made in the Tariff Regulations, in accordance with the detailed procedure to be prepared by SLDC and approved by the Commission.

u. Scheduling of Collective Transactions:

(i) Power Exchange(s) will open bidding window for day ahead collective transactions and TRAS from 10.00 AM to 11AM of 'D-1' day.

(ii) The power exchange will submit the day-ahead provisional trade schedules along with net power interchange of each bid area and region to NLDC by 11.45 AM of 'D-1' day.

(iii) NLDC will validate the same from system security angle and inform the power exchange with revisions required, if any, due to transmission congestion or any other system constraint by 12.15 PM of 'D-1' day.

(iv) The power exchange shall submit the final trade schedules to NLDC for regional entities and to SLDC for intra-State entities by 1.00 PM of 'D-1' day.

v. RLDC shall release balance corridors after finalization of schedules under day ahead collective transactions by 1.00 PM of 'D-1' day.

w. RLDC shall process exigency applications received till 1 PM of 'D-1' day for the 'D' day by 2 PM of 'D-1' day.

x. SLDC shall update the availability of balance transmission corridors, if any, after finalization of schedules for day ahead applications by 2.00 PM of 'D-1' day on its website. The balance transmission corridor may be utilized by LTA&MTOA/GNA grantees by way of revision of schedule, under any contract within its LTA&MTOA/GNA or for day ahead applications or in real time market on first cum first serve basis.

y. Procedure for scheduling of transaction in Real-time market (RTM):

(i) All the entities participating in the real-time market including TRAS may place their bids and offers on the Power Exchange(s) for purchase and sale of power.

(ii) The window for trade in real-time market for day (D) shall open from 22.45 hrs to 23.00 hrs of (D-1) for the delivery of power for the first two time- blocks of 1st hour of day (D) i.e., 00.00 hrs to 00.30 hrs, and will be repeated every half an hour thereafter.

(iii) NLDC will indicate to the Power Exchange(s) the available margin on each of the transmission corridors before the gate closure.

(iv) The power exchanges shall clear the real-time bids from 23.00 hrs till 23.15 hrs of 'D-1' day based on the available transmission corridor and the buy and sell bids for the real time market (RTM) for the specified duration and intimate the cleared bids to NLDC by 23.15 hrs, for scheduling.

z. NLDC will finalize schedules under RTM, SCED and Ancillary Services by 23.30 hrs. of 'D-1'day and RLDC shall publish the final schedules for dispatch by 23.35 hrs. of 'D-1'day.

aa. TRAS shall be procured in accordance with Ancillary Services Regulations along with bidding for collective transactions, RTM or any other mechanism as per these regulations or Ancillary Services Regulations.

2. Issuance of day-ahead schedule:

SLDC will convey the following for the next day to all intra state entities including the information received from RLDC for the GNA grantees and T-GNA grantees:

(i) The ex-power plant schedule to each of the regional entity generating station and In-SGS, in MW for different time blocks along with breakup of schedule for each beneficiary or buyer.

(ii) The "net drawal schedule" for each intra state entity in MW for each time block, along with break-up of (a) schedule from each of the sellers, (b) schedule of injection to ISTS and (c) injection or drawal schedule under collective transaction

(iii) All requisitions and schedules shall be rounded off to the nearest two decimals at each control area boundary for each of the transaction and shall have a resolution of 0.01 MW.

3. Issue of schedules by SLDC:

(i) SLDC shall take into account the schedule released by the RLDC for their intra-State entities and finalize the intra-State schedule.

(ii) Power Exchange(s) shall furnish the detailed break up of each point of injection and each point of drawal within each State to respective SLDCs after receipt of acceptance from NLDC. Power Exchange(s) shall ensure necessary coordination with SLDCs for scheduling of the transactions.

4. Margins for Primary Response:

For the purpose of ensuring primary response, SLDC and Beneficiaries, as the case may be, shall not schedule the generating station or unit(s) thereof beyond ex-bus generation corresponding to 100% of the Installed capacity of the generating station or unit(s) thereof. The generating station shall not resort to Valve Wide Open (VWO) operation of units, whether running on full load or part load, and shall ensure that there is margin available for providing governor action as primary response.

In case of gas or liquid fuel-based units, suitable adjustment in Installed Capacity shall be made by SLDC for scheduling in due consideration of the prevailing ambient conditions of temperature and pressure vis à-vis site ambient conditions on which installed capacity of the generating station or unit(s) thereof have been specified:

Provided that the hydro generating stations shall be permitted to schedule ex-bus generation corresponding to 110% of the installed capacity or any other overload capability during high inflow periods to avoid spillage.

5. Power to revise schedules:

a. Curtailment of scheduled transactions for grid security:

When for the reason of transmission constraints or in the interest of grid security, it becomes inevitable to curtail power flow on a transmission corridor, the transactions already scheduled may be curtailed with immediate effect by the SLDC/RLDC (keeping in view the transaction which is likely to relieve the threat to grid security) as follows:

I. Transactions under STOA/ T-GNA shall be curtailed first followed by transactions under LTA&MTOA / GNA.

II. Transactions under STOA/T-GNA shall be curtailed in the following order:

(i) Within transactions under STOA/T-GNA, bilateral transactions shall be curtailed first followed by collective transactions under day ahead market followed by collective transactions under real time market;

(ii) Within bilateral transactions under STOA/ T-GNA, curtailment shall be done first from generation sources other than wind, solar, wind-solar hybrid and run of the river hydro plants with up to three hours pondage (in case of excess water leading to spillage), pro rata based on their STOA/T-GNA quantum;

(iii) The generation from wind, solar, wind-solar hybrid and run of the river hydro plants with up to three hours pondage (in case of excess water leading to spillage) shall be curtailed pro rata based on STOA/T-GNA, after curtailment of generation from other sources, within STOA/T-GNA.

(iv) Collective transactions under day ahead market shall be curtailed after curtailment of bilateral transactions under STOA/T-GNA.

(v) Collective transactions under real time market shall be curtailed after curtailment of collective transactions under day ahead market.

III. Transactions under LTA&MTOA/ GNA shall be curtailed in the following order:

(i) Within transactions under LTA&MTOA / GNA, curtailment shall be done first from generation sources other than wind, solar, wind-solar hybrid and run of the river hydro plants with up to three hours pondage (in case of excess water leading to spillage), on pro rata basis based on their LTA&MTOA / GNA quantum.

(ii) The generation from wind, solar, wind-solar hybrid and run of the river hydro plants with up to three hours pondage (in case of excess water leading to spillage) shall be curtailed pro rata based on their LTA&MTOA / GNA quantum, after curtailment of generation from other sources, within LTA&MTOA / GNA.

IV. RLDC or SLDC, as the case may be, shall publish a report of such incidents on its website.

b. SLDC shall publish, from time to time on its website, the operational limits of parameters for maintenance of grid security for the information and compliance of users of the grid. The curtailment of schedule shall be carried out only in case of violation of the operational limits.

c. In the event of bottleneck in evacuation of power due to outage, failure or limitation in the transmission system or any other constraint necessitating reduction in generation, the SLDC shall revise the schedules:

Provided that generation and drawal schedules revised by the State Load Despatch Centre shall become effective from 7^{th} block or 8^{th} block depending on time block in which schedule has been revised as first time block.

d. In case of contingencies such as critical loading of lines, transformers, abnormal voltages or threat to system security, the following steps as considered necessary, may be taken by SLDC:

   (i) Issue directions to concerned entities to adhere to the schedules;
   (ii) Deployment of ancillary services;
   (iii) Switching on/off pump storage plants operating in pumping mode;
   (iv) Dispatching emergency demand response measures;
   (v) Direct the intra state entities to increase or decrease their drawal or injection by revising their schedules and such directions shall be immediately acted upon.

e. Whenever SLDC revises final schedules due to reasons of grid security or contingency, brief reasons shall be informed immediately to the concerned entity followed by a detailed explanation to be posted on SLDC website within 24 hours.

f. Any verbal directions by SLDC shall be confirmed in writing as soon as possible latest within twenty-four (24) hours.

6. Revision of schedules on request of buyers:

a. SLDC on behalf of intra-state entities, regional entity ESSs as drawee entities, beneficiaries, regional entity buyers may revise their schedules under LTA&MTOA/ GNA as per sub-clauses (b) and (c) of this clause in accordance with their respective contracts: Provided that scheduled transactions under STOA/T-GNA once scheduled cannot be revised other than in case of forced outage as per clause (8) of this Regulation.

b. The request for revision of scheduled transaction for 'D' day, shall be allowed subject to the following:

   (i) Request of buyers for upward revision of schedule from the generating station whose tariff is determined under Section 62 of the Act shall be allowed starting 2 PM on 'D-1' day, only in respect of the remaining available quantum of un-requisitioned surplus in such generating stations, after finalization of schedules under day ahead market.

"Provided that downward revision of schedules by the buyers for 'D' day, after 1430 hrs on 'D-1' day in the generating station shall not be allowed below their respective share of minimum turndown level in the generating station."

(ii) Request of buyers for upward or downward revision of schedule in respect of the generating stations other than those whose tariff is determined under Section 62 of the Act, shall be allowed in terms of provisions of the respective contracts between the generating stations and beneficiaries or buyers.

c. Based on the request for revision in schedule made as per sub-clauses (a) and (b) of this clause, any revision in schedule made in odd time blocks shall become effective from 7^{th} time block and any revision in schedule made in even time blocks shall become effective from 8^{th} time block, counting the time block in which the request for revision has been received by the SLDC to be the first one.

d. While finalizing the drawal and despatch schedules, in case any congestion is foreseen in the intra-State transmission system or technical constraints of a generating station, the SLDC shall moderate the schedules as required, under intimation to the concerned intra state entities.

7. Grid Disturbance of category GD-5:

a. GD-5 occurs when forty per cent or more of the antecedent generation or load in a regional grid is lost as defined in the CEA Grid Standards.

b. Certification of such grid disturbance and its duration will be done by the RLDC.

c. Scheduled generation of all the affected intra state entity generating stations supplying power under bilateral transactions shall be deemed to have been revised to be equal to their actual generation for all the time blocks affected by the grid disturbance. Such intra state entity generating station shall pay back the energy charges received by it for the scheduled generation revised as actual generation to the Deviation and Ancillary Service Pool Account:

Provided that, in case the beneficiaries or buyers of such Intra state generating station are also affected by such grid disturbance, the scheduled drawal of such beneficiaries or buyers shall be deemed to have been revised to corresponding actual generation schedule of intra state entity generating stations:

Provided further that in case the beneficiaries or buyers of such intra state entity generating station are not affected by such grid disturbance and they continue to draw power, the scheduled drawal of such beneficiaries or buyers shall not be revised.

d. The scheduled generation of all the affected intra state entity generating stations supplying power under collective transactions shall be deemed to have been revised to be equal to their actual generation. Such intra state entity generating stations shall refund the charges received towards such scheduled energy to the Deviation and Ancillary Service Pool Account.
e. The declaration of grid disturbance will be done by the concerned RLDC at the earliest. A notice to this effect shall be posted at its website by the SLDC/RLDC of the State/region in which the grid disturbance has occurred which shall be considered as declaration of the grid disturbance by RLDC. All intra state entities shall take note of the grid disturbance and take appropriate action at their end.
f. Energy and deviation settlement for the period of such grid disturbance causing disruption in injection or drawal of power shall be done by the SLDC:

   Provided that generation and drawal schedules revised by the State Load Despatch Centre shall become effective from 7^{th} block or 8^{th} block depending on block in which schedule has been revised as first block.

8. The generation schedules and drawal schedules shall be accessible to the Intra State entities through user credentials controlled access. After the operating day is over at 2400 hours, the schedule finally implemented during the day (taking into account all before-the-fact changes in despatch schedule of Intra-State entity generating stations and drawal schedule of the beneficiaries) shall be issued by the SLDC. These schedules shall be the basis for commercial accounting.

9. Revision of Declared Capacity and schedule of a generating station or ESS (as an injecting entity) shall be allowed only in case of bilateral transactions and not in case of collective transaction as per following details:

   (a) The generating station (other than lignite, gas based thermal generating station, and hydro generating station) or ESS (as an injecting entity) shall be allowed a maximum of four (4) revisions of Declared Capacity and schedule in a day subject to a maximum of sixty (60) revisions during a month, due to reasons such as a partial outage of the unit or variation of fuel quality or any other technical reason to be recorded in writing:

   Provided that SLDC may allow upward revision of DC beyond the above limit keeping in view grid requirements.

   (b) The generating station based on lignite, gas, or hydro generating station shall be allowed six (6) revisions of Declared Capacity and schedule in a day subject to a maximum of 120 (One hundred twenty) revisions during a month, due to reasons such as a partial outage of the unit or water availability for hydro generating stations or fuel quality or variations in the supply of gas for gas generating stations or any other technical reason to be recorded in writing:

   Provided that SLDC may allow upward revision of DC beyond the above limit keeping in view grid requirements.

10. In case of requirement of revision of schedule due to forecasting error, a WS seller may revise its schedule only in case of bilateral transactions and not in case of collective transaction. Such revision of schedule shall become effective from the time block and in the manner as specified in sub-clause (c) of clause (6) of this Regulation.

    This revision of schedule and its applicability applies to all WS sources as these Codes supersedes the other KERC Regulations where it is provisioned.

    Further, the capacity applicable for forecasting, scheduling for WS sources remains same as per relevant regulations

11. In case of requirement of revision of Declared Capacity due to forecasting error, a RoR generating station may request for revision of its Declared Capacity and

schedule only in case of bilateral transactions and not in case of collective transaction. Such revision shall become effective from the time block and in the manner as specified in sub- clause (c) of clause (6) of this Regulation.

12. In the event of forced outage of a generating station or unit thereof, the generating company owning the generating station or unit thereof shall fulfil its supply obligation to the beneficiaries which made requisition from such generating station or unit thereof, (i) by entering into contract(s) covered under Power Market Regulations or (ii) by arranging supply from any other generating station or unit thereof owned by such generating company subject to honouring of rights of the original beneficiaries of the said generating station or unit thereof from which the supply is arranged, as applicable.

13. Discrepancy in schedule:

All Intra State Entities, open access customers, injecting entities and drawee consumers shall closely check their transaction Schedule and point out errors, if any, to the SLDC.

The final schedules issued by SLDC shall be open to all Intra State entities and other Inter- State open access entities for any checking and verification, for a period of 5 days. In case any mistake or omission is detected, the SLDC shall make a complete check and rectify the same.

14. Energy Metering and Accounting:

a. The STU shall be responsible for procurement and installation of Interface Energy Meters (IEMs), at the cost of respective entity, at all the In-STS interface points, points of connections between the Intra State entities and other identified points for recording of actual active and reactive energy interchanged in each time-block through those points, and its operation and periodic calibration shall be done by the respective entity. STU shall be responsible for replacement of faulty meters.
b. The installation, operation, calibration and maintenance of Interface Energy Meters (IEMs) with automatic remote meter reading (AMR) facility shall be in accordance with the CEA Metering Regulations 2006.

c. The installation, operation, and maintenance of additional communication links, if any, required for the purpose of AMR facility shall be in accordance with CEA Communications Regulations.
d. Access to such metering data to the SLDC shall be in accordance with the CEA Metering Regulations 2006.
e. 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 (7) day period ending on the preceding Sunday 2400 hrs and transmitting them to the SLDC 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 SLDC.
f. SLDC shall, based on the IEM readings, compute time block wise actual net injection and drawal of intrastate entities/QCA within their control area:

   Provided that the computations done by SLDC shall be open to all intrastate entities/QCA for a period of fifteen (15) days for checking and verification.

g. In case any error or omission is detected by self-analysis or brought to notice by an entity, SLDC, as the case may be, shall make a complete check and rectify the error within a period of a month from date of such detection.
h. SLDC shall prepare state energy account in accordance with these regulations.
i. STU shall make necessary arrangements for installation of suitable meters, capable of recording energy flows at 15-minute intervals or any other time interval as specified by the Commission, at the points of injection and drawal. The time synchronization of metering system shall be through Global Positioning System with counter check from the State Energy Accounting Centre at SLDC.
j. STU shall register all the interface points and interface meters in the MDAS software and share the meter data with SLDC registry for DSM computation. No change in the interface metering infrastructure shall be carried out by STU without prior approval of the SLDC and suitable modifications in the records of the registry in the MDAS software.

15. Inspection of records:

The operational logs and records of the Intra state entity Generating Station and intra- State transmission licensees shall be available for inspection and review by the ALDCs and SLDC.

16. Oversight of injection and drawal:

SLDC shall periodically review the over drawal from or under injection into the grid. In case of persistent over drawal or under injection, the matter shall be reported to the Commission for necessary action.

17. Scheduling of Intra-State Hydro Generating Stations:

a. While declaring the availability, Intra-State Hydro Generating Stations shall inform, month- wise water availability and all other parameters such as reservoir level, overall water quota available for generation along with unit availability to Distribution Licensee with whom it has PPA and also to SLDC, for the next month before 21st day of the current month.

b. Concerned Distribution Licensee shall inform day-wise generation from hydro generating stations considering water availability to SLDC for the next month before 25th day of the current month.

c. SLDC shall be responsible for operating Intra state entity Generating Hydro Station on a daily basis considering the month-wise water availability and schedule provided by contracted Distribution Licensee of the respective Hydro Stations to SLDC.

d. In order to meet system contingencies, SLDC may keep hydro capacity equivalent to the capacity of largest thermal Unit as a reserve capacity requirement.

e. For operation of Pumped storage hydro power plants (PSHPP), concerned distribution licensee shall indicate the daily schedule of PSHPP for the week. SLDC shall operate the PSHPP as per the daily schedule indicated by concerned distribution licensee considering the grid conditions such as frequency, voltage, reactive power requirement etc., and availability of off-peak energy.

f. The Intra-State hydroelectric generating stations are expected to respond to grid frequency changes and inflow fluctuations. They would, therefore, be free to deviate from the given schedule as long as they do not cause a grid constraint. While computing the deviation of intra-state hydro generating stations, the schedule of hydro generating stations shall be replaced with actual generation.

g. Notwithstanding anything contained in clause (a) to (f) of this Regulation, SLDC may have the complete control over the hydro generating unit/stations to maintain the DSM, ACE, Network stability and Reservoir level.

18. Implementation of Regulation of Access/Contracts:

SLDC shall implement the regulation of Access/Contracts in line with LPS Rules 2022 along with its Amendments. The regulation of access/contracts advised by RLDC on intra state entities /buyers/sellers if any shall be implemented by SLDC.

Chapter – 8: Protection Code

8.1. General:

1. This code covers the protection protocol, protection settings, protection system management and protection audit plan of electrical systems.
2. There shall be a uniform protection protocol for the users of the grid:
    a. for proper co-ordination of protection system in order to protect the equipment/system from abnormal operating conditions, isolate the faulty equipment and avoid unintended operation of protection system;
    b. to have a repository of protection system, settings and events at intra state level;
    c. specifying timelines for submission of data;
    d. to ensure healthiness of recording equipment including triggering criteria and time synchronization; and
    e. to provide for periodic audit of protection system.

8.2. Protection Protocol:

1. All users connected to the integrated grid shall provide and maintain effective protection system having reliability, selectivity, speed and sensitivity to isolate faulty section and protect element(s) as per the CEA Technical Standards for Construction, the CEA Technical Standards for Connectivity, the CEA (Grid Standards) Regulations, 2010, the CEA Technical Standards for Communication and any other applicable CEA Standards specified from time to time.

a. Back-up protection system shall be provided to protect an element in the event of failure of the primary protection system.

b. RPC will develop the protection protocol and revise the same, after review from time to time, in consultation with the stakeholders in the region, and in doing so shall be guided by the principle that minimum electrical protection functions for equipment connected with the grid shall be provided as per the CEA Technical Standards for Construction, the CEA Technical Standards for Connectivity, the CEA Technical Standards for Communication, the CEA (Grid Standards) Regulations, 2010, the CEA (Measures relating to Safety and Electric Supply) Regulations, 2023, and any other CEA standards specified from time to time.

c. The protection protocol in a particular system may vary depending upon operational experience. Changes in protection protocol, as and when required, shall be carried out after deliberation and approval of the RPC.

d. In line with the protection protocol of RPC, STU shall prepare the Protection Manual within 90 days from the notification of these Regulations in consultation with the PCCC & stakeholders covering all the protection aspects of the grid elements connected to 400/220/132kV/110/66kV and below voltage level which shall be followed by all users.

e. Violation of the protection protocol and protection manual of the State shall be brought to the notice of PCCC by the SLDC.

2. STU shall ensure that the provisions of the Protection Manual shall be consistent with the following as amended from time to time:

   a. Protection Philosophy;
   b. CEA (Technical Standards for Connectivity to the Grid) Regulations,2007 as amended from time to time;
   c. CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) 2022 as amended from time to time;
   d. CEA (Grid Standards) Regulations, 2010 as amended from time to time;
   e. CEA (Technical Standards for Communication system in Power System Operation) Regulation 2020
   f. Protection protocol adopted by RLDC/RPC; and
   g. System Requirement and past field experience of STU.

3. The Protection Manual prepared by the STU shall contain provisions for the following:
    a. Role and responsibility of STU/SLDC and Users;
    b. Protection System for Generators;
    c. Protection System for Transmission Lines including HVDC;
    d. Protection System for substations and Transmission to Distribution interface;
    e. Compliance monitoring of the protection code by the Users;
    f. Calibration and testing of the equipment and Relays used in the protection system;
    g. Type of communication required for protection system;
    h. Protection Audit; and
    i. Any other provisions that STU deem fit as required for the system.

8.3. Protection Settings:

1. STU shall be the nodal agency to ensure implementation of protection schemes in accordance with the provisions of the Regulations specified by the Authority and in co- ordination with RPC.
2. Electrical equipment or part of electrical equipment shall be allowed to remain connected to the In-STS only if it shall be provided by minimum specified protection aimed at reliability, selectivity, speed, stability, and sensitivity.
3. All Users shall co-operate with STU to ensure correct and appropriate settings of the protection system to achieve effective, discriminatory removal of faulty equipment within the time for target clearance specified in these Regulations as amended from time to time.
4. Protection system settings shall not be altered, or protection relays bypassed and/or disconnected without consultation and agreement between all affected Users and Nodal agency. In case where protection is bypassed and/or disconnected by an agreement, the cause shall be rectified, and the protection is restored to normal condition as quickly as possible. If agreement has not been reached, the electrical equipment shall be removed from service forthwith.
5. The Protection and Communication Coordination Committee shall decide the date from which the existing protection system provided by STU and/or User is required to be changed, if it is not meeting the minimum requirement as stipulated in this code.

6. User shall update the protection system, if STU confirms that the protection system of User does not comply with the minimum requirement as stipulated in this code.
7. **Fault Clearance Time:** From stability considerations, the maximum Fault Clearance Time for faults on any user's system directly connected to the Transmission System, or any faults on the Transmission System itself, shall be as specified in the CEA (Grid Standards) Regulations, 2010, amended from time to time as shown in Table-9:

TABLE-9

Voltage Class	**Target clearance time**
400kV	100 milli seconds
220kV	160 milli seconds
110/66Kv	350 milliseconds

8. STU shall undertake review of the protection settings, assess the requirement of revisions in protection settings and revise protection settings in consultation with the stakeholders of In-STS, from time to time and at least once in a year. The necessary studies in this regard shall be carried out by the STU. The data including base case (peak and off-peak cases) files for carrying out studies shall be provided by SLDC:

9. **All users connected to the grid shall:**
   a. furnish the protection settings implemented for each element to STU in a format as prescribed by the STU in line with RPC;
   b. obtain approval of the RPC for (i) any revision in settings, and (ii) implementation of new protection system;
   c. STU shall intimate to the RPC about the changes implemented in protection system or protection settings within a fortnight of such changes;
   d. ensure correct and appropriate settings of protection as prescribed by the RPC.
   e. ensure proper coordinated protection settings.

10. **STU shall:**
    a. maintain a centralized database and update the same on periodic basis containing details of relay settings for grid elements connected to voltage level may be 400/220/132/110/66kV. SLDC shall also maintain such database.

b. carry out detailed system studies, once a year, for protection settings and advise modifications / changes, if any, to the Transmission licensee (s) and to all users and In-STS of the State. The data required to carry out such studies shall be provided by SLDC and RLDC.

c. provide the database access to RPC and RLDC and to all users, SLDC, and In- STS of the State. The database shall have different access rights for different users.

11. The changes in the network and protection settings of grid elements connected to 220kV and above shall be informed to RPC by STU.

8.4. Protection Audit Plan:

1. All users shall conduct internal audit of their protection systems, and any shortcomings identified shall be rectified and informed to STU. The audit report along with action plan for rectification of deficiencies detected, if any, shall be shared with STU for users connected at Voltage level of 400/220/132/110/66 kV or as agreed with STU.
2. Periodicity for the Internal Protection Audit for the Users connected to Grid at 400/220kV Voltage class shall be once in a year and for 132/110/66kV voltage class shall be once in Five (5) Years.
3. All users shall also conduct third party protection audit of each sub-station at Voltage of 400kV and 220kV or any other voltage level once in five (5) years or earlier as advised by RPC/STU/SLDC.
4. After analysis of any event, STU shall identify a list of substations / and generating stations where third-party protection audit is required to be carried out and accordingly advise the respective users to complete third party audit within three (3) months.
5. The third-party protection audit report shall contain information sought in the format as specified in IEGC. The protection audit reports, along with action plan for rectification of deficiencies detected, if any, shall be submitted to the STU, within a month of submission of third-party audit report. The necessary compliance to such protection audit report shall be followed up regularly in the PCCC.
6. Annual audit plan for the next financial year shall be submitted by the users to STU by 31st July. The users shall adhere to the annual audit plan and report compliance

of the same to STU. STU would furnish the Audit Plan to SRPC by 31st October after discussing in State PCCC.

7. Users shall submit the following protection performance indices of previous month to STU and SLDC on monthly basis for Voltage level of 400kV and 220kV or any other voltage level prescribed by SLDC/STU, which shall be reviewed by the STU/SLDC/RPC:

    a. **The Dependability Index defined as D =** $\dfrac{Nc}{Nc+Nf}$

    Where,
    Nc is the number of correct operations at internal power system faults and Nf is the number of failures to operate at internal power system faults.

    b. **The Security Index defined as S =** $\dfrac{Nc}{Nc+Nu}$

    Where,
    Nc is the number of correct operations at internal power system faults Nu is the number of unwanted operations.

    c. **The Reliability Index defined as R =** $\dfrac{Nc}{Nc+Ni}$

    Where,
    Nc is the number of correct operations at internal power system faults Ni is the number of incorrect operations and is the sum of Nf and Nu.

8. Each user shall also submit the reasons for performance indices less than unity of individual element wise protection system to the STU and action plan for corrective measures. Above 220kV indices would also be furnished to RPC. The action plan will be followed up regularly in the State PCCC/ RPC PCSC.
9. In case any user fails to comply with the protection protocol specified by the STU/RPC or fails to undertake remedial action identified by the STU/RPC within the specified timelines, the STU/ RPC may approach the Commission with all relevant details for suitable directions.

8.5. System Protection Scheme (SPS):

1. SPS for identified system shall have redundancies in measurement of input signals and communication paths involved up to the last mile to ensure security and dependability.
2. For the operational SPS, SLDC, RLDC or NLDC, as the case may be, in consultation with the RPC(s) shall perform regular load flow and dynamic studies and mock testing for reviewing SPS parameters & functions, at least once in a year. S L D C o r RLDC shall share the report of such studies and mock testing including any short comings to RPC(s). The data for such studies shall be provided by STU to the RPC, SLDC and RLDC.
3. The users and SLDC shall report about the operation of SPS immediately and detailed report shall be submitted within three (3) days of operation to the RPC and RLDC in the format specified by the RPC.
4. The performance of SPS shall be assessed as per the protection performance indices specified in these Regulations. In case, the SPS fails to operate, the concerned User shall take corrective actions and submit a detailed report on the corrective actions taken to the RPC within a fortnight.

8.6. Recording Instruments:

1. All users shall keep the recording instruments (disturbance recorder and event logger) in proper working condition.
2. 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 RPC.
3. The time synchronization of the disturbance recorders shall be corroborated with the PMU data or SCADA event loggers by the RLDC. Disturbance recorders which are non- compliant shall be listed out for discussion at RPC.

8.7. Revision in the Protection Manual and Best Practices Guidebook:

1. Transmission Licensees shall share the best practices of protection system development, operation and safety provisions among the other stakeholders. PCCC shall coordinate and formulate a forum of technical experts from industry and academia for continuous improvement in the knowledge of protection system, preventive measures, monitoring and reporting of best practices.

2. The events of protection system/switchgear/relay/device failure as well as the events leading to successful operation of the protection system/switchgear/ relay/device shall be recorded and deliberated during PCCC meetings.
3. Review of the Protection Manual for upgradation/modification shall be undertaken at least once in a year. Such review would cover the important developments/events at national/regional level, need for periodic review due to upgradation of technical standards for switchgear/devices, technological innovations, use of IT tools/practices, training, and capacity building requirements. Based on the review, the PCCC shall recommend suitable modifications/amendments to Protection Manual which shall be duly incorporated in time bound manner upon following due stakeholder consultation process.

8.8. Establishing Protection Application Department:

1. STU, transmission licensee(s) and all Users shall have a Protection Application Department with adequate manpower and skill set.
2. The protection system skill set is gained with experience, resolving various practical problems, case studies, close interaction with the relay manufacturers and field engineers.
3. Therefore, it is proposed that such people should be nurtured to have a long standing career growth in the Protection Application Department.

8.9. Protection System Management:

In addition to technical issues related to protection, the management issues related to protection system need to be addressed. In order to comprehensively address the protection issues in the STU, transmission licensee (s) and all Users, following are the recommendations.

8.9.1 Relay Setting Calculations:

1. The protection application department should do periodic relay setting calculations as and when necessitated by system configuration changes. A relay setting approval system should be in place.
2. Relay setting calculations also need to be revisited whenever the minor configuration or loading, changes in the system due to operational constraints.

Feedback from the field/substations on the performance of the relay settings should be collected and settings should be reviewed and corrected if required.

3. **Creating and maintaining data base of relay settings:** Data regarding settings of relays in their network should be compiled by the CTU and STU and furnished to the RLDC and SLDC respectively and a copy should also be submitted to RPC for maintaining the data base.

8.10. Co-Ordination with System Study Group, System Planning Group and Other Stakeholders:

1. STU, transmission licensee (s) and all Users shall develop a strong system study group with adequate manpower and skill-set that can carry out various system studies required for arriving at system related settings in protection system in addition to others' studies.
2. The Protection Application Department should closely work in coordination with the STU, transmission licensee (s) and all Users' system study group, system planning group, the system operation group.
3. Wherever applicable, it should also co-ordinate and work with STU, transmission licensee (s) and all Users to arrive at the proper relay setting calculations for the system as a whole. The interface point relay setting calculations at CTU-STU, STU-Distribution Licensee/s control area, STU-GEN Companies, CTU-GEN Companies and also generator backup relay setting calculations related to system performance should be periodically reviewed and joint concurrence should be arrived.
4. The approved relay settings should be properly documented. Any un-resolved issues among the stakeholders should be taken up with the PCCC and resolved.

8.10.1 Simulation testing for checking Dependability and Security of Protection System for Critical lines and series compensated Lines:

The protection system for critical lines, all series compensated lines along with interconnected lines should be simulated for intended operation under normal and abnormal system conditions and tested for the dependability and security of Protection system. The RTDS facilities available in the country like at CPRI, POWERGRID and other places should be made use of by the STU, transmission licensee(s) and all Users of the Grid for this purpose.

The network model should be periodically updated with the system parameters, as and when network changes are incorporated.

8.10.2 Adoption of Relay Setting and Functional verification of Setting at site:

1. The Protection Application Department shall ensure through field testing group that the final relay settings are exactly adopted in the relays at field.
2. There should be clear template for the setting adoption duly authorized and approved by the field testing in-charge.
3. No relay setting in the field shall be changed without proper documentation and approval by the Protection Application Department.
4. The Protection Application Department shall periodically verify the implemented setting at site through an audit process.
5. Protection application department should also maintain a log of all protection operations. This record will be assets' record and assist in future upgradation of protection system.

8.10.3 Storage and Management of Relay settings:

With the application of numerical relays, increased system size and volume of relay setting, associated data to be handled is enormous. It is recommended that utilities shall evolve proper storage and management mechanism (version control) for relay settings.

Along with the relay setting data, IED configuration file should also be stored and managed.

8.10.4 Root Cause Analysis of Major Protection Tripping (Multiple Element Outages) along with corrective & Improvement Measures:

1. The routine tripping of transmission lines, transformers and generating units are generally analyzed by the field protection personnel. For every tripping, a trip report along with an associated DR and event logger file shall be generated. However, for major tripping in the system, it is recommended that the protection application department shall perform the root cause analysis of the event.
2. The root cause analysis shall address the cause of a fault, any mal-operation or non- operation of relays, protection scheme etc.
3. The root cause analysis shall identify corrective and improvement measures required in the relay setting, protection scheme or any other changes to ensure system security, reliability and dependability of the protection system.

4. The Protection Application Department shall keep proper records of corrective and improvement actions taken.

8.10.5 Regular Training and Certification:

1. The members of the Protection Application Department shall undergo regular training to enhance & update their skill sets.
2. The training modules shall consist of system studies, relaying applications, testing & commissioning of relays and Certification of protection system is strongly recommended.

8.11. Metering:

1. Meters shall be provided as specified in the Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 as amended from time to time and the standards prescribed thereunder.
2. All interface meters, consumer meters and energy accounting meters shall comply with the relevant standards of Bureau of Indian Standards (BIS). If BIS Standards are not available for a particular equipment or material, International Electro-Technical Commission (IEC) Standards, CBIP Technical Report or any other equivalent Standards shall be followed.
3. Whenever an international Standard or IEC Standard is followed, necessary corrections or modifications shall be made for nominal system frequency, nominal system voltage, ambient temperature, humidity, and other conditions prevailing in India before actual Adoption of the said Standard.
4. The installation, operation, calibration and maintenance of Interface Energy Meters (IEMs) with automatic remote meter reading (AMR) facility shall also fulfill the requirement of clause 7.9 (14) of these regulations.

Chapter -9: Cyber Security and Communication Code

9.1. General:

1. Cyber Security and Communication Code provides for planning, implementation, operation and maintenance and up-gradation of the reliable communication system for all communication requirements including the exchange of data for integrated operation of State Grid.

a. To ensure seamless integration, reliable, redundant, and secure communication;

b. To ensure that any network change shall not cause any adverse effect on the functioning of the existing Communication System. The Communication System shall continue to perform an intended function with specified reliability, security, and quality;

c. A Data Provider or an intervening Communication System Provider is required to be aware, in advance, of the latest standards and conditions to be met by its system for being connected into the Communication System.

d. To safeguard the State grid from spyware, malware, cyber-attacks, network hacking.

e. The procedure for security audit from time to time, upgradation of system requirements and keeping abreast of latest developments in the area of cyber-attacks and cyber security requirements.

9.2. Intra-State Communication System:

a. SLDC control rooms
b. STU (In-STS network)
c. Distribution Companies and Buyers within the State
d. State Generating Stations, IPPs including RE generators connected to In-STS.
e. Substations of STU and State Transmission licensees
f. Nodes of ISTS with In-STS
g. Captive Generators/Consumers

9.3. Periodic Testing of Communication System:

1. All Users providing communication systems shall facilitate periodic testing of the communication system in accordance with the procedure for testing and maintenance to be prepared by STU.
2. **STU shall prepare the procedure for testing and maintenance of communication network security system including third party system if any in accordance with provisions of the CEA (Technical Standard for Communication system in Power System Operation) Regulations 2020, within Six (6) Months from the date of notification of these Regulations and approved by Grid Code Review Panel.**

9.4. Periodic Auditing of Communication System:

The Protection and Communication Coordination Committee under Grid Code Review Panel shall conduct a performance audit of the communication system annually as per the procedure specified by CERC/RPC/RLDC/Authority. Based on the audit report, Grid Code Review Panel shall issue necessary instructions to all stakeholders to comply with the audit requirements within the time stipulated by the Grid Code Review Panel.

9.5. Fault Reporting:

1. SLDC in case of outage of telemeter data or communication failure shall inform the respective User so that the User shall ensure the healthiness of its communication system. In case outage pertains to a fault in the communication system of other User, the User shall lodge complaints about the failure of the communication to the communication system owner for quick restoration.
2. The communication provider shall explore the possibility for route diversion on the existing facility in close coordination with a concerned provider in case the fault restoration is prolonged. No separate charges shall be paid for such route diversion or channel re-allocation. However, such re-routing shall be discontinued once the original channel is restored.

9.6. Communication System Availability and Backup:

1. All Users of In-STS shall maintain the communication system availability at 99.9% annually and with a backup communication system, the availability of the communication system shall be 100%.
2. The SLDC shall maintain the record of communication system availability and submit to the Commission on yearly basis.

9.7. Monitoring and Reporting of Communication System Performance:

1. All Users/Transmission Licensees shall monitor and keep record of the month-wise Communication System (SCADA RTU) Availability Index and Average Duration of Downtime per month (in Minutes) for AMR System at each Connection Point and submit report for the past six-monthly performance during next Protection and Communication Coordination Committee meeting.
2. Protection and Communication Coordination Committee shall review and deliberate on the cause of the significant variations in indices from the normal

range (below 99.9% for Communication System (SCADA/RTU) Availability Index and more than 60 minutes/month in case of Average duration of Downtime for AMR system) and guide the remedial actions for the improvements.

3. **STU in consultation with Protection and Communication Coordination Committee shall formulate detailed procedure for measurement, monitoring and reporting of the Communication System Index (for SCADA/RTU) and Average duration of Downtime (for AMR System) at Connection Point covering In-STS and procedure for centralized supervision for quick fault detection and restoration. STU shall publish such report on its website from time to time.**

9.8. Cyber Security:

1. All Users shall identify critical and vulnerable cyber assets and take maximum possible efforts to protect them from potential cyber-attacks so as to support reliable and secure operation of the grid.
2. Communication infrastructure shall be planned, designed, and executed to address the network security needs as per the standards specified by CEA and shall be in conformity with the Cyber Security Policy of the Government of India, issued from time to time.
3. **STU in assistance with SLDC shall prepare a standard Operating procedure for Cyber Security, Crisis Management Plan and/or procedure in line with Information Technology (IT) Act 2002, as amended from time to time and any other rules or policy or guidelines relevant to the subject, within six (6) months from the date of notification of these Regulations, to ensure that adequate Cyber Security mechanism is available with all Users to prevent any potential cyber-attack on the systems and submit for approval of the Grid Code Review Panel.**
4. An appropriate communication or IT network may be built up preferably using Multi- Protocol Label Switching, which is simple, cost-effective, and reliable. In the remote places where connectivity is a problem, the stations can use dedicated fibre cable from the nearest node. Such communication or IT network may be built using dedicated fibres to avoid any cyber-attack on the power system.
5. The existing communication or IT network shall be maintained properly. Remote Terminal Units and communication equipment shall have an uninterrupted

power supply with proper battery backup so that in case of total power failure, supervisory commands and control channels do not fail.

6. Regular cyber vulnerability test/mock drills/cyber audit/and other measures as per the crisis management plan of Computer Emergency Response Team (CERT) shall be carried out regularly by all Users, SLDC and STU. The frequency of such audits/mock drills shall be decided by STU in the procedure/guidelines stipulated as per clause (3) of these Regulations.
7. A cyber audit specifically to detect malware targeting Industrial Control Systems (ICS) shall be conducted at critical plants and substations SLDC and STU control rooms after any abnormal event.
8. A dedicated team of IT Personnel for cyber security of substations shall be developed and proper training for the team members shall also be imparted regularly by the respective organizations to upgrade their skills.
9. SLDC shall scrutinize the cyber security incidences and discuss them in the Protection and Communication Coordination Committee and Grid Code Review Panel and take necessary actions as deemed fit.
10. Grid Code Review Panel shall ensure that third party cyber security audits shall be conducted periodically (period to be decided at Grid Code Review Panel) and appropriate measures shall be implemented to comply with the findings of the audits. The audits shall be conducted by CERT-In certified third-party auditors.

9.9. Cyber Security Coordination Forum:

1. The sectoral CERT (Computer Emergency Response Team) for wings of power sector, as notified by Government of India, from time to time, shall form a Cyber Security Coordination Forum with members from all concerned utilities and other statutory agencies to coordinate and deliberate on the cyber security challenges and gaps at appropriate level. A committee of the same shall be formed at the State level by STU including all sectorial of power sector.

2. The sectoral CERT will lay down rules of procedure for carrying out their activities.

9.10. Guidelines or Procedures to be issued by Different Entities:

1. Following entities shall be responsible for preparation, consultation and finalization of the Guidelines/Procedures required under these Regulations which shall be in

line with the Central Electricity Authority (Technical Standards for Communication System in Power System Operations) Regulations, 2020 and Central Electricity Regulatory Commission (Communication System for inter-State transmission of Electricity) Regulations, 2017 and amended from time to time.

a. SLDC shall prepare Guidelines on "Interfacing Requirements" in respect of terminal equipment, RTUs, SCADA, PMUs, Automatic Generation Control (AGC), Automatic Meter Reading (AMR) Advanced Metering Infrastructure (AMI), etc., and for data communication from the User's point to the respective control center (s) based on technical standards issued by CEA;

b. STU shall prepare Procedure on "Centralized supervision for quick fault detection and restoration" as per the Regulation 9.7.3 and "Testing and Maintenance of communication system" as per the Regulations 9.3.2;

c. STU shall prepare Guidelines on "Availability of Communication System" in consultation with SLDC and other stakeholders and submit to Grid Code Review Panel.

2. All the entities shall post the draft guidelines/procedure on its website and invite comments from the stakeholders and finalize the guidelines after considering the comments received from them. The entities, while submitting the final procedures/guidelines to the Commission, shall submit a statement indicating its views on the comments received from the general public and stakeholders.

Chapter- 10: Monitoring and Compliance Code

10.1. General:

This code deals with (a) monitoring of compliance of these Regulations by various entities in the grid by Grid Code Review Panel, STU, SLDC or any other person, (b) manner of reporting the instances of violations of these Regulations and (c) taking remedial steps or initiating appropriate action.

10.2. Assessment of Compliances:

The performance of all users, STU, SLDC, In-STS, Intra state entity Generating Station and QCA, with respect to compliance of these regulations shall be assessed periodically.

10.3. Monitoring of Compliance:

1. In order to ensure compliance, two (2) methodologies shall be followed:
   a. Self-Audit
   b. Compliance Audit

2. Self –Audit:
   a. All users, STU, SLDC, In-STS, Intra state entity Generating Station and QCAs shall conduct annual self-audits to review compliance of these regulations and submit the reports by 31st July of every year.
   b. The self-audit report shall inter alia contain the following information with respect to non- compliance:
      (i) Sufficient information to understand how and why the non-compliance occurred;
      (ii) Extent of damage caused by such non-compliance;
      (iii) Steps and timeline planned to rectify the same;
      (iv) Steps taken to mitigate any future recurrence;
   c. The self-audit reports by users, QCAs shall be submitted to the SLDC.
   d. The self-audit reports of STU and SLDC shall be submitted to the State Commission.
   e. The deficiencies shall be rectified in a time bound manner within a reasonable time.
   f. In the State control area, the monitoring agency for users shall be the SLDC; The monitoring agency shall track the progress of compliances of users, and exceptional reporting for non- compliance shall be submitted to the Commission.
   g. The monitoring agency for STU and SLDC, shall be the Commission.
   h. The Grid Code Review Panel in the State shall also continuously monitor the instances of non-compliance of the provisions of these regulations and endeavor to sort out all operational issues and deliberate on the ways in which such cases of non-compliance shall be prevented in future. The Grid Code Review Panel may also report any unresolved issues to the Commission.
   i. The Commission may initiate appropriate proceedings upon receipt of report under sub- clauses (f) and (h) of this clause.
   j. In case of non-compliance of any provisions of these regulations by SLDC, STU, In-STS, Intra state entity Generating Station, Users and any other person, the matter may be reported by any person to the Commission through filing of a petition.

3. **Independent Third-Party Compliance Audit:**
The Commission may order independent third-party compliance audit for any user, STU, SLDC, and QCA as deemed necessary based on the facts brought to the knowledge of the of the Commission.

Chapter- 11: Miscellaneous

11.1. Power to Relax:
The Commission, for reasons to be recorded in writing, may relax any of the provisions of these regulations on its own motion or on an application made before it by an affected person to remove the hardship arising out of the operation of any of these regulations, applicable to a class of persons.

11.2. Power to Remove Difficulty:
If any difficulty arises in giving effect to the provisions of these regulations, the Commission may, on its own motion or on an application made before it by the nodal agency, by order, make such provisions not inconsistent with the provisions of the Act or provisions of other regulations specified by the Commission, as may appear to be necessary for removing the difficulty in giving effect to the objectives of these regulations.

11.3. Repeal and Savings:
Save as otherwise provided in these regulations, the Central Electricity Regulatory Commission (Karnataka Electricity Grid Code) Regulations, 2015 and all subsequent amendments thereof shall stand repealed from the date of commencement of these Regulations.

11.4. Issue of Suo Motu Orders and Directions:
The Commission may from time-to-time issue Suo-motu orders and practice directions with regard to implementation of these regulations and matters incidental or ancillary thereto, as the case may be.

11.5. Treatment of These Regulations in Contract:
The provisions of these regulations or any amendments thereof shall not be treated under 'Change in law' in any of the agreements entered into by any of the Users covered under these regulations.

By Order of the Commission,

Secretary
Karnataka Electricity Regulatory Commission

ANNEXURE-1

Site Responsibility Schedule

Name of Power Station / Sub – Station: Site Owner:
Site Manager:
Tel. Number: Fax
Number:

Item of Plant / Apparatus	Plant Owner	Safety responsibility	Control responsibility	Operation responsibility	Maintenance responsibility	Remarks
KV Switchyard						
All equipment including bus bars						
Feeders						
Generating units						

ANNEXURE-2

Assessment of Secondary and Tertiary Generation Reserves at Intra State Level:

1. Area control error (ACE) for each Control Area shall be calculated using sub-clause (d) of clause (10) of Regulation 6.4.3 of these regulations, time block wise for the last financial year.
2. The positive ACE and negative ACE shall be separately tabulated.
3. The positive ACE shall be arranged in ascending order and 99 percentile of such ACE shall be captured. Similarly, negative ACE shall be arranged in ascending order and 99 percentile of such ACE shall be captured.
4. Such 99 percentile of positive and negative ACE respectively of a control area for previous financial year, is the desired positive and negative secondary reserve capacity for such control area for next financial year. Desired quantum of tertiary reserve of the control area shall also be equal to such estimated secondary reserve.
5. The total reserves in a State shall be algebraic sum of reserves in each state control area.

   However, due to diversity within the State, the State as a whole might need lesser reserves of secondary and tertiary reserves. The reserve requirement shall be based on regional ACE which shall further be divided to identify the share of each state based on 99 percentile ACE of such State control area.

6. The amount of reserve to be kept with each State control area as per clause (5) of this Annexure shall be validated against the maximum unit size of the intra-state generator of that control area such that reserve requirement is not more than unit size of maximum intra- state generator.

7. The secondary reserves for each control area obtained as per clause (5) of this Annexure shall be further apportioned among the reserve to be kept at intra-state generation and at inter-state generation as per the following considerations:
    1) The maximum demand and maximum internal generation for each control area.
    2) The ratio of demand met through internal generation and inter-state generation (drawal from the grid) is calculated.
    3) The above ratio is used to apportion the secondary reserve obtained as per clause-5 of this Annexure among the reserves to be maintained by each control area at intra- state generators and inter-state generators.

    Illustration: The maximum demand met of Karnataka is 13602 MW and internal generation is 6932 MW. The drawal from the grid is therefore 13602-6932= 6670 MW. Suppose the reserve capacity calculated for Karnataka in step-5 is 91 MW. The ratio of demand met by internal generation is 0.51(6932/13602) and by ISGS generation is 0.49 (6670/13602). Thus reserve to be kept by Karnataka in intra-state generation is 46 MW (0.51*91) and in ISGS generation is 44 MW (0.49*91).

8. For control areas having no generation or very small generation, the entire reserves capacity calculated as per clause (5) of this Annexure for the state, shall be kept at inter- state generation.

ANNEXURE-3

Accounting and Pool Settlement System

(1) **Metering, Accounting and Settlement System:**

(a) At the Intra State Transmission System (In-STS) level, the basic principle followed is that all settlements for the energy scheduled before the fact are done directly between the sellers and the buyers, with the SLDC issuing the Accounts specifying the quantum of energy scheduled. All deviations from the schedule are settled through a regulatory Pool Account maintained by SLDC where only the deviation payments are handled.

(b) The settlement system shall be transparent, robust, scale-able (multi buyer/seller, inter connection with lower and upper pool systems) and dispute-free with integrity and probity and usage of state of the art techniques. The settlement computation details, applicable charges and operation of different regulatory Pool Accounts shall be in accordance with various regulations of the Commission. SLDC shall standardize the formats of various accounts.

(c) The Implemented Schedule incorporating all before-the-fact changes in schedule shall be used as a reference for energy accounting.

(d) Energy Accounts inter-alia shall indicate Declared Capability of generating stations, Entitlements, Requisitions, scheduled loss, scheduled transactions and actual Interchange, Reactive Power Accounts, and any other accounts to be issued under KERC Regulations.

(e) Assumptions, if any, in the accounts shall be clearly stated in Notes to the Accounts.

(f) Each Intra-State entity (whether generator, RE Generator, QCA (on behalf of generators), captive Power Plant, OA customer connected at ISTS) in a State shall be a member of the State pool and separately accountable for deviations.

ANNEXURE- 4

Procedure to be submitted for approval of the of the Commission, after Preparation and due Stakeholder Consultation.

Sl. No	Entity Responsible	Drafting Responsibilities	Timeline to submit to the Commission from date of notification of these regulations	Reference Regulation of these Regulations
1	SLDC	Detailed procedure covering modalities for **First Time Energization/Charging (FTC)** and integration of new or modified power system elements.	Sixty (60) days	4.3(5)
2	STU	The **Standard Connection Agreement** shall be prepared in line with Central Electricity Regulatory Commission (Connectivity and General Network Access to the inter- State Transmission System) Regulations,	Sixty (60) days	4.5(a)
3	SLDC	**Compensation of Quick Start Generation** (including synchronous generation).	Sixty (60) days	6.4.3
4	Grid Code Review Panel	The Procedure for cost allocation of SRAS & TRAS procurement done by NLDC/SLDC among Users/generating Stations.	One Hundred and Twenty (120) days	6.4.3 (10&11)
5	Grid Code Review Panel	Detailed procedure for **Part Load Compensation.**	Sixty(60) days	7.7 (4)
6	Grid Code Review Panel	**Supply from alternate REGS source**: sharing of net savings for generating stations whose tariff is determined under Section 62 of the Act.	Sixty(60) days	7.8 (3) (f)

ANNEXURE- 5

Procedure to be submitted for Information of the Commission, after Preparation and due Stakeholder Consultation.

Sl. No	Entity Responsible	Drafting Responsibilities	Timeline to submit to the Commission from date of notification of these Regulations	Reference Regulation of these Regulations
1	STU	The Standard Format for user seeking to establish new or modified arrangement of connection or for use of In-STS or distribution system	Sixty (60) days	4.3(1)
2	SLDC	Detailed procedure covering modalities for carrying out inter connection studies.	Ninety (90) days	4.6(b)

3	SLDC	Methodology & Procedure for carrying out Reactive Energy accounting of intra state entity(ies)	Fifteen (15) days	6.17(k)
4	SLDC	Detailed Operating Procedures for State grid shall be developed, maintained and updated, consistent with the operating Procedure of RLDC/NLDC.	Ninety (90) days	6.2.2
5	SLDC	**The list of important grid elements shall be prepared and reviewed at least in every three (3) months**	-----	6.3.5
6	STU	List of System Protection Schemes in the power system (including inter-tripping and runback) for Users and Transmission Licensees to facilitate identification, installation and Commissioning.	Ninety (90) days	6.3.12
7	Grid Code Review Panel	The Grid Code Review Panel shall prepare the Procedure for RE curtailment and it shall be implemented by SLDC.	Sixty(60) days	6.3.27
8	SLDC	Common outage planning procedure	Sixty(60) days	6.6(1)
9	SLDC	System Restoration/Recovery Procedures	To be updated every year	6.8(1)(2)
10	User	Detailed procedures for restoration post partial and total blackout of user system	To be reviewed and updated every year	6.8(3)
11	SLDC	Detailed Operating Procedure	-	6.9(2)
12	STU	STU in consultation with SLDC shall develop a procedure for relieving congestion in the In- STS.	One Hundred and Twenty (120) days	6.10
13	Distribution Licensee/User/STU	Contingency procedures to make arrangements that will enable demand disconnection to take place	Sixty (60) days	6.12(4)
14	SLDC	Methodology & Procedure for carrying out Reactive Energy accounting of intra state entity(ies)	Fifteen (15) days	6.17 (k)
15	STU	Procedure for testing and maintenance of communication network security system including third party system if any in accordance with provisions of the CEA (Technical Standard for Communication system in Power System Operation) Regulations 2020	Sixty (60) days	9.3(2)
16	STU	Procedure for measurement, monitoring and reporting of the Communication System Index (for SCADA/RTU) and Average duration of Downtime (for AMR System) at Connection Point covering In-STS and procedure for centralized supervision for quick fault detection and restoration	Six (6) months	9.7(3)

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17	SLDC	Standard Operating procedure for Cyber Security, Crisis Management Plan and/or procedure in line with Information Technology (IT) Act 2002, as amended from time to time and any other rules or policy or guidelines relevant to the subject	Six (6) months	9.8(3)
18	STU	Procedure on "Centralized supervision for quick fault detection and restoration" as per the Regulation 9.7.3 and "Testing and Maintenance of communication system as per the Regulation 9.3.2	Six (6) months	9.10(b)
19	STU	Guidelines on "Availability of Communication System" in Consultation with SLDC	Six (6) months	9.10(c)

ಮುದ್ರಕರು ಹಾಗೂ ಪ್ರಕಾಶಕರು:- ಸಂಕಲನಾಧಿಕಾರಿಗಳು, ಕರ್ನಾಟಕ ರಾಜ್ಯಪತ್ರ, ಸರ್ಕಾರಿ ಕೇಂದ್ರ ಮುದ್ರಣಾಲಯ, ಬೆಂಗಳೂರು