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ARUNACHAL PRADESH STATE ELECTRICITY REGULATORY COMMISSION
ITANAGAR

NOTIFICATION

The 31st October, 2025

STATE GRID CODE REGULATIONS - 2025

No. APSERC/NOTIFICATION/53/2025.—In exercise of the powers conferred by Section 181 read with Section 86 (1) (h) of the Electricity Act, 2003 (36 of 2003) and all other powers enabling it in this behalf, the Arunachal Pradesh State Electricity Regulatory Commission hereby makes the following Regulations, namely:

Short title, extent and commencement : (1) These regulations may be called the Arunachal Pradesh State Electricity Regulatory Commission (State Grid Code) Regulations, 2025 thereby repealing the earlier APSERC (State Grid Code) Regulations, 2018.

(2) This Regulation shall extend to the whole of the State of Arunachal Pradesh.

(3) These Regulations shall come into force from the date of their publication in the Official Gazette.

CHAPTER - 1

1. GENERAL

1.1 **Introduction :** The State Grid Code lays down the rules, guidelines and standards to be followed by all Users of the State Transmission System, to operate and maintain an efficient and coordinated power system in the State of Arunachal Pradesh in coordination with the concerned Regional Grids as per the provisions of Indian Electricity Grid Code (IEGC) 2023 notified by the Central Electricity Regulatory Commission (CERC) as amended from time to time and also in line with the National Electricity policy.

1.2 **Objective :** (1) The State Grid Code governs the boundary between State Transmission Utility (STU) and Users as well as establishes guidelines for operation of facilities for those who are connected and will use the State Transmission System. It lays down both the information requirements and procedures governing the relationship between STU and Users.

(2) The principal objectives of the State Grid Code are :

- (i) To provide clarity in the functions of the STU, State Generation Companies, Distribution Licensees, IPPs/CPPs and open access consumers connected to the State Grid by specifying their respective roles, responsibilities and obligations with respect to the operation of the State Grid.
- (ii) To improve the Grid stability and achieve minimum standards of system performance.
- (iii) To specify the transmission connectivity requirement for new entrants i.e., future new generating companies, distribution/trading licensees, open access customers and other consumers.
- (iv) To document the normal practices in grid operation for easy reference and for compliance.
- (v) To elicit data from generators on the performance characteristics of their plant to meet the connectivity requirements. To provide a mechanism for clear and consistent disclosure of all information between the utilities concerned. To indicate how generation is to be scheduled and dispatched.
- (vi) To actually enforce what is verbally agreed.

1.3 **Scope :** (1) State Grid Code is a document that defines the boundary between STU and Users and establishes the procedures for operation of facilities connected to the State Transmission System.

(2) The Grid Code shall be complied with by STU in its capacity as holder of the State Transmission Licence and by State Generating Stations (SGS), IPPs, State Transmission Licensees other than STU, Distribution Licensees, Open Access customers and any Other User of Intra-State Transmission System, in the course of generation, transmission and distribution of electricity.

1.4 **Structure of State Grid Code**

The State Grid Code comprises of the following :

- Chapter - 1 General
- Chapter - 2 Definitions
- Chapter - 3 Management of State Grid Code & Roles of Various Organizations
- Chapter - 4 System Planning
- Chapter - 5 Connection Conditions
- Chapter - 6 System Security Aspects
- Chapter - 7 Operational Planning
- Chapter - 8 Commissioning & Commercial Operation Date
- Chapter - 9 Inter User Boundary Safety
- Chapter - 10 Scheduling and Dispatch Code
- Chapter - 11 Outage Planning Code
- Chapter - 12 Reports
- Chapter - 13 Protection and Metering
- Chapter - 14 Data Registration & Miscellaneous
- Chapter - 15 Cyber Security Code

- 1.5 **State Grid** : Arunachal Pradesh State Power System operates in synchronism with Northern Eastern Regional Grid. Northern Eastern Regional Grid System consists of power systems of constituent States namely Assam, Manipur, Meghalaya, Mizoram, Tripura, Nagaland & Arunachal Pradesh. The NE grid constitutes of respective state-owned generating stations, state owned transmission system along with Central Generating Stations with interstate transmission system of Power Grid Corporation of India Limited (PGCIL).
- 1.6 **Implementation and Operation of the Grid Code** : (1) All Users are required to comply with the Grid Code, which shall be enforced by STU. Users must provide STU reasonable rights of access, service and facilities necessary to discharge its responsibilities in the Users' premises and to comply with instructions as issued by STU reasonably required to implement and enforce the Grid Code.
- (2) The operation of the Grid Code will be reviewed regularly by the Grid Code Review Committee in accordance with the provisions of the relevant chapter of the Grid Code.
- 1.7 **General Requirements** : (1) The Grid Code contains procedures to permit equitable management of day-to-day technical situations in the State Transmission System, taking into account a wide range of operational conditions likely to be encountered under both normal and abnormal circumstances. It is nevertheless necessary to recognise that the Grid Code cannot predict and address all possible operational conditions.
- (2) Users must therefore, understand and accept that STU in such unforeseen circumstances may be required to act decisively to discharge its obligations under its Grid Code. SGS, IPPs, REGS, CPPs and DISCOMs shall provide such reasonable co-operation and assistance as STU may request in such circumstances.
- 1.8 **Code Responsibilities** : (1) In discharging its duties under the State Grid Code, STU has to rely on information, which Users shall supply regarding their requirements and intentions.
- (2) STU shall exercise strict supervision over the Users to ensure compliance with the instructions issued by SLDC for efficient discharge of the Grid operations.
- 1.9 **Confidentiality** : (1) Under the terms of the State Grid Code, STU will receive information from Users relating to their intentions in respect of their Generation or Supply businesses.
- (2) STU shall not, other than as required by the State Grid Code, disclose such information to any person other than Central or State Government without the prior written consent of the provider of the information.
- 1.10 **Dispute Settlement Procedures** : (1) In the event of any dispute regarding interpretation of any part of the SGC provision between any User and the STU / SLDC, 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 SGC and any contract or agreement between the Users, the provision of the SGC shall prevail.
- 1.11 **Communication between STU and Users** : (1) All communications between STU and Users shall be in accordance with the provision of the relevant chapter of the Grid Code and shall be made with the designated nodal officer, appointed by STU.
- (2) Unless otherwise specifically required by the Grid Code, all communications shall be in writing, save as where operation time scales require oral communication. Such oral communications shall be confirmed in writing as soon as practicable.
- (3) The voice shall be recorded at SLDC and such record shall be preserved for a reasonable time.

- 1.12 **Directive** : (1) The appropriate Government may issue policy directives in any matter to STU or SLDC as the case may be, to take such measures as may be necessary for maintaining smooth and stable transmission and supply of electricity to any region of State as per Section 37 of the Electricity Act 2003.
- (2) STU shall promptly inform the Commission and all Users of the requirement of such directives. The Users, subject to the relevant sections of the Act, shall comply with all such directives.
- 1.13 **Compatibility with Indian Electricity Grid Code** : This State Grid Code shall be consistent/compatible with the Indian Electricity Grid Code (IEGC). In matters relating to inter-State transmission, if any provisions of the State Grid Code are inconsistent with the provisions of the IEGC, then the provisions of IEGC as approved by CERC shall prevail.

CHAPTER - 2

2. **Definitions** : In these Regulations the following words and expressions shall, unless the subject matter or context otherwise requires or is inconsistent there with, bear the following meanings :
- (1) **“Act”** means the Electricity Act, 2003 (Act No. 36 of 2003) as amended from time to time.
 - (2) **“Accredited Test Laboratory”** means the test laboratory accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL).
 - (3) **“Active Energy”** means the electrical energy produced, flowing or supplied by an electric Circuit during a time interval, being the integral with respect to time of the instantaneous Power, measured in units of watt-hours or standard multiples thereof.
 - (4) **“Active Power”** means the product of voltage and the in-phase component of alternating current measured in units of watts and standard multiples thereof.
 - (5) **“Alert State”** means 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;
 - (6) **“Apparatus”** means all the electrical apparatus like machines, fittings, accessories and appliances in which electrical conductors are used.
 - (7) **“Apparent Power”** means the product of voltage and alternating current measured in unit of volt- amperes and standard multiples thereof.
 - (8) **“Applicant”** means a person such as Generating Company including captive generating plant or Transmission Licensee (excluding State Transmission Utility) or Distribution Licensee or Bulk Consumer, who is seeking connection of his new or expanded electrical plant in the Grid at Voltage level 33 kV or above.
 - (9) **“Appropriate Transmission Utility”** means the “Central Transmission Utility” (CTU) or the “State Transmission Utility” (STU), as case may be.
 - (10) **“Area of Supply”** means the Area within which a Distribution Licensee is authorized by his license to supply electricity.
 - (11) **“Authority”** means Central Electricity Authority (CEA) referred to in sub-section (1) of Section 70 of the Act.
 - (12) **“Automatic Generation Control (AGC)”** means a mechanism that automatically adjusts the generation of a control area to maintain its interchange schedule plus its share of frequency response
 - (13) **“Automatic Voltage Regulator (AVR)”** means a continuously acting automatic excitation control system to control the voltage of a Generating Unit measured at the generator terminals.
 - (14) **“Availability Based Tariff (ABT)”** means a tariff structure based on availability of generating units and having components, viz Capacity Charges (CC), Energy Charges (EC) Or Variable Charges (VC) and charges for Unscheduled Interchange(UI)/Deviation Settlement.
 - (15) **Backing down** means reduction of generation from generating unit under abnormal conditions such as high frequency, low system demand or network constraints under instructions from SLDC/ ERLDC
 - (16) **“Beneficiary”** means a person who has share in SGS/ISGS or bilateral exchanges including open access users ;
 - (17) **“Bilateral Transaction”** means the transaction for the exchange of energy (MWh) between a specified buyer and a specified seller directly or through a trading licensee or discovered at power exchange through anonymous bidding from a specific point of injection to a specific point of drawl for a fixed or varying quantum of power (MW) for any time during the month.
 - (18) **“Black Start Procedure”** means the procedure necessary to recover from a partial or total black out in the region.
 - (19) **“Bulk Consumer”** means a Consumer who avails supply at voltage of 33 kV or above.

- (20) **“Buyer”** means any generating company or licensee or consumer whose system receives electricity from any other licensee or generating company.
- (21) **“BIS”** means Bureau of Indian Standards.
- (22) **“BS”** means British Standards.
- (23) **“Captive Power Plant (CPP)”** means a Power Plant set up by any person to generate electricity for his own use or 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.
- (24) **“Central Commission”** means Central Electricity Regulatory Commission (CERC) referred to in sub-section (1) of Section 76 of the Act.
- (25) **“CEA”** means Central Electricity Authority constituted under Section 3 (1) of Electricity Supply Act 1948, which has been superseded by Section 70 (1) of the Electricity Act 2003.
- (26) **“CGS or Central Generating Station”** means the generating stations owned or controlled by the Central Government.
- (27) **“Central Transmission Utility (CTU)”** means any Government Company which the Central Government may notify under sub section (1) of Section 38 of the Act.
- (28) **“Check Meter”** means 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) **“Commission”** means Electricity Regulatory Commission for the State of Arunachal Pradesh.
- (30) **“Connection”** means the electric power lines and electrical equipment used to effect a connection of a user’s system to the Transmission System.
- (31) **“Congestion”** means where the demand for transmission capacity exceeds the available transfer capacity.
- (32) **“Connection conditions”** means those conditions mentioned in Chapter 5 (“Connection Conditions”) which have to be fulfilled before the User’s System is connected to the Grid.
- (33) **“Connection point”** means an electrical point of connection between the Transmission System and the User’s System.
- (34) **“Constituent”** means a Distribution Licensee or Deemed Distribution Licensee of the State, a Generating Company having an SGS, State Transmission Utility, State Transmission Licensees, and Open Access users.
- (35) **“Consumer”** means any person who is supplied with electricity for his own use by a licensee or the Government or by any other person engaged in the business of supplying electricity to public under the Act or any other law for the time being in force and includes any person whose premises are for the time being connected for the purpose of receiving electricity with the works of a licensee, the Government or such other person, as the case may be.
- (36) **“Control Area”** means an electrical system bounded by interconnections (tie lines) metering and telemetry which controls its generation 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.
- (37) **“Demand”** means the demand of Active Power in MW and Reactive Power in MVAR of electricity unless otherwise stated.
- (38) **“Demand control”** means any of the following methods of achieving a load reduction:
- (i) Consumer Load Management initiated by Users.
 - (ii) Consumer Load reduction by Disconnection initiated by Users (other than following an instruction from Load Despatch Centre).
 - (iii) Consumer Load reduction instructed by the Load Despatch Centre.
 - (iv) Automatic under Frequency Load Disconnection
 - (v) Emergency manual Load Disconnection
- (39) **“Deviation Settlement Mechanism”** means Central Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters) Regulations, 2022 including any subsequent amendments thereof.
- (40) **“Despatch Schedule”** means the ex-power plant net MW and MWh output of generating station, scheduled to be exported to the grid from time to time.
- (41) **“Drawal Schedule”** means the summation of station-wise power plant drawl schedules from all ISGS and drawl from/injection to regional grid consequent to other long-term access, medium term and short term open access transactions.

- (42) **“df/dt Relay”** means a relay which operates when the rate of change of system frequency (over time) goes higher than a specified limit and initiates load shedding.
- (43) **“Distribution system”** means the system of wires and associated facilities between the delivery points on the transmission lines or the generating station connection and the point of connection to the installation of the consumers.
- (44) **“Drawl Energy Accounting and Audit Meters”** means the import/export of electrical energy from / to the grid Meters used or accounting of the electricity to various segments of electrical system so as to carry out further analysis to determine the consumption and loss of energy therein over a specified time period ;
- (45) **“Energy Accounting & Audit Meters”** Meters used for accounting of the electricity to various segments of electrical system so as to carry out further analysis to determine the consumption and loss of energy therein over a specified time period;
- (46) **“Event”** means an unscheduled or unplanned occurrence in the State Transmission System including faults, incidents and breakdowns.
- (47) **“Extra High Voltage (EHV) or Extra High Tension (EHT)”** means Voltage exceeding 33000 volts under normal subject to the percentage variation allowed by the Authority.
- (48) **“Energy Storage System (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.
- (49) **“Forced Outage”** means an Outage of State Generating Station or any of Power Station Equipment, generally due to sudden failure of one or more parts of equipment at a generating station, of which no notice can be given by the Generator to STU and also include outage of transmission line and any substation equipment of which no notice can be given by State Transmission Utility.
- (50) **“Force Majeure”** means any event which is beyond the control of the persons involved in 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 person such being the following including.
- (i) Acts of GOD, natural phenomena, floods, droughts, earthquakes and epidemics.
 - (ii) Enemy acts of any Government domestic or foreign, war declared or undeclared, hostilities, priorities, quarantines, embargoes.
 - (iii) Riot or Civil commotion.
 - (iv) Grids failure not attributable to the person.
- (51) **“Gaming”** means an intentional mis-declaration of available capacity or schedule by any seller in order to make an undue commercial gain through charge for deviations.
- (52) **“Generating company”** means any station for generating electricity, including any building and plant with step-up transformer, switchyard, switchgear, cables or other appurtenant equipment, if any, used for that purpose and the site thereof, a site intended to be used for a generating station, and any building used for housing the operating staff of a generating station and where electricity is generated by water - power, includes, penstocks, head and tail works, main and regulatory reservoirs, dams and other hydraulic works, but does not in any case include any substation.
- (53) **“Good utility Practice”** means 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.
- (54) **“Grid”** means High Voltage back bone system of inter-connected Transmission Lines, sub-stations and Generating plants.
- (55) **“Grid Code”** means Indian Electricity Grid Code, (IEGC) specified by the Central Commission under clause (h) of sub section (1) of Section 79 of the Act.
- (56) **“Grid Standards”** means Grid Standards specified by the Central Electricity Authority under Clause (d) of Section 73 of the Act.
- (57) **“High voltage (HV) or High Tension (HT)”** means voltage greater than 400 V and does not exceed 33000 volts under normal conditions subject to the percentage variation allowed by the Authority.
- (58) **“IEGC or Indian Electricity Grid Code”** means regulations framed by Central Electricity Regulatory Commission under clause (h) of sub-section (1) of Section 79 read with clause (g) of sub-section (2) of Section 178 of the Act.
- (59) **“Independent Power Producer”** means a Power Station owned by a generator who is not a part of Government Department.
- (60) **“Indian Standards”** means those Standards and specifications approved by the Bureau of Indian Standards.

- (61) **“Instrument Transformer”** means the Current Transformer (CT), Voltage Transformer (VT) and Capacitor Voltage Transformer (CVT).
- (62) **“Interconnecting Transformer”** means the transformer connecting EHV lines of different voltage systems.
- (63) **“Interface Meter”** means a meter 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 Intra-State Transmission system who have to be covered under ABT and have been permitted open access by the Appropriate Commission.
- (64) **“Inter-State Transmission System”** means the system which includes :
- (i) Any system for the conveyance of electricity by means of a main transmission line from the territory of one State to another State ;
 - (ii) The conveyance of electricity across the territory of an intervening State as well as conveyance within a State, which is incidental to such inter-state transmission of electricity.
 - (iii) The transmission of electricity within the territory of a State built, owned, operated maintained or controlled by the Central Transmission Utility.
- (65) **“Intra-State Transmission System”** any system for transmission of electricity other than an Inter - State Transmission System.
- (66) **“Inter State Generating Station (ISGS)”** means 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;
- (67) **“Isolation”** means the disconnection of EHV/HV Apparatus from the remainder of the System in which that EHV/HV Apparatus is situated.
- (68) **“ISGS or Interstate Generating station”** means a central generating station or other generating station in which two or more states have shares.
- (69) **“LCP”** means Line Clear Permit
- (70) **“Lean Period”** means that period in a day when the electrical power demand is lowest.
- (71) **“License”** means a license granted under Section 14 of the Act.
- (72) **“Licensee”** means a person who has been granted a license under Section 14 of the Act.
- (73) **“Load”** means the Active, Reactive or Apparent power as the context requires, generated, transmitted or distributed.
- (74) **“Low Voltage or LV”** means voltage not exceeding 440 volts.
- (75) **“Minimum Turndown level”** means 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.
- (76) **“Main Meter”** means a meter which would primarily be used for accounting and billing of electricity.
- (77) **“Main protection”** means protection equipment or system expected to have priority in initiating either a fault clearance or an action to terminate an abnormal condition in a power system.
- (78) **“NERLDC”** means North Eastern Regional Load Dispatch Centre notified as Regional Load Dispatch Centre for North Eastern India.
- (79) **“NERPC”** means North Eastern Regional Power Committee in accordance with Electricity Act, 2003.
- (80) **“Open Access”** means the non-discriminatory provision for the use of transmission lines or distribution system or associated facilities with such lines or system by any licensee or consumer or a person engaged in generation in accordance with the regulations specified by the Appropriate Commission.
- (81) **“Operation”** means a scheduled or planned action relating to the operation of a system/Operational procedure Management instructions and procedures, both for the safety rules and for the local and remote operation of plant and apparatus, issued in connection with the actual operation of plant and/or apparatus at or from a connecting site.
- (82) **“Operational Procedure”** means Management instructions and procedures, both for the safety rules and for the local and remote operation of plant and apparatus, issued in connection with the actual operation of plant and/or apparatus at or from a connecting site.
- (83) **“Outage”** means a total or partial regulation in availability due to repair and maintenance of the Transmission or Distribution or Generation facility or defect in Auxiliary System.

- (84) **“Part Load”** means a condition of a generating station which is loaded but is not running at its declared availability.
- (85) **“Partial shutdown”** a shutdown of a part of the system resulting in failure of power supply, either from external connections or from the healthy part of the system.
- (86) **“Peak period”** means that period in a day when the electrical power demand is highest.
- (87) **“Person”** means any company or body corporate or association or body of individuals, whether incorporated or not, or artificial juridical person.
- (88) **“Planned outage”** means an outage of generating plant or part of the Transmission system, or part of a User’s System co-ordinated by SLDC.
- (89) **“Power factor”** means the ratio of Active Power (KW) to Apparent Power (KVA).
- (90) **“PGCIL”** means Power Grid Corporation of India Limited, which has been notified as Central Transmission Utility.
- (91) **“Power System”** means all aspects of generation, transmission, distribution and supply of electricity and includes one or more of the following namely :
- (i) Generating Station
 - (ii) Transmission or main transmission lines
 - (iii) sub-stations
 - (iv) Tie-lines
 - (v) Load dispatch activities
 - (vi) Mains or distribution mains
 - (vii) Electric supply lines
 - (viii) Overhead lines
 - (ix) Service lines
 - (x) Works.
- (92) **“Protection”** means the scheme and apparatus for detecting abnormal conditions on system and initiating fault clearance or actuating signals or indications.
- (93) **“Power Exchange”** means the exchange, which has been granted registration in accordance with CERC (Power Market Regulations), 2010 as amended from time to time.
- (94) **“Pool Account”** means Regional account for (i) Payment regarding Deviation Charges (Deviation Charge Account) or (ii) Reactive energy exchanges (Reactive Energy Account) (iii) Congestion Charge as the case may be.
- (95) **“Pooling Station”** means the substation where pooling of generation of individual wind generators or solar generators is done for interfacing with the next higher level voltage.
- (96) **“Rated MW”** means the “Nameplate” MW output of a Generating machine, being that output up to which the Generating machine is designed to operate.
- (97) **“Reactive Power”** means the product of voltage and current and the sine of the phase angle between them measured in units of volt-amperes reactive and standard multiples thereof;
- (98) **“Safety Rules”** means the rules framed by the Users and the transmission licensee to ensure safety to persons working on plant/apparatus.
- (99) **“Start-Up”** the action of bringing a generating unit from shutdown to synchronous speed.
- (100) **“SGC or State Grid Code”** means the Electricity Grid Code for state of Arunachal Pradesh, a document describing the procedures and the responsibilities for planning and operation of the Grid in the state of Arunachal Pradesh specified by the Commission.
- (101) **“SLDC”** means the State Load Dispatch Centre.
- (102) **“STS or State Transmission System”** means system for transmission of electricity other than an Inter-State Transmission System and includes. (i) Any system for the conveyance of electricity by means of a main transmission line within the territory of the State. (ii) The transmission of electricity within the territory of State on a system built, owned, operated, maintained or controlled by STU.
- (103) **“State Transmission Utility (STU)”** means the Government Company specified as such by the State Government under sub-section (1) of Section 39.
- (104) **“Sub-station”** means Station for transforming or converting electricity for the transmission or distribution thereof and includes transformers, converters, switchgears, capacitors, synchronous condensers, structures, cable and other appurtenant equipment and any buildings used for that purpose and the site thereof.

- (105) **“Supervisory Control and Data Acquisition or (SCADA)”** means the communication links and data processing systems, which provide information to enable implementation of requisite supervisory and control actions.
- (106) **“SGS”** means state generating station owned by the state government.
- (107) **“Supplier”** means any generating company or licensee from whose system electricity flows into the system of another generating company or licensee or consumer.
- (108) **“Synchronized”** means the conditions where an incoming generating unit or system is connected to the bus bars of another system so that the frequencies and phase relationships of that generating unit or system as the case may be, and the system to which it is connected are identical.
- (109) **“Time Block”** means block of 15 minutes each for which Special Energy Meters record specified electrical parameters and quantities with first time block starting at 00.00 Hrs.
- (110) **“Transmission licensee”** means a licensee authorized to establish and operate transmission lines.
- (111) **“Transmission lines”** means all high pressure cables and over head lines (not being an essential part of the distribution system of a licensee) transmitting electricity from a generating station to another generating station or a sub-station, together with any step-up and step-down transformers, switch-gear and other works necessary to and used for the control of such cables or overhead lines, and such buildings or part thereof as may be required to accommodate such transformers, switch-gear and other works.
- (112) **“Transmission system”** means the system consisting of high-pressure cables and over head lines of transmission licensee including electrical sub-stations, for transmission of electrical power from the generating station up to connection point/interface point with the distribution system. This shall not include any part of the distribution system.
- (113) **“Under Frequency Relay”** means an electrical measuring relay intended to operate when its characteristic quantity reaches the relay settings by decrease in frequency.
- (114) **“User”** means a person such as a generating company including captive generating plant or Transmission Licensee (other than Central and State Transmission Utility) or Distribution Licensee or Bulk Consumer, whose electrical plant is connected to the State Transmission System at a voltage level 33 kV and above.

Words and expressions used in this State Grid Code Regulations and not defined here in the Act shall have the meaning assigned to them in the Act.

CHAPTER - 3

3. MANAGEMENT OF STATE GRID CODE AND ROLES OF VARIOUS ORGANIZATIONS

3.1. Applicable Codes :

- (a) Central Electricity Authority (Technical standards for connectivity to Grid) Regulations 2019, as amended from time to time.
- (b) Central Electricity Authority (Installation and Operation of Meters) Regulation 2022, as amended from time to time.
- (c) Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of electrical plants and electric lines) Regulations 2022, as amended from time to time.
- (d) Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022 as amended from time to time.
- (e) Central Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters) Regulations, 2022 as amended from time to time.
- (f) Manual on Protection of Generators, Generator Transformers and 220kV and 400kV Networks Published by Central Board of Irrigation and Power (CBIP) publication No.274
- (g) Protection of Auto transformers, Power Transformers and Distribution Transformers as per revised manual on transformers published by Central Board of Irrigation and Power (CBIP) Publication No.275
- (h) Report on SAMAST issued by Forum of Regulators on July, 2016.
- (i) CEA (Flexible operation of coal based thermal power generating units) Regulation 2023 and amendment thereof

3.2. **Introduction :** The State Grid Code lays down the rules, guidelines and standards to be followed by all Users of the State Transmission System, to operate and maintain an efficient and coordinated power system in the state of Arunachal Pradesh in coordination with the concerned Regional Grids as per the provisions of Indian Electricity Grid Code (IEGC) notified by Central Electricity Regulatory Commission (CERC) as amended from time to time and also in line with the National Electricity policy.

- 3.3. **Objective** : The objective of this procedure is to define the method of managing the State Grid Code, submitting and pursuing of any proposed change to the State Grid Code and the responsibilities of all Users to effect that change.
- 3.4. **Roles & Responsibility of Various Organizations and their linkages** : Consistent with the provisions of the Act, this sub-section defines the role and functions of various organizations so far as it relates to State Grid Code.
- 3.5. **Roles & Responsibilities of SLDC** : (1) Operation and management of STS is an important and complex activity and SLDC shall be the apex body to ensure integrated operation of the power system in the state. SLDC shall discharge its functions as stated in section 32 & 33 of the Act.
- (2) With reference to SGC, the functions of SLDC shall be as under: -
- (a) The SLDC shall be the apex body to ensure integrated operation of the power system in the State.
 - (b) SLDC shall be responsible-
 - (i) For optimum scheduling and despatch of electricity within the State in accordance with the contracts entered in to with the licensees or the generating companies operating in the State ;
 - (ii) Monitor grid operations ;
 - (iii) Keep accounts of the quantity of electricity transmitted through the State grid ;
 - (iv) Exercise supervision and control over the state transmission system ;
 - (v) 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 CEA Grid Standards and the SGC/IEGC.
 - (c) SLDC may levy and collect such fee and charges from the generating companies and licensees using the State transmission system as may be specified by the Commission; Provided that in event of a SLDC being operated by the STU, as per first proviso of sub-section (2) of Section 31 of the Act, adequate autonomy shall be provided to the SLDC to enable it to discharge its functions in the above manner.
 - (d) The functions of SLDC under Section 32 of EA 2003 include the following: -
 - (i) System operation and control including intra-state transfer of power, covering contingency analysis and operational planning on real time basis;
 - (ii) Scheduling / re-scheduling of generation;
 - (iii) System restoration following grid disturbances;
 - (iv) Metering and data collection;
 - (v) Compiling and furnishing data pertaining to system operation;
 - (vi) Operation of State deviation settlement mechanism/SAMAST of pool account and State reactive energy account.
- 3.6. **Roles & Responsibilities of STU** : (1) The STU shall play the main role of evacuation of generated power by State Generating Stations, supply of power to distribution licensee(s) and exchanging power through inter-connection with CTU, IPPs and other entities. STU shall be responsible for maintaining the state transmission system in an efficient and coordinated manner. STU shall be responsible for coordinating and managing the SGC. It shall discharge its functions as stated in Section 39 of the Act. With reference to SGC, some of the functions of STU shall be as under :
- (2) To undertake transmission of electricity through the state transmission system;
 - (3) To discharge all functions of planning and co-ordination relating to the state transmission system with
 - (a) Central Transmission Utility ;
 - (b) State Governments ;
 - (c) Generating companies ;
 - (d) Regional Power Committees ;
 - (e) Authority ;
 - (f) Licensees ;
 - (g) Any other person notified by the State Government in this behalf.
 - (4) To ensure development of an efficient, coordinated and economical system of the state transmission lines for smooth flow of electricity from a generating station to the load centers ;

- (5) To provide non-discriminatory open access to its transmission system for use by -
 - (a) Any licensee or generating company on payment of the transmission charges; or
 - (b) Any consumer as and when such open access is provided under sub-section (2) of Section- 42 of the Act, on payment of transmission charges, surcharge, additional surcharge and any other charges thereon, as may be specified by the Commission.
 - (6) In case of open access in intra-state transmission, SLDC shall be the nodal agency for the short-term open access and STU shall be the Nodal Agency for medium & long-term access. The procedure and modalities in regard to open access shall be as per the Arunachal Pradesh State Electricity Regulatory Commission (Terms and Conditions of Intra-State Open Access) Regulations, 2012, as amended from time to time.
 - (7) Until a Government company or any authority or corporation is notified by the State Government, the STU shall operate the SLDC.
- 3.7. **Role of Transmission Licensee(s):** The main function of the transmission licensee as stated in Section 40 of the Act is to build, maintain and operate an efficient, coordinated and economical Transmission System and comply with the directives of SLDC and provide non-discriminatory Open Access.
- 3.8. **Role of Distribution Licensee:** (1)The functions of Distribution Licensee shall be as stated in Section 42 of the Act. The licensee shall be responsible for developing and maintaining the distribution network within the state in an efficient manner such that it ensures economical distribution system in its area of supply. With reference to SGC, some of the functions of distribution licensee shall be as under :
- (a) To provide non-discriminatory open access to its distribution system for use by -
 - (i) Any licensee or generating company on payment of the distribution charges ;
 - (ii) Any consumer as and when such open access is provided by the Commission under sub-section (2) of Section-42 of the Act, on payment of charges for wheeling and a surcharge thereon, as may be specified by the Commission ;
 - (b) In order to facilitate load control, scheduling & despatch, and open access operation etc. under the ABT mechanism within the state, each Distribution Licensee shall establish a Distribution Control Centre (DCC) within its Area of Supply, having adequate communication facilities with round the clock manning. It shall take appropriate action in response to any event in the grid in coordination with the SLDC.
 - (c) The Distribution Licensee shall inform the SLDC about the details of 15 minutes'/hourly/daily/weekly/monthly demand and energy requirement and also contracts entered into for importing power from different sources and coordinate with SLDC in real time operation. It shall follow the directions of SLDC in scheduling its exchange of power and help in controlling the operation of the system by adjustment of drawl from the system. They shall take special care for drawl/injection of reactive power from/to the State Power System.
- 3.9. **Role of Generating Companies :** The generating companies connected to and/or using the STS for evacuating their 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 SGC and assist the SLDC in the real time operation and control of the system and scheduling of generation.
- 3.10. **State Grid Code Review Committee (SGCRC) :** (1) The State Transmission Utility (STU) is required to implement and comply with the State Grid Code and to carry out periodic review and amendments of the same with the approval of the State Commission. A State Grid Code Review Committee shall be constituted by STU, comprising of the representatives of the State Constituents of the State Transmission System within thirty days from the date of notification of the State Grid Code.
- (2) The Chairperson of the State Grid Code Review Committee shall be an engineer of the STU not below the rank of Chief Engineer. The Member Secretary of the Review Committee shall also be nominated by STU. The Review Committee shall also consist of the following members as recommended by the heads of the respective organizations:
 - (i) One representative from the State Government connected with Electricity Affairs of the State.
 - (ii) One representative from Management level, North Eastern Regional Load Despatch Centre (Shillong).
 - (iii) One Representative from the State Load Despatch Centre (Incharge).
 - (iv) CE (P) Eastern Electrical Zone, Department of Power.
 - (v) CE (P) Western Electrical Zone, Department of Power.
 - (vi) CE (P) Planning and Monitoring.

- (vii) Director (E & M), NEEPCO.
 - (viii) Director (E & M), NHPC
 - (ix) Chief Engineer, Department of Hydro Power Development.
 - (x) Director, APEDA
 - (xi) One Representative from NERPC
 - (xii) Any other person as may be nominated by the State Commission.
- (3) The Member Secretary nominated by STU shall be the convener and he shall coordinate the functioning of the committee.
- (4) STU shall inform all the Users, the names and addresses of the Review Committee Chairperson and the Member Secretary. Any subsequent changes shall also be informed to all the Users by STU. Similarly, each User shall inform the names and designations of their representatives to the Member Secretary of the Review Committee. The Rules to be followed by SGCRC in conducting their business shall be formulated by the Committee itself and approved by the Commission. The SGCRC shall meet at least once in three months.
- (5) **The functions of the State Grid Code Review Committee are as follows :**
- (i) Implementation of the State Grid Code, and its implementation under continuous scrutiny and review.
 - (ii) Consideration of all requests for review proposed by any User and publication of the recommendations for changes in the State Grid Code together with reasons for such changes.
 - (iii) Consideration of the problems raised by any User as well as resolution of the problems.
 - (iv) Review and analyze the reasons for failure of protection system in case of any grid disturbances and recommend methods for improvement.
 - (v) Ensuring that the changes/modifications proposed in the State Grid Code are consistent and compatible with Indian Electricity Grid Code (IEGC).
 - (vi) Such other matters as may be directed by the State Commission from time to time. The State Grid Code Review Committee may hold any number of meetings as required subject to the condition that at least one meeting shall be held once every six (6) months.

3.11. **State Grid Code Review and Revisions :**

- (1) State Grid Code shall be reviewed by the State Grid Code Review Committee at least once in every twelve (12) months.
- (2) No change in the State Grid Code shall be made with out being deliberated and agreed by the State Grid Code Review Committee and approved by the State Commission.
- (3) The Users seeking any amendment to the State Grid Code shall send written requests to the Member Secretary of the State Grid Code Review Committee.
- (4) The Member Secretary shall place all the proposed revisions for the State Grid Code to the Review Committee for its consideration.
- (5) After discussion in the review meeting, the member secretary of the State Grid Code Review Committee shall send a report to the STU/Commission, providing information regarding:
 - (i) Outcome of the review ;
 - (ii) Any proposed revisions to the State Grid Code ;
 - (iii) Copies of all written representations received from by the Users;
- (6) The STU shall send its recommendations regarding the proposed modification(s) / amendment(s) on the report along with all the related correspondence to the State Commission for approval.
- (7) Amendments to the State Grid Code shall be finalized and notified by the State Commission duly adopting the prescribed procedure followed for regulations issued by the Commission.
- (8) After the approval by the State Commission, it shall publish revisions to the State Grid Code and forward copies of approved amendments to all Users.
- (9) STU shall maintain copies of the State Grid Code with the latest amendments and shall make them available at a reasonable cost to any person requiring it. This may also be made available on the website as soon as feasible.
- (10) The Commission, may, on the application by the User or otherwise, call the emergency meeting of the Grid Code Review Committee as and when required and make such alterations or amendments in the State Grid Code as it thinks fit.

CHAPTER - 4**4. SYSTEM PLANNING**

4.1. Introduction : (1) This section specifies the methods for data submissions by Users to STU for the planning and development of the State Transmission System. This section also specifies the procedure to be applied by STU in the planning and development of the State Transmission System. A requirement for reinforcement or extension of the State Transmission System may arise for a number of reasons of which a few are mentioned below :

- (i) Developments/changes occurring on a User's system already connected to the STS.
- (ii) Introduction of a new connection point between the User's system and the STS.
- (iii) System of evacuation of power from generating stations within or outside the State
- (iv) Reactive power compensation.
- (v) Need to increase system capacity, to remove operational constraints and to maintain standards of security to accommodate a general increase in the demand.
- (vi) Transient and steady state stability considerations.
- (vii) Cumulative effect of any combination of the above.
- (viii) Any other need to effect changes in the State Transmission System. The reinforcement or extension of the State Transmission System may involve work at an entry or exit point (connection point) of a User to the State Transmission System.
- (ix) Development of State Transmission system must be planned well in advance to ensure constituents and way leaves to be obtained and detailed engineering design/construction work to be completed. To this effect, the planning code imposes time lines for exchange of necessary information between STU and Users.

4.2. Objective : (1) The objective of planning criteria is as follows :

- (i) To specify the principles, procedures and criteria that shall be used in the planning and development of the Intra-State Transmission System (In-STS) and the links to Regional Grid.
- (ii) To promote co-ordination amongst all Users, STU, CTU, RLDC, CEA in any proposed planning and development of the In-STS.
- (iii) To provide methodology and information exchange amongst all Users, STU, SLDC, RLDC, RPC, and CEA for planning and development of the In-STS grid.

4.3. Scope : This section is applicable to STU, transmission licensees, generating stations connected to and/or using and involved in developing the state transmission system.

4.4. Planning Policy : (1) Resource Adequacy

The integrated resource planning including demand forecasting, generation resource adequacy planning and transmission resource adequacy assessment, required for secure grid operation. The planning of generation and transmission resources shall be to meet the projected demand in compliance with specified reliability standards for serving the load with optimum generation mix with a focus on integration of environmental friendly 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.

(2) **Integrated Resource Planning** The integrated resource planning shall include :

- (i) Demand forecasting ;
- (ii) Generation resource adequacy planning; and
- (iii) Transmission resource adequacy planning.

(3) **Demand Forecasting and Generation Resource Adequacy Planning**

- (a) The provisions related to demand assessment and forecasting and Generation Resource Adequacy Planning shall be governed by the provisions of APERC (Framework for Resource Adequacy) Regulations, 2024 and amendments thereof.
- (b) In order to ensure optimum and least cost generation resource procurement planning, each distribution licensee of the State or any agency on its behalf shall give due consideration to the factors such as its share in the State, regional and national coincident peak, seasonal requirement and possibility of sharing generation capacity seasonally with other States.

(4) **Transmission Resource Adequacy Planning**

- (a) 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 the Intra-State Transmission System.

- (5) The STU shall carry out planning process from time to time as per the requirement for identification of major intra-State transmission system including inter-State schemes, which shall fit in with the perspective plan developed by the Authority.
- (6) The STU shall also plan, from time to time, system-strengthening schemes, to overcome the constraints in power transfer and to improve the overall performance of the grid. The intra-State transmission proposals including system-strengthening schemes identified on the basis of the planning studies shall be discussed, reviewed and finalized in the meetings of Grid Code Review Committee.
- (7) Based on above, the STU shall come out with a Transmission System Plan, the transmission system plan shall also include information related to additional equipment including transformers, capacitors, reactors, Static VAR Compensators:
- (8) The information on targets set in the preceding plans and progress achieved on the identified intra-State/inter-State transmission schemes and system strengthening schemes shall also be included in the transmission system plan.
- (9) The State Transmission Utility, for the purpose of preparing the transmission system plan may seek such information as may be required by it from State Constituents, including generation capacity addition, system augmentation and long-term load forecast and all (approved/pending) applications for open access.
- (10) The State Transmission Utility shall also consider the following for the purpose of preparing the transmission system plan;
 - (i) Plans formulated by the Authority for the transmission system under the provisions of clause (a) of Section 73 of the Act ;
 - (ii) Electric Power Survey of India report of the Authority;
 - (iii) Grid Standards specified by the Authority under clause (d) of Section 73 of the Act.
 - (iv) Transmission Plan formulated by Central Transmission Utility under the provisions of Grid Code specified by Central Electricity Regulatory Commission under clause (h) of sub-section of Section 79 of the Act;
 - (v) Transmission Planning Criteria and Guidelines issued by the Authority;
 - (vi) Recommendations/inputs, if any, of the Regional Power Committee;
 - (vii) Reports on National Electricity Policy which are relevant for development of ISTS;
 - (viii) Any other information/data source suggested by the State Commission.
- (11) All State Constituents and agencies will supply to the STU, the desired planning data from time to time to enable it to formulate and finalize its plan.
- (12) The State Transmission Utility shall send a copy of transmission system plan to the State Commission by 31st December each year and also publish it on its website. The STU shall also make the same available to any person upon request.

4.5. Planning Criteria :

- (1) The planning criteria shall be based on the security philosophy on which both Inter State Transmission System (ISTS) and the Intra-State Transmission System (STS) have been planned. The security philosophy may be as per the Transmission Planning criteria and other guidelines given by CEA. The STU shall carry out appropriate system studies while developing the transmission system plan.
- (2) The State Transmission Utility, as a general rule, shall be responsible and capable of withstanding and securing against the following contingency outages without necessitating load shedding or rescheduling of generation during steady state operation.
 - (i) Outage of 220 kV line
 - (ii) Outage of 132 kV line
 - (iii) Outage of 33 kV line
 - (iv) Outage of a single Interconnecting Transformer
- (3) All the generating Units may operate within their reactive capability curves and the network voltage profile shall also be maintained within voltage limits specified.
- (4) The Intra-State Transmission System shall be capable of withstanding the loss of most severe single in feed without loss of stability.

- (5) Any one of the events defined in sub-para 4.5 (2) above shall not cause:
 - (i) Loss of supply;
 - (ii) Prolonged operation of the system frequency below and above specified limits;
 - (iii) Unacceptable high or low voltage;
 - (iv) System instability;
 - (v) Unacceptable overloading of STS elements ;
 - (6) In all extra high voltage sub-stations (132 kV and above) suitable number (at least two) and appropriate capacity transformers shall be provided to have reliability.
 - (7) STU shall carry out planning studies for Reactive Power compensation of State Transmission System including reactive power consumption requirement at the State Generating Stations switchyard.
- 4.6. **Planning responsibility :** (1) The primary responsibility of load forecasting within distribution licensee's area of supply rests with the respective Distribution Licensees. The Distribution Licensee shall determine peak load and energy forecast of their areas for each category of loads for each of the succeeding 5 years and submit the same annually by 31st March to STU along with details of demand forecasts, data, methodology and assumptions on which forecasts are based along with their requirement for transmission system augmentation.
- (2) The load forecasts shall be made for each of the prevalent as well as proposed inter connection points between STU and Distribution Licensees and shall include annual peak load and energy projections. The demand forecasts shall be updated annually or whenever major changes are made in the existing forecasts or planning. While indicating requirements of single consumers with large demands (1 MW or higher) the Distribution Utility/Licensee shall satisfy itself as to the degree of certainty of the demand materializing.
 - (3) Generating stations shall provide their generation capacity to STU for evacuating power from their power stations for each of the succeeding 5 years along with their requirement or augmentation of transmission proposals and submit the same annually by 31st March to STU.
 - (4) The planning for strengthening the State Transmission System for evacuation of power from generating stations to outside State shall be initiated by STU.
 - (5) State Grid Code Review Committee consisting of members from each Distribution Licensee, STU and SGS shall review and approve the load forecasts and the methodology followed by each of the Distribution Licensees.
 - (6) The State Transmission System proposals identified based on planning studies would be discussed, reviewed and finalised by the State Grid Code Review Committee.
- 4.7. **Planning data :** (1) State Generating Companies/IPP's/licensees shall provide following types of data to STU for the purpose of developing transmission plan:
- (a) **Standard Planning Data (Generation & Distribution) as per Appendix A.**
 - (b) **Detailed Planning Data (Generation & Distribution) as per Appendix B**
- (a) **Standard Planning Data :** Standard Planning data shall consist of details which are expected to be normally sufficient for the STU to investigate the impact on the State Transmission System (STS) due to User/ Transmission Licensee development. The Transmission Licensee's and Users shall provide the following standard planning data to STU from time to time in the standard formats prescribed by STU.
 - (i) Preliminary project planning data,
 - (ii) Committed project planning data
 - (iii) Connected planning data.
 - (b) **Detailed Planning data :** Detailed Planning data shall consist of detailed data required by STU to assess the impact of User/Transmission Licensee development on the State Transmission System.
 - (i) The detailed planning data shall be furnished by the Users and Transmission Licensees as and when requested by STU.
 - (ii) The one-time data shall be submitted by all the Users and Transmission Licensees to STU within six (6) months from the date of notification of this State Grid Code.
 - (iii) STU shall also furnish to all the Users, the Annual Transmission Planning Report, Grid Map and any other information as the State Commission may specify.
- 4.8. **Implementation of Transmission Plan :** The actual programme of implementation of State transmission lines, inter-connecting transformers, reactors/capacitors and other transmission elements will be determined by STU in consultation with the concerned agencies. The completion of these works within time frame shall be ensured by STU through the concerned agencies.

CHAPTER - 5**5. CONNECTION CONDITIONS**

5.1 Introduction : (1) This section specifies the minimum technical, design and operational criteria, which must be complied with by STU & every User connected to or seeking connection to the State Transmission System. These also set out the procedure by which STU shall ensure compliance by any agency with above criteria as pre-requisite for establishment of an agreed connection. STU and other Users connected to or seeking connection to STS shall comply with the following Regulations/codes from time to time

- (i) CEA (Technical Standards for Construction of Electric Plants and Lines) Regulations, 2010, and amendments thereof
- (ii) CEA (Grid standards) Regulations 2010 and amendments thereof
- (iii) CEA (Technical standards for Communication system in power system operation) Regulations 2020 and amendments thereof
- (iv) CEA (Cyber security in Power sector) Guidelines 2021 and amendments thereof
- (v) APSPERC (terms and conditions of open access) Regulations 2021 and amendments thereof
- (vi) CEA (Technical standards for construction of Electrical plants and Electrical lines) Regulations 2022 and amendments thereof
- (vii) CEA (measures related to safety and electric supply) Regulations 2023 and amendments thereof.

(2) The objective of this section is to ensure the following :-

- (i) To ensure safe reliable and integrated operation of the grid;
- (ii) All users or prospective users are treated equitably;
- (iii) Any new or modified connection, when established, shall not impose any adverse effect on STS nor shall a new or modified connection suffer adversely due to its connectivity to STS;
- (iv) By specifying minimum design and operational criteria, to assist Users in their requirement to comply with Licence obligations and ensure that a system of acceptable quality is maintained;
- (v) The ownership and responsibility for all items of equipment is clearly specified in a schedule (APPENDIX - F : Site Responsibility Schedule) for every site where a Connection is made.

5.2 Scope:

The connection code applies to STU, CTU and all Users connected to or seeking connection in the state transmission system.

5.3 General Connectivity Conditions : (1) The Applicant shall be responsible for the planning, design, construction, reliability, protection and safe operation of its own equipment. The Applicant and User shall furnish data as required by the State Transmission Utility or by the licensee or generating station with whose system the inter-connection is proposed, for permitting interconnection with the Grid.

- (2) The Applicant and user shall provide necessary facilities for voice and data communication and transfer of on-line operational data, such as voltage, frequency, line flows and status of breaker and isolator position and other parameters as prescribed by the State Load Despatch Centre.
- (3) The Applicant and User shall cooperate with State Load Despatch Centre in respect of the matters listed below, but not limited to: -
 - (i) Protection coordination and settings of its protective relays accordingly;
 - (ii) Agree to maintain meters and communication system in its jurisdiction in good condition ;
 - (iii) Participate in contingency operations such as load shedding, increasing or reducing generation, islanding, black start, providing start-up power and restoration as per the procedure decided by the State Load Despatch Centre;
 - (iv) Furnish data as required by State Transmission Utility or Transmission Licensee, State Load Despatch Centre, North Eastern Regional Power Committee and any committee constituted by the Commission or Government for system studies or for facilitating analysis of tripping or disturbance in power system;
 - (v) Carry out modifications in his equipment with respect to short circuit level, protection coordination and other technical reasons considered necessary due to operational requirements;
 - (vi) Abide by the coordinated outage plan of the state and region in respect of generating units and transmission lines as approved by the State Load Despatch Centre;

5.4 Procedure/Application for connection to the State Transmission System : (1) The procedure for any new connection or modification of an existing connection with the State Transmission System shall consist of following :

- (a) Any User seeking to establish new or modified arrangements for connection to and/or use of the transmission system shall submit the following report, data and undertaking along with an application and processing fee to the STU/transmission licensee: -
 - (i) Report stating purpose of proposed connection and/or modification, connection site, transmission licensee to whose system connection is proposed, description of apparatus to be connected or modification to apparatus already connected and beneficiaries of the proposed connection;
 - (ii) Construction schedule and target completion date;
 - (iii) An undertaking that the user shall abide by the provisions of SGC, IEGC, Indian Electricity Rules and various standards including Grid Connectivity Standards made by the Authority pursuant to the Act for installation and operation of the apparatus ;
 - (iv) The User shall furnish the Detailed Planning Data as per APPENDIX - B ;
 - (b) The standard format for application shall be developed by State Transmission Utility and shall be made available at its office and in its website within two (2) months of notification of this State Grid Code. The above application shall be submitted along with the following details:
 - (i) The STU shall forward a copy of the application to the Transmission Licensee in whose system the connection is being sought and to the State Load Despatch Centre for their comments.
 - (ii) The STU or the Transmission licensee, in whose system the connection is being sought, may carry out the power system studies as considered appropriate before allowing any new connection.
 - (iii) The STU shall, within thirty (30) days, from the receipt of an application and after considering all suggestions and comments received from the parties identified above, accept the application with such modification or such conditions as may be specified by the STU.
 - (c) On acceptance of an application, the STU shall make a formal offer to the applicant for consent, specifying any works required for the extension or reinforcement of the State Transmission System necessitated by the applicant's proposal. A copy of the offer shall be forwarded to the concerned Transmission Licensee.
 - (d) The STU shall, upon compliance of the required conditions by the User, shall notify the concerned User, that it can be connected to the STS.
 - (e) The applicant and the concerned Transmission Licensee or STU, in whose system the connection is being sought, shall finalize a Connection Agreement on acceptance of the offer by the applicant. A copy of the Connection Agreement shall be provided to the STU and SLDC.
- 5.5 Rejection of application :** (1) STU shall be entitled to reject any application for connection to the State Transmission System for reasons, to be recorded in writing, if such application is not in accordance with the provisions of the State Grid Code.
- (2) In the event of any dispute with regard to rejection of application by STU, the User may approach the Commission.
- 5.6 Connection Agreement :** (1) All Users connected to or Applicants seeking connections to the Grid shall enter in to connection agreement with the STU. A connection agreement, shall include within its terms and conditions, the following :
- (i) A condition requiring both parties to comply with the provisions of the State Grid Code.
 - (ii) Details of connection, technical requirements and commercial arrangements.
 - (iii) Details of any capital related expenditure arising from reinforcement or extension of the system, data communication etc., and demarcation of the same between the concerned parties.
 - (iv) Details of Plants and equipment have to be connected.
 - (v) A Site Responsibility Schedule.
 - (vi) General philosophy, guidelines, etc. on protection.
 - (vii) Any other information considered appropriate by the STU or the Commission.
- (2) STU shall develop a model Connection Agreement within two months and submit to the Commission for approval.
- 5.7 Site Responsibility Schedule :** (1) For every connection to the State Transmission System for which a connection agreement is required, the User shall prepare a schedule called 'Site Responsibility Schedule' indicating the following for each item of equipment installed at the connection site.
- (i) Ownership of the equipment.
 - (ii) Responsibility for control of equipment.

- (iii) Responsibility for maintenance of equipment.
 - (iv) Responsibility for operation of equipment.
 - (v) Responsibility for all matters relating to safety of any person at the connection/interface site.
 - (vi) Management of the Connection/Interface site.
 - (2) The format to be used in the preparation of Site Responsibility Schedule is given in Appendix - F as per Data Registration.
- 5.8 **Access to Connection site** : The Applicant or User, as the case may be, owning the electrical plant shall provide reasonable access and other required facilities to the State Transmission Utility or State Load Despatch Centre, whose equipment is installed or proposed to be installed at the Connection Site for installation, operation and maintenance etc. of the equipment.
- 5.9 **Site Common Drawings** : Site Common Drawings shall be prepared for each connection point by the owner of the sub-station where connection is taking place.
- 5.10 **System Performance** : (1) The Design and Construction of all the equipment connected to the State Transmission System shall satisfy the relevant Indian Standard Specifications. In case of equipment for which Indian Standard Specifications do not exist, the appropriate IEC, or IEEE or other International Standards shall apply.
- (2) Installation of all electrical equipment shall comply with IE Rules, 1956 which are in force for time being or as replaced by new rules made under Electricity Act, 2003.
 - (3) For every new/modified connection sought the STU shall specify the connection point, technical requirements and the voltage to be used, along with protection and metering requirements as specified in the Protection and Metering (Chapter-9).
 - (4) Insulation coordination of the User's equipment shall conform to those applicable as per Indian Standards. Rupturing capacity of the switchgear shall not be less than that specified as per Indian Standards.
 - (5) Protection schemes and metering schemes shall be as detailed in the Protection and Metering Chapters.
 - (6) The State Transmission System rated frequency shall be 50.00 Hz and shall normally be controlled within the limits as per Regulations issued by the Authority/IEGC amended from time to time.
 - (7) The User shall be subject to the Grid discipline prescribed by SLDC and RLDC. In the event of Grid disturbances in the Regional Grid, SLDC shall not be liable to maintain system parameters within the normal range of voltage and frequency.
- 5.11 **Connection Points/Interface Point** :
- (1) **State Generating Station (SGS)/IPPs/CPPs** :
 - (i) The voltage at the Connection point / Interface point with the State Transmission System may be 220/132/110/66 KV or as agreed with STU.
 - (ii) Unless specifically agreed with STU, the Connection point with generating station shall be the terminal isolator provided just before the outgoing gantry of the feeders.
 - (iii) SGS shall operate and maintain all terminals, communication and protection equipment's provided within the generating station.
 - (iv) The provisions for the metering between generating station and STU system shall be as per the Metering Code.
 - (v) Respective Users shall maintain their equipment from the going out feeders' gantry on wards emanating from generating station.
 - (2) **Distribution Licensee** :
 - (i) The voltage at the Connection Point / Interface Point to State Transmission System may be as specified by the Distribution Licensee or as agreed with STU. For EHV consumer directly connected to the transmission system, voltage may be 220 KV or 132 KV.
 - (ii) Unless specifically agreed with Distribution Licensee, the Connection point with STU shall be the outgoing feeder gantry, from STU sub-station.
 - (iii) STU shall operate and maintain all terminals, communication and protection equipment's provided within its sub-station.
 - (iv) The provisions for the metering between Distribution Licensee and STU systems shall be as per the Metering Code.
 - (v) Respective Users shall maintain their equipment beyond the outgoing gantry of feeders emanating from STU sub-station onwards.

(3) North Eastern Regional Transmission System :

The Connection, protection scheme, metering scheme and the voltage shall be in accordance with the provisions of IEGC.

(4) EHV Consumers and Open Access Consumers :

- (i) The voltage may be 220/132/110/66 KV or as agreed with STU.
- (ii) The Connection point shall be just before the feeder gantry in their premises. The metering point shall be Connection point / Interface Point with their system.

5.12 Reactive Power Compensation :

- (1) Reactive Power compensation and/or other facilities should be provided by Transmission Licensee/ Distribution licensees as far as possible close to the load points there by avoiding the need for exchange of Reactive Power to/from In STS and to maintain In STS voltage within the specified range.
- (2) Line or Bus Reactors may be provided to control temporary over voltage within the limits as set out in connection agreements.
- (3) The additional reactive compensation to be provided by a User shall be indicated by STU in the Connection Agreement for implementation.
- (4) Users shall endeavour to minimize the lagging Reactive Power drawl at an interchange point when the voltage at that point is below 97% of rated voltage, and shall inject lagging Reactive Power when the voltage is above 103% of rated voltage. Inter-connecting Transformer taps at the respective drawl points may be changed to control the Reactive Power interchange as per a User's request to the State Load Despatch Centre, but only at reasonable intervals.

5.13 Harmonics :

The limits of harmonics shall be maintained as per CEA's notification (Technical standard for connectivity to the grid) Regulations 2007, as amended from time to time.

5.14 Data and Communication Facilities : (1) All Users shall provide reliable and efficient voice and data communication systems at their own cost to facilitate necessary communication and data exchange, and supervision/control of the State Grid by the SLDC, under normal and abnormal conditions: Provided that unless and until the communication facilities are installed, commissioned, and functioning properly, the User shall not be allowed to synchronize with the Grid.

- (2) All Users and Transmission Licensees in coordination with the STU shall provide the required facilities at their respective ends as specified in the Connection Agreement at their own cost:

Provided that the equipment/devices for communication and data exchange shall be provided as specified by the Commission in the Communication Code of these Regulations, guidelines of SLDC for interface requirement and other such guidelines/specifications as applicable.

- (3) All Users shall provide systems to telemeter power system parameters such as power flow, voltage, and status of switches/transformer taps, etc. in line with interface requirements and other guidelines made available by SLDC. The associated communication system to facilitate data flow up to appropriate data collection point on In STS shall also be established by the concerned User as specified by the STU in the Connection Agreement at their own cost. If the Users do not comply to provide the requisite communication facilities, STU shall not grant the final connectivity.

5.15 System recording instruments : (1) Recording instruments such as Data Acquisition System/ Disturbance Recorder/Event Logger/Fault Locator (including time synchronization equipment)/voice recorder/any other such equipment in each generating station/substation/SLDC/ALDC shall be provided in the In STS for recording of dynamic performance of the system and shall be maintained in working condition:

- (2) Provided that all such locations shall be time synchronized with the Meter Data Acquisition Systems (MDAS) located at SLDC and same shall be ensured by periodic verification and validation procedure to be developed and monitored by the STU.
- (3) All Users and Transmission Licensees shall provide all the requisite recording instruments as specified in the Connection Agreement in accordance with the agreed time schedule.

5.16 Responsibilities for safety :

STU and all users shall be responsible for safety in accordance with the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007, the Arunachal Pradesh Electricity Regulatory Commission (the terms and Condition for Open Access) Regulations, 2012, as amended from time to time and CEA (Technical Standards for Construction of Electric plants and Electric Lines) Regulations, 2010 and Measures Relating to Safety and Electric Supply) Regulations, 2010.

5.17 Cyber Security :

All Users and STU shall have in place, a cyber-security framework as specified in Information Technology Act, 2002 amended from time to time to identify the critical cyber assets and protect them so as to support reliable operation of the Grid.

5.18 Schedule of assets of the State Grid :

STU, other transmission licensees granted license by the Commission and Generators shall maintain the schedule of their assets and host the same in their respective websites. The same shall be submitted to the Commission as and when called for.

5.19 Connectivity of renewable energy generating station to the grid :

General Conditions for Connectivity of Renewable sources can be connected at the distribution level or transmission level of the State as deem fit, which can be amended as and when required. The provisions under CEA(Technical Standards for Connectivity of the Distributed Generation Resources) Amendment Regulations, 2019 and amendment thereof shall be applicable while connecting the distributed RE sources to grid.

CHAPTER - 6**6. SYSTEM SECURITY ASPECTS**

- 6.1 System security aspects :** (1) All State constituents shall endeavour to operate their respective power systems and generating stations in synchronism with each other at all times, such that the State Grid operates as synchronized system and integrated part of Concerned Regional Grid (NERLDC).
- (2) The STU shall endeavour to operate the inter- state links in such a way that transfer of power can be achieved smoothly when required. Security of the power system and safety of power equipment shall enjoy priority over economically optimal operations.
 - (3) All switching operations, whether manually or automatic, will be based on regulatory provisions of IEGC, State Grid Code, CEA Regulations or any other guidelines issued by appropriate Authority from time to time.
 - (4) No part of the State Transmission System shall be deliberately isolated from the integrated grid except under the following conditions;
 - (i) Under emergency conditions in which such isolation would prevent a total grid collapse and/ or would enable early restoration of power supply.
 - (ii) When serious damage to a costly equipment is imminent and such isolation would prevent the same.
 - (iii) When such isolation is specifically instructed by SLDC.
 - (iv) On operation of under frequency/islanding scheme as approved by NERPC/NERLDC.
 - (5) In case of isolating of any important element of the state transmission system under an emergency , any such isolation shall be reported to SLDC within next fifteen (15) minutes. All such isolations shall be restored, as soon as the conditions again permit it. No transmission elements shall be synchronized without prior consent of SLDC. In case of any Grid incidence/disturbance, Grid shall be restored as per Detailed Operating Procedure of SLDC and instructions given by SLDC during the real time. No User of the Grid is allowed to perform any switching operation by their own. The restoration process shall be supervised by SLDC.
 - (6) All operational instructions given by RLDC and SLDC shall have unique codes, which shall be recorded and maintained as specified in CEA Grid Standards Regulations and amendments thereof. No transmission element shall be taken into service without obtaining unique code from the SLDC. All Generators including RE and ESS shall have to obtain unique code before synchronization with the State Grid or while isolating from the Intra-State Transmission System.
 - (7) SLDC, in consultation with ERPC, Users and respective RLDC, shall prepare a list of important elements in the State grid that are critical for State grid operation and shall make the said list available to all concerned Users.
 - (8) An important element of the State Grid as listed at (7) above can be taken out of service only after prior clearance/ approval of SLDC, except in emergencies as per the Detailed Operating Procedure(s) of SLDC. SLDC shall inform the opening or removal of any such important element (s) of the State Grid to RLDC / NLDC/ ERPC and the concerned regional entities, who are likely to be affected, as specified in the Detailed Operating Procedure of NLDC or RLDC or SLDC.
 - (9) In case of switching off or tripping of any of the important elements of the State Grid under emergency conditions or otherwise, it shall be intimated immediately by the Users with available details to SLDC, if the element is within the control area of SLDC, who in turn shall intimate the concerned RLDC. The reasons for such switching off or tripping to the extent determined and the likely time of restoration shall also be intimated within half an hour. The SLDC and the Users shall ensure restoration of such elements within the estimated time of restoration, as intimated.
 - (10) The isolated, taken out or switched off elements shall be restored as soon as the system conditions permit. The restoration process shall be supervised by SLDC, in coordination with concerned RLDC and NLDC in accordance with the system restoration procedures of NLDC or RLDC or SLDC.

- (11) Maintenance of grid elements shall be carried out by respective User in accordance with the provisions of the CEA Grid Standards Regulations and amendments thereof. 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 SLDC. SLDC shall report such outages to RLDC/ WRPC. SLDC shall also issue suitable instructions to restore such elements in a specified time period.
- (12) All generating units shall have their Automatic Voltage Regulators (AVRs), Power System Stabilizers (PSSs), voltage (reactive power) controllers (Power Plant Controller) and any other requirements in operation, as per CEA Technical Standards for Connectivity Regulations and amendments thereof. If a generating unit with a capacity higher than 100 (hundred) MW is required to be operated without its AVR or voltage controller in service, the generating station shall immediately inform the SLDC of the reasons thereof and the likely duration of such operation and obtain its permission.
- (13) The tuning of AVR, PSS, Voltage Controllers (PPC) 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 :

(i) at least once every five (5) years;

(ii) based on operational feedback provided by SLDC, after analysis of a grid event or disturbance;

(iii) in case of major network changes or fault level changes near the generating station as reported by SLDC; and

(iv) in case of a major change in the excitation system of the generating station.
- (14) 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 concerned ERPC/SLDC. 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 (4) of the Act.
- (15) SLDC shall prepare the islanding schemes in accordance with the CEA Grid Standards Regulations and amendments thereof 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.

Mock drill of the islanding schemes shall be carried out annually by SLDC in coordination with respective RLDC 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, simulation testing shall be carried out by SLDC.
- (16) All Distribution Licensees, STU and Users 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 ERPC from time to time. The default UFR settings shall be as specified in Table below or as amended in IEGC from time to time.

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 load generation balance in coordination with SLDC and approval of the ERPC.		
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.		

Provided that the quantum of load relief under each stage of UFR shall be as indicated by the ERPC.

- (17) The following shall be factored in while designing and implementing the UFR and df/dt relay schemes:

(i) The under-frequency and df/dt load shedding relays are always functional.

(ii) Demand disconnection shall not be set with any time delay in addition to the operating time of the relays and circuit breakers.

(iii) There shall be a uniform spatial spread of feeders selected for UFR and df/dt disconnection.

(iv) 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. SLDC shall monitor the combined load in MW of these feeders at all times. SLDC shall share the above data with respective RLDC in real time and submit a monthly exception report to respective RPC. SLDC shall inform respective RLDC as well as respective 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 SLDC/respective RPC. SLDC shall take corrective measures within a reasonable period and inform the respective RLDC and RPC, failing which suitable action may be initiated by respective RPC.

- (v) ERPC shall undertake a monthly review of UFR and df/dt scheme and may also carry out random inspection of the under-frequency relays. WRPC shall publish such a monthly review along with an exception report on its website.
- (vi) SLDC shall report the actual operation of UFR and df/dt schemes and load relief to the respective RLDC and RPC and publish the monthly report on its website.
- (18) 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-regional level shall be finalized by the SLDC/WRPC. 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 and the same shall be informed to NERLDC.
- (19) SLDC and Users shall operate in a manner to ensure that the steady state grid voltage as per CEA Grid Standards Regulations and amendments thereof remains within the following operating range:

Voltage (kV rms)		
Nominal	Maximum	Minimum
765	800	728
400	420	380
230*	245*	207*
220	245	198
132	145	122
110	121	99
33	36	30

* As per CEA Manual on Transmission Planning Criteria and subsequent updates.

- (20) SLDC shall take appropriate measures to control the voltage as per its operating procedures.
- (21) The concerned Users shall implement defence mechanisms as finalized by the respective RPC/SLDC to prevent voltage collapse and cascade tripping.
- (22) All defence mechanisms shall always be in operation and any exception shall be immediately intimated by the concerned User to the SLDC along with the reasons and the likely duration of such exception. The concerned User shall also obtain permission from SLDC.
- (23) The 132 KV and above transmission lines and ICTs shall not be deliberately opened or removed from service at any time except when advised by SLDC or with specific and prior clearance of SLDC. Where prior clearance from SLDC is not possible, it should be intimated to SLDC at the earliest possible time after the incident.
- (24) All Users and SLDC shall take all possible measures to ensure that the grid frequency always remains within the specified band as specified in IEGC and amended thereof except in an emergency, or when it becomes necessary to prevent imminent damage to critical equipment, no User shall suddenly reduce its generating unit output by more than 100 (one hundred) MW without prior permission of the SLDC. Similarly, except in an emergency, or when it becomes necessary to prevent imminent damage to critical equipment, no User shall cause a sudden variation in its load by more than 100 (one hundred) MW without the prior permission of the SLDC.

Provision of protections and relay settings shall be coordinated with State Transmission System, as per plan finalised in Protection Co-ordination Committee.

- (25) Each User shall provide adequate and reliable communication facility with SLDC to ensure exchange of data/information necessary to maintain reliability and security of the grid. Wherever possible, redundancy and alternate path shall be maintained for communication along important routes, e.g., User to SLDC.
- (26) The Users shall send information/data including disturbance recorder/sequential event recorder output, etc., to SLDC for the purpose of analysis of any grid disturbance/event. No User shall block any data/information required by SLDC for maintaining reliability and security of the grid and for analysis of an event.
- (27) STU and/or SLDC shall carry out load flow studies based on operational data from time to time to predict where voltage problems may be encountered and identify appropriate measures to ensure that voltages remain within the defined limits. On the basis of these studies, SLDC shall instruct SGS to maintain specified voltage level at interconnecting points.

- (28) SLDC shall continuously monitor 220, 132 KV and 33 KV voltage levels at strategic sub-stations.
- (29) The State Transmission System normally operates in synchronism with the NATIONAL Grid and NERLDC has the overall responsibility of the integrated operation of the North Eastern Regional Power System. The rated frequency of the system shall be 50 Hz and shall normally be regulated within the limits prescribed in IEGC. STU & SLDC as constituent of North Eastern Region shall make all possible efforts to ensure that grid frequency remains within 49.9 - 50.05 Hz band. However, under conditions of falling and rising frequency following measures needs to be adopted.

(a) **Falling frequency :**

Under falling frequency conditions, SLDC shall take appropriate action to issue instructions, in co-ordination with NERLDC to arrest the falling frequency and restore frequency within permissible range. Such instructions may include despatch instruction to SGS to increase generation and/or instruction to Distribution Licensees and Open Access Consumers to reduce load demand by appropriate manual and/or automatic load shedding.

Users and Transmission Licensees shall provide automatic under frequency and df/dt relay- based load shedding/islanding schemes in their respective systems, wherever applicable, to arrest frequency decline that could result in a collapse/disintegration of the State grid, as per the plan separately finalized by the State Grid Code Review Committee and shall ensure its effective application to prevent cascade tripping of generating units in case of any contingency. Users and Transmission Licensees shall ensure that the under-frequency and df/dt relay- based load shedding/islanding schemes, mentioned in sub-Regulation (13) are always functional. However, the relays may be temporarily kept out of service, in extreme contingencies, with prior consent of State Load despatch Centre.

(b) **Rising Frequency :**

Under rising frequency conditions, SLDC shall take appropriate action to issue instructions to SGS in co-ordination with NERLDC to arrest the rising frequency and restore frequency within permissible range. SLDC shall also issue instructions to Distribution Licensees and Open Access Consumers in coordination with NERLDC to lift Load shedding (if exists) in order to take additional load.

- (30) Governor action for all Generators of different capacity hydro (hydro units 10MW and above), renewable generating units shall be operated as per the provisions of IEGC.

(a) The Restricted Governor Mode of Operation (RGMO) shall essentially have the following features:

There should not be any reduction in generation in case of improvement in grid frequency below 50.05Hz, the upper limit fixed by CERC/SERC from time to time (for example if grid frequency changes from 49.9 to 49.95Hz. then there shall not be any reduction in generation). Whereas for any fall in grid frequency, generation from the unit should increase by 5% limited to 105% of the Maximum Continuous Rating (MCR) of the unit subject to machine capability.

- (i) Ripple filter of +/- 0.03 Hz. shall be provided so that small changes in frequency are ignored for load correction, in order to prevent governor hunting.
- (ii) If any of these generating units is required to be operated without its governor in operation as specified above, NERLDC shall be immediately advised about the reason and duration of such operation. All governors shall have a droop setting between 3% and 6%.

- 6.2 **Special requirements for Solar/ Wind generators :** (1) SLDC shall make all efforts to evacuate the available solar and wind power and treat them as a must-run station. However, SLDC may instruct the solar/ wind generator to back down generation on consideration of grid security or if safety of any equipment or personnel is endangered, and Solar/ wind generator shall comply with the same. For this, Data Acquisition System facility/ communication system shall be provided for transfer of information to SLDC:

- (a) SLDC may direct a wind farm to curtail its VAr drawal/ injection in case, the security of grid or safety of any equipment or personnel is endangered.
- (b) During the wind generator start-up, the wind generator shall ensure that the reactive power drawal shall not affect the grid performance.

6.3 **Protocol for curtailment : (1) Management of Curtailment for Frequency Management :**

- (a) In case frequency exceeds the over-frequency limit, SLDC is expected to back-down the hydro generation [except for constrained hydro generation projects such as run-of-river hydro projects, irrigation linked hydro generation projects or storage hydro factoring spillage considerations] followed by thermal generation to technical minimum (as per MOD) considering the scheduled demand in subsequent time blocks and ramp up/ramp down requirement to meet the scheduled demand.
- (b) SLDC may instruct DISCOMs / MPPMCL to reduce the requisition from their contracted Inter-State Generating Stations (ISGS) through revision of schedules. Also, DISCOMs /MPPMCL may be advised to withdraw demand curtailments, if any, issued.

- (c) SLDC may request NERLDC for backing down the inter-State generation schedule to State.
- (d) SLDC shall instruct the Pump Storage Hydro Projects to operate in Pumped mode subject to capacity constraint and spillage considerations to provide the load to the system for reduction of the frequency.
- (e) If hydro generation (excluding run-of-river) is in operation, SLDC shall reduce or stop the hydro generation to provide required relief considering its higher ramp down rate and avoiding the wastage of water resources.
- (f) Besides implementing all the above measures, if the necessary relief is not achieved and frequency continues to rise beyond the upper limit of 50.05 Hz for two or more consecutive time-blocks, SLDC may instruct the Pooling Sub Stations (PSS) to back down or curtail the renewable generation as last option for maintaining the frequency within limits.
- (g) While curtailing for the purpose of frequency management, SLDC would ensure to avail required relief with minimum curtailment. In such instances, curtailment instructions shall be given to all PSSs on pro-rata basis of 'Available Capacity', for the time-block immediately prior to issuance of curtailment instructions.

(2) Curtailment for relief from Transmission Congestion :

- (a) No Transmission Line outage shall be availed without the approval from SLDC. Also, no planned outages of Transmission Line shall be considered if not submitted at least two (2) days prior to the date of Outage.
- (b) The incidences resulting in curtailment of Wind/Solar Generation, which shall be intimated to SLDC are as follows:
 - (i) Planned / Forced Outages on evacuation infrastructure,
 - (ii) Tripping of any transmission elements/evacuation infrastructure,
 - (iii) Overloading of any transmission elements/evacuation infrastructure.
- (c) In case of tripping of any transmission element/evacuation infrastructure/PSS resulting in curtailment/backing down of renewable generation, it shall be the responsibility of concerned Transmission Licensee and affected renewable Generator(s) (for their respective Pooling Sub-Stations) through their Lead Generator or separately to intimate the same immediately to SLDC for required modifications in the schedules along with tentative time for restoration.
- (d) In case of planned outages, the Transmission Licensee shall plan the outage period so as to avoid curtailment of Wind/Solar generation.
- (e) All the events of Planned/Forced Outages of Transmission Lines resulting in the backing down/curtailment of Wind and Solar Generation shall be submitted to SLDC, which would cover information about event duration, affected location(s) of grid elements, renewable capacity, cause of outage, likely restoration / rectification time.
- (f) In case of any bottleneck in the Intra-State Transmission network, SLDC is required to initiate the load relief on the specific transmission lines connected to Wind/Solar Pooling Sub-Station (PSS). SLDC may issue instructions to PSS to back down/curtail the renewable generation to that extent in order to seek desired relief in the best interest of grid operations.
- (g) While curtailing to mitigate the congestion, SLDC would target the specific PSS to get required load relief with minimum curtailment. However, SLDC shall also ensure that, the same PSS are not receiving frequent curtailments. In such cases, curtailment instructions may be given on pro-rata basis of 'available capacity' at PSS in that area, for the time-block immediately prior to issuance of curtailment instructions.

(3) Maintaining the Volume Limits at State Periphery

- (a) CERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2022 read with the CERC order dated 6th February, 2023 have specified the volume limits for schedule less than 400 MW and for renewable rich States for deviation of drawal from the schedule at the State periphery. SLDC is mandated to take all measures to maintain the State drawal within the Volume Limits specified by CERC.
- (b) SLDC may initiate the Backing down or Curtailment in case under-drawal of State is beyond the Volume Limit at the State periphery. SLDC shall also take into consideration the grid frequency, while acting on the volume limits as specified in the CERC DSM Regulations.

CHAPTER - 7**7. OPERATIONAL PLANNING****7.1 Objective :**

The detailed provision is required to enable SLDC to achieve a reduction in demand to avoid operating problems on all or part of the State Transmission System. SLDC shall utilise Demand Control in a manner, which does not unduly discriminate against any one or group of customers.

7.2 Operational Philosophy : (1) All Intra-State Users shall at all times function in coordination to ensure integrity, stability and resilience of the grid and achieve economy and efficiency in the operation of power system.

(2) Operation of the State grid shall be monitored by SLDC.

(3) Detailed Operating Procedures for State grid shall be developed, maintained and updated by the SLDC, consistent with the Detailed Operating Procedures of respective NERLDC .

(4) SLDC shall have qualified operating personnel manning the control room round the clock.

(5) Every generating station and transmission sub-station of 132 KV and above shall have a control room manned by qualified operating personnel round the clock. 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 sub-station, shall have a coordination centre functioning round the clock, manned by qualified personnel for operational coordination with SLDC and equipped to carry out the operations as directed by SLDC.

(6) Qualified Coordinating Agency (QCA) shall have coordination centres functioning round the clock, manned by qualified personnel for operational coordination with SLDC and generating stations. ESS and Bulk Consumers, which are State entities, shall have coordination centres functioning round the clock and manned by qualified personnel for operational coordination with SLDC.

7.3 Demand Estimation :

The demand estimation shall be done by the distribution licensees in accordance with the provisions of Chapter Error Reference source not found.- System Planning of the Grid Code. SLDC/STU shall be provided with a copy of the same as and when it is finalized

7.4 Demand Management : (1) This sub-section is concerned with the provisions to be made by SLDC to effect are duction of demand in the event of insufficient generating capacity, and inadequate transfers from external inter connections to meet demand, or in the event of break down or congestion in intra-state or inter-state transmission system or other operating problems (such as frequency, voltage levels beyond normal operating limit, or thermal overloads, etc.) or over drawl of power vis-à-vis that of the regional entities beyond the limits mentioned in deviation settlement Regulations of CERC. Primarily the need for demand control would arise on account of the following conditions:

(i) Variations in demand from the estimated or forecasted values, which can not be absorbed by the grid;

(ii) Unforeseen generation/transmission outages resulting in reduced power availability;

(iii) Heavy reactive power demand causing low voltages.

(2) SLDC shall match the consolidated demands of the Distribution Licensees with consolidated generation availability from SGS, ISGS, IPP, CPP and other sources and exercise the Demand Control to ensure that there is a balance between the energy availability and the Distribution Licensees demand plus losses plus the required reserve. SLDC would maintain a historical database for the purpose of Demand Estimation and shall be equipped with the state-of-the-art tools such as Energy Management System (EMS) for short-term demand estimation to plan in advance as to how the load would be met without overdrawing from the grid.

7.5 Demand Control/Disconnection : (1) Automatic load shedding shall be resorted to by means of installation of the Under Frequency Relays at the sub stations of the STU as per the directions of the SLDC to preserve the overall integrity of the power system. The number and size of the discrete blocks using Automatic Under Frequency Relays for Load Shedding shall be determined on rotational basis in consultation with every Distribution Licensee. The frequency settings of these relays shall be coordinated in consultation with the NERLDC.

(2) Whenever restoration of large portions of the total demand disconnection effected by the automatic load shedding is not possible within a reasonable time, the SLDC shall implement additional disconnection manually, to restore an equivalent amount of demand disconnected.

- (3) Each Distribution Licensee shall help the SLDC in identifying such load blocks. Load shed by the operation of automatic load shedding devices shall not be restored without specific directions from the SLDC.
 - (4) Planned manual load shedding shall be implemented by the SLDC when there is a shortfall in generation, or constraints in Transmission System, or reduction of imports through external connection etc., requiring demand control to control the over-drawl of power from ISGS. In such cases, a rotational load-shedding scheme shall be adopted to ensure equitable treatment for all consumers as far as practicable.
 - (5) Emergency manual load shedding to deal with unacceptable voltage and frequency levels etc. shall be implemented by the SLDC when loss of generation, mismatch of generation with the demand, constraints in the transmission system, over-drawl from the grid in excess of respective schedule affecting the frequency of the regional grid below 49 Hz, requiring load shedding at short notice or no notice, to maintain a regulating margin.
 - (6) These control measures shall not be withdrawn till the system frequency improves and when the SLDC issues such instructions after review of the situation.
- 7.6 **Load Crash :** (1) In the event of load crash in the system due to weather disturbance or any other reasons, the situation would be controlled by SLDC by getting the following methods implemented from distribution licensee(s) and other concerned Users in descending priorities: -
- (i) Lifting of the load restrictions, if any;
 - (ii) Exporting the power to neighboring regions/states;
 - (iii) Backing down of thermal stations with a time lag of 5-10 minutes for short period in merit order.
 - (iv) Closing down of hydel units (subject to non-spilling of water and effect on irrigation) keeping in view the in flow of water into canals and safety of canals/hydel channels. Any other instruction issued by NERLDC shall assume priority over all the above methods. This methodology shall be reviewed from time to time with State Grid Code Review Committee.
- (2) While implementing the above, the system security aspects should not be violated as per provisions in Chapter - 6 of the Grid Code Regulations.

7.7 **Data Requirements :**

Users shall provide to the STU and SLDC with data as specified in **Appendix - C** in the Data Registration Chapter.

CHAPTER - 8

8. COMMISSIONING AND COMMERCIAL OPERATION DATE (COD)

8.1 Introduction :

This chapter covers aspects related to drawal of start-up power from and injection of infirm power into the grid, trial run operation, documents and tests required to be furnished before declaration of COD, and requirements for declaration of COD.

- 8.2 **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 intra-State Transmission System 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 SLDC.

Provided that the SLDC 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 15 months prior to the expected date of first synchronization and one year after the date of first synchronization; and
 - (b) Injection of infirm power shall not exceed one year from the date of first synchronization.
- (3) Notwithstanding the provisions of the above, 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 months in advance of the completion of the stipulated period.
- (4) The charges for deviation for drawal of start-up power or for injection of infirm power shall be as per Central Electricity Regulatory Commission (Deviation Settlement Mechanism and Related Matters) Regulations, 2022 and amendments thereof till the time no separate Regulations/ order/ notification is issued by the Commission in the above said matter.

- (5) Start-up power shall not be used by the generating station for construction activities.
- (6) The onus of proving that the inter-change 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 inter-change 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 inter-change. 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.
- (7) In the case of multiple generating units of the same generating station or multiple generating stations owned by different entities connected at a common 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.

8.3 Data to be furnished prior to notice of Trial Run :

The following details, as applicable, shall be furnished by each entity generating station to the SLDC, STU and the beneficiaries of the generating station, wherever identified, prior to notice of 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	M3/ MW
Unit-wise forbidden zones	MW

8.4 Declaration of Commercial Operation Date (COD) : (1) COD in relation to a generating unit of hydro generating station including pumped storage hydro generating station, shall mean the date declared by the generating company after demonstrating peaking capability corresponding to the Installed Capacity of the generating station through a successful trial run and after getting clearance from the SLDC and in relation to the generating station as a whole, the COD of the last generating unit of the generating station.

Provided that :

- (a) Trial run or each repeat trial run shall commence after a notice of not less than seven days by the generating company to the beneficiaries and SLDC;
- (b) The generating company shall certify that:
 - (i) The generating station or unit thereof meets the requirement and relevant provisions of the technical standards of CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022 and Indian Electricity Grid Code, as applicable:

- (ii) The main plant equipment and auxiliary systems including drainage and dewatering system, primary and secondary cooling system, LP and HP air compressor, firefighting system, etc. have been commissioned and are capable for full load operation of units on a sustained basis.
- (iii) Permanent electric supply system 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.
- (c) The certificates as required under clause (iii) above shall be signed by the Director/Senior officer of the generating company and a copy of the certificate shall be submitted to the SLDC, before the declaration of COD. The generating company shall submit approval of the Board of Directors to the certificates as required under clause (iii) within a period of three months.
- (d) Trial run, in case of a hydro generating station or a unit thereof, shall mean successful running of the generating station or unit thereof at maximum rating or installed capacity or nameplate rating for a continuous period of 12 hours.
- (e) Where on the basis of the trial run, a unit of the generating station fails to demonstrate the unit capacity corresponding to maximum continuous rating (MCR) or Installed Capacity or name plate rating, the generating company shall have the option to either derate the capacity or to go for repeat trial run.
- (f) In case a hydro generating station with pond age or storage is not able to demonstrate the peaking capability corresponding to the installed capacity for the reasons of insufficient reservoir or pond level, the COD of the last unit of the generating station shall be considered as the COD of the generating station as a whole and it will be mandatory for such hydro generating station to demonstrate peaking capability equivalent to installed capacity of the generating station or unit thereof as the case may be, as and when such reservoir/pond level is achieved:
- (g) If a run-of-river hydro generating station or a unit thereof is declared under commercial operation during lean inflows period when the water inflow is insufficient for such demonstration of peaking capability, it shall be mandatory for such hydro generating station or unit thereof to demonstrate peaking capability equivalent to the installed capacity as and when sufficient water inflow is available. In case of failure to demonstrate the peaking capacity, the unit capacity shall be de-rated to the capacity demonstrated with effect from the COD.
- (h) If SLDC, notices any deficiency in the trial run, it shall be communicated to the generating company within seven days of receiving the generation data based on the trial run.
 - (i) Scheduling shall commence from 00:00 hrs after the declaration of COD.
- (2) COD in relation to an intra-state transmission system (In STS) or an element thereof shall mean the date declared by the transmission licensee from 00:00 hours of which an element of the transmission system is in regular service after successful trial operation for transmitting electricity and communication signal from the sending end to the receiving end. Trial run and Trial operation in relation to a transmission system or an element thereof shall mean successful charging of the transmission system or an element thereof for 24 hours at the continuous flow of power and communication signal from the sending end to the receiving end and with the requisite metering system, telemetry and protection system in service enclosing certificate to that effect from the SLDC:

Provided that :

- (a) In case of In STS executed through TBCB, the transmission licensee shall declare COD of the In STS in accordance with the provisions of the Transmission Service Agreement (TSA).
- (b) Where the transmission line or substation is dedicated for evacuation of power from a particular generating station and the dedicated transmission line is being implemented other than through TBCB, the concerned generating company and Transmission Licensee shall endeavour to commission the generating station and the transmission system simultaneously as far as practicable and shall ensure the same through appropriate Implementation Agreement. In case the transmission line or substation dedicated to a generator is being implemented through TBCB, then matching of commissioning of the transmission line/substation and generating station shall be monitored by the appropriate Authority.
- (c) Where the transmission system executed by a transmission licensee is required to be connected to the transmission system executed by any other Transmission Licensee and both transmission systems are executed in a manner other than through TBCB, the Transmission Licensee shall endeavour to match the commissioning of its transmission system with the transmission system of the other licensee as far as practicable and shall ensure the same through an appropriate implementation agreement. Where either of the transmission systems or substations or both are implemented through TBCB, the progress of implementation shall be monitored by the appropriate authority as per the provisions of the TBCB guidelines or any other such document specified by the appropriate authority.

- (d) In case a transmission system or an element thereof is prevented from regular service on or before 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, or downstream distribution system of distribution Licensee, the Transmission Licensee shall approach the Commission through an appropriate application for approval of the COD of such transmission system or an element thereof.
 - (i) Provided that, the Transmission Licensee while executing the Transmission, System shall endeavour to match the construction schedule of the generator or downstream network as the case may be to avoid the idling of the assets.
 - (ii) Provided further that, in case of an existing Transmission Licensee, such request may be filed under the provisions of the MYT Regulations;
- (e) An element shall be declared to have achieved COD only after all the elements which are pre-required to achieve COD as per the TSA are commissioned. In case any element is required to be commissioned prior to the commissioning of the pre-required element, the same can be done if STU confirms that such commissioning is in the interest of the power system.
- (f) Transmission Licensee shall submit a certificate from the Director/Senior officer of the company that the transmission line, substation and communication system conform to the relevant provisions of Grid Code and other Standards specified by the Authority.
- (3) The COD in the case of units of a renewable generating station (Solar and Wind) aggregating to 5 MW and above or such other limit as specified in (i) and (ii) below shall mean the date declared by the generating station after undergoing a successful trial run as given below for Solar and Wind and subject to fulfilment of other conditions, if any, as per PPA.

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.

- (i) Trial run of the solar inverter unit(s) connected at State Transmission system shall be performed for a minimum capacity of 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 5 MW :

Successful trial run of a solar inverter unit(s) covered under the above Regulation 3 (i) shall mean the flow of power and communication signal for not less than four 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 :

- (a) the output below the corroborated performance level with the solar irradiation of the day shall call for a repeat of the trial run;
- (b) 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 year from the date of COD:
- (ii) Trial run of a wind turbine(s) connected at State Transmission system shall be performed for a minimum capacity of 5 MW:

Provided that in the case of a project having a capacity of more than 5 MW, the trial run for wind turbine(s) above the capacity of 5 MW shall be performed in batch sizes of not less than 5 MW:

Successful trial run of a wind turbine(s) covered under the above Regulation Error! Reference source not found.3 (ii) shall mean the flow of power and communication signal for a period of not less than continuous four (4) hours 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-

- (a) the output below the corroborated performance level with the wind speed of the day shall call for a repeat of the trial run;
- (b) 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 year from the date of COD:

8.5 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 STU and SLDC.
- (4) All operational instructions given by SLDC shall have unique codes which shall be recorded and maintained as specified by the Authority.
- (5) 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.
- (6) Any operation in a State having an impact on other state(s)/region(s) shall be intimated by the SLDC to NERLDC.

CHAPTER - 9**9. INTER USER BOUNDARY SAFETY :****9.1 Introduction :**

This section sets down the requirements for maintaining safe working practices associated with inter user boundary operations. It lays down the procedure to be followed when work is required to be carried out on electrical equipment that is connected to another User's system.

9.2 Objective :

The objective of this chapter is to achieve an agreement and consistency on the principles of safety as prescribed in the Indian Electricity Rules when working across the inter user boundary between one User and another User.

9.3 Designated Persons :

STU and all Users shall nominate and notify authorized persons to be responsible for the co-ordination of safety across their boundary. These persons shall be referred to as Designated Officers.

9.4 Procedure to work on Inter User Boundary Circuits : (1) STU shall issue a list of Designated Persons (names, designations and telephone numbers) to all Users who have a direct inter user boundary with STU. This list shall be updated promptly, whenever there is a change of name, designation or telephone number of any designated persons named in the list.

- (2) All Users with a direct inter user boundary with STU or other User's system shall issue a similar list of their Designated Persons to STU or other User. This list shall be updated promptly whenever there is any change in the said list.
- (3) Whenever any work across an inter-user boundary is to be carried out by the User or the STU, the Designated Persons of the User or STU as the case may be, wishing for Line Clear Permit/Permit to Work (PTW) shall personally contact the other relevant Designated Person. If the Permit to Work cannot be obtained personally, the Designated Persons shall contact through telephone and exchange code word or secrete code to ensure correct identification of both agencies.
- (4) If the work extends beyond than one shift, the Designated Person shall ensure that the Relieving Designated Person is fully briefed on the nature of the work and the code words in operation.

- (5) The Designated Officer(s) shall co-operate to establish and maintain the precautions necessary for the required work to be carried out in a safe manner. Both the established isolation and the established earth shall be kept in locked position with "Men Working" tag, where such facilities exist and shall be clearly identified.
- (6) Work shall not commence until the Designated Person in-charge of the work of the User is satisfied that all the safety precautions have been established. This Designated Person shall issue approved safety documentation and work permit (PTW) to the working party to allow work to commence. The Permit to Work in respect of EHV lines and other interconnections shall be issued with the consent of SLDC.
- (7) When work is completed and safety precautions are no longer required, the Designated Person who has been responsible for the work being carried out shall make direct contact with the other Designated Person to return the Permit to Work and removal of those safety precautions. Return of Permit to Work in respect of specified EHV lines and interconnections shall be informed to SLDC.
- (8) The equipment shall only be considered as suitable for connecting back to service when all safety measures are confirmed as removed, by direct communication using code word contact between the two Designated Persons, return of agreed safety documentation from the working party and after ensuring that the return of Permit to Work from the working party has taken place.
- (9) STU shall develop an agreed written procedure for Inter-User Boundary safety and continuously update it.
- (10) Any dispute concerning inter-user boundary safety shall be resolved at the level of STU, if STU is not a party. In case STU is a party, the dispute shall be referred to the Grid Code Review Committee for resolving the dispute.

9.5 **Special Consideration :** (1) For inter-user boundary between STU and other User's circuits, all Users shall comply with the agreed safety rules, which must be in accordance with CEA safety Regulations or any other rules and regulations framed under the Act.

- (2) Each Designated Officer shall maintain a legibly written safety log, in chronological order, of all operations and messages relating to safety co-ordination sent and received by him. All safety logs shall be retained for a period of not less than 10 years.

9.6 **Safety Standards :** (1) STU shall prepare their own "Safety Manual" for the maintenance of Transmission Lines and Sub- Stations and get vetted by an accredited agency. Copies of this safety manual shall be provided at all the Sub-Stations, concerned departments of STU and Users. For the guidance of the Shift Operators, "Operation and Maintenance Manuals" for each Sub-Station shall be prepared by the STU and Users containing all the maintenance and operation schedules based on the recommendations of the manufacturers of the various equipment's installed in the Substation. These manuals shall be periodically reviewed based on the experience gained and re placement of equipment's. A maintenance register for all the equipment's including the station batteries shall be maintained at the respective Sub-Stations. These shall be updated as and when the maintenance work is carried out and shall be periodically reviewed by the Commission. Similar registers shall be maintained for the Transmission and Sub- Transmission Lines.

- (2) The 'Operation and Maintenance Manual' shall clearly specify the details of isolation and earthing to be provided for allowing work on the equipment's. The 'Single Line Diagram' of the Sub- Station indicating the positions of various isolating devices shall be prominently displayed in the station. Charts showing the clearances from live parts (section clearance) for working on the isolated equipment's where workmen are allowed to work shall be displayed prominently at each Sub-Station.
- (3) STU and Users shall affix the "Danger" boards (of a design as per relevant ISS No. 2551) prominently displayed at a conspicuous place at all the locations as required in the IE Rules.
- (4) All the equipment including the system batteries in the receiving stations and Substations shall be maintained in good condition as per the manufacturers' manuals and also as per relevant Indian and / or International standards. The DC system (Batteries etc.) provided in all these stations shall be properly maintained with no appreciable leakage current. On-line monitoring system for monitoring of leakage and detection of ground faults shall be adopted.

9.7 **Line Clear Permit (LCP) :**

The formats enclosed shall be used while issuing and returning line clear permit. The Format - 1 designated as "Requisition for Line Clear Permit" shall be used by the requesting Safety Coordinator who is an authorized person. The Format - 2 designated as "Line Clear Permit" as given in appendix section shall be used at the time of issue of Line Clear Permit. The Format -3 designated as "Line Clear Return" shall be used for the Permit return of the Line Clear Permit after the work is completed for which the Line Clear Permit is taken.

CHAPTER - 10**10. SCHEDULING AND DESPATCH CODE :****10.1 Introduction :**

This part describes the following :

- (i) Demarcation of responsibilities between various Intra-State entities and SLDC in Scheduling and Despatch.
- (ii) The Procedure for Scheduling and Despatch.
- (iii) Technical Minimum Schedule for Operation of In SGS Connected to In STS
- (iv) The Reactive power and Voltage control mechanism.
- (v) Complementary commercial mechanisms.

10.2 Objective :

The objective of this chapter is to deal with the procedures to be adopted for scheduling of ISGS, SGS, IPPs, Joint Ventures, CGPs, Open Access Customers and REGS in detail and responsibility of SLDC in preparing and issuing daily schedule of dispatch/ drawal of generators and DISCOMs/Users respectively.

10.3 Scope :

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

10.4 Demarcation of Responsibilities :

- (1) In its control area, SLDCs shall have the total responsibility for
 - (i) Forecasting demand for its control area for each time block on day-ahead and intra-day basis;
 - (ii) Scheduling/dispatching for the entities in their control area in accordance with contracts (including generation of the embedded licensees) ;
 - (iii) Scheduling the drawl from the generating stations including SGS (within their share in the respective plant's expected capability)
 - (iv) Regulating the net drawl by each beneficiary from the State Grid ; and
 - (v) Balancing demand and supply to minimize Area Control Error (ACE) for the State.
- (2) The SLDC shall always endeavour to restrict their net drawl from the grid to within their respective drawl schedules, whenever the system frequency is below 49.9 Hz. When the frequency falls below 49.0 Hz, requisite load shedding shall be carried out to curtail the over-drawl.
- (3) The SLDC/STU shall regularly carry out the necessary exercises regarding short-term and long-term demand estimation for the State, to enable them to plan in advance as to how they would meet their consumer's load without over drawing from the Grid.
- (4) The generating stations including SGS shall be responsible for power generation generally according to the daily schedules advised to them by the SLDC on the basis of the requisitions received from the beneficiaries and for proper operation and maintenance of their generating stations such that these stations achieve the best possible long-term availability and economy.

While the generating stations including SGS would normally be expected to generate power according to the daily schedules advised to them, it would not be mandatory to follow the schedules tightly. The SGS may deviate from the given schedules within the limit specified in DSM regulations of CERC in case state deviation settlement Regulations is not in placed depending on the plant and system conditions. In particular, they would be allowed to generate beyond the given schedule under deficit conditions. When the frequency is higher than 50.05 Hz, the actual net injection shall not exceed the scheduled dispatch for that time. When the frequency falls below 49.9 Hz, the generation at all SGS (except those on peaking duty) shall be maximized, at least up to the level which can be sustained, without waiting for an advice from SLDC.

- (5) Deviations from the ex-power plant generation schedules shall, however, be appropriately priced through the deviation settlement mechanism regulations of CERC in case state deviation settlement Regulations is not in place. Notwithstanding the above, the SLDC may direct the beneficiaries/ SGS/ other generating stations to increase/decrease their drawl/generation in case of contingencies e.g. overloading of lines/transformers, abnormal voltages, threat to system security. Such directions

shall immediately be acted upon. In case the situation does not call for very urgent action and SLDC has sometime for analysis, it shall be checked whether the situation has arisen due to deviations from schedules or due to any power flows pursuant to short-term open access. These shall be got terminated first, in the above sequence, before an action which would affect the scheduled supplies from SGS to the long term consumers is initiated.

- (6) It shall be incumbent upon the generating stations including SGS to declare the plant capabilities faithfully, i.e., according to their best assessment. In case, it is suspected that they have deliberately over/under declared the plant capability contemplating to deviate from the schedules given on the basis of their capability declarations (and thus make money either as undue capacity charge or as the charge for deviations from schedule), the SLDC may ask the generating stations including SGS to explain the situation with necessary backup data. In the event of the generating stations failing to demonstrate the declared capability, the capacity charges due to the generator(s) shall be reduced as a measure of penalty.
- (7) The STU shall install special energy meters on all inter-connections between the State constituents and other identified points for recording of actual net MWh inter-changes and MVarh draws. All concerned entities (in whose premises the special energy meters are installed) shall fully co-operate with the STU/SLDC and extend the necessary assistance by taking weekly meter readings and transmitting them to the SLDC.
- (8) The SLDC shall be responsible for computation of actual net MWh injection of each generating stations including SGS and actual net drawl of each beneficiary, on 15 minute-time block basis based on the above meter readings and for preparation of the State Energy Accounts. All computations carried out by SLDC shall be open to all constituents for checking/verifications for a period of 15 days. In case any mistake/omission is detected, the SLDC shall forthwith make a complete check and rectify the same.

Provided that from the date as may be notified by the Commission in due course of time, the scheduling period may be revised to 288 time blocks, each of 5-minutes duration starting from 0000 hours and ending with 2400 hours. Accordingly, all the future resource planning, software and hardware development may be undertaken to cater the requirement of scheduling at 15 minutes as well as 5-minute duration.

- (9) Hydro generating stations are expected to respond to grid frequency changes and inflow fluctuations. Maximum Deviation allowed during a time block shall be as per the CERC Deviation Settlement Mechanism Regulations in case state deviation settlement Regulations is not in place.
- (10) SLDC shall periodically review the actual deviation from the dispatch and net drawl schedules being issued, to check whether any of the constituents are indulging in unfair gaming or collusion. In case any such practice is detected, the matter shall be reported to the STU for further investigation/action.
- (11) All generating stations including SGS (excluding CPPs) shall provide to SLDC 15-minute block-wise generation summation outputs where no automatically transmitted metering or SCADA/RTU equipment exists. CPPs shall provide to SLDC 15-minute block-wise export / import data (MW and MVar).
- (12) SLDC shall inform a generating station including SGS, in writing, if the continual monitoring demonstrates an apparent persistent or material mismatch between the despatch instructions and the Generating Unit output or breach of the Connection Conditions. Continued discrepancies shall be resolved by the State Grid Code Review Committee with a view to either improve performance in future, providing more realistic declarations or initiate appropriate action for any breach of Connectivity Conditions. Continued default by the generating stations entails penalty as may be determined by the Commission.
- (13) All generating stations including SGS shall promptly inform SLDC of the tripping of a Generating Unit, with reasons, SLDC shall intimate NERLDC about the tripping's and their revival. SLDC shall keep a written log of all such tripping's, including the reasons with a view to demonstrating the effect on system performance and identifying the need for remedial measures. SGS shall submit a more detailed monthly report of tripping of their Generating Units to SLDC.

10.5 Scheduling and Dispatch Procedure :

- (1) The procedure for scheduling of ISGS and SGS/IPP/CPP shall be as described below:
 - (a) Each day starting from 00.00 hours will be divided into 96 time-blocks of 15 minutes' interval.
 - (b) By 9:00 AM every day each, SGS shall intimate the SLDC the station wise ex- power plant MW and MWh capabilities foreseen for the next day i.e., between 00.00 to 24.00 hrs of the following day.

- (c) By 9:00 AM every day each Distribution Licensee shall intimate SLDC the overall requirement in MW and MWh for the next day i.e., between 00.00 to 24.00 hours of the following day.
- (d) By 10:00 AM every day, the above information along with the entitlements of the State in various Inter State Generating stations given by NERLDC, the SLDC shall compile the aggregate generating capability of SGS, entitlement from ISGS bilateral interchange, if any, vis-à-vis the Distribution Licensee requirement.
- (e) By 3:00 PM, SLDC shall finalize generation schedule of SGS and drawal schedule of each Distribution Licensees, convey to NERLDC the net drawal schedule from each of the ISGS along with the bilateral exchanges agreed or intended to be had with the other state / states and the estimates of demand / availability in the state and additional power required to be obtained.
- (f) By 6:00 PM, NERLDC shall convey to SLDC the drawal schedule for the State from each of the ISGS
- (g) By 7:00 PM, SLDC shall convey,
 - (i) the ex-power plant despatch schedule to each of SGS, in MW for different hours, for the next day
 - (ii) the "net drawal schedule" to the distribution licensee in MW for different hours, for next day.
- (h) SGS and Distribution Licensees shall inform any modifications / changes, if any, to be made, in the above station wise drawal schedule to SLDC by 9:00 PM or preferably earlier.
- (i) SLDC after considering the same shall convey revised schedule to NERLDC by 10:00 PM.
- (j) SLDC may also give the required data to the NERLDC such that the NERLDC itself may decide the best drawal schedules for the State.
- (k) SLDC shall prepare the day ahead generation schedule keeping in view the followings:
 - (i) Transmission System constraints from time to time.
 - (ii) 15-minute load requirements as estimated by SLDC.
 - (iii) The need to provide operating margins / reserves required to be maintained.
 - (iv) The availability of generation from SGS, Central Sector Generators and others together with any constraint in each case.
- (l) During the day of operation, the generation schedule may be revised under following conditions:
 - (i) In case of forced outage of a unit of any SGS, SLDC may revise the generation schedule on the basis of revised declared capability by the affected SGS. The revised declared capability and the revised schedules shall become effective from the 4th time block, counting the time block in which the revision is advised by the ISGS or SSGS to be the first one.
 - (ii) In case of any grid disturbance, scheduled generation of all the SGS and scheduled drawal of all the beneficiaries shall be deemed to have been revised to be equal to their actual generation/drawal for all the time blocks affected by the grid disturbance. Certification of grid disturbance and its duration shall be done by the SLDC.
 - (iii) Revision of declared capability by the SGS(s) and requisition by beneficiary (ies) for the remaining period of the day shall also be permitted with advance notice. Revised schedules/ declared capability in such cases shall become effective from the 6th time block, counting the time block in which the request for revision has been received in the SLDC to be the first one.
 - (iv) If, at any point of time, the SLDC observes that there is need for revision of the schedules in the interest of better system operation, it may do so on its own, and in such cases, the revised schedules shall become effective from the 4th time block, counting the time block in which the revised schedule is issued by the SLDC to be the first one.
 - (v) To discourage frivolous revisions, SLDC may, at its sole discretion, refuse to accept schedule/capability changes of less than two (2) percent of the previous schedule/capability.
 - (vi) After the operating day is over at 2400 hours, the schedule finally implemented during the day (taking into account all changes in dispatch schedule of generating stations and drawal schedule of the States) shall be issued by SLDC. These schedules shall be the datum for commercial accounting. The average ex-bus capability for each SGS shall also be worked out based on all before the-fact advice to SLDC.

- (vii) SLDC shall properly document all above information i.e., station-wise foreseen ex-power plant capabilities advised by the generating stations, the drawal schedules advised by beneficiaries, all schedules issued by the SLDC, and all revisions/updating of the above.
- (viii) The procedure for scheduling and the final schedules issued by SLDC shall be open to all constituents for any checking/verification, for a period of 5 days. In case any mistake/omission is detected, the NERLDC shall forthwith make a complete check and rectify the same.

(2) Scheduling of solar and wind generation should follow below outlines :

- (a) Scheduling of Solar and wind power generation plants would have to be done for the purpose of computing deviation where the sum of generation capacity of such plants are clubbed at a Pooling Station and connected through a line(s) at the connection point to the transmission or distribution system is 10 MW and above and connection point is 33 KV and above, and where PPA has not yet been signed. For capacity and voltage level below this, as well as for old Wind farms (A wind farm is collection of wind turbine generators that are connected to a common connection point commonly known as a Pooling Station), it could be mutually decided between the Wind Generator and the transmission or distribution utility, as the case may be, if there is no existing contractual agreement to the contrary. The schedule by wind power generating stations (excluding collective transactions) may be revised by giving advance notice to SLDC. The revisions by wind power generating stations and solar power generating stations shall be effective from 4th time block, the first being the time-block in which notice was given. There may be one revision for each time slot of 1.5 hours starting from 00:00 hours of a particular day subject to a maximum of 16 revisions during the day or as specified in CERC (Forecasting, Scheduling, Deviation settlement and related matters for solar and wind Generation sources) Regulations, issued and amended from time to time in case state deviation settlement Regulations is not in place.
- (b) The schedule of solar generation shall be given by the generator based on availability of the generator, weather forecasting, season and normal solar generation curve and shall be vetted by the SLDC. If SLDC is of the opinion that the schedule is not realistic, it may ask the solar generator to modify the schedule.
- (c) SLDC shall maintain the record of schedule from renewable power generating stations based on type of renewable energy sources i.e., wind or solar from the point of view of grid security. While scheduling generating stations in the State, system operator shall aim at utilizing available solar and wind energy fully.

(3) Scheduling of collective transaction

- (a) SLDC shall receive details of collective transactions for the State if any from the NLDC/Power Exchanges.
- (b) SLDC shall consider the collective transactions of Buyers and Sellers for preparation of Load-Generation balance.
- (c) For scheduling of collective transactions through power exchanges, the procedure specified by the NLDC shall be followed.
 - (i) The declaration of the generating capability by hydro In-SGS shall include limitation on generation during specific time periods, if any, on account of restriction(s) on water use due to irrigation, drinking water, industrial, environmental considerations etc. The SLDC shall periodically check that the generating station is declaring the capacity and energy sincerely and is not manipulating the declaration.
 - (ii) Since variation of generation in run-of-river power stations shall lead to spillage, these shall be treated as must-run stations. All renewable energy power plants, except for biomass power plants and non-fossil fuel based cogeneration plants whose tariff is determined by the APSERC shall be treated as 'MUST RUN' power plants and shall not be subjected to 'merit order despatch' principles. Provided that, incase of low load conditions, the SLDC shall regulate the generation of Renewable energy power plants to maintain Grid security.
 - (iii) Run-of-river power station with pondage and storage type power stations are designed to operate during peak hours to meet system peak demand. Maximum capacity of the station declared for the day shall be equal to the installed capacity including overload capability, if any, minus auxiliary consumption, corrected for the reservoir level. The State Load Despatch Centre shall ensure that generation schedules of such type of stations are prepared and despatched for optimum utilization of available hydro energy except in the event of specific system requirements/constraints.

- (iv) The schedule finalized by the SLDC for hydro generating station, shall normally be such that the scheduled energy for a day equals the total energy (ex-bus) expected to be available on that day, as declared by the generating station, based on foreseen/planned water availability/release. It is also expected that the total net energy actually supplied by the generating station on that day will equal the declared total energy, in order that the water release requirement is met.
- (v) While finalizing the drawl and dispatch schedules as above, the SLDC shall also check that the resulting power flows do not give rise to any transmission constraints. In case any constraints are foreseen, the SLDC shall moderate the schedules to the required extent, under intimation to the concerned Constituents. Any changes in the scheduled quantum of power which are too fast or involve unacceptably large steps may be converted into suitable ramps by the SLDC.
- (vi) In the event of bottleneck in evacuation of power due to any constraint, outage, failure or limitation in the transmission system, associated switchyard and sub-stations owned by the State Transmission Utility or any other transmission licensee involved in intra-state transmission (as certified by the SLDC) necessitating reduction in generation, the SLDC shall revise the schedules which shall become effective from the 6th time block, counting the time block in which the bottleneck in evacuation of power has taken place to be the first one.
- (vii) In case of any grid disturbance, scheduled generation of all the SGS and scheduled drawl of all the beneficiaries shall be deemed to have been revised to be equal to their actual generation/drawl for all the time blocks affected by the grid disturbance. Certification of grid disturbance and its duration shall be done by the SLDC.
- (viii) A procedure for recording the communication regarding changes to schedules duly taking into account the time factor shall be evolved by the SLDC.
- (ix) When for the reason of transmission constraints e.g. congestion or in the interest of grid security, it becomes necessary to curtail power flow on a transmission corridor, the transactions already scheduled may be curtailed by the State Load Despatch Centre.
- (x) The short-term consumer shall be curtailed first followed by the medium term consumers, which shall be followed by the long-term consumers and amongst the consumers of a particular category, curtailment shall be carried out on pro-rata basis.
- (xi) 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 dispatch schedule of generating stations and drawl schedule of the beneficiaries) shall be issued by SLDC. These schedules shall be the datum for commercial accounting. The average ex-bus capability for each SGS shall also be worked out based on all before-the-fact advice to SLDC.
- (xii) Collective Transaction through Power Exchange(s) would normally be curtailed subsequent to the Short Term Bilateral Transaction(s).
- (xiii) NERLDC will curtail a Transaction at the periphery of the Regional Entities. SLDC shall further incorporate the curtailment of intra-State Entities to implement the curtailment.
- (xiv) While availability declaration by the In-SGS shall have a resolution of one (1) MW and one (1) MWh, all entitlements, requisitions and schedules shall be rounded off to the nearest two decimals at each control area boundary for each of the transactions, to have a resolution of 0.01 MW and 0.01 MWh".

10.6 **Technical Minimum Schedule for Operation of Thermal Generating Stations Connected to STU :**

- (1) The minimum turndown level for operation in respect of a unit of a thermal generating station connected to STU network and under the control area of SLDC shall be 55% of the Maximum Continuous Rating (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:
- (2) 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:
- (3) 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 :
- (4) Provided also that the thermal generating stations whose tariffs are determined under Section 62 or 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 to be specified by the Commission through separate regulations or through Order :

10.7 Reactive Power Management :

- (1) All Users shall endeavour to maintain the voltage at the inter-connection point in the range specified in the Grid Code.
- (2) All generating stations shall be capable of supplying reactive power support so as to maintain power factor at the point of inter-connection within the limits of 0.95 lagging to 0.95 leading as per the CEA Technical Standards for Connectivity Regulations and amendments thereof.
- (3) All generating stations connected to the grid shall generate or absorb reactive power as per instructions of SLDC, within the capability limits of the respective generating units, where capability limits shall be as specified by the OEM.
- (4) The reactive interchange of Users shall be measured and monitored by SLDC/ NERLDC .
- (5) SLDC/NERLDC may direct the Users about reactive power set-points, voltage set-points and power factor control to maintain the voltage at inter-connection points.
- (6) SLDC shall assess the dynamic reactive power reserve available at various sub-stations or generating stations under any credible contingency on a regular basis based on technical details and data provided by Users, as per the procedure specified by NLDC/ SLDC.
- (7) SLDC shall take appropriate measures to maintain the voltage within limits, inter-alia, using the following facilities, but not limited to and the facility owner shall abide by the instructions of NLDC, NERLDC s and SLDCs:
 - (i) Shunt reactors,
 - (ii) Shunt capacitors (excluding HVDC automatic control),
 - (iii) Thyristor-Controlled Series Capacitor (TCSC),
 - (iv) Voltage Sourced Converter (VSC) based High Voltage Direct Current (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) Transformer tap change: generator transformer and inter-connecting transformer,
 - (ix) HVDC power order or HVDC controller selection to optimise filter bank.
- (8) Reactive power facility shall be in operation at all times and shall not be taken out without the permission of SLDC.
- (9) Periodic or seasonal tap changing of inter-connecting transformers and generator transformers shall be carried out to optimize the voltages, subject to technical feasibility, and wherever necessary, other options such as tap staggering may be carried out in the network.
- (10) Hydro and gas generating units having this capability shall operate in synchronous condenser mode operation as per instructions of the respective NERLDC or SLDC. Standalone synchronous condenser units shall operate as per the instructions of respective NERLDC or SLDC.
- (11) Any commercial settlement for reactive power shall be governed as given below:
 - (a) Reactive power compensation should ideally be provided locally, by generating reactive power as close to the reactive power consumption as possible. The state entities are therefore expected to provide local VAR compensation or generation such that they do not draw VARs from the EHV grid, particularly under low-voltage condition. To discourage VAR draws by state entities, VAR exchanges with Intra State Transmission System shall be priced as follows:
 - (i) The State entity pays for VAR drawal when voltage is below 97%
 - (ii) The State entity gets paid for VAR return when voltage is below 97%.
 - (iii) The State entity gets paid for VAR drawal when voltage is above 103%.
 - (iv) The State entity pays for VAR return when voltage is above 103%.
 - (b) Where all voltage measurements are at the interface point with Intra-State Transmission system the charge for VARh shall be at the rate of 14 paise/kVARh and this will be applicable between regional entities, except generating stations and the regional pool account for VAR interchanges. This rate shall be escalated at 0.5 paise/KVARh per year or unless otherwise revised by the Commission. However, the Reactive Power Compensation (VARh) for RE generators shall be governed according to the provisions given in RE tariff Orders issued by the Commission for respective RE sources, time to time.

CHAPTER - 11**11. OUTAGE PLANNING CODE :****11.1 Introduction :**

This chapter describes the process by which STU carries out the planning of State Transmission System Outages, including interface co-ordination with Users. Outage planning shall be done by SLDC 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 State 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 State grid, 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.

11.2 Objective :

The objective of this chapter is to define the process, which will allow STU to optimise its transmission system outage, while maintaining the system security to the extent possible.

11.3 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 STU and SLDC.

(4) All operational instructions given by SLDC shall have unique codes which shall be recorded and maintained as specified by the Authority.

(5) 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.

(6) Any operation in a State having an impact on other state(s)/region(s) shall be intimated by the SLDC to ENERLDC .

11.4 Outage Planning : (1) This section describes the process by which STU shall carry out the planning of outage in the State Transmission System, in a coordinated and optimal manner keeping in view the State or Regional system operating conditions and the balance of generation and demand. The generation output and transmission system should be adequate after taking in to account the outages to achieve the security standards. The outage planning of run-of-the-river hydro plant, solar and wind power plant and its associated evacuation network shall be planned to extract maximum power from these renewable sources of energy. This section is applicable to SLDC, STU and all distribution licensee/Users.

(2) The objective are as follows :

(i) To produce a coordinated generation and transmission outage programme for the State grid, considering all the available resources and taking into account transmission constraints.

(ii) To minimize surplus or deficits, if any, in the system requirement of power and energy and help operate system within Security Standards.

(iii) To optimize the transmission outages of the elements of the State grid without adversely affecting the grid operation but taking into account the Generation Outage Schedule, outages of User/STU systems and maintaining system security standards.

11.5 Outage Planning Process : (1) The SLDC shall be responsible for analyzing the outage schedule given by all Users Transmission licensees/Users/SGS) preparing a draft annual outage schedule and finalization of the annual outage plan for the following financial year by 15th February of each year.

(2) All users and STU shall provide SLDC with their proposed outage programmes in writing for the next financial year by 31st October of each year. These shall contain identification of each generating unit/line/ICT, the preferred date for each outage and its duration.

(3) SLDC shall prepare the outage programme for the next financial year by 30th November of each year for the In STS :

(a) **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) **Provided further that** outage of wind generator may be planned during lean wind season, outage of solar, if required during the rainy season and outage of run-of-the river hydropower plant in the lean water season. The Annual outage plan shall be finalized after considering the final outage plan for the State prepared by the NERPC Secretariat and shall be intimated to all State constituents for implementation latest by 15th February of each year.
- (4) Transmission Outage Planning shall be harmonized with Generation Outage Planning and Distribution System Outage Planning shall be harmonized with Generation and Transmission Outage Planning.
- (5) 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 finalise the outage plan in consultation with the Users and Transmission Licensee:

Provided further that the above annual outage plan shall be reviewed by SLDC on monthly basis in coordination with all concerned parties, and adjustments made wherever found necessary
- (6) Each User or Transmission Licensee shall, at least two weeks prior to availing an outage as per the planned schedule, inform SLDC about the outage and obtain prior approval from it to avail outage.
- (7) 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.
- (8) Provided that SLDC shall inform about the revised outage plan, with appropriate reasons for revisions in the outage plan, as soon as possible 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 :
 - (a) 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 :
- (9) SLDC shall prepare and submit to ERPC its outage plan in writing for the next financial year by 30th November 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 WRPC. The annual plans for managing deficits/surpluses shall be clearly indicated in the Load Generation Balance Report (LGBR).
- (10) Scheduled outage of power stations and EHV transmission lines affecting regional power system shall be affected only with the approval of WNERLDC in coordination with SLDC.
- (11) SLDC shall upload quarterly, half-yearly, yearly outage reports on its website.
- (12) In respect of scheduled outage referred in this Regulation, a calendar shall be formulated in respect of Annual Outage Planning for the ensuing financial year.

11.6 **Availing of shutdowns schedule :**

- (1) SLDC would review on daily basis the proposed outage schedule for the next two days and for any contingency or conditions such as,
 - (i) Major grid disturbances,
 - (ii) System isolation
 - (iii) Partial black out
 - (iv) Any other event in the system that may have an adverse impact as the system security by the proposed outage.

- (2) SLDC may defer any planned outage stating the reasons thereof. The revised dates in such cases would be finalized in consultation with the User as soon as possible.
- (3) STU and User shall obtain the final approval from SLDC prior to availing the shutdown.
- (4) Where interruption of power supply is caused to consumers due to availing of the planned shutdown, the Distribution Licensee shall obtain the prior approval of the Commission and give prior information to the consumers by publishing in the daily news paper regarding the interruption of supply timings.

11.7 Recovery Procedure :

- (1) SLDC shall be prepared to face and efficiently handle the following types of contingencies and restoration of system back to normal in accordance with the System Restoration Procedure of North Eastern Region prescribed under IEGC and further supplemented by SLDC for Arunachal Pradesh State Grid in consultations with STU/SGS/transmission and distribution licensees and other Users : -
 - (i) Partial system black out in the state due to multiple tripping of the transmission lines emanating from power stations/sub-stations.
 - (ii) Total black out in the state/region.
 - (iii) Synchronisation of system is lands and system split.
- (2) Diesel generating (DG) sets of sufficient capacity shall be provided at each power station to meet the start-up power.
- (3) Synchronizing facility shall be available at all power stations and 220 KV, 132 KV, 110 K and 66 KV sub-stations having inter-connection with Inter State Transmission System.
- (4) In case of partial blackout in the system/state, priority is to be given for early restoration of power station units, which have tripped.
- (5) In case of total regional blackout, SLDC shall co-ordinate and follow the instructions of Regional Load Despatch Centre (NERLDC) for early restoration of the entire grid.
- (6) For safe and fast restoration of supply, SLDC shall formulate the proper sequence of operations for major generating units, lines, transformers and load within the state. The sequence of operations shall include opening, closing/tripping of circuit breakers, isolators, on-load tap-changers etc.

11.8 Restoration Procedure :

- (1) Detailed and procedure for restoration of the State Grid under partial/total blackout shall be developed by SLDC in consultation with NERLDC and all Users and shall be in conformity to the System Restore Procedure prescribed under IEGC. The procedure shall be reviewed/updated annually.
- (2) Detailed procedures for restoration under partial/total blackout of each User's system within the State will be finalized by the concerned User in co-ordination with SLDC.
- (3) List of generating stations with black start facility, inter-state/inter-regional ties, synchronizing points and essential loads to be restored on priority, shall be available with SLDC.
- (4) All communication channels required for restoration process shall be used for operational communication only till grid normalcy is restored.

11.9 Special Considerations :

- (1) During the process of restoration of the State Transmission System or Regional System blackout conditions, the normal standards of voltage and frequency need not be insisted and may left to the discretion of the SLDC.
- (2) Distribution Licensees shall separately identify non-essential loads, which may be kept off during system contingent conditions. They shall also draw up an appropriate schedule with corresponding load blocks in each case. The non-essential loads can be put on only when system normalcy is restored or as advised by SLDC.
- (3) All Users shall pay special attention in carrying out the procedures to prevent secondary collapse of the system due to undue haste or inappropriate loading operation of conditions. Despite the urgency of the situation, prompt and complete logging of all operations and operational messages shall be ensured by all Users to facilitate subsequent investigation into the incident and reviewing of the efficiency of the restoration process. Such investigation shall be conducted after the incident, and placed before the State Grid Code Review Committee in its next meeting.

CHAPTER - 12**12. REPORTS :****12.1. Periodic reports :****(1) Monthly Report**

A monthly report shall be uploaded by SLDC on its website, which shall cover the performance of the State grid for the previous month. The monthly report shall contain the following:

- (i) Frequency profile.
- (ii) Maximum and minimum frequency recorded daily and daily frequency variation index (FVI).
- (iii) Voltage profile.
- (iv) Voltage profile of selected sub-stations.
- (v) Major Generation and Transmission Outages.
- (vi) Transmission Constraints.
- (vii) Instances of persistent/significant non-compliance of Grid Code.
- (viii) Grid Security events, leading to curtailment along with reasons.

(2) Other Reports/Forms

The SLDC shall also upload a quarterly report on its website, which 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 various actions taken by different Users and the Users responsible for causing the constraints.

These reports shall also be submitted to the Commission within a week from the due date of issue of the reports.

12.2. Operational Event/Accident Reporting**(1) Introduction**

This chapter describes the reporting procedure, of reportable events in writing in the State Transmission System.

(2) Objective

The objective of this chapter is to define the incidents to be reported, the reporting route to be followed and the information to be supplied to ensure a consistent approach for reporting of incidents and accidents on the Intra-State Transmission System.

(3) Reportable Incidents

Any of the following events that could affect the State Transmission System requires reporting:

- (i) Exceptionally high/low system voltage or frequency.
- (ii) Serious equipment problem, i.e., major circuit breaker, transformer or bus-bar etc.
- (iii) Loss of Generating Unit.
- (iv) Instance of Black Start.
- (v) Tripping of Transmission Line, Interconnecting transformer (ICT) and capacitor banks
- (vi) Major fire incidents.
- (vii) Major failure of protection.
- (viii) Equipment and transmission line overload.
- (ix) Accidents - Fatal and Non-Fatal.

(4) Load Crash/Loss of Load.

- (i) Violation of Security Standards.
- (ii) Grid indiscipline.
- (iii) Non-compliance of SLDC instructions.
- (iv) Excessive drawal deviations.
- (v) Minor equipment alarms.

The last two reportable incidents are typical examples of those, which are of lesser consequence, but still affect the State Transmission System and can be reasonably classed as minor. They will require corrective action but may not warrant management reporting until these are repeated for sufficient time.

12.3. Reporting Procedure/Forms :

- (1) All reportable incidents occurring in lines and equipment of 132 kV and above affecting the State Transmission System shall promptly be communicated by the User whose equipment has experienced the incident (the Reporting User) to any other significantly affected Users and to SLDC.
- (2) Within one (1) hour of being informed by the Reporting User, SLDC may ask for a written report on any incident.
- (3) If case of minor incident, the Reporting User shall submit an initial written report within two (2) hours and comprehensive report within twenty-four (24) hours of the submission of the initial written report, whereas, in other cases, the Reporting User shall submit a report within five (5) working days to SLDC.
- (4) SLDC may call for a report from any User on any reportable incident affecting other Users and STU, in case the same is not reported by such User whose equipment might have been source of the reportable incident. This shall not relieve any User from the obligation to report events in accordance with IE Rules.
- (5) The format of such a report will be as agreed by the Grid Code Review Committee, but will typically contain the following information:
 - (i) Location of incident.
 - (ii) Date and time of incident.
 - (iii) Plant or equipment involved.
 - (iv) Details of relay indications with nature of fault implications.
 - (v) Supplies interrupted and duration if applicable.
 - (vi) Amount of generation lost if applicable.
 - (vii) Brief description of incident.
 - (viii) Estimate of time to return to service.
 - (ix) Name of originator.
 - (x) Possibility of alternate arrangement of supply
 - (xi) Single line diagram
 - (xii) All Relevant system data including copies of records of all recording instruments including Disturbance Recorder, Event Logger, Data Acquisition System (DAS), etc.

12.4. Major Failure :

Following a major failure, SLDC and other Users shall co-operate to inquire and establish the cause of such failure and produce appropriate recommendations. The SLDC shall report the major failure to the Commission immediately for information and shall submit the enquiry report to the Commission within two (2) months of the incident.

12.5. Accident Reporting :

Reporting of accidents shall be in accordance with the relevant Rules/ Regulations/ Grid Code. In both fatal and non-fatal accidents, the report shall be sent to the Electrical Inspector in the specified form.

12.6. Data Requirements :

Users shall provide to the STU and SLDC with data as specified in Appendix - G

CHAPTER - 13**13. PROTECTION & METERING CODE****13.1. Introduction :**

In order to safe guard the State Transmission System and Users' system from faults occurring in other User's system, it is essential that certain minimum standards for protection be adopted. This section describes the minimum standards and is supplementary to the applicable Central Electricity Authority (Technical Standards for Construction of Electrical Plants & Electric Lines) Regulations, (as amended from time to time)

13.2. Objective :

The objective of this section is to define the minimum protection requirements for any equipment connected to the State Transmission System and there by minimize disruption due to faults.

13.3. General Principles :

- (1) No item of electrical equipment shall be allowed to remain connected to the State Transmission System unless it is covered by minimum specified protection as defined by the STU. / CEA
- (2) All Users shall co-operate with STU to ensure correct and appropriate settings of protection to achieve effective, discriminatory removal of faulty equipment within the target clearance time specified in this section.
- (3) STU shall be guided by the advice of NERPC/NERLDC for the following:
 - (i) Planning for upgrading and strengthening protection system based on analysis of grid disturbance and partial/total blackout in State Transmission System.
 - (ii) Planning of Islanding and system split schemes and installation of Under Frequency Relays and df/dt relays.
- (4) Under-Frequency relay for load shedding, relays provided for islanding scheme, disturbance recorder, and fault locator installed at various sub-stations shall be tested and calibrated. All Users shall ensure correct and appropriate settings of protection equipment. Protective Relay settings shall not be altered, or protection relays by passed and/or disconnected without consultation and agreement between all Users. In case where protection is by passed and/or disconnected by an agreement, then the cause must be rectified and the protection restored to normal condition as quickly as possible. If agreement has not been reached, that electrical equipment which is not having protection shall be removed from service forth with.

13.4. Protection Coordination :

- (1) The State Grid Code Review Committee constituted as per Chapter- of the State Grid Code and shall also be responsible for all the protection coordination functions.
- (2) The settings of protective relays starting from the generating unit up to the remote end of 110 KV/66 KV/33 KV line shall be such that only the faulty section is isolated under all circumstances.
- (3) The STU shall notify the initial settings and any subsequent changes approved by the Protection Coordination Committee to the Users from time to time. Periodical testing of all the protective relays shall be conducted once in six months.
- (4) Mal functioning of any protective relay shall be intimated to the State Grid Code Review Committee immediately for analysing and to recommend necessary corrective actions.
- (5) A separate cell headed by an engineer of executive level, having experience in protection of system and consisting of necessary supporting technical and non-technical staff shall be established by the STU, for testing and maintenance of protection relays, meters and other connected instruments.
- (6) At all places where protection schemes are installed, they have to be exhibited in singleline diagram.
- (7) Copies of the specifications of all the protection relays installed shall be provided at all places where such relays are installed.

13.5. Fault Clearance Times & Short-time Ratings :

- (1) The fault clearance time when all equipment operates correctly, for a three-phase fault (close to the bus bars) on user equipment directly connected to State Transmission System and for a three-phase fault (close to bus bars) on State Transmission Connected to the user's equipment, shall not be more than ;

Sl. No.	Nominal Voltage (Kv) rms	Maximum time (milliseconds)
1.	400 kV	100
2.	220 kV , 132 kV, 110 kV	160
3.	66 Kv	300

- (2) Lesser fault clearance time than the above are preferable.
- (3) Lower fault clearance times for faults on a user's system may be agreed to but only if, in STU's opinion, system conditions allow this. STU shall specify the required opening time and rupturing capacity of the circuit breakers at various locations for STU and Distribution Licensees/Open Access Customers directly connected to Transmission System. At generating stations, line faults should be cleared at the generation station end within the critical clearing time so that the generators remain in synchronism.

13.6. **Generator Requirements :**

All generating units and all associated electrical equipment of the generating company connected to the Transmission System shall be protected by adequate protection, as per the CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007 and CBIP manual on Protection of Generators, Generator Transformers and 220kV& 400kV networks vide publication 274 (revised), so that, the Transmission System does not suffer due to any disturbances originating at the generating unit. In case of inconsistency in protection aspects between CEA and CBIP, the provisions of CEA shall prevail.

13.7. **Transmission Line Requirements :**

(1) **General :**

Every EHT line taking off from a Generating Station or a sub-station or a switching station shall have adequate protection and back up protection approved by the Protection Coordination Committee. Switchgear equipment and Relay Panels for the protection of lines of STU taking off from a Generating Station shall be owned and maintained by the Generator. Any transmission line related relay settings or any change in relay settings will be carried out by the Generator in close co-ordination and consultation with STU. Carrier cabinets / equipment, Line matching units including wave traps and communication cable shall be owned and maintained by STU. All Generators shall provide space, connection facility, and access to STU for such purpose. The guidelines mentioned in the Manual on protection of 220 kV and 400 kV network etc. vide publication No. 274 of CBIP shall also be kept in view.

(2) **400 KV Transmission Lines**

All 400kV transmission lines owned by STU shall have two fast acting protection schemes, the voltage of the two relays shall be fed from two different cores of the line CVT and the currents of the two relays shall be fed from two different cores of the line CTs. Main 1 protection scheme shall be numerical, three zone, non-switched fast acting distance protection scheme with permissible inter-trip at remote end (in case of zone-2 fault). Main 2 protection scheme shall be either similar type of numerical, three zone, non-switched fast acting distance protection scheme with permissible inter-trip at remote end (in case of zone-2 fault) or a unit protection scheme employing transient wave detection, directional comparison or phase comparison carrier relaying scheme. One pole tripping and single shot auto-reclosing with adjustable dead-time shall be provided. All 400kV sub-station shall have bus-bar differential protection scheme along with LBB and auto-reclosures for transmission lines.

(3) **220 KV Transmission Lines**

All 220 KV transmission lines owned by STU shall have two fast acting protection schemes. Main 1 protection scheme shall be numeric, three zone, non-switched fast acting distance protection scheme with permissible inter-trip at remote end (in case of zone-2 fault). The scheme shall have power swing blocking, location of fault recording, disturbance recording, event logger, communication port, single and three shot auto reclosing as well as Local Breaker Backup (LBB). Main 2 protection scheme shall be static/ numeric, three zone, switched/ non-switched fast acting distance protection scheme having all features as in Main- 1 except auto reclosing and Local Breaker Backup (LBB). For back-up protection, three directional IDMTL over current relays and unidirectional earth fault relay shall be provided.

(4) **132 KV/110 KV/66 KV Lines**

A single scheme three zone, non-switched numeric distance protection with standard built in features like single and three phase tripping, carrier inter-tripping, IDMT over current and earth fault, power swing blocking and LBB protection shall be provided as main protection. The backup protection shall be at least two directional IDMTL over current relays and one directional earth fault relay. For short transmission radial lines, appropriate alternative protection schemes may be adopted.

(5) Distribution Lines

All the 33 Kv and 11kV lines at Connection Points/Interface Points shall be provided with a minimum of over current and earth fault relays.

13.8. Transformer Requirements :

- (1) The protection of EHV Transformers, Power Transformers and Distribution Transformers shall be as per revised manual on transformers published by Central Board of Irrigation and Power (CBIP) Publication No. 275. The protection of Power Transformers shall be as approved by the State Grid Code Review Committee.
- (2) The following minimum protections should be provided for transformers :
 - (i) All 220kV class power transformers shall be provided with numeric fast acting differential, REF, open delta (Neutral Displacement Relay) and over-fluxing relays. In addition, there shall be back up IDMTL over current and earth fault protection. For parallel operation, such back up protection shall have inter-tripping of both HV and LV breakers. For protection against heavy short circuits, the over current relays should incorporate a high set instantaneous element. In addition to electrical protection, transformer own protection viz. buchholz, OLTC oil surge, buchholz, winding temperature protection, oil temperature protection, PRV relay shall be provided for alarm and trip functions.
 - (ii) For 132 KV, 110 KV and 66 KV class power transformers of capacity of 10MVA and above ; the protection shall be same as mentioned in the (i) above except over-fluxing, REF and PRV relays.
 - (iii) For 132 KV, 110 KV and 66 KV class power transformers of capacity less than 10 MVA, over-current with high set instantaneous element along with auxiliary relays for transformer trip and alarm functions as per transformer requirements, shall be provided.
 - (iv) Distribution System: For smaller transformers of HV class on the distribution system, differential protection shall be provided for 5 MVA capacities and above, along with back-up time lag over current and earth fault protection with directional feature for parallel operation. Transformers of capacity less than 5 MVA shall be protected by time lag over current, earth fault and instantaneous restricted earth fault relays. In addition, all such transformers shall be provided with buchholz relays, winding and oil temperature protection.
 - (v) In addition to electrical protection, gas operated relays, winding temperature protection and oil temperature protection shall be provided.

13.9. Sub-Station Protection :

- (1) Fire Protection-Adequate precautions shall be taken and protection shall be provided against fire hazards to all Apparatus of the Users conforming to relevant Indian Standard Specification and provisions in CEA Safety Regulations framed under Electricity Act, 2003. Adequate precautions shall be taken and protection shall be provided against fire hazards to all apparatus and other assets conforming to relevant Indian Standard Specification and provisions in I.E. Rules. The firefighting equipment installed shall be maintained in good working condition and shall be inspected daily and recorded in the maintenance logbook by the concerned in charge person. The single line schematic diagram of the five protection arrangement shall be displayed in the sub-station control room.
- (2) Bus-Bar Protection-Numerical protection scheme shall be provide data II 400 kV, 220 KV sub-stations and generating station switchyard for high speed clearance of bus-bar faults by tripping all circuit breakers connected to the faulty bus. Only exception can be radially fed 220 KV sub-stations. It should comply with CBIP manual (274), Section-6.
- (3) All circuit breakers in stalled in the sub-station from 11 kV to 132 kV level should clear the faults in two and half cycles and above 132 kV level in two cycle. The total time of clearing fault including main protection relay shall not exceed that specified at clause 9.4 (Fault Clearance Times & Short-time Ratings).

13.10. Calibration and Testing :

The protection scheme shall be tested at each 220 KV, 132 KV, 110 KV, 66 KV sub-station by STU and Users once in six months or immediately after any major fault, whichever is earlier. Testing and calibration of all protection scheme spertaining to generating units/stations shall be the responsibility of respective generating station. All equipment owners shall submit a testing plan for the next year to the STU/SLDC by 31st December to ensure proper coordination during testing as per the schedule. The owners of the power system elements shall implement the recommendations, if any, suggested in the test reports in consultation with STU, SLDC, and any other relevant authorities. The overall co-ordination between Users and STU shall be decided by the Committee responsible for the protection coordination functions.

13.11. Data Requirements :

Users shall provide to the STU and SLDC with data as specified in Appendix-D in the Data Registration Chapter.

13.12. Metering Code :**(1) Objective :**

To define minimum acceptable standards of metering equipment which shall provide proper metering of the various operating system parameters for the purpose of accounting, commercial billing and settlement of electrical energy and to provide information which shall enable to operate the system in economic manner.

(2) Scope :

- (a) This Metering code covers the practices that shall be employed and the facilities that shall be provided for the measurement and recording of various parameters like active/reactive/apparent power/energy, power factor, voltage, frequency etc.
- (b) This Metering code sets out or refers to the requirements of metering at generating stations, sub-stations and interfaces for tariff and operational metering.
- (c) This Metering code also specifies the requirement for calibration, testing and commissioning of metering equipments viz. energy meters with associated accessories, current transformers and voltage transformers. The Metering broadly indicates the technical features of various elements of the metering, data communication and testing system.

(3) Applicability :

- (1) This Metering code shall be applicable to meters installed and to be installed by all:
 - (i) STU/Transmission Licensees,
 - (ii) Generating Stations connected to State Transmission System,
 - (iii) Distribution Licensees connected to State Transmission System,
 - (iv) EHV Consumers of Distribution Licensee(s) directly connected to State Transmission System,
- (2) Open Access Customers availing Open Access on State Transmission system, and
- (3) Captive Generators connected to State Transmission System
- (4) Type of meters
 - (i) All interface meters, User meters and energy accounting and audit meters shall be of static type.
 - (ii) The meters not complying with the specified type shall be replaced by the STU on his own or on request of the User.
 - (iii) The meters may also be replaced as per the regulations or directions of the Commission or pursuant to the reforms programme of the Government.

(5) Standards :

- (a) All interface meters, and energy accounting and audit meters shall:
 - (i) Comply with the relevant standards of Bureau of Indian Standards (BIS). If BIS Standards are not available for a particular equipment or material, the relevant British Standards (BS), International Electro-Technical Commission (IEC) Standards, or any other equivalent Standard shall be followed:
 - (ii) Provided that 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;
 - (iii) Conform to the standards on 'Installation and Operation of Meters' as specified in Schedule annexed to Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 and as amended from time to time.

(6) Ownership of meters :

- (a) Interface meters
 - (i) All interface meters installed at the points of interconnection with Inter- State Transmission System (ISTS) for the purpose of electricity accounting and billing shall be owned by CTU.

- (ii) All interface meters installed at the points of interconnection with State Transmission System excluding the system covered under sub-clause (a) above for the purpose of electricity accounting and billing shall be owned by STU.
- (iii) All interface meters installed at the points of inter connection between the two licensees excluding those covered under sub-clauses (a) and (b) above for the purpose of electricity accounting and billing shall be owned by respective licensee of each end.
- (iv) All interface meters installed at the points of inter connection for the purpose of electricity accounting and billing not covered under subclauses (a), (b) and (c) above shall be owned by supplier of electricity.

(b) **Energy accounting and audit meters :**

Energy accounting and audit meters shall be owned by the generating company or STU, as the case may be.

(7) **Locations of meters :**

- (a) The location of interface meters, and energy accounting and audit meters shall be as per the Table given below :

Sl. No.	Stages	Main Meter	Check Meter	Standby Meter
	Generating Station	On all Outgoing Feeders	On all Outgoing Feeders F	(i) High Voltage (HV) side of Generator Transformers (ii) High Voltage (HV) side of all Station Auxiliary Transformers
(Explanation : The location of main, check and standby meters installed at the existing generating stations shall not be changed unless permitted by the Authority)				
	Transmission & Distribution System	At one end of the line between the sub-stations of the same licensee, and at both ends of the line between sub-stations of two different licensees. Meters at both ends shall be considered as main meters for respective licensees.		There shall be no separate standby meter. Meter installed at other end of the line in case of two different licensees shall work as stand by meter.
	Inter-Connecting Transformer	High Voltage (HV) side of ICT.		Low Voltage (LV) side of ICT.

- (b) The generating companies or licensees may install meters at additional locations in their systems depending upon the requirement.

(c) **Interface Meters**

- (i) Users who have interconnection with the Inter-State Transmission System or State Transmission System and have been permitted open access by the Commission shall be provided with interface meters.
- (ii) For Users connected to distribution system and permitted open access, by provision of interface meters may be made as per the regulations or of the Commission shall be provided with interface meters.

(d) **Energy accounting and audit meters**

Energy accounting and audit meters shall be installed at such locations so as to facilitate accounting for the energy generated, transmitted, distributed in the various segments of the power system and the energy loss. The location of these meters shall be as under:

- (i) **Generating Stations**
 - at the stator terminal of the generator;
 - on HV and LV sides of the station and the unit auxiliar transformers;
 - on feeders to various auxiliaries.

(ii) Transmission System

- All incoming and outgoing feeders (If the interface meters do not exist).

(iii) Distribution System

- all incoming feeders (11 kV and above);
- all outgoing feeders (11 kV and above);

(8) Accuracy Class of meters

Every meter shall meet the requirement of accuracy class as specified in the standards given in the Schedule annexed to Central Electricity Authority "Installation and Operation of Meters" Regulations, 2006 (Annexure).

(9) Installation of meter

- Generating company or STU, as the case may be, shall examine, test and regulate all meters before installation and only correct meters shall be installed.
- The meter shall be installed at locations, which are easily accessible for installation, testing, commissioning, reading, recording and maintenance.
- In case CTs and VTs form part of the meters, the meter shall be installed as near the instrument transformers as possible to reduce the potential drop in the secondary leads.

(10) **Operation, Testing and Maintenance of meters**

The operation, testing and maintenance of all types of meters shall be carried out by the generating company or the STU, as the case may be.

(11) **Access to meter**

The owner of the premises where, the meter is installed shall provide access to the authorized representative(s) of the STU for installation, testing, commissioning, reading and recording and maintenance of meters.

(12) **Sealing of meters**

(a) Sealing Arrangements

- All meters shall be sealed by the manufacturer at its works. In addition to the seal provided by the manufacturer at its works, the sealing of all meters shall be done as follows at various sealing points as per the standards given in the Schedule annexed to Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006
- Sealing of interface meters, shall also be done by both the supplier and the buyer.
 - Sealing of User meters shall be done by the STU.
 - Sealing of energy accounting and audit meters shall be done by the STU or generating company as the case may be.
- Seal shall be unique for each utility and name or logo of the utility shall be clearly visible on the seals.
- Only the patented seals (seal from the manufacturer who has official right to manufacture the seal) shall be used.
- Polycarbonate or acrylic seals or plastic seals or holographic seals or any other superior seal shall be used.
- Lead seals shall not be used in the new meters. Old lead seals shall be replaced by new seals in a phased manner and the time frame of the same shall be submitted by the STU to the Commission for approval.

(13) **Removal of seals from meters**(a) **Interface meters**

Whenever seals of the interface meters have to be removed for any reason, advance notice shall be given to other party for witnessing the removal of seals and resealing of the interface meter. The breaking and re-sealing of the meters shall be recorded by the party, who carries out the work, in the meter register, mentioning the date of removal and resealing, serial numbers of the broken and new seals and the reason for removal of seals.

(b) **Energy accounting and audit meters**

Seal of the energy accounting and audit meter shall be removed only by the generating company or the STU who owns the meter.

(14) Safety of meters

- (a) The supplier or buyer in whose premises the interface meters are installed shall be responsible for their safety.
- (b) The User shall, as far as circumstances permit, take precautions for the safety of the meter installed in his premises belonging to the STU or Distribution licensee.
- (c) The generating company or the STU who owns the energy accounting and audit meters shall be responsible for its safety.

(15) Meter reading and recording**(a) Interface meters**

It shall be the responsibility of the Appropriate Transmission Utility or Distribution licensee to take down the meter reading and record the metered data, maintain database of all the information associated with the interface meters and verify the correctness of metered data and furnish the same to various agencies.

(b) Energy accounting and audit meters

It shall be the responsibility of the generating company or STU to record the metered data, maintain database of all the information associated with the energy accounting and audit meters and verify the correctness of metered data. Each generating company or STU shall prepare quarterly, half-yearly and yearly energy account for its system for taking appropriate action for efficient operation and system development.

(16) Meter failure or discrepancies**(a) Interface meters**

- (i) Whenever the difference between the readings of the Main meter and the Check meter for any month is more than 0.5%, the following steps shall be taken:
 - Checking of CT and VT connections;
 - Testing of accuracy of interface meter at site with reference standard meter of accuracy class higher than the meter under test. If the difference exists even after such checking or testing, then the defective meter shall be replaced with a correct meter.
- (ii) In case of conspicuous failures like burning of meter and erratic display of metered parameters and when the error found in testing of meter is beyond the permissible limit of error provided in the relevant standard, the meter shall be immediately replaced with a correct meter.
- (iii) In case where both the Main meter and Check meter fail, at least one of the meters shall be immediately replaced by a correct meter.
- (iv) Billing for the failure period:
 - The SLDC / STU shall develop a procedure for assessment of consumption of defective meter during the failure period of the meter and submit the same to the Commission for its approval. The billing for the failure period of the meter shall be done as per this approved procedure.
 - Readings recorded by Main, Check and Standby meters for every time slot shall be analysed, crosschecked and validated by the SLDC. The discrepancies, if any, noticed in the readings shall be informed by SLDC in writing to the energy accounting agency for proper accounting of energy. SLDC shall also intimate the discrepancies to the State Transmission Utility or the User, who shall take further necessary action regarding testing, calibration or replacement of the faulty meters in accordance with the provisions laid down.
- (v) The defective meter shall be immediately tested and calibrated.

(b) Energy accounting and audit meters

Energy accounting and audit meters shall be rectified or replaced by the generating company or licensee immediately after notice of any of the following abnormalities :

- (i) the errors in the meter readings are beyond the limits prescribed for the specified Accuracy Class;
- (ii) meter readings are not in accordance with the normal pattern of the load demand;
- (iii) meter tampering, or erratic display or damage.

(17) Anti-tampering features of meters

The meters shall be provided with such anti-tampering features as per the Standards on Installation and Operation of Meters given in the Schedule annexed to Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006

(18) Quality assurance of meters

- (a) The STU shall set up appropriate number of accredited testing units or utilize the services of other accredited testing laboratories. The STU shall take immediate action to get the accreditations of their existing meter testing laboratories from NABL, if not already done.
- (b) The generating company or STU shall ensure that all type, routine and acceptance tests are carried out by the manufacturer complying with the requirement of the relevant BIS or BS or IEC as the case may be.

(19) Calibration and periodical testing of meters.**(a) Interface meter**

- (i) At the time of commissioning, each interface meter shall be tested by the STU at site for accuracy using standard reference meter of better accuracy class than the meter under test.
- (ii) All interface meters shall be tested at least once in five years. These meters shall also be tested whenever the energy and other quantities recorded by the meter are abnormal or inconsistent with electrically adjacent meters. Whenever there is unreasonable difference between the quantity recorded by interface meter and the corresponding value monitored at the billing center via communication network, the communication system and terminal equipment shall be tested and rectified. The meters may be tested using NABL accredited mobile laboratory or at any accredited laboratory and recalibrated if required at manufacturer's works.
- (iii) Testing and calibration of interface meters may be carried out in the presence of the representatives of the supplier and buyer by giving due notice of testing in advance.

(20) Energy accounting and audit meters

Energy accounting and audit meters shall be tested at site at least once in five years or whenever the accuracy is doubtful or whenever the readings are inconsistent with the readings of other meters, e.g., check meters, standby meters. The testing must be carried out without removing the CTs and VTs connection. Testing may be carried out through NABL accredited mobile laboratory using secondary injection kit, measuring unit and phantom loading or at any accredited test laboratory and recalibrated if required at manufacturer's works.

(21) Data Requirements

Users shall provide metering data as specified in Appendix - D & E

CHAPTER - 14**14. DATA REGISTRATION & MISCELLANEOUS :****14.1. Objective :**

The objective of this section is to list out all the data required to be provided by Users to STU and /or SLDC and vice versa, in accordance with the provisions of the State Grid Code.

14.2. Responsibility :

- (1) All Users are responsible for submitting the required up-to-date data to STU/SLDC in accordance with the provisions of the State Grid Code.
- (2) All Users shall provide STU and SLDC, the names, addresses and telephone numbers of the persons responsible for sending the data.
- (3) Responsibility for the correctness of the data rests with the concerned User providing the data.
- (4) STU shall inform all Users and SLDC, the names, addresses, and telephone numbers of the persons responsible for receiving data.
- (5) STU shall provide up-to-date data to Users as provided in the relevant Chapters of this State Grid Code.

14.3. Data to be registered :

Data required to be registered/exchanged as been listed in the Appendices under various categories with cross-reference to the concerned sections. The data so far applicable to the particular User need only to be registered and exchanged with STU or SLDC.

14.4. Changes in User's Data :

Whenever any User becomes aware of a change to any items of data that is registered with STU, the User must promptly notify the STU of the changes. STU on receipt of intimation of the changes shall promptly correct the database accordingly. This shall also apply to any data compiled by STU regarding its own system.

14.5. Method of Submitting Data :

- (1) The data shall be furnished in the standard formats for data submission and such formats must be used for the written submission of data to SLDC and STU. Where standard formats are not enclosed they would be developed by SLDC or STU in consultation with Users.
- (2) All data to be submitted under the Schedule(s) must be submitted to SLDC/STU or to such other department and/or entity as STU may from time to time notify to Users. The name of the person who is submitting each schedule of data shall be indicated.
- (3) Where a computer data link exists between a User and SLDC/STU, data may be submitted via this link. The data shall be in the same format as specified for paper transmission. Other modes of data transfer, such as pen drive/ e-mail may be utilised, if SLDC/STU gives its prior written consent. The User shall specify the method to be used in consultation with the SLDC/STU and resolve issues such as protocols, transmission speeds etc. at the time of transmission.

14.6. Data not supplied :

All Users are obliged to supply data as referred to in the individual Chapters of this State Grid Code and listed out in this Data Registration Chapter Appendices. In case any data is not supplied by any User or is not available, STU or SLDC may, acting reasonably, if and when necessary, estimate such data depending upon the urgency of the situation. Similarly, in case any data is not supplied by STU, the concerned User may, acting reasonably, if and when necessary, estimate such data depending upon urgency of the situation. Such estimates will in each case, be based upon corresponding data for similar Plant or Apparatus or upon such other information, the User or STU or SLDC, as the case may be, deems appropriate.

14.7. Special Considerations :

SLDC and any other User may at any time make reasonable request to STU for extra data as necessary. STU shall supply data, required/requested by SLDC for system operation.

CHAPTER -15**CYBER SECURITY CODE****15.1 General :**

- (1) This chapter 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.
- (2) All Users, SLDC and STU shall have in place, a Cyber Security framework in accordance with Information Technology Act, 2000, CEA Technical Standards for Connectivity Regulations, CEA (Cyber Security in Power Sector) Guidelines, 2021 and any such Regulations issued from time to time, by an appropriate authority to identify the critical cyber assets and protect them so as to support reliable operation of the grid.

15.2 Cyber security audit :

- (1) All Users, SLDC and STU, shall conduct Cyber Security Audit as per the guidelines mentioned in the CEA (Cyber Security in Power Sector) Guidelines, 2021 and any other guidelines issued by an appropriate Authority.

15.3 Guideline/Procedure :

- (1) 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.
- (2) 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.
- (3) 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.

- (4) A dedicated team of IT Personnel for cyber security of substations shall be developed and proper training for the team members shall also be conducted regularly by the respective organizations to upgrade their skills.
- (5) SLDC shall scrutinize the cyber security incidences and discuss them in the Grid Code Review Panel and take necessary actions as deemed fit.

15.4 Mechanism of reporting :

- (1) All entities shall immediately report to the appropriate government agencies in accordance with the Information Technology Act, 2000, as amended from time to time, and CEA (Cyber Security in Power Sector) Guidelines, 2021, in case of any cyber- attack.
- (2) SLDC and the Commission shall also be informed by such entities in case of any instance of cyber-attack.

15.5 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 sub-committee of the same shall be formed at the regional level.
- (2) The sectoral CERT shall lay down rules of procedure for carrying out their activities.

MISCELLANEOUS :

15.6 Dispute Redressal :

Any dispute regarding interpretation of any provision of the State Grid Code, shall be addressed to Secretary to the Commission. The decision of the Commission shall be taken as final and binding on all concerned.

15.7 Non-Compliance & Derogation :

- (1) Provisions where any User fails to comply with any provision of State Grid Code, the Commission may take suo-moto action against such cases.
- (2) Wrong declaration of capacity, non-compliance of SLDC's load dispatch instructions, non-compliance of SLDC's instructions for backing down without adequate reasons, non-furnishing data etc. constitute non-compliance of State Grid Code and thus the contravention of Regulations of the Commission. It may attract provision of Section 33(5) or Section 142 of the Electricity Act, 2003.
- (3) Consistent failure to comply with the State Grid Code may lead to disconnection of the User's plant and/or facilities.
- (4) Derogation, if any, for any particular section or chapter or provision of the State Grid Code shall be with the permission of the Commission for a specified time. Derogation of any requirement of the State Grid Code shall be exception and not the norm, and will be allowed only when it is impossible and not just difficult or inconvenient for the User to comply within the required time-scale.

15.8 Power to Remove Difficulties :

If any difficulty arises in giving effect to any of the provisions of the Grid Code, the Commission may, by general or specific order, make such provisions not inconsistent with the provisions of the Act, as may appear to be necessary for removing the difficulty.

15.9 Power to Relax :

The Commission may by general or special order, for reasons to be recorded in writing and after giving an opportunity of hearing to the parties likely to be effected by grant of relaxation, may relax any of the provisions of the Grid Code on its own motion or on an application made before it by an interested person.

15.10 Power to Amend :

The Commission may, at any time, vary, alter, modify or amend any provision of Grid Code.

By the Order of the Commission

Marjum Karlo
Secretary (i/c), APSERC

FORMAT - 1

Serial No. xxxxxxx
REQUISITION FOR LINE CLEAR PERMIT
Date
Time
I Shri/Shrimati request Line Clear Permit on the following EHT Line/Equipment.
EHT / HT Apparatus/Line Identification:
Details of works to be carried out:
Estimated time required for completion:
Name and Signature
(Person Requesting Line Clear Permit)
Designation.....
Date.....
(FOR USE IN SUBSTATION FROM WHERE LINE CLEAR PERMIT WILL BE ISSUED)
(a) Line Clear Permit issued : Yes/No
(b) Number and Date of Issue :
(c) Time of Issue :
(d) Date and Time of Return :
(e) Remarks : See Check List LCP - Format - 2
RECEIPT OF Line Clear Per No..... Date.....
I have received confirmation from Coordinator) at (location) that the safety precautions have been established and the instructions will not be issued at his location for their removal until his LCP is cancelled.
Name and Signature (Person Requesting Line Clear Permit)

FORMAT - 2

Serial No. xxxxxx
LINE CLEAR PERMIT
LCP Number.....
Date.....
Time.....
CHECK LIST OF THE LINE CLEAR PERMIT :
(a) Name of location for which line clear is issued.
(b) Reference and Authority requisitioning line clear: (Indicate serial number of LCP requisition).
(c) Identity of HV Apparatus.
(d) Sources from which the Line/Equipment is charged.
(e) No./name of Circuit Breaker/Isolating Switch open at each of above sources.
(f) Whether confirmed that the Line is disconnected at both ends.
(g) Whether line is Earthed at both ends.
(h) Whether the Circuit Breaker truck removed in case of indoor switchgear controlling the Feeder/Equipment for which line clear is given.
(i) Whether Isolating Switches controlling the feeder/equipment for which line clear is given are locked and kept in safe custody.
(j) Time of issue of Line Clear Permit and LCP No.
(k) Name of requesting Safety Coordinator on whom LCP is issued.
(l) Approximate Time for returning LCP as ascertained from the Requesting Coordinator.
Name and Signature.....
Designation.....
LINE CLEAR PERMIT
LCP No.....
I Shri/Srimati.....
(Issuing Safety Coordinator) do here by issue permission to Shri/Srimati.....
(Requesting Safety Coordinator) for carrying out works as per requisition No.....
Date..... Time
The EHT/ HT Line/equipment herein described is declared safe.
The permission is subject to the conditions given on backside of this Permit.
Name and Signature.....
(Person issuing Line Clear Permit)
Designation.....
(To be printed on the reverse of LCP : Format - 2).

CONDITIONS :

- (1) This permit is valid only for working on the Feeder/Equipment mentioned herein and not in any other Feeder/Equipment.
- (2) Only authorized persons are allowed to work on Feeder/Equipment for which the permit has been issued.
- (3) Works as per requisition only should be carried out.
- (4) Before touching any part of the Feeder / Equipment it should be ensured that earthing at two points on either side through standard discharge rods connected with good Earths. Temporary Earths may be removed after completion of all works and after all the men have come down from the Feeder/Equipment.
- (5) Work should be so planned that the Line Clear is returned before or at the time indicated. If unavoidable delay is anticipated advance information should be given to the location from where the Line Clear is issued.

- (6) Before return of the Line Clear, it should be ensured that all the men, materials, tools/tackles etc. on line have returned and reported that all temporary earths are removed. There should also be a check on the material, Tools and Plant issued for the work to ensure that nothing is left behind on the Line or Equipment.
- (7) Only authorized persons should return Line Clear.
- (8) In case the Line Clear cannot be returned in person, the same may be returned to the Line Clear Issuing Authority over Telephone by naming the Code Words assigned and the telephone number which is used for naming the Code Words assigned. In case two or more different Code Words are issued to the two or more persons in whose favour the permit is given, those persons must jointly return the Line Clear by naming their own Code Words. The Line Clear Return will not be accepted unless returned by all these persons.
- (9) The Line Clear issuing authority should go through the checklist of Line Clear Return before accepting it.
- (10) If Line Clear is returned over telephone, the Line Clear Return Form duly filled and signed should be sent to the Line Clear Issuing Authority by post immediately for record.
- (11) Control persons should keep all the required data of LCP issued and LCR received. He should monitor and keep specific note in log sheet when more than one LCP are issued on same line/ equipment/bay along with code words.

FORMAT - 3

Serial No. xxxxxxxxx
LINE CLEAR PERMIT RETURN
LCP Number.....
Date.....
Time.....
I, Shri/Shrimati hereby return the
LCP No..... at..... issued for the following HT/EHT
Line/Apparatus.
I declare that all the crew who were sent on work have been withdrawn, temporary earth(s) removed, all repair tools and materials checked and the Feeders/Equipment's mentioned below are safe to be energized.
(a) EHT / HT Apparatus/Line Identification :
(b) Details of work done
CHECK LIST TO BE TICKED OFF :
(a) Whether all men withdrawn: Yes/No
(b) Whether all temporary Earthing removed: Yes/No
(c) Whether all materials, Tools and Plant used in the work have been checked: Yes/No
Code Number (If used when Line Clear is returned over phone)
Name and Signature.....
(Person Returning Line Clear Permit)
Designation.....

1. APPENDIX

APPENDIX-A-STANDARD PLANNING DATA

I. Standard planning data (hydro generation)

	General	
Sl. No.	Particulars	Details
(i)	Site	Give location map to scale showing roads, railway lines, and transmission lines.
(ii)	Site Map(To Scale)	Showing proposed canal, reservoir area, water conductor system, fore-bay, power house etc.
(iii)	Submerged Area	Give information on area submerged, villages submerged, submerged forest land, agricultural land etc.
(iv)	Whether Storage type or run of river type	
(v)	Whether catchment receiving discharges from other reservoir or power plant.	
(vi)	Full reservoir level	
(vii)	Minimum draw down level.	
(viii)	Tail race level	
(ix)	Design Head	
(x)	Reservoir level v/s energy potential curve	
(xi)	Restraint, if any, in water discharges	
(xii)	Approximate period of construction.	
(xiii)	Annual Generation in million kWH	

II. Connection

Sl. No.	Particulars	Details
(i)	Point of Connection	Give single line diagram proposed
(ii)	Step up voltage for Connection (kV)	Connection with the Transmission System.

III. Station capacity

Sl. No.	Particulars	Details
(i)	Total Power Station capacity (MW)	State whether development is carried out in phases and if so furnish details.
(ii)	No. of units & unit size (MW)	

IV. Generating unit data

Sl. No.	Particulars	Details
(i)	Operating Head (in Metres)	Maximum Minimum Average
(ii)	Hydro Unit	Capability to operate as synchronous condenser. Water head versus discharges curve (at full and part load)Power requirement or water discharge while operating as synchronous condenser
(iii)	Turbine	State Type and capacity
(iv)	Generator	Make and Type
		Rating (MVA)
		Speed (RPM)
		Terminal voltage (KV)

		Rated Power Factor
		Reactive Power Capability (MVA _r) in the range 0.95 of leading and 0.85 of lagging
		Short Circuit Ratio
		Direct axis transient (saturated) reactance (% on rated MVA)
		Direct axis sub-transient (saturated) reactance (% on rated MVA)
		Auxiliary Power Requirement (MW)
(iv)	Generator- Transformer	Type
		Make
		Phases
		Rated Capacity (MVA)
		Voltage Ratio HV/LV
		Tap change Range (+% to -%)
		Percentage Impedance (Positive
		Sequence at Full Load).

STANDARD PLANNING DATA (TRANSMISSION) :

For STU and Transmission Licensees :

STU shall make arrangements for getting the required data from different Departments of STU/other transmission licensees (if any) to update its Standard Planning Data in the format given below :

Sl. No.	Particulars	Details
(i)	Name of the Line (indicating generating stations and sub-station to be connected)	
(ii)	Voltage of Line (kV)	
(iii)	No. of Circuits	
(iv)	Route Length (CKM)	
(v)	Conductor Sizes	
(vi)	Line Parameters (PU on 100 MVA base or ohmic values)	
(vii)	Approximate Power Flow MW & MVA _r	Resistance/KM Inductance Reactance/KM Susceptance/KM
(viii)	Reference to scheme, wheeling to other states	
(ix)	Line Route (Topographical sheets) Purpose of Connection	
(x)	Approximate Period of Construction	

STANDARD PLANNING DATA (DISTRIBUTION)
(To be furnished by distribution utility to STU)

I. General

Sl. No.	Particulars	Details
(i)	Area Map (to scale)	Furnish map of Arunachal Pradesh dulymarked with the area of supply relevant for the Distribution License.
(ii)	Single Line Diagram	Licensee wise up to 33kV Substations
(iii)	Consumer Data	Furnish category wise number of consumers, their connected loads to the best judgement of the distribution Licensee
(iv)	Reference to area offices presently in charge of the distribution	

II. Connection :

Sl. No.	Particulars	Details
(i)	Connections points/Interface points	Furnish Single Line diagrams showing Connection Points/Interface Points
(ii)	Voltage of Supply at Connection Points/Interface points	
(iii)	Name of Grid sub-station feeding the connection points/Interface points	

III. Lines and sub-stations :

Sl. No.	Particulars	Details
(i)	Line Data	Furnish Length of the Line and Voltages (EHV Level)
(ii)	Sub-Station Data	Furnish Transformer details of 132/33kv ,33,11 kV

IV. Loads :

Sl. No.	Particulars	Details
(i)	Loads drawn at connection points/ interface points	If the distribution licensee receives power at number of connection points in a compact area which are interconnected in a ring then such a distribution licensee shall forward the overall load drawn for overall area of supply, as well as at each connection point with the variation or tolerance as mutually discussed and agreed upon with STU.
(ii)	Details of loads fed at EHV	Provide name of consumer, voltage of supply, contract demand and name of grid station from which line is drawn, length of EHT line from grid station to the consumer premises.

V. Demand data (For all loads 1MW and above) :

Sl. No.	Particulars	Details
(i)	Type of load	State whether furnace loads, rolling mills, traction loads, other industrial loads, pumping loads etc.
(ii)	Rated voltage and phase	
(iii)	Electrical loading of equipment	State number and size of motors, types of drive and control arrangements.
(iv)	Sensitivity of load to voltage and frequency of supply.	
(v)	Maximum Harmonic content of load.	
(vi)	Average and maximum phase unbalance of load.	
(vii)	Nearest sub-station from which load is to be fed.	
(viii)	Location map to scale	Showing location of load with reference to lines and sub-stations in the vicinity.

VI. Load forecast data :

Sl. No.	Particulars	Details
(i)	Peak load and energy forecast for each category of loads for each of the succeeding 5 years.	
(ii)	Details of methodology and assumptions on which forecasts are based.	
(iii)	Details of loads 1 MW and above.	
	(a) Name of prospective consumer.	
	(b) Location and nature of load.	
	(c) Sub-Station from which to be fed.	
	(d) Voltage of supply.	
	(e) Phasing of load.	

APPENDIX-B-DETAILED PLANNING DATA
Detailed Planning Data (Hydro Generation)

I. General

Sl. No.	Particulars	Details
(i)	Name of Generating Station	
(ii)	No. and capacity of units(MW)	
(iii)	Expected level of Generation (MU)	
(iv)	Period of Generation (in months) per year	
(v)	Whether the plant is based on water released from dam/canal for irrigation purposes	
(vi)	Reservoir Data. (a) Salient features (b) Type of Reservoir (c) Multipurpose (d) For Power	
(vii)	Rating of all major equipment's (a) Turbine (b) Generators (c) Generator Transformers Auxiliary Transformers Single Line diagram of generating station and switchyard Relaying and metering diagram Neutral Grounding of Generator Excitation Control Earthing arrangement with earth resistance values	
(viii)	Communication-details of PLCC and other communication equipment installed.	

II. Protection :

Sl. No.	Particulars	Details
(i)	Full description including settings for all relays installed on all outgoing feeders from Power Station switchyard, tiebreakers, and incoming breakers.	
(ii)	Full description including settings for all relays and protection systems installed on the Generating Unit, Generator transformer, auxiliary transformer and electrical motor of major equipment.	
(iii)	Full description of inter-tripping of breakers at the point or points of Connection with the Transmission System.	
(iv)	Most Probable fault clearance time for electrical faults on the User's System.	

III. Switchyard :

1. In relation to interconnecting transformers between HV Transmission system and the generator transformer voltage system.

Sl. No.	Particulars	Details
(i)	Rated MVA	
(ii)	Voltage Ratio	
(iii)	Vector Group	
(iv)	Positive sequence reactance for maximum, minimum and normal Tap. (% on MVA).	
(v)	Positive sequence resistance for maximum, minimum and normal Tap. (% on MVA).	
(vi)	Zero sequence reactance (% on MVA)	
(vii)	Type of Tap changer (off/on load).	
(viii)	Tap changer range (+% to -%) and steps.	
(ix)	Neutral grounding details.	

2. In relation to switch gears including circuit breakers, isolators on all circuits connected to the point of connection.

Sl. No.	Particulars	Details
(i)	Rated voltage (KV).	
(ii)	Type of Breaker (MOCB/ABCB/SF6).	
(iii)	Rated short circuit breaking current (KA) 3 phase.	
(iv)	Rated short circuit breaking current (KA) 1 phase.	
(v)	Rated short circuit making current (KA) 3 phase.	
(vi)	Rated short circuit making current (KA) 1 phase.	
(vii)	Provisions of auto reclosing with details.	
(viii)	Details of instrument transformers	
(ix)	Lightning Arrestors technical data.	
(x)	Communication : Details of communication equipment installed at connection points/interface points.	
(xi)	Basic insulation level (kV)	
	(a) Bus bar (b) Switchgear (c) Transformer Bushings	

II. Generator units :

1. Parameers of Generating units :

Sl. No.	Particulars	Details
(i)	Rated terminal voltage (KV).	
(ii)	Rated MVA.	
(iii)	Rated MW	
(iv)	Speed (rpm) or number of poles.	
(v)	Inertia constant H (MW sec./MVA).	
(vi)	Short circuit ratio.	
(vii)	Direct axis synchronous reactance Xd (% on MVA).	
(viii)	Direct axis (saturated) transient reactance (% on MVA) X'd.	
(ix)	Direct axis (saturated) sub-transient reactance (% on MVA) X''d.	
(x)	Quadrature axis synchronous reactance (% on MVA) Xq.	
(xi)	Quadrature axis (saturated) transient reactance (% on MVA) X'q.	
(xii)	Quadrature axis (saturated) sub-transient reactance (% on MVA) X''q.	
(xiii)	Direct axis transient open circuit time constant (sec) T'do.	
(xiv)	Direct axis sub-transient open circuit time constant (sec) T''do.	
(xv)	Quadrature axis transient open circuit time content (sec) T'qo.	
(xvi)	Quadrature axis transient open circuit time constant (sec) T''qo.	
(xvii)	Stator Resistance (ohm) Ra & leakage reactance (ohm) X1.	
(xviii)	Stator time constant (sec).	
(xix)	Rated Field current (A).	
(xx)	Neutral grounding details.	
(xxi)	Open Circuit saturation characteristics of the Generator for various terminal voltages giving the compounding current to achieve this.	
(xxii)	Type of Turbine.	
(xxiii)	Operating Head (metres).	
(xxiv)	Discharge with full gate opening (cumecs).	
(xxv)	Speed Rise on total Load throw off (%).	

2. Parameters of Excitation Control System :

Sl. No.	Particulars	Details
(i)	Type of Excitation	
(ii)	Maximum field voltage	
(iii)	Rated field voltage	
(iv)	Gain factor	
(v)	Exciter response time	
(vi)	Time constant for control Amplifier	
(vii)	Feedback strength	
(viii)	Time constant for Exciter	
(ix)	Feedback strength	
(x)	Output voltage of control amplifier	
(xi)	Maximum output voltage of control amplifier	
(xii)	Time constant for Feedback	
(xiii)	Minimum output voltage of control amplifier	

3. Parts of Governor/Turbine :

Sl. No.	Particulars	Details
(i)	Governor average gain (MW/Hz)	
(ii)	Speeder motor setting range	
(iii)	Governor valve opening limits	
(iv)	Governor valve rate limits	
(v)	Time constant of turbine	
(vi)	Type of Governor	
(vii)	Regulation and drop	
(viii)	Maximum velocity limit	
(ix)	Minimum velocity limit	

4. Operational Parameters :

Sl. No.	Particulars	Details
(i)	Minimum notice required for synchronizing a generating unit from desynchronization.	
(ii)	Minimum time between synchronising different generating units in a generating station.	
(iii)	Minimum Block load requirements on synchronising.	

5. General status :

Sl. No.	Particulars	Details
(i)	Detailed Project Report	
(ii)	Status Report (a) Topographical survey (b) Geological survey (c) Land (d) Environmental Clearance (e) Rehabilitation of displaced persons	
(iii)	Techno-economic approval by Central Electricity Authority	
(iv)	Financial Tie-up	
(v)	Approval of State Government/Government of India	

6. CONNECTION :

Sl. No.	Particulars	Details
(i)	Reports of Studies for parallel operation with the State Transmission System. (a) Short Circuit studies. (b) Stability Studies. (c) Load Flow Studies.	
(ii)	Proposed Connection with the State Transmission System. (a) Voltage. (b) (b)No. of circuits.Point of Connection.	

7. RESERVOIR DATA :

Sl. No.	Particulars	Details
(i)	Dead Capacity	
(ii)	Live Capacity	

1. DETAILED SYSTEM DATA (TRANSMISSION)

(For STU and Transmission Licensees)

I. General :

Sl. No.	Particulars	Details
(i)	Single line diagram of the Transmission System down to 132,33 KV bus at Grid Sub-station detailing	
(ii)	Name of Sub-station	
(iii)	Generating Station connected	
(iv)	Number and length of circuits	
(v)	Interconnecting transformers	
(vi)	Sub-station bus layouts	
(vii)	Power transformers	
(viii)	Reactive compensation equipment.	
(ix)	Details of Capacitors installed. (a) Additional capacitors to be commissioned alongwith additional loads.	
	(b) Lightning Arrestors	
(x)	Bus or Line reactors	

II. Sub-station layout diagrams showing :

Sl. No.	Particulars	Details
(i)	Bus bar layouts	
(ii)	Electrical circuits, lines, cables, transformers, switchgear etc.	
(iii)	Phasing arrangements.	
(iv)	Earthing arrangements.	
(v)	Switching facilities and interlocking arrangements.	
(vi)	Operating voltages.	
(vii)	Numbering and nomenclature : (a) Transformers (b) Circuits (c) Circuit breakers.	
(viii)	(b) Isolating switches.	

III. LINE PARAMETERS (for all circuits) :

Sl. No.	Particulars	Details
(i)	Designation of Line.	
(ii)	Length of line (Km).	
(iii)	Number of circuits, size of conductor, rating etc.	
(iv)	Per circuit values	
(v)	Operating voltage (KV).	
(vi)	Positive Phase sequence reactance (pu on 100 MVA) X1	
(vii)	Positive Phase sequence resistance (pu on 100 MVA) R1	
(viii)	Positive Phase sequence susceptance (pu on 100 MVA) B1	
(ix)	Zero Phase sequence reactance (pu on 100 MVA) X0	
(x)	(vi) Zero Phase sequence resistance (pu on 100 MVA) R0	
(xi)	Zero Phase sequence susceptance (pu on 100 MVA) B0	

IV. Transformer parameters (For all transformers sub-station wise) :

Sl. No.	Particulars	Details
(i)	Rated MVA.	
(ii)	Voltage Ratio.	
(iii)	Vector Group.	
(iv)	Positive sequence reactance, maximum, minimum and normal (pu on 100 MVA) X1.	
(v)	Positive sequence resistance, maximum, minimum and normal (pu on 100 MVA) R1.	
(vi)	Zero sequence reactance (pu on 100 MVA).	
(vii)	Tap change range (+% to -%) and steps.	
(viii)	Details of Tap changer. (Off/On load).	
(ix)	Neutral Grounding.	
(x)	% Impedance (Max/Min).	

V. Equipment details (For all substations) :

Sl. No.	Particulars	Details
(i)	Circuit Breakers	
(ii)	Isolating switches	
(iii)	Current Transformers	
(iv)	Potential Transformers /CVTs	
(v)	Lightning arrestors	
(vi)	Earthing switches	

VI. Relaying and metering :

Sl. No.	Particulars	Details
(i)	Protection relays installed for all transformers and feeders along with their settings and level of co-ordination with other Users.	
(ii)	Metering Details	

VII. **System studies :**

Sl. No.	Particulars	Details
(i)	Load Flow studies (Peak and lean load for maximum hydro and maximum thermal generation).	
(ii)	Transient stability studies for three-phase fault in critical lines.	
(iii)	Dynamic Stability Studies.	
(iv)	Short circuit studies (three-phase and single phase to earth).	
(v)	Transmission and Distribution Losses in the Transmission System.	

VIII. **Demand data (For all substations) :**

Sl. No.	Particulars	Details
(i)	Demand Profile (peak and off peak load) forecast for next five years	

IX. **Reactive compensation equipment :**

Sl. No.	Particulars	Details
(i)	Type of equipment (fixed or variable).	
(ii)	Capacities and/or Inductive rating or its operating range in MVar.	
(iii)	Details of control.	
(iv)	Point of Connection to the System.	

2. **Detailed Planning Data (Distribution) :**

(For Distribution Licensees)

I. **General :**

Sl. No.	Particulars	Details
(i)	Distribution map (To scale). Showing all lines up to 11KV and sub-stations belonging to the Supplier.	
(ii)	Single line diagram of distribution System (showing distribution lines from points of Connection with the Transmission System, 132/33 KV sub-stations, 33/11KV, 33/0.4kVsub-stations, and consumer bus in case of consumers fed directly from the Transmission System).	
(iii)	Numbering and nomenclature of lines and sub-stations (Identified with feeding Grid sub-stations of the Transmission and concerned 220/132/33/11/0.4KV, 132/33/11KV, and 33/11KV sub-stations of Licensee).	

II. **Connection & loads :**

Sl. No.	Particulars	Details
(i)	Points of Connection (Furnish details of existing arrangement of Connection).	
(ii)	Details of metering at points of Connection	
(iii)	Details of major loads of 1 MW and above to be contracted for next 5 years	
(iv)	Demand profile of Distribution System (Current & forecast)	

APPENDIX - C - OPERATIONAL PLANNING DATA

Operational planning data

I. Outage Planning Data :

(1) Demand Estimates (For Distribution Licensees)

Sl. No.	Particular's	Due Date & Time
(i)	Estimated aggregate month-wise annual sales of Energy in Million Units and peak and lean demand in MW & MVAR at each Connection point for the next financial year.	15th November of current year
(ii)	Estimated aggregate day-wise monthly sales of Energy in million Units and peak and lean demand in MW & MVAR at each Connection point for the next month.	25th of current month
(iii)	Hourly block-wise demand estimates for the day ahead.	09.00 Hours every day.

(2) Estimates of Load Shedding for Distribution Licensee

Sl. No.	Particular's	Due Date & Time
(i)	Details of discrete load blocks that may be shed to comply with instructions issued by SLDC when required, from each connection point.	Soon after connection is made.

(3) Year ahead outage programme (For the financial year)

(a) Generator outage programme for (SGS)

Sl. No.	Particular's	Due Date & Time
(i)	Identification of Generating Unit.	15th November each year
(ii)	MW, which will not be available as a result of Outage.	15th November each year 15th
(iii)	Preferred start date and start-time or ranges of start dates and start times and period of outage	November each year
(iv)	If outages are required to meet statutory requirement, then the latest date by which outage must be taken.	15th November each year

(b) Affecting Intra - State Transmission System

Sl. No.	Particular's	Due Date & Time
(i)	MW, which will not be available as a result of Outage from Imports through external connections.	15th November each year
(ii)	Start date and start time and period of Outage.	15th November each year

(c) Year ahead CPP's outage programme (Affecting Intra - State Transmission)

Sl. No.	Particular's	Due Date & Time
(i)	MW, which will not be available as a result of Outage from Imports through external connections.	15th November each year
(ii)	Start date and start time and period of Outage.	15th November each year

(d) Year ahead Distribution Licensees outage programme

Sl. No.	Particular's	Due Date & Time
(i)	Loads in MW not available from any connection point. Identification of connection point	15th November each year
(ii)	Period of suspension of drawl with start date and start time	15th November each year

(e) STU's Overall outage programme

Sl. No.	Particular's	Due Date & Time
(i)	Report on proposed outage programme	15th February each year
(ii)	Release of finally agreed outage plan	15th February each year

II. Generation Scheduling Data :

Schedule & Dispatch (For SGS, IPPs, CPPs)

SI. No.	Particular's	Due Date & Time
(i)	Day ahead Hourly block-wise MW/MVA availability (00.00 - 24.00 Hours). (a) Status of Generating Unit Excitation AVR in service (Yes/No). (b) Status of Generating Unit Speed Control System. Governor in service (Yes/No). (c) Spinning reserve capability (MW). (d) Backing down capability with/without oil support (MW).	09.00 hrs
(ii)	Hydro reservoir levels and restrictions (a) Generating Units Hourly block-wise summation outputs (MW). (b) Day ahead Hourly block-wise MW entitlements from Central Sector Generation Power Stations from NERLDC	

III. Capability data (For SGS) :

SI. No.	Particular's	Due Date & Time
(i)	Generators and IPPs shall submit to STU up-to-date capability curves for all Generating Unit.	On receipt of request from STU/SLDC.
(ii)	CPPs shall submit to STU net return capability that shall be available for export/import from Transmission System	On receipt of request from STU/SLDC.

IV. Response to frequency change (For SGS) :

(FREQUENCY AND VOLTAGE MANAGEMENT)

SI. No.	Particular's	Due Date & Time
(i)	Primary Response in MW at different levels of loads ranging from minimum generation to registered capacity for frequency changes resulting in fully opening of governor valve	On receipt of request from STU/SLDC
(ii)	Secondary response in MW to frequency changes	On receipt of request from STU/SLDC

V. MONITORING OF GENERATION AND DRAWL (For SLDC) :

SI. No.	Particular's	Due Date & Time
(i)	SGS shall provide 15-minute block-wise generation summation to SLDC.	Real time basis
(ii)	CPPs shall provide 15-minute block-wise export/import MW to SLDC	Real time basis
(iii)	Logged readings of Generators to SLDC.	As required
(iv)	Detailed report of generating unit tripping on monthly basis	In the first week of the succeeding month

VI. Essential and non-essential load data (For SGS) :

SI. No.	Particular's	Due Date & Time
(i)	Schedule of essential and non-essential loads on each discrete load block for purposes of load shedding.	As soon as possible after connection

APPENDIX - D - PROTECTION DATA

I. Protection :

Sl. No.	Particular's	Due Date & Time
(i)	Generators/CPPs/IPP's shall submit details of protection requirement and schemes installed by them as referred to in B-1. Detailed planning Data under sub-section "Protection and Metering".	As applicable to Detailed Planning Data
(ii)	The STU shall submit details of protection equipment and schemes installed by them as referred to in B-2. Detailed system Data, Trans- mission under sub-section "Relaying and Metering" in relation to Connection with any User.	As applicable to Detailed Planning Data

APPENDIX - E- METERING DATA

I. Metering :

Sl. No.	Particular's	Due Date & Time
(i)	SGS shall submit details of metering equipment and schemes installed by them as referred in B-1. Detailed Planning Data under sub-section "Protection and Metering".	As applicable to Detailed Planning Data
(ii)	STU s shall submit details of metering equipment and schemes installed by them as referred in B-2. Detailed System Data, Transmission under sub-section "Relaying and Metering" in relation to connection with any User.	As applicable to Detailed Planning Data

APPENDIX - F - 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	Remarks
Switchyard (kV)						
All equipment including bus bars						
Feeders						
Generating units						

APPENDIX - G- INCIDENT REPORTING (OTHER THAN ACCIDENTS)

1.		First Report Date : Time :
Sl. No.	Particulars	Details
1.	Date and time of incident	
2.	Location of incident	
3.	Type of incident	
4.	System parameters before the incident (voltage, frequency, flows, generation etc.)	
5.	Relay indications received and performance of protection	
6.	Damage to equipment	
7.	Supplies interrupted and duration, if applicable	
8.	Amount of generation lost, if applicable	
9.	Possibility of alternate supply arrangement	
10.	Estimate of time to return to service	
11.	Cause of incident	
12.	Any other relevant information and remedial action taken	
13.	Recommendations for future improvement/repeat incident	
14.	Name of the organization	

Marjum Karlo
Secretary i/c,
Arunachal Pradesh
State Electricity Regulatory Commission,
Itanagar.