APSERC (Draft for State Grid Code) Regulations, 2018

ARUNACHAL PRADESH STATE ELECTRICITY REGULATORY COMMISSION

(APSERC)

23/5/2018

ARUNACHAL PRADESH STATE ELECTRICITY REGULATORY COMMISSION

ITANAGAR

NOTIFICATION

State Grid Code Regulations

No APSERC/NOTIFICATION/: In exercise of powers conferred under clause (zp) of subsection (2) of section 181 read with clause (h) of subsection (1) of section 86 of the Electricity Act, 2003 (36 of 2003) and all powers enabling it in this behalf, the **Arunachal Pradesh State Electricity Regulatory Commission,** the same having being previously published in the **Arunachal Pradesh** Gazette issue dated 19th November 2012 and duly considered, namely, the Arunachal Pradesh State Electricity Regulatory Commission **(State Grid Code) Regulations 2012** and as required by subsection(2) of Section 181 of the Act ,the draft regulations are hereby published for the information of all the persons likely to be affected thereby; and notice is hereby given that the said draft regulations will be taken into consideration, after the expiry of thirty (30) days from the date of publication of the proposed draft in the **Arunachal Pradesh** Gazette together with any objections or suggestions which may within the aforesaid period be received in respect thereto. The objections or suggestions in this behalf should be addressed to the Secretary, Arunachal Pradesh State Electricity Regulatory Commission, 2nd Floor, OT Building, Niti Vihar Market, Itanagar- 791111 (Arunachal Pradesh).The text of the aforesaid draft regulations is also available on the website of the Commission i.e. www.apserc.nic.in .Comments / suggestions of the stakeholders on the above proposal are invited by 21st June 2018.

Short title, extent and commencement

1) These regulations may be called the Arunachal Pradesh State Electricity Regulatory Commission (State Grid Code) Regulations, 2018.

2) These Regulations shall come into force after 60 days from the date of their publication in the Official Gazette of Arunachal Pradesh.

Table of Contents

1 GENERAL

1.1 Introduction

In compliance with section 86 (1) (h) of the Electricity Act, 2003 the Arunachal Pradesh State Electricity Regulatory Commission hereby specifies the State Grid Code which is consistent with the Indian Electricity Grid Code specified by the Central Electricity Regulatory Commission under section 79 (1) (h) of the Act.

1.2 Objective

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.

The principal objectives of the State Grid Code are:

(a) 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.

(b) To improve the Grid stability and achieve minimum standards of system performance.

(c) To specify the transmission connectivity requirement for new entrants i.e., future new generating companies, distribution/trading licensees, open access consumers and consumers.

(d) To document the normal practices in grid operation for easy reference and for compliance.

(e) To elicit with generators on the performance characteristics of their plant to meet the connectivity requirements.

(f) To provide a mechanism for clear and consistent disclosure of all information between the utilities concerned.

(g) To indicate how generation is to be scheduled and dispatched.

(h) To actually enforce what is verbally agreed.

1.3 Scope

All Users, STU, SLDC, NERLDCs, open access consumers are required to abide by the principles and procedures defined in the State Grid Code in so far as they apply to that party.

1.4 Structure of State Grid Code

The State Grid Code comprises of the following:

Section-1	General
Section-2	Definitions
Section-3	Management Of State Grid Code & Roles Of Various Organizations
Section-4	System Planning
Section-5	Connection Conditions
Section-6	Operational Planning
Section-7	Inter User Boundary Safety
Section-8	Scheduling And Dispatch Code
Section-9	Protection And Metering
Section-10	Data Registration
Section-11	Miscellaneous
Section-12	Appendix

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 Code Responsibilities

a) In discharging its duties under the State Grid Code, STU has to rely on information, which Users shall supply regarding their requirements and intentions.

b) STU shall exercise strict supervision over the Users to ensure compliance with the instructions issued by SLDC for efficient discharge of the Grid operations.

1.7 Confidentiality

a) 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.

b) 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.

1.8 Dispute Settlement Procedures

a) 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.

b) 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.

1.9 Communication between STU and Users

All communications between the STU and Users shall be in accordance with the provisions of the relevant provision of the SGC.Unless otherwise specifically required by the SGC, all communications shall be in writing, save that where operation timescales require oral communication, these communications shall be confirmed in writing as soon as practicable but not later than two working days.

1.10 Directive

a) Any directions issued by the State Government under section 37 of the Electricity Act 2003, shall be promptly informed to the Commission and all Users by STU.

b) Any directives issued by the Commission from time to time shall be complied with by STU and all Users.

1.11 Compatibility with Indian Electricity Grid Code

This State Grid Code shall be consistent/compatible with the IEGC. However, 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.

2 DEFINITIONS

In these Regulations the following words and expressions shall, unless the subject matter or context otherwise requires or is inconsistent therewith, 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) **"Apparatus"** means all the electrical apparatus like machines, fittings, accessories and appliances in which electrical conductors are used.

6) **"Apparent Power"** means the product of voltage and alternating current measured in unit of volt amperes and standard multiples thereof.

7) **"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.

8) **"Appropriate Transmission Utility"** means the "Central Transmission Utility" (CTU) or the "State Transmission Utility" (STU), as case may be.

9) **"Area of Supply"** means the Area within which a Distribution Licensee is authorized by his license to supply electricity.

10) **"Authority"** means Central Electricity Authority (CEA) referred to in sub-section (1) of Section 70 of the Act.

11) **"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.

12) **"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.
13) **"Beneficiary"** means a person who has share in SGS / ISGS or bilateral exchanges including open access users;
14) **"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
15) **"Black Start Procedure"** means the procedure necessary to recover from a partial or total black out in the region.
16) **"Bulk Consumer"** means a Consumer who avails supply at voltage of 33 kV or above.
17) **"Buyer"** means any generating company or licensee or consumer whose system receives electricity from any other licensee or generating company.
18) **"BIS"** means Bureau of Indian Standards
19) **"BS"** means British Standards
20) **"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.
21) **"Central Commission"** means Central Electricity Regulatory Commission (CERC) referred to in sub-Section (1) of section 76 of the Act
22) **"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.
23) **"CGS or Central Generating Station"** means the generating stations owned or controlled by the Central Government.
24) **"Central Transmission Utility (CTU)"** means any Government Company which the Central Government may notify under sub section (1) of section 38 of the Act.

25) **"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.

26) **"Commission"** means Electricity Regulatory Commission for the State of Arunachal Pradesh.

27) **"Connection"** means the electric power lines and electrical equipment used to effect a connection of a user's system to the Transmission System.

28) **"Congestion"** means where the demand for transmission capacity exceeds the available transfer capacity.

29) **"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.

30) **"Connection point" means** an electrical point of connection between the Transmission System and the User's System.

31) **"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.

32) **"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.

33) **"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.

34) **"Demand"** means the demand of Active Power in MW and Reactive Power in MVAR of electricity unless otherwise stated.

35) **"Demand control"** means any of the following methods of achieving a load reduction:

(a) Consumer Load Management initiated by Users.

(b) Consumer Load reduction by Disconnection initiated by Users (other than following an instruction from Load Despatch Centre).

(c) Consumer Load reduction instructed by the Load Despatch Centre.

(d) Automatic under Frequency Load Disconnection

(e) Emergency manual Load Disconnection

36) **"Deviation Settlement Mechanism"** means Central Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters) Regulations, 2014 including any subsequent amendments thereof.

37) **"Despatch Schedule"** means the expower plant net MW and MWh output of generating station, scheduled to be exported to the grid from time to time.

38) **"Drawal Schedule"** means the summation of station wise power plant drawal 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.

39) **"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.

40) **"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.

41) **"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;

42) **"Event"** means an unscheduled or unplanned occurrence in the State Transmission System including faults, incidents and breakdowns.

43) **"Extra High Voltage (EHV)"** means Voltage exceeding 33000 volts under normal subject to the percentage variation allowed by the Authority

44) **"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.

45) **"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

a) Acts of GOD, natural phenomena, floods, droughts, earthquakes and epidemics.
b) Enemy acts of any Government domestic or foreign, war declared or undeclared, hostilities, priorities, quarantines, embargoes.
c) Riot or Civil commotion.
d) Grids failure not attributable to the person

46) **"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.

47) **"Generating company"** means any station for generating electricity, including any building and plant with step-up transformer, switchyard, switch gear, 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.

48) **"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.

49) **"Grid"** means High Voltage back bone system of inter-connected Transmission Lines, Sub Stations and Generating plants.

50) **"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.

51) **"Grid Standards"** means Grid Standards specified by the Central Electricity Authority under Clause (d) of section 73 of the Act.

52) **"High voltage or HV"** means voltage greater than 400 V and does not exceed 33000 volts under normal conditions subject to the percentage variation allowed by the Authority.

53) **"IEGC or Indian Electricity Grid Code"** means the regulations specifying the philosophy and responsibilities for planning and operation of Indian Power system.

54) **"Independent Power Producer"** means a Power Station owned by a generator who is not a part of Government Department.

55) **"Indian Standards"** means those Standards and specifications approved by the Bureau of Indian Standards.

56) **"Instrument Transformer"** means the Current Transformer (CT), Voltage Transformer (VT) and Capacitor Voltage Transformer (CVT).

57) **"Interconnecting Transformer"** means the transformer connecting EHV lines of different voltage systems.

58) **"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.

59) **"Inter-State Transmission System"** means the system which includes:

a) Any system for the conveyance of electricity by means of a main transmission line from the territory of one State to another State;

b) 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.

c) The transmission of electricity within the territory of a State built, owned, operated maintained or controlled by the Central Transmission Utility.

60) **"Isolation"** means the disconnection of EHV/HV Apparatus from the remainder of the System in which that EHV / HV Apparatus is situated.

61) **"ISGS or Interstate Generating station"** means a central generating station or other generating station in which two or more states have shares.

62) **"LCP"** means **Line Clear Permit**

63) **"Lean Period"** means that period in a day when the electrical power demand is lowest.

64) **"License"** means a license granted under section 14 of the Act.

65) **"Licensee"** means a person who has been granted a license under section 14 of the Act.

66) **"Load"** means the Active, Reactive or Apparent power as the context requires, generated, transmitted or distributed.

67) **"Low Voltage or LV"** means voltage not exceeding 440 volts.

68) **"Main Meter"** means a meter which would primarily be used for accounting and billing of electricity.

69) **"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.

70) **"NERLDC"** means North Eastern Regional Load Dispatch Centre notified as Regional Load Dispatch Centre for North Eastern India.

71) **"NERPC"** means North Eastern Regional Power Committee in accordance with Electricity Act'2003.

72) **"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.

73) **"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.

74) **"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.

75) **"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.

76) **"Part Load"** means 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.

77) **"Peak period"** means that period in a day when the electrical power demand is highest.

78) **"Person"** mean any company or body corporate or association or body of individuals, whether incorporated or not, or artificial juridical person.

79) **"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.

80) **"Power factor"** means the ratio of Active Power (KW) to Apparent Power (KVA).

81) **"PGCIL"** means Power Grid Corporation of India Limited which has been notified as Central Transmission Utility.

82) **"Power System"** means all aspects of generation, transmission, distribution and supply of electricity and includes one or more of the following namely:

a) Generating Station
b) Transmission or main transmission lines
c) Sub-stations

d) Tie-lines
e) Load dispatch activities
f) Mains or distribution mains
g) Electric supply lines
h) Overhead lines
i) Service lines
j) Works.

83) **"Protection"** means the scheme and apparatus for detecting abnormal conditions on system and initiating fault clearance or actuating signals or indications.

84) **"Power Exchange"** means the exchange which has been granted registration in accordance with CERC (Power Market Regulations),2010 as amended from time to time.

85) **"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.

86) **"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.

87) **"Rated MW"** means the "Name plate" MW output of a Generating machine, being that output up to which the Generating machine is designed to operate.

88) **"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;

89) **"Safety Rules"** means the rules framed by the Users and the transmission licensee to ensure safety to persons working on plant / apparatus.

90) **"SAMAST"** means Scheduling, Accounting, Metering and Settlement of Transactions in Electricity.

91) **"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.

92) **"SLDC"** means the State Load Dispatch Centre.

93) **"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.

94) **"State Transmission Utility (STU)"** means the Government Company specified as such by the State Government under sub-section (1) of section 39.

95) **"Substation"** 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.

96) **"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.

97) **"SGS"** means state generating station owned by the state government.

98) **"Supplier"** means any generating company or licensee from whose system electricity flows into the system of another generating company or licensee or consumer.

99) **"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.

100) **"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

101) **"Transmission licensee"** means a licensee authorized to establish and operate transmission lines.

102) **"Transmission lines"** means all high pressure cables and overhead 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 substation, 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.

103) **"Transmission system"** means the system consisting of high pressure cables and overhead 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.

104) **"Under Frequency Relay"** means an electrical measuring relay intended to operate when its characteristic quantity reaches the relay settings by decrease in frequency.

105) **"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.

2.1 Applicable Codes

a) Central Electricity Authority (Technical standards for connectivity to Grid) Regulations 2007, as amended from time to time.

b) Central Electricity Authority (Installation and Operation of Meters) Regulation 2006, as amended from time to time.

c) Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of electrical plants and electric lines) Regulations 2010, as amended from time to time.

d) Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010.

e) Central Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters) Regulations, 2014.

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.

3 MANAGEMENT OF STATE GRID CODE & ROLES OF VARIOUS ORGANIZATIONS

3.1 Introduction

It is the duty of the STU, SLDC and all Users of STS to comply with State Grid Code. STU is required to periodically carry out review and amendments of the same with the approval of commission. For the above purpose a State Grid Code Review Committee, as per section 3.3, shall be established. This document defines the procedure to be followed by STU, SLDC and other agencies in managing the State Grid Code and also in pursuing any change.

3.2 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.

3.3 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 organisations so far as it relates to State grid code.

3.3.1 Roles & Responsibilities of SLDC

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.

With reference to SGC, the functions of SLDC shall be as under: -

i. The SLDC shall be the apex body to ensure integrated operation of the power system in the State.
ii. SLDC shall be responsible-
    - For optimum scheduling and despatch of electricity within the State in accordance with the contracts entered into with the licensees or the generating companies operating in the state;
    - Monitor grid operations;
    - Keep accounts of the quantity of electricity transmitted through the State grid;

- Exercise supervision and control over the state transmission system;
- 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.

iii. 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.

The functions of SLDC under section 32 of EA 2003 include the following: -

- System operation and control including intra-state transfer of power, covering contingency analysis and operational planning on real time basis;
- Scheduling / re-scheduling of generation;
- System restoration following grid disturbances;
- Metering and data collection;
- Compiling and furnishing data pertaining to system operation;
- Operation of State deviation settlement mechanism/SAMAST of pool account and State reactive energy account.

3.3.2 SAMAST (Scheduling, Accounting, Metering and Settlement of Transactions in Electricity)

The Electricity Act 2003 mandates that the Load Dispatch Centre shall schedule in accordance with the contracts and keep account of electricity transmitted through the transmission grid, this implies that a ledger of energy transactions have to be maintained, the physical flow of electricity across various notional seams in the electricity have to be measured and energy balance sheets have to be prepared at the transmission level. The measurement has to be at the remote substations and collected at a centralized location for preparation of energy statements that indicate the scheduled and actual interchange of entities with the grid as well as account for the transmission losses incurred in the grid. The transaction would have to be scheduled, physical delivery would have to be measured, accounted for and finally settled across multiple seams. The financial settlement of of all energy transaction would ultimately require

scheduling and book keeping besides a tamper proof, robust, scalable, flexible and dispute free energy metering, accounting and settlement system. The integrity and timeliness of the energy accounting system are indispensable for the viability, financial stability and sustainability of the sector. Thus it is essential that adequate priority and importance is assigned to this critical statutory function of SLDC.The detailed working and pre-requisites of SAMAST can be referred from the report issued by Forum of Regulators on July 2016 which has been advised to the State Govt by the Commission.

3.3.3 Roles & Responsibilities of STU

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(220kV,132kV,33kV) in an efficient and coordinated manner. STU shall be responsible for co-ordinating 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: -

(i) To undertake transmission of electricity through the state transmission system;

(ii) To discharge all functions of planning and co-ordination relating to the state transmission system with

- Central Transmission Utility;
- State Governments;
- Generating companies;
- Regional Power Committees;
- Authority;
- Licensees;
- Any other person notified by the State Government in this behalf.

(iii) To ensure development of an efficient, co-ordinated and economical system of the state transmission lines for smooth flow of electricity from a generating station to the load centres;

(iv) To provide non-discriminatory open access to its transmission system for use by -

- ✓ Any licensee or generating company on payment of the transmission charges; or
- ✓ 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.

(v) 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.

(vi) Until a Government company or any authority or corporation is notified by the State Government, the STU shall operate the SLDC.

3.3.4 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.

3.3.5 Role of Distribution Licensee

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 (33kV, 11kV, 415V, 230V) 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 -

- Any licensee or generating company on payment of the distribution charges;
- 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.

3.3.6 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.

3.4 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 Superintending 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:

(a) One representative from the State Government connected with Electricity Affairs of the State.

(b) One representative from Management level, North Eastern Regional Load Despatch Centre(Shillong)

(c) One Representative from the State Load Despatch Centre (In charge).

(d) CE(P) Eastern Electrical Zone, Department of Power

(e) CE(P) Western Electrical Zone, Department of Power

(f) CE(P) Planning and Monitoring.

(g) Director (E&M), NEEPCO

(h) Chief Engineer, Department of Hydro Power Development.

(i) Director, APEDA

(j) Chairman, APSERC

(k) One Representative from NERPC

(l) 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.

The functions of the State Grid Code Review Committee are as follows:

a) Implementation of the State Grid Code, and its implementation under continuous scrutiny and review.

b) 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.

c) Consideration of the problems raised by any User as well as resolution of the problems.

d) Ensuring that the changes / modifications proposed in the State Grid Code are consistent and compatible with Indian Electricity Grid Code (IEGC).

e) 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.

3.5 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 without 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 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.

4 SYSTEM PLANNING

4.1 Introduction

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 Reactive power compensation.
iv) Need to increase system capacity, to remove operational constraints and to maintain standards of security to accommodate a general increase in the demand.
v) Transient and steady state stability considerations.
vi) Cumulative effect of any combination of the above.
vii) 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.
viii) 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

The objective of planning criteria is as follows:

(a) To specify the principles, procedures and criteria this shall be used in the planning and development of the Intra-State Transmission System (In-STS) and the links to Regional Grid
(b) To promote co-ordination amongst all Users, STU, CTU, RLDC, CEA in any proposed planning and development of the In-STS.

(c) 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) 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.
2) 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.
3) 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:
4) 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.
5) 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.
6) 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 (1) 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.

7) 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.

8) 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) 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 for augmentation of transmission proposals and submit the same annually by 31st March to STU.
3) The planning for strengthening the State Transmission System for evacuation of power from generating stations to outside State shall be initiated by STU.
4) 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.
5) 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

State Generating Companies / IPPs / licensees shall provide following types of data to STU for the purpose of developing transmission plan:

1) Standard Planning Data (Generation & Distribution) as per Appendix A
2) Detailed Planning Data (Generation & Distribution) as per Appendix B

1) **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.
   a) Preliminary project planning data,
   b) Committed project planning data
   c) Connected planning data.

2) **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.
   a) The detailed planning data shall be furnished by the Users and Transmission Licensees as and when requested by STU.
   b) 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.
   c) 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.

5 CONNECTION CONDITIONS

5.1 Introduction

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 CEA (Technical Standards for Connectivity to the Grid) Regulations 2007 as amended from time to time.

5.2 Objective

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

a) All users or prospective users are treated equitably;
b) 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;
c) 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;
d) 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.

5.3 Scope

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

5.4 General Connectivity Conditions

1) The Applicant shall be responsible for the planning, design, construction, reliability, protection and safe operation of its own equipment.

2) 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.
3) 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.
4) The Applicant and User shall cooperate with State Load Despatch Centre in respect of the matters listed below, but not limited to: -
   a) Protection coordination and settings of its protective relays accordingly;
   b) Agree to maintain meters and communication system in its jurisdiction in good condition;
   c) 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;
   d) 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;
   e) Carryout modifications in his equipment with respect to short circuit level, protection coordination and other technical reasons considered necessary due to operational requirements;
   f) 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;

5.5 Procedure /Application for connection to the State Transmission System

The procedure for any new connection or modification of an existing connection with the State Transmission System shall consist of following:

1) 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: -
   a) 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;

b) Construction schedule and target completion date;

c) 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;

d) The User shall furnish the Detailed Planning Data as per APPENDIX-B;

2) 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:

a) 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.

b) 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.

c) 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.

3) 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.

4) 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.

5) 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.

5.6 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.

5.7 Connection Agreement

1) All Users connected to or Applicants seeking connections to the Grid shall enter into connection agreement with the STU. A connection agreement, shall include within its terms and conditions, the following:
   a) A condition requiring both parties to comply with the provisions of the State Grid Code.
   b) Details of connection, technical requirements and commercial arrangements.
   c) 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.
   d) Details of Plants and equipment have to be connected.
   e) A Site Responsibility Schedule. 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.

5.8 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.
   a) Ownership of the equipment.
   b) Responsibility for control of equipment.
   c) Responsibility for maintenance of equipment.
   d) Responsibility for operation of equipment.
   e) Responsibility for all matters relating to safety of any person at the connection / interface site.
   f) 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.

5.9 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.

5.10 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.

5.11 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.

5.12 Connection Points / Interface point

1) **State Generating Station (SGS) / IPPs / CPPs:**

a) The voltage at the Connection point / Interface point with the State Transmission System may be as agreed with STU.

b) 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.

c) SGS shall operate and maintain all terminals, communication and protection equipment's provided within the generating station.

d) The provisions for the metering between generating station and STU system shall be as per the Metering Code.

e) Respective Users shall maintain their equipment from the going out feeders' gantry onwards emanating from generating station

2) **Distribution Licensee:**

a) 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.

b) Unless specifically agreed with Distribution Licensee, the Connection point with STU shall be the outgoing feeder gantry, from STU sub-station.

c) STU shall operate and maintain all terminals, communication and protection equipment's provided within its sub-station.

d) The provisions for the metering between Distribution Licensee and STU systems shall be as per the Metering Code.

e) 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:**

a) The voltage may be 220/132/33 KV or as agreed with STU.

b) 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.

5.13 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 thereby avoiding the need for exchange of Reactive Power to/from In STS and to maintain In STS voltage within the specified range.
2) Line 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 drawal at an interchange point when the voltage at that point is below 97% of rated voltage, and shall not inject lagging Reactive Power when the voltage is above 103% of rated voltage. Interconnecting Transformer taps at the respective drawal points may be changed to control the Reactive Power interchange as per a User's request to the State Load Despatch Centre, but only at reasonable intervals.

5.14 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).

5.15 Data and Communication Facilities

Reliable and efficient communication systems (for speech, data and protection requirements) shall be provided to facilitate necessary information exchange, by all Users, and the STU for supervision/control/protection of the grid by the SLDC, under normal and abnormal conditions. All Users shall provide Systems to telemeter power system parameters such as flow (active and reactive power), voltage and status of switches/ transformer taps etc., in line with interface requirements and other guidelines made available to users by SLDC. The associated communication system and other required facilities at their respective end to facilitate data flow up to appropriate data collection point on STU's system shall also be established by the concerned User, Transmission Licensee / Distribution Licensees as specified by the STU in the Connection Agreement.

5.16 System recording instruments

Recording instruments such as Data Acquisition System / Disturbance Recorder/ Event Logger / Fault Locator (including time synchronization equipment) shall be provided in the state transmission system for recording of dynamic performance of the system. Users shall provide all the requisite recording instruments as stated in the Connection Agreement according to the agreed time schedule.

5.17 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.

5.18 Cyber Security

All Users and STU shall have in place, a cyber-security framework as specified in Information Technology Act, 2000 amended from time to time to identify the critical cyber assets and protect them so as to support reliable operation of the Grid.

5.19 Schedule of assets of the State Grid

STU, other transmission licensees granted licence 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.

5.20 Connectivity of renewable energy generating station to the grid

General Conditions for Connectivity of Renewable sources can be connected at the distribution level (not exceeding 33 kV) or transmission level (above33 kV) of the State which can be amended as per time.

6 OPERATIONAL PLANNING

6.1 Philosophy

1) The primary objective of the integrated operation of the State grid is to enhance the overall operational reliability and economy of the entire power network spread over the geographical area of the state interconnected system. Each constituent shall cooperate with each other and adopt good utility practice at all times for satisfactory and beneficial operation of the state grid.
2) Overall operation of the state grid shall be supervised from SLDC in coordination with NERLDC.The roles of NERLDC & SLDC shall be in accordance with the provisions made in Part-2 of the IEGC.
3) A set of detailed operating procedures shall be developed and maintained by SLDC in consultation with the concerned persons for guidance of the staff of SLDC and shall be consistent with IEGC to facilitate compliance with the requirement of IEGC.
4) The control rooms of SLDC, power plants, substations etc. and other control centres of other entities shall be manned round the clock by qualified and adequately trained personnel. Training requirements may be notified by the Commission from time to time by orders.
5) All persons shall comply with operating code for deriving maximum benefits from the integrated operation and for equitable sharing of obligations.

6.2 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) No part of the State Transmission System shall be deliberately isolated from the integrated grid except under the following conditions;
    a) Under emergency conditions in which such isolation would prevent a total grid collapse and / or would enable early restoration of power supply
    b) When serious damage to a costly equipment is imminent and such isolation would prevent the same.

c) When such isolation is specifically instructed by SLDC.

d) On operation of under frequency/islanding scheme as approved by NERPC/NERLDC.

4) In case of isolating of any important element of the State Transmission System under an emergency situation, the same shall be intimated to SLDC at the earliest possible time after the event.

5) Complete synchronization of grid shall be restored as soon as the conditions permit it. The restoration process shall be supervised by SLDC.

6) Any tripping, whether manual or automatic of any transmission lines of 33kV and above or power transformers of 132 KV and above of State Grid shall be promptly reported to the SLDC at the earliest along with the reasons for such tripping and the likely time required for restoration. While restoring the tripped equipment / line, the SLDC shall be informed and get the clearance.

7) Each User and Transmission Licensee shall provide adequate and reliable communication facility internally and with the State Load Despatch Centre, other Users and other Transmission Licensees to ensure exchange of data/information necessary to maintain reliability and security of the grid.

8) User and State Transmission Utility shall send the requested information/data including disturbance recorder/sequential event recorder output etc. to State Load Despatch Centre for purpose of analysis of any grid disturbance/event.

9) All Users, SLDC and STU shall take all possible measures to ensure that the grid voltages always remain within the operating range specified.

10) Users using the Intra-State Transmission System shall make all possible efforts to ensure that the grid voltage always remains within the limits specified in IEGC at clause 5.2 (s).

Voltage (KV rms)		
Nominal	Maximum	Minimum
220	**245**	**198**
132	**145**	**122**
33	**36**	**30**

11) 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.

12) SLDC shall continuously monitor 220, 132KVand 33 KV voltage levels at strategic sub-stations.

13) 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.

i. 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.

ii.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 RLDC to lift Load shedding (if exists) in order to take additional load.

14) 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:

(i) 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 49.95 Hz. 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.

(ii) 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.

(iii) 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%.

b) All other generating units including those with pondage up to 3 hours, solar and wind generators shall be exempted from clause 6.2.1 and following clauses vii, viii and ix till

the situation is reviewed. Provided that if a generating unit cannot be operated under restricted governor mode operation, then it shall be operated in free governor mode operation with manual intervention to operate in the manner required under restricted governor mode operation

c) Special requirements for Renewable Energy

(i) System Operator (SLDC) shall make all efforts to evacuate the available Solar, mini-hydel, co- generation and wind power and other Renewable Energy (RE) sources and treat the plants as must-run stations. However, SLDC may instruct such generator to back down generation in case grid security or safety of any equipment or personnel is likely to be endangered and Renewable Energy (RE) sources shall

comply with the same. For this, Data Acquisition System facility shall be provided by the generator for transfer of information to the SLDC.

(ii) 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.

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

6.3 Demand Estimation

The demand estimates will enable the SLDC to conduct system studies for operational planning purpose.

1) The long term demand estimation and load forecast (for more than 1 year) shall be done by STU. SLDC shall be provided with a copy of the same as and when it is finalized.
2) It shall be the responsibility of all Distribution Licensees to fully cooperate with STU in preparation of demand estimation and load forecast for the entire state.
3) The Distribution Licensees shall provide to the STU their estimates of demand for the year ahead on month-basis at each inter connection point for the next financial year by 31st January of each year. Distribution Licensees shall also provide daily demand on the month ahead at each inter connection point by 25th for the next month.
4) Based on the data furnished by the Distribution Licensees, STU shall make monthly peak and lean period demand estimates for year ahead and daily peak and lean period demand estimates for the month ahead and furnish the same to SLDC.
5) The Distribution Licensee shall provide to SLDC, estimates of loads that may be shed when required, in discreet blocks with details of arrangements of such load shedding.
6) Distribution Licensees shall also furnish realistic category wise demand along with details of essential loads, supply lines to be maintained in rural areas, details of power cuts imposed or to be imposed etc. to STU and SLDC.
7) The SLDC would up to date the demand forecast (in MW as well as MWh) on quarterly, monthly, weekly and ultimately on daily basis which would be used in the day-ahead scheduling.

6.4 Demand Management

This subsection is concerned with the provisions to be made by SLDC to effect a reduction of demand in the event of insufficient generating capacity, and inadequate transfers from external interconnections to meet demand, or in the event of breakdown 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:

a) Variations in demand from the estimated or forecasted values, which cannot be absorbed by the grid;

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

c) Heavy reactive power demand causing low voltages.

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.

6.5 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 RLDC.

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.

6.6 Load Crash

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 neighbouring regions/ states;

iii. Closing down of hydel units (subject to non-spilling of water and effect on irrigation) keeping in view the inflow 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.

While implementing the above, the system security aspects should not be violated as per provisions in Section 6.2 of the Grid Code Regulations.

6.7 Periodic Reports

A monthly report covering performance of the State grid shall be prepared by SLDC and made available on its web site.

The monthly reports shall contain the following: -

a) Frequency profile;

b) Voltage profile of important substations and sub-stations normally having low /high voltages;

c) Major Generation and Transmission Outages and its restoration time;

d) Transmission Constraints;

e) Instances of persistent/significant non-compliance of State Grid Code;

f) Instances of congestion in transmission system;

g) Instances of inordinate delays in restoration of transmission elements and generating units;

h) Non-compliance of instructions of SLDC by distribution licensees / users/ Bulk consumers to curtail drawl resulting in non-compliance of State Grid Code;

i) Total scheduled and actual generation / drawl of the State;

j) Lines/Sub-Stations drawing excessive reactive power.

k) A daily report covering the performance of the State grid shall be prepared by SLDC based on the inputs received from STU, all transmission licensees, all distribution licensees and other Users and shall be put on its website. This report shall also cover the wind power/solar power generation and injection in to grid.

l) Daily and monthly reports shall categorise the grid incidents as GI-1 to GI-2 and grid disturbance as GD-1 to GD-5 based on severity of tripping as per clause 11 of the CEA Grid Standards.

m) Other Reports:

(i) The SLDC shall prepare a quarterly report which shall bring out the system constraints, reasons for not meeting the requirements, if any, of security standards and quality of service, along with details of various actions taken by different persons, and the persons responsible for causing the constraints and summary of monthly reports.

(ii) The SLDC shall also provide information/report to the Operation coordination committee of the SGCRC in the interest of smooth operation of STS.

6.8 Operational Liaison

This Section sets out the requirements for the exchange of information in relation to Operations/events on the grid which might have effect on

(i) Regional Grid

(ii) State transmission system

(iii) System of User

The liaison function is mandatory built in hierarchical function of RLDC, SLDC, Users to facilitate quick transfer of information to operational staff. It will correlate the required inputs for optimization of decision making and actions.

The detailed procedure for operational liaison shall be adopted as per details mentioned in IEGC.

6.9 Outage planning

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 into 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.

The objective are as follows:

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

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

c) 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.

6.9.1 Outage Planning Process

1) The SLDC shall be responsible for analysing 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 then come out with a draft outage programme for the next financial year by 15th January of each year for the State Grid taking into account the draft outage plan for the State given by NERPC Secretariat. This will be done after carrying out necessary system studies and, if necessary, the outage programmes shall be rescheduled. Adequate balance between generation and load requirement shall be ensured while finalising outage programmes.

4) 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.

5) The above annual outage plan shall be reviewed by SLDC on quarterly and monthly basis in coordination with all parties concerned, and adjustments made wherever found to be necessary.

6) In case of emergency in the system, viz., loss of generation, breakdown of transmission line affecting the system, grid disturbances, system isolation, SLDC may conduct studies again before clearance of the planned outage.

7) The detailed generation and transmission outage programmes shall be based on the latest annual outage plan (with all adjustments made to date).

8) Each State Constituent shall obtain the final approval from SLDC prior to availing an outage.

6.9.2 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 also give prior information to the consumers by publishing in the daily newspaper regarding the interruption of supply timings.

6.10 Recovery Procedure

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: -

a) Partial system black out in the state due to multiple tripping of the transmission lines emanating from power stations/sub-stations.
b) Total black out in the state/region.
c) Synchronisation of system islands and system split.

1) Diesel generating (DG) sets of sufficient capacity shall be provided at each power station to meet the start-up power.
2) Synchronizing facility shall be available at all power stations and 220 KV,132,33 KV sub-stations having inter-connection with Inter State Transmission System.
3) In case of partial blackout in the system/state, priority is to be given for early restoration of power station units, which have tripped.
4) 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.
5) 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.

6.11 Restoration Procedure

1) Detailed 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 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.

6.12 Special Considerations

During restoration process following the State Transmission System or Regional System or National Grid System blackout conditions, normal standards of voltage and frequency may not be insisted. Distribution Licensees/ Users with essential loads shall separately identify non-essential components of such loads, which may be kept off during system contingencies. Distribution Licensees shall draw up an appropriate schedule with corresponding load blocks in each case and assign relative priority in restoration of essential loads. The non-essential loads can be put on only when system normalcy is restored, as advised by SLDC.

All Users shall pay special attention to carry out the procedures so that secondary collapse due to undue haste or inappropriate loading is avoided. Despite the urgency of the situation, careful, prompt and complete logging of all operations and operational messages shall be ensured by all users to facilitate subsequent investigation into the incident and the efficiency of the restoration process. Such investigation shall be conducted promptly after the incident and placed before the Grid Code Review Committee in its next meeting.

6.13 Event information

Any of the following events require reporting by Users, Distribution licensees, STU: -

a) Violation of security standards;
b) Grid indiscipline;
c) Non-compliance of SLDC's instructions;

d) System islanding/system split;

e) Regional black out/partial system black out;

f) Protection failure on any element of STS, and on any item on the "agreed list" of the intra-State and inter-state systems;

g) Power system instability;

h) Tripping of any element of the State grid;

i) Sudden load rejection by any User;

j) Exceptionally high / low system voltage or frequency;

k) Serious equipment problem relating to major circuit breaker, transformer or bus bar;

l) Loss of major Generating Unit;

m) Tripping of Transmission Line, ICT (Inter connecting transformer) and capacitor banks;

n) Major fire incidents;

o) Force-Majeure condition like flooding or lightening etc.;

p) Equipment and Transmission Line overload

q) Accidents-Fatal and Non-Fatal;

6.14 Reporting Procedure

All incidents occurring on lines and equipment on & above 33 kV and all the lines on which there is the inter user flow affecting the State Transmission System shall immediately be reported orally on telephone or through power line carrier communication etc. by the User or STU whose equipment has experienced the incident to SLDC. The reporting User or STU shall submit a confirmation report by Telephone message / Fax / E-mail to SLDC within one hour of such oral report. The reporting User shall submit a written report within 2 (two) days of occurrences of the incident to the SLDC by e-mail or by courier or by certified post. SLDC shall suo-moto call for a report from any User on any incident affecting other Users or STU. However, this shall not relieve any User from the obligation to report events in accordance with provisions of the State Grid Code to SLDC / STU.

6.15 Reporting Form

The standard reporting form other than for accidents shall be as agreed from time to time by the State Grid Code Review Committee. The standard reporting form shall be made available in the website of STU and SLDC. A typical form is attached (APPENDIX-G) in the written report

shall be sent to/by Users, STU and distribution licensees as the case may be, in the reporting formats as devised by the SLDC and will confirm the oral notification together with the following details of the event: -

i. Location of incident.
ii. Time and date of incident.
iii. Plant and equipment directly involved.
iv. Details of relay indications with nature of fault implications.
v. Demand / Transmission or Generation (in MW) interrupted and duration of interruption.
vi. Brief description and cause of incident / event.
vii. Estimated time to return to service.
viii. Possibility of alternate arrangement made for restoration of supply
ix. Any other relevant information

6.16 Major Incident

Whenever a major incident such as tripping of generating unit or EHV transmission line, system frequency or voltage outside the statutory limits, system overload, accidents etc. takes place, the User shall inquire and establish the cause of such failure and report to STU / SLDC / Commission. The STU shall submit the report with its comments / remarks to State Grid Code Review Committee within one month for further analysis. On demand by the Commission a detailed report on any major incidents shall be submitted to the Commission by the STU / SLDC.

6.17 Accident Reporting

If any accident occurs in connection with the Generation, Transmission, Distribution of supply or use of electricity or in connection with any part of electric lines or electrical plant of any person and the accident results or is likely to result in loss of human or animal life or any injury to human being or an animal, the same shall be dealt with in accordance with Section 161 of the Electricity Act, 2003.

7 INTER USER BOUNDARY SAFETY

7.1 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.

7.2 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 1956 which are in force for the time being and will be replaced by the rules made under Electricity Act, 2003 when working across the inter user boundary (cross boundary) between one User and another User.

7.3 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 Persons.

7.4 Procedure to work on Inter User Boundary Circuits

i. STU shall issue a list of Designated Persons names, designations and telephone numbers to all Users who have a direct inter user boundary with him. 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.

ii. All Users with a direct inter user boundary with STU shall issue a similar list of their Designated Persons to STU. This list shall be updated promptly whenever there is any change of name etc. in the list.

iii. 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.

iv. 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.

v. The Designated Person (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.

vi. 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.

vii. 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.

viii. 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, and after ensuring that the return of Permit to Work from the working party has taken place.

ix. STU shall develop an agreed written procedure for Inter-User Boundary safety and continuously update it.

x. 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.

7.5 Special Consideration

i. 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.

ii. 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.

7.6 Safety Standards

STU shall prepare their own "Safety Manual" for the maintenance of Transmission Lines, and Substations 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 replacement of equipment's. A maintenance register for all the equipment's including the station batteries shall be maintained at the respective Substations. 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. 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 Substation 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 Substation.

STUs 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. 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.

7.7 Line Clear Permit (LCP):

The formats enclosed shall be used while issuing and returning line clear permit. The Format - I 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" 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.

FORMAT – 1

Serial No. xxxxxxx
REQUISITION FOR LINE CLEAR PERMIT
Date…… ……
Time
I Sri/Srimati……. 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 & 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 Sri/Srimati……..
(Issuing Safety Coordinator) do here by issue permission to Sri/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…….
(Tobe printed on the reverse of LCP: Format-2)

CONDITIONS:

(a)This permit is valid only for working on the Feeder/Equipment mentioned herein and not in any other Feeder/Equipment.

(b)Only authorized persons are allowed to work on Feeder / Equipment for which the permit has been issued.

(c)Works as per requisition only should be carried out.

(d)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.

(e)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.

(f)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.

(g)Only authorized persons should return Line Clear.

(h)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.

(i)The Line Clear issuing authority should go through the checklist of Line Clear Return before accepting it.

(j)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.

(k)Control persons should keep all the required data of LCP issued & 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, Sri/Srimati……. 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
(d)Code Number (If used when Line Clear is returned over phone) ……
Name and Signature……..….
(Person Returning Line Clear Permit)
Designation……...……

8 SCHEDULING AND DESPATCH CODE

8.1 Introduction

This part describes the following:

a) Demarcation of responsibilities between various Intra-State entities and SLDC in Scheduling and Despatch;

b) The Procedure for Scheduling and Despatch;

c) The Reactive power and Voltage control mechanism;

d) Complementary commercial mechanisms

8.2 Objective

This code deals with the procedures to be adopted for scheduling of the net injection/drawls of concerned entities on a day ahead basis with the modality of the flow of information between NERLDC/SLDC/Power exchanges and regional entities. This code also provides the methodology for rescheduling of solar and wind generators which state entities on one and half hourly basis and the methodology of handling deviations of such solar and wind generators. Appropriate meters shall be provided for accounting of charges for deviation under DSM Regulations. Telemetry/Communication system and Data Acquisition System shall also be provided for transfer of information to the concerned SLDC and NERLDC.

8.3 Scope

This code is applicable to SLDC/ISGS/SGS/STU/Transmission Licensees /Distribution Licensees, solar and wind generating station and other concerned persons connected to the state grid.

8.4 Demarcation of Responsibilities

1) In its control area, SLDCs shall have the total responsibility for

i. Scheduling/dispatching their own generation (including generation of their embedded licensees)

ii. Regulating the demand of their consumers

iii. Scheduling their drawl from the SGS (within their share in the respective plant's expected capability)

iv. Arranging any bilateral interchanges, and

v. Regulating their net drawl by each beneficiary from the State Grid

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 overdrawing from the Grid.
4) The 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.
5) While the 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 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.
6) Deviations from the ex-power plant generation schedules shall, however, be appropriately priced through the deviation settlement mechanism regulations CERC. Notwithstanding the above, the SLDC may direct the beneficiaries / SGS 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 some time 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.

7) It shall be incumbent upon the 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 SGS to explain the situation with necessary backup data.
8) 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 interchanges and MVArhdrawals. 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.
9) The SLDC shall be responsible for computation of actual net MWh injection of each SGS and actual net drawl of each beneficiary, 15 minute-wise, 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.
10) 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.
11) 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.
12) 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 (MW and MVAr).
13) SLDC shall inform a 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.

14) SGS shall promptly inform SLDC of the tripping of a Generating Unit, with reasons, SLDC shall intimate RLDC 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

8.5 Scheduling and Dispatch Procedure

1) All intra-State generating stations (SGS) and inter-State generating stations (ISGS), in whose output more than one beneficiary has an allocated/contracted share, shall be duly listed. The station capacities and allocated/contracted shares of different beneficiaries shall also be listed out.
2) By 10 AM every day, the SGS shall advise the SLDC, the station-wise ex-power plant MW and MWh capabilities foreseen for the next day, i.e., from 0000 hrs to 2400 hrs of the following day.
3) The above information of the foreseen capabilities of the SGS along with the entitlements of the State in various ISGS given by NERLDC and the corresponding MW and MWh entitlements of each beneficiary, shall be compiled by the SLDC every day for the next day, and advised to all beneficiaries by 11 AM. The beneficiaries shall review it vis-à-vis their foreseen load pattern and their own generating capability including bilateral exchanges, if any, and advise the SLDC by 1 PM their drawl schedule for each of the SGS/ISGS in which they have shares, long term bilateral interchanges, approved short-term bilateral interchanges and composite request for day-ahead open access and scheduling of bilateral interchanges.
4) The beneficiaries may also give standing instructions to the SLDC such that the SLDC itself may decide the drawl schedules for the beneficiaries
5) After considering the dispatch schedule and net drawl schedule for the State as intimated by NERLDC, by 6 PM each day, the SLDC shall convey:
   i. The ex-power plant "dispatch schedule" to each of the SGS, in MW for different hours, for the next day. The summation of the ex-power plant drawl schedules advised by all beneficiaries shall constitute the ex-power plant station-wise dispatch schedule for ISGS.
   ii. The "net drawl schedule" to each beneficiary, in MW for different hours, for the next day. The summation of the station wise ex-power plant drawl schedules for all ISGS/ISGS and

drawl from State Grid consequent to bilateral interchanges, after deducting the transmission losses (estimated), shall constitute the beneficiary-wise drawl schedule.

6) While finalizing the above daily dispatch schedules for the SGS, SLDC shall ensure that the same are operationally reasonable, particularly in terms of ramping-up/ramping-down rates and the ratio between minimum and maximum generation levels.

7) Scheduling of collective transaction:

(i) The individual transactions for State Utilities/intra-State entities shall be scheduled by the SLDC. Power Exchange(s) will send the detailed breakup of each point of injection and each point of drawal within the State to SLDC after receipt of acceptance from NLDC. Power Exchange(s) will ensure necessary coordination with SLDC for scheduling of the transactions.

(ii) Timeline for above activities will be as per detailed procedure for Scheduling of Collective Transaction issued in accordance with the CERC (Open access in inter-State transmission) Regulations, 2008 and the APSERC [Terms and Conditions for Open Access] Regulations, 2012 as amended from time to time.

8) The beneficiaries / SGS may inform any modifications/changes to be made in station-wise drawl schedule & bilateral interchanges /foreseen capabilities, if any, to SLDC by 9 PM.

9) Upon receipt of such information, the SLDC after consulting the concerned Constituents shall issue the final 'drawl schedule' to each beneficiary and the final 'dispatch schedule' to each SGS by 11.00 PM.

10) 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.

11) 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, in case of low load conditions, the SLDC shall regulate the generation of Renewable energy power plants to maintain Grid security.

12) 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.

13) 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.

14) 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.

15) 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. Also, during the first, second, third, fourth and fifth time blocks of such an event, the scheduled generation of the SGS shall be deemed to have been revised to be equal to actual generation and the scheduled drawls of the beneficiaries shall be deemed to have been revised to be equal to their actual drawls.

16) 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.

17) 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 8th time block,

counting the time block in which the request for revision has been received in the SLDC to be the first one.

18) 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 6thtime block, counting the time block in which the revised schedule is issued by the SLDC to be the first one.

19) 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.

20) SLDC shall properly document all above information i.e. station-wise foreseen ex-power plant capabilities advised by the generating stations, the drawl schedules advised by beneficiaries, all schedules issued by the SLDC and all revisions/updating of the above.

21) 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 SLDC shall forthwith make a complete check and rectify the same.

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

(i) 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 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.

(ii) 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.

(iii) 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.

23) Generation schedules and drawal schedules issued/revised by the State Load Despatch Centre shall become effective from designated time block irrespective of communication success.

24) For any revision of scheduled generation, including post facto deemed revision, there shall be a corresponding revision of scheduled drawls of the beneficiaries.

25) A procedure for recording the communication regarding changes to schedules duly taking into account the time factor shall be evolved by the SLDC.

26) 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.

27) 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.

28) 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.

29) Collective Transaction through Power Exchange(s) would normally be curtailed subsequent to the Short Term Bilateral Transaction(s)

30) 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.

31) 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."

8.6 Reactive Power and Voltage Control

1) Reactive power compensation should ideally be provided locally, by generating Reactive Power as close to the Reactive Power consumption as possible. The beneficiaries are therefore expected to provide local VAr compensation/generation, such that they do not draw VArs from the state grid, particularly under low-voltage conditions. However, considering the present limitations, this is not being insisted upon. Instead, to discourage VAr drawals by beneficiaries, VAr exchanges with Intra-State Transmission System shall be priced as follows:
   a) The beneficiary pays for VAr drawal when voltage at the metering point is below 97%,
   b) The beneficiary gets paid for VAr return when voltage is below 97%,
   c) The beneficiary gets paid for VAr drawal when voltage is above 103%,
   d) The beneficiary pays for VAr return when voltage is above 103%.
2) The charge/payment for VArs 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.
3) The SLDC may issue direction to any generator within the State to increase Var generation/absorption up to the machine capability limit. In general, the beneficiaries shall endeavour to minimize the VAr drawal at an interchange point when the voltage at that point is below 95% of the rated voltage and shall not return VAr when the voltage is above 105%. Transformer taps at the respective drawal points may be changed to control the VAr interchange as per the beneficiary's request to SLDC, but only at reasonable intervals. A beneficiary may also request the SLDC for increase/decrease of VAr generation at a generating station for addressing a voltage problem.
4) VAr exchanges directly between two beneficiaries on the interconnecting lines generally addresses or causes a local voltage problem, and generally do not have an impact on the voltage profile of the State grid. Accordingly, the management/control and commercial

handling of the VAr exchanges on such lines shall be as per following provisions, on case-by-case basis:

a) The two concerned beneficiaries may mutually agree not to have any charge/payment for VAr exchanges between them on an interconnecting line,

b) The two concerned beneficiaries may mutually agree to adopt a payment rate/scheme for VAr exchanges between them identical to or at variance from that specified by the CERC for VAr exchanges with the state transmission system. If the agreed scheme requires any additional metering, the same shall be arranged by the concerned beneficiaries,

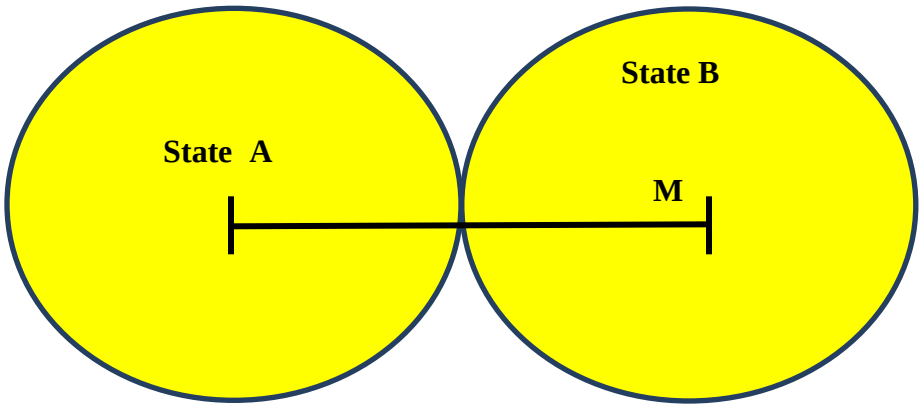
c) The computation and payments for such VAr exchanges shall be effected as mutually agreed between the two beneficiaries.

In case of a disagreement between the concerned beneficiaries (e.g. one party wanting to have the charge/payment for VAr exchanges, and the other party refusing to have the scheme), the scheme as specified below:

Payment for reactive energy exchanges on lines owned by individual entities.

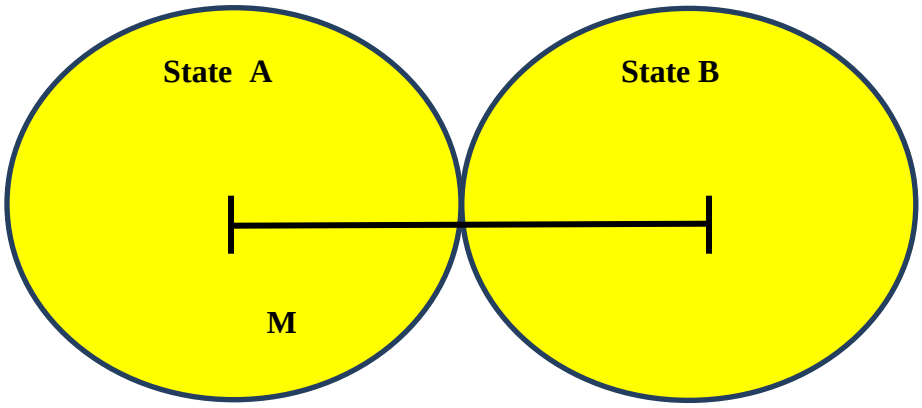
Case- 1: Interconnecting line owned by Entity – A

Metering Point: Substation of Entity – B



Case- 2: Interconnecting line owned by Entity – B

Metering Point: Substation of Entity – A



Entity B pays to Entity A for

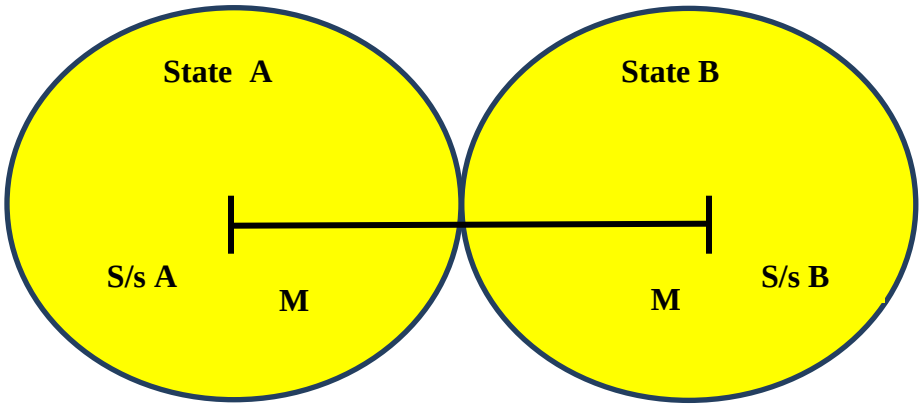
(i) Net VArh received from Entity A while voltage is below 97%

(ii) Net VArh supplied to Entity A while voltage is above 103%

Note: Net VArh and net payment may be positive or negative

Case- 3: Interconnecting line jointly owned by Entity – A & B

Metering Point: Substations of Entity - A & Entity - B



Net VArh exported from S/s-A, while voltage < 97% = X1

Net VArh exported from S/s-A, while voltage > 103% = X2

Net VArh imported at S/s-B, while voltage < 97% = X3

Net VArh imported at S/s-B, while voltage > 103% = X4

(i) State-B pays to State-A for X1 or X3, whichever is smaller in magnitude, and

(ii) State-A pays to State-B for X2 or X4, whichever is smaller in magnitude.

Note:

1. Net VArh and net payment may be positive or negative.

2. In case X1 is positive and X3 is negative, or vice-versa, there would be no payment under (i) above.

2. In case X2 is positive and X4 is negative, or vice-versa, there would be no payment under (ii) above.

9 PROTECTION & METERING

9.1 Introduction

In order to safeguard 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 Central Electricity Authority (Technical Standards for Construction of Electrical Plants & Electric Lines) Regulations, 2010(as amended from time to time)

9.2 Objective

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

9.3 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.
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) Protective Relay settings shall not be altered, or protection relays bypassed and/or disconnected without consultation and agreement between all Users. In case where protection is bypassed 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 forthwith.
4) Protection Coordination
    i. The settings of protective relays starting from the generating unit up to the remote end of 33 KV line shall be such that only the faulty section is isolated under all circumstances. 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.
    ii. Malfunctioning of any protective relay shall be intimated to the State Grid Code Review Committee immediately for analysing and to recommend necessary corrective actions.

iii. 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.

iv. At all places where protection schemes are installed, they have to be exhibited in single line diagram.

v. Copies of the specifications of all the protection relays installed shall be provided at all places where such relays are installed.

9.4 Fault Clearance Times & Short-time Ratings

From stability consideration, the minimum short circuit current rating and time for switchgear and the maximum fault clearance times for faults on any User's system directly connected to the State Transmission System, or any faults on the State Transmission System itself, should be as follows:

S.No	Nominal Voltage (kV rms)	Maximum Time(in milli seconds)
1	220 & 132 kV	160
2	33 kV	300

Lesser fault clearance time than the above are preferable. 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 Consumers 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.

9.5 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.

9.6 Transmission Line Requirement

1) **HV/EHV/UHV** line emanating from a generating station or a substation or a switching station shall necessarily have distance protection along with other protection as per the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 and CBIP manual on Protection of Generators, Generator Transformers and 220kV and 400 kV networks vide publication 274 (revised).

2) **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 ofzone-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.
3) **132 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.
4) **33kV Lines**: All 33 KV lines at connection points / Interface points shall be provided with a minimum of over current and earth fault relays as follows:

(i) Radial Feeders:

Directional over current and Earth Fault Relays with suitable settings to obtain discrimination between adjacent relay settings.

(ii) Parallel / Ring Feeders:

Directional Time Delay over current and Earth Fault Relays. For short transmission radial lines, appropriate alternative protection schemes may be adopted.

(iii) Long Feeders/Transformer Feeders

For long feeders or transformer feeders, the relays should incorporate a high set instantaneous element (timer, relay).

(iv) The distance relay can also be applied for 33 KV network.

5) **Distribution Lines**: All the 33 kV and 11 kV lines at Connection Points/ Interface Points shall be provided with a minimum of over current and earth fault relays.

9.7 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 220 kV 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 and 33 kV class transformers of capacity above 5 MVA, the protection shall be same as mentioned in 9.7 (1) except over-fluxing, REF and PRV relays. However, REF shall also be provided for transformers of capacity equal to or more than 20 MVA.

iii) For 33 kV class power transformers less than or equal to 5 MVA provided on either transmission or Distribution System, over-current with high set instantaneous element along with auxiliary relays for transformer trip and alarm functions as per transformer requirements, shall be provided. In addition to electrical protection, buchholz relays, winding temperature protection and oil temperature protection 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.

9.8 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 confirming 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 provided at all 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 installed 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.

9.9 Calibration and Testing

The protection scheme shall be tested at each 220 KV, 132 KV,33 KV substation by STU and Users once in six months or immediately after any major fault, whichever is earlier. Testing and calibration of all protection schemes pertaining to generating units/stations shall be the responsibility of respective SGS.

9.10 Data Requirements:

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

9.11 Metering Code

This minimum requirement and technical standards of metering for commercial and operational purpose at connection points/ interface points to be provided by Users and STU including, Generating Companies, Distribution Licensees and Open Access Consumers and EHV Consumers of Distribution Licensees directly connected to the State Transmission System. Relevant features, parameters, standards and protocols adopted shall be in line with IEGC, Central Electricity Authority Installation & Operation of Meters Regulations 2006 (As amended from time to time).

10 DATA REGISTRATION

10.1 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.

10.2 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.

10.3 Data to be registered

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

10.4 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.

10.5 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. 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.

10.6 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.

10.7 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.

11 MISCELLANEOUS

11.1 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.

11.2 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 despatch 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 with in the required time-scale.

11.3 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.

11.4 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.

11.5 Power to Amend

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

12 APPENDIX

13 APPENDIX-A-STANDARD PLANNING DATA

Standard planning data (hydro generation)

I. General

S.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

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

III. Station capacity

S.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

S.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 & Type
		Rating (MVA)
		Speed (RPM)
		Terminal voltage (KV) Rated Power Factor

		Reactive Power Capability (MVAr) 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)
v	Generator- Transformer	Type
		Make
		Phases
		Rated Capacity (MVA)
		Voltage Ratio HV/LV
		Tap change Range (+% to -%)
		Percentage Impedance (Positive
		Sequence at Full Load).

1. **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:

S.No	Particulars	Details
i	Name of the Line (indicating generating stations and substation 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)	Resistance/KM Inductance Reactance/KM Susceptance/KM
vii	Approximate Power Flow MW & MVAr	
viii	Line Route (Topographical sheets)	
ix	Purpose of Connection	Reference to scheme, wheeling to other states
x	Approximate Period of Construction	

2. STANDARD PLANNING DATA (DISTRIBUTION)

(To be furnished by distribution utility to STU)

I. General

S.No	Particulars	Details
i	Area Map (to scale)	Furnish map of Arunachal Pradesh duly marked 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

S.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 substation feeding the connection points/Interface points	

III. Lines and substations

S.No	Particulars	Details
i	Line Data	Furnish Length of Line and voltages(EHV level)
ii	Substation Data	Furnish Transformer details of 132/33 kV, 33/11kV

IV. Loads

S.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)

S.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

S.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.	

14 APPENDIX-B-DETAILED PLANNING DATA

Detailed Planning Data (Hydro Generation)

I. General

S.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	
viii.	Single Line diagram of generating station and switch yard	
ix.	Relaying and metering diagram	
x.	Neutral Grounding of Generator	
xi.	Excitation Control	
xii.	Earthing arrangement with earth resistance values	
xiii.	Communication-details of PLCC and other communication equipment installed.	

II. Protection

S.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.

S.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.

S.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	

IV. Generator units

1. Parameters of Generating units:

S.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

S.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.	Output voltage of control amplifier	
x.	Maximum output voltage of control amplifier	
xi.	Time constant for Feedback	
xii.	Minimum output voltage of control amplifier	

3. Parts of Governor/Turbine

S.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

S.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

S.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

S.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) No. of circuits c) Point of Connection.	

7. RESERVOIR DATA

S.No	Particulars	Details
i.	Dead Capacity	
ii.	Live Capacity	

1. DETAILED SYSTEM DATA (TRANSMISSION)

(For STU and Transmission Licensees)

I. General

S.No	Particulars	Details
i.	Single line diagram of the Transmission System down to 132,33KV 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 along with additional loads. b) Lightning Arrestors	
x.	Bus or Line reactors.	

II. Sub-station layout diagrams showing:

S.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. d)Isolating switches	

III. LINE PARAMETERS (for all circuits)

S.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 i. Operating voltage (KV). ii. Positive Phase sequence reactance (pu on 100 MVA) X1 iii. Positive Phase sequence resistance (pu on 100 MVA) R1 iv. Positive Phase sequence susceptance (pu on 100 MVA) B1 v. Zero Phase sequence reactance (pu on 100 MVA) X0 vi. Zero Phase sequence resistance (pu on 100 MVA) R0 vii. Zero Phase sequence susceptance (pu on 100 MVA) B0	

IV. Transformer parameters (For all transformers substation wise)

S.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)

S.No	Particulars	Details
xi.	Circuit Breakers	
xii.	Isolating switches	
xiii.	Current Transformers	
xiv.	Potential Transformers /CVTs	
xv.	Lightning arrestors	
xvi.	Earthing switches	

VI. Relaying and metering

S.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

S.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)

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

IX. Reactive compensation equipment

S.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.

S.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, 33/0.4kVsubstations, 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

S.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)	

15 APPENDIX-C-OPERATIONAL PLANNING DATA

Operational planning data

I. Outage Planning Data

1) Demand Estimates (For Distribution Licensees)

S.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

S.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)

i. Generator outage programme for (SGS)

S.No	Particulars	Due Date & Time
iv.	Identification of Generating Unit.	15th November each year
v.	MW, which will not be available as a result of Outage.	15th November each year
vi.	Preferred start date and start-time or ranges of start dates and start times and period of outage.	15th November each year
vii.	If outages are required to meet statutory requirement, then the latest – date by which outage must be taken.	15th November each year

ii. Affecting Intra – State Transmission System

S.No	Particulars	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

iii. Year ahead CPP's outage programme (Affecting Intra – State Transmission System)

S.No	Particulars	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

iv. Year ahead Distribution Licensees outage programme

S.No	Particulars	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

v. STU's Overall outage programme

S.No	Particulars	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)

S.No	Particulars	Due date/ Time
i.	Day ahead Hourly block-wise MW/MVAr availability(00.00 - 24.00 Hours).	09.00 hrs
	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).	

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)

S.No	Particulars	Due date/ Time
iii.	Generators and IPPs shall submit to STU up-to-date capability curves for all Generating Unit.	On receipt of request from STU / SLDC.
iv.	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)

S.No	Particulars	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)

S.No	Particulars	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)

S.No	Particulars	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

16 APPENDIX-D- PROTECTION DATA

I. Protection

S.No	Particulars	Due date/ Time
i	Generators/CPPs/IPPs 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, Transmission under sub-section “Relaying and Metering” in relation to Connection with any User.	As applicable to Detailed Planning Data

17 APPENDIX-E- METERING DATA

I. Metering

S.No	Particulars	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

18 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 responsibility**	**Remarks**
Switchyard(kV)						
All equipment including bus bars						
Feeders						
Generating units						

19 APPENDIX-G-INCIDENT REPORTING (OTHER THAN ACCIDENTS)

1.	First Report	Date: Time:
S.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	