PUNJAB STATE ELECTRICITY REGULATORY COMMISSION

Notification

The 14th February, 2013

No.PSERC/Secy./Regu. 80 –In exercise of the powers conferred by Section 181 read with Section 86(1)(h) of the Electricity Act, 2003 (Central Act 36 of 2003) and all other powers enabling it in this behalf, the Punjab State Electricity Regulatory Commission hereby makes the following Regulations namely :-

A. Short title, extent and commencement

(i) These Regulations may be called the Punjab State Electricity Regulatory Commission (Punjab State Grid Code) Regulations, 2013, in short, "State Grid Code (SGC)".

(ii) These Regulations shall come into force with effect from the date of their publication in the official gazette of the Government of Punjab.

(iii) These Regulations shall extend to whole of the State of Punjab.

B. Definitions

(i) In this code, unless the context otherwise requires, terms will have meaning as defined hereunder:-

Defined Term	Definition
Act	The Electricity Act, 2003 (Central Act No. 36 of 2003), as amended from time to time
Active Energy	Active Energy means the electrical energy produced, flowing or supplied by an electrical circuit during a time interval, and being the integral of the instantaneous power with respect to time, measured in units of watt hours or standard multiples thereof. Unless otherwise qualified, the term "energy" refers to active energy.
Active Power	Active Power means the product of voltage and the in-phase component of alternating current measured in units of watts and standard multiples thereof.
Ancillary Services	In relation to power system (or grid) operation, the services necessary to support the power system (or grid) operation in maintaining power quality, reliability and security of the grid, e.g. active power support for load, reactive power support, black start, etc.
Apparatus	Electrical apparatus and includes all machines, fittings, accessories and appliances in which conductors are used.
Apparent Energy	Apparent Energy means the integral of the Apparent Power with respect to time. It is measured in Volt Ampere hour and standard multiples thereof.

Apparent Power	Apparent Power means the product of the root-mean-square (RMS) or effective value of the current and the root-mean-square value of the voltage. For AC circuits or systems, it is the square root of the sum of the squares of the active and reactive power and is measured in kilo volt-ampere (kVA) or multiples thereof.
Appendix	An Appendix to a Section of the State Grid Code.
Area Load Despatch Centre (ALDC)	Area Load Despatch Centre means a computerized load despatch centre of PSTCL which reports to SLDC.
Area of Supply	Area within which a Distribution Licensee is authorised by his license to supply electricity.
Automatic Voltage Regulator (AVR)	A continuously acting automatic excitation control system to control the voltage of a Generating Unit as measured at the Generator Terminals.
Available Transfer Capability (ATC)	The transfer capability of the inter-control area transmission system available for scheduling commercial transactions (through long term access, medium term open access and short term open access) in a specific direction, taking into account the network security. Mathematically, ATC is the Total Transfer Capability less Transmission Reliability Margin.
Backing Down	SLDC instructions or NRLDC instructions conveyed through SLDC for reduction of generation from generating unit under abnormal conditions such as high frequency, low system demand or network constraints.
Base Computer System (BCS)	BCS means Base Computer System meant to handle the data downloaded from ABT meters through CMRI or through remote communication network, converts downloaded raw data into standard output format and processes data for various calculations, analysis and display.
Beneficiary	A person who has a share in State Generating Station/Inter-State Generating Station
Bilateral Transaction	A transaction for 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 specified point of injection to a specified point of drawal for a fixed or varying quantum of power (MW) for any time period during a month.
Black Start Procedure	The procedure necessary to recover from a total or partial blackout in the State.
Board	The Board refers to erstwhile Punjab State Electricity Board (PSEB).
Breakdown	An occurrence relating to equipment of supply system which prevents its normal functioning
Captive Power Plant (CPP)	For the purpose of State Grid Code, the Power Station that is captive power plant as defined in Electricity Act,2003, which meets the criteria laid out in Section 3 of the Electricity Rules, 2005 (framed under Section 176 of the Act)
CEA/Authority	Central Electricity Authority
CEA Grid Standards	Central Electricity Authority (Grid Standards) Regulations 2010, as amended from time to time

CEA Meter Regulations	Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006, as amended from time to time
CEA Safety Regulations	Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations 2010, as amended from time to time
Central Generating Station	The generating stations owned by the companies owned or controlled by the Central Government.
Central Transmission Utility (CTU)	The utility notified by the Government of India under sub-section (1) of Section 38 of the Act.
Collective Transaction	A set of transactions discovered in power exchange through anonymous, simultaneous competitive bidding by buyers and sellers.
Common Meter Reading Instrument (CMRI)	CMRI means a common meter reading instrument with necessary accessories capable of downloading data/information from various makes of AC static energy meters when loaded with the corresponding meter specific downloading software(s) called meter reading instrument program(s). (Note: The CMRI can extract information about energy data, load survey data, billing parameters, meter status, meter anomaly and tamper data from the memory of the meter and store for retrieval at a later stage.)
Congestion	Situation where the demand for transmission capacity exceeds the Available Transfer Capability.
Connection	The electric lines and electrical equipment used to effect a Connection of a User's system to the State Transmission System.
Connection Agreement	An Agreement between STU / intra-state transmission licensee other than STU (if any) and any person setting out the terms relating to a connection to and/or use of the State Transmission System.
Connection Conditions	The technical conditions to be complied with by any User having a Connection to the State Transmission System as laid down in Section 4 "Connection Conditions" of the State Grid Code.
Connection Point	An electrical point at which a User's Plant and/ or Apparatus connects to the State Transmission System.
Connectivity	The state of getting connected to the State Transmission System by a generating station, including a captive generating plant, a EHV consumer or a state transmission licensee.
Control Area	An electrical system bounded by interconnections (tie lines), metering and telemetry which controls its generation and/or load to maintain its interchange schedule with other control areas whenever required to do so and contributes to frequency regulation of the synchronously operating system.
Consumer	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 the 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.
Demand	The demand of active power (MW) and reactive power (MVAR) of electricity unless otherwise stated.
Demand response	Reduction in electricity usage by end customers from their normal consumption pattern, manually or automatically, in response to high UI charges being incurred by the State due to overdrawal by the State at low frequency, or in response to congestion charges being incurred by the State for creating transmission congestion, or for alleviating a system contingency, for which such consumers could be given a financial incentive or lower tariff.
Designated Officer	A person identified as having responsibility for inter User boundary safety under Section 9 of the State Grid Code.
Despatch Instruction	An instruction by SLDC to State Generating Station (other than CPP) to despatch generation and to Distribution Licensee to regulate drawal in accordance with the Scheduling & Despatch procedure of State Grid Code.
Disconnection	The act of physically separating a User's or EHV Consumer's electrical equipment from the State Transmission System.
Distribution Control Centre (DCC)	The office & associated facilities established by the Distribution Licensee to coordinate with SLDC and carry out the functions as laid down in the SGC
Distribution Licensee	Licensee authorised to operate and maintain a distribution system for supplying electricity to the consumers in the area of supply and includes PSPCL/other deemed distribution licensee(s).
Distribution System	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.
Drawal	The import from, or export to, State transmission system/Inter-State Transmission System, of electrical energy and power or both active/ reactive power.
EHV Consumer	A person to whom electricity is provided and who has a dedicated supply above 33kV under normal conditions.
Event	An unscheduled or unplanned occurrence on a Grid including faults, incidents and breakdowns.
Event Logging Facilities	A device provided to record the chronological sequence of operations, of the relays and other equipment.
Ex-Power Plant	Net MW/MWh output of a generating station, after deducting auxiliary consumption and transformation losses.
External Interconnection	Electric lines and electrical equipment used for the transmission of electricity between the State Transmission System and the Regional Transmission System and other states' systems.
Extra High Voltage (EHV)	Where the voltage exceeds 33 kV under normal conditions, subject, however, to the percentage variation allowed by the Authority;

Fault Locator (FL)	A device provided at the end of a transmission line to measure/ indicate the distance at which a line fault may have occurred.
Flexible Alternating Current Transmission System (FACTS)	Power electronics based system and other static equipment that provide control of one or more AC transmission system parameters to enhance controllability and increase power transfer capability.
Force Majeure	Any event which is beyond the control of the persons involved which they could not foresee or with a reasonable amount of diligence could not have foreseen or which could not be prevented and which substantially affects the performance by person including but not limited to :- 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) Grid's failure not attributable to the person
Forced Outage	An outage of a Generating Unit or a transmission facility due to a fault or other reasons which has not been planned
Generating Company	A Generating Company means any company or body corporate or association or body of individuals, whether incorporated or not, or artificial juridical person, which owns or operates or maintains a generating station and includes PSPCL and its successor generation entity.
Generating Unit	The combination of an alternator and a turbine set (whether steam, gas, liquid fuel, water or wind driven) or a reciprocating engine and all of its associated equipment, which together represents a single electricity generating machine.
Generator	A person or agency who generates electricity and who is subjected to State Grid Code either pursuant to any agreement with STU or otherwise and include SGS and ISGS
Grid	Grid means the high voltage backbone system of inter-connected transmission lines, sub-stations and generating plants.
Grid Contingencies	Abnormal operating conditions brought out by tripping of generating units, transmission lines, transformers or abrupt load changes or by a combination of the above leading to abnormal voltage and/or frequency excursions and/or overloading of network equipment.
Grid Disturbance	Grid Disturbance is the situation where disintegration and collapse of grid either in part or full take place in an unplanned and abrupt manner, affecting the power supply in a large area of the region.
Independent Power Producer (IPP)	Independent Power Producer means a Power Station within the State, owned by a Generator who is not part of PSPCL, STU, BBMB or Central Sector Generation and is not classified as a CPP and for the purpose of State Grid code having connection to State Grid.

Indian Electricity Grid Code (IEGC)	Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations 2010 as amended from time to time
Inter Connecting Transformer (ICT)	Transformer connecting EHV system of different voltage levels.
'Interface Meter'	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 State Transmission System who have to be covered under ABT and have been permitted open access by the Commission.
Inter-State Generating Station (ISGS)	A Central generating station or other generating station, in which two or more states have shares;
Inter-State Transmission System (ISTS)	(i) any system for conveyance of electricity by means of a main transmission line from territory of one state to another state; (ii) the conveyance of electricity across the territory of an intervening state as well as conveyance within the state, which is incidental to such inter-state transmission of energy; (iii) the transmission of electricity within the territory of a state on a system built, owned, operated, maintained or controlled by the CTU.
Licensee	Licensee means a person who has been granted a Licence under section 14 of the Act including a deemed licensee and shall interalia also include PSPCL or its successor entities.
Load	The MW/MWh/MVAR/MVARh consumed by a utility/ installation
Load Crash	Sudden or rapid reduction of electrical load connected to a system that could be caused due to tripping of major transmission line(s), feeder(s), power transformer(s) or natural causes like rain etc.
Load Survey Data	Load survey data is a database of load values defined in terms of Watt, VAr or VA (or multiples thereof) during each predefined interval of time.
Long –term Access	The right to use the transmission system of STU/ transmission licensee and/or inter-State transmission system for a period exceeding 12 years but not exceeding 25 years.
Maximum Continuous Rating (MCR)	The normal rated full load MW output capacity of a Generating Unit, which can be sustained on a continuous basis at specified conditions.
Medium-term customer	A person who has been granted medium-term open access.
Medium-term Open Access	The right to use the transmission system of STU/ transmission licensee and/or inter- State transmission system for a period exceeding 3 months but not exceeding 3 years.
Merit Order Operation	Priority order of various generating units under BBMB/ ISGS/ SGS, operating in synchronism with Northern Grid System, compiled by SLDC pursuant to schedule and despatch requirements, generally in ascending order of variable cost of energy.

Meter	Meter means a device for measurement of bi-directional/uni-directional active energy, reactive energy, apparent energy, active power, reactive power (lag/lead), apparent power, currents, voltages, power factor, frequency and any other electrical parameter derived out of these measurements. Meter shall be capable to record the various parameters as may be required for a particular category of the consumers on the basis of tariff applicable from time to time.
Metering Point	Metering point means the physical location of current and voltage sensing devices (i.e. CTs, VTs) and meters at which electricity is metered.
Metering System	Metering System means set of meters, measurement transformers (CTs & VTs), metering protection equipment including alarms, circuitry and their associated data collection outstations, communication system and wiring which are part of the measuring equipment at or relating to a site.
National Grid	The entire inter-connected electric power network of the country.
Net Drawal Schedule	The drawal schedule of a distribution licensee, open access consumer, generating station or Regional Entity after deducting the apportioned transmission losses (estimated).
Northern Region / Region	Region comprising of the States and Union Territory of J & K, Punjab, Himachal Pradesh, Haryana, Chandigarh, Uttarakhand, Uttar Pradesh, Rajasthan and Delhi.
Northern Regional Grid System	Northern Regional Grid System means power systems of SEBs/ PSPCL/PSTCL/Utilities/ IPP/ CPPs/Open Access Customers of the States of the Northern Region and of BBMB, NTPC, NHPC, NPC, SJVNL, THDCL & PGCIL having integrated operation.
Open Access	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 Commission
Open Access Consumer	Open Access Consumer means a consumer who is eligible to receive supply of electricity from a person other than the distribution licensee of his area of supply
Open Access Customer	Open Access Customer means a consumer permitted by the Commission to receive supply of electricity from a person other than distribution licensee of his area of supply, and the expression includes a generating company or a licensee, who has availed of or intends to avail of open access
Outage	In relation to a Generator/ Transmission/ Distribution facility, an interruption of power supply whether manually or by protective relays in connection with the repair or maintenance of the SGS/Transmission facility or resulting from a breakdown or failure of the Transmission /Distribution facility/SGS unit or defect in its Auxiliary system.
Peak Period	That period in a day during which power demand is at its highest.

Planned Outage	An Outage in relation to a SGS unit for Power Station Equipment or Transmission facility which has been planned and agreed with SLDC, in advance in respect of the year in which it is to be taken.
Power Station	An installation of one or more Generating Units (even when sited separately) owned and/or operated by the same SGS and which may reasonably be considered as being managed as a single integrated generating complex.
Power System	All aspects of generation, transmission, distribution and supply of electricity and includes one or more of the following, namely: (a) generating stations; (b) transmission or main transmission lines; (c) sub-stations; (d) tie-lines; (e) load despatch activities; (f) mains or distribution mains; (g) electric supply-lines; (h) overhead lines; (i) service lines; (j) works;
Protocol	Protocol is the software implemented to exchange the information with external device or equipment through interfacing communication port.
PSERC / Commission	PSERC/Commission refers to Punjab State Electricity Regulatory Commission functioning under section 82 of the Act.
PTW (Permit to Work)	Safety documentation issued to any person to allow work to commence on inter-user boundary after satisfying that all the necessary safety precautions have been established.
Reactive Energy	Reactive Energy means the integral of the Reactive Power with respect to time. It is measured in volt-amperes reactive hours and standard multiples thereof.
Reactive Power	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.
Reactor	An electrical facility specifically designed to absorb Reactive Power.
Regional Transmission System	The combination of EHV transmission lines and associated electrical equipment owned or operated by transmission and distribution licensees in the region.
Remote Transmitting Unit (RTU)	RTU means a unit for data transmission in digital and sequential mode i.e. to transmit low level analogue / digital signals from transducers, switches, relays etc. connected to it and to transmit received signal to devices connected to it
Rotational Load Shedding	Planned Disconnection of customers on a rotational basis during periods when there is a significant short fall of power required to meet the total demand.
Section	A section or part of this State Grid Code, which is, identified as covering a specific topic.

Short-term open Access	Open access for a period up to one (1) month at one time.
Shut Down	The condition of a Generating Unit where it is at rest or on barring gear isolated from Grid or Transmission facility, which is at rest or isolated from Grid.
Simultaneous Maximum Demand (SMD)	For a given demand period, sum of individual demands across all interface points in a Distribution System gives simultaneous demand of a Distribution Licensee for a given period. SMD means the maximum demand value out of all such simultaneous demands for a month (i.e. maximum demand value out of 4 x 24 x 30 = 2880 periods in a 30 day month for demand period of 15 minutes)
Spinning Reserve	Unloaded generating capacity, which is synchronised to the System and is ready to provide increased generation at short notice pursuant to despatch Instruction or instantaneously in response to frequency drop.
State	The State of Punjab.
State Entity	Such persons who are in the control area of SLDC & whose metering and energy accounting is done at the state level.
State Generating Station (SGS)	State Generating Station (SGS) means a power station within the State, except Inter-State Generating Station (ISGS) located within the State. This includes IPP and CPP
State Grid Code / Grid Code	The State Grid Code specified under clause (h) of sub-section (1) of section 86 of the Electricity Act,2003.
State Grid Code Review Committee(SGCRC)/Committee	The Committee set up under Section 2 “Management of State Grid Code” of State Grid Code.
State Load Despatch Centre (SLDC)	The State Load Despatch Centre means the load despatch centre established under sub-section (1) of section 31 of the Act and having its location at Ablowal (Patiala). This includes any back up SLDC also.
State Transmission System (STS)	The system of EHV electric lines and electrical equipment operated and/or maintained by STU or any Transmission Licensee for the purpose of the transmission of electricity within the state.
State Transmission Utility (STU)	The Board or Government Company specified as such by the Government of Punjab under sub-section (1) of section 39 of the Electricity Act, 2003.
Supervisory Control and Data Acquisition (SCADA)	The combination of transducers, RTU, communication links and data processing systems, which provides information to the SLDC on the operational state of the State Transmission System.
Synchronised	The condition where an incoming Generating Unit or System is connected to another System so that the voltage, 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 and the terms “Synchronise” and “Synchronisation” shall be construed accordingly.
Time Block	Block of 15 minutes each for which Special Energy Meters record values of specified electrical parameters with first time block starting at 00.00 Hrs.

Transmission Licence / Licence	The Licence to be granted by the Commission under section 14 of Electricity Act, 2003.
Transmission Planning Criteria	The policy, standards and guidelines issued by the CEA for the planning and design of the Transmission system.
Transmission Reliability Margin (TRM)	The amount of margin kept in the total transfer capability necessary to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in system conditions.
Unscheduled Generation	The difference between the actual generation and the scheduled generation.
Unscheduled Interchange (UI)	In a time block for a generating station or a seller means its total actual generation minus its total scheduled generation and for a beneficiary or buyer means its total actual drawal minus its total scheduled drawal.
User	A person such as a Generating Company including Captive Generating Plant or Transmission Licensee (other than the Central Transmission Utility and State Transmission utility) or Distribution Licensee (including PSPCL) or EHV Consumer or Open Access Consumer, whose electrical plant is connected to the State transmission system at a voltage level 33kV and above.

(ii) a) Words and expressions used in this Grid Code and not defined herein but defined in the Act/ Indian Electricity Grid Code (IEGC) shall have the meaning assigned to them under the Act /Indian Electricity Grid Code (IEGC).

b) Words and expression used in this Grid Code and not defined in this Grid Code or Act or IEGC shall have accepted engineering / dictionary meaning.

c) Terms defined in singular or plural, as the case may be, shall be construed to apply for plural or singular respectively also.

C. ABBREVATIONS

Abbreviation	Stand for
BBMB	Bhakra Beas Management Board
PSEB	Punjab State Electricity Board
CBIP	Central Board of Irrigation & Power
CERC	Central Electricity Regulatory Commission
IED	Intelligent Electronic Device
LGBR	Load Generation Balance Report
NHPC	National Hydroelectric Power Corporation Limited.
NPC	Nuclear Power Corporation of India Limited.
NRLDC	Northern Regional Load Despatch Centre.
NRPC	Northern Regional Power Committee
NTPC	National Thermal Power Corporation Limited.
PGCIL	Power Grid Corporation of India Limited.
PSERC	Punjab State Electricity Regulatory Commission
PSPCL	Punjab State Power Corporation Limited
PSTCL	Punjab State Transmission Corporation Limited
SJVNL	Satluj Jal Vidyut Nigam Limited
THDCL	Tehri Hydro Development Corporation Limited
VAr	Volt Ampere reactive

PART WISE STATE GRID CODE CONTENTS

SECTION WISE STATE GRID CODE CONTENTS

PART IV-SCHEDULING AND DESPATCH CODE

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PART I - GENERAL

STATE GRID CODE – REVISION SHEET

REVISION NUMBER	DATE ISSUED	SECTION (S) REVISED	BRIEF STATEMENT OF CHANGE

SECTION 1 – GENERAL

1.1 Introduction

In compliance with section 86 (1) (h) of the Electricity Act, 2003 the Punjab 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.

The State Grid Code lays down the rules, guidelines and standards to be followed by all Users of the State Grid and STU/SLDC to operate and maintain an efficient and coordinated power system in the State in integration with the Northern Regional Grid as per the provisions of Indian Electricity Grid Code (IEGC). The State Grid Code further lays down what is technically optimal with respect to operation and defines standards and common terms to reduce ambiguity and avoid discrimination.

The State Load Despatch Centre (SLDC) shall 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 CEA Grid Standards and the State Grid Code/ Indian Electricity Grid Code.

1.2 Objectives

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:

- To provide clarity and certainty to the STU, State Generating Stations (SGS) other than inter-state generating stations, including Independent power plants (IPPs) /Captive Power Plants (CPPs) within Punjab, Distribution Licensees, Transmission licensees and Open Access Consumers by stating their respective roles, responsibilities and obligations with respect to the operation of the State Transmission System.
- To improve the grid stability and set minimum standards of system performance.
- To define requirement for new entrants i.e. future new generating companies, licensees, CPPs and consumers.
- To document the common knowledge or normal practice in writing for ease of reference and help in compliance.
- To lay down in consultation with generators, performance characteristics of generating plants.
- To improve co-operation by providing a mechanism for clear and consistent disclosure of all information.
- To provide a level playing field.
- To indicate how generation and load is to be scheduled and despatched.
- To actually enforce what is verbally agreed.

1.3 Scope

1.3.1 State Grid Code defines the boundary between STU and Users and establishes the procedures for operation of facilities connected to the State Grid.

1.3.2 All Users that connect with and/or utilize the State Transmission System are required to abide by the principles and procedures as laid down in the State Grid Code in so far as they apply to that User.

1.3.3 The State Grid Code shall be complied with by SLDC as the apex body to ensure integrated operation of power system in the state, STU in its capacity as holder of the Transmission Licence, transmission licensee, State Generating Station (SGS), Distribution Licensees including EHV consumers and Open Access Consumers connected directly with STS in the course of generation, transmission, supply and utilisation of electricity.

1.3.4 The State Grid Code shall come into effect from the date of publication in the official gazette of Government of Punjab.

1.4 Structure of State Grid Code

The State Grid Code comprises of following parts:

Part I- General

This section includes :

- Management: The State Grid Code is a live document and has to be periodically reviewed by a competent panel as and when required in the light of experience gained and difficulties faced from time to time. This section formulates the procedures for the same. It also defines the roles and functions of various agencies to ensure that all other sections of the State Grid Code work together in the management of the State Grid Code.
- Review Procedures: specify a procedure for review of State Grid Code to cater to inadvertent omissions and any modifications needed from time to time.

Part II- Planning Code

Planning Code includes sections on:

- System Planning: specifies the procedures to be applied by STU in the planning and development of the State Transmission System and by other Users connected or seeking Connection to the State Transmission System.
- Procedures: specify procedures to be followed by STU in the development of the State Transmission System in the long term taking into account the requirements for new connection of generation and demand.
- Connection Conditions: specifies the technical requirements and standards to be complied with by STU and other Users connected or seeking Connection to the State Transmission System.

Part III- Operating Code

Operating Code specifies the conditions under which STU and transmission licensee shall operate the State Transmission System, the Generating Companies shall operate their Power Stations and the Distribution Licensees shall operate their Distribution Systems in so far as necessary to protect the security and quality of supply and safe operation of the State Transmission System under both normal and abnormal operating conditions. This code

includes sections on:-

- System Security: describes the general security aspects to be followed by generating companies, STU and all other Users of the State Grid.
- Operational Planning: describes the process by which SLDC carries estimation of the demand in its control area and methodology for demand control for ensuring grid security.
- Outage Planning: describes the process by which SLDC shall carry out the planning of outage in the STS in a coordinated and optimal manner.
- Contingency Planning**:** describe the steps to be followed by all Users for recovery in case of total or partial blackouts of STS
- Inter-User Boundary Safety**:** describes the procedure to be followed for maintaining safe working practices associated with inter-user boundary operation.
- Event/Accident Reporting**:** describes the reporting procedure of reportable events in the STS

Part IV- Scheduling and Despatch Code

- Schedule and Despatch: Specifies the procedures relating to the scheduling and despatch of Generating Stations and drawal by Distribution Licensees/ Open Access Customers to meet state demand and drawal allocation.
- Frequency, Voltage and Reactive Power Management: describes the method by which all Users of the State Transmission System shall co-operate with SLDC and STU in contributing towards effective control of the system frequency and managing the voltage of the State Transmission System.
- Monitoring of Generation & drawal: describes the responsibility of all SGS to ensure reliability & performance of generating units and distribution licensee responsibility to comply with scheduled drawal.

Part V- Protection Code

Protection Code specifies the co-ordination responsibility and minimum standards of protection that are required to be installed by Users of the State Transmission System.

Part VI- Metering Code

Metering Code specifies the minimum operational and commercial metering to be provided for each User. It also sets out the requirement and procedures for metering.

Part VII- Data Registration Code

This contains the details of all the data required by STU, which is to be provided by the Users and vice versa.

1.5 State Grid

1.5.1 Punjab State Power System operates in synchronism with Northern Regional Grid. Northern Regional Grid System consists of power systems of constituent States namely Haryana, Punjab, Rajasthan, Uttar Pradesh, Uttarakhand, Himachal Pradesh, Delhi, Jammu & Kashmir and Union Territory Chandigarh, Inter-State Generating Stations of National Thermal Power Corporation (NTPC), National Hydro Power Corporation (NHPC), Nuclear Power Corporation (NPC), Bhakra Beas Management Board (BBMB), Satluj Jal Vidyut Nigam (SJVNL), Tehri Hydro Development Corporation Limited

(THDCL) and Inter-State Transmission System of Power Grid Corporation of India Limited (PGCIL) & transmission system of BBMB.

1.5.2 Electrical Grid of Punjab State (State Grid) have generating stations of Punjab State Power Corporation Limited (PSPCL), IPPs, Captive Power Stations and State Transmission System, the distribution network of Distribution Licensees connected to State Transmission System at various inter-connection points on 66 kV, 33 kV and 11 kV, partnership projects and transmission system of BBMB/PowerGrid located within Punjab state and connected at various points to State Transmission System.

1.5.3 The latest position of installed capacity of Generating Stations, details of 400kV, 220 kV, 132 kV, 66kV & 33kV transmission lines and list of EHV Sub-stations (substations of voltage exceeding 33 kV) in the State of Punjab are shown on the web-sites of respective utilities/entities and can be downloaded by interested Users.

1.5.4 The single line diagram of 400 kV/ 220 kV/ 132 kV electrical network of Punjab shall be made available by STU on PSTCL website i.e. 'www.pstcl.org' which can be referred to by the users. A web link shall also be provided on SLDC website 'www.punjabsldc.org' to have access to single line diagram of STU network.

1.6 Implementation and Operation of the State Grid Code

1.6.1 The date of commencement of this code shall be the date of publication in the official gazette of Punjab Government. The STU/SLDC and concerned Users shall commence its implementation accordingly.

1.6.2 The connectivity criteria and other provisions of the State Grid Code shall be applicable to the new Connections and equipments procured/provided for new works/ replacements from the date the State Grid Code is made effective.

1.6.3 The existing connections and equipment shall continue to operate till such time the State Grid Code Review Committee (SGCRC) considers alterations necessary. However, operational aspects of the State Grid Code shall have no such relaxation and shall apply with immediate effect.

1.6.4 The State Grid Code shall apply to Users, SLDC, STU and any future transmission licensee. The STU/SLDC has the responsibility of implementing the State Grid Code.

1.6.5 SLDC shall be the apex body to ensure integrated operation of the power system in the state. It is the duty of SLDC, STU and all Users to comply with SGC. Users must provide STU reasonable rights of access; service and facilities necessary to discharge its responsibilities in the Users premises and to comply with instructions as issued by STU/SLDC reasonably required to implement and enforce the State Grid Code.

1.6.6 SLDC shall not unduly discriminate against or unduly prefer any one or any group of persons; or STU in the conduct of any business.

1.6.7 If any User fails to comply with any provision of State Grid Code. The concerned User shall report non-compliance of the State Grid Code to State Grid Code Review Committee without delay. Any other User can also report non compliance of State Grid Code. In any case, the concerned User shall intimate the reasons for its non compliance to the SLDC/ affected Users/ SGCRC and shall promptly take remedial action for compliance.

1.6.8 Consistent failure to comply with the State Grid Code provisions may lead to disconnection of the User's plant and /or facilities.

1.6.9 The operation of the State Grid Code will be reviewed regularly by the State Grid Code Review Committee in accordance with the provisions of the relevant section of the State Grid Code.

1.7 General Requirements

1.7.1 The State Grid Code contains procedures to permit equitable management of day-to-day technical situations in the power system, taking into account a wide range of operational conditions likely to be encountered under both normal and abnormal circumstances. It is nevertheless necessary to recognise that the State Grid Code cannot predict and address all possible operational conditions.

1.7.2 Users must therefore understand and accept that SLDC/STU in such unforeseen circumstances may be required to act decisively to discharge its obligations under the Act, Regulations and/or its Licence. User(s) shall provide such reasonable co-operation and assistance as SLDC/STU may decide in such circumstances.

1.8 Grid Code Responsibilities

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

1.8.2 SLDC/STU shall not be held responsible for any consequences that arise from its reasonable and prudent actions on the basis of such information.

1.9 Confidentiality

1.9.1 Under the terms of the State Grid Code, STU and/or SLDC will receive information from Users relating to their intentions in respect of their Generation or Supply business.

1.9.2 Except as provided herein after, SLDC/STU shall not, other than as required by the State Grid Code, disclose such information to any person without the prior written consent of the provider of the information. Provided that this provision will not apply in respect of information in public domain. Provided further that this provision shall not apply in respect of such information sought by statutory authorities specified in Electricity Act or any other Act, Competent Court, State Govt or Central Government, Committee constituted by any of them and ordered to be supplied under RTI Act.

1.10 Dispute Settlement Procedures

1.10.1 If any dispute arises with reference to the quality of electricity or safe, secure and integrated operation of the State Grid or in relation to any direction given under Regulation 1.12.1, it shall be referred to the Commission for decision.

Provided that pending the decision of the Commission, the directions of SLDC shall be complied with by the Users.

1.10.2 In the event of any dispute regarding interpretation of any provision of the State Grid Code between any User and SLDC/STU, the matter may be referred to the Commission for its decision. The Commission's decision shall be final and binding and may have retrospective application. During the intervening period, interpretation of SLDC/STU shall apply unless otherwise directed by the Commission.

1.10.3 In the event of any conflict between any provision of the State Grid Code and any contract or agreement between STU and Users or between Users, the provision(s) of the State Grid Code will prevail.

1.11 Communication between STU and Users

1.11.1 All communications between SLDC/STU and Users shall be in accordance with the provision of the relevant section of the State Grid Code and shall be made to the designated nodal officer appointed by SLDC/STU.

1.11.2 Unless otherwise specifically required by the State Grid Code all communications shall be in writing, save that where operation time scales require oral communication, such communications shall be confirmed in writing as soon as practicable.

1.11.3 In case of oral communication the voice shall be recorded at SLDC and such record shall be preserved for a reasonable time to be decided by the State Grid Code Review Committee.

1.12 Directive

1.12.1 SLDC may give directions and exercise such supervision and control as may be required for ensuring the integrated grid operation and for achieving the maximum economy and efficiency in the operation of the power system in the state under Section 33(1) of Electricity Act, 2003.

1.12.2 Every licensee, generating company, generating station, substation and any other person connected with the operation of the power system shall comply with the directions issued by SLDC as per clause 1.12.1 above.

1.12.3 Regional Load Despatch Centre may issue directions under section 29 of The Electricity Act and the State Government may issue directives in certain matters under section 37 of the Electricity Act, 2003 and SLDC shall promptly inform the Commission and all Users of the requirement of such directives.

1.13 Compatibility with Indian Electricity Grid Code

This State Grid Code is consistent/ compatible with the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010 (IEGC), as amended from time to time. 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 shall prevail.

SECTION 2 - MANAGEMENT OF THE STATE GRID CODE

2.1 Introduction

2.1.1 It is the duty of the STU, SLDC and all Users of STS to comply with Grid Code. STU is required to periodically review the State Grid Code and its implementation. For the above purpose a State Grid Code Review Committee, as per section 2.4, shall be established.

2.1.2 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.

2.2 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.

2.3 Roles & Responsibility of Various Organisations 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 SGC,

2.3.1 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, some of the functions of SLDC shall be as under:-

(a) The SLDC shall be the apex body to ensure integrated operation of the power system in the State.

(b) SLDC shall-

(i) 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;

(ii) monitor grid operations;

(iii) keep accounts of the quantity of electricity transmitted through the State grid;

(iv) exercise supervision and control over the state transmission system;

(v) be responsible for carrying out real time operations for grid control and despatch of electricity within the State through secure and economic operation of the State grid in accordance with the CEA Grid Standards and the SGC/IEGC.

(c) SLDC may levy and collect such fee and charges from the generating companies and licensees using the State transmission system as may be specified by the Commission;

Provided that in event of a SLDC being operated by the STU, as per first proviso of sub-section (2) of section 31 of the Act, adequate

autonomy shall be provided to the SLDC to enable it to discharge its functions in the above manner.

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

(i) system operation and control including intra-state transfer of power, covering contingency analysis and operational planning on real time basis;

(ii) scheduling / re-scheduling of generation;

(iii) system restoration following grid disturbances;

(iv) metering and data collection;

(v) compiling and furnishing data pertaining to system operation;

(vi) operation of State Unscheduled Interchange (UI) pool account and State reactive energy account.

2.3.2 Roles & Responsibilities of STU

(a) 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 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 -

(a) any licensee or generating company on payment of the transmission charges; or

(b) any consumer as and when such open access is provided under

sub-section (2) of section- 42 of the Act, on payment of transmission charges, surcharge, additional surcharge and any other charges thereon, as may be specified by the Commission.

(b) 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 Punjab State Electricity Regulatory Commission (Terms and Conditions of Intra-state Open Access) Regulations, 2011, as amended from time to time.

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

2.3.3 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.

2.3.4 Role of Distribution Licensee

The functions of Distribution Licensee shall be as stated in section 42 of the Act. With reference to SGC, some of the functions of distribution licensee shall be as under:

(a) to develop and maintain an efficient, co-ordinated and economical distribution system in its area of supply;

(b) to provide non-discriminatory open access to its distribution system for use by -

(i) any licensee or generating company on payment of the distribution charges; or

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

(c) 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 Center (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;

(d) 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 drawal from the system. They shall take special care for drawal/injection of reactive power from/to the State Power System.

2.3.5 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.

2.4 State Grid Code Review Committee (SGCRC)

2.4.1 A State Grid Code Review Committee (SGCRC) shall be constituted by STU within 30 days from date of notification of State Grid Code and STU shall inform all Users of the names and addresses of the Committee Chairman and Member Secretary within 15 days of the approval of the committee. STU shall inform Users in writing of any subsequent changes. The existing SGCRC shall continue until the new Committee is formed.

2.4.2 The State Grid Code Review Committee shall be chaired by the Director Technical, STU and consist of the following members:

- Director Technical of STU - Chairman
- Chief Engineer level officer of STU - Member Secretary
- Director/Generation of Distribution Licensee (PSPCL) excluding IPP/CPP - Member
- Director/Distribution of Distribution Licensee (PSPCL) – Member
- Chief Engineer (In-charge SLDC) - Member
- One member representing transmission and distribution licensee (other than STU/ PSPCL) - Member
- One representative of IPP/CPP – Member
- Further, one representative each from BBMB, NRPC and NRLDC may participate in the Committee as a special invitee.

NRPC, NRLDC, BBMB shall inform the Committee Member Secretary of the name and designation of their representative within 30 days of the approval of State Grid Code by PSERC and shall inform the Committee Member Secretary, in writing, of any subsequent change.

A member, in case of exigency, may nominate his alternative for the meeting.

2.5 State Grid Code Review Committee Proceedings

2.5.1 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 shall be as follows:

- To keep the State Grid Code and its implementation under scrutiny and review.
- To propose any revision, if necessary, in the State Grid Code consequent to analysis report on major grid disturbance soon after its occurrence. The recommendations of the Committee shall be submitted to the Commission for approval and issue of directives to the Users for taking necessary remedial measures, as may be deemed fit, to prevent recurrence;

- To consider all requests for amendment to the State Grid Code as may be made by the Users;
- To issue guidance on the interpretation and implementation of the State Grid Code;
- To examine problems raised by the Users.

2.5.2 Meetings may be held by STU with a User to discuss individual requirements and with groups of Users to prepare proposals for the Committee meeting. The Committee may set up sub committees for detailed studies of related problems.

2.6 State Grid Code Review and Revisions

2.6.1 STU on the recommendations of SGCRC and in consultation with such other persons as the Commission may direct, every three years, or earlier if required by the Commission, shall review the State Grid Code and its implementation.

2.6.2 The Commission shall reserve the right to review the State Grid Code as and when required.

2.6.3 The Member Secretary of SGCRC shall present all proposals for revisions of the State Grid Code to the Committee for its consideration.

2.6.4 STU shall send to the Commission following reports at the conclusion of each review meeting of the Committee.

(i) A report on the outcome of such review;

(ii) Any proposed revisions to the State Grid Code from time to time as SGCRC thinks reasonably necessary for the achievement of the objectives of the State Grid Code along with justification there for.

2.6.5 All revisions to the State Grid Code shall require the prior written approval of the Commission.

2.6.6 Subject to the conditions in the next paragraph of this section, all proposals for revisions in the State Grid Code shall be decided by consensus in the meeting of State Grid Code Review Committee**.** However, where consensus cannot be arrived in two sessions of the State Grid Code Review Committee, it will be with majority of members voting. In the event of no decision arrived by majority in two sessions, the matter shall be referred to the Commission for decision. All revisions in the State Grid Code shall be effected as per provisions of the Electricity Act,2003/IEGC and after approval by the Commission & notification in the official gazette of Punjab.

2.6.7 In any unusual situation where normal day-to-day operation is not possible without revision of some section(s) of the State Grid Code, a provisional revision may be implemented before approval of the Commission is received, but only after discussions at a special meeting of State Grid Code Review Committee convened on emergency basis. The Commission shall be intimated and approval shall be sought at the earliest but not later than 15 days after the provisional revision by recorded means of communication.

2.6.8 The changes/revisions proposed by the State Grid Code Review Committee shall be consistent/ compatible with IEGC.

2.6.9 The Commission may issue directives requiring STU to revise, supplement or replace the State Grid Code in such manner as may be specified in those directives and STU shall forthwith comply with any such directives.

2.6.10 STU shall convey to all concerned, revisions to the State Grid Code after approval by the Commission and the same shall be incorporated in the subsequent version of the State Grid Code.

2.6.11 The revision number and date of issue shall appear on every page of the State Grid Code. Every change from the previous version shall be clearly marked in the margin. In addition, a revision sheet shall be placed at the front along with the General Section that lists the number of every changed section, together with a brief statement of change.

2.6.12 STU shall make available a copy (other than service copy) of the respective parts of the State Grid Code in force for sale to any person requesting for it.

2.6.13 STU shall keep an up-to-date list of the recipients and locations of all authenticated copies of the State Grid Code.

2.6.14 STU & SLDC shall put the latest State Grid Code with list of amendments on their web-sites.

2.7 Functional Committees

2.7.1 STU is responsible for co-ordinating and managing the State Grid Code whereas the State Grid Code Review Committee shall be responsible to keep the implementation of State Grid Code under scrutiny and review for any changes, modifications therein. The State Grid Code Review Committee shall constitute following functional committees for implementation of the State Grid Code:

(i) Planning Code: Transmission Planning Committee (TPC)

(ii) System Operation Code: Operation and Co-ordination Committee (OCC)

(iii) Protection Code: Protection Co-ordination Committee (PCC)

(iv) Energy Accounting & Metering: Commercial & Metering Committee (CMC)

2.7.2 The State Grid Code Review Committee shall nominate the members of the functional committees. However, adequate representation to distribution licensee(s) and Generation Company shall be ensured. Chairman and Member Secretary of the functional committees shall be from STU/ SLDC, as applicable.

However, the State Grid Code Review Committee can formulate any other operational committee as it deems fit for the implementation of the State Grid Code.

2.7.3 <u>Transmission Planning Committee (TPC)</u>

Transmission Planning Committee shall coordinate the implementation of Planning Code (Part II) to ensure system planning coordination for the state as a whole.

TPC shall comprise of Chief Engineer level members to be nominated by the State Grid Code Review Committee, which shall meet once every three months and deliberate on all technical and operational aspects of Planning Code and shall give their recommendations to the State Grid Code Review Committee.

The rules to be followed by the committee in conducting their business shall be formulated by the committee itself and shall be approved by the State Grid Code Review Committee.

The committee shall perform the following functions:

(i) Co-ordination of system planning, execution of works, maintenance schedule and contingency plan to ensure adequate transmission and distribution system;

(ii) Review of existing interconnection equipment for alteration, if necessary, so as to comply with the Connection Conditions provided for in the State Grid Code;

(iii) Review the load forecast and the methodology and assumptions made by Users;

(iv) Review and finalise the proposals identified on the basis of planning studies.

2.7.4 Operation and Co-ordination Committee (OCC)

Operation and Co-ordination Committee shall coordinate the implementation of Operating Code (Part III) and Scheduling & Despatch Code (Part IV) to ensure that respective Generators and Distribution Companies using State Transmission System discharge their obligations under the State Grid Code.

OCC shall comprise of Chief Engineer level members to be nominated by the State Grid Code Review Committee, which shall meet every month and deliberate on all technical and operational aspects of Load Despatch and System Operation and shall give their recommendations to the State Grid Code Review Committee.

The rules to be followed by the committee in conducting its business shall be formulated by the committee itself and shall be approved by the State Grid Code Review Committee.

The committee shall perform the following functions;

(i) Review the reactive compensation in the State Transmission System.

(ii) Review the load shedding mechanisms;

(iii) Review and analyse the grid disturbances and system restoration procedure;

(iv) Review and finalise amendments of Outage Plan of State Transmission System;

(v) Deliberate and prepare the Under Frequency Load Shedding Schemes and the mechanism to be adopted for the same for various sub-stations to ensure that the frequent tripping of same feeder is avoided;

(vi) Review the installation of Disturbance Recorders, Event Loggers in the State Transmission System;

(vii) Review & Study the implementation of free governing/ restricted governing system for all the generating stations.

2.7.5 Protection Co-ordination Committee (PCC)

Protection Co-ordination Committee shall coordinate the implementation of Protection Code (Part V) to ensure that respective Users using State Transmission System discharge their obligations under the Protection Code.

Protection Co-ordination Committee shall comprise of Chief Engineer level members to be nominated by the State Grid Code Review Committee, which

shall meet once every three months and shall give their recommendations to the State Grid Code Review Committee.

The rules to be followed by the Protection Co-ordination Committee in conducting its business shall be formulated by the committee itself and shall be approved by State Grid Code Review Committee.

The committee shall perform the following functions.

(i) Keep Protection Code and its implementation under scrutiny & review and to ensure compliance thereof;

(ii) Consider all requests for amendment to the Protection Code which any User makes;

(iii) Create awareness about various issues related to the Protection Code;

(iv) Deliberate and decide various protection settings, testing procedure and periodicity;

(v) Review and specify the minimum protection requirements for the User's system connected to the State Transmission System;

(vi) Deliberate and decide regarding upgradation of protection schemes and necessary switchgear equipments;

(vii) Review and analyse the failure of protection system in case of major grid disturbance and recommend modifications and improvements.

2.7.6 Commercial & Metering Committee (CMC)

Commercial & Metering Committee shall coordinate the implementation of the Metering Code (Part VI) to ensure that the respective constituents discharge their obligations under the Metering Code. The committee shall also be responsible for coordinating the preparation of state energy account in accordance with the provisions of the State Grid Code.

The committee shall comprise of Chief Engineer level members to be nominated by the State Grid Code Review Committee, which shall meet every month.

The rules to be followed by the Commercial & Metering Committee in conducting its business shall be formulated by the committee itself and shall be approved by the State Grid Code Review Committee.

The committee shall perform the following functions.

(i) Keep Metering Code and its implementation under scrutiny and review and to ensure compliance thereof;

(ii) Consider all requests for amendment to the Metering Code which any User makes;

(iii) Create awareness about various issues related to the Metering Code;

(iv) Review deviations in the existing CTs and PTs/CVTs from the minimum specifications prescribed in the State Grid Code and upgradation/ replacement of the same within one year of coming into effect of the State Grid Code;

(v) Deliberate and decide the issues relating to the monthly energy account and settlement prepared by SLDC;

(vi) Resolve any energy accounting and settlement disputes arising out of metering failure;

(vii) Review and propose amendments, if necessary, in the methodology and principles for maintaining State Energy Accounts;

(viii) Resolve billing disputes and complaints regarding Open Access consumers as per the redressal mechanism under PSERC (Terms and Conditions for Intra-state Open Access) Regulations 2011, as amended from time to time.

2.8 Non-Compliance & Derogation

2.8.1 Provisions of clause 1.6.7 will apply where any User fails to comply with any provision of State Grid Code.

2.8.2 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.

2.8.3 Consistent failure to comply with the State Grid Code may lead to disconnection of the User's plant and/or facilities.

2.8.4 Derogation, if any, for any particular section or chapter or provision of the State Grid Code shall be with the express 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. Failure to comply with fixed-time derogation by any User shall carry a financial penalty not exceeding rupees five lacs & as may be decided by the Commission.

PART II- PLANNING CODE

SECTION 3 - SYSTEM PLANNING

3.1 Introduction

3.1.1 This section specifies the methods for data submissions by Users to STU for the planning and development of the State Transmission System. This section also specifies the procedure to be applied by STU in the planning and development of the State Transmission System.

3.1.2 A requirement for reinforcement or extension of the State Transmission System may arise for a number of reasons, including but not limited to the following:

(i) Development on a User's system already connected to the State Transmission System;

(ii) The introduction of a new Connection point between the User's system and the State Transmission System;

(iii) Evacuation system for Generating Stations within or outside the State;

(iv) Reactive Compensation;

(v) A general increase in system capacity due to addition of generation or system load;

(vi) Transient or steady state stability considerations;

(vii) Cumulative effect of any of the above.

3.1.3 Accordingly, 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. Since development of all User's systems must be planned well in advance to ensure consents and right of way to be obtained and detailed engineering design/construction work to be completed, STU will require information from Users and vice versa. To this effect, the planning code imposes time scale, for exchange of necessary information between STU, and Users, having regard where appropriate, to the confidentiality of such information.

3.2 Objective

The provisions of this section are intended to enable STU to produce a plan in consultation with Users, to provide an efficient, coordinated, secure and economical State Transmission System to satisfy requirement of future demand. The Planning Code:

- Defines the procedure for the exchange of information between STU and a User in respect of any proposed development on the User’s system, which may have an impact on the performance of the User;
- Details the information which STU shall make available to Users in order to facilitate the identification and evaluation of opportunities for use of or connection to the State Transmission System;
- Details the information required by STU from Users to enable STU to plan the development of its Transmission System to facilitate proposed User developments;
- Specifies planning and design standards, which shall be applied by STU in planning and development of the power system.

3.3 Planning Policy

3.3.1 STU would develop a perspective rolling transmission plan for next 10 years for the State Transmission System. These perspective transmission plans shall be updated every year to take care of the revisions in load projections and generation capacity additions. The perspective plans shall be submitted to the Commission for approval by 30th Nov. each year.

3.3.2 STU shall carry out annual planning process corresponding to a 5 year forward term for identification of major State Transmission System schemes which shall be dovetailed into National Electricity Plan on 5 years short term basis prepared by CEA.

3.3.3 STU shall carry out network studies and review fault levels for planning system strengthening and augmentation.

3.3.4 STU shall follow the following steps in planning:

(i) Forecast the demand for power within the Area of Supply, based on the forecasts provided by Distribution Licensees, and provides to the Commission details of the demand forecasts, data, methodology and assumptions on which the forecasts are based. These forecasts would be annually reviewed and updated;

(ii) Prepare a proposal for the requirement of generation for the State to meet the load demand as per the forecast, after examining the economic, technical and environmental aspects of all available alternatives taking into account the existing contracted generation resources and effects of demand side management;

(iii) Prepare a transmission plan for the State Transmission System compatible with the above load forecast and generation plan. This will include provision for VAr compensation needed in the State Transmission System;

(iv) The reactive power planning exercise to be carried out by STU in consultation with NRLDC/NRPC, Distribution Licensees, as per the Commission's directives, if any, and Programme for installation of reactive compensation equipment by STU & Distribution Licensees;

(v) STU's planning department shall use load flow, short circuit, and transient stability studies and other techniques for transmission system planning;

(vi) STU's planning department shall simulate the contingency and system constraint conditions for the system for transmission system planning;

(vii) STU would maintain a historical database based on operational data supplied by SLDC using the state-of-the-art tools such as Energy Management System (EMS) for demand forecasting;

(viii) STU shall prepare and submit first long-term plan within 6 months of commencement of this code to the Commission for generation expansion and transmission system expansion to fully meet both energy and peak demand for the plan period and create adequate reserve capacity margin;

(ix) The STU would coordinate with the CTU for eliminating transmission constraints in a cost effective manner.

3.3.5 All the Users shall supply to STU, the planning data prescribed in Appendix A and Appendix B within 3 months from the effective date of the State Grid Code and thereafter such data shall be furnished by 30th April every year to

enable STU to formulate and finalise the updated plan by 30th Nov. each year for the next 5 years.

3.4 Planning Criteria

3.4.1 The State Transmission System planning and generation expansion planning shall be in accordance with the provisions of the planning criterion as per IEGC Clause 3.5. However, some planning parameters of the State Transmission System may vary according to directives of the Commission.

3.4.2 The planning criterion shall be based on the security philosophy on which both ISTS and the State Transmission System have been planned. The security philosophy shall be as per the Transmission Planning Criteria and other guidelines as given by CEA.

3.4.3 The STU shall also consider the following for the purpose of preparing the transmission system plan under these Regulations -

(i) Plans formulated by the Authority for the transmission system under the provisions of clause (a) of Section 73 of the Act;
(ii) Latest available Electric Power Survey of the Authority;
(iii) Short term and Long term Power Procurement Plan approved by the Commission as per PSERC (Power Purchase and Procurement Process of Licensee) Regulations, 2012;
(iv) Grid Standards specified by the Authority under clause (d) of Section 73 of the Act;
(v) Transmission Plan formulated by Central Transmission Utility under the provisions of Grid Code specified by Central Electricity Regulatory Commission under clause (h) of Section 79 of the Act;
(vi) Transmission Planning Criteria and Guidelines issued by the Authority;
(vii) Recommendations/ inputs, if any, of the Northern Regional Power Committee (NRPC);
(viii) National Electricity Plan / National Electricity Policy which are relevant for development of STS; and
(ix) any other information/data source suggested by the Commission.

3.5 Planning Responsibility

3.5.1 The primary responsibility of load forecasting within Distribution Licensee's Area of Supply rests with respective Distribution licensees. The Distribution licensees shall determine month-wise peak load and energy forecasts of their areas for each category of loads for each of the succeeding 10 years as per the procedure laid down in PSERC (Power Purchase and Procurement Process of Licensee) Regulation 2012 and submit the same annually by 30th April to STU along with details of the demand forecasts, data, methodology and assumptions on which the forecasts are based along with their proposals for transmission system augmentation. However, first such submission shall be within 3 months of commencement of this Code. The load forecasts shall be made for each of the existing as well as proposed interconnection points between STU and Distribution Licensees and shall include annual peak load and energy projections. The demand forecasts shall be updated annually or whenever major changes are made in the existing forecasts or planning. While indicating requirements of single consumers with large demands (500 KW or higher) the Distribution licensee shall satisfy itself as to the degree of certainty of the demand materialising.

3.5.2 SGS shall provide their generation capacity to STU for evacuating power from their power stations for each of the succeeding 10 years along with their proposals for transmission system augmentation and submit the same annually by 30th April to STU.

3.5.3 The planning for strengthening the State Transmission System for evacuation of power from outside state stations shall be initiated by STU.

3.5.4 Transmission Planning 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.

3.5.5 The State Transmission System proposals identified based on planning studies would be discussed, reviewed and finalised by the Transmission Planning Committee.

3.6 Planning Data

3.6.1 To enable STU to conduct System Studies and prepare perspective plans for electricity demand, generation and transmission, the Users shall furnish data, to STU from time to time as detailed under Data Registration section as under:

(i) Standard Planning Data (Generation)/ Standard Planning Data (Distribution) as per APPENDIX A.

(ii) Detailed Planning Data (Generation)/ Detailed Planning Data (Distribution) as per APPENDIX B.

3.6.2 To enable the Users to co-ordinate planning, design and operation of their plants and systems with the State Transmission System, they may seek certain salient data of Transmission System as applicable to them, which STU shall supply from time to time as detailed under Data Registration section and categorized as:

(i) Standard Planning Data (Transmission) as per APPENDIX A.

(ii) Detailed Planning Data (Transmission) as per APPENDIX B.

3.6.3 STU shall also furnish to all the Users, Annual Transmission Planning Report, Power Map and any other information as the Commission may specify.

SECTION 4- CONNECTION CONDITIONS

4.1 Introduction

Connection Conditions specify 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,

4.2 Objective

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

(i) All Users or prospective Users are treated equitably;

(ii) 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;

(iii) 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;

(iv) The ownership and responsibility for all items of equipment is clearly specified in a schedule (APPENDIX D: Site Responsibility Schedule) for every site where a Connection is made.

4.3 Procedure for Application

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

(i) 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;

e) For special loads like arc furnaces, rolling mills etc., Real and Reactive Power values of the load with time and harmonic level.

(ii) STU shall make a formal offer within 60 days of the receipt of the application. The offer shall specify and take into account any works required for the extension or reinforcement of the State Transmission System necessitated by the applicant's proposal and for obtaining any consent necessary for the purpose.

(iii) If the specified time limit for making the offer against any application is not adequate, STU shall make a preliminary offer within the specified time indicating the extent of further time required for detailed analysis.

(iv) Any offer made by STU shall remain valid for a period of 60 days and unless accepted before the expiry of such period, shall lapse thereafter.

In the event of offer becoming invalid or not accepted by the applicant alternative offer or revised application can be furnished with processing fee and the procedure laid above will be followed.

4.4 Rejection of Application

STU shall be entitled to reject any application for connection to or use of the State Transmission System due to the following reasons apart from others as considered reasonable:

(i) If such proposed connection is likely to cause breach of any provision of its Licence or any provision of the State Grid Code or any provision of IEGC or any criteria or covenants or deeds or regulations by which STU is bound;

(ii) If the applicant does not undertake to be bound, in so far as applicable, by the terms of the State Grid Code;

(iii) If the applicant fails to give confirmation and undertakings according to this section.

4.5 Connection Agreement

A Connection Agreement (or the offer for a Connection Agreement) shall include within its terms and conditions the following:

(i) A condition requiring both agencies to comply with the State Grid Code;

(ii) Details of connection charges and/or use of system charges;

(iii) Details of any capital related payments arising from necessary reinforcement or extension of the system, data Communication, RTU etc.;

(iv) Diagram of electrical system to be connected;

(v) General philosophy, guidelines etc. on protection;

(vi) A Site Responsibility Schedule (APPENDIX-D).

4.6 Site Responsibility Schedule

For every Connection to the State Transmission System for which Connection Agreement is required, STU shall prepare a schedule of equipment with information supplied by the respective Users. This schedule, called a Site Responsibility Schedule, shall indicate the following for each item of equipment installed at the Connection site.

(i) The ownership of equipment.

(ii) The responsibility for control of equipment.

(iii) The responsibility for maintenance of equipment.

(iv) The responsibility for operation of equipment.

(v) The manager of the site.

(vi) The responsibility for all matters relating to safety of persons at site.

4.7 System Performance

4.7.1 All equipment connected to the State Transmission System shall be of such design and construction that enables STU to meet the requirement of Standards of Performance. Distribution Licensees and other Users shall ensure that their loads do not cause violation of these standards.

4.7.2 Any User seeking to establish new or modified arrangement(s) for Grid connection and/or use of transmission system of STU shall submit the application in the form as specified by STU.

4.7.3 For every new /modified Connection sought, STU shall specify the Connection Point, technical requirements and the voltage to be used, along with the metering and protection requirements as specified in the Metering Code and Protection Code.

4.7.4 SGS (except CPPs) shall make available to SLDC the up to date capability curves for all Generating Units, indicating any restrictions, to allow accurate system studies and effective operation of the State Transmission System. CPPs shall similarly furnish the net reactive capability that will be available for Export to / Import from the State Transmission System.

The State Transmission System rated frequency shall be 50.00 Hz and shall always remain within the 49.7 –50.2 Hz band as specified in IEGC.

4.7.5 The User shall be subject to the Grid discipline in respect of variation of voltage at the inter connection point prescribed by clause 3(1)(b) of the CEA Grid Standards (reproduced below).

Limits of Voltage Variation		
Nominal (kV)	Maximum (kV)	Minimum (kV)
765	800	728
400	420	380
220	245	198
132	145	122
110	121	99
66	72	60
33	36	30

4.7.6 Distribution Licensees and Open Access/EHV Consumers directly connected to STS shall ensure that their loads do not affect STU system in terms of causing any:

(i) Unbalance in the phase angle and magnitude of voltage at the interconnection point beyond the limits prescribed.

(ii) Individual and Total Harmonic Distortion (THD) of voltage shall not exceed the values specified in clause 3(2) of the CEA Grid Standards (reproduced below).

System Voltage (kV)	Total Harmonic Distortion (THD)	Individual harmonic of any particular frequency
765	1.5%	1.0%
400	2.0%	1.5%
220	2.5%	2.0%
33 to 132	5.0%	3.0%

SLDC may direct the Distribution Licensees and Open Access/EHV Consumers connected to STS to take appropriate measures to bring the Harmonics within permissible limit.

4.7.7 In the event of Grid disturbances in the Northern Regional grid, STU shall not be liable to maintain the system parameters within the normal range of voltage and frequency.

4.7.8 Insulation Co-ordination of the User's equipment shall conform to values as specified by STU from time to time out of those applicable as per Indian Standards / Codes. Short circuit current of switchgear shall not be less than its magnitude and time specified by STU from time to time.

4.7.9 Protection schemes and metering schemes shall be as detailed in the Protection Code and Metering Code.

4.8 Connection Point

4.8.1 State Generating Station (SGS)

Voltage may be 400/220/132/66 kV or as agreed with STU.

Unless specifically agreed with STU, the Connection point with generating station shall be the outgoing gantry of the feeders of power station switchyard.
SGS shall operate and maintain all terminals, communication, metering and protection equipments owned by SGS within its jurisdiction. All electrical equipments including communication equipment from outgoing feeder gantry onwards shall be owned, operated & maintained by STU/Transmission licensee.

The provisions for the metering between generating station and STU/Transmission licensee system shall be as per the Metering Code.

4.8.2 Distribution Licensee

Voltage may be LV side of power transformer i.e. 220 kV, 132 kV, 66 kV or 33 kV or 11 kV or as agreed with STU.

Unless specifically agreed with Distribution Licensee, the Connection point with STU shall be the outgoing gantry of the feeder to Distribution Licensee or individual EHV consumer as the case may be, from STU sub-station.

STU shall operate and maintain all terminals, communication and protection equipments provided within its jurisdiction. The provisions for the metering between STU and Distribution Licensee systems shall be as per the Metering Code. Respective Users shall maintain their equipment beyond the outgoing gantry of feeders emanating from STU sub-station onwards.

4.8.3 Northern Regional Transmission System

For the Northern Regional Transmission System/CTU, the Connection, protection scheme, metering scheme and the voltage shall be in accordance with the provisions of IEGC.

4.8.4 IPPs, CPPs, Open Access Customers and other Consumers directly connected to STS

Voltage may be 400/220/132/66/33/ kV or as agreed with STU.

When IPPs, CPPs, EHV Consumers or the Open Access Customers own sub-stations, the Connection point shall be the terminal isolator provided just before the gantry of outgoing/incoming feeder in their premises.

4.9 Data & Communication Facilities

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

4.10 SAFETY STANDARDS

The applicable safety standards for construction, operation and maintenance of electrical plants and electric lines shall be as per the Standards notified by CEA under clause (c) of the section 73 of the Act.

4.11 CONNECTION STANDARDS

The applicable technical standards for construction of electrical plants, electric lines and connectivity to the STS shall be as per CEA (Technical Standards for Connectivity of the Grid) Regulations, 2007.

4.12 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.

PART III-OPERATING CODE

SECTION 5 - SYSTEM SECURITY ASPECTS

5.1 Introduction

All Users and STU shall endeavour to operate their respective power system and generating stations in synchronism with each other at all times, so that the whole State Transmission System operates as a synchronised system as well as integrated part of NEW Grid. STU shall endeavour to operate the interstate links so that interstate 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.

5.2 Scope

The system security relates to entire inter-connected power system. The system security aspect therefore affects all Users of the regional inter-connected power systems. However, the operation of the State Transmission System will be controlled and maintained by SLDC in accordance with directions and instructions of NRLDC under provisions of IEGC.

5.3 System Security

5.3.1 All switching operations, whether affected manually or automatic, will be based on policy guide lines of:

- IEGC
- National Load Despatch Centre/ NRLDC/SLDC's instructions/ Guidelines under CEA safety Regulations or any other rules and regulations framed under the Act.
- State Grid Code
- PSERC's directives
- State Grid Code Review Committee's decisions

5.3.2 No part of the State Grid shall be deliberately isolated from the integrated Grid, except

- Under an emergency, and conditions in which such isolation would prevent a total Grid collapse and/or enable early restoration of power supply,
- For safety of human life,
- When serious damage to a costly equipment is imminent and such isolation would prevent it,
- When such isolation is specifically advised by SLDC,
- On operation of under frequency/islanding scheme as approved by NRPC/PSERC.

All such isolations shall be as per standing guidelines approved by NRPC/SGCRC. Any other isolation shall be put up in the State Grid Code Review Committee for ratification. Complete synchronisation of integrated Grid shall be restored, as soon as the conditions again permit it. The restoration process shall be supervised by SLDC, in co-ordination with

NRLDC in accordance with operating procedures separately formulated by SLDC/NRLDC.

5.3.3 No important element of the State grid shall be deliberately opened or removed from service at any time, except when specifically instructed by SLDC or with specific and prior clearance of SLDC. The list of such important grid elements on which the above stipulations apply shall be prepared by the SLDC in consultation with the Users and STU, and be available at the websites of SLDC. In case of opening/removal of any important element of the grid under an emergency situation, the same shall be communicated to SLDC at the earliest possible time after the event. Any emergency tripping not advised or permitted by SLDC shall be put up to the State Grid Code Review Committee for ratification in the next meeting.

5.3.4 Any tripping, whether manual or automatic, of any of the elements mentioned above, shall be precisely intimated by the concerned User/STU to SLDC at the earliest, say within ten minutes of the event. The reason (to the extent determined) and the likely time of restoration shall also be intimated. All reasonable attempts shall be made for the element restoration at the earliest. The information/ data including that downloaded from disturbance recorder, sequential event logger outputs etc. containing the sequence of tripping and restoration shall be sent to SLDC for the purpose of analysis. Disturbance Recorders data may be directly made available at SLDC through suitable communication media for faster post fault analysis during grid disturbances.

5.3.5 Maintenance of their respective power system elements shall be carried out by User/ STU in accordance with the provisions in CEA Grid Standards. Any prolonged outage of power system elements of any User/STU, which is causing or likely to cause danger to the grid or sub-optimal operation of the grid, shall regularly be monitored by SLDC. SLDC shall report such outages to SGCRC which shall finalize action plan and give instructions to restore such elements in a specified time period.

5.3.6 All thermal generating units of 200 MW and above and all hydro units of 10 MW and above, which are synchronized with the grid, irrespective of their ownership, shall have their governors in operation at all times in accordance with the following provisions:

Governor Action

i) Thermal generating units having Electro Hydraulic Governor (EHG) System and hydro (except those with upto three hours pondage) generating units shall be operated under restricted governor mode of operation.

ii) The restricted governor mode of operation shall essentially have the following features:

a) There should not be any reduction in generation in case of improvement in grid frequency below 50.2 Hz. (for example if grid frequency changes from 49.3 to 49.4 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 MCR of the unit subject to machine capability.

b) 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.

c) If any of these generating units is required to be operated without its governor in operation as specified above, the SLDC shall be immediately informed about the reason and duration of such operation. All governors shall have a droop setting of between 3% and 6%.

d) After stabilisation of frequency around 50 Hz, the CERC may review the above provision regarding the restricted governor mode of operation and free governor mode of operation may be introduced.

(iii) All other generating units including the pondage upto 3 hours, Gas turbine/Combined Cycle Power Plants, wind and Solar generators and Nuclear Power Stations shall be exempted from Sections 5.3.6, 5.3.7 and 5.3.8 till the Commission reviews the situation.

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.

5.3.7 Facilities available with/in Load Limiters, Automatic Turbine Run-up System (ATRS), Turbine Supervisory Coordinated Control system etc. shall not be used to suppress the normal governor action in any manner and no dead bands and/or time delays shall be deliberately introduced except as specified in Para 5.3.6 above.

5.3.8 All thermal generating units of 200 MW and above and all hydro units of 10 MW and above operating at or up to 100% of their Maximum Continuous Rating (MCR) shall normally be capable of (and shall not in any way be prevented from) instantaneously picking up to 105% and 110% of their MCR respectively, when frequency falls suddenly. After an increase in generation as above, a generating unit may ramp back to the original level at a rate of about one percent (1%) per minute, in case continued operation at the increased level is not sustainable. Any generating unit, not complying with the above requirements, shall be kept in operation (synchronized with the State grid) only after obtaining the permission of SLDC.

The recommended rate for changing the governor setting, i.e., supplementary control for increasing or decreasing the output (generation level) for all generating units, irrespective of their type and size, would be one (1.0) per cent per minute or as per manufacturer's limits. However, if frequency falls below 49.8 Hz, all partly loaded generating units shall pick up additional load at a faster rate, according to their capability.

5.3.9 Except under an emergency, or to prevent an imminent damage to costly equipment or danger to human / animal life, no User shall suddenly reduce his generating unit output by more than 100 MW without prior intimation to and consent of the SLDC, particularly when frequency is falling or is below 49.7 Hz. Similarly, no User shall cause a sudden variation in its load by more than 100 MW without prior intimation to and consent of the SLDC, particularly when frequency is deteriorating.

All users shall ensure that temporary over voltage due to sudden load rejection and the maximum permissible values of voltage unbalance shall remain within limits specified under CEA Grid Standards as amended from time to time.

5.3.10 All Generating Units shall normally have their Automatic Voltage Regulators (AVRs) in operation, In particular, if a Generating Unit of over fifty (50) MW capacity is required to be operated without its AVR in service, the SLDC shall be immediately intimated about the reason and duration, and its permission obtained. Power System Stabilizers (PSS) in AVRs of generating units (wherever provided), shall be got properly tuned by the respective generating unit owner as per a plan prepared for the purpose by the STU from time to time. STU will be allowed to carry out checking of PSS and further tuning it, wherever considered necessary.

5.3.11 SGS and other generating stations connected to the Grid shall follow the instructions of SLDC for backing down/boxing up (ramping-down) and shutting down the generating unit(s). SLDC shall provide the certificate for the period of the backing down/boxing up or shutting down for the purpose of computing the deemed generation, if required.

5.3.12 Provision of protections and relay settings in the State Transmission System shall be coordinated by the Protection Co-ordination Committee as per plan to be separately finalized by the Committee.

The Committee shall also prepare islanding schemes and ensure its implementation in accordance with CEA Grid Standards. All users shall ensure that installation and operation of protection system shall comply with the provisions of CEA Grid Standards.

5.3.13 Various steps shall be taken for frequency management (as per Section 12.3) and voltage management (as per Section 12.5) so as to ensure system security.

5.3.14 All Users shall take all possible measures to ensure that the grid frequency always remains within the 49.7 –50.2 Hz band.

5.3.15 All generation units with capacity of 200 MW and above & all substations of 220 kV and above shall be provided with the facilities of Disturbance Recorders (DRs) and Event Loggers (ELs) with GPS time synchronization. Such Disturbance Recorders (DRs) and Event Loggers (ELs) may be either independent stand-alone type or provided with numeric relays provided at these sub-stations.

5.3.16 All distribution licensees / STU shall provide automatic under-frequency and df/dt relays for (1) load shedding in their respective systems, to arrest frequency decline that could result in a collapse/disintegration of the grid, as per the plan separately finalized by the SLDC and shall ensure its effective application to prevent cascade tripping of generating units in case of any contingency and (2) to effect islanding.

All distribution licensees, STU shall ensure that the above under-frequency and df/dt load shedding/islanding schemes are always functional. The provisions regarding under frequency and df/dt relays of relevant CEA Regulations shall be complied with. SLDC shall carry out periodic inspection of the under frequency and df/dt relays and maintain proper records of the inspection. SLDC shall decide and intimate the action required by distribution licensee and STUs to get required load relief from under frequency and df/dt relays. All distribution licensee and STUs shall abide by these decisions. SLDC shall keep a comparative record of expected load relief and actual load relief obtained in Real time system operation.

5.3.17 All Users, STU/SLDC shall also facilitate identification, installation and commissioning of System Protection Schemes (SPS) (including inter-tripping and run-back) in the power system to operate the transmission system closer to their limits and to protect against situations such as voltage collapse and cascade tripping, tripping of important corridors etc. Such schemes would be finalized by the SLDC in consultation with OCC & PCC and shall always be kept in service. If any SPS is to be taken out of service, permission of SLDC shall be obtained indicating reason and duration of anticipated outage from service.

5.3.18 Procedures shall be developed to recover from partial/total collapse of the grid in accordance with CEA Grid Standards and to periodically update the same in accordance with the requirements given under Section 8.4. These procedures shall be followed by all the Users, STU and SLDC to ensure consistent, reliable and quick restoration.

5.3.19 Each User, STU, SLDC shall provide and maintain adequate and reliable communication facility internally and with other Users/STUs /SLDC to ensure exchange of data/information necessary to maintain reliability and security of the grid. Wherever possible, redundancy and alternate path shall be maintained for communication along important routes, e.g., Users to Distribution Licensees/respective entity to SLDC.

5.3.20 All the Users, STU shall send information/data including disturbance recorder/sequential event recorder output to SLDC within 24 hours for purpose of analysis of any grid disturbance/event. No User, STU shall block any data/information required by the SLDC and NRPC for maintaining reliability and security of the grid and for analysis of an event.

5.3.21 All Users, SLDC and STU shall take all possible measures to ensure that the grid voltages always remain within the operating range specified at clause 4.7.5

5.3.22 All Users and STUs shall provide adequate voltage control measures as finalized by SLDC, to prevent voltage collapse and shall ensure its effective application to prevent voltage collapse/cascade tripping. Voltage fluctuation limits and voltage wave-form quality shall be maintained as specified in CEA Grid Standards.

5.4 Special requirements for Solar/ wind generators

5.4.1 System operator (SLDC) shall make all efforts to evacuate the available solar and wind power and treat as a must-run station. However, System operator may instruct the solar /wind generator to back down generation on consideration of grid security or safety of any equipment or personnel is endangered and Solar/ wind generator shall comply with the same. For this, voice, text and real time Data Acquisition System facility shall be provided for transfer of information to SLDC.

5.4.2 SLDC may direct a wind farm to curtail its Volt Ampere reactive lagging (VAr) drawal/injection in case the security of grid or safety of any equipment or personnel is endangered.

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

SECTION 6 - OPERATIONAL PLANNING

6.1 Introduction

This section describes the process by which the SLDC carries out the operational planning and demand control procedures to permit reduction in Demand for any reason.

6.2 Objective

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

6.3 Demand Estimation

6.3.1 This section describes the procedures/responsibilities of the SLDCs for demand estimation for both Active Power and Reactive Power.

6.3.2 The demand estimation is to be done on daily/weekly/monthly /yearly basis for current year for load - generation balance planning. It shall be the responsibility of all distribution licensees/users and other concerned persons to provide relevant data and other information as required by SLDC for demand estimation. The SLDC shall carry out system studies for operational planning purposes using this demand estimate.

6.3.3 The long-term demand estimation/ load forecast (for more than 1 year) shall be done by the planning department of STU in accordance with the provisions of SECTION 3 . SLDC shall be provided with a copy of the same as and when it is finalised. Demand Estimation for period up to 1 year ahead shall be done by SLDC. For demand estimation, the methodology and procedure adopted in PSERC (Power Purchase and Procurement Process of Licensee) Regulations, 2012 shall also be kept in view.

6.3.4 Attention shall also be paid by SLDC in demand forecasting for special days such as important festivals, religious occasions and National Holidays having different crests and troughs in the daily load-curve as compared to normal weather conditions & days.

6.3.5 SLDC shall furnish data for and participate in deliberations on data for load generation balance or annual demand, availability and shunt capacitors requirement studies of NRPC.

6.3.6 The SLDC shall develop methodologies/mechanisms for daily/ weekly/monthly/yearly demand estimation (MW, MVAR and MWh) for operational purposes, which would be used in the day-ahead scheduling. Based on this demand estimate and the estimated availability from different sources, SLDC shall plan demand management measures like load shedding, power cuts, etc. and shall ensure that the same is implemented by the distribution licensees/users.. All distribution licensees/users shall abide by the demand management measures of the SLDCs and shall also maintain historical database for demand estimation.

6.3.7 SLDC shall carry out its own demand estimation from the historical data and weather forecast data from time to time. All distribution licensees/users and other concerned persons shall provide relevant data and other information as required by SLDC for demand estimate. All distribution licensees/users shall provide to the SLDC their estimates of demand for the year ahead on monthly-basis at each inter connection point for the next financial year by 1st October each year. All distribution licensees/users shall also provide daily demand for the month ahead at each inter-connection point by 25th for the next month.

6.3.8 All distribution licensees/users shall provide to SLDC on day ahead basis at 1100 hrs each day their estimated demand for each 15-minute block for the ensuing day along with the estimates of load that may be shed when required, in discrete blocks with the details of arrangements of such load shedding.

6.3.9 While the demand estimation for operational purposes is to be done on a daily/weekly/monthly basis initially, mechanisms and facilities at SLDCs shall be created at the earliest but not later than three months from the commencement of this State Grid Code to facilitate on-line estimation of demand for daily operational use for each 15 minutes block.

6.3.10 The SLDC shall take into account the Wind Energy/Solar Energy forecasting to meet the active and reactive power requirement. Date of introduction of wind energy forecasting, and its permissible errors will be notified separately by the Commission.

6.3.11 In order to facilitate estimation of Total Transfer Capability (TTC) /Available Transfer Capability (ATC) on three month ahead basis, all distribution licensees/users shall furnish estimated demand and availability data to SLDCs.

6.4 Demand Management

6.4.1 Introduction

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 overdrawal of power vis-à-vis that of the regional entities beyond the limits mentioned in UI Regulations of CERC.

6.4.2 Procedure

(i) Primarily the need for demand control would arise on account of the following conditions:

- Variations in demand from the estimated or forecasted values, which cannot be absorbed by the grid;
- Unforeseen generation/transmission outages resulting in reduced power availability; and
- Heavy reactive power demand causing low voltages.

(ii) 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.

(iii) 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.

6.4.3 Demand Disconnection

(i) SLDC/distribution licensee/users and EHV consumers connected to STS shall initiate action to restrict the drawal of its control area, from

the grid, within the net drawal schedule whenever the system frequency falls to 49.8 Hz.

(ii) The SLDC/ distribution licensee/users and EHV consumer shall ensure that requisite load shedding is carried out in its control area so that there is no over-drawal when frequency is 49.7 Hz. or below.

(iii) Each Distribution licensee/User/STU shall formulate contingency procedures and make arrangements that will enable demand disconnection to take place, as instructed by the SLDC, under normal and/or contingent conditions. These contingency procedures and arrangements shall be regularly updated by distribution licensee/User/STU and monitored by SLDC. SLDC may direct any User/STU to modify the above procedures/arrangement, if required, in the interest of grid security and the concerned User/STU shall abide by these directions.

(iv) The SLDC through respective Distribution Licensees/Users shall also formulate and implement state-of-the-art demand management schemes for automatic demand management like under frequency relays, rotational load shedding, demand response (which may include lower tariff for interruptible loads) etc. within three months from the commencement of this State Grid Code, to reduce overdrawal in order to comply with Para 6.4.3 (i) and (ii). These schemes shall be duly approved by the functional committee i.e. Operation and Co-ordination Committee formed by State Grid Code Review Committee.

(v) The particulars of feeders or group of feeders at a STU sub-station which shall be tripped under under-frequency load shedding scheme whether manually or automatic on rotational basis or otherwise shall be displayed on Notice Board and will also be available at the sub-station for information of the consumer(s).

(vi) In order to maintain the frequency within the stipulated band and maintaining the network security, the interruptible loads shall be arranged in four groups of loads, for scheduled power cuts/load shedding, loads for unscheduled load shedding, loads to be shed through under frequency relays/ df/dt relays and loads to be shed under any System Protection Scheme. These loads shall be grouped in such a manner, that there is no overlapping between different Groups of loads. In case of certain contingencies and/or threat to system security, the SLDC may direct any distribution licensee/user or EHV consumer connected to the STS to decrease drawal of its control area by a certain quantum. Such directions shall immediately be acted upon. Distribution licensee/user or EHV consumer shall send compliance report immediately after compliance of these directions to SLDC.

(vii) SLDC may direct any distribution licensee/user/EHV consumer connected to the STU to curtail drawal from grid. SLDC shall monitor the action taken by the concerned entity and ensure the reduction of drawal from the grid as directed by RLDC.

(viii) SLDC shall devise standard, instantaneous, message formats in order to give directions in case of contingencies and /or threat to the system security to reduce overdrawal by any user/distribution licensee/EHV consumer at different overdrawal conditions depending upon the severity of the overdrawal. The concerned user/distribution licensee/EHV consumer shall ensure immediate compliance with these directions of SLDC and send a compliance report to the SLDC.

(ix) All distribution licensees, other Users or EHV consumers shall comply with directions of SLDC and carry out requisite load shedding or

backing down of generation in case of congestion in transmission system to ensure safety and reliability of the system. The procedure for application of measures to relieve congestion in real time as well as provisions of withdrawl of congestion shall be in accordance with Central Electricity Regulatory Commission (Measures to relieve congestion in real time operation) Regulations, 2009.

(x) The measures taken by the distribution licensee/user or EHV consumer shall not be withdrawn as long as the frequency remains at a level lower than the limits specified in Section 5.3 or congestion continues, unless specifically permitted by the SLDC.

(xi) Demand control can also be exercised by SLDC through direct circuit breaker tripping affected from SLDC using RTUs and under frequency detection by SCADA or through telephonic instructions. No demand shed by operation of under frequency relays shall be restored without specific directions from SLDC.

6.5 Load Crash

6.5.1 In the event of load crash in the system due to weather disturbance or any other reasons, the situation would be controlled by SLDC by getting the following methods implemented from distribution licensee(s) and other concerned Users in descending priorities:-

(i) Lifting of the load restrictions, if any;

(ii) Exporting the power to neighbouring regions/ states;

(iii) Backing down of thermal stations with a time lag of 5-10 minutes for short period in merit order;

(iv) Closing down of hydel units (subject to non spilling of water and effect on irrigation) keeping in view the inflow of water into canals and safety of canals/hydel channels.

Any other instruction issued by NRLDC shall assume priority over all the above methods.

The above methodology shall be reviewed from time to time in Operation and Co-ordination Committee.

6.5.2 While implementing the above, the system security aspects as per provisions in section 5.2 of IEGC and Section 5 of the State Grid Code should not be violated. Further, in case of hydro generation linked with irrigation requirements, the actual backing down or closing down of such hydro units shall be subject to limitations on such account & to avoid spillage of water.

6.6 Demand Control by Distribution Licensee/ Users

Distribution Licensees and other Users shall provide SCADA and data management systems in their area of control for efficient working of Distribution Systems. The Distribution Licensees/Users shall prepare and send SCADA and data management system report to SLDC. Distribution Licensees/Users shall provide sub-station automation equipment within one year from date of coming into effect of the State Grid Code at important substations identified by SLDC in consultation with Distribution Licensee(s).

SECTION 7 - OUTAGE PLANNING

7.1 Introduction

a) 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.

b) The generation output and transmission system should be adequate after taking into account the outages to achieve the security standards.

c) Annual outage plan shall be prepared in advance for the financial year by the SLDC in consultation with distribution licensees/Users and reviewed during the year on quarterly and Monthly basis. All Users, STU etc. shall follow these annual outage plans. If any deviation is required the same shall be with prior permission of SLDC. The outage planning of run-of-the-river hydro plant, wind and solar power plant and its associated evacuation network shall be planned to extract maximum power from these renewable sources of energy. Outage of wind generator should be planned during lean wind season, outage of solar, if required during the rainy season and outage of run-of-the river hydro power plant in the lean water season.

d) This section is applicable to SLDC, STU and all distribution licensee/Users.

7.2 Objective

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, as well as, irrigational requirements.

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.

7.3 Outage Planning Process

7.3.1 Each User and STU shall provide their proposed outage programme in writing for ensuing financial year to SLDC for preparing an overall outage plan for the State Transmission System as a whole. SLDC shall be responsible for analyzing the outage schedules of all users [including SGS, Distribution Licensees, Transmission Licensee(s)] & STU schedules for outage of Transmission network and preparing a draft annual Outage Plan for the State Transmission System in coordination with the Outage Plan prepared for the region by NRPC. The Users shall furnish the information to SLDC as per APPENDIX C.

7.3.2 However, SLDC is authorised to defer the outage in case of any of the following events:

- Major grid disturbance;
- System Isolation;
- Partial/Complete black out in the State;
- Any other event in the system that may have an adverse impact on system security by the proposed outage.

7.3.3 Each User, STU and other generating station shall obtain approval of SLDC, prior to availing the Outage.

7.3.4 SLDC while releasing any circuit for outage shall issue specific code to authorised person. Such circuit shall be connected back to the State Transmission System after specific code is returned by the authorised person to whom it is issued and thereafter with the approval by SLDC.

7.3.5 This restriction shall however not be applicable to individual Generating Unit(s) of a CPP.

7.4 Annual Outage Planning

7.4.1 Scheduled outage of power stations of capacity 10 MW & above as notified by SLDC from time to time, will be subject to annual planning.

7.4.2 Provided that scheduled outage of power station of 50 MW and above and EHV lines as notified by NRLDC, will also be subject to annual planning by NRLDC in co-ordination with SLDC.

7.4.3 SGS (except CPPs) connected to the State Grid shall furnish their proposed Outage programme for the next financial year in writing by Ist October each year. SGS Outage programme shall contain details like identification of unit, reason for outage, generation availability affected due to such outage, outage start date and duration of outage.

7.4.4 SLDC shall also obtain from STU and other transmission licensee(s), the proposed outage programme for Transmission lines, equipments and sub-stations etc. for next financial year by 1st October each year. STU outage programme shall contain identification of lines/ substations, reasons for outage, outage start date and duration of outage.

7.4.5 SLDC shall prepare & submit Load Generation Balance Report (LGBR) for peak as well as off-peak scenario and annual outage plan by 31st October for the next financial year to NRPC. The annual plans for managing deficits/surpluses shall be clearly indicated in the LGBR.

7.4.6 Scheduled outage of power stations and EHV transmission lines affecting regional power system shall be affected only with the approval of NRLDC in co-ordination with SLDC.

7.4.7 SLDC shall then come out with a draft LGBR for peak as well as off peak scenario and also prepare draft annual outage plan for the next financial year in consultation with NRPC by 30th November of each year for the State grid taking into account the available resources in an optimal manner and to maintain security standards. This will be done after carrying out necessary system studies and, if necessary, the outage programmes shall be rescheduled and LGBR shall be modified. Adequate balance between generation and load requirement shall be ensured while finalising outage programmes. The draft LGBR and draft outage plan shall be uploaded by the SLDC on its website.

7.4.8 The outage plan shall be finalised in consultation with NRLDC/NRPC. The LGBR after considering the comments/observations of stakeholders shall be finalised by SLDC in consultation with NRPC/NRLDC by 31st Dec. The final outage plan and final LGBR shall be uploaded on the website of SLDC and shall also be intimated to all Users, STU, SGS and other licensees by 15th Jan In case of emergency in the system, viz., loss of generation, break down of transmission line affecting the system, grid disturbances, system isolation, SLDC may conduct studies again before clearance of the planned outage.

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

7.4.10 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.

7.4.11 SLDC shall submit quarterly , half-yearly reports to the Commission indicating deviation in outages from the plan along with reasons .These reports shall also be put up on the SLDC website.

7.4.12 Scheduled outage of power stations of capacity 10 MW and above, of all EHV lines and HV lines forming interconnection between two EHV substations (and these notified as such by SLDC) shall be approved by SLDC, 24 hours in advance based on prevalent operating conditions. Approval shall be sought 72 hours before the scheduled outage by the power stations of capacity 25 MW and above or 132 kV and higher voltage transmission lines (other than radial lines). For other power stations and lines such approval shall be sought 48 hours in advance.

7.4.13 In respect of scheduled outage referred in this section a calendar shall be formulated in respect of annual outage planning for the ensuing financial year. Such outage plan shall be deliberated and finalised in the meeting of the Operation and Co-ordination Committee (OCC).

7.4.14 Outage plans for EHV lines / substations of more than 100 MVA transformation capacity shall be intimated to SLDC by the respective utilities.

7.5 Availing of shutdowns schedule

7.5.1 SLDC would review on daily basis the outage schedule for the next two days and in case of any contingency or conditions defer any planned outage as deemed fit clearly stating the reasons thereof. The revised dates in such cases would be finalized in consultation with the User.

7.5.2 The shutdowns for scheduled outage shall be taken in accordance with the provisions of Section 9 of the State Grid Code to ensure inter-user coordination.

SECTION 8 - CONTINGENCY PLANNING

8.1 Introduction

This section describes the steps in the recovery process to be followed by all Users in the event of total or partial blackouts of the State Transmission System or Regional System or National Grid System.

8.2 Objective

The objective of this section is to define the responsibilities of all Users to achieve the fastest recovery in the event of the State Transmission System or Regional System or National Grid System blackout, taking into account essential loads, generator capabilities and system constraints.

8.3 Contingency Planning 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 Northern Region prescribed under IEGC and further supplemented by SLDC for Punjab State Grid in consultations with STU / SGS / transmission and distribution licensees and other Users :-

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

In case of partial black out in the system/state/region/national grid, priority is to be given for early restoration of power station units, which have tripped. Start up power for the power station shall be extended through shortest possible route and within shortest possible time from adjoining sub-station/power station where the supply is available. Synchronising facility at all power stations and 220 kV sub-stations having inter-connection with ISTS shall be available.

In case of total regional black out, SLDC In-charge shall follow the system restoration procedure and for that purpose co-ordinate and follow the instructions of NRLDC for early restoration of the entire grid. Black start power stations shall be immediately started. Start-up power to the thermal stations shall be given by the hydel stations or through interstate supply, if available. All possible efforts shall be made to extend the hydel supply to the thermal power stations through shortest transmission network so as to avoid high voltage problem due to low load conditions. For safe and fast restoration of supply, SLDC shall formulate the proper sequence of operation for major generating units, lines, transformers and load within the state in consultations with NRLDC. The sequence of operation shall include opening, closing/tripping of circuit breakers, isolators, on-load tap-changers etc.

8.4 Restoration/Recovery Procedure

8.4.1 Punjab falls in North-Central (NC) sub-system of the Northern Regional Grid. SLDC shall follow the sequence prescribed for restoration procedure, utilise black start facility/ avail start-up power and synchronize the system elements as per the directions and instructions prescribed for North-Central (NC) sub-system of latest NR Restoration Procedure. Detailed procedure for restoration of the State Transmission System shall be prepared by SLDC for the following contingencies and shall be in conformity with the System Restoration Procedure of the Northern Region prescribed under IEGC:-

- Total System Black out;

- Partial System Blackout;
- Synchronisation of System Islands and System Split.

The restoration process shall take into account the generator capabilities and the operational constraints of Regional and the State Transmission System with the object of achieving normalcy in the shortest possible time. All Users should be aware of the steps to be taken during major Grid Disturbance and system restoration process.

8.4.2 Detailed plans and procedures for restoration of the State grid under partial/total blackout shall be developed by SLDC in consultation with all Users, STU, and NRLDC and shall be reviewed / updated annually.

8.4.3 Detailed plans and procedures for restoration after partial/total blackout of each User's or STU system within the State will be finalized by the concerned User's or STU in coordination with the SLDC. The procedure will be reviewed, confirmed and/or revised once every subsequent year. Mock trial runs of the procedure for different subsystems shall be carried out by the Users or STU at least once every six months under intimation to the SLDC.

8.4.4 The SLDC is authorized during the restoration process following a black out, to operate with reduced security standards for voltage and frequency as necessary in order to achieve the fastest possible recovery of the grid.

8.4.5 All communication channels required for restoration process shall be used for operational communication only, till grid normalcy is restored.

8.5 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 shall not apply.

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.

8.6 Post Disturbance Analysis

SLDC as per guidelines and instructions from NRLDC shall carryout the post disturbance analysis of all major grid disturbances resulting into total or partial system blackout and system split and desynchronism of any part of the State Grid. All users shall co-ordinate and furnish the data pertaining to the system disturbance to enable SLDC to analyse the system disturbance and furnish report to NRLDC in accordance with Section 5.9 of the IEGC.

Protection Coordination Committee shall also review the data collected and analyse the failure of protection system either of STU or any User and recommend modification and / or improvement in the protection system/ relay setting schemes and, if necessary, of the islanding and restoration scheme of Northern Region, to be carried out by the Grid Users.

SECTION 9 - INTER USER BOUNDARY SAFETY

9.1 Introduction

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

9.2 Objective

The objective of this section is to achieve agreement and consistency on the principles of safety as prescribed in the CEA safety regulations 2010, as amended from time to time when working across the inter user boundary between one User and another User.

9.3 Designated Officers

STU and all Users shall nominate authorized persons to be responsible for the co-ordination of safety across each inter user boundary. These persons shall be referred to as Designated Officer(s).

9.4 Procedure

9.4.1 STU shall issue a list of Designated Officers (names, designations and telephone numbers) to all Users who have a direct inter user boundary with STU or other Users. This list shall be updated promptly whenever there is change of name, designation or telephone number.

9.4.2 All Users with a direct inter user boundary with STU or other User system shall issue a similar list of their Designated Officers to STU or other User(s), which shall be updated promptly whenever there is a change in the list.

9.4.3 Whenever work across an inter-user boundary is to be carried, the Designated Officer of the User including STU itself, wishing to carry out work shall personally contact the other Designated Officer and collect the permit to work(PTW) with code word. PTW will also be returned personally by designated Officer using same code word. If the Permit to Work (PTW) cannot be obtained / returned personally, the Designated Officers shall contact through telephone and exchange Code words and have cross checks to ensure correct identification of both agencies before issuing / returning PTW.

9.4.4 Should the work extend over more than one shift, the Designated Officer shall ensure that the relief Designated Officer is fully briefed on the nature of the work and the code words in operation.

9.4.5 The Designated Officer(s) shall co-operate to establish and maintain the precautions necessary for the required work to be carried out in a safe manner. Both the established isolation and the established earth shall be locked in position, where such facilities exist, and shall be clearly identified.

9.4.6 Work shall not commence until the Designated Officer of the User including STU itself, wishing to carry out the work, is satisfied that all the safety precautions have been established. This Designated Officer shall issue agreed safety documentation (PTW) to the working party to allow work to commence. The PTW in respect of specified EHV lines and other interconnections shall be issued with the consent of SLDC.

9.4.7 When work is completed and safety precautions are no longer required, the Designated Officer who has been responsible for the work being carried out shall make direct contact with the other Designated Officer to return the PTW

and removal of those safety precautions. Return of PTW in respect of specified EHV lines and interconnections shall be informed to SLDC.

9.4.8 The equipment shall only be considered as suitable for connecting back to service when all safety precautions are confirmed as removed, by direct communication using code word contact between the two Designated Officers, and after ensuring that the return of agreed safety documentation (PTW) from the working party has taken place.

9.4.9 STU shall develop an agreed written procedure for inter-user boundary safety and regularly update it.

Any dispute concerning inter user Boundary Safety shall be resolved at the level of Operation & Co-ordination Committee.

9.5 Special Consideration

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

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

SECTION 10 - OPERATIONAL EVENTS/ ACCIDENT REPORTING

10.1 Introduction

This section describes the reporting procedure of reportable events in the State Transmission System

10.2 Objective

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

10.3 Periodic Reports

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

(ii) 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/ EHV consumers to curtail drawal resulting in non-compliance of State Grid Code;

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

(j) Lines/Sub-Stations operating near thermal rating or rated capacity;

(k) Lines/Sub-Stations drawing excessive reactive power.

(iii) 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.

(iv) 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 trippings as per clause 11 of the CEA Grid Standards.

10.3.2 <u>Other Reports</u>

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.

(iii) E-mail transmission with password protected read only report file will be considered as written report.

10.3.3 Reportable Events

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

(i) Violation of security standards;
(ii) Grid indiscipline;
(iii) Non-compliance of SLDC's instructions;
(iv) System islanding/system split;
(v) Regional black out/partial system black out;
(vi) Protection failure on any element of STS, and on any item on the "agreed list" of the intra-State and inter-state systems;
(vii) Power system instability;
(viii) Tripping of any element of the State grid;
(ix) Sudden load rejection by any User;
(x) Exceptionally high / low system voltage or frequency;
(xi) Serious equipment problem relating to major circuit breaker, transformer or bus bar;
(xii) Loss of major Generating Unit;
(xiii) Tripping of Transmission Line, ICT (Inter connecting transformer) and capacitor banks;
(xiv) Major fire incidents;
(xv) Force-Majeure condition like flooding or lightening etc.;
(xvi) Equipment and Transmission Line overload;
(xvii) Accidents-Fatal and Non-Fatal;
(xviii) Load Crash / Loss of Load.

10.3.4 Reporting Procedure

(i) Written reporting of Events by Users, STU and distribution licensees to SLDC:

In the case of an event which was initially reported by Users, STU and distribution licensees to SLDC orally, the Users, STU and distribution licensees will give a written report to SLDC in accordance with this section.

All reportable incidents occurring on lines and equipment of 33 kV and above and all the lines on which there is the inter user flow affecting the State Transmission System shall promptly be communicated by the User whose equipment has experienced the incident (the reporting User) to any other significantly affected Users and to SLDC.

Within 1 (one) hour of being informed by the Reporting User, SLDC should ask for a written report on any incident.

Reporting User shall submit an initial written report within two hours to SLDC. This has to be further followed up by the submission of a comprehensive report within 48 hours of the submission of the initial written report.

SLDC shall call for a report from any User on any reportable incident affecting other Users and STU, in case the same is not reported by such User whose equipment might have been source of the reportable incident.

The above shall not relieve any User from the obligation to report events in accordance with CEA Safety Regulations.

(ii) Written Reporting of Events by SLDC to Users, STU and distribution licensees:

In the case of an event which was initially reported by SLDC to Users, STU and distribution licensees orally, the SLDC will give a written report to the Users, STU and distribution licensees in accordance with this section.

10.4 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. A 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) Time and date of event;

(ii) Location;

(iii) Plant and/or Equipment directly involved;

(iv) Description and cause of event;

(v) Antecedent conditions of load and generation, including frequency, voltage and the flows in the affected area at the time of tripping including Weather Condition prior to the event;

(vi) Duration of interruption and Demand and/or Generation (in MW and MWh) interrupted;

(vii) All Relevant system data including copies of records of all recording instruments including Disturbance Recorder, Event Logger, Data Acquisition System (DAS) etc.;

(viii) Sequence of trippings with time;

(ix) Details of Relay Flags;

(x) Remedial measures.

A typical form is attached (APPENDIX-E).

10.5 Major Failure

Following a major failure, SLDC and other Users shall co-operate to inquire and establish the cause of such failure and make appropriate recommendations. SLDC shall report the occurrence of major failure to the Commission immediately for information and shall submit the enquiry report to the Commission within One month of the incident.

10.6 Accident Reporting

Reporting of accidents shall be in accordance with the section 161 of the Electricity Act, 2003 and the rules framed there under. Notice of accident and failure of supplies or transmission of electricity shall be in the specified form to the Commission and the Electrical Inspector.

PART IV-SCHEDULING AND DESPATCH CODE

SECTION 11 - SCHEDULE AND DESPATCH

11.1 Introduction

This section specifies the procedure to be adopted for the scheduling and despatch of generation of SGS, CPPs/IPPs and scheduling of other transactions through long-term access, medium-term and short term open access including complementary commercial mechanisms, on a day-ahead and intra-day basis with the process of the flow of information between the SGS/BBMB Load despatch centre /CPPs/IPPs, Northern Regional Load Despatch Centre (NRLDC), Power Exchanges and the State Load Despatch Centre (SLDC) and other concerned persons to meet system demand and drawal allocation requirements of beneficiaries/Distribution Licensees. In its control area, SLDCs shall have the total responsibility for

(i) scheduling/despatching of generation from all SGS (including generation of its embedded licensees);
(ii) regulating the demand of its control area;
(iii) scheduling their drawal from the ISGS (within its share in the respective plant's expected capability);
(iv) permitting long term access, medium term and short term open access transactions for embedded generators/consumers, in accordance with the contracts; and
(v) regulating the net drawal of its control area from the regional grid in accordance with the respective regulations of the CERC.

11.2 Objective

State Grid Code deals with the procedures to be adopted for scheduling of the net injection / drawals of State Entities on a day ahead basis with the modality of the flow of information between the SLDC/ ALDCs/ Power Exchange and State Entities. The procedure for submission of capability declaration by each SGS/CPPs/IPPs and submission of requisition/ drawal schedule by other State Entities is intended to enable SLDC to prepare the despatch schedule for each SGS/CPPs/IPPs and drawal schedule for each beneficiary/ Distribution Licensee. It also provides methodology of issuing real time despatch/drawal instructions and rescheduling, if required, to State Entities along with the commercial arrangement for the deviations from schedules, as well as, mechanism for reactive power pricing.

This code also provides the methodology for re-scheduling of wind and solar energy on three (3) hourly basis and the methodology of claiming the Renewable Regulatory charge for dealing with the variable generation of the wind and solar energy stations within State. For this, appropriate meters and Data Acquisition System facility (for real time as well as stored data) shall be provided for accounting of UI charges and transfer of information to SLDC.

The provisions contained in this Part are without prejudice to the powers conferred on SLDC under sections 32 and 33 of the Electricity Act, 2003

11.3 General

The following specific points would be taken into consideration while preparing and finalising the schedules:

11.3.1 Certain procedures are to be adopted while scheduling of generation by State Generating Companies (SGS), Open access customers, share from Central sector generation and other Licensees for scheduling the drawal by the beneficiaries of the State on a daily basis. The procedure for submission of

capability by each Generating Company and submission of drawal schedule by each beneficiary / Distribution Licensee of the State is intended to enable SLDC to prepare the generation and drawal schedule connected with system operation. It also provides methodology for issuing real time despatch / drawal instructions and rescheduling, if required, along with the commercial arrangement for the deviations from schedules.

11.3.2 SLDC will issue despatch instructions required to regulate all generation and imports from SGS (including IPPs , CPPs and Renewable Energy Sources) according to the 15-minute day ahead generation schedule, unless rescheduling is required due to unforeseen circumstances.

In the absence of any despatch instruction by SLDC, SGS shall generate/ export according to the day- ahead generation schedule. However the SLDC shall regulate the overall state generation in such a manner that generation from following types of power stations where energy potential, if unutilized, goes waste shall not be curtailed:

- Run of river or canal based hydro stations;
- Storage type hydro-stations like those of BBMB, when water level is at peak reservoir level or expected to touch peak reservoir level as per inflows or governed by irrigational discharge;
- Nuclear power stations to avoid poisoning of fuel;
- Renewable Energy Sources.

11.3.3 Despatch instructions to SGS shall be in standard format to be finalized by SLDC. These instructions will recognize declared availability and other parameters that have been made available by the SGS to SLDC. These instructions shall include time, Power Station, Generating Units (Total export in case of CPP), name of operators sending and receiving the same. Standard despatch instructions may include:

- To switch a SGS into or out of Service;
- To schedule generation;
- Details of reserve to be carried on a unit;
- To increase or decrease MVAR generation to maintain voltage profile as per unit capability at that time;
- To begin pre-planned Black Start procedures;
- To hold spinning reserve;
- To hold Generating Units of SGS on standby;
- To control MW/MVAR Drawal.

11.3.4 The State Load Despatch Centre is responsible for coordinating the scheduling of a generating station within the State, real-time monitoring of the station's operation, checking that there is no gaming (gaming is an intentional mis-declaration of a parameter related to commercial mechanism in vogue, in order to make an undue commercial gain) in its availability declaration, or in any other way revision of availability declaration and injection schedule, switching instructions, meter data processing, collections/disbursement of UI payments, outage planning etc. SLDC shall check that there is no gaming in scheduling by the open access consumers / licensees. In case, gaming is suspected, SLDC shall disallow the energy corresponding to suspected gaming from UI account till final decision.

11.3.5 If a generating station is connected only to the State transmission network, the SLDC shall coordinate scheduling, except for the Central Generating Stations.

11.3.6 If a generating station is connected both to ISTS and the State network, scheduling and other functions performed by the system operator of a control area will be done by SLDC, only if state has more than 50% share of power. The role of NRLDC, in such a case, shall be limited to consideration of the schedule for interstate exchange of power on account of this ISGS while determining the net drawal schedules of the respective states. If the State has a share of 50% or less, the scheduling and other functions shall be performed by NRLDC.

11.3.7 All state entities (SGS, Distribution Licensees & other beneficiaries) shall abide by the concept of frequency linked load despatch and pricing of deviations from schedule i.e. unscheduled interchanges. All State Entities shall normally be operated according to the standing frequency linked load despatch guidelines issued by the SLDC to the extent possible, unless otherwise advised by the SLDC.

11.3.8 SLDC may direct the State Entities (beneficiaries or Distribution Licensees)/SGS to increase/decrease their drawal/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, pursuant to intra-state short-term open access. These shall be got terminated under intimation to the injecting/drawee utility.

11.3.9 In case of inter-state bilateral and collective short-term open access transactions having a state utility or an intra-state entity as a buyer or a seller, SLDC shall accord concurrence or no objection or a prior standing clearance, as the case may be, in accordance with the Central Electricity Regulatory Commission (Open Access in inter-state Transmission) Regulations, 2008 as amended from time to time.

11.3.10 The SGS shall make an advance declaration of ex-power plant MW and MWh capabilities foreseen for the next day, i.e., from 0000 hrs to 2400 hrs. During fuel shortage condition, in case of thermal stations, they may specify minimum MW, maximum MW, MWh capability and declaration of fuel shortage. The generating stations shall also declare the possible ramping up / ramping down in a block. In case of a gas turbine generating station or a combined cycle generating station, the generating station shall declare the capacity for units and modules on APM (Administered Pricing Mechanism) gas, RLNG (Regasified Liquified Natural Gas) and liquid fuel separately, and these shall be scheduled separately.

11.3.11 While making or revising its declaration of capability, except in case of Run of the River (with up to three hour pondage) hydro stations, the SGS shall ensure that the declared capability during peak hours is not less than that during other hours. However, exception to this rule shall be allowed in case of tripping/re-synchronisation of units as a result of forced outage of units.

11.3.12 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 serve the notice of gaming and ask the SGS to explain the situation with necessary backup data.

11.3.13 The SGS shall be required to demonstrate the declared capability of its generating station as and when asked by the SLDC. In the event of the SGS failing to demonstrate the declared capability, the capacity charges due to the generator shall be reduced as a measure of penalty. The quantum of penalty for the first mis-declaration for any duration/block in a day shall be the charges corresponding to two days fixed charges. For the second mis-declaration the penalty shall be equivalent to fixed charges for four days and for subsequent mis-declarations, the penalty shall be multiplied in the geometrical progression over a period of a month.

11.3.14 The STU shall procure and install special energy meters, communication etc. on all inter connections between the state entities, Open Access consumers (directly connected to STS) and other identified points for recording of actual net MWh interchanges and MVARh drawals. The installation, operation and maintenance of special energy meters shall be in accordance with Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 as amended from time to time. All concerned Users (in whose premises the special energy meters are installed) shall take weekly meter readings and transmit them to the SLDC by Tuesday noon / as specified by SLDC, in case of manual meter reading mechanism. However, charges incurred will be paid by the respective users.

11.3.15 RTUs at each and every substation should be provided by the owner of the substation in consultation with State Load Dispatch Centre so that data from the substation may be integrated with the SLDC. Online data from these RTUs shall be made available at SLDC for monitoring purpose.

11.3.16 SLDC must have provision to provide remote consoles for the utilities who may desire to have access to the remote data pertaining to the utility. ABT scheduling shall preferably also be provided through the remote consoles.

11.3.17 The SLDC shall be responsible for computation of actual net injection / drawal of concerned Users, 15 minute-wise, based on the above meter readings. Subsequently, SLDC will prepare and issue the Unscheduled Inter-change (UI) account. All computations carried out by SLDC shall be open to all entities 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.

11.3.18 The operating log books of the generating station shall be available for review by the SLDC. These books shall keep record of machine operation and maintenance.

11.3.19 Hydro generating stations are expected to respond to grid frequency changes and inflow fluctuations. The hydro generating stations shall be free to deviate from the given schedule without causing grid constraint and a compensation for difference between the actual net energy supply by the hydro generating station and the scheduled energy (ex-bus) over day shall be made by the SLDC in the day ahead schedule for the 4th day (day plus 3).

11.3.20 SLDC shall periodically review the actual deviation from the despatch and net drawal schedules being issued, to check whether any of the state entities are indulging in unfair gaming or collusion. In case such practice is detected the matter shall be reported to Member Secretary SGCRC.

11.3.21 Scheduling and dispatch procedures for long term, medium term and short term Open Access shall be as per provisions of Open Access Regulations issued by PSERC and detailed procedures as approved by the Commission.

11.4 Generation and Drawal Scheduling

11.4.1 SLDC is responsible for collection, examination and compilation of generation Schedule for each SGS/IPP/CPP and drawal Schedule for each Distribution Licensees in prescribed manner and at the prescribed time. For scheduling purpose, each day starting from 00.00 hrs. will be divided into 96 time blocks of 15 minutes intervals.

Steps in Scheduling

Step by step procedure for scheduling of ISGS, BBMB generating stations, SGS/IPP/CPP, Long-term access, Medium – term and Short-term open access shall be as described below:

(i) By 10.00 hrs every day each SGS shall intimate to SLDC the station wise ex-power plant MW and MWh capabilities foreseen for the next day i.e. between 00.00 to 24.00 hrs of the following day, at 15 minutes interval.

(ii) By 11.00 hours every day each Distribution Licensee shall intimate SLDC the overall requirement in MW and MWh for the next day at 15 minutes interval. Distribution Licensees shall be entitled to a MW despatch up to (foreseen ex-power plant MW capability for the day) x (Distribution Licensee's Share in the station's capacity) for all such stations. In case of hydro-electric stations, there would also be a limit on daily MWh despatch equal to (MWh generation capacity for the day) x (Distribution Licensee's share in the station's capacity).

(iii) As per the procedure formulated by the BBMB in consultation with NRLDC under clause 6.3 of IEGC, the generation scheduling for the stations under Bhakra Beas Management Board (BBMB) would be coordinated and finalized by BBMB in accordance with the requirements of the beneficiary states viz. Punjab, Haryana, Rajasthan and Himachal Pradesh and subject to the irrigation and hydrology constraints. The schedules so finalized for each BBMB station and also generation scheduling of ISGS would be communicated to NRLDC every day by BBMB and respective ISGS as per provisions of IEGC.

(iv) As per clause 6.5(3&4) of IEGC, these foreseen capabilities of ISGS & BBMB power plants and the corresponding MW and MWh entitlements available to Punjab shall be compiled by NRLDC during the following day at 15 minutes intervals and shall be intimated to SLDC as per provisions of IEGC.

(v) After receipt of the information in regard to the availability from different sources at (i), (iii) & (iv) above, the SLDC shall review aggregate capability of SGS and the bilateral interchanges, if any, vis-à-vis Distribution Licensees requirements.

(vi) By 15.00 hrs, SLDC shall finalise (a) generation schedule of SGS and (b) drawal schedule of each Distribution Licensee. It shall accordingly advise each Distribution Licensee of their drawal schedule and will workout and convey to NRLDC the net drawal schedule in each of the ISGS along with the bilateral exchanges agreed or intended to be had with the other state / states and the estimates of demand / availability in the state and additional power it would like to draw subject to availability.

(vii) Scheduling of collective transaction (through Power Exchange):

As per clause 6.5(5) of IEGC**,** NRLDC shall schedule the Collective Transaction at the Punjab state periphery. The individual transactions for State Utilities/intra-State Entities shall be scheduled by the SLDC. Power Exchange(s) shall send the detailed break up of each point of injection and each point of drawal within the State to SLDC. Power Exchange(s) shall ensure necessary coordination with SLDC for scheduling of the transactions.

Timeline for above activities will be as per detailed procedure for Scheduling of Collective Transaction issued in accordance with CERC (Open-access in inter-state transmission) Regulations, 2008 as amended from time to time.

(viii) As per clause 6.5(7) of IEGC, by 1800 hrs, NRLDC shall convey to SLDC the drawal schedule for Punjab State from each of the ISGS and BBMB. SLDC shall convey to SGS the generation schedule and drawal schedule to Distribution Licensees by 1900 hrs.

(ix) SGS and each Distribution Licensee may inform the modifications / changes to be made, if any, in the above schedule to SLDC by 21.30 hours.

(x) SLDC after considering the same shall convey any modification/changes to be made in drawal schedule/foreseen capabilities, if any, to NRLDC by 22.00 hrs or preferably earlier.

(xi) On receipt of information and after due consultations, the NRLDC shall issue the final generation and drawal schedule by 23.00 hrs, and SLDC shall inform the same to all concerned.

(xii) The hydro electric generation stations are expected to respond to grid frequency changes and inflow fluctuations. They would, therefore, be free to deviate from the given schedule as long as they do not cause a grid constraint. As a result, the actual net energy supply by a hydro generating station over a day may differ from schedule energy (ex-bus) for that day. Compensation shall then be made by the SLDC to the hydro SGS in the day ahead schedule for the 4th day (day plus 3).

(xiii) The declaration of the generating capability by hydro SGS should 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 with the intent of making undue money through UI.

(xiv) 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 PSERC shall be treated as 'MUST RUN' power plants and shall not be subjected to 'merit order despatch' principles.

(xv) 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 SLDC shall ensure that generation schedules of such type of SGS are prepared and the schedule despatched for optimum utilization of available hydro energy except in the event of specific system requirements/constraints.

(xvi) The schedule finalized by the SLDC for hydro SGS, 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 would equal the declared total energy, in order that the water release requirement is met. While the 15-minute block wise deviations from schedule would be accounted for as Unscheduled Interchange (UI), the net energy deviation for the whole day, if any, shall be additionally accounted for as shown in the illustration.

Illustration

Suppose the foreseen/expected total energy (ex-bus) for Day-1 is E1, the scheduled energy is S1, actual net energy (metered) is A1, all in ex-bus MWh. Suppose the expected energy availability for Day 4, as declared by the generator, is E4. Then, the schedule for day4 shall be drawn up such that the scheduled energy for Day 4, shall be

S4=E4+(A1-(E1)), Similarly,

S5= E5+(A2-(E2)),

S6=E6+(A3-(E3)),

S7=E7+ (A4- (E4)), and so on.

11.4.2 SLDC shall prepare the day ahead generation/drawal schedule keeping in view the followings:

(i) Transmission System constraints from time to time.

(ii) 15 minute load requirements as scheduled by Users i.e. distribution licensees and open access consumers,

(iii) The need to provide operating margins and reserves required to be maintained.

(iv) The availability of generation from SGS, IPPs, CPPs .and Central Sector Generators together with any constraint in each case.

(v) 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.

11.5 Revision in injection/drawal schedule on real time basis

During the day of operation, the injection/drawal schedule may be revised by SLDC under following conditions:

(i) Revision of schedules of SGS shall be governed by SGC.

(ii) NRLDC may revise the schedule of drawal from Northern Region and consequently SLDC shall enforce the revisions within Punjab.

(iii) In case of forced outage of a unit of any SGS, SLDC may revise the generation/drawal schedule on the basis of revised declared capability by the affected SGS/Distribution Licensee.

(iv) In case of bottleneck in evacuation of power due to any constraint, SLDC may revise the generation/drawal schedule on the basis of revised declared capability by the affected SGS/Distribution Licensee.

(v) In consideration to clause 6.5 (16) of IEGC, the revised schedules in case of above contingencies (Regulation 11.5 (iii) & 11.5 (iv)) will become effective from the 4th time block, counting from the time block in which the revision is

advised by the generator or in which the bottleneck in evacuation of power has taken place to be the first one. The revised declared capability will also become effective from the 4th time block. Also, during the first, second and third time blocks of such an event, the scheduled generation of the station will be deemed to have been revised to be equal to actual generation and also the scheduled drawals of the beneficiaries / Distribution Licensees will be deemed to have been revised to be equal to their actual drawals.

(vi) In case of any Grid Disturbance, Scheduled Generation of all the Generating Stations and Scheduled Drawal of all the Beneficiaries / Distribution Licensees shall be deemed to have been revised to be equal to their Actual Generation/ Drawal for all the time blocks affected by the Grid Disturbance. Certification of Grid Disturbance and its duration shall be done by SLDC.

(vii) In consideration to clause 6.5 (18) of IEGC, Revision of declared capability by the SGS(s) having two part tariff with capacity charge and energy charge (except hydro stations) and requisition by beneficiaries/ Distribution Licensees for the remaining period of the day shall also be permitted with advance notice. Revised schedules/ declared capability in such cases shall become effective from the 6th time block, counting the time block in which the request for revision has been received in the SLDC to be the first one. SLDC may allow revision, of the declared capacity at 6 hourly intervals effective from 0000,0600,1200 and 1800 hours in case of Run of the River (ROR) and pondage based hydro generating stations, if there is large variation of expected energy (MWh) for the day compared to previous declaration.

(viii) Notwithstanding anything contained in Regulation 11.5(vii), in case of forced outages of a unit, for those stations who have a two part tariff based on capacity charge and energy charge for long term and medium term contracts, the SLDC shall revise the schedule on the basis of revised declared capability. The revised declared capability and the revised schedules shall become effective from the fourth time block, counting the time block in which the revision is advised by the SGS to be the first one.

(ix) Notwithstanding anything contained in Regulation 11.5(vii) in case of forced outage of a unit of a generating station (having generating capacity of 100 MW or more) and selling power under Short Term bilateral transaction (excluding collective transactions through power exchange), the generator or electricity trader or any other agency selling power from the unit of the generating station shall immediately intimate the outage of the unit along with the requisition for revision of schedule and estimated time of restoration of the unit, to SLDC. The schedule of beneficiaries, sellers and buyers of power from this generating unit shall be revised accordingly. The revised schedules shall become effective from the 4th time block, counting the time block in which the forced outage is declared to be the first one. The SLDC shall inform the revised schedule to the seller and the buyer. The original schedule shall become effective from the estimated time of restoration of the unit. However, the transmission charges as per original schedule shall continue to be paid for two days.

Provided that the schedule of the buyers and sellers shall be revised after forced outage of a unit, only if the source of power for a particular transaction has clearly been indicated during short-term open access application and the said unit of that generating station goes under forced outage.

(x) In case of revision of schedule of a generating unit, the schedules of all transactions under the long-term access, medium-term open access and short-term open access (except collective transactions through power exchange), shall be reduced on pro-rata basis.

(xi) If, at any point of time, SLDC observes that there is need for revision of the schedules in the interest of better system operation, it may do so on its own and in such cases, the revised schedules shall become effective from the 4th time block, counting the time block in which the revised schedule is issued by SLDC to be the first one.

(xii) To discourage frivolous revisions, SLDC may, at its sole discretion, refuse to accept schedule/capability changes of less than two (2) percent of previous schedule/capability. The schedule of thermal generating stations indicating fuel shortage while intimating the Declared Capacity to the SLDC shall not be revised except in case of forced outage of generating unit. Provided that in case of gas based generating stations, for optimum utilization of gas, this shall be permitted, i.e. in case of tripping of a unit, this gas may be diverted to another unit using the same gas.

(xiii) Special dispensation for scheduling of wind and solar generation

(a) Scheduling of wind power generation plants would have to be done for the purpose of UI where the sum of generation capacity of such plants connected 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) 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 supplying power under long term access, medium-term and short-term open access (excluding collective transactions) may be revised by giving advance notice to SLDC. Such revisions by wind power generating stations shall be effective from 6th time block, the first being the time-block in which notice was given. There may be one revision for each time slot of 3 hours starting from 00:00 hours of a particular day subject to maximum of 8 revisions during the day.

Date of introduction of forecasting for wind power generation and its permissible errors will be notified separately by the Commission.

(b) The schedule of solar generation shall be given by the generator based on availability of the generator, weather forecasting, solar insolation, season and normal solar generation curve and shall be vetted by the SLDC in which the generator is located and incorporated in the inter-state schedule. If SLDC is of the opinion that the schedule is not realistic, it may ask the solar generator to modify the schedule.

(c) SLDC shall maintain the record of schedule from renewable power generating stations based on type of renewable energy sources i.e wind or solar from the point of view of grid security. While scheduling generating stations in a region, system operator shall aim at utilizing available wind and solar energy fully.

(xiv) Generation schedules and drawal schedules issued/revised by SLDC shall become effective from designated time block irrespective of communication success.

(xv) For any revision of scheduled generation, including post facto deemed revision; there shall be a corresponding revision of scheduled drawals of the beneficiaries.

(xvi) While finalizing the drawal and despatch schedules as above, the SLDC and ALDCs shall also check that the resulting power flows do not give rise to any transmission constraint. In case any impermissible constraints are foreseen, the SLDC shall moderate the schedules to the required extent, under intimation to the concerned Users.

(xvii) On completion of the operating day, by 24.00 hours, the schedule finally implemented during the day (taking into account all before-the fact changes in despatch schedule of generating stations and drawal schedule of the Users) shall be issued by SLDC by placing it on web site and conveying it on e-mail id registered with SLDC. This schedule shall be the datum for commercial accounting. The average ex-bus capability for each of the generating stations shall also be worked out based on all before-the-fact advice to SLDC.

(xviii) The SLDC and the ALDCs shall properly document all the above information i.e. station-wise foreseen ex-power plant capabilities advised by the generating stations, the drawal schedule indented by the beneficiaries / Distribution Licensees, all schedules issued by the SLDC / ALDCs, and all revisions / updating of the above.

(xix) The procedure for scheduling carried out by SLDC/ ALDCs and the final schedules issued by SLDC shall be open to all Users for any checking / verification, for a period of 5 days. In case any mistake / omission is detected by SLDC or pointed out by User, the SLDC and ALDCs shall forthwith make a complete check and rectify the same.

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

(xxi) While availability declaration, by 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 decimal for each of the transaction, to have a resolution of 0.01 MW and 0.01 MWh."

11.6 Generation Despatch

11.6.1 SGS shall comply promptly with a despatch instruction issued by SLDC unless this action would compromise the safety of plant or personnel. SGS shall promptly inform SLDC in the event of any unforeseen difficulties in carrying out an instruction.

11.6.2 Despatch instructions shall be issued by E-Mail /Fax/ telephone, confirmed by exchange of name of operators sending and receiving the same and logging the same at each end. All such oral instructions shall be complied forthwith and written confirmation shall be issued promptly by FAX, tele-printer or otherwise.

11.7 Enhancement of Schedule and Despatch Procedure

Schedule and despatch procedures shall be suitably enhanced by SLDC to cater to tariff agreements as soon as such agreement is reached with SGS. All Distribution Licensees/State utilities/ consumers (IPPs/CPPs etc.) shall keep SLDC informed about any changes in existing Agreements or additional Agreements.

11.8 Data Requirements

Users shall provide SLDC with data for this section as specified in the Data Registration section.

SECTION 12 - FREQUENCY, VOLTAGE & REACTIVE POWER MANAGEMENT

12.1 Introduction

This section describes the method by which all Users of the State Transmission System shall co-operate with SLDC and STU to ensure effective control of the system frequency and for managing the voltage of the State Transmission System.

The State Transmission System normally operates in synchronism with the NEW (North, North Eastern, Eastern and Western) Grid and NRLDC has the overall responsibility of the integrated operation of the Northern Regional Power System. The constituents of the Region are required to follow the instructions of NRLDC for backing down generation, regulating loads, MVAR drawal etc. to meet the objective.

SLDC shall accordingly instruct Generating Units to regulate Generation/Export and hold reserves of active and reactive power within their respective declared parameters. SLDC shall also regulate the load as may be necessary to meet the objective.

The State Transmission System voltage levels can be affected by Regional operation. The STU/SLDC shall optimize voltage management by adjusting transformer taps (On Line Tap Changers) to the extent available and switching of circuits/ capacitors/ reactors and other operational steps. SLDC will instruct SGS to regulate MVAR generation within their declared parameters. SLDC shall also instruct Distribution Licensees to regulate demand, if necessary.

12.2 Objective

The objectives of this section are as follows:

- To define the responsibilities of all Users in contributing to frequency and voltage management.
- To define the actions required to enable SLDC and STU to maintain the State Transmission System voltages and frequency within acceptable levels in accordance with IEGC guidelines as well as Planning and Security Standards for the State Transmission System specified by the Commission, if any.

12.3 Responsibilities

12.3.1 SLDC shall monitor actual power drawal against scheduled power drawal and regulate internal generation and demand to maintain this schedule. SLDC shall also monitor reactive power drawal and availability of capacitor banks.

12.3.2 Generating Stations within Punjab, other than ISGS and of BBMB, shall follow the despatch instructions issued by SLDC.

12.3.3 Distribution licensees, Open Access Customers and Other Users shall comply with the instructions of SLDC for managing load & reactive power drawal as per system requirement.

12.4 Frequency Management

12.4.1 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 Northern Region shall make all possible efforts to ensure that grid frequency remains within 49.7 – 50.2 Hz band.

12.4.2 <u>Falling frequency</u>

SLDC /distribution licensee and EHV consumer shall initiate action to restrict the drawal of its control area, from the grid, within the net drawal schedule whenever the system frequency falls below 49.8 Hz. The SLDC/ distribution

licensee and EHV consumer shall ensure that their automatic demand management scheme mentioned in section 6.4.3 acts to ensure that there is no over drawl when frequency is 49.7 Hz or below. If the automatic demand management scheme has not yet been commissioned, then action has to be taken as per manual demand management scheme to ensure zero overdrawal when frequency is 49.7 Hz. or below.

The SLDC/ STU /Distribution Licensees shall regularly carry out the necessary exercises regarding short-term demand estimation for their respective States/area, to enable them to plan in advance as to how they would meet their consumers' load without overdrawing from the grid.

12.4.3 Rising Frequency

When the frequency is above 50.2 Hz, the SGS may (at their discretion) back down up to 5% or higher value (if pre-advised by SLDC) without waiting for an advice from SLDC to restrict the frequency rise. When the frequency falls below 49.8 Hz**,** the generation at all SGS (except those on peaking duty) shall be maximized, at least upto the level to which can be sustained, without waiting for an advice from SLDC subject to the condition that such increase does not lead to unacceptable line loading or system parameters to deteriorate beyond permissible limit.

12.5 Voltage Management

12.5.1 Users using the State Transmission System shall make all possible efforts to ensure that the grid voltage always remains within the limits specified at clause 4.7.5 above.

12.5.2 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 to 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. SLDC and STU shall co-ordinate with the Distribution Licensees to determine voltage level at the interconnection points.

SLDC shall continuously monitor 400/220/132/66/33 kV voltage levels at strategic sub-stations.

12.5.3 SLDC shall take appropriate measures to control State Transmission System voltages, which may include but not be limited to transformer tap changing, capacitor / reactor switching including capacitor switching by Distribution Licensees at 66kV & 33kV substations, operation of Hydro unit as synchronous condenser and use of MVAR reserves with SGS within technical limits agreed to between STU and Generators. Generators shall inform SLDC of their reactive reserve capability promptly on request.

12.5.4 SGS (except CPPs) shall make available to SLDC the upto date capability curves for all Generating Units, as detailed in Section 4, indicating any restrictions, to allow accurate system studies and effective operation of the State Transmission System. CPPs shall similarly furnish the net reactive capability that will be available for Export to / Import from State Transmission System.

12.5.5 Distribution licensees, Open Access Customers and other users shall participate in voltage management by providing Local VAr compensation (as far as possible in low voltage system close to load points) such that they do not depend upon EHV grid for reactive support.

12.6 Reactive Power management

12.6.1 Reactive power compensation should ideally be provided locally, by generating reactive power as close to the reactive power consumption as possible. The State Entities except Generating Stations are therefore expected to provide local Volt Ampere reactive (VAr) compensation/generation such that they do not draw VArs from the EHV grid, particularly under low-voltage condition. To discourage VAr drawals by State Entities except Generating Stations , VAr exchanges with State Grid shall be priced as follows:

- The State Entities except Generating Stations pay for VAr drawal when voltage at the metering point is below 97%.
- The State Entities except Generating Stations get paid for VAr return when voltage is below 97%.
- The State Entities except Generating Stations get paid for VAr drawal when voltage is above103%.
- The State Entities except Generating Stations pay for VAr return when voltage is above 103%.

Provided that there shall be no charge/payment for drawal/return by a State Entities except Generating Stations on its own line emanating directly from an SGS.

The clause regarding Reactive Power Compensation in the state shall be operative from the date to be decided by the Commission.

12.6.2 The charge for VArh shall be as per IEGC Regulations, 2010, as amended from time to time.

12.6.3 Notwithstanding the above, SLDC may direct a State Entities except Generating Stations to curtail its VAr drawal/injection in case the security of grid or safety of any equipment is endangered.

12.6.4 In general, the State Entities except Generating Stations shall endeavor to minimize the VAr drawal at an interchange point when the voltage at that point is below 95% of rated, 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 State Entities except Generating Stations's request to the SLDC, but only at reasonable intervals.

12.6.5 Switching in/out of 400 kV bus and line Reactors throughout the grid shall be carried out as per instructions of RLDC/SLDC. Tap changing on all identified 400/220, 220/132 kV & 220/66 kV Transformers shall be done as per SLDCs instructions only.

12.6.6 The SGS and other generating stations connected to state grid shall generate/ absorb reactive power as per instructions of SLDC, within capability limits of the respective generating units, that is without sacrificing on the active generation required at that time. No payments shall be made to the generating companies for such VAr generation/absorption.

12.7 General

Close co-ordination between Users and SLDC and STU shall exist at all times for the purposes of effective frequency and voltage management.

SECTION 13 - MONITORING OF GENERATION & DRAWAL

13.1 Introduction

The monitoring of SGS output and active and reactive reserve capacity is important to evaluate the performance of generation plants.

The monitoring of actual Drawal against schedule is important to ensure that STU and Distribution Licensees contribute towards improving system performance and observe Grid discipline.

13.2 Objective

The objective of this section is to define the responsibilities of all SGS in the monitoring of Generating Unit reliability and performance, and STU's/ Distribution Licensees' compliance with the scheduled drawal to assist SLDC in managing voltage and frequency.

13.3 Monitoring Procedure

13.3.1 For effective operation of the State Transmission System, it is important that a SGS's declared availability is realistic and that any departures are continually and invariably fed back to the Generator to help effect improvement.

13.3.2 The SLDC shall continuously monitor Generating Unit outputs and Bus voltages. More stringent monitoring may be performed at any time when there is reason to believe that a SGS's declared availability may not match the actual availability or declared output does not match the actual output.

13.3.3 SLDC can ask for putting a generating station to demonstrate the declared availability by instructing the generating station to come up to the declared availability within time specified by generators.

13.3.4 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 actions for any breach of Connectivity Conditions. Continued default by the generating stations entails penalty as may be determined by the Commission.

13.3.5 SGS (excluding CPPs) shall provide to SLDC hourly 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.

13.3.6 The SGS shall provide any other logged readings that SLDC may reasonably require, for monitoring purposes where SCADA data is not available.

13.4 Generating Unit Trippings

13.4.1 SGS shall promptly inform SLDC of the tripping of a Generating Unit, with reasons in accordance with Section 10 'Operational Event/Accident Reporting'. SLDC shall intimate NRLDC about the trippings and their revival. SLDC shall keep a written log of all such trippings, including the reasons with a view to demonstrating the effect on system performance and identifying the need for remedial measures.

13.4.2 SGS shall submit a more detailed report of Generating Unit tripping to SLDC on monthly basis.

13.5 Monitoring of Drawal

13.5.1 SLDC shall continuously monitor actual MW drawal by Distribution Licensees and other users against their schedules through use of SCADA equipment or direct online monitoring of interface meter readings.

13.5.2 SLDC shall continuously monitor the actual MVAR drawal to the extent possible. This will be used to assist in State Transmission System voltage management.

13.5.3 For Open Access Customers, appropriate action will be taken by SLDC in case of mismatch beyond permissible limit(s) and keeping in view system security requirements. In case of persistent default or gaming by the open access customers, action shall be taken as per Open Access Regulations.

13.6 Data Requirement

SGS shall submit data to SLDC as listed in Data Registration Section (Appendix C-5).

SECTION 14 - ENERGY ACCOUNTING

14.1 Energy Accounting

14.1.1 Section 32 (2) (c) of the Act specifies the function of State Load Despatch Centre in the preparation of Energy Account for the quantity of electricity transmitted through the State Grid.

14.1.2 SLDC shall prepare every month, the accounts of scheduled and actual energy injection and energy drawal by:-

- Distribution Licensees;
- Open Access Customers within Punjab;
- SGS, CPP connected to the State Grid;
- Injection/drawl through BBMB system as reflected in monthly Regional Energy Account (REA) by NRPC.

14.1.3 The monthly energy accounts so prepared by SLDC shall be sent to all concerned for the purpose of monthly billing.

14.1.4 In the preparation of such energy accounts, SLDC shall take into consideration:-

- Agreements for supply and/or transmission of power, bilateral agreements, short term and spot purchases affected by any licensee, and User;
- Policy guidelines or decisions of State Grid Code Review Committee;
- Decisions/directives of the Commission;
- Components of tariff as approved by the Commission; and
- Such accounts by BBMB and NRPC.

14.1.5 For the purpose of preparation of energy accounts, the joint meter reading(s) taken on 1st of every month at inter connection points between STU / transmission licensee and SGS or any IPP or CPP or Open Access Customers and between STU/ transmission licensee and Distribution Licensees or between two distribution licensees shall be conveyed to SLDC by 5th of every month. The UI energy account shall be prepared by SLDC as per ABT regime based on CERC (Unscheduled Interchange charges & related matters) Regulations, 2009 as amended from time to time.

14.1.6 Monthly State Energy accounts for Punjab shall be prepared by SLDC by 7th of every month and shall be conveyed to all concerned for raising bills. Such energy accounts shall be subject to inspection/ verification/checking and raising any objection within 15 days of date of issue. If no objection is raised, energy accounts shall be finalized. In case, any objection is raised, same shall be deliberated in Commercial and Metering Committee and finalized as per their decision. Supplementary bills/credit note shall be raised accordingly.

14.1.7 In case energy accounts prepared/finalized by SLDC require any change on account of revisions of energy accounts by BBMB or NRPC, SLDC shall suo-moto or on the request of Commercial & Metering Committee shall effect changes following the provisions of Section 14.1.5 above.

14.2 SLDC Fee and Charges

14.2.1 SLDC as per provisions of the section 32 (3) of the Act, may levy SLDC fee and charges as may be determined by the Commission, upon the Generating Companies and Licensees engaged in intra-state transmission of electricity. SLDC fee & charges shall be levied upon Open Access Customers and CPPs in accordance with relevant Regulations framed by the Commission.

14.2.2 SLDC shall serve to each utility on 7th of every month the bills of its fees and charges. These charges shall be payable by 13th of every month. Delay in payment of SLDC fee and charges shall be subject to levy of late payment surcharge. Besides this, SLDC may direct disconnection of the utility from the Grid or regulate their supply/despatch and may approach competent authority for levy of fines.

PART V - PROTECTION CODE

SECTION 15 - PROTECTION

15.1 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.

15.2 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.

15.3 General Principles

15.3.1 Protection standards are treated as interface issues because of the possible severe inter-user boundary repercussions of faults that occur in the system of any entity. Minimum protection requirements are prescribed in this section because inadequate protection or mal-operation of protection system of any entity may result in far reaching consequences, disturbances and even damages to the systems of other entities.

15.3.2 No item of electrical equipment shall be allowed to remain connected to the State Transmission System unless it is covered by minimum specified protection aimed at reliability, selectivity, speed, stability and sensitivity.

15.3.3 All Users shall co-operate to ensure correct and appropriate settings of protection to achieve effective, discriminatory removal of faulty equipment within the time for target clearance specified in this section.

15.3.4 Protection settings shall not be altered, or protection relays bypassed and/or disconnected without consultation and agreement between all affected Users. In a 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, the electrical equipment shall be removed from service forthwith.

15.3.5 NRLDC shall advise STU regarding:

(i) Planning for upgrading and strengthening protection system based on analysis of grid disturbance and partial/total blackout in the State Transmission System.

(ii) Planning of Islanding and System Split schemes and installation of Under Frequency Relays and df/dt relays.

The Protection Practices and Protocol Manual of SLDC, approved by Protection Coordination Committee, shall have provision for the same.

15.3.6 A Protection Coordination Committee (PCC) shall be constituted as per Section 2.7.5 of the State Grid Code and shall be responsible for all the protection coordination functions defined under the same section. STU shall be responsible for arranging periodical meetings of the Protection Coordination Committee. STU shall investigate any malfunctioning of protection or other unsatisfactory protection issues. Users shall take prompt action to correct any protection mal-function or issue as discussed and agreed to in these periodical meetings. Protection Coordination Committee shall decide the date from which the existing protection provided in STU and/

or User systems not meeting the minimum requirement as stipulated in this code is required to be changed.

If, it is felt by STU that user's protection system does not comply with the norms, user is bound to get his protection system checked/tested/inspected by STU, and if required replaced by new ones after its inspection and testing, so that there is no adverse impact on state grid or STU's system.

15.3.7 Instead of PLCC system, Optical fibre cable, V-sat or any other communication system can be used with the approval of PCC.

15.4 Fault Clearance Times & Short-time Ratings

15.4.1 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, are as follows:

Nominal Voltage	**Minimum Short Circuit current rating & duration for Switchgear**		**Target Fault clearance Time**
kV	KA(rms)	Seconds	msec.
400	40	1	100
220	40	1	160
132	40	1	160
66	25	1	160

15.4.2 Slower fault clearance times for faults on a Users system may be agreed to but only if, in STU's opinion, system conditions allow this. STU shall specify the required opening time and short circuit rating of the circuit breakers at various locations for STU/ transmission licensee and Distribution Licensees/Open Access Customers directly connected to Transmission System. At generating stations, line faults should be cleared at the generating station end within the critical clearing time so that the generators remain in synchronism.

15.5 Generator Requirements

All Generating Units and all associated electrical equipment of the Generating Units connected to the State Transmission System shall have adequate protection so that the State Transmission System does not suffer due to any disturbances originating from the Generation units. The generator protection schemes shall cover at least Differential protection, back up protection, Stator & Rotor Earth fault protection, field ground/field failure protection (not applicable to brush-less excitation system), negative sequence protection, under frequency, over flux protection, inter-turn Differential protection for generator, restricted E/F for Generator Transformer, back-up impedance protection, pole slipping protection (applicable to units above 200MW), reverse power protection etc. It should comply with CBIP manual (pub; 274), section-1.

15.6 Transmission Line Requirements

15.6.1 General

Every EHV line taking off from a Power Station or a sub-station shall have protection and back up protection as mentioned below. STU shall notify Users of any changes in its policy on protection.

Switchgear equipment and Relay Panels for the protection of lines of STU taking off from a Power Station shall be owned and maintained by the Generator. Any transmission line related relay settings or any change in relay settings will be carried out by the Generator in close co-ordination and consultation with STU. All such issues shall be put up in the next meeting of Protection Coordination Committee for ratification. Carrier cabinets / equipment, Line matching units including wave traps and communication cable shall be owned and maintained by STU. All Generators shall provide space, connection facility, and access to STU for such purpose.

15.6.2 400kV and 220 kV Transmission Lines

All 400 kV and 220 kV transmission lines owned by STU shall have two fast acting distance protection schemes. These protection schemes shall be numeric, four independent zones (three forward and one reverse), non-switched (with separate measurement for all phase to phase and phase to ground faults) fast acting distance protection scheme with permissible inter-trip at remote end (in case of zone-2 fault). The scheme shall have inbuilt features of power swing blocking, fault recorder, disturbance recorder, event logger, relevant communication ports, single and three phase auto reclosing (with deadline charging and synchro- check facility), Local Breaker Backup (LBB), VT fail, broken conductor and sufficient LED's to display faulty phases and zones. Maximum operating time of relay on fault should not exceed 50 ms.

For back-up protection, a numerical directional IDMTL over current (for each phase) and earth fault relay shall be provided.

Additional, two stage over-voltage protection is required for 400 kV lines. However, in case of short lines, utility is at discretion to provide this protection.

Each transmission line shall have carrier inter-tripping through PLCC equipment for fast clearing of zone-2 Faults

15.6.3 132 kV and 66 kV Lines

A single distance protection scheme, which shall be numeric, with four independent zones (three forward and one reverse), non-switched (with separate measurement for all phase to phase and phase to ground faults) fast acting distance protection scheme with permissible inter-trip at remote end (in case of zone-2 fault). The scheme shall have inbuilt features of power swing blocking, fault recorder, disturbance recorder, event logger, relevant communication ports, single and three phase auto re-closing (with deadline charging and synchro- check facility), Local Breaker Backup (LBB), VT fail, broken conductor and sufficient LED's to display faulty phases and zones. Maximum operating time of relay on fault should not exceed 50 ms.

For back-up protection, a numerical directional IDMTL over current (for each phase) and earth fault relay shall be provided.

For short transmission lines, appropriate alternative protection schemes may be adopted such as pilot wire protection schemes.

15.7 Transformer Requirements

15.7.1 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 following minimum protections should be provided for transformers:

(i) All 400kV and 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, gas operated relays, winding temperature protection, oil temperature protection, PRV relay shall be provided for alarm and trip functions.

(ii) For 132 kV, 66 kV and 33 kV class transformers of capacity above 5 MVA, the protection shall be same as mentioned in 15.7.1 (i) 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 66 kV and 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.

15.7.2 In addition to electrical protection, gas operated relays, winding temperature protection and oil temperature protection shall be provided.

15.8 Sub-Station Protection

i) 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.

ii) 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.

iii) In case of 400 kV system REACTORS to be used to limit over-voltages due to capacitive VAr generation in long transmission lines shall have numeric reactor differential protection, reactor REF protection, back-up protection (over current and earth fault) and other protections to monitor reactor such as bucholz, winding temperature, oil temperature, pressure release valve (PRV), oil level, fire protection etc. It should comply with CBIP manual (pub 274), section-5.

iv) 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 15.4.

15.9 Calibration & Testing

All protection scheme (except distance protection schemes) shall be tested at each 400 kV, 220 kV, 132 kV, 66 kV sub-station by STU once in six months or immediately after any major fault, which ever is earlier. Distance protection schemes shall be tested once in a year.

Setting, co-ordination, testing and calibration of all protection schemes pertaining to generating units/stations shall be responsibility of respective SGS.

The overall co-ordination between Generators, Distribution Licensees , transmission licensee and STU shall be decided in meeting of Protection Co-ordination Committee. The Protection Co-ordination Committee shall review the testing and calibration procedures as and when needed.

15.10 Data Requirements

Users shall provide STU with data for this section as specified in the Data Registration section.

PART VI- METERING CODE

SECTION 16 - METERING CODE

16.1 Introduction

This code prescribes 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 Customers and EHV Consumers of Distribution Licensees directly connected to the State Transmission System.

16.2 Objective

The objective of this code is to prescribe a uniform policy in respect of minimum acceptable standards of metering which shall provide proper metering of the various operating system parameters for the purpose of accounting, commercial billing and settlement of electrical energy and to provide information which shall enable to effect management of State transmission system in a safe and economical manner.

Relevant features, parameters, standards and protocols adopted shall be in line with IEGC, CEA Regulations depending upon the metering applications.

16.3 Scope

16.3.1 The scope of this code covers the practices that shall be employed and the facilities that shall be provided for the measurement and recording of various parameters like active/reactive/apparent power/energy, power factor, voltage, frequency etc.

16.3.2 This code sets out or refers to the requirements of interface metering and describes type, standards, ownership, location, accuracy class, installation, operation, testing and maintenance, access, sealing, safety, meter reading and recording, meter failure or discrepancies, quality assurance, calibration and periodical testing of meters, additional meters and adoption of new technologies in respect of Interface meters for correct accounting and billing.

16.3.3 This code also lays down the procedure for assessment of consumption in case of defective and stuck-up meters and lays down guidelines for resolution of disputes between different agencies.

16.4 Applicability

This Metering Code for Punjab Grid shall apply to:

(i) STU/Transmission Licensees;

(ii) Generating Stations (SGSs , IPPs) connected to State Transmission System;

(iii) Distribution Licensees connected with State Transmission System;

(iv) EHV Consumers of Distribution Licensee(s) directly connected to State Transmission System;

(v) Open Access Customers availing Open Access on State Transmission system;

(vi) Captive Generators connected to State Transmission System.

16.5 Reference Standards

All the equipment installed under these Regulations/Code shall necessarily conform to the relevant standards/ requirements as specified in the Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006,as amended from time to time.

16.6 Meter Installation

16.6.1 Ownership

The ownership and responsibility for safety of the metering system shall be as specified in the CEA Metering Regulations..

16.6.2 Right to Install Energy Meters.

Each User shall extend necessary assistance and make available the required space to the STU for installation of the metering equipment and provide required outputs of the specified current and voltage transformers to facilitate installation of Meters, RTUs and associated equipment in their premises. Necessary auxiliary supply, if required, shall be extended up to the metering system.

16.6.3 Access to Equipment and Data

Each User on request, shall grant access to install metering equipments and RTUs to STU's employees, agents/duly authorized representative. The STU shall also have access to metering locations for inspecting, testing, calibrating, sealing, replacing the damaged equipment, collecting the data, joint readings of meters and metering equipments, and other functions necessary jointly or otherwise as mutually agreed.

16.6.4 Operation and Maintenance of the Metering System

The operation and maintenance of the metering system includes proper installation, regular maintenance of the metering system and RTUs, checking of errors of the CTs, VTs and meters, proper laying of cables and protection thereof, cleaning of connections/joints, checking of voltage drop in the CT/VT leads, condition of meter box and enclosure, condition of seals, regular/daily reading meters and regular data retrieved through CMRI and BCS, attending any breakdown/fault on the metering system etc shall be the responsibility of STU.

16.6.5 Type of Meters and Metering Capability.

The Interface meters to be used shall be suitable for measurement of commercial transactions between the utilities according to applicable tariffs. The meters shall be all electronic (static) poly phase tri-vector type having facility to measure active, reactive and apparent energy/power in all four quadrants i.e. a true import export meter. All inter-user meters shall be bi-directional while capacitor bank meters and sub-station auxillary meters shall be unidirectional if, bi-directional meters already exist, these may not be changed. Any User which connects to the STS shall provide specified meters as above along with the communication (redundant, if required). The respective entity /utility shall also provide local site arrangements such as space, routine access to the meter, power supply, back up/ auxiliary supply and other infrastructure requirements at its cost.

ABT compliant energy meters shall be provided at interface points, wherever the energy exchange is based on Availability Based Tariff (ABT), according to aforesaid regulations of CEA.

16.7 Standards for Metering Equipment

The STU shall install special energy meters on all inter-connection points for recording of actual net MWh interchanges and MVARh drawls. The installation, operation, maintenance and specifications of special energy meters shall be in accordance with Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006, as amended from time to time.

16.8 Testing Arrangement

(i) Two types of test facilities shall be available with STU.

a) Automatic meter test bench with high accuracy, static source and 0.02S class electronic reference standard meter (RS Meter) shall be used for testing and calibration of meters. Meter Testing Laboratories duly equipped with testing benches and other equipments shall be established at suitable locations for testing and calibration of meters by STU. The Meter Testing benches with 0.02S-class reference standard meter shall also be used for checking and calibration of portable testing equipments. Testing, calibration and maintenance of Energy Meters shall conform to the requirement of IS: 9792 and Testing equipments shall conform to Indian Standards Specification IS: 12346.

b) Portable test set with static source and electronic reference meter of 0.1S class shall be used for verification and joint testing of accuracy of static tri-vector meters at site on regular/routine basis.

(ii) Separate test terminal blocks for testing of main and check meters shall be provided so that when one meter is under testing, the other meter continues to record actual energy during testing period. Where only one/main meter exists, an additional meter shall be put in circuit to record energy during the testing period of the main meter so that while the main meter is under testing, the other meter continues to record energy during the period of meter remaining under testing.

(iii) Testing at site shall be carried out as follows:

- All meters where power handled is normally more than 10 MW- once in six months.
- All meters where power handled is normally less than 10 MW – once in two years.

(iv) Subject to Regulations issued by the Commission in this regard, the Licensee shall allow the testing of Open Access Customers' meters at third party NABL approved Testing Labs in case the Customers so request for the same. In case of testing by third party NABL approved Testing Labs, the Open Access Customers shall apply with prescribed fee to the Licensee.

16.9 Meter Reading, Data Collection and Data Downloading

(i) The STU and the concerned User shall jointly read the meters through their authorized representatives on 1st of every month at 12.00 Hrs. / retrieve meter reading data using CMRI/Tele metering.

(ii) Where a smart meter has been installed for an Open Access Customer connected to the transmission system, the Distribution Licensee shall be required to keep a metering database of the meter readings for the consumer for:

a) 13 months in an accessible format;

b) 5 years in archive.

(iii) SLDC shall be responsible for computation of actual net injection/drawl of the concerned intra state entities, 15 minute block-wise, based on interface ABT meter readings. The data of the special energy meters shall be downloaded by the designated representatives of the intra state entities jointly and forwarded to the State Load Dispatch Centre for preparation of intra state account of unscheduled inter changes of energy and related matters. This data shall be downloaded as per the specified schedule fixed for issue of intra state UI account by SLDC.

(iv) Provision of remote downloading of data of Special Energy Meters (SEMs) including that of Open Access Customers shall also be made.

16.10 Rights of access to metering data

The only persons entitled to access metering data from a metering installation shall be:

(i) The Distribution or Transmission Licensee or STU who is responsible for the metering installation;

(ii) The State Load Despatch Centre;

(iii) The consumer of electricity or the generator of electricity at the metering installation as the case may be;

(iv) Any other person having an agreement to supply electricity to the consumer associated with that metering installation;
In relation to this sub-clause, the person must present a written authorisation from the consumer to the Distribution Licensee before the data is to be provided; and

(v) The Commission when such information is required for an investigation.

16.11 System for Joint Inspection, Testing, Calibrations

(i) The metering system located at metering points between Generating Companies, STU and Distribution Licensees shall be regularly inspected at least once in a year or at an interval lesser than 1 year as mutually agreed by both the agencies involved for despatch and receipt of energy. Since the static tri-vector meters are calibrated through software at the manufacturers' works, only accuracy of the meters and functioning shall be verified during joint inspection and certified jointly by both the agencies.. After inspection /testing, the meter shall be properly sealed and a joint report shall be prepared giving details of testing work carried out, details of old seals removed and new seals affixed, test results, further action to be taken (if any) etc. The agency in whose premises the meter is located shall be responsible for proper security, protection of the metering equipment and sealing arrangement. To cover for loss of time, spare meters shall always be kept available with the STU/ owner of the meter/metering point.

(ii) Joint inspection shall also be carried out as and when difference in meter readings (so corrected) exceeds the sum of maximum error as per accuracy class of main and check meter. The meters provided at the sending end as well as at the receiving end shall be jointly tested/ on all loads and power factors as per relevant standards through static phantom load.

(iii) Calibration, sealing of interface meters, reading for UI Billing purposes before and after installation as and when required shall be carried out by STU or its nominated agency at the expenses of the respective User.

(iv) If, it is felt by STU that user's metering system does not comply with the norms, user is bound to get his metering system checked/tested/inspected by STU and if required, replaced by new ones after its inspection and testing.

16.12 Sealing

(i) Interface meter/ metering systems shall be jointly sealed by the authorized representatives of the concerned agencies as per the procedure agreed upon.

(ii) Any seal, applied pursuant to this metering code, shall not be broken or removed except in the presence of or with the prior consent of the agency affixing the seal or on whose behalf the seal has been affixed unless it is necessary to do so in circumstances where (a) both main and check meters are malfunctioning or there occurs a fire or similar hazard and such removal is essential and such consent can not be obtained immediately (b) such action is required for the purpose of attending to the meter failure. In such circumstances, verbal consent shall be given immediately and it must be confirmed in writing forthwith.

(iii) Each agency shall control the issue of its own seals and sealing pliers, and shall keep proper register/record of all such pliers and the authorized persons to whom these are issued.

(iv) Sealing of the metering system shall be carried out in such a manner so as not to hamper downloading of the data from the meter using CMRI or a remote meter reading system.

16.13 Assessment of consumption of defective and/or stuck-up meter

In case of excessive / less consumption or stoppage of meter, burning/damage of the meter or damage to the seals, the meter shall be considered as defective. In case, difference in consumption between the main and check meter for any month is more than 0.5%, checking of CT and VT connections and/or testing of meter at site, using the reference standard meter shall be carried out immediately to determine the accuracy of the main/check meter.

Whenever a main meter goes defective, the consumption recorded by the check meter / standby meter shall be referred to. The details of the malfunctioning along with date and time and snap shot parameters along with load survey shall be retrieved from the main meter. The exact nature of the mal-functioning shall be brought out after analyzing the data so retrieved and the consumption / losses recorded by the main meter shall be assessed accordingly. If main as well as check metering systems become defective, the assessment of energy consumption for the outage period shall be done from the standby meters by the concerned agencies as mutually agreed or at the level of Commercial & Metering Committee.

16.14 Replacement of Defective or Stuck-up Meter

Defective or stuck-up meter shall be replaced as soon as possible. The owner of the meter shall maintain spare inventory of meters in sufficient quantity, so that down time is minimized.

16.15 Interface Metering Arrangement

The metering system shall comprise of main, check, and standby meters. The order of precedence for billing shall be (a) main (b) check (c) standby.

16.15.1 The location of Interface meters for:

(i) Generating Station, Transmission & Distribution System and Inter-Connecting Transformer shall be as specified in CEA Metering Regulations (reproduced below)

S. No.	Stages	Main meter	Check meter	Standby meter
1.	Generating Station	On all outgoing feeders	On all outgoing feeders	(i) High Voltage (HV) side of Generator Transformers. (ii) HV side of all Station Auxiliary Transformers
2.	Transmission and Distribution System	At one end of the line between the substations of the same licensee, and at both ends of the line between substations of two different licensees. Meters at both ends shall be considered as main meters for respective licensees.	-	There shall be no separate standby meter. Meter installed at other end of the line in case of two different licensees shall work as standby meter.
3	Inter-Connecting Transformer	High Voltage side of Inter-Connecting Transformer	-	Low Voltage side of Inter-Connecting Transformer

- Operational meters shall also be provided on all outgoing 66 KV, 33 KV and 11 KV feeders as back-up meter for energy audit on feeder and reconciliation of energy with respect to energy measured on LV side of EHV Power Transformer.
- Operational metering shall be sited wherever reasonably required by STU/Generating Companies for applications other than tariff metering.

ii) Open Access Consumers

The Inter-State Open Access Customers shall provide Special Energy Meters. The embedded Open Access Customers within the State Transmission System shall also provide Special Energy Meters both at the point of injection and point of drawal of supply. Special Energy Meters (SEM) shall be capable of time-differentiated measurement (15 minutes) of active energy and voltage differentiated measurement of reactive energy as specified by CTU/ NRLDC. The Distribution licensee may provide Check Meters of the same specification as Main Meters.

For real time monitoring of ABT meter parameters in case of open access customers, the ABT meters shall be capable for remote meter data acquisition at base computer centre (SLDC) for which two number independent channels shall be provided by Open Access Customer or licensee (Distribution Licensee) at the cost of OA customer in line with Open Access Regulations.

iii) EHV Consumers

In case of EHV industrial and other consumers directly fed from 220 kV or 132 kV or 66 kV sub-stations, tariff metering shall be provided on outgoing feeder emanating from EHV sub-station.

iv) Interstate Transmission and Inter-Regional Transmission System: Metering arrangement for Inter-State Transmission Lines and for Inter-Regional Transmission System shall be governed by IEGC. Special Energy Meters (SEM) capable of time-differentiated measurement (15 minutes) of active energy and voltage differentiated measurement of reactive energy as specified by CTU/NRLDC shall be provided on interstate and inter-regional transmission lines. STU shall comply with requirement for installation, meter reading & downloading and communication of readings of Special Energy Meters (SEM) to NRLDC as per operating procedure of NRLDC. STU may install its own Check Meters at inter-state/inter-regional transmission lines at the periphery of State Transmission System.

v) Sub-station Auxiliary Consumption Metering:

The STU sub-stations auxiliary consumption shall be recorded on LV side of station auxiliary transformers. If such transformer(s) is feeding other local load (colony quarters, streetlights etc.) apart from sub-station auxiliary load, separate metering shall be provided on individual feeders.

16.15.2 The scheme for location of interface meters shall be submitted to the CTU/STU by the owner of the meter in advance before installation of the scheme.

16.15.3 Metering Arrangements

The above meters shall have following facilities:

a) Metering equipment shall have external / internal modem so as to be capable of remote transmission of all data available in the meter memory through any of the information link viz. Radio Frequency, Public Switched Telephone Network (PSTN), Power Line Carrier Communication (PLCC) lines, Microwave, V-SAT Network, Mobile and other means of telemetry like private network of STU or low power radio.

b) The meters shall be self contained and shall normally operate with the power drawn from CT/VT secondary circuits. However, meters shall have the provision to display and downloading the data in case of feeder supply outage.

c) The meter shall be capable of data transmission to RTU's as well Intelligent Electronic Device (IED). The format/ protocol of communication for data retrieval and data telex should be made known to owner of meter by the concerned meter supplier.

16.16 ABT, Two Part and ToD Tariff Capability

The ABT compliant meter will have provision to compute and store average active and reactive energy and load data with respect to system frequency and the integration of the data i.e. average kWh & kVArh, and average frequency for 15 minutes block will be available in each meter in CT/VT secondary quantities.

Meters shall also have reactive high and reactive low volt-ampere hour registers for total drawal, high & low system voltage drawal. The Distribution Licensee wise summation of kWh, kW, PF, demand, scheduled interchange/ unscheduled interchange will be done at the main computer station provided at central billing station or at State Load Despatch Centre.

The metering arrangement for recording Distribution Licensee consumption/power input in his area of supply shall consist of following:

(i) Frequency based ABT compliant meters shall be provided on 66 kV or lower voltage lines feeding each Distribution Licensee area of supply. The function of these meters will be as under:

a) To measure Distribution Licensee-wise UI (Unscheduled Interchange) energy and corresponding average frequency during 15 minute block;

b) The Distribution Licensee wise summation of kWh, kW, PF, demand, scheduled interchange/ unscheduled interchange will be done at the main computer station provided at central billing station or at State Load Despatch Centre;

c) For this purpose, the various parameters shall be integrated at one centrally located station preferably at State Load Despatch Centre at Patiala through computer and suitable software.

(ii) Static tri-vector meters to be provided on LV secondary side of all EHV transformers. The function/duty of this meter will be as under:

a) Measurement of kWh energy supplied to Distribution Licensee for billing purpose.

b) 15 minute block-wise as well monthly kW/ kVA demand and power factor, caused by Distribution Licensee on each EHV transformer.

PART VII - DATA REGISTRATION CODE

SECTION 17 - DATA REGISTRATION

17.1 Introduction:

This section contains a list of all data required by STU and SLDC, which is to be provided by Users, and data required by Users to be provided by STU at times specified in the State Grid Code.

17.2 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.

17.3 Responsibility

17.3.1 All Users are responsible for submitting up-to-date data to STU/ SLDC in accordance with the provisions of the State Grid Code.

17.3.2 All Users shall provide STU and SLDC with the name, address and telephone number of the person responsible for sending the data.

17.3.3 STU shall inform all Users and SLDC of the name, address and telephone number of the person responsible for receiving data.

17.3.4 STU shall provide up-to-date data to Users as provided in the relevant schedule of the State Grid Code.

17.3.5 Responsibility for the correctness of data rests with the concerned User providing the data.

17.4 Data Categories and Stages in Registration

17.4.1 Data required to be exchanged has been listed in the Appendices under various categories with cross-reference to the concerned sections.

17.4.2 Changes to Users Data

Whenever any User becomes aware of a change to any items of data that is registered with STU, the User must promptly notify 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.

17.4.3 Methods of Submitting Data

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/STU.

Where standard formats are not enclosed these would be developed by SLDC / STU in consultation with Users.

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 must be indicated.

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 Excel (.xls / .xlsx) format as specified for paper transmission. Electronic encoding shall be made accordingly. 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. Other modes of data transfer, such as compact disc, hard disc or magnetic tape may be utilised if SLDC/ STU gives its prior written consent.

17.4.4 Data not supplied

Users are obliged to supply data as referred to in the individual sections of the State Grid Code and listed out in the Data Registration section 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, deemed appropriate.

17.5 Special Considerations

STU and SLDC and any other User may at any time make reasonable request for extra data as necessary.

STU shall supply data, required/requested by SLDC for system operation, from data bank to SLDC.

SECTION 18-MISCELLANANEOUS

18.1 Power to Remove Difficulties

If any difficulty arises in giving effect to any provisions of the Code, the Commission may by general or special order, direct the STU, SLDC, and the User(s) to take such action as may appear to the Commission to be necessary or expedient for the purpose of removing difficulties.

18.2 Power to Relax

The Commission may, for reasons to be recorded in writing, relax any of the provisions of these Regulations not being inconsistent with the provisions of the Act.

18.3 General Power to Amend

The Commission may, at any time and on such terms as it may deem fit, amend any of these Regulations for the purpose of meeting the objectives with which these Regulations have been framed.

18.4 Repeal and Saving

(i) The Punjab State Grid Code 2006, which was applicable from 1.4.2006, shall stand repealed from the date of commencement of these Regulations.

(ii) Notwithstanding such repeal, anything done or purported to have been done under the repealed regulations shall be deemed to have been done or purported to have been done under these regulations.

BY ORDER OF THE COMMISSION

Secretary to the Commission

PART VIII – APPENDICES

APPENDIX A - STANDARD PLANNING DATA

Standard Planning Data consist of details, which are expected to be normally sufficient for STU to investigate the impact on the State Transmission System due to User development.

REFERENCE TO: SECTION 3 AND SECTION 4

A-1 STANDARD PLANNING DATA (GENERATION)

A.1.1 THERMAL (COAL / GAS/FUEL LINKED)

For SGS – Thermal

A.1.1.1 GENERAL

i	Site	Give location map to scale showing roads, railway lines, Transmission lines, canals, pondage and reservoirs, if any.
ii	Coal linkage/ Fuel (Like Liquefied Natural Gas, Naphtha etc.) linkage	Give information on means of coal transport / carriage. In case of other fuels, give details of source of fuel and their transport.
iii	Water Sources	Give information on availability of water for operation of the Power Station.
iv	Environmental	State whether forest or other land areas are affected.
v	Site Map (To Scale)	Showing area required for Power Station coal linkage, coal yard, water pipe lines, ash disposal area, colony etc.
vi	Approximate period of construction	

A.1.1.2 CONNECTION

I	Point of Connection	Give single line diagram of the proposed Connection with the system.
ii	Step up voltage for Connection (kV)	

A.1.1.3 STATION CAPACITY

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

A.1.1.4 GENERATING UNIT DATA

i	Steam Generating Unit	State type, capacity, steam pressure, stream temperature etc.
ii	Steam turbine	State type, capacity.
iii	Generator	Type Rating (MVA) Speed (RPM) Terminal voltage (kV) Rated Power Factor Reactive Power Capability (MVAR) in the range of 0.95 leading and 0.85 lagging Short Circuit Ratio Direct axis (saturated) transient reactance (% on MVA rating) Direct axis (saturated) sub-transient reactance (% on MVA rating) Auxiliary Power Requirement (MW) MW and MVAR Capability curve Ramp-up and ramp-down rate Generator Characteristic curve
iv	Generator Transformer	Type Rated capacity (MVA) Voltage Ratio (HV/LV) Tap change Range step-wise (+ % to - %) Percentage Impedance (Positive Sequence at Full load)

A.1.2 HYDRO ELECTRIC

For SGS-Hydro

A.1.2.1 GENERAL

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	Constraint, if any, in water discharges	
xii	Approximate period of construction.	

A.1.2.2 CONNECTION

i	Point of Connection	Give single line diagram proposed Connection with the Transmission System.
ii	Step up voltage for Connection (kV)	

A.1.2.3 STATION CAPACITY

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)	

A.1.2.4 GENERATING UNIT DATA

i	Operating Head (in Metres)	a. Maximum b. Minimum c. 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	Type Rating (MVA) Speed (RPM) Terminal voltage (kV) Rated Power Factor Reactive Power Capability (MVAR) MW & MVAR capability curve of generating unit Short Circuit Ratio

	Generator	Direct axis transient (saturated) reactance (% on rated MVA) Direct axis sub-transient (saturated) reactance (% on rated MVA) Auxiliary Power Requirement (MW)
v	Generator - Transformer	a. Type b. Rated Capacity (MVA) c. Voltage Ratio HV/LV d. Tap change Range Step-Wise (+% to -%) e. Percentage Impedance (Positive Sequence at Full Load).

A.2 STANDARD PLANNING DATA (TRANSMISSION)

For STU and Transmission Licensees

Note: The compilation of the data is the internal matter of STU, and as such 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:

(i) Name of line (Indicating Power Stations and substations to be connected).

(ii) Voltage of line (kV).

(iii) No. of circuits.

(iv) Route length (km).

(v) Conductor sizes.

(vi) Line parameters (Per Unit values).

(vii) Resistance/km

(viii) Inductance/km

(ix) Susceptance/ km (B/2)

(x) Approximate power flow expected- MW & MVAR.

(xi) Terrain of the route- Give information regarding nature of terrain i.e. forest land, fallow land, agricultural and river basin, hill slope etc.

(xii) Route map (to scale) - Furnish topographical map showing the proposed route showing existing power lines and telecommunication lines.

(xiii) Purpose of Connection- Reference to Scheme, wheeling to other States etc.

(xiv) Approximate period of Construction.

(xv) Maximum conductor temperature for which the line is designed.

A.3. STANDARD PLANNING DATA (DISTRIBUTION)

For Distribution licensees

A.3.1 GENERAL

i	Area Map (to scale)	Furnish map of Punjab duly marked with the area of supply relevant for the Distribution Licence .
ii	Consumer Data	Furnish categories of consumers, their numbers and connected loads.
iii	Reference to distribution Divisions.	

A.3.2 CONNECTION

i	Points of Connection	Furnish single line diagram showing points of Connection
ii	Voltage of supply at points of Connection	
iii	Names of Grid Sub-Station feeding the points of Connection	

A.3.3 LINES AND SUBSTATIONS

i	Line Data	Furnish lengths of line within the Area, its laying (overhead / underground), conductor / cable size , bundle spacing of conductors, phases and voltages.
ii	Sub-station Data	Furnish details of 66/11 kV sub-station, 33/11 kV sub-station, 11/0.4 kV sub-stations, transformer capacity with vector group, capacitor installations

A.3.4 LOADS

i	Loads drawn at points of Connection.
ii	Details of loads fed at EHV, if any. Give name of consumer, voltage of supply, contract demand/load and name of Grid Sub-station from which line is drawn, length of EHV line from Grid Sub-station to consumer's premises.
iii	Reactive Power compensation installed

A.3.5 DEMAND DATA (FOR ALL LOADS 1 MW AND ABOVE)

i	Type of load	State whether furnace loads, rolling mills, traction loads, continuous process load, pumping loads, other industrial 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	Power Factor	

v	Sensitivity of load to voltage and frequency of supply.	
vi	Maximum Harmonic content of load.	
vii	Average and maximum phase unbalance of load.	
viii	Nearest sub-station from which load is to be fed.	
ix	Location map to scale	Showing location of load with reference to lines and sub-stations in the vicinity.
x	Sanctioned load of continuous process industries	

A.3.6 LOAD FORECAST DATA

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	If supply is received from more than one substation, the sub-station wise break up of peak load and energy projections for each category of loads for each of the succeeding 5 years along with estimated Daily load curve.
iv	Details of loads 1 MW and above. a. Name of prospective consumer. b. Location and nature of load/complex. c. Sub-Station from which to be fed. d. Voltage of supply. e. Phasing of load.

APPENDIX B - DETAILED PLANNING DATA
REFER TO: SECTION 3 & SECTION 4
FOR ROUTINE SUBMISSION

B.1 DETAILED PLANNING DATA (GENERATION)

B.1.1 THERMAL POWER STATIONS

For SGS – Thermal

B.1.1.1 GENERAL

i. Name of Power Station.
ii. Number and capacity of Generating Units (MVA/MW).
iii. Ratings of all major equipments (Boilers and major accessories, Turbines, Alternators, Generator Unit Transformers etc).
iv. Single line Diagram of Power Station and switchyard.
v. Relaying and metering diagram.
vi. Neutral Grounding of Generating Units.
vii. Excitation control- (What type is used? e.g. Thyristor, Fast Brushless Excitors)
viii. Earthing arrangements with earth resistance values.

B.1.1.2 PROTECTION AND METERING

i. Full description including settings for all relays and protection systems installed on the Generating Unit, Generator unit Transformer, Auxiliary Transformer and electrical motor of major equipments listed, but not limited to, under Sec. 3 (General).
ii. Full description including settings for all relays installed on all outgoing feeders from Power Station switchyard, tie circuit breakers, and incoming circuit breakers.
iii. Full description of inter-tripping of circuit 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 (with main and back up protection).
v. Full description of operational and commercial metering schemes.

B.1.1.3 SWITCHYARD

(i) In relation to interconnecting transformers:

- Rated MVA.
- Voltage Ratio.
- Vector Group.
- Positive sequence reactance for max., min., normal Tap. (% on MVA).
- Positive sequence resistance for max., min., normal Tap. (% on MVA).
- Zero sequence reactance (% on MVA).
- Tap changer Range (+% to -%) and steps.
- Type of Tap changer. (off/on load).

(ii) In relation to switchgear including circuit breakers, isolators on all circuits connected to the points of Connection:

- Rated voltage (kV).
- Type of circuit breaker (MOCB/ABCB/SF6).
- Rated short circuit breaking current (kA) 3 phase.
- Rated short circuit breaking current (kA) 1 phase.
- Rated short circuit making current (kA) 3 phase.
- Rated short circuit making current (kA) 1-phase.
- Provisions of auto reclosing with details.

(iii) In relation to the Lightning Arresters -number and location(line / transformer)- Technical data

(iv) In relation to the Communication - Details of communication equipment installed at points of connections.

(v) In relation to the Basic Insulation Level (kV) -

- Bus bar.
- Switchgear.
- Transformer bushings.
- Transformer windings.

B.1.1.4 Parameters of Generating Units

(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 (% on MVA) Xd.

(viii) Direct axis (saturated) transient reactance (% on MVA) Xd'.

(ix) Direct axis (saturated) sub-transient reactance (% on MVA) Xd".

(x) Quadrature axis synchronous reactance (% on MVA) Xq .

(xi) Quadrature axis (saturated) transient reactance (% on MVA) Xq'.

(xii) Quadrature axis (saturated) sub-transient reactance (% on MVA) Xq".

(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 constant (sec) T’qo.

(xvi) Quadrature axis sub-transient open circuit time constant (sec) T’'qo.

(xvii) Stator Resistance (Ohm)Ra.

(xviii) Neutral grounding details.

(xix) Stator leakage reactance (Ohm) X1.

(xx) Stator time constant (sec).

(xxi) Rated Field current (A).

(xxii) Open Circuit saturation characteristic for various terminal Voltages giving the compounding current to achieve the same.

(xxiii) MW and MVAR Capability curve

B.1.1.5 Parameters of excitation control system:

(i) Type of Excitation.

(ii) Maximum Field Voltage.

(iii) Minimum Field Voltage.

(iv) Rated Field Voltage.

(v) Details of excitation loop in block diagrams showing transfer functions of individual elements using I.E.E.E. symbols.

(vi) Dynamic characteristics of over - excitation limiter.

(vii) Dynamic characteristics of under-excitation limiter.

B.1.1.6 Parameters of governor:

(i) Governor average gain (MW/Hz).

(ii) Speeder motor setting range.

(iii) Time constant of steam or fuel Governor valve.

(iv) Governor valve opening limits.

(v) Governor valve rate limits.

(vi) Time constant of Turbine.

(vii) Governor block diagram showing transfer functions of individual elements using I.E.E.E. symbols.

B.1.1.7 Operational parameters:

Minimum notice required to synchronize a Generating Unit from de- synchronization.

(i) Minimum time between synchronizing different Generating Units in a Power Station.

(ii) The minimum block load requirements on synchronizing.

(iii) Time required for synchronizing a Generating Unit for the following conditions:

- Hot
- Warm
- Cold

(iv) Maximum Generating Unit loading rating for the following conditions:

- Hot
- Warm
- Cold

(v) Minimum load without oil support (MW).

B.1.1.8 GENERAL STATUS

(i) Detailed Project report.

(ii) Status Report

- Land
- Coal
- Water
- Environmental clearance
- Rehabilitation of displaced persons

(iii) Techno-economic approval by Central Electricity Authority (CEA).

(iv) Approval of State Government/Government of India.

(v) Financial Tie-up.

B.1.1.9 CONNECTION

(i) Reports of Studies for parallel operation with the State Transmission System.

(ii) Short Circuit studies

(iii) Stability Studies.

(iv) Load Flow Studies.

(v) Proposed Connection with the State Transmission System.

- Voltage
- No. of circuits
- Point of Connection.

B.1.2 HYDRO - ELECTRIC STATIONS

For SGS – Hydro

B.1.2.1 GENERAL

(i) Name of Power Station.

(ii) No. and capacity of units. (MW/MVA)

(iii) Ratings of all major equipment.

a. Turbines (HP)

b. Generators (MVA)

c. Generator Transformers (MVA)

d. Auxiliary Transformers (MVA)

(iv) Single line diagram of Power Station and switchyard.

(v) Relaying and metering diagram.

(vi) Neutral grounding of Generator.

(vii) Excitation control.

(viii) Earthing arrangements with earth resistance values.

(ix) Reservoir Data.

a. Salient features

b. Type of Reservoir

- Multipurpose
- For Power

c. Operating Table with

- Area capacity curves and
- Unit capability at different net heads

B.1.2.2 PROTECTION

(i) 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 included, but not limited to those listed, under Sec. 3 (General).

(ii) Full description including settings for all relays installed on all outgoing feeders from Power Station switchyard, tiebreakers, and incoming breakers.

(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.

B.1.2.3 SWITCHYARD

(i) Interconnecting transformers:

- Rated MVA
- Voltage Ratio
- Vector Group
- Positive sequence reactance for max., min. and normal Tap.(% on MVA).
- Positive sequence resistance for max., min. and normal Tap.(% on MVA).
- Zero sequence reactance (% on MVA)
- Tap changer range (+% to -%) and steps.
- Type of Tap changer (off/on load).
- Neutral grounding details.

(ii) Switchgear (including circuit breakers, Isolators on all circuits connected to the points of Connection).

- Rated voltage (kV).
- Type of Breaker (MOCB/ABCB/SF6).
- Rated short circuit breaking current (kA) 3 phase.
- Rated short circuit breaking current (kA) 1 phase.
- Rated short circuit making current (kA) 3 phase.
- Rated short circuit making current (kA) 1 phase.
- Provisions of auto reclosing with details.

(iii) Lightning Arresters-number and location(line / transformer)-Technical data

(iv) Communications
Details of Communications equipment installed at points of connections.

(v) Basic Insulation Level (kV)

- Bus bar.
- Switchgear.
- Transformer Bushings
- Transformer windings.

B.1.2.4 GENERATING UNITS

(i) Parameters of Generator

- Rated terminal voltage (kV).
- Rated MVA.
- Rated MW
- Speed (rpm) or number of poles.
- Inertia constant H (MW sec./MVA).
- Short circuit ratio.
- Direct axis synchronous reactance Xd (% on MVA).
- Direct axis (saturated) transient reactance (% on MVA) X'd.
- Direct axis (saturated) sub-transient reactance (% on MVA) X"d.
- Quadrature axis synchronous reactance (% on MVA) Xq.
- Quadrature axis (saturated) transient reactance (% on MVA) X'q.
- Quadrature axis (saturated) sub-transient reactance (% on MVA) X"q.
- Direct axis transient open circuit time constant (sec) T'do.
- Direct axis sub-transient open circuit time constant (sec) T"do.
- Quadrature axis transient open circuit time constant (sec) T'qo.
- Quadrature axis transient open circuit time content (sec) T"qo.
- Stator Resistance (Ohm) Ra.
- Stator leakage reactance (Ohm) X1.
- Stator time constant (sec).
- Rated Field current (A).
- Neutral grounding details.
- Open Circuit saturation characteristics of the Generator for various terminal voltages giving the compounding current to achieve this.
- Type of Turbine.
- Operating Head (Metres)
- Discharge with full gate opening (cumecs)
- Speed Rise on total Load throw off(%).
- MW and MVAR Capability curve

(ii) Parameters of excitation control system:

(iii) Parameters of governor:

(iv) Operational parameter:

- Minimum notice required to Synchronise a Generating Unit from de-synchronisation.
- Minimum time between Synchronising different Generating Units in a Power Station.
- Minimum block load requirements on Synchronising.

B.1.2.5 GENERAL STATUS

(i) Detailed Project Report.

(ii) Status Report.

- Topographical survey
- Geological survey
- Land
- Environmental Clearance
- Rehabilitation of displaced persons.

(iii) Techno-economic approval by Central Electricity Authority.

(iv) Approval of State Government/Government of India.

(v) Financial Tie-up.

B.1.2.6 CONNECTION

(i) Reports of Studies for parallel operation with the State Transmission System.

- Short Circuit studies
- Stability Studies.
- Load Flow Studies.

(ii) Proposed Connection with the State Transmission System.

- Voltage
- No. of circuits
- Point of Connection.

B.1.2.7 RESERVOIR DATA

(i) Dead Capacity

(ii) Live Capacity

B.2 DETAILED PLANNING DATA – TRANSMISSION

For STU/Transmission Licensees

B.2.1 GENERAL

(i) Single line diagram of the Transmission System down to 66kV,33kV bus at Grid Sub-station detailing:

- Name of Sub-station.
- Power Station connected.
- Number and length of circuits.
- Interconnecting transformers.
- Sub-station bus layouts.
- Power transformers.
- Reactive compensation equipment.

(ii) Sub-station layout diagrams showing:

- Bus bar layouts.
- Electrical circuitry, lines, cables, transformers, switchgear etc.
- Phasing arrangements.
- Earthing arrangements.
- Switching facilities and interlocking arrangements.
- Operating voltages.
- Numbering and nomenclature:
- Transformers.
- Circuits.
- Circuit breakers.
- Isolating switches.

B.2.2 LINE PARAMETERS (for all circuits)

(i) Designation of Line.

- Length of line (km).
- Number of circuits.Per Circuit values.
- Operating voltage (kV).
- Positive Phase sequence reactance (pu on 100 MVA) X1
- Positive Phase sequence resistance (pu on 100 MVA) R1
- Positive Phase sequence susceptance (pu on 100 MVA) B1
- Zero Phase sequence reactance (pu on 100 MVA) X0
- Zero Phase sequence resistance (pu on 100 MVA) R0
- Zero Phase sequence susceptance (pu on 100 MVA) B0

B.2.3 TRANSFORMER PARAMETERS (For all transformers)

(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).

B.2.4 EQUIPMENT DETAILS (For all substations)

(i) Circuit Breakers

(ii) Isolating switches

(iii) Current Transformers

(iv) Potential Transformers /CVTs

B.2.5 RELAYING AND METERING

(i) Protection relays installed for all transformers and feeders along with their settings and level of co-ordination with other Users.

(ii) Metering Details.

B.2.6 SYSTEM STUDIES

(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 Losses in the Transmission System.

B.2.7 DEMAND DATA (For all substations)

Demand Profile (Peak and lean load).

B.2.8 REACTIVE COMPENSATION EQUIPMENT

(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.

B.3 DETAILED PLANNING DATA (DISTRIBUTION)

For Distribution Licensees

B.3.1 GENERAL

(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, 66/11kV substations, 33/11kV substations, 11/0.4kV substation, 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 66/11kV substation, 33/11kV sub-station of Licensee).

B.3.2 CONNECTION

(i) Points of Connection (Furnish details of existing arrangement of Connection).

(ii) Details of metering at points of Connection.

B.3.3 LOADS

(i) Connected load - Active and Reactive Load. Furnish consumer details, Number of Consumers category wise, details of loads 1 MW and above, power factor.

(ii) Information on diversity of load and coincidence factor.

(iii) Daily demand profile (current and forecast) on each 66/11kV substation & 33/11kV sub-station.

(iv) Cumulative demand profile of Distribution System (current & forecast).

(v) Demand mix of essential load (priority wise) and non essential loads in MW.

APPENDIX C - OPERATIONAL PLANNING DATA

C.1 OUTAGE PLANNING DATA

REFER TO: SECTION 7 OUTAGE PLANNING

C.1.1 DEMAND ESTIMATES

For Distribution Licensees

Item	Due date/ Time
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.	1st October of current year
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
15 Minute block-wise demand estimates for the day ahead.	11.00 Hours every day.

C.1.2 ESTIMATES OF LOAD SHEDDING

For Distribution Licensee

Item	Due date/ Time
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.

C.1.3 YEAR AHEAD OUTAGE PROGRAMME(For the financial year)

C.1.3.1 GENERATION OUTAGE PROGRAMME For SGS

Station Name	Date of BLR (for thermal stns.)	Unit No.	Capacity (MW)	Proposed schedule			Reason	Total no. of maintenance days during previous yr and date of Annual/Capital Mtc.	Remarks
				From	To	No. of days			

Due date/ Time for SGS 1st October each year

C.1.3.2 YEAR AHEAD OUTAGE PROGRAMME

(Affecting Transmission System)

Item	Due date/ Time
MW, which will not be available as a result of Outage from Imports through external Connections. Start-date and start-time and period of Outage.	1st October each year

C.1.3.3 YEAR AHEAD CPP's OUTAGE PROGRAMME

Item	Due date/ Time
MW, which will not be available as a result of Outage. Start-date and start time and period of Outage.	1st October each year

C.1.3.4 YEAR AHEAD DISTRIBUTION LICENSEE's OUTAGE PROGRAMME

Item	Due date/ Time
Loads in MW not available from any Connection point. Identification of Connection point. Period of suspension of Drawal with start-date and start-time.	1st October each year

C.1.3.5 OVERALL LGBR & OUTAGE PROGRAMME to be provided by SLDC

Item	Due date/ Time
Report on proposed LGBR & Outage programme to NRPC.	31st Oct each year
Release of finally agreed LGBR & Outage plan.	31st Dec. each year

C.1.3.6 STU's OUTAGE PROGRAMME to SLDC

Item	Due date/ Time
Proposed outage programme for transmission lines, equipments and sub-stations	1st October each year

C-2. GENERATION SCHEDULING DATA

REFER TO: SECTION 11 - SCHEDULE AND DESPATCH

For SGS

Item	Due date/ Time
Day ahead 15-minute block-wise MW/MVAR availability (00.00 - 24.00 Hours) of SGS.	10.00 hrs
Day ahead 15-minute block-wise MW import/export from CPP's.	10.00 hrs
Status of Generating Unit Excitation AVR in service (Yes/No).	10.00 hrs
Status of Generating Unit Speed Control System. Governor in service (Yes/No).	10.00 hrs
Spinning reserve capability (MW).	10.00 hrs
Backing down capability with/without oil support (MW).	10.00 hrs
Hydro reservoir levels and restrictions.	10.00 hrs
Generating Units 15-minute block-wise summation outputs (MW).	10.00 hrs
Day ahead 15-minute block-wise MW entitlements from Central Sector Generation Power Stations from NRLDC.	10.00 hrs

C-3 CAPABILITY DATA

REFER TO: SECTION 13

For SGS

Item	
Generators and IPPs shall submit to STU up-to-date capability curves for all Generating Units. 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. On receipt of request from STU/ SLDC.

C-4 RESPONSE TO FREQUENCY CHANGE

REFER TO: SECTION 13

For SGS

Item	
Primary Response in MW at different levels of loads ranging from minimum Generation to registered capacity for frequency changes resulting in full opening of governor valve.	On receipt of request from STU/ SLDC.
Secondary response in MW to frequency changes	On receipt of request from STU/ SLDC.

C-5 MONITORING OF GENERATION

REFER TO: SECTION 13

For SGS

Item	
SGS shall provide 15-minute block-wise generation summation to SLDC. CPPs shall provide 15-minute block-wise export/ import MW to SLDC. Logged readings of Generators to SLDC. Detailed report of Generating Unit tripping on monthly basis.	Real time basis Real time basis As required In the first week of the succeeding month

C-6 ESSENTIAL AND NON-ESSENTIAL LOAD DATA

REFER TO: SECTION 6

For Distribution Licensee.

Item	Due date/ Time
Schedule of essential and non-essential loads on each discrete load block for purposes of load shedding.	As soon as possible after Connection

APPENDIX D: SITE RESPONSIBILITY SCHEDULE
REFER TO: Section 4-CONNECTION CONDITIONS

Name of Power Station/Sub-Station:
Site Owner:
Site Manager:
Tel. Number:
Fax Number:

Item of Plant/ Apparatus	Plant Owner	Safety Respon-sibility	Control Respon-sibility	Operation Respon-sibility	Maintenance Responsibility	Remarks
……kV Switchyard						
All equipment including bus bars						
Feeders						
Generating Units						

APPENDIX E: INCIDENT REPORTING
REFER TO: SECTION 10

FIRST REPORT……

Date: ……
Time: ……

S. No.	Item	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 to avoid repeat incident	
14	Name of the Organisation	