

# UTTARAKHAND ELECTRICITY REGULATORY COMMISSION

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## Draft Notification

August ....., 2016

### Uttarakhand Electricity Regulatory Commission (State Grid Code) Regulations, 2016

No. .... - In exercise of the powers conferred by clause (zp) of Section 181 read with clause (h) of sub-section (1) of Section 86 of the Act (36 of 2003), the Uttarakhand Electricity Regulatory Commission hereby makes the following Regulations, namely:

#### **1 Short title, extent and commencement**

- (1) These Regulations may be called the Uttarakhand Electricity Regulatory Commission (State Grid Code) Regulations, 2016.
- (2) These Regulations shall extend to the whole of the State of Uttarakhand.
- (3) These Regulations shall come into force with effect from the date of their publication in the official gazette replacing the existing Uttarakhand Electricity Regulatory Commission (State Grid Code) Regulations, 2007.

#### **2 Scope and applicability**

- (1) These Regulations shall apply to all parties that connect with and/or utilize the IaSTS or those, including SLDC, which are required to abide by the principles and procedures defined in the SGC in so far as they apply to that party. For Inter-State transmission of electricity the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010 as amended from time to time shall be applicable.
- (2) Persons availing open access, who are connected to and/or use the IaSTS, shall comply with UERC (Terms and Conditions of Intra-State Open Access) Regulations, 2015 as amended from time to time.

### **3 Objective**

The SGC brings together a single set of technical and commercial rules, encompassing all the Utilities connected to/or using the intra-State transmission system (IaSTS) and provides the following:

- (1) Documentation of the principles and procedures which define the relationship between the various Users of the intra-State transmission system (IaSTS), as well as the Regional and State Load Despatch Centres.
- (2) Facilitation of the operation, maintenance, development and planning of economic and reliable State Grid.
- (3) Facilitation for beneficial trading of electricity by defining a common basis of operation of the IaSTS, applicable to all the Users of the IaSTS.

### **4 Definitions**

- (1) In these Regulations, unless the context otherwise requires:
  - (a) “Act” means the Act (36 of 2003), including amendments thereto;
  - (b) “Ancillary Services” means 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 following, reactive power support, black start, etc;
  - (c) “Automatic Voltage Regulator (AVR)” means a continuously acting automatic excitation control system to control the voltage of a Generating Unit measured at the generator terminals;
  - (d) “Available Transfer Capability (ATC)” means 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;

- (e) “Area-Load Despatch Centre” means the offices and associated facilities of State Load Despatch Centre set up for different areas of the State for monitoring and control of the State Grid and includes any such offices and associated facilities set-up by State Load Despatch Centre in future;
- (f) “Beneficiary” means a person who has a share in an IaSGS/ISGS or bilateral exchanges including open access Users;
- (g) “Bilateral Transaction” means 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;
- (h) “Black Start Procedure” means procedure necessary to recover the grid from a partial or a total blackout;
- (i) “Bulk Consumer” means any consumer who avails supply at voltage of 33 kV or above;
- (j) “Capacitor” means an electrical facility provided for generation of reactive power;
- (k) “Central Transmission Utility (CTU)” means any Government company, which the Central Government may notify under sub-Section (1) of Section 38 of the Act;
- (l) “Collective Transaction” means a set of transactions discovered in power exchange through anonymous, simultaneous competitive bidding by buyers and sellers;
- (m) “Congestion” means a situation where the demand for transmission capacity exceed the Available Transfer Capability;

- (n) “Connection Agreement” means an agreement setting out the terms relating to connection to and/or use of the intra-State transmission system;
- (o) “Connection Point” means a point at which a User’s or Transmission Licensee’s Plant and/or Apparatus connects to the intra-State transmission system;
- (p) “Connectivity” means the state of getting connected to the Inter-State/Intra state transmission system by a generating station, including a captive generating plant, distribution licensee, a bulk consumer or an inter-State/intra-state transmission licensee;
- (q) “Constituent” means a Distribution Licensee or Deemed Distribution Licensee of the State, a Generating Company having an IaSGS, State Transmission Utility, State Transmission Licensees, Open Access Users;
- (r) “Control Area” means 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;
- (s) “Deviation Settlement Mechanism Regulations” means Central Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters) Regulations, 2014 including any subsequent amendments, and/or UERC (Deviation Settlement Mechanism and related matters) Regulations, 2016 (as and when notified by the Commission) whichever is applicable;
- (t) “Demand” means the demand of Active Power in MW and Reactive Power in MVAR of electricity unless otherwise specified;

- (u) “Demand response” means reduction in electricity usage by end customers from their normal consumption pattern, manually or automatically, in response to high deviation 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;
- (v) ‘df/dt Relay’ means a relay which operates when the rate of change of system frequency (over time) goes higher than a specified limit and initiates load shedding;
- (w) “Despatch Schedule” means the ex-power plant net MW and MWh output of a generating station, scheduled to be exported to the Grid from time to time;
- (x) “Disturbance Recorder (DR)” means a device provided to record the behavior of the pre-selected digital and analog values of the system parameters during an Event;
- (y) “Data Acquisition System (DAS)” means a system provided to record the sequence of operation in time, of the relays/equipments as well as the measurement of pre-selected system parameters;
- (z) “Drawal Schedule” means the ex-power plant, MW that a Distribution Licensee or Open Access User is scheduled to receive from the IaSGS or ISGS, including bilateral exchanges from time to time;
- (aa) “Entitlement” means a Share of a beneficiary (in MW / MWh) in the installed capacity/output capability of an ISGS;
- (bb) “Event” means an unscheduled or unplanned occurrence in the intra-State transmission system including faults, incidents and

breakdowns;

- (cc) “Event Logger” means a device provided to record the sequence of operation in time, of the relays/ equipments at a location during an Event;
- (dd) “Ex-Power Plant” means net MW/MWh output of a generating station, after deducting auxiliary consumption and transformation losses;
- (ee) Fault Locator (FL)” means a device provided at the end of a transmission line to measure/ indicate the distance at which a line fault may have occurred;
- (ff) “Flexible Alternating Current Transmission (FACT)” means facilities that enable power flows on A.C. lines to be regulated, to control loop flows, line loading etc.;
- (gg) “Force Majeure” means 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 such being the following including but not limited to :
  - (i) Acts of God, natural phenomena, floods, droughts, earthquakes and epidemics;
  - (ii) Enemy acts of any Government domestic or foreign, war declared or undeclared, hostilities, priorities, quarantines, embargoes;
  - (iii) Riot or Civil Commotion;
  - (iv) Grid’s failure not attributable to the person.
- (hh) “Forced Outage” means an outage of a Generating Unit or a transmission facility due to a fault or other reasons which has

not been planned;

- (ii) “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;
- (jj) “Generating Unit” means an electrical Generating Unit coupled to a turbine within a Power Station together with all Plant and Apparatus at that Power Station which relates exclusively to the operation of that turbo-generator;
- (kk) “Good Utility Practices” means any of the practices, methods and acts engaged in or approved by a significant portion of the electric utility industry during the relevant time period which could have been expected to accomplish the desired results at a reasonable cost consistent with good business practices, reliably, safely and with expedition;
- (ll) “Governor Droop” means in relation to the operation of the governor of a Generating Unit, the percentage drop in system frequency which would cause the Generating Unit under restricted/free governor action to change its output from zero to full load;
- (mm) “Grid Standards” means the standards specified by the CEA under clause (d) of the Section 73 of the Act;
- (nn) “Extra High Voltage(EHV)” means where the voltage exceeds 33,000 volts under normal conditions, subject, however, to the percentage variation allowed by the CEA;
- (oo) “Independent Power Producer (IPP)” means a generating company not owned/ controlled by the Central/State Government;
- (pp) “Inter-State Generating Station (ISGS)” means a Central/other

generating station in which two or more states have shares and whose scheduling is to be coordinated by the RLDC;

(qq) “Intra-State Generating Station (IaSGS)” means a State/other generating station which is connected to/utilises IaSTS and whose scheduling is to be coordinated by the SLDC;

(rr) “Inter State Transmission System (ISTS)” means

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

(ii) The conveyance of electricity across the territory of an intervening State as well as conveyance within the State which is incidental to such inter-state transmission of energy;

(iii) The transmission of electricity within the territory of State on a system built, owned, operated, maintained or controlled by CTU.

(ss) “Intra-State Transmission System (IaSTS)” means any system for transmission of electricity other than an inter-State transmission system and includes:

(i) Any system for the conveyance of electricity by means of a main transmission line within the territory of the State;

(ii) The transmission of electricity within the territory of State on a system built, owned, operated, maintained or controlled by STU;

Provided that the definition of point of separation between a transmission system and distribution system and between a Generating Station and transmission system shall be guided by the provision of the Regulations notified by the CEA under clause (b) of



Section 73 of the Act;

- (tt) “Licensee” means a person who has been granted a license under Section 14 of the Act;
- (uu) “Load” means the MW/MWh /MVAR/MVARh consumed by a utility/ installation;
- (vv) “Long -term Access” means the right to use the inter and/ or intra-State transmission system for a period exceeding 12 years but not exceeding 25 years;
- (ww) “Maximum Continuous Rating (MCR)” means the maximum continuous output in MW at the generator terminals guaranteed by the manufacturer at rated parameters;
- (xx) “Medium-term Open Access” means the right to use the inter and/or intra- State transmission system for a period exceeding 3 months but not exceeding 3 years;
- (yy) “National Grid” means the entire inter-connected electric power network of the country;
- (zz) “Net Drawal Schedule” means the drawal schedule of a Regional Entity after deducting the apportioned transmission losses (estimated);
- (aaa) “Operation” means a scheduled or planned action relating to the operation of a System;
- (bbb) “Open Access Customer” means a consumer, trader, distribution licensee or a generating company who has been granted open access under the UERC (terms and conditions of intra state open access) Regulations, 2015 amended from time to time;
- (ccc) “Operating Range” means the operating range of frequency and voltage as specified under the operating code (Chapter-5);
- (ddd) “Power Exchange” means the power exchange which has been granted registration in accordance with CERC (Power

Market Regulations), 2010 as amended from time to time;

- (eee) "Power System" means all aspects of generation, transmission, distribution and supply of electricity and includes one or more of the following, namely:
- (i) generating stations;
  - (ii) transmission or main transmission lines;
  - (iii) sub-stations;
  - (iv) tie-lines;
  - (v) load despatch activities;
  - (vi) mains or distribution mains;
  - (vii) electric supply lines;
  - (viii) overhead lines;
  - (ix) service lines;
  - (x) works.
- (fff) "Reactor" means an electrical facility specifically designed to absorb Reactive Power;
- (ggg) "Regional Power Committee (RPC)" means a Committee established by resolution by the Central Government for a specific region for facilitating the integrated operation of the power systems in that region;
- (hhh) "RPC Secretariat" means the Secretariat of the RPC;
- (iii) "Regional Grid" means the entire synchronously connected electric power network of the concerned Region;
- (jjj) "Regional Load Despatch Centre (RLDC)" means the Centre established under sub-section (1) of Section 27 of the Act;
- (kkk) "Share" means percentage share of a beneficiary in a generating station as notified by Appropriate Government or as agreed to in the agreement between the generating stations or

- trading/distribution licensees and their beneficiaries;
- (lll) “Short-term Open Access” means open access for a period up to one (1) month at one time;
- (mmm) “State Energy Account (SEA)” means a State energy account prepared on monthly basis by the SLDC for the billing and settlement of ‘Capacity Charge’, ‘Energy Charge’, ‘Deviation charge’ and ‘Reactive energy charge’;
- (nnn) “State Grid Code (SGC) or Grid Code” means these Regulations specifying the philosophy and the responsibilities for planning and operation of State power system;
- (ooo) “State Pool Account” means State account for (i) payments regarding Deviation (State Deviation Pool Account) or (ii) reactive energy exchanges (State Reactive Energy Pool Account), as the case may be;
- (ppp) “Spinning Reserve” means part loaded generating capacity with some reserve margin that is synchronized to the system and is ready to provide increased generation at short notice pursuant to despatch instruction or instantaneously in response to a frequency drop;
- (qqq) “Single Line Diagram” means diagrams which are a schematic representation of the HV/EHV apparatus and the connections to all external circuits at a Connection Point incorporating its numbering nomenclature and labeling;
- (rrr) “Site Common Drawing” means drawings prepared for each Connection Point, which incorporates layout drawings, electrical layout drawings, common protection/control drawings and common service drawings;
- (sss) “State Load Despatch Centre (SLDC)” means the Centre established under sub-section (1) of Section 31 of the Act;

- (ttt) “State Transmission Utility (STU)” means the Board or the Government Company specified as such by the State Government under sub- section (1) of Section 39 of the Act;
- (uuu) “Static VAR Compensator (SVC)” means an electrical facility designed for the purpose of generating or absorbing Reactive Power;
- (vvv) “Time Block” means 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;
- (www) “Total Transfer Capability (TTC)” means the amount of electric power that can be transferred reliably over the inter-control area transmission system under a given set of operating conditions considering the effect of occurrence of the worst credible contingency;
- (xxx) “Transmission License” means a License granted under Section 14 of the Act to transmit electricity;
- (yyy) “Transmission Planning Criteria” means the policy, standards and guidelines issued by the CEA for the planning and design of the Transmission system;
- (zzz) “User” means a person such as a Generating Company including Captive Generating Plant or Transmission Licensee (other than State Transmission utility) or Distribution Licensee or Open Access Customers;

Words and expressions used in these Regulations and not defined, but defined in the Act or the other Regulations issued by the Commission shall have the same meaning assigned to them respectively in the Act or such Regulations issued by the Commission.

## **5 Structure of the SGC**

This SGC contains the following:

### **Chapter 1: General**

This Chapter largely deals with compliance and procedure for review & Revision of SGC.

### **Chapter 2: Role of various organizations**

This chapter defines the functions of the various organizations as are relevant to SGC.

### **Chapter 3: Planning Code for intra-State transmission**

This Chapter provides the policy to be adopted in the planning and development of bulk power transfer and associated IaSTS. The Planning Code lays out the detailed information exchange required between the planning agencies and the various participants of the power system for load forecasting, generation availability and power system planning etc. for the future years under study. The Planning Code stipulates the various criteria to be adopted during the planning process.

### **Chapter 4: Connection Code**

This Chapter specifies minimum technical and design criteria to be complied with by any agency, connected to the system or seeking connection to the IaSTS, to maintain uniformity and quality across the system. This includes:

- (a) Procedure for connection to the IaSTS
- (b) Site responsibility schedule.

### **Chapter 5: Operating Code**

This Chapter describes the operational philosophy to maintain efficient, secure and reliable Grid Operation and contains the following parts.

- (a) Operating Policy
- (b) System security aspects

This part describes the general security aspects to be followed by generating companies and all State Constituents of the Grid.

(c) Demand Estimation for operational purposes

This part details the procedures to estimate the demand by the various constituents for their systems for the day/week/month/year ahead, which shall be used for operational planning.

(d) Demand management

This part identifies the methodology to be adopted for demand control by each State constituent as a function of the frequency and deficit generation.

(e) Periodic Reports

This part provides various provisions for reporting of the operating parameters of the State Grid such as frequency profile, voltage profile etc.

(f) Operational liaison

This part sets out the requirement for the exchange of information in relation to normal operation and/or events in the State Grid.

(g) Outage Planning

This part indicates procedure for outage planning.

(h) Recovery procedures

This part contains the procedures to be adopted following a major grid disturbance, for black start and resynchronization of islands, etc.

(i) Event Information

This part indicates the procedure by which events are reported and the information exchange etc. takes place.

## **Chapter 6: Scheduling & Despatch Code**

This part deals with the procedure to be adopted for scheduling and despatch of generation of the State Generating Stations (SGS) including complementary commercial mechanisms, on a daily basis with the modality of the flow of information between the IaSGS, other Users and the State Load Despatch Centre (SLDC).

## **Chapter 7: Metering Code**

Metering Code provides for development of minimum requirements and standards for installation and operation of meters, for commercial and operational purposes, to be provided by user or transmission licensee at the Connection Point.

## **Chapter 8: Safety**

This chapter specifies the requirements for safe working practices for maintenance of equipment associated with cross boundary operations and lays down the procedure to be followed when the work is carried out on electrical equipment connected to another User's System.

## **Chapter 9: Management of SGC**

This Chapter deals with the procedure for review/amendment and management of SGC

## **CHAPTER 1: GENERAL**

### **1.1 Introduction**

The State Grid Code (SGC) lays down the rules, guidelines and standards to be followed by various agencies and participants in the intra-State transmission system (IaSTS) to plan, develop, maintain and operate the intra-State transmission system, a part of Northern Region Grid System, in most efficient, reliable, economic and secure manner, while facilitating a healthy competition in the generation and supply of electricity.

### **1.2 Compliance**

- (1) State Transmission Utility shall be responsible for monitoring the compliance by the Users and Transmission System Licensees with the provisions, contained in Chapter 3, Chapter 4 and Chapter 5 of these Regulations and with the rules and procedures developed under such provisions.

Provided that the State Transmission Utility shall not unduly discriminate against or unduly prefer any User or Transmission Licensee.

- (2) State Load Despatch Centre shall be responsible for monitoring the compliance of the Users and Transmission System Licensees with the provisions contained in Chapter 5 and Chapter 6 of these Regulations and with the rules and procedures developed under such provisions.

Provided that the State Load Despatch Centre shall not unduly discriminate against or unduly prefer any User or Transmission Licensee.

- (3) In case of persistent non-compliance of the provisions of State Grid Code and/or of the rules and procedures prescribed/specified under such provisions, such matter shall be reported to the Commission.
- (4) All directions issued by the concerned Regional Load Despatch Centre to any Transmission Licensee or any other Licensee of the State or generating company (other than those connected to inter-State



transmission system) or sub-station in the State shall be issued through the State Load Despatch Centre and the State Load Despatch Centre shall ensure that such directions are duly complied with the licensee or generating company or sub-station.

- (5) State Load Despatch Centre may give such directions to and exercise such supervision and control over a State Constituent as may be required for ensuring the integrated grid operation and for achieving the maximum economy and efficiency in the operation of power system.
- (6) Every Transmission Licensee and User connected with the operation of the power system shall comply with the direction issued by the State Load Despatch Centre under sub-Regulation (5) of this Regulation.
- (7) If any dispute arises with reference to the quality of electricity or safe, secure and integrated operation of the State grid or in relation to any direction given under sub-Regulation (5) of this Regulation, it shall be referred to the Commission for decision.

Provided that till such time the Commission decides the matter, the direction of the State Load Despatch Centre shall be complied with by the Transmission Licensee or User.

- (8) Consistent failure to comply with the provisions of the State Grid Code or with the rules and procedures specified under such provisions, by User or Transmission Licensee or State Transmission Licensee, may lead to disconnection of the Plant and/or Apparatus of such User or Transmission Licensee or State Transmission Licensee.
- (9) Nothing contained in this Regulation shall in any manner impact the powers conferred upon the Commission to monitor and enforce compliance by the Users, Transmission Licensees and State Transmission Licensee with the provisions of State Grid Code and with the rules and procedures developed under such provisions.

### **1.3 Procedure for Review & Revision of SGC**

- (1) Users seeking any amendment to the SGC Code shall send written requests to the Chairperson of Grid Coordination Committee (GCC) with a copy to the Commission. If the request is sent to the Commission directly, the same shall be forwarded to GCC who shall, in consultation with the Distribution Licensees, Generating Companies, Central Transmission Utility (CTU) and such other persons as the Commission may direct or GCC may decide to consult, review the State Grid Code provisions.
- (2) Proposed changes/modifications in line with IEGC stipulations shall be circulated to all GCC members during GCC Meeting (which shall be convened at least twice in a year or as may be directed by the Commission) for their written comments within a reasonable time frame. Whenever it is observed that a certain provision of the SGC is not consistent with the IEGC, then the same shall be discussed in the GCC and the provision may be revised to make it consistent with IEGC.
- (3) Based on the response received from the members of the GCC, a report shall be prepared and submitted to the Commission for approval. The report shall cover the following:
  - (a) Reports on the outcome of the proposed review.
  - (b) Any proposed revision to the SGC as GCC thinks necessary for achievement of the objectives referred to in these Regulations/transmission licence.
  - (c) All written representations and objections submitted by the Users at the time of review.
- (4) Any change from the previous version shall be clearly marked in the margin. In addition, a revision sheet shall be placed at the front of the revised version, noting the number of each changed sub-section, together with reasons for the change.
- (5) STU shall maintain and upload State Grid Code Regulations with the latest amendments on its website.

## **CHAPTER 2: ROLES & FUNCTIONS OF VARIOUS ORGANIZATIONS**

### **2.1 Introduction**

This Chapter defines the management of grid code and role & functions of the various organizations involved in the field of grid operation and management and their organizational linkages so as to facilitate development and smooth operation of State Grid in harmony with Regional and National Grid.

### **2.2 State Transmission Utility**

The Government of Uttarakhand, in exercise of powers conferred by sub-section (1) of Section 39 of the Act notified Power Transmission Corporation of Uttarakhand Limited (PTCUL) as the State Transmission Utility (STU) with effect from 01.06.2004 as per GoU Notification No. 85/1/2004-06(3)/259/2003 dated 31.05.2004. Accordingly, PTCUL undertakes transmission activities and business as STU.

2.2.1 As per sub-section (2) of Section 39 of the Act following are the functions of the State Transmission Utility:-

- (1) To undertake transmission of energy through the intra-state transmission system.
- (2) To discharge all functions of planning and co-ordination relating to intra-State transmission system with:
  - (a) Central Transmission Utility
  - (b) State Governments
  - (c) Generating Companies
  - (d) Regional Power Committees
  - (e) Authority
  - (f) Licensees
  - (g) Any other person notified by the State Government in this behalf

- (3) To ensure development of an efficient, co-ordinated and economical system of intra-State transmission lines for smooth flow of electricity from a generating station to the load centres
- (4) 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 by the State Commission under sub-section (2) of Section 42 of the Act, on payment of the transmission charges and a surcharge thereon, as may be specified by the State Commission.

2.2.2 Until a government company or any authority or corporation is notified by the State Government, the State Transmission Utility shall operate the State Load Despatch Centre as per Section 31 of the Act.

Provided that in event of State Load Despatch Centre being operated by the State Transmission Utility, as per first proviso of sub-section (2) of Section 31 of the Act adequate autonomy shall be provided to the State Load Despatch Centre for it to be able to discharge its functions in the above mentioned manner.

2.2.3 The STU shall comply with the responsibilities specified in sub-Regulation (1) of Regulation 1.2 of these Regulations.

## **2.3 SLDC**

2.3.1 As per sub-section (2) of Section 31 of the Act, the State Load Despatch Centre shall be operated by a government company/any authority or corporation established or constituted by or under any State Act, as may be notified by the State Government. Until a government company or any authority or corporation is notified by the State Government, the State Transmission Utility shall operate the State Load Despatch Centre.

2.3.2 State Load Despatch Centre shall discharge the functions assigned to it under the provisions of the Act and these Regulations in an independent and unbiased manner.

2.3.3 As per Section 32 of the Act, the State Load Despatch Centre (SLDC) shall have following functions:

(1) The State Load Despatch Centre shall be the apex body to ensure integrated operation of the power system in the State.

(2) The State Load Despatch Centre shall:-

(a) be responsible for optimum scheduling and despatch of electricity within a State, in accordance with the contracts entered into with the licensees or generating companies operating in the State;

(b) monitor grid operations;

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

(d) exercise supervision and control over the intra-state transmission system; and

(e) be responsible for carrying out real time operations for grid control and dispatch of electricity within the State through secure and economic operation of the State grid in accordance with the Grid Standards and the State Grid Code.

(3) The State Load Despatch Centre may levy and collect such fee and charges from the generating companies and licensees engaged in intra-State transmission of electricity as may be specified by the State Commission.

2.3.4 Besides above, following shall be the exclusive functions of SLDC:-

(1) System operation and control of the State Grid covering contingency analysis and operational planning on real time basis;

- (a) Scheduling/re-scheduling of generation;
- (b) System restoration following grid disturbances;
- (c) Meter data collection;
- (d) Compiling and furnishing data pertaining to system operation;
- (e) Operation of State Energy Account, State Pool Accounts and any other functions as directed by the Commission.
- (f) Keep account of the quantity of electricity generated in the State.

2.3.5 In accordance with Section 33 of the Act the State Load Despatch Centre in a State may give such directions and exercise such supervision and control as may be required for ensuring the integrated grid operations and for achieving the maximum economy and efficiency in the operation of power system in that State. 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 the SLDC shall comply with the directions of the RLDC.

2.3.6 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 seller, SLDC shall accord concurrence or no objection or a prior standing clearance, as the case may be, in accordance with the CERC (Open Access in inter-state Transmission) Regulations, 2008 and UERC (Terms & Conditions of Intra-State Open Access) Regulations, 2015 amended from time to time.

2.3.7 Procedures to be developed by State Load Despatch Centre

- (1) Procedures and processes developed by State Load Despatch Centre, in discharge of its functions under the provisions of these Regulations, shall clearly provide for the following aspects, wherever applicable:
  - (a) Roles and Responsibilities of SLDC, ALDCs and State constituents;
  - (b) Communication facilities between SLDC, ALDCs and State constituents;

- (c) Information flow between SLDC, ALDCs and State constituents;  
and
- (d) Any other aspect considered appropriate by the State Load Despatch Centre or the Commission.

Provided that such procedures shall be developed in consultation with State Constituents and shall be consistent with SGC to enable compliance with the requirement of this SGC.

Provided further that such procedures shall be submitted, within three (3) months of notification of these Regulations, to the Commission for approval.

2.3.8 The SLDC shall comply with the responsibilities specified in sub-Regulations (2), (4) & (5) of Regulation 1.2 of these Regulations.

## **2.4 Area Load Despatch Centre**

- (1) The Area Load Despatch Centre (ALDC) shall be a subsidiary of SLDC operating within the State in particular area having main functions:-
  - (a) Data acquisition & transfer to SLDC;
  - (b) Supervisory control of load centre in their respective area;
  - (c) The ALDC shall assist SLDC to ensure integrated operation of the power system in a State;
  - (d) The ALDC shall assist SLDC for monitoring grid operations;
  - (e) The ALDC shall assist SLDC for supervision and control over the intra-state transmission system within their area.

## **2.5 Grid Coordination Committee**

- (1) The Grid Coordination Committee (GCC) shall be responsible for the following matters, namely:
  - (a) facilitating the implementation of these Regulations and the rules and procedures developed under the provisions of these Regulations;

- (b) assessing and recommending remedial measures for issues that might arise during the course of implementation of provisions of these Regulations and the rules and procedures developed under the provisions of these Regulations;
  - (c) review of the State Grid Code, in accordance with the provisions of the Act and these Regulations;
  - (d) ensuring that the changes/modifications proposed in the SGC are consistent and compatible with the IEGC.
  - (e) analysis of major disturbances in State Grid after their occurrence and constitution of the sub-committee to investigate the reasons thereof;
  - (f) the intra-State transmission proposals including system strengthening scheme identified on the basis of the planning studies would be discussed, reviewed and finalized in the meetings of Grid Co-ordination Committee. While reviewing the same, GCC shall also take into consideration the report of long term load forecast submitted by distribution licensees for their respective licence areas.
  - (g) such other matters as may be directed by the Commission from time to time.
- (2) The GCC shall comprise of the following members:
- (a) One member from State Transmission Utility;
  - (b) One member of the State Load Despatch Centre;
  - (c) One member each to represent the State and Privately owned generating companies in the State;
  - (d) One member to represent the Transmission Licensees in the State, other than the State Transmission Utility;
  - (e) One member to represent the State-owned Distribution Licensees in the State;



- (f) One member to represent the privately-owned Distribution Licensees in the State;
- (g) One member to represent the Electricity Traders in the State;
- (h) One member to represent the concerned Regional Load Despatch Centre;
- (i) One member to represent State Renewable Energy Agency;
- (j) One member to represent Solar/Wind Generators in the State;
- (k) Such other persons as may be nominated by the Commission.

Provided that the member from State Transmission Utility shall be the Chairperson of the Committee.

Provided that the Member from State Load Despatch Centre shall be the Convener of the Grid Coordination Committee.

Provided further that the State Transmission Utility shall, in coordination with State Load Despatch Centre, facilitate and manage the functioning of the Grid Coordination Committee.

- (3) The members of the GCC shall be selected as follows:
  - (a) the concerned Director of State Transmission Utility, having the responsibility of looking after technical activities of State Transmission Utility shall be the member referred to in clause (a) of sub-Regulation (2) of this Regulation.
  - (b) the member referred to in clause (b) of sub-Regulation (2) of this Regulation shall be the head of State Load Despatch Centre not below the rank of General Manager;
  - (c) the members referred to in clauses (c), (d), (e), (f), (g) (h) (i) and (j) of sub-Regulation (2) of this Regulation shall be nominated by their respective organizations. The organizations (except agency mentioned at clause (i)) will be selected in rotation from among all such organizations in the State. The term of each such member,

selected in rotation, shall be one (1) year.

Provided that the members nominated by each of the organization to the above Committee shall be holding a senior position in their respective organization.

- (4) Atleast two GCC meeting shall be held in a year or as may be directed by the Commission. Sub-meeting may be held by STU with the user to discuss individual requirements and with groups of Users to prepare proposals for consideration before the GCC.

## **2.6 Shift In-charge of SLDC**

- 2.6.1 Carrying out real time power system operation and control within the State to maintain grid discipline during the shift;
- 2.6.2 Coordination with NRLDC, CTU, STU, Transmission Licensee, State Generating Stations and Distribution Licensees for smooth and reliable grid operations;
- 2.6.3 Ensuring the adherence to maintain the injection/drawl as per schedule for maintaining grid stability;
- 2.6.4 Recording the major activities performed during the shift in log book;
- 2.6.5 Approving declaration of generator, requisition of DISCOMs & Open access customer and revisions thereof in real time operation;
- 2.6.6 Permitting EHV line/equipment outages and operation thereof;
- 2.6.7 Preparation of various reports during the shift;
- 2.6.8 Reviewing demand/availability in real time, forecasting and proposing for taking machine ON/OFF bar as per system requirement and merit order;
- 2.6.9 Updating unit outage and ensuring real time data on website.

## **2.7 Shift In-charge of Sub-station**

- 2.7.1 Monitoring real time power system key operational parameters (i.e. Voltage, Current, Power Factor, Active Power, Reactive Power etc.);

- 2.7.2 During the shift, in case of abnormal operation parameters, Shift in-charge has to take corrective action under intimation to its Sub-station in-charge;
- 2.7.3 Recording abnormalities/observed and corrective action taken in log sheet/computer;
- 2.7.4 Recording abnormalities not attended immediately in defect register as mechanism to inform Sub-station in-charge for early rectification;
- 2.7.5 Issuance of LCP (Line Clear Permit) ensuring isolation for safety and equipments & maintenance personals

## **2.8 Distribution Licensee**

- 2.8.1 The Distribution Licensees shall have the primary responsibility for developing long term load forecasts for not less than 3 years for their respective licence areas. The provisions related to load forecasting as provided in the Distribution Code shall be applicable to distribution licensee.
- 2.8.2 The Distribution Licensees shall submit long term load forecast for their respective licence areas to GCC with a copy to the Commission within 3 months of start of each financial year.

## **CHAPTER 3: PLANNING CODE FOR INTRA-STATE TRANSMISSION**

This Chapter comprises various aspects of Planning relating to Intra-State transmission systems.

### **3.1 Introduction**

The Planning Code specifies the policy and procedures to be applied in planning of State Grid and Inter-State links.

- (1) In accordance with sub-section (2) (b) of Section 38 of the Act, the Central Transmission Utility (CTU) shall discharge all functions of planning and co-ordination relating to inter- State transmission system in coordination with State Transmission Utility, Central Government, State Governments, Generating Companies, Regional Power Committees, Central Electricity Authority (CEA), licensees and any other person notified by the Central Government in this behalf.
- (2) Similarly, in accordance with sub-section (2) (b) of Section 39 of the Act, the State Transmission Utilities (STUs) shall discharge all functions of planning and coordination relating to intra-State transmission system with Central Transmission Utility, State Governments, Generating Companies, Regional Power Committees, Central Electricity Authority , licensees and any other person notified by the State Government in this behalf
- (3) In accordance with sub-section (2) (d) of Section 39 of the Act, the State Transmission Utility (STU) shall inter-alia 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 by the State Commission under sub-section (2) of Section 42 of the Act,

on payment of the transmission charges and a surcharge thereon, as may be specified by the Commission.

- (4) In accordance with Section 40 of the Act, the transmission licensee shall inter-alia 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 by the State Commission under sub-section (2) of Section 42 of the Act, on payment of the transmission charges and a surcharge thereon, as may be specified by the State Commission.

### **3.2 Objective**

The objectives of Planning Code are as follows:

- (1) To specify the principles, procedures and criteria which shall be used in the planning and development of the IaSTS and inter-State links.
- (2) To promote co-ordination amongst all State Constituents, and agencies in any proposed development of the IaSTS.
- (3) To provide methodology and information exchange amongst State Constituents, in the planning and development of the IaSTS.

### **3.3 Scope**

The Planning Code applies to STU, other State Transmission licensees, Intra-State Generating Station (IaSGS), connected to and/or using and involved in developing the IaSTS. This Planning Code also applies to Generating Companies, IPPs, Open Access Users and other licensees, regarding generation and/or transmission of energy to/from the IaSTS.

### **3.4 Planning Philosophy**

- (1) CEA would formulate perspective transmission plan for inter-State transmission system as well as intra-State transmission system. These perspective transmission plans would be continuously updated to take care of the revisions in load projections and generation scenarios considering the seasonal and the time of the day variations. In formulating perspective transmission plan the transmission requirement for evacuating power from renewable energy sources shall also be taken care of. The transmission system required for open access shall also be taken into account in accordance with National Electricity Policy so that congestion in system operation is minimized.
- (2) The STU shall carry out planning process from time to time as per the requirement for identification of intra-State transmission system including transmission system associated with Generation Projects and inter-state transmission system strengthening schemes which shall fit in with the perspective plan developed by CEA. While planning schemes, the following shall be considered in addition to the data of authenticated nature collected from and in consultation with Users by STU:
  - (a) Perspective plan formulated by CEA.
  - (b) Electric Power Survey of India published by the CEA.
  - (c) Transmission Planning Criteria and guidelines issued by the CEA
  - (d) Grid Standards specified by the CEA under clause (d) of Section 73 of the Act
  - (e) Operational feedback from RPC/RLDC/SLDC
  - (f) Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-state Transmission and related matters) Regulations, 2009 and UERC (Terms & Conditions of Intra-State Open Access) Regulations, 2015 amended from time to time.

- (g) Renewable capacity addition plan issued by Ministry of New and Renewable Energy Sources & Uttarakhand Renewable Energy Development Agency (UREDA).
  - (h) Reports on National Electricity Policy which are relevant for development of IaSTS;
  - (i) Any other information/data source suggested by the Commission.
- (3) In addition to the intra-state transmission system, the STU shall plan, from time to time, system strengthening schemes, need of which may arise to overcome the constraints in power transfer and to improve the overall performance of the grid. The intra-State transmission proposals including system strengthening scheme identified on the basis of the planning studies would be discussed, reviewed and finalized in the meetings of Grid Co-ordination Committee.
- (4) Based on above, the STU shall come out with a Transmission System Plan, the format of which can be decided by the State Transmission Utility.
- (5) The transmission system plan shall describe the plan for the IaSTS and shall include the proposed intra-State transmission schemes and system strengthening schemes for the benefit of all Users. The transmission system plan shall include information related intra-State transmission lines, additional equipment including transformers, capacitors, reactors, Static VAR Compensators and Flexible Alternating Current Transmission Systems. Further, the transmission system plan shall also include information on targets set in the preceding plans and progress achieved on the identified intra-State/inter-State transmission schemes and system strengthening schemes.
- (6) As voltage management plays an important role in transmission of energy, special attention shall be given by STU for planning of capacitors, reactors, SVC and FACTs etc. to optimize the use of the integrated transmission network.

- (7) The State Transmission Utility may, for the purpose of preparing the transmission system plan under these Regulations, seek such information as may be required by it from State Constituents, including generation capacity addition, system augmentation and long-term load forecast and all (approved/pending) applications for open access. Provided that the Distribution Licensees shall have the primary responsibility for developing long term load forecasts for their respective license areas. The provisions related to load forecasting as provided in the Distribution Code shall be applicable. Provided also that the State Transmission Utility shall consider, but not be bound by, the information provided under this Regulation in preparing the transmission system plan.
- (8) All State Constituents and agencies will supply to the STU, the desired planning data from time to time to enable it to formulate and finalize its plan.
- (9) The plan reports shall contain a chapter on additional transmission requirement which may include not only intra-State transmission lines but also additional equipment such as transformer, capacitors, reactors etc.
- (10) Based on plans prepared by CTU, STU shall have to plan their systems to further evacuate power from ISTS and to optimize the use of integrated transmission network.
- (11) The plan report shall also indicate the action taken to fulfill the additional requirement and actual progress made on new schemes. These reports will be available to any interested party for making investment decision/connection decisions to the IaSTS.
- (12) The State Transmission Utility shall send a copy of transmission system plan for the IaSTS to the Commission by 31st December each year and also publish it on its website. The STU shall also make the same available to any person upon request.



### **3.4 Planning Criteria**

- (1) The planning criteria shall be based on the security philosophy on which the IaSTS has been planned. The security philosophy may be as per the Transmission Planning Criteria and other guidelines as given by the CEA. Provided that State Transmission Utility shall carry out appropriate system studies while developing the transmission system plan.
- (2) The IaSTS, as a general rule, shall be capable of withstanding and be secured against the following contingency outages without necessitating load shedding or rescheduling of generation during Steady State Operation:
  - (a) Outage of a 132kV S /C line or,
  - (b) Outage of a 220 kV S/C line or,
  - (c) Outage of a 400 kV S/C line or,
  - (d) Outage of a single Interconnecting Transformer or,
  - (e) Outage of a one pole of HVDC Bipole line or,
  - (f) Outage of a 765 kV S/C line.
- (3) The IaSTS, as a general rule, shall be capable of withstanding and be secured against the following contingency outages without necessitating load shedding but could be with rescheduling of generation during steady state operation:
  - (a) Outage of a 400 kV S/C line with TCSC or,
  - (b) Outage of a 400 kV D/C line or
  - (c) Outage of a both pole of HVDC Bipole line or, both pole of HVDC back to back Station or
  - (d) Outage of a 765 kV S/C line with series compensation.

- (4) The above contingencies shall be considered assuming a pre-contingency system depletion (Planned outage) of another 132kV D/C , 220 kV D/C line or 400 kV S/C line in another corridor and not emanating from the same substation. The planning study would assume that all the Generating Units operate within their reactive capability curves and the network voltage profile are also maintained within voltage limits specified.
- (5) All the Generating Units may operate within their reactive capability curves and the network voltage profile shall be maintained within voltage limits specified.
- (6) The intra-State transmission system shall be capable of withstanding the loss of most severe single infeed without loss of stability.
- (7) Any one of the events defined above shall not cause:
  - (a) Loss of supply;
  - (b) Prolonged operation of the system frequency below and above specified limits;
  - (c) Unacceptable high or low voltage;
  - (d) System instability;
  - (e) Unacceptable overloading of IaSTS elements.
- (8) In all substations (132 kV and above), atleast two transformers shall be provided.
- (9) State Transmission Utility shall carry out planning studies for Reactive Power compensation of IaSTS including reactive power compensation requirement at the existing generators switchyard and for connectivity of new generators to the intra-state transmission system.
- (10) The maximum permissible thermal line loadings for different types of line configurations, employing various types of conductors shall be considered according to the Table II, Annexure-V of CEA Manual on Transmission Planning Criteria, 2013 as amended from time to time.

### **3.5 Planning Data**

- (1) To enable STU to discharge its responsibilities under the Transmission Licence by conducting system studies and preparation of the perspective plans, all Transmission Licensees and Users shall furnish all the data to STU from time to time as per Annexure-3 given in this Code. All the Users & transmission licensees shall also be required to furnish the updated data to the STU whenever any addition/deletion/modification of their network takes place.
- (2) To enable the Users to coordinate planning, design and operation of their plants and systems with the Transmission System, they may seek certain salient data of the Transmission System as applicable to them. STU/transmission Licensee shall provide the data from time to time as detailed in Annexure-4.
- (3) In addition to the above, the planning code of IEGC which calls for data exchange, shall also apply to the Generating Companies, CPPs, IPPs, Transmission Licensee Utilities and Distribution Licensees, regarding generation/transmission of energy from Inter State Transmission Systems.
- (4) The One time data (includes data required for modeling of existing electrical power system) shall be submitted within six (6) months from the date of notification of these Regulations by all the Users to STU. The data other than this one time data i.e. any augmentation/modification in the existing system shall be made available to STU on or before 1st of May & 1st of November every year.

### **3.6 Implementation of Transmission Plan**

The actual program of implementation of transmission lines, Inter-connecting Transformers, reactors/capacitors and other transmission elements will be determined by STU in consultation with the concerned agencies. The completion of these works, in the required time frame, shall be ensured by STU through the concerned agency.

## **CHAPTER 4: CONNECTION CODE**

### **4.1 Introduction**

STU, Transmission Licensees & Users shall comply with CEA (technical Standards for connectivity to the Grid) Regulations, 2007 and open access customers shall also comply with UERC (Terms and Conditions of the Intra-State Open Access) Regulations, 2015 as amended from time to time for connectivity to the Grid.

The Connection Code specifies the minimum technical and design criteria which shall be complied with by STU and any User/Transmission Licensee connected to, or seeking connection to IaSTS. They also set out the procedures by which STU shall ensure compliance by any agency with the above criteria as pre-requisite for the establishment of an agreed connection.

### **4.2 Objective**

#### **4.2.1 The Connection Code is designed to ensure that:**

- (1) To ensure the safe operation, integrity and reliability of the grid.
- (2) The basic rules for connections are complied with and also to treat all agencies in a non-discriminatory manner.
- (3) Any new or modified connections, when established, shall neither suffer unacceptable effects due to its connections to IaSTS nor impose unacceptable effects on the system of any other connected user or STU.
- (4) Any person seeking a new connection to the grid is required to be aware, in advance, of the procedure for connectivity to IaSTS and also the standards and conditions his system has to meet for being integrated into the grid.
- (5) The ownership and responsibility for all the equipments shall be clearly specified in a schedule (site responsibility schedule) for every site, where a connection is made.

### **4.3 Scope**

The Connection code applies to all State Constituents (STU, IaSGS etc.) and any other agency/licensees connected to and involved in developing the IaSTS. This Connection Code also applies to all agencies, which are planning to generate/transmit and/or are generating/transmitting energy to/from IaSTS. Such entities shall abide by the CEA (Technical Standards for connectivity to the Grid) Regulations, 2007, as amended from time to time, in order to ensure that the integrated grid is not adversely affected.

### **4.4 Connection Standard**

The applicable technical standards for construction of electrical plants, electric lines and connectivity to the IaSTS shall be as per CEA (Technical Standards for Construction of Electrical Plants & Electric Lines) Regulation, 2010 and CEA (Technical Standards for Connectivity to the Grid) Regulation, 2007 amended from time to time.

### **4.5 Safety Standard**

The applicable safety requirements for construction, operation and maintenance of electrical plants and electric lines shall be as per the CEA (Safety Requirements for construction, operation and maintenance of electrical plants and electric lines) Regulations, 2011 and CEA (Measures Relating to Safety and Electric Supply) Regulations, 2010 and amendments from time to time shall also be applicable.

### **4.6 Procedure for connection**

- (1) Prior to an agency being connected to the IaSTS, all necessary conditions outlined in the SGC, in addition to other mutually agreed requirements to be complied with, must be fulfilled by the agency.
- (2) Application for establishing new arrangement or modifying existing arrangement of connection to and/or use of the IaSTS shall be submitted by the concerned Transmission Licensee or User (Generator) to the State Transmission Utility. In case of consumer connected to IaSTS/distribution licensee network the application shall be submitted to the

Distribution licensee who inturn shall coordinate with the STU in accordance with UERC (Release of new HT & EHT Connections, Enhancement and Reduction of Loads) Regulations, 2008 amended from time to time.

Provided that for Generating Units embedded in the Distribution systems, and not connected to the IaSTS, shall be finalized by the respective Distribution Licensees.

Provided further, that the standard format for application shall be developed by State Transmission Utility and shall be made available at its website within two (2) months of notification of these Regulations.

- (3) The application mentioned in sub-Regulation (2) of this Regulation shall be submitted along with the following details:
  - (a) Report stating the purpose of the proposed connection and/or modification, transmission licensee to whose system connection is proposed, connection point, description of apparatus to be connected or modification of the apparatus already connected and beneficiaries of the proposed connection;
  - (b) Construction schedule and target completion date; and
  - (c) Confirmation that the Transmission Licensee or the User shall abide by the provisions of State Grid Code, CEA (Measures Relating to Safety and Electric Supply) Regulations, 2010 as amended from time to time and various standards including Grid Connectivity Standards made pursuant to the Act.
- (4) The State Transmission Utility shall forward a copy of the application to the Transmission Licensee in whose system the connection is being sought, to State Load Despatch Centre and to every Transmission Licensee within the State whose Transmission System is likely to be affected by such application.

- (5) The State Transmission Utility or Transmission Licensee, in whose system the connection is being sought, shall carry out the power system studies as considered appropriate before allowing any new connection.
- (6) The State Transmission Utility shall, within Thirty (30) days, from the receipt of an application under sub-Regulation (2) of this Regulation and after considering all suggestions and comments received from the parties identified under sub-Regulation (4) of this Regulation:
  - (a) accept the application with such modification or such conditions as may be specified by the State Transmission Utility;
  - (b) Reject the application for reasons to be recorded in writing if such application is not in accordance with the provisions of these Regulations.
- (7) In case of acceptance of an application as per clause (a) of sub-Regulation (6) of this Regulation, the State Transmission Utility shall make a formal offer to the applicant.

Provide that the State Transmission Utility shall forward a copy of the offer to the appropriate Transmission Licensee.

- (8) The voltage level at which the applicant is offered to be connected to the IaSTS shall be governed by the standards notified by the CEA and prevailing guidelines adopted by the State Transmission Utility.
- (9) The State Transmission Utility shall, upon compliance of the required conditions by the concerned Transmission Licensee/User, shall notify the concerned Transmission Licensee/User that it can be connected to the IaSTS.
- (10) The applicant and the Appropriate Transmission Licensee, in whose system the connection is being sought, shall finalise a Connection Agreement on acceptance of the offer by the applicant.

Provided that the State Transmission Utility shall be provided with a copy of the Connection Agreement by the Appropriate Transmission Licensee:

Provided further the State Load Despatch Centre shall also be provided with a copy of the above mentioned Connection Agreement by the Appropriate Transmission Licensee.

#### **4.7 Connection Agreement**

- (1) Connection Agreement shall include, as appropriate, within its terms and conditions, the following information relating to the connection of the User or Transmission Licensee to the IaSTS:
  - (a) a condition requiring both parties to comply with the State Grid Code;
  - (b) details of connection, technical requirements and commercial arrangements;
  - (c) details of any capital expenditure arising from necessary reinforcement or extension of the system, data communication etc. and demarcation of the same between the concerned parties;
  - (d) Site Responsibility Schedule;
  - (e) General philosophy and guidelines on protection and telemetry;
  - (f) Protection systems;
  - (g) System recording instruments;
  - (h) Communication facilities; and
  - (i) Any other information considered appropriate by the State Transmission Utility or the Commission.
- (2) State Transmission Utility shall revise Model Connection Agreement in accordance with the provisions in these Regulations within two (2) months of notifications of these Regulations and submit to the Commission for approval.



## **4.8 Equipment at Connection Points**

### **4.8.1 Sub-station Equipment**

- (1) All Extra High Voltage (EHV) sub-station equipments shall comply with standards prescribed by Bureau of Indian Standards/International Electro-technical Commission/prevaling Code of practice.
- (2) All equipment shall be designed, manufactured, tested and certified in accordance with the quality assurance requirements as per the standards of International Electro-technical Commission or the Bureau of Indian Standards.
- (3) Each connection between a User and IaSTS shall be controlled by a circuit breaker capable of interrupting, at the connection point, at least the short circuit current as advised by State Transmission Utility in the specific Connection Agreement.

### **4.8.2 Fault Clearance Times**

- (1) The fault clearance time for primary protection schemes, when all equipments operate correctly, for a three phase fault (close to the bus-bars) on Users' equipment directly connected to IaSTS and for a three phase fault (close to the bus-bars) on IaSTS connected to Users' equipment, shall not be more than:
  - (a) 100 milliseconds for 800 kV class & 400 kV
  - (b) 160 milliseconds for 220 kV & 132 kV/110 kV
- (2) Back-up protection shall be provided for required isolation/protection in the event of failure of the primary protection systems provided to meet the above fault clearance time requirements. If a Generating Unit is connected to the IaSTS directly, it shall be capable of withstanding the fault, until clearing of the fault by back-up protection on the IaSTS side.

### **4.8.3 Protection**

- (1) Protection Systems shall be provided by all Transmission Licensees and Users connected to IaSTS in co-ordination with STU to isolate the faulty equipments and protect the other components against all types of faults, internal/external to them, within specified fault clearance time as specified in sub-Regulation 4.8.2 of these Regulation.

Provided that all Users or Transmission Licensees connected to IaSTS shall provide protection systems as specified in the Connection Agreement.

- (2) Relay setting co-ordination shall be done by STU.

## **4.9 Reactive Power Compensation**

- (1) Reactive Power Compensation and/or other facilities shall be provided by Users, as far as possible, in the low voltage systems close to the load points thereby avoiding the need for exchange of Reactive Power to/from the IaSTS and to maintain the IaSTS voltage within the specified range.
- (2) Line Reactors may be provided to control temporary over voltage within the limits as set out in connection agreements.
- (3) The additional reactive compensation to be provided by the User shall be indicated by Transmission Licensee in the Connection Agreement for implementation.
- (4) The agency engaged in sub-transmission and distribution shall not depend upon the IaSTS for reactive support when connected. The agency shall estimate and provide the required reactive compensation in its transmission and distribution network to meet its full Reactive Power requirement, unless specifically agreed to with STU.

#### **4.10 Data and 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 agencies shall provide Systems to telemeter power system parameter such as flow, voltage and status of switches/ transformer taps etc. in line with interface requirements and other guideline made available to SLDC. The associated communication system to facilitate data flow up to SLDC, as the case may be, shall also be established by the concerned agency as specified by STU in connection agreement. All agencies in coordination with STU shall provide the required facilities at their respective ends and SLDC as specified in the Connection Agreement.

#### **4.11 System Recording Instruments**

- (1) Recording instruments such as Data Acquisition System/Disturbance Recorder/Event Logger/Fault Locator (including time synchronization equipment) shall be provided in the IaSTS for recording of dynamic performance of the system.
- (2) All Users and Transmission Licensees shall provide all the requisite recording instruments as specified in the Connection Agreement in accordance with the agreed time schedule.

#### **4.12 Responsibilities for Operational Safety**

Transmission Licensees and the Users shall be responsible for safety as indicated in Site Responsibility Schedules for each connection point.

#### **4.13 Site Responsibility Schedule**

- (1) Site Responsibility Schedule shall be produced by the concerned Transmission Licensee and the User detailing the ownership responsibilities of each, before execution of the project or connection, including safety responsibilities.

- (2) The Site Responsibility Schedule shall be developed by the concerned Transmission Licensee pursuant to the relevant Connection Agreement and shall state the following for each item of plant and apparatus installed at the Connection Point:
  - (a) Ownership of the Plant/ Apparatus;
  - (b) Responsibility for control of the Plant/ Apparatus;
  - (c) Responsibility for operation of the Plant/ Apparatus;
  - (d) Responsibility for maintenance of the Plant/ Apparatus; and
  - (e) Responsibility for all matters relating to safety of any person at the Connection Point.
- (3) The format, principles and basic procedure to be used in the preparation of Site Responsibility Schedules shall be formulated by State Transmission Utility within three (3) months of notification of these Regulations and shall be provided to each User and Transmission Licensee for compliance.

Provided that the State Transmission Utility shall put up the information related to above mentioned format, principles and procedures on its Website.

- (4) All agencies connected to or planning to connect to IaSTS would ensure providing of RTU and other communication equipment, as specified by SLDC, for sending real-time data to SLDC at least before date of commercial operation of the generating stations or sub-station/line being connected to IaSTS.

#### **4.14 Single Line Diagrams**

- (1) Single Line Diagram shall be furnished for each connection point by the connected User or Transmission Licensee to the State Transmission Utility.

Provided that the Transmission licensee shall also furnish the above

information to the SLDC.

- (2) Single Line Diagram shall include all High Tension (HT) connected equipment and the connections to all external circuits and incorporate numbering, nomenclature and labeling etc. The diagram is intended to provide an accurate record of the layout and circuit connections, rating, numbering and nomenclature of HV apparatus and related plant.
- (3) In the event of a proposal to change any equipment, the concerned User or Transmission Licensee shall intimate the necessary changes to State Transmission Utility and to all concerned. When the changes are implemented, Single Line Diagram shall be updated appropriately by the concerned Users or Transmission Licensee and a copy of the same shall be provided to the State Transmission Utility and SLDC.

#### **4.15 Site Common Drawings**

- (1) Site Common Drawings shall be prepared for each Connection Point and will include the following information:
  - (a) Site Layout;
  - (b) Electrical Layout;
  - (c) Details of Protection/Control; and
  - (d) Common Services Drawings.

Necessary details shall be provided by the agencies to STU.

- (2) Detailed drawings shall be prepared by Transmission Licensee and User in respect of their system/facility at each Connection Point and copies of the same shall be made available to concerned User and Transmission Licensee respectively.
- (3) In case of any change in the Site Common Drawings that is found necessary by Transmission Licensee or User in respect of their system/facility at the Connection Point, the details of such change shall be furnished to the other party as soon as possible.

##### **4.15.1 Cyber Security**

All utilities shall have in place, a cyber security framework to identify the critical cyber assets and protect them so as to support reliable operation of the Grid.

#### **4.16 Procedure for Site Access, Site Operational Activities and Maintenance Standards**

- (1) The Connection Agreement will also indicate any procedure necessary for Site access, Site operational activities and maintenance standard for equipment of the STU/transmission licensee at IaSGS/licensee/User premises and vice versa.
- (2) The Transmission Licensee or User owning the Connection Site shall provide reasonable access and other required facilities to another Transmission Licensee or User whose equipment is proposed to be installed/installed at the Connection Site for installation, operation, maintenance, etc.
- (3) Written procedures and agreements shall be developed between Transmission Licensees and Users to ensure that mandatory access is available to the concerned Transmission Licensee or User at the same time safeguarding the interests of Transmission Licensee and User at the connection site.

#### **4.17 International Connections to IaSTS**

The procedure for international Connection to IaSTS and the execution of agreement for the same shall be done by STU in consultation with CEA and Ministry of Power (MOP).

#### **4.18 Schedule of assets of State Grid**

STU shall submit annually to the Commission by 30th September a schedule of transmission assets, which constitute the State Grid as on 31st March of that year indicating ownership on which SLDC has operational control and responsibility.

## **CHAPTER 5: OPERATING CODE**

### **5.1 Objective**

The primary objective of integrated operation of the State Grid is to enhance the overall operational economy and reliability of the entire electric power network spread over the geographical area of the entire State.

#### **5.1.1 Operating Policy**

- (1) Participant utilities shall cooperate with each other and adopt Good Utility Practice at all times for satisfactory and beneficial operation of the State grid.
- (2) Overall operation of the State Grid shall be supervised from the State Load Despatch Centre (SLDC). The roles of SLDC shall be in accordance with the provisions specified in Chapter-2 of the SGC
- (3) All State Constituents shall comply with this Operating Code, for deriving maximum benefits from the integrated operation and for equitable sharing of obligations.
- (4) State Load Despatch Centre shall develop, document and maintain a set of detailed internal operating procedures for managing the State Grid. These internal operating procedures shall include the following:
  - (a) Black start procedures;
  - (b) Load shedding procedures;
  - (c) Islanding procedures; and
  - (d) Any other procedures considered appropriate by the State Load Despatch Centre;

Provided that such procedures shall be specified in consultation with State Constituents and shall be consistent with the provisions included in this Chapter to enable compliance with the requirement of these Regulations.

Provided further that such procedures shall be submitted to the Commission for approval within three (3) months from the date of notification of these Regulations.

- (5) The control rooms of the State Load Despatch Centre including Area-Load Despatch Centres, Power Plants, substations of 132 kV and above and any other control centres of Transmission Licensees and Users shall be manned round-the-clock by qualified and adequately trained personnel.

## **5.2 System Security Aspects**

- (1) All State Constituents shall endeavor to operate their respective power systems and power stations in synchronism with each other at all times, such that the entire system within the State operates as one synchronized system.
- (2) No part of the State Grid shall be deliberately isolated from the rest of the State Grid, except (i) under an emergency and conditions in which such isolation would prevent a total grid collapse and/or would enable early restoration of power supply, (ii) for safety of human life (iii) when serious damage to a costly equipment is imminent and such isolation would prevent it and (iv) when such isolation is specifically instructed by SLDC. Complete synchronization of grid shall be restored as soon as the conditions again permit it. The restoration process shall be supervised by SLDC, in coordination with RLDC, as per operating procedures separately formulated by SLDC.
- (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 constituents and be



available at 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.

- (4) Any tripping, whether manual or automatic, of any of the above elements of State Grid shall be precisely intimated by the concerned ALDC/agency to SLDC as soon as possible, 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 elements' restoration as soon as possible. SLDC shall inform the tripping of the important elements of the State Grid, to RLDC.
- (5) Maintenance of their respective power system elements shall be carried out by Users, STUs in accordance with the provisions in CEA (Grid Standards) Regulations, 2010. Any prolonged outage of power system elements of any User/STU, which is causing or likely to cause danger to the State Grid or sub-optimal operation of the State Grid, shall regularly be monitored by SLDC. SLDC shall report such outages to RLDC.
- (6) All thermal generating units of 200 MW and above and all hydro units of 10 MW and above (except those with upto 3 hours pondage), which are synchronized with the Grid, irrespective of their ownership, shall have their governors under restricted mode of operation at all times. The restricted governor mode of operation shall have the following features:
  - (a) There should not be any reduction in generation in case of improvement in Grid frequency below 50.05 Hz (for example, if Grid frequency changes from 49.9 to 49.95 Hz, 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  $\pm 0.03$  Hz shall be provided so that small changes in frequency are ignored for load correction, in order to prevent governor hunting.

Provided that if the above 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.

- (7) All governors shall have a droop of between 3% and 6%.
- (8) All other generating units including the hydro units of pondage upto 3 hours, Gas turbine/Combined Cycle Power Plants, wind and solar generators and Nuclear Power Stations shall be exempted from sub-Regulation (6), (9), (10) & (11) of Regulation 5.2 till review of the situation by appropriate Commission.

Provided further that if the above generating unit is required to be operated without its governor in normal operation as above the SLDC shall be immediately advised about the reason and duration of such operation.

- (9) Facilities available with/in load limiters, Automatic Turbine Run-up System (ATRS), Turbine supervisory control, coordinated control system, etc., shall not be used to suppress the normal governor action in any manner. No dead bands and/or time delays shall be deliberately introduced.
- (10) 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. However, SLDC can make up the corresponding short fall in spinning reserve by maintaining an extra spinning reserve on the other Generating Units of the State.

- (11) 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.
- (12) Except under an emergency or to prevent an imminent damage to a costly equipment, no constituent shall suddenly reduce his generating unit output / injection by more than 30MW without prior intimation to and consent of the SLDC. Similarly, no User shall cause a sudden variation in its drawl by more than 30MW without prior intimation to and consent of the SLDC. All State constituents 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) Regulations, 2010.
- (13) All generating units shall normally have their automatic voltage regulators (AVRs) in operation, with appropriate settings. In particular, if a generating unit of thirty (30) MW and above size 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.
- (14) Provision of protections and relay settings shall be coordinated periodically throughout the State grid, by Grid Coordination Committee assisted by the STU in accordance with the plan separately finalized by

the protection sub-committee of the RPC from the time to time. All State constituents shall ensure that installation and operation of protection system shall comply with the provisions of CEA (Grid Standards) Regulations, 2010 amended from time to time.

- (15) All State constituents shall take all possible efforts to ensure that the grid frequency always remains within the 49.90 – 50.05 Hz band.
- (16) Users and Transmission Licensees shall provide automatic under-frequency and  $df/dt$  relay-based load shedding/islanding schemes in their respective systems, wherever applicable, to arrest frequency decline that could result in a collapse/disintegration of the State grid, as per the plan separately finalized by the RPC and shall ensure its effective application to prevent cascade tripping of generating units in case of any contingency. Users and Transmission Licensees shall ensure that the under-frequency and  $df/dt$  relay-based load shedding/islanding schemes, are always functional.

The provisions regarding under frequency and  $df/dt$  relays of CEA (Grid Standards) Regulations, 2010 amended from time to time shall be complied.

- (17) State Transmission Utility shall carry out periodic inspection of the under frequency relays and produce the report to State Load Despatch Centre. State Load Despatch Centre shall maintain the record of under frequency relay and/or  $df/dt$  relay operation and shall furnish monthly report of under frequency relay and  $df/dt$  relay operation in their system to the RPC.
- (18) All State Constituents shall also facilitate identification, installation and commissioning of System Protection Schemes (including inter-tripping and run-back) in the power system to operate transmission system closer to their limits and to protect against situations such as voltage collapse and cascading tripping, tripping of important corridors/flow gates etc. Such schemes would be finalized by the STU and shall be kept

in service. SLDC shall be promptly informed in case any of these are taken out of service.

- (19) Procedures shall be developed to recover from partial/total collapse of the grid and periodically updated in accordance with CEA (Grid Standards) Regulations, 2010 and with the requirements given under Regulation 5.9. These procedures shall be followed by all State constituents to ensure consistent, reliable and quick restoration.
- (20) Each State Constituent shall provide & maintain adequate and reliable communication facility internally and with other Constituents/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., ALDC to SLDC.
- (21) The State Constituents shall send information/data including disturbance recorder/sequential event recorder output etc., within 24hrs to SLDC for purpose of analysis of any grid disturbance/event. No State constituent shall block any data/information required by the SLDC for maintaining reliability and security of the grid and for analysis of an event.
- (22) All State Constituents shall make all possible efforts to ensure that the grid voltage always remains within the following operating range:

<b>VOLTAGE-(kV RMS)</b>		
<b>Nominal</b>	<b>Maximum</b>	<b>Minimum</b>
765	800	728
400	420	380
220	245	198
132	145	122

### **5.3 Special requirements for Solar/ wind generators**

- (1) 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, Data Acquisition System facility shall be provided for transfer of information to concerned SLDC.

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

#### **5.4 Demand Estimation for Operational Purposes**

- (1) This part describes the responsibilities /procedures of the SLDC for demand estimation for both Active Power and Reactive Power.
- (2) The demand estimation is to be done on daily/weekly/monthly basis for current year for load – generation balance planning. The SLDC shall carry out system studies for operation planning purposes using this demand estimate.
- (3) SLDC shall develop methodologies/mechanisms for daily/weekly/monthly/yearly demand estimation (MW, MVA<sub>r</sub> and MWh) for operational purposes. 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. All distribution licensees shall abide by the demand management measures of the SLDC and shall also maintain historical database for demand estimation.
- (4) SLDC shall carry out its own demand estimation from the historical data and weather forecast data from time to time. All distribution licensees and other concerned persons shall provide relevant data and other information as required by SLDC for demand estimation.

- (5) While the demand estimation for operational purposes is to be done on a daily/weekly/monthly basis initially, mechanisms and facilities at SLDC shall be created at the earliest to facilitate on-line estimation of demand for daily operational use for each 15 minutes block.
- (6) The monthly estimated demand by the SLDC shall be provided to RLDC and RPC for better operation planning.
- (7) The SLDC shall take into account the Wind Energy forecasting to meet the active and reactive power requirement.
- (8) In order to facilitate estimation of Total Transfer Capability / Available Transfer Capability on three month ahead basis, the SLDC shall furnish estimated demand and availability data to RLDCs.

## **5.5 Demand Management**

This part 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/inter State transmission system or other operating problems (such as frequency, voltage levels beyond normal operating limit, or thermal overloads etc.) or overdrawl of power by the licensee and open access consumer beyond the limits mentioned in Deviation Settlement Mechanism Regulation on any part of the grid

### **5.5.1 Demand Disconnection**

- (1) SLDC/ State constituents shall initiate action to restrict the drawal of its control area, from the grid, within the net drawal schedule.
- (2) The SLDC/State constituents shall ensure that requisite load shedding is carried out in its control area so that there is no overdrawl.
- (3) Each State constituent 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 the State constituent and monitored by SLDC. SLDC may direct any State constituent to modify the above procedures/arrangement, if required, in the interest of grid security and the concerned State constituents shall abide by these directions.

- (4) The SLDC through the Distribution Licensees, shall also formulate and implement state-of-the-art demand management schemes for automatic demand management like rotational load shedding, demand response (which may include Time of Day Tariff and/or lower tariff for interruptible loads) etc. to reduce over drawal in order to comply with clause (1) & (2) of sub-Regulation 5.5.1 of these Regulations. A report detailing the scheme and periodic reports on progress of implementation of the schemes shall be sent to the State Commission by the SLDC.
- (5) 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:
  - (a) For scheduled power cuts/load shedding
  - (b) Loads for unscheduled load shedding
  - (c) Loads to be shed through under frequency relays/ df/dt relays
  - (d) Loads to be shed under any system protection scheme identified at the RPC level.

The aforesaid loads shall be grouped in such a manner, that there is no overlapping between different groups of loads.

- (6) 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 deviation from schedule by the Users at different overdrawal/ underdrawal/ over injection/ under injection conditions depending upon the severity. The Users shall ensure immediate compliance with these directions of SLDC.



- (7) All State constituents shall comply with direction 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 withdrawal of congestion shall be in accordance with Central Electricity Regulatory Commission (Measures to relieve congestion in real time operation) Regulations, 2009.
- (8) The measures taken to reduce the Constituents drawal from the grid shall not be withdrawn as long as the frequency/voltage remains at a level lower than the limits specified in Regulation 5.2 or congestion continues, unless specifically permitted by the SLDC.

## **5.6 Periodic Reports**

### **5.6.1 Daily report**

A daily report covering the performance of the State grid shall be prepared by SLDC based on the inputs received from constituents and shall be put on its website. This report shall also cover the wind / solar power generation and injection into the grid.

### **5.6.2 Weekly report**

- (1) A weekly report shall be issued by SLDC to all Constituents of the State and shall cover the performance of the State Grid for the previous week. Such weekly report shall also be available on the website of the SLDC for at least 12 weeks. The weekly report shall contain the following:
  - (a) Frequency profile;
  - (b) Voltage profile of selected substations and substations normally having low/high voltages;
  - (c) Demand and Supply Situation;
  - (d) Major Generation and Transmission Outages;
  - (e) Transmission Constraints;

- (f) Instances of persistent/significant non-compliance of SGC.
- (g) Instances of congestion in transmission system
- (h) Instances of inordinate delays in restoration of transmission elements and generating units.
- (i) Non-compliance of instructions of SLDC by State constituents, to curtail drawal resulting in non-compliance of SGC

### **5.6.3 Other Reports**

- (1) 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 agencies, and the agencies responsible for causing the constraints.
- (2) The SLDC shall also provide information/report which can be called for by STU in the interest of smooth operation of IaSTS.

## **5.7 Operational Liaison**

### **5.7.1 Introduction**

- (1) This part sets out the requirements for the exchange of information in relation to Operations and/or Events on the total grid system which have had or will have an effect on:
  - (a) The State Grid
  - (b) The IaSTS in the State
  - (c) The system of a State Constituent
- (2) The above generally relates to notifying of what is expected to happen or what has happened and not the reasons why.
- (3) The Operational liaison function is a mandatory built-in hierarchical function of the SLDC and State Constituents, to facilitate quick transfer of information to operational staff. It will correlate the required inputs for optimization of decision making and actions.

## **5.7.2 Procedure for Operational Liaison**

- (1) Operations and events on the State Grid
  - (a) Before any operation is carried out on State Grid, the SLDC will inform each State Constituent, whose system may, or will, experience an operational effect, and give details of the operation to be carried out.
  - (b) Immediately following an event on State Grid, the SLDC will inform each State Constituent, whose system may, or will, experience an operational effect following the event, and give details of what has happened in the event but not the reasons why.
- (2) Operations and events on a Constituent's system
  - (a) Before any operation is carried out on a constituent's system, the constituent will inform the SLDC, in case the State Grid may, or will, experience an operational effect, and give details of the operation to be carried out.
  - (b) Immediately following an event on a constituent's system, the constituent will inform the SLDC, in case the State Grid may, or will, experience an operational effect following the event, and give details of what has happened in the event but not the reasons why.
  - (c) All operational instructions given by SLDC shall have unique codes which shall be recorded and maintained as specified in CEA (Grid Standards) Regulations, 2010.

## **5.8 Outage Planning**

### **5.8.1 Introduction**

- (1) This part sets out the procedure for preparation of outage schedules for the elements of the State Grid in a co-ordinated and optimal manner keeping in view the State system operating conditions and the balance of generation and demand. (List of elements of grid covered under these stipulations shall be prepared and be available with SLDC and ALDCs).

- (2) The generation output and transmission system should be adequate after taking into account the outages to achieve the security standards.
- (3) Annual outage plan shall be prepared in advance for the financial year by the SLDC and reviewed during the year on Quarterly and Monthly basis. All State constituents 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.

### **5.8.2 Objective**

- (1) The objective of this part is:
  - (a) To produce a coordinated generation 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 STU/Transmission Licensee/User systems and maintaining system security standards.

### **5.8.3 Scope**

This part is applicable to all State Constituents including SLDC, ALDCs, Transmission Licensees/Users, IaSGS and STU.

#### **5.8.4 Outage Planning Process**

- (1) The SLDC shall be responsible for analyzing the outage schedule given by all State Constituents, preparing a draft annual outage schedule and finalization of the annual outage plan for the following financial year.
- (2) All State constituents shall provide SLDC with their proposed outage programmes in writing for the next financial year by 31<sup>st</sup> October of each year. These shall contain identification of each generating unit/line/ICT, the preferred date for each outage and its duration and where there is flexibility, the earliest start date and latest finishing date.
- (3) SLDC shall then come out with a draft outage programme for the next financial year by 15<sup>th</sup> December of each year for the State Grid taking into account the draft outage plan for the State given by RPC Secretariat, 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. Adequate balance between generation and load requirement shall be ensured while finalising outage programmes. SLDC shall send its draft outage plan to RPC secretariat by 15<sup>th</sup> December.
- (4) The final outage plan shall be intimated to all State constituents for implementation latest by 31<sup>th</sup> January of each year after considering the final outage plan for the State prepared by the RPC Secretariat.
- (5) The above annual outage plan shall be reviewed by SLDC on quarterly and monthly basis in coordination with all parties concerned, and adjustments made wherever found to be necessary.
- (6) In case of emergency in the system, viz., loss of generation, breakdown of transmission line affecting the system, grid disturbances, system isolation, SLDC may conduct studies again before clearance of the planned outage.

- (7) SLDC is authorized to defer the planned outage, in case of any of the following, taking into account the statutory requirements:
  - (a) Major grid disturbances (total black-out in State)
  - (b) System isolation
  - (c) Black-out in a Constituent System
  - (d) Any other event in the system that may have an adverse impact on the system security by the proposed outage.

Provided that the State Load Despatch Centre shall inform the concerned State constituents about the revised outage plan, with appropriate reasons for revisions in the outage plan, as soon as possible.

- (8) The detailed generation and transmission outage programmes shall be based on the latest annual outage plan (with all adjustments made to date).
- (9) Each State Constituent shall obtain the final approval from SLDC prior to availing an outage.
- (10) The State constituents request for additional outages will be considered by SLDC to accommodate to the extent possible.

## **5.9 Recovery Procedures**

- (1) Detailed plans and procedures for restoration of the State Grid under partial/total blackout shall be developed by SLDC in consultation with all State Constituents and shall be reviewed / updated annually.
- (2) Detailed plans and procedures for restoration after partial/total blackout of each Constituent's system within the State will be finalized by the concerned Constituent in co-ordination with the SLDC. The procedure will be reviewed, confirmed and/or revised once every subsequent year. Mock trial runs of the procedure for different sub-systems shall be carried out by the Constituents at least once in every six months under intimation to the SLDC. Diesel Generator sets for black

start would be tested on weekly basis and test report shall be sent to SLDC on quarterly basis.

- (3) List of generating stations with black start facility, inter-State/inter regional ties, synchronizing points and essential loads to be restored on priority, shall be prepared by and be available with SLDC.
- (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.
- (5) All communication channels required for restoration process shall be used for operational communication only, till grid normalcy is restored.
- (6) Once an outage has commenced, if any delay in restoration is apprehended, concerned user shall inform SLDC promptly together with revised estimation of restoration time.

## **5.10 Event Information**

### **5.10.1 Introduction**

This part deals with reporting procedures in writing of reportable events in the system to all State Constituents and SLDC/ALDCs.

### **5.10.2 Objective**

The objective of this part is to define the incidents to be reported, the reporting route to be followed and information to be supplied to ensure consistent approach to the reporting of incidents/events.

### **5.10.3 Scope**

This part covers all State Constituents, SLDC and ALDCs.

### **5.10.4 Responsibility**

- (1) The SLDC/ALDCs shall be responsible for reporting events to the State Constituents/SLDC.

- (2) All State Constituents and the ALDCs shall be responsible for collection and reporting of all necessary data to SLDC for monitoring, reporting and event analysis.

#### **5.10.5 Reportable Events**

- (1) Any of the following events require reporting by SLDC/State Constituent:
  - (a) Violation of security standards;
  - (b) Grid indiscipline;
  - (c) Non-compliance of SLDC's instructions;
  - (d) System islanding/system split;
  - (e) State black-out/partial system black-out;
  - (f) Protection failure on any element of IaSTS;
  - (g) Power system instability; and
  - (h) Tripping of any element of the State grid.
  - (i) Sudden load rejection by any State constituent

#### **5.10.6 Reporting Procedure**

- (1) Written reporting of Events by State Constituents to SLDC

In the case of an event, which was initially reported by a State Constituent or an ALDC to SLDC orally, the Constituent/ALDC will give a written report to SLDC in accordance with this part.

- (2) Written Reporting of Events by SLDC to State Constituents

In the case of an event, which was initially reported by SLDC to a Constituent/ALDC orally, the SLDC will give a written weekly report to the Constituent/ALDC in accordance with this part.

- (3) Form of Written Reports

A written report shall be sent to SLDC or a State Constituent/ALDC, as the case may be, and will confirm the oral notification together with the following details of the event:



- (a) Time and date of event;
  - (b) Location;
  - (c) Plant and/or Equipment directly involved;
  - (d) Description and cause of event;
  - (e) 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
  - (f) Demand and/or Generation (in MW) interrupted and duration of interruption;
  - (g) All Relevant system data including copies of records of all recording instruments including Disturbance Recorder, Event Logger, DAS etc.;
  - (h) Sequence of trippings with time;
  - (i) Details of Relay Flags; and
  - (j) Remedial measures.
- (4) Events affecting a generation capacity of more than 300 MW or load of more than 500 MW for more than 3 hours shall be reported in writing to the Commission by the State Load Despatch Centre, Transmission Licensee or User, as the case may be.

Provided that a summary document including brief detail of the event, extent and probable causes of the event shall be sent across to the Commission within 24 hours of occurrence of such event.

## **CHAPTER 6: SCHEDULING AND DISPATCH CODE**

### **6.1 Introduction**

This Chapter sets out the:

- (1) Demarcation of responsibilities between various State Constituents and SLDC in scheduling and dispatch
- (2) the procedure for scheduling and dispatch
- (3) the reactive power and voltage control mechanism
- (4) Complementary commercial mechanisms (in the Annexure-1), which shall be applicable w.e.f. such date as may be decided by Commission for introduction of Intra-State ABT.

### **6.2 Objective**

This code deals with the procedures to be adopted for scheduling of the intra-State generating stations (IaSGS) and net drawals of concerned Constituents on a day a head basis with the modality of the flow of information between the IaSGS/SLDC/beneficiaries of the State. The procedure for submission of capability declaration by each IaSGS and submission of drawal schedule by each beneficiary is intended to enable SLDC to prepare the dispatch schedule for each IaSGS and drawal schedule for each beneficiary. It also provides methodology of issuing real time dispatch/drawal instructions and rescheduling, if required, to IaSGS and beneficiaries 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 one and half hour basis . For this, appropriate meters and Data Acquisition System facility shall be provided for accounting of deviation charges and transfer of information to concerned SLDC and RLDC. The provisions contained in this chapter are without prejudice to the powers conferred on SLDC under Section 32 and 33 of the Act.

### **6.3 Scope**

This Code shall be applicable to SLDC/ALDCs, IaSGS, Transmission Licensees/STU and other beneficiaries in the State Grid.

### **6.4 Demarcation of responsibilities**

- (1) The State Load Despatch Centre is responsible for coordinating the scheduling of a generating station, within the State control area. The SLDC shall also be responsible for such generating stations for (1) real-time monitoring of the station's operation, (2) 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, (3) revision of availability declaration and injection schedule, (4) switching instructions, (5) metering and energy accounting, (6) issuance of deviation settlement within the control area, (7) collections/disbursement of deviation charges, (8) outage planning etc., (9) Any other activity directed by the Commission.
- (2) The following generating stations shall come under the IaSTS control area and hence, SLDC shall coordinate the scheduling of the following generating stations:
  - (a) The Central Generating Stations where full share is allocated to the State irrespective of its connectivity to ISTS/IaSTS.
  - (b) If a generating station is connected only to the State Transmission network.
  - (c) If a generating station is connected both to ISTS & IaSTS and the State has more than 50% share of power.
  - (d) If a generating station including IPP is connected both to ISTS & IaSTS and not tied up its generation with any outside State utility on long term basis and having long term PPA with the State irrespective of the State's share.

- (3) There may be exceptions with respect to above provisions, for reasons of operational expediency, subject to approval of CERC, irrespective of the control area of the jurisdiction. If a generating station is connected both to the ISTS and the STU, the load dispatch centre of the control area under whose jurisdiction the generating station falls, shall take into account grid security implication in the control area of the other load dispatch centre.
- (4) The State Grid shall be operated as power pool (with decentralized scheduling and dispatch), in which the Users shall have full operational autonomy and Users, through their concerned ALDCs, shall have the total responsibility for:
  - (a) scheduling/dispatching their own generation (including generation of their embedded licensees)
  - (b) regulating the demand of their customers
  - (c) scheduling their drawal from the IaSGS (within their share in the respective plant's expected capability)
  - (d) permitting long term access, medium term and short term open access transactions for embedded generators / consumers in accordance with the contract and
  - (e) Regulating their net drawal from the State Grid as per these Regulations amended from time to time.
- (5) The system of each beneficiary shall be treated and operated as a notional control area. The algebraic summation of scheduled drawal from IaSGs/ISGS and from contracts through long- term access, medium-term and short-term open access arrangements shall provide the drawal schedule of each beneficiary, and this shall be determined in advance on day- ahead basis. The beneficiaries shall regulate their embedded generation and/or consumers' load so as to maintain their actual drawal from the State Grid close to the above schedule. The beneficiaries may, at their discretion, deviate from the drawal schedule, as long as such

deviations do not cause system parameters to deteriorate beyond permissible limits and/or do not lead to unacceptable line loading. Inadvertent deviations, if any, from net drawal schedule shall be priced through the Deviation Settlement Mechanism Regulations. Every beneficiary shall ensure reversal of sign of deviation from schedule at least once after every twelve time blocks.

- (6) The SLDC, distribution licensee shall always restrict the net drawal of the State from the grid within the drawal schedules keeping the deviations from the schedule within the limits specified in the Deviation Settlement Mechanism Regulations. The concerned User and SLDC shall ensure that their Automatic Demand Management Scheme mentioned in sub-Regulation 5.5.1 of these Regulations acts to ensure that there is no over-drawal. If the Automatic Demand Management Scheme (ADMS) has not yet been commissioned, then action shall be taken as per manual demand management scheme to restrict the net drawal from grid to within schedules and all actions for early commissioning of ADMS shall be initiated.
- (7) The SLDC/STU/Distribution Licensee shall regularly carry out the necessary exercises regarding short-term and long-term demand estimation for the State, to enable them to plan in advance as to how they would meet their consumers' load without overdrawing from the grid.
- (8) The IaSGS shall be responsible for power generation generally according to the daily schedules advised to them by the SLDC on the basis of the contracts/requisitions received from the beneficiaries/ALDCs/power exchanges and for proper operation and maintenance of their generating stations such that these stations achieve the best possible long-term availability and economy.
- (9) The IaSGS is normally expected to generate power according to the daily schedules advised to them barring any inadvertent deviations. Maximum deviation allowed during a time block shall not exceed the limits

specified in the Deviation Settlement Mechanism Regulations. Such deviations should not cause system parameters to deteriorate beyond permissible limits and should not lead to unacceptable line loadings. Inadvertent deviations, if any, from the ex-power plant generation schedules shall be appropriately priced in accordance with Deviation Settlement Mechanism Regulations. In addition, deviations from schedules causing congestion, shall also be priced in accordance with the Central Electricity Regulatory Commission (Measure to relieve congestion in real time operation) Regulations, 2009.

- (10) The treatment of injection of infirm power by generating stations during testing shall be in accordance with Deviation Settlement Mechanism Regulations amended time to time.
- (11) Notwithstanding the above, SLDC may direct the beneficiaries/ALDCs/IaSGS 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 short-term open access. These shall be terminated first, before any action, which would affect the scheduled supplies to the long term and medium term customers, is initiated in accordance with Uttarakhand Electricity Regulatory Commission (Terms and Conditions of Intra-state Open Access) Regulations, 2015 as amended from time to time. In case Short Term/Medium Term Open Access or Long Term Access are curtailed, SLDC shall submit a report within three days to the defaulting open access consumer, regarding the reasons due to which it was not able to curtail deviations from Schedule and agencies which had not taken necessary actions.

- (12) For all outages of generation and transmission system, which may have an effect on the State Grid, all Constituents shall cooperate with each other and co-ordinate their actions through Grid Coordination Committee (GCC) for outages foreseen sufficiently in advance and through SLDC (in all other cases), as per procedures finalized separately by GCC. In particular, outages requiring restriction of IaSGS generation and/or restriction of IaSGS/ISGS share which a beneficiary can receive (and which may have a commercial implication) shall be planned carefully to achieve the best optimization.
- (13) The State Constituents shall enter into separate joint/bilateral agreement(s) to identify the beneficiary's shares in IaSGS/ISGS projects (based on the allocations by Appropriate Government/Commission, where applicable), scheduled drawal pattern, tariffs, payment terms etc. All such agreements shall be filed with the SLDC for being considered in scheduling and State energy accounting. Any bilateral agreements between Constituents for scheduled interchanges on long-term/medium-term/short-term basis shall also specify the interchange schedule, which shall be duly filed in advance with the SLDC, as the case may be about these agreements in accordance with UERC (Terms and conditions Intra-state open access) Regulations, 2015 amended from time to time.
- (14) The IaSGS 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 gas, RLNG and liquid fuel separately, and these shall be scheduled separately.

- (15) While making or revising its declaration of capability, except in case of Run off the River (with up to three hour pondage) hydro stations, the IaSGS 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.
- (16) It shall be incumbent upon the IaSGS to declare the plant capabilities faithfully, i.e., according to their best assessment. In case, it is suspected that they have deliberately over/under declared the plant capability contemplating to deviate from the schedules given on the basis of their capability declarations (and thus make money either as undue capacity charge or as the charge for deviations from schedule), the SLDC may ask the IaSGS to explain the situation with necessary backup data.
- (17) The IaSGS shall be required to demonstrate the declared capability of its generating station as and when asked by the SLDC. In the event of the IaSGS failing to demonstrate the declared capability, the capacity charges due to the generator shall be reduced as a measure of penalty. 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.
- (18) 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.
- (19) The STU shall install special energy meters on all inter connections between State Constituents the 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 CEA (Installation and Operation of Meters) Regulations, 2006 as amended from time to time.

- (20) The SLDC shall be responsible for computation of actual net MWh injection of each IaSGS and actual net drawal of each beneficiary, 15 minute-wise, based on the above meter readings and for preparation of the State Energy Accounts as per Deviation Settlement Mechanism Regulations as amended from time to time.
- (21) 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.
- (22) SLDC shall periodically review the actual deviation from the dispatch and net drawal schedules being issued, to check whether any of the constituents are indulging in unfair gaming or collusion. In case any such practice is detected, the matter shall be reported to the STU for investigation and STU shall furnish a report in the matter to the Commission.
- (23) In case the Distribution Licensee having an area of supply in which an IaSGS is located has a predominant share in that IaSGS, the concerned parties may mutually agree (for operational convenience) to assign the responsibility of scheduling of the IaSGS to the concerned ALDC. The role of the SLDC, in such a case, shall be limited to consideration of the schedule for intra-State exchange of power on account of this IaSGS while determining the net drawal schedules of the respective beneficiaries.

## **6.5 Scheduling and Despatch procedure**

- (1) All intra-State generating stations (IaSGS) and inter-State generating stations (ISGS), in whose output more than one beneficiary has an allocated/contracted share, shall be duly listed. The station capacities and allocated/contracted shares of different beneficiaries shall also be

listed out. Provided that the division of State's allocated share in an ISGS/IaSGS amongst the beneficiaries shall be in the proportion as may be determined by the Commission.

- (2) Each beneficiary shall be entitled to a MW dispatch upto (foreseen ex-power plant MW capability for the day) x (beneficiary'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 dispatch, equal to (MWh generation capacity for the day) x (beneficiary's share in the station's capacity).
- (3) By 10 AM every day, the IaSGS shall advise the SLDC, the station-wise ex-power plant MW and MWh capabilities foreseen for the next day, i.e., from 0000 hrs to 2400 hrs of the following day.
- (4) The above information of the foreseen capabilities of the IaSGS along with the entitlements of the State in various ISGS given by RLDC and the corresponding MW and MWh entitlements of each beneficiary, shall be compiled by the SLDC every day for the next day, and advised to all beneficiaries by 11 AM. The beneficiaries shall review it vis-à-vis their foreseen load pattern and their own generating capability including bilateral exchanges, if any, and advise the SLDC by 1 PM their drawal schedule for each of the IaSGS/ISGS in which they have shares, long-term bilateral interchanges, approved short-term bilateral interchanges and composite request for day-ahead open access and scheduling of bilateral interchanges.

Provided that a beneficiary's entitlements for plant-wise drawal/bilateral exchanges through the inter-State connections can be determined in lump sum by the SLDC if it is operationally convenient and feasible to do.

- (5) Scheduling of collective transaction:
- (a) NLDC shall indicate to Power Exchange(s), the list of interfaces/control areas/regional transmission systems on which unconstrained flows are required to be advised by the Power Exchange(s) to the NLDC. Power Exchange(s) shall furnish the interchange on various interfaces/control areas/regional transmission systems as intimated by NLDC. Power Exchange(s) shall also furnish the information of total drawal and injection in each of the regions. Based on the information furnished by the Power Exchanges, NLDC shall check for congestion. In case of congestion, NLDC shall inform the Exchanges about the period of congestion and the available limit for scheduling of collective transaction on respective interface/control area/transmission systems during the period of congestion for Scheduling of Collective Transaction through the respective Power Exchange. The limit for scheduling of collective transaction for respective Power Exchange shall be worked out in accordance with CERC directives. Based on the application for scheduling of Collective Transaction submitted by the Power Exchange(s), NLDC shall send the details (Scheduling Request of Collective Transaction) to different RLDCs for final checking and incorporating them in their schedules. After getting confirmation from RLDCs, NLDC shall convey the acceptance of scheduling of collective transaction to Power Exchange(s). RLDCs shall schedule the Collective Transaction at the respective periphery of the Regional Entities.
- (b) 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 after receipt of acceptance from NLDC. Power Exchange(s) shall ensure necessary coordination with SLDC for scheduling of the transactions.

- (c) 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 and as amended from time to time.
- (6) The beneficiaries may also give standing instructions to the SLDC such that the SLDC itself may decide the drawal schedules for the beneficiaries
- (7) After considering the dispatch schedule and net drawal schedule for the State as intimated by RLDC, by 6 PM each day, the SLDC shall convey:
  - (a) The ex-power plant “dispatch schedule” to each of the IaSGS, in MW for different hours, for the next day. The summation of the ex-power plant drawal schedules advised by all beneficiaries shall constitute the ex-power plant station-wise dispatch schedule for IaSGS.
  - (b) The “net drawal schedule” to each beneficiary, in MW for different hours, for the next day. The summation of the station-wise ex-power plant drawal schedules for all IaSGS/ISGS and drawal from State Grid consequent to bilateral interchanges, after deducting the transmission losses (estimated), shall constitute the beneficiary-wise drawal schedule.
- (8) The beneficiaries/IaSGS may inform any modifications/changes to be made in station-wise drawal schedule & bilateral interchanges /foreseen capabilities, if any, to SLDC by 9 PM.
- (9) Upon receipt of such information, the SLDC after consulting the concerned Constituents shall issue the final ‘drawal schedule’ to each beneficiary and the final ‘dispatch schedule’ to each IaSGS by 11.30 PM.
- (10) Also, based on the surpluses foreseen for the next day, if any, the Constituents may arrange for bilateral exchanges. The schedules for such arrangements shall be intimated latest by 9 PM to SLDC, who in turn

will take into account these agreed exchanges while issuing the final dispatch/drawal schedules at 11.30 PM provided they would not lead to a transmission constraint and are not objected to by RLDC.

- (11) The declaration of the generating capability by hydro IaSGS 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 Deviation Settlement mechanism.
- (12) 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 Commission shall be treated as “MUST RUN” power plants and shall not be subjected to “Merit order despatch” principles.
- (13) Run-of-river power station with pondage and storage type power stations are designed to operate during peak hours to meet system peak demand. Maximum capacity of the station declared for the day shall be equal to the installed capacity including overload capability, if any, minus auxiliary consumption, corrected for the reservoir level. The State Load Despatch Centers shall ensure that generation schedules of such type of stations are prepared and the stations despatched for optimum utilization of available hydro energy except in the event of specific system requirements/constraints.
- (14) The schedule finalized by the State load despatch centre for hydro generating station, shall normally be such that the scheduled energy for a day equals the total energy (ex-bus) expected to be available on that day, as declared by the generating station, based on foreseen/planned

water availability/release. It is also expected that the total net energy actually supplied by the generating station on that day would equal the declared total energy, in order that the water release requirement is met.

- (15) While finalizing the above daily dispatch schedules for the IaSGS, SLDC shall ensure that the same are operationally reasonable, particularly in terms of ramping-up/ramping-down rates and the ratio between minimum and maximum generation levels. A ramping rate of upto 200 MW per hour should generally be acceptable for an IaSGS and for a State Constituent except for hydro-electric generating stations which may be able to ramp up/ramp down at a faster rate.
- (16) While finalizing the drawal and dispatch schedules as above, the SLDC shall also check that the resulting power flows do not give rise to any transmission constraints. In case any constraints are foreseen, the SLDC shall moderate the schedules to the required extent, under intimation to the concerned Constituents. Any changes in the scheduled quantum of power which are too fast or involve unacceptably large steps may be converted into suitable ramps by the SLDC.
- (17) In case of forced outage of a unit, the SLDC shall revise the schedules on the basis of revised declared capability. The revised declared capability and the revised schedules shall become effective from the 4th time block, counting the time block in which the revision is advised by the IaSGS to be the first one.
- (18) In the event of bottleneck in evacuation of power due to any constraint, outage, failure or limitation in the transmission system, associated switchyard and sub- stations owned by the State Transmission Utility or any other transmission licensee involved in intra-state transmission (as certified by the SLDC) necessitating reduction in generation, the SLDC shall revise the schedules which shall become effective from the 4th time block, counting the time block in which the bottleneck in evacuation of power has taken place to be the first one. Also, during the first, second,

third, time blocks of such an event, the scheduled generation of the IaSGS shall be deemed to have been revised to be equal to actual generation and the scheduled drawals of the beneficiaries shall be deemed to have been revised to be equal to their actual drawals

- (19) In case of any grid disturbance, scheduled generation of all the IaSGS and scheduled drawal of all the beneficiaries shall be deemed to have been revised to be equal to their actual generation/drawal for all the time blocks affected by the grid disturbance. Certification of grid disturbance and its duration shall be done by the SLDC.

The declaration of disturbance shall be done by the SLDC at the earliest. A notice to this effect shall be posted at its website by the SLDC of the area in which the disturbance occurred. Issue of the notice at SLDC web site shall be considered as declaration of the disturbance by SLDC. All State constituents shall take note of the disturbance and take appropriate action [at] their end.

- (20) Revision of declared capability by the IaSGS having two part tariff with capacity charge and energy charge and requisition by beneficiary (ies) for the remaining period of the day shall also be permitted with advance notice. Revised schedules/declared capability in such cases shall become effective from the 4th time block, counting the time block in which the request for revision has been received in the SLDC to be the first one.
- (21) Notwithstanding anything contained in sub-Regulation (20) of this Regulation, 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 IaSGS to be the first one.

- (22) Notwithstanding anything contained in sub-Regulation (20) of this Regulation, in case of forced outage of a unit of a generating station (having generating capacity of more than 30MW) 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 timeblock, 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.

- (23) 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
- (24) If, at any point of time, the SLDC observes that there is need for revision of the schedules in the interest of better system operation, it may do so on its own, and in such cases, the revised schedules shall become effective from the 4th time block, counting the time block in which the revised schedule is issued by the SLDC to be the first one.



- (25) To discourage frivolous revisions, SLDC may, at its sole discretion, refuse to accept schedule/capability changes of less than two (2) percent of the previous schedule/capability. 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 IaSGS, 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.
- (26) The State Load Despatch Centre shall also formulate the procedure for meeting contingencies both in the long run and in the short run (Daily scheduling).
- (27) Wind and Solar generators
- (a) Wind and Solar generators shall mandatorily provide to the SLDC, in a format as prescribed by SLDC, the technical specifications at the beginning and whenever there is any change. The data relating to power system parameters and weather related data as applicable shall also be mandatorily provided by such generators to SLDC in real time.
- (b) Forecasting shall be done by wind and solar generator as well as the SLDC. The SLDC may engage forecasting agency (ies) and prepare a schedule for such generating stations. The forecast by the SLDC shall be with the objective of ensuring secure grid operation. The forecast by the wind and solar generator shall be generator centric. The wind and solar generators which are State constituents will have the option of accepting SLDC's forecast for preparing its schedule or provide the SLDC with a schedule based on its own forecast. Any commercial impact on account of deviation from schedule based on the forecast chosen by the wind and solar generator shall be borne by it.
- (c) The schedule by wind and solar generators which are State constituents (excluding collective transactions) may be revised by giving advance notice to the SLDC, as the case may be. Such revisions

shall be effective from 4th time block, the first being the time-block in which notice was given. There may be one revision for each time slot of one and half hours starting from 00:00 hours of a particular day subject to maximum of 16 revisions during the day.

- (d) The schedule of solar generators which are State constituents shall be given by the generator based on availability of the generator, weather forecasting, solar insolation/irradiance, season and normal solar generation curve.
- (28) Generation schedules and drawal schedules issued/revised by the State Load Despatch Centre shall become effective from designated time block irrespective of communication success.
- (29) For any revision of scheduled generation, including post facto deemed revision; there shall be a corresponding revision of scheduled drawals of the beneficiaries.
- (30) A procedure for recording the communication regarding changes to schedules duly taking into account the time factor shall be evolved by the State Transmission Utility.
- (31) When for the reason of transmission constraints e.g. congestion or in the interest of grid security, it becomes necessary to curtail power flow on a transmission corridor, the transactions already scheduled may be curtailed by the State Load Despatch Centre.
- (32) The short-term customer shall be curtailed first followed by the medium-term customers, which shall be followed by the long-term customers and amongst the customers of a particular category, curtailment shall be carried out on pro rata basis.
- (33) After the operating day is over at 24:00 hours, the schedule finally implemented during the day (taking into account all before-the-fact changes in dispatch schedule of generating stations and drawal schedule of the beneficiaries) shall be issued by SLDC. These schedules shall be

the datum for commercial accounting. The average ex-bus capability for each IaSGS shall also be worked out based on all before-the-fact advice to SLDC.

- (34) Collective Transaction through Power Exchange(s) would normally be curtailed subsequent to the Short Term Bilateral Transaction(s).
- (35) In case of curtailment of a transaction by RLDC, SLDC shall incorporate the inter-se curtailment of intra-State Entities to implement the curtailment.
- (36) SLDC shall properly document all above information i.e. station-wise foreseen ex-power plant capabilities advised by the generating stations, the drawal schedules advised by beneficiaries, all schedules issued by the SLDC and all revisions/updating of the above.
- (37) The procedure for scheduling and the final schedules issued by SLDC shall be open to all Constituents for any checking/verification, for a period of 5 days. In case any mistake/omission is detected, the SLDC shall forthwith make a complete check and rectify the same.
- (38) While availability declaration by IaSGS shall have a resolution of one decimal (0.1) MW and one decimal (0.1) MWh, all entitlements, requisitions and schedules shall be rounded off to the nearest two decimals at each control area boundary for each of the transaction, and shall have a resolution of 0.01 MW.

## **6.6 Reactive Power and Voltage Control**

- (1) Reactive power compensation should ideally be provided locally, by generating reactive power as close to the reactive power consumption as possible. The beneficiaries are, therefore, expected to provide local VAR compensation/generation such that they do not draw VARs from the EHV grid, particularly under low-voltage condition. However, considering the present limitations, this is not being insisted upon. Instead, to discourage VAR drawals by Beneficiaries, VAR exchanges with IaSTS shall be priced as follows:

- (a) The Beneficiary pays for VAr drawal when voltage at the metering point is below 97%
- (b) The Beneficiary gets paid for VAr return when voltage is below 97%
- (c) The Beneficiary gets paid for VAr drawal when voltage is above 103%.
- (d) The Beneficiary pays for VAr return when voltage is above 103%

Provided that there shall be no charge/payment for VAr drawal/return by a Beneficiary on its own line emanating directly from an IaSGS.

- (2) The charge for VARh shall be at the rate of 13 paise/kVARh with effect from the date of notification of these Regulations and this will be applicable between the Beneficiary and State Reactive Energy pool account for VAr interchanges. This rate shall be escalated at 0.5paise/kVARh per year thereafter, unless otherwise revised by the Commission.
- (3) Notwithstanding the above, SLDC may direct a beneficiary to curtail its VAr drawal/injection in case the security of grid or safety of any equipment is endangered.
- (4) In general, the Beneficiaries shall endeavour to minimize the VAr drawal at an interchange point when the voltage at that point is below 95% of rated, and shall not return VAr when the voltage is above 105%. ICT taps at the respective drawal points may be changed to control the VAr interchange as per a Beneficiary's request to the SLDC, but only at reasonable intervals.
- (5) Switching in/out of all 400 kV bus and line Reactors throughout the grid shall be carried out as per instructions of SLDC. Tap changing on all 400/220/132 kV ICTs shall also be done as per SLDCs instructions only.
- (6) The IaSGS 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.

- (7) VAR exchange directly between two Beneficiaries on the interconnecting lines owned by them (singly or jointly) generally address or cause a local voltage problem, and generally do not have an impact on the voltage profile of the State Grid. Accordingly, the management/control and commercial handling of the VAR exchanges on such lines shall be as per following provisions, on case-by-case basis:
- (a) The two concerned Beneficiaries may mutually agree not to have any charge/payment for VAR exchanges between them on an interconnecting line
  - (b) The two concerned Beneficiaries may mutually agree to adopt a payment rate/scheme for VAR exchanges between them identical to or at variance from that specified by the Commission for VAR exchanges with IaSTS. If the agreed scheme requires any additional metering, the same shall be arranged by the concerned Beneficiaries.
  - (c) In case of a disagreement between the concerned Beneficiaries (e.g. one party wanting to have the charge/payment for VAR exchanges, and the other party refusing to have the scheme), the scheme as specified in Annexure-2 shall be applied. The per kVARh rate shall be as specified by the Commission for VAR exchanges with IaSTS.
  - (d) The computation and payments for such VAR exchanges shall be effected as mutually agreed between the two Beneficiaries

## **CHAPTER 7: METERING CODE**

### **7.1 Metering requirements**

- (1) The State Transmission Utility shall develop a Metering Communication & Data Acquisition Requirements (MCDAR) for each user at the inter connection points and also at cross boundary circuits, submit the same to the Commission for its approval within Ninety (90) days of notification of these Regulations.
- (2) The MCDAR shall be as per CEA (Installation and Operation of Meters) Regulations, 2006 amended from time to time. Provided that till the time the aforesaid requirements are developed and approved by the Commission, the provisions of prevailing relevant statutes shall be applicable.
- (3) MCDAR developed by STU shall provide the minimum requirements and standards for Installation and Operation of meters, for commercial and operational purposes, to be provided by User or Transmission Licensee at the Connection Point.

Provided that such requirements shall be consistent with the Regulations as may be specified by the CEA under Section 55 of the Act.

Provided further that such requirements shall be applicable to any other point that may be internal to the power system of the User or Transmission Licensee if information captured by such meter shall be required for commercial or operational purposes.

- (4) The Commission shall review the MCDAR submitted for approval by the State Transmission Utility and shall either:
  - (a) approve the MCDAR, with such conditions or modifications as the Commission may deem appropriate; or
  - (b) reject the MCDAR ,for reasons to be recorded in writing if the said document is not in accordance with the Act or these Regulations or

with the Grid Code specified under clause (h) of sub-section (1) of Section 79 of the Act and direct the State Transmission Utility to submit a revised draft of the same.

- (5) The State Transmission Utility shall put up a copy of the MCDAR on its Internet website and make available a copy of the applicable MCDAR to any person requesting it, at a price not exceeding the reasonable cost of reproducing it.
- (6) MCDAR shall clearly identify the concerned User, responsible for ownership and maintenance of the meters & communication system.
- (7) MCDAR shall include and describe the following:
  - (a) provisions related to location and installation of meters;
  - (b) specifications and accuracy limits for the meters;
  - (c) rights, responsibilities and procedures related to recording, collection, transfer, data acquisition ,communication system, processing and storage of data collected from meters;
  - (d) provisions related to ownership of metering data;
  - (e) calibration procedures to be carried out by each concerned agency to ensure conformance to the above accuracy limits;
  - (f) procedures associated with maintenance of the meters in proper functioning state, safety of meters, testing of the new or replacement meters, sealing of meters and inspection of meters;
  - (g) provisions related to right of access to the meters;
  - (h) procedures to address metering discrepancies, defective equipments and meter failures;
  - (i) procedures for resolution of disputes on matters related to metering; and;
  - (j) Any other aspect considered appropriate, for inclusion in the MCDAR, by the State Transmission Utility or the Commission.

## **CHAPTER 8: Safety**

### **8.1 Introduction**

This chapter specifies the requirements for safe working practices for maintenance of equipment associated with cross boundary operations and lays down the procedure to be followed when the work is carried out on electrical equipment connected to another User's System.

### **8.2 Objective**

The objective of this section is to achieve an agreement on the principles of safety prescribed in the CEA (Measures Relating to Safety and Electric Supply) Regulations, 2010 and CEA (Safety Requirements for construction, operation and maintenance of electrical plants and electric lines) Regulations, 2011 when working across a control boundary between the STU/ Transmission Licensee and the Users.

### **8.3 Control Persons and their Responsibility**

- (1) STU/ Transmission Licensee and all the Users shall nominate suitably authorized and technically qualified persons to be responsible for the co-ordination of safety across their boundary. These persons shall be referred to as "Control Persons".
- (2) STU/ Transmission Licensee shall issue a list of Control Persons with their names, designations, addresses and telephone numbers, to all the Users having direct control boundary with it. This list shall be updated promptly whenever there is any change of name, designation or telephone number of any Control Person named in the list.
- (3) All Users having a direct control boundary with STU/ Transmission Licensee shall issue a similar list of their Control Persons to STU/ Transmission Licensee. This list shall be updated promptly whenever there is any change of name, designation or telephone number of any Control Person named in the list.



- (4) Whenever any work across a cross boundary is to be carried out by the user or STU/ Transmission Licensee, the Control Person of the user or STU/Transmission Licensee as the case may be, who has to carry out the work, shall directly contact his counterpart. Code words shall be agreed to, at the time of work, to ensure correct identification of both the parties. Contact between Control Persons shall normally be made by direct telephone.
- (5) If the work extends beyond one shift, the Control Person shall hand over charge to the relief Control Person and fully brief him on the nature of work and the code words in the operation.
- (6) The Control Persons shall cooperate to establish and maintain the precautions necessary to be taken for carrying out the required work in a safe manner. Both the established isolation and the established earth shall be kept in the locked positions wherever such facilities exist, and these shall be clearly identified and entered into the log sheet.
- (7) The Control Person in charge of the work shall satisfy himself that all the safety precautions to be taken are established before commencing the work. He should issue the safety documentation to the working party to allow the work to commence.
- (8) After completion of the work, the Control Person in charge of the work being carried out, should satisfy himself that the safety precautions taken are no longer required, and shall make a direct contact with his counterpart Control Person and request removal of the safety precautions. The equipment shall be declared as suitable for return to service only after confirmation of removal of all the safety precautions, by direct communication, using the code word contact between the two Control Persons, and the return of agreed safety documentation from the working party.
- (9) STU shall develop an agreed written procedure for Cross Boundary Safety and continuously update the same.

- (10) Any dispute concerning Cross Boundary Safety shall be resolved at the level of STU, if STU is not a party. In case where STU is a party, the dispute shall be referred to the Commission for resolution of the dispute.

#### **8.4 Special Considerations**

- (1) All Users shall comply with the agreed safety rules drawn up in accordance with CEA (Measures Relating to Safety and Electric Supply) Regulations, 2010.
- (2) All equipment on Cross Boundary Circuits, which may be used for the purpose of safety coordination and establishment of isolation and earthing, shall be permanently and clearly marked with an identification number or name being unique to the particular substation. The equipment shall be regularly inspected and maintained in accordance with the manufacturer's specifications.
- (3) Each Control Person shall maintain a legibly written safety log, in chronological order, of all operations and messages relating to the safety coordination sent and received by him. All these safety logs shall be retained for a period of not less than five years.
- (4) The Transmission Licensee shall maintain an updated map of his system pertaining to the area fed by each substation and exhibit the same that sub-station.

## **CHAPTER 9: MANAGEMENT OF STATE GRID CODE**

### **9.1 Management of SGC**

- (1) The State Grid Code (SGC) shall be specified by the Commission. Any amendment to SGC shall also be specified by the Commission only.
- (2) State Grid Code shall be reviewed by the Grid Coordination Committee at least once in every twelve (12) months or as may be directed by the Commission.
- (3) Upon completion of such review, the Grid Coordination Committee shall send a report to the State Transmission Utility providing information regarding:
  - (a) outcome of the review; and
  - (b) Any proposed revisions to the State Grid Code.
- (4) The State Transmission Utility shall send the report, referred in sub-Regulation (3) of this Regulation to the Commission.
- (5) The SGC and its amendments shall be finalized and notified adopting the prescribed procedure followed for Regulations issued by the Commission.
- (6) The requests for amendments to/modifications in the SGC and for removal of difficulties shall be addressed to Secretary to the Commission, for periodic consideration, consultation and disposal.
- (7) Any dispute or query regarding interpretation of SGC may be addressed to Secretary to the Commission and clarification issued by the Commission shall be taken as final and binding on all concerned.

### **9.2 Power to amend**

The Commission may, at anytime, vary, alter, modify or amend any provisions of these Regulations.

### **9.3 Power to remove difficulties**

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

By Order of the Commission

(Neeraj Sati)

Secretary

Uttarakhand Electricity Regulatory Commission

## **Annexure-1**

[refer sub-Regulation (4) of Regulation 6.1]

### **COMPLEMENTARY COMMERCIAL MECHANISMS**

(Applicable w.e.f. such date as may be decided by Commission for introduction of Intra-State ABT)

- (1) The beneficiaries shall pay to the respective IaSGS Capacity Charges corresponding to plant availability and Energy Charges for the scheduled dispatch, as per the relevant notifications and orders of the Commission. The bills for these charges shall be issued by the respective IaSGS to each beneficiary on monthly basis.
- (2) The sum of the above two charges from all beneficiaries shall fully reimburse the IaSGS for generation according to the given dispatch schedule. In case of a deviation in actual generation from the dispatch schedule, the concerned IaSGS shall receive or shall pay in accordance with Deviation Settlement Mechanism Regulations. Similarly, the deviation of actual drawl by any Beneficiary from the net drawl schedule shall be treated as Deviation from the schedule. All 15-minute energy figures (net scheduled, actually metered and Deviation from the schedule) shall be rounded off to the nearest 0.01 MWh. The Deviation charges and the modalities of settlement of Deviation shall be in accordance with Deviation Settlement Mechanism Regulations.
- (3) Complementary Commercial Mechanism for wind and solar generators shall be according to the Indian Electricity Grid Code (IEGC), 2010 and as amended from time to time.
- (4) The summation of station-wise ex-power plant dispatch schedules from each IaSGS/ISGS and any bilaterally agreed interchanges of each beneficiary shall be adjusted for transmission losses, and the net drawal schedule so calculated shall be compared with the actual net drawal of the beneficiary. In case of excess drawal, the beneficiary shall be required to pay through the Deviation Settlement Mechanism for the

excess energy. In case of under-drawal, the beneficiary shall be paid back through the Deviation Settlement mechanism, for the energy not drawn.

- (5) When requested by a constituent, SLDC shall assist the constituent in locating a buyer/seller and arranging a scheduled interchange within the State or across the State boundary. The SLDC shall act only as a facilitator (not a trader/broker), and shall assume no liabilities under the agreement between the two parties, except.
  - (i) ascertaining that no component of the power system of any other constituent shall be over-stressed by such interchange/trade, and
  - (ii) Incorporating the agreed interchange/trade in the net interchange schedules for the concerned Constituents.
  - (iii) All computations carried out by SLDC shall be open to all constituents for checking/verifications for a period of 15 days. In case any mistake/omission is detected, the SLDC shall forthwith make a complete check and rectify the same.
- (6) State Energy Accounts shall be prepared on monthly basis and the statement of Deviation charges and Reactive Energy Charges shall be prepared by the SLDC on a weekly basis and these shall be issued to all State constituents by Tuesday for the seven-day period ending on the previous Sunday mid-night. Payment of Deviation charges shall have a high priority and the concerned State constituent shall pay the indicated amounts within 7 (seven) days of the statement issue into a State Deviation pool account operated by the SLDC. The State constituents who have to receive the money on account of Deviation charges would then be paid out from the State Deviation pool account, within five (5) working days from the receipt of payment in the State Deviation Pool account.

- (7) The SLDC shall also issue the weekly statement for VAr charges to all Beneficiaries who have a net drawal/injection of reactive energy under low/high voltage conditions. These payments shall also have a high priority and the concerned Beneficiaries shall pay the indicated amounts into State Reactive Energy Pool account operated by the SLDC within 7 (seven) days of statement issue. The Beneficiaries who have to receive the money on account of VAr charges would then be paid out from the State Reactive Energy Pool account, within five (5) working days from the receipt of payments in the State Reactive Energy Pool account.
- (8) If payments in State Pool accounts (State Deviation Pool Account & State Reactive Energy Pool Account) against the above Deviation and VAr charges are delayed by more than two days, i.e., beyond nine (9) days from statement issue, the defaulting Constituent shall have to pay simple interest @ 0.04% for each day of delay. The interest so collected shall be paid to the Constituents who had to receive the amount, payment of which got delayed. Persistent payment defaults, if any, shall be reported by the SLDC to the STU, for initiating remedial action.
- (9) The money remaining in the State Reactive Energy Pool account after pay-out of all VAr charges upto 31<sup>st</sup> March of every year shall be utilized for training of the SLDC operators and other similar purposes which would help in improving/streamlining the operation of the State Grid, as decided by the STU from time to time.
- (10) In case the voltage profile of State Grid improves to an extent that the total pay-out from the State VAr charges account for a week exceeds the total amount being paid-in for that week and if the State reactive account has no balance to meet the deficit, the pay-outs shall be proportionately reduced according to the total money available in the above account.
- (11) The SLDC shall table the complete quarterly statement of the State Deviation Pool account and the State Reactive Energy Pool account in the GCC meeting, for audit by the latter.

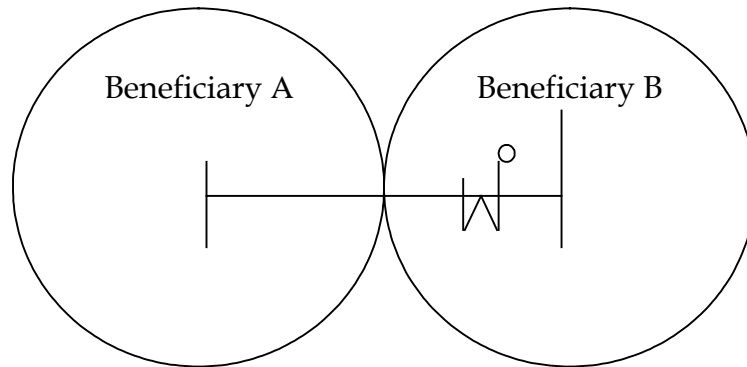
**Annexure-2**

[(refer clause (c) of sub-Regulation (7) of Regulation 6.6]  
**Payment for Reactive Energy Exchanges on Beneficiary Owned Lines**

**Case - 1:**

Interconnecting line owned by Beneficiary-A

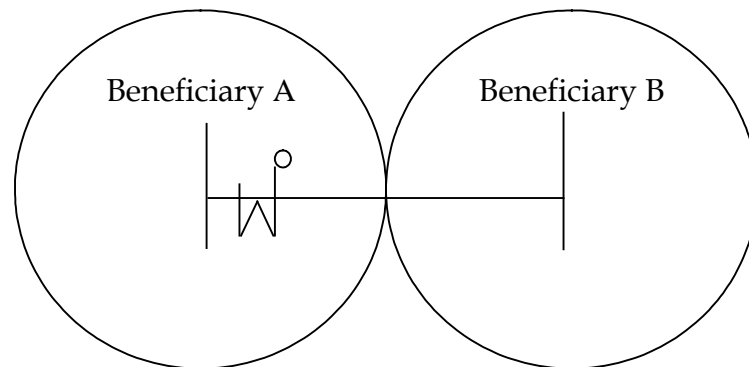
Metering Point: Substation of Beneficiary-B



**Case - 2:**

Interconnecting line owned by State-B

Metering point: Substation of Beneficiary-A



Beneficiary-B pays to Beneficiary-A for

- (i) Net VARh received from Beneficiary-A while voltage is below 97%,  
and
- (ii) Net VARh supplied to Beneficiary-A while voltage is above 103%

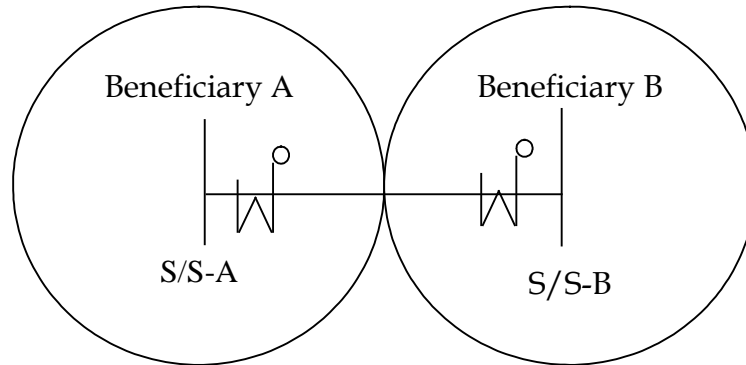
Note: Net VARh and net payment may be positive or negative



**Case-3:**

Interconnecting line is jointly owned by Beneficiary-A and -B.

Metering points: Substations of Beneficiary -A and Beneficiary -B



Net VARh exported from S/S-A, while voltage  $< 97\%$  = X1

Net VARh exported from S/S-A, while voltage  $> 103\%$  = X2

Net VARh imported at S/S-B, while voltage  $< 97\%$  = X3

Net VARh imported at S/S-B, while voltage  $> 103\%$  = X4

(i) Beneficiary -B pays to Beneficiary -A for

X1 or X3, whichever is smaller in magnitude, and

(ii) Beneficiary -A pays to Beneficiary -B for

X2 or X4, whichever is smaller in magnitude.

**Note:**

1. Net VARh and net payment may be positive or negative.
2. In case X1 is positive and X3 is negative, or vice-versa, there would be no payment under (i) above.
3. In case X2 is positive and X4 is negative, or vice-versa, there would be no payment under (ii) above.

## Annexure-3

**Planning Data Requirement from the Generating and Distribution Company**

**Part- I: Generation**

(To be furnished by the generating company to STU)

**(A) Standard Planning Data (Generation)**

**1. Hydro**

<b>General</b>	
Site	Furnish location map (schematic) showing roads, railway lines, transmission lines, rivers, and reservoirs, if any.
Approximate period of construction	
Annual generation in million kWh	
<b>Connection</b>	
Connection Point / Interface Point	Furnish single line diagram of the proposed connection with the Transmission System with clear indication of possibility for right-of-way for unobstructed outlet
Step up voltage for connection kV	
<b>Station Capacity</b>	
Total generating station capacity (MW)	
No. of units and unit size MW	State whether development will be carried out in phases and if so, furnish details.
<b>Generating Unit Data</b>	
<b>(1) Generator</b>	
(a) Make and Type	
(b) Rating (MVA)	
(c) Terminal Voltage (kV)	
(d) Rated Power Factor	
(e) Rated Power capability (MVA <sub>r</sub> ) in the range 0.95 leading and 0.85 lagging	
(f) Short Circuit Ratio	
(g) Direct axis transient reactance (% on MVA rating)	
(h) Direct axis sub-transient	

reactance (% on MVA rating)	
(i) Auxiliary power Requirement	
<b>(2)Generator Transformer</b>	
(a) Type	
(b) Rated Capacity(MVA)	
(c) Voltage Ratio(HV/LV)	
(d) Tap Change range (+%to - %)	
(e) Percentage Impedence (Positive Sequence at Full load)	

## 2. Thermal Electric

### (i) General:

(as applicable to hydro generating stations mentioned above)

### (ii) Connection:

(as applicable to hydro generating stations mentioned above)

### (iii) Station Capacity

(as applicable to hydro generating stations mentioned above)

### (iv) Generation Unit Data:

(as applicable to hydro generating stations mentioned above)

## **(B) Detailed Planning Data (Generation)**

### **1. Thermal Generating Stations**

#### **I. General:**

- (i) Name of generating station
- (ii) No. and capacity of generating units (MW)
- (iii) Single line diagram of generating station and switchyard
- (iv) Relaying and metering diagram
- (v) Neutral grounding of generating units
- (vi) Excitation control
- (vii) Earthings arrangements with earth resistance values
- (viii) Communication- details of PLCC and other communication equipment installed

## **II. Protection and Metering:**

- (i) Full description including settings for all relays and protection systems installed on the generating unit, generating unit transformer, auxiliary transformer and electrical motor of major equipment; viz. boiler feed pump, ID fans, condensate extraction pump etc.
- (ii) Full description including settings for all relays installed on all outgoing feeders from generating station switchyard, tie circuit breakers, incoming circuit breakers.
- (iii) Full description of inter-tripping of circuit breakers at Connection Point(s) / Interface Point(s) with the Transmission System
- (iv) Most probable fault clearance time for electrical faults on the user's system
- (v) Full description of operational and commercial metering schemes
- (vi) Breaker operating time counting from initiation of protective relay to the opening of breaker

## **III. Switchyard:**

- (i) In relation to Interconnecting Transformers between EHV / HV Transmission System and the Generator Transformer Voltage System:
  - (a) Rated MVA
  - (b) Voltage Ratio
  - (c) Vector Group
  - (d) Positive sequence reactance (maximum, minimum, normal Tap (% on MVA))
  - (e) Positive sequence resistance (maximum, minimum, normal Tap (% on MVA))
  - (f) Zero sequence reactance (% on MVA)
  - (g) Tap changer range (+ % to - %) and steps

- (h) Type of tap changer (OFF/ON)
- (i) Details of reactors, and other circuits connected to tertiary winding of ICT
- (j) Method of grounding
- (ii) In relation to switchgear including circuit breakers, isolators on all circuits connected to the points of connection:
  - (a) Rated voltage (kV)
  - (b) Type of breaker (MOCB/ ABCB/SF6 ---)
  - (c) Rated short circuit breaking current (kA) 3 Phase
  - (d) Rated short circuit breaking current (kA) 1 Phase
  - (e) Rated short circuit making current (kA) 3 Phase
  - (f) Rated short circuit making current (kA) 1 Phase
  - (g) Provisions of auto reclosing with details.
  - (h) Details of instrument transformers
- (iii) Lightning arresters, technical data
- (iv) Communication- Details of PLCC and other communication equipment installed at Connection Point(s)/ Interface Point(s).
- (v) Basic insulation level (kV)
  - (a) Busbar
  - (b) Switchgear
  - (c) Transformer bushings
  - (d) Transformer windings

**IV. Generating Units:**

- (i) Parameters of Generating Units:
  - (a) Rated terminal voltage (kV)

- (b) Rated MVA
- (c) Rated MW
- (d) Inertia constant H (MW Sec./MVA) of generator
- (e) Short circuit ratio
- (f) Direct axis synchronous reactance (% on MVA) (Both unsaturated and saturated)
- (g) Direct axis transient reactance (% on MVA) (Both unsaturated and saturated)
- (h) Direct axis sub-transient reactance (% on MVA) (Both unsaturated and saturated)
- (i) Quadrature axis synchronous reactance (% on MVA) (Both unsaturated and saturated)
- (j) Quadrature axis transient reactance (% on MVA) (Both unsaturated and saturated)
- (k) Quadrature axis sub-transient reactance (% on MVA) (Both unsaturated and saturated)
- (l) Direct axis transient open circuit time constant (Sec)  $T'_{do}$
- (m) Direct axis sub-transient open circuit time constant (Sec)  $T_{do}$
- (n) Quadrature axis transient open circuit time constant (Sec)  $T'_{qo}$
- (o) Quadrature axis sub-transient open circuit time constant (Sec)  $T_{qo}$
- (p) Stator resistance (Ohm)
- (q) Stator leakage reactance (Ohm)  $T_a$
- (r) Stator time constant (Sec)
- (s) Rated field current (A)

- (t) Open circuit saturation characteristic for various terminal voltages giving the exciting current to achieve the same.
- (u) Generator Capability Curve
- (v) Rated stator current (A)
- (w) Phase connection
- (x) Number of terminals brought out
- (y) Rated speed (rpm)
- (z) Rated Frequency (Hz.)
- (aa) Efficiency at MCR condition (percent)
- (bb) Negative sequence current capability ( $I_2T$ )
- (cc) Capacitance of generator stator winding to ground (microf/ph)
- (dd) DC resistance of rotor at 200 C (in ohm)
- (ee) Zero sequence reactance  $X_0$  (Percentage)
- (ff) Negative sequence reactance  $X_2$  (Percentage)
- (gg) Negative sequence reactance  $R_2$  (Percentage)
- (hh) Sub-Transient S-C time constant (in second)
  - Direct axis  $T_d$
  - Quadrature axis  $T_q$
- (ii) Transient S-C time constant (in second)
  - Direct axis  $T'd$
  - Quadrature axis  $T'q$
- (jj) Machine saturation at 1.0 pu voltage in pu
- (kk) Machine saturation at 1.2 pu voltage in pu
- (ll) Percentage regulation
- (mm) Short circuit characteristics curves

- (ii) Parameters of Excitation Control System:
  - (a) Type of Excitation
  - (b) Maximum Field voltage
  - (c) Minimum Field voltage
  - (d) Rated Field voltage
  - (e) Gain factor
  - (f) Feedback strength
  - (g) Time constant for control amplifier
  - (h) Time constant for Exciter
  - (i) Time constant for Feedback
  - (j) Output voltage of control amplifier
  - (k) Maximum output voltage of control amplifier
  - (l) Minimum output voltage of control amplifier
  - (m) Details of excitation loop in block diagrams showing transfer functions of individual elements using IEEE symbols along with set values.
  - (n) Dynamic characteristics of over-excitation limiter
  - (o) Dynamic characteristics of under-excitation limiter
  - (p) Exciter IEEE model I type no.
  - (q) Exciter response time
- (iii) Parameters of Governor/ Turbine:
  - (a) Governor average gain (MW/Hz)
  - (b) Speeder motor setting range
  - (c) Time constant of steam or fuel governor valve
  - (d) Governor valve opening limits



- (e) Governor valve rate limits
  - (f) Time constant of turbine (HP, IP, LP)
  - (g) Governor block diagram showing transfer functions of individual elements using IEEE symbols along with set values.
  - (h) Type of governor, whether IEEE standard governor used
  - (i) Regulation and droop
  - (j) Fraction of total power generated HP, IP, LP turbine
  - (k) Maximum velocity limit HP, IP, LP turbine
  - (l) Minimum velocity limit HP, IP, LP turbine
- (iv) Operational Parameters:
- (a) Min. notice required for synchronizing a generating unit from de-synchronization
  - (b) Min. time between synchronizing different generating units in a generating station
  - (c) The minimum block load requirements on synchronizing
  - (d) Time required for synchronizing a generating unit for the following conditions:
    - Hot
    - Warm
    - Cold
  - (e) Maximum Generating Unit loading rate for the following conditions:
    - Hot
    - Warm
    - Cold
  - (f) Minimum load without oil support (MW)

**V. Plant Performance:**

Daily Demand Profile (Last Year)	Half-hourly integrated demand throughout the day
Units Generated (Million kWh)	
Units consumed in Auxiliaries (Million Kwh)	
Units supplied from system to Auxiliary Load	
Seasonal Generation	

**2. Hydroelectric Stations:**

**I. General:**

- (a) Name of generating station:
- (b) No. and capacity of units (MW)
- (c) Expected level of generation (MU)
- (d) Period of generation (in months) per year
- (e) Whether the plant is based on water released from dam/canal for irrigation purposes
- (f) Rating of all major equipments.
  - Turbine
  - Generators
  - Generator Transformers
  - Auxiliary Transformers
- (g) Single line diagram of generating station and switchyard
- (h) Relaying and metering diagram
- (i) Neutral grounding of generator
- (j) Excitation control
- (k) Earthing arrangements with earth resistance values
- (l) Communication- Details of PLCC and other communication equipment installed

**II. Protection:**

(As applicable to thermal generating stations mentioned above)

**III. Switchyard:**

(As applicable to thermal generating stations mentioned above)

**IV. Generating Units**

**(a) Parameters of generating units:**

(As applicable to thermal generating stations mentioned above)

**(b) Parameters of Excitation Control System:**

(As applicable to thermal generating stations mentioned above)

**(c) Parameters of governor/ turbine:**

(As applicable to thermal generating stations mentioned above)

**(d) Operational Parameters:**

- Minimum notice required for synchronizing a generating unit from de- synchronization
- Minimum time between synchronizing different generating units in a generating station
- Minimum block load requirements on synchronizing

**(C) Other Planning Data:**

**Generation**

(For submission by generator on request by STU)

**1. For Thermal Generating Stations, if desired by STU)**

**(1) Connection:**

**(i) Report of studies of parallel operation with Transmission System:**

- a. Load flow studies
- b. Stability studies
- c. Short Circuit studies

(ii) Proposed connection with Transmission system:

- a. Voltage
- b. No. of circuits
- c. Connection Point(s) I Interface Point(s)

**2. For Hydroelectric Generating Stations, if desired by STU**

(As applicable to thermal generating stations mentioned above)

**Part - II- Distribution**

(To be furnished by the distribution company to STU)

**(A) Standard Planning Data (Distribution)**

<b>General</b>	
SingleLine Diagram	Licensee-wise up to 33 kV substations.
Consumer Data	Furnish category wise number of consumers, their connected loads to the best judgment of the Distribution Licensee
Reference to area offices presently in charge of the distribution	
<b>Connection</b>	
Connection Points/ Interface Points:	Furnish single line diagram showing Connection Points/ InterfacePoints.
Voltage of supply at Connection Points/ Interface Points:	
Names of Grid Substation feeding the Connection Points/ InterfacePoints:	
<b>Lines and Substations:</b>	
I. Line Data:	Furnish length of line and voltages (EHV level)
2. Substation Data:	Furnish transformer details for substations, capacitor installations.
<b>Loads</b>	
Loads drawn at Connection Points/ Interface Points:	If the Distribution Licensee receive power at a number of connection points in a compact area, which are interconnected in a ring, then such a Distribution Licensee shall forward the overall load drawn for overall Area of Supply, as well as at each connection point with the variation or tolerance as mutually discussed and agreed upon with the STU
Details of load fed at EHV if any;	Give name of consumer, voltage of supply, contract demand and name of grid substation from

	which line is drawn, length of EHT line from grid substation to the consumer's premises.
<b>Demand Data (For All Loads 5 MW and Above):</b>	
Type of Load & Rating in HP or kW	State whether furnace loads, rolling mills traction loads, other industrial loads , pumping loads.
Rated voltage	
Electrical loading of equipment:	
Sensitivity of load to voltage and frequency of supply	State number and size of motors, rating of arc furnaces/induction furnace, types of drive and control arrangements.
Maximum harmonic content of load	
Average and maximum phase unbalance of load	
Nearest substation from which load is to be fed	
Location map to scale	Map shall show the location of load with reference to lines and sub-sations in the vicinity
<b>Load Forecast Data</b>	
Peak load for Connection Point/ Interface Point as well as peak load and energy forecast for Area of Supply for each of the succeeding five years.	
Details of methodology and assumptions on which forecasts are based.	
Details of load 5 MW and above. <ul style="list-style-type: none"> <li>• Name of prospective consumer.</li> <li>• Phasing of load</li> </ul>	

**(B) Detailed Planning Data (Distribution)**

<b>General</b>	
Schematic single line diagram of Distribution System (showing distribution lines from Connection Points/ Interface Points with Transmission System at various voltage levels, consumer bus if fed directly from Transmission system)	
Numbering and nomenclature of lines and substations (identified with feeding grid substations of the Transmission System at various voltage levels.	
<b>Connection</b>	

Connection Points/ Interface Points (furnish details of existing arrangement of connection)	
Details of metering of Connection Points/ Interface Points.	
<b>Detailed Planning Data (Distribution) (For submission on request by STU)</b>	
<b>Connection</b>	
Connection Points/ Interface Points as applied for <ul style="list-style-type: none"> <li>• New</li> <li>• Upgrading existing connection</li> </ul>	
Changes in metering at Connection Points/ Interface Points	
<b>Loads</b>	
Details of major loads of 1 MW and above to be contracted for next three years.	

## Annexure-4

**Planning Data Requirement by User from STU/  
Transmission Licensee.**

(To be furnished to the user by STU/ Transmission Licensee.)

**(A) Standard Planning Data (Transmission)**

Name of the line (indicating generating station and substation to be connected)	
Voltage of line KV:	
No of circuits	
Route length CKM	
Conductor Size	
Line parameter (PU on 100MVA base or ohmic value):	Resistance /KM Inductive reactance/KM Suceptance /KM
Approximate Load flow MW & MVAR	
Line route (topographic sheet)	

**(B) Detailed System Data (Transmission)**

<b>General</b>	
Single line diagram of the Transmission System at grid sub-station	
Name of substation	
Generating station connected	
Number and length of circuits	
Interconnecting transformers	
Substation bus layouts	
Power transformers	
Reactive compensation equipment <ul style="list-style-type: none"> <li>• The details of capacitors installed:</li> <li>• Additional capacitors to be commissioned along with additional loads</li> </ul>	
Lightning arresters	
Bus and/or line reactors	
<b>Substation Layout Diagrams Showing</b>	
Bus bar layouts	
Electrical circuitry, lines, cables, transformers, switchgear etc.	
Phasing arrangements	
Earthing arrangements	
Switching facilities and interlocking arrangements	



Operating voltages	
Numbering and nomenclature	
<ul style="list-style-type: none"> <li>• Transformers</li> </ul>	
<ul style="list-style-type: none"> <li>• Circuits</li> </ul>	
<ul style="list-style-type: none"> <li>• Circuit breakers</li> </ul>	
<ul style="list-style-type: none"> <li>• Isolating switches</li> </ul>	
<b>Line Parameters: (For All Circuits)</b>	
Name of line	
Length of line (KM)	
No. of circuits, size and type of conductor, thermal rating	
Per circuit values	
<ul style="list-style-type: none"> <li>• Operating voltage (kV)</li> </ul>	
<ul style="list-style-type: none"> <li>• Positive phase sequence reactance ohms/KM</li> </ul>	
<ul style="list-style-type: none"> <li>• Positive phase sequence resistance ohms/KM</li> </ul>	
<ul style="list-style-type: none"> <li>• Positive phase sequence susceptance mhos/KM</li> </ul>	
<ul style="list-style-type: none"> <li>• Zero Phase Sequence Reactance Ohms/Km</li> </ul>	
<ul style="list-style-type: none"> <li>• Zero phase sequence resistance ohms/KM</li> </ul>	
<ul style="list-style-type: none"> <li>• Zero Phase sequence susceptance mhos/KM</li> </ul>	

<b>Transformer Parameters: (For All Transformers Substation-wise)</b>	
Rated MVA	
Voltage ratio	
Vector group	
Positive sequence reactance on rated MVA base (Max., min. & normal)	
Positive sequence resistance on rated MVA base (max., min. & Normal)	
Zero sequence reactance on rated MVA base	
Tap change range (+% to -%) and steps	
Details of tap changer (OFF/ON)	
Neutral grounding transformer/resistor values	

10.% Impedance (Max/Min/Normal Tap	
<b>Equipment Details: (For All Substations)</b>	
Circuit breakers	
Isolating switches	
Current transformers	
Potential transformers	
Lightning arresters	
Earthing switches	
<b>Relaying and Metering</b>	
Relay protection installed for all transformers and feeders along with their settings and level of coordination with other Users.	
Metering Details	
<b>Demand Data (For all substation)</b>	
Demand Profile (peak and off peak load)	
Forecast for next five years	
<b>Reactive compensation Equipment</b>	
Type of equipment (fixed or variable)	
Capacities and/or inductive rating (voltage and MVar) or its operating range.	
Details of control	
Connection Point/ Interface Point to the system.	
<b>Detailed Planning Data(Transmission)</b>	
<b>Connection</b>	
Single Line Diagram showing position of connection	
Substation layout diagram	
New	
Addition and alteration	
Revised system studies with changed parameters	
Connection Point/ Interface Point:	
• Voltage	
• Length of circuit	
• Circuit parameters	

<ul style="list-style-type: none"><li>• PLCC facilities</li></ul>	
<ul style="list-style-type: none"><li>• Relaying with inter tripping arrangements to inter trip system. breaker at Connection Point/ Interface Point to isolate on fault</li><li>• Metering at Connection Point/ Interface Point.</li></ul>	
<ul style="list-style-type: none"><li>• Other communication facility</li></ul>	

**ABBREVIATIONS**

ABCB	Air Brake Circuit Breaker
ABT	Availability Based Tariff
ACSR	Aluminium Conductor Steel Reinforced
APM	Administered Pricing Mechanism
AVR	Automatic Voltage Regulator
BIS	Bureau of Indian Standards
CEA	Central Electricity Authority
CERC	Central Electricity Regulatory Commission
CPP	Captive Power Plant
CVT	Capacitive Voltage Transformer
D/C	Double Circuit
DISCOMs	Distribution Companies
DSM	Demand Settlement Mechanism
EFR	Earth Fault Relay
EHV	Extra High Voltage
EHT	Extra High Tension
EMPT	Electromagnetic Potential Transformer
FACTS	Flexible AC Transmission System
HVDC	High Voltage Direct Current
ICT	Inter Connected Transformer
ID	Induced Draft
IEC	International Electro-Technical Commission
IEC Standard	Standard approved by International Electro-technical Commission
IEEE	Institution of Electrical and Electronic Engineering
IPP	Independent Power Producer
IS	Indian Standards
MB-1	Maneri Bhali Hydro Electric Project
MNRE	Ministry of New and Renewable Energy Sources
MU	Million Unit
OCR	Over Current Relay
PLCC	Power Line Carrier Communication
PLF	Plant Load Factor
PMU	Phasor Measurement Unit
REA	Regional Energy Account
RLDC	Regional Load Dispatch Centre
RLNG	Re-Liquefied Natural Gas
ROR	Run of River
RPC	Regional Power Committee
S/C	Single Circuit
SCADA	Supervisory Control and Data Acquisition
SEA	State Energy Account
SVC	Static VAr compensator

## Annexure-5

### Check List for Reports/Plans/Procedures

Submitted by	Submitted to							
	Agency	SLDC	STU	State Constituents	Transmission Licensee/USERS	RPC/RLDC	Commission	GCC
	SLDC		6.4 (22)	5.6 5.7.2 5.8.4 (4) & (7) 5.10.4 (1) 5.10.6 (2) & (3) 6.4 (11) Annexure-I clause (6)		5.2 (4) (6) & (17) 5.4 (8) 5.8.4 (3)	5.1.1 (4) 5.5.1 (4)	Annexure-I clause (11)
	STU	5.2 (17)			3.5 (2) 4.13 (3) 8.3 (2)		3.4 (12) 4.18 6.4 (22) 7.1 (1) 9.1 (4)	
	State Constituents	5.2 (3), (4), (18) & (21) 5.4 (4) 5.5.1 (3) 5.8.4 (2) 5.9 (2) & (6) 5.10.4 (2) 5.10.6 (1) & (3)	3.4 (8)					
	Transmission Licensee/USERS		3.5 (1) & (4) 8.3 (3)		4.15 (2) & (3) 4.16 (3)			
	GCC		9.1 (3)					