

# HIMACHAL PRADESH ELECTRICITY REGULATORY COMMISSION

## NOTIFICATION

No: HPERC-Grid Code(388)

Dated: 05 August, 2008

In exercise of the powers conferred under sub-section (1)(h) Section 86 of the Electricity Act, 2003 (Central Act 36 of 2003) and all other powers enabling it in that behalf, the Himachal Pradesh Electricity Regulatory Commission hereby specifies the Himachal Pradesh Electricity Grid Code (hereinafter also referred to as “HPEGC” or “ Grid Code”). The HPEGC shall come into effect from the date of its publication in the Rajpatra, Himachal Pradesh.

### CHAPTER – 1

#### GENERAL

##### 1.1 Introduction

1.1.1 The Himachal Pradesh Electricity Grid Code lays down the rules, procedures and standards to be followed by the various Users and participants in the Intra -State Transmission System to plan, develop, maintain and operate the Intra -State Transmission System, a part of Northern Region Grid System, in the most efficient, reliable, economic and secure manner.

##### 1.2 Objective

1.2.1 The Grid Code is designed to facilitate the development, and maintenance of an efficient, coordinated, secure and economical Intra -State Transmission System (IaSTS). It accordingly provides the following:

- (a) Documentation of the principles and procedures, which define the relationship between the various Users of IaSTS as well as the Regional Load Despatch Centre and the State Load Despatch Centre.
- (b) Technical Standards, Rules and Procedures (technical, operational and for information sharing) to be adopted by State Load Despatch Centre (SLDC), State Transmission Utility (STU) and Users connected to the IaSTS.
- (c) Common basis of operation of the IaSTS to facilitate open access and trading of electricity, applicable to all the Users of the IaSTS.

##### 1.3 Scope and Extent of Application

- 1.3.1 This Code 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 this Code to the extent it applies to them.
- 1.3.2 The Grid Code shall apply for the Intra-State transmission of electricity. For the Inter-State transmission of electricity the Indian Electricity Grid Code (IEGC) shall be applicable.

- 1.3.3 This Grid Code shall not affect the obligations of the STU, SLDC and Users as laid down under the Indian Electricity Grid Code notified by the Central Electricity Regulatory Commission, and/or the Electricity Act, 2003 and rules and regulations made thereunder.

#### **1.4 Structure of the HPEGC**

- 1.4.1 The HPEGC is structured in distinct chapters as follows:

(a) Chapter-1: General

This chapter outlines the broad features of the HPEGC. The various terms used in the HPEGC are also defined in this chapter.

(b) Chapter -2: Role of various Organizations & their linkages

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

(c) Chapter -3: Planning Code for Intra-State Transmission

This chapter specifies the principles, procedures and criteria that shall be used in the planning and development of the IaSTS.

(d) Chapter -4: Connectivity Conditions Code

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

(e) Chapter -5: Operation Planning and System Security Code

This Chapter describes the operational philosophy to maintain efficient, secure, economic and reliable grid operation. This chapter covers the requirement for the exchange of information in relation to security aspects, demand estimation, demand management, outage planning, operational liasioning, and events occurring in the State Power System and the Northern Grid, which have had or may have an effect on the Regional Grid and/or the State Power Grid and/or Users' System connected to the State Power Grid. This chapter also formulates the recovery and normalization of power supply process to be followed by all the Users connected to the State Power Grid in the event of failure of State Power Grid and/or the Northern Grid (total or partial collapse) causing blackouts.

(f) Chapter -6: Scheduling & Despatch Code

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

(g) Chapter -7: Management of HPEGC

This chapter deals with the procedure for review/amendment and management of the HPEGC.

## **1.5 Non-compliance**

- 1.5.1 State Transmission Utility shall be responsible for monitoring the compliance by the Users with the provisions contained in Chapter 3 and Chapter 4 of this Code. Responsibility for monitoring the compliance by the Users with the provisions contained in Chapter 5 and Chapter 6 of this Code rests with the State Load Despatch Centre.
- 1.5.2 In monitoring the compliance of the Users with the relevant provisions of the HPEGC, the STU/SLDC shall not unduly discriminate against or unduly prefer any User.
- 1.5.3 In case of a persistent non-compliance of any of the stipulations of the HPEGC, such matter shall be reported to the Commission.

## **1.6 Free Governor Mode of Operation**

- 1.6.1 All thermal and hydro (except those with zero pondage) generating units shall operate under free governor mode of operation with effect from the date to be separately notified by the Commission.
- 1.6.2 Any exemption from the above may be granted only by the Commission for which the concerned agency shall file a petition in advance.
- 1.6.3 Gas turbine/Combined Cycle Power Plants shall be exempted from sections 4.8.3, 4.8.4, 5.3.6, 5.3.7, 5.3.8 and 5.3.9 till the Commission reviews the situation and provides otherwise.

## **1.7 Charge/Payment for Reactive Energy Exchanges**

- 1.7.1 The rate for charge/payment of reactive energy exchanges (according to the scheme specified in section 6.6 shall be at such rate in paise/kVArh w.e.f such date, and shall be escalated at such rate per year thereafter, as the Commission may determine in this behalf.

## **1.8 Exemptions**

- 1.8.1 Any exemption from provisions of HPEGC shall be allowed by the Commission only on receipt of a petition from the concerned User giving reasons /justification for exemption sought therein. The Commission may invite comments from various stakeholders before allowing any such exemption.

## **1.9 Definitions**

- 1.9.1 In the HPEGC, the following words and expressions shall, unless the subject matter or context otherwise requires or is inconsistent therewith, bear the following meaning:

<b>Item</b>	<b>Definition</b>
Act	The Electricity Act, 2003(Central Act No. 36 of 2003), including amendments thereto.

Agency	A term used in various sections of HPEGC to refer to SSGS/Licensee that utilize the IaSTS.
Authority	Central Electricity Authority referred to in sub-section (1) of Section 70 of the Act.
Automatic Voltage Regulator (AVR)	A continuously acting automatic excitation control system to control the voltage of a Generating Unit measured at the generator terminals.
Backing Down	Reduction of generation by a Generating Unit on instructions from SLDC under abnormal conditions such as high frequency, low system demand or network constraints.
BBMB	Bhakra Beas Management Board
Beneficiary	A person who has share in an ISGS, SSGS and BBMB generating stations.
Black Start Procedure	The procedure necessary to recover the grid from a partial or a total blackout.
BIS	The Bureau of Indian Standards
Captive Generating Plant (CGP)	A power plant set up by any person to generate electricity primarily for his own use and includes a power plant set up by any co-operative society or association of persons for generating electricity primarily for use of members of such co-operative society or association.
Capacitor	An electrical facility provided for generation of reactive power.
CEA	Central Electricity Authority.
CERC	The Central Electricity Regulatory Commission
Central Transmission Utility (CTU)	Any Government company, which the Central Government may notify under sub-section (1) of Section 38 of the Act.
Commission / HPERC	The Himachal Pradesh Electricity Regulatory Commission
Connection Agreement	An Agreement setting out the terms relating to a connection to and /or use of the IaSTS.
Connection Point	A point at which a User's Plant and /or Apparatus connects to the Intra-State Transmission System.
Data Acquisition System (DAS)	A device provided to record the sequence of operations in time, of the relays / equipments / system parameters at a location.
Demand	The demand of Active Power in MW and Reactive Power in MVAR of electricity unless otherwise stated.

Despatch Schedule	The, ex-power plant, net MW and MWH output of a generating station, scheduled to be exported/despached to the Grid from time to time.
Disturbance Recorder (DR)	A device provided to record the behaviour of the pre-selected digital and analog values of the system parameters during an Event.
Drawl Schedule	The ex-power plant MW that a licensee/ User is scheduled to receive from SSGS/ISGS and BBMB generating stations, including bilateral exchanges from time to time.
Event	An unscheduled or unplanned occurrence in the grid including faults, incidents and breakdowns.
Event Logger (EL)	A device provided to record the sequence of operation in time, of the relays/equipments at a location during occurrence of an Event.
Ex-Power Plant MW/MWH	Net MW/MWH output of a generating station, after deducting auxiliary consumption and transformation losses.
Extra High Voltage (EHV)	Where the voltage exceeds 33,000 volts under normal conditions subject, however, to the percentage variation allowed by the Authority.
Fault Locator (FL)	A device provided at the end of a transmission line to measure/ indicate the distance at which a line fault may have occurred.
Flexible Alternating Current Transmission (FACT)	Facilities that enable power flows on A.C. lines to be regulated, to control loop flows, line loadings, etc.
Forced Outage	An outage of a Generating Unit or a transmission facility due to a fault or other reasons which has not been planned.
Generating Company	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.
Generating Unit	An electrical Generating Unit coupled to a turbine within a Power Station together with all Plant and Apparatus at that Power Station (up to the Connection Point).
Good Utility Practices	Any of the practices, methods and acts engaged in or approved by a significant portion of the electric utility industry during the relevant time period which could have been expected to accomplish the desired results at a reasonable cost consistent with good business practices, reliably, safely and with expedition.

Governor Droop	In relation to the operation of the governor of a Generating Unit, the percentage drop in system frequency which would cause the Generating Unit under free governor action to change its output from zero to full load.
Grid Standards	Grid Standards specified by the Authority under clause (d) of Section 73 of the Act.
High Voltage (HV)	Where the voltage exceeds 650 Volt but not exceeds 33,000 volts under normal conditions subject, however, to the percentage variation allowed by the Authority.
IEC	The International Electro-technical Commission
Independent Power Producer (IPP)	A generating company not owned /controlled by the Central/State Government.
Indian Electricity Grid Code (IEGC)	A document describing the philosophy and the responsibilities for planning and operation of Indian power system specified by the CERC in accordance with sub-section 1(h) of Section 79 of the Act.
Inter-State Generating Station (ISGS)	A Central/other generating station in which two or more than two States have a share and whose scheduling is to be coordinated by the Regional Load Despatch Centre.
Inter-State Transmission System (ISTS)	Inter-State Transmission System includes: (i) any system for the conveyance of electricity by means of a main transmission line from the territory of one State to another State. (ii) the conveyance of electricity across the territory of an intervening State as well as conveyance within 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.
Intra-State Transmission System (IaSTS)	The Intra-State Transmission System shall include the entire transmission network within the State excluding the Inter-State Transmission System.
Licensee	A person who has been granted a licence under Section 14 of the Act.
Load	The MW/MWH consumed by a utility/ installation.
Long-term open access customer	A long-term open access customer as defined under the HPERC (Terms and Conditions for Open Access) Regulations, 2005 as amended from time to time.

Maximum Continuous Rating (MCR)	The normal rated full load MW output capacity of a Generating Unit which can be sustained on a continuous basis at specified conditions.
National Grid	The entire inter-connected electric power network of the country, which would evolve after inter-connection of Regional grids.
Non-Conventional Energy Sources (NCES)	NCES shall mean generating plants based on non-conventional energy sources e.g. solar, wind, bagasse, biomass, bio-gas, industrial waste, municipal waste and small hydro generating stations.
Net Drawal Schedule	The drawal schedule of a beneficiary after deducting the apportioned transmission losses (estimated).
Operation	A scheduled or planned action relating to the operation of a System.
Reactor	An electrical plant specifically designed to absorb Reactive Power.
Regional Power Committee (RPC)	A Committee established by resolution by the Central Government for a specific region for facilitating the integrated operation of the power systems in that region.
Regional Grid	The entire synchronously connected electric power network of the concerned Region, comprising of ISTS, ISGS and Intra-state systems.
Regional Load Despatch Centre	The Centre established under sub-section (1) of Section 27 of the Act.
Short Term Open Access Customer	A short-term open access customer as defined under the HPERC (Terms and Conditions for Open Access) Regulations, 2005 as amended from time to time.
Single Line Diagram	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.
Site Common Drawing	Drawings prepared for each Connection Point, which incorporates layout drawings, electrical layout drawings, common protection/ control drawings and common service drawings.
Spinning Reserve	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.

State Energy Account	A State energy account, for the billing and settlement of 'Capacity Charge', 'Energy Charge', 'UI Charge' and 'Reactive Charge'.
State Pool Account	State account for: (i) payments regarding unscheduled-interchanges (UI Account) or (ii) reactive energy exchanges (Reactive Energy Account), as the case may be.
State Government	Government of the State of Himachal Pradesh.
State Load Despatch Centre (SLDC)	A Centre established by the State Government under sub-section (1) of Section 31 of the Act.
State Transmission Utility (STU)	The Board or the Government Company specified as such by the State Government under sub-section (1) of Section 39 of the Act.
State Sector Generating Stations (SSGS)	Generating Stations connected with the IaSTS including IPP, Captive Generating Plant, Co-Generators and NCES. For the purpose of scheduling / dispatching, SSGS shall include Hydroelectric Projects only above 5 MW capacity.
Static VAR Compensator (SVC)	An electrical facility designed for the purpose of generating or absorbing Reactive Power.
Time Block	Block of 15 minutes each for which special energy Meters record specified electrical parameters and quantities with first time block starting and 00.00 Hrs.
Transmission Licence	A Licence granted under Section 14 of the Act to transmit electricity.
Transmission Planning Criteria	The policy, standards and guidelines issued by the CEA for the planning and design of the Transmission system.
User	A term used in various sections of the HPEGC to refer to the persons/ agencies using the IaSTS, as more particularly identified in each section of HPEGC.

Note: 1. Terms defined in singular shall be considered to apply for plural also.

2. Words and expressions used and not defined in this Code but defined in the Act shall have the same meanings assigned to them in the said Act. Subject to the above, expressions used herein but not specifically defined in this Code or in the Act shall have the meaning as is generally assigned in the electricity industry.



## CHAPTER -2

### ROLE OF VARIOUS ORGANISATIONS & THEIR LINKAGES

#### 2.1 Introduction

2.1.1 In the light of the provisions of the Electricity Act, 2003, it has become necessary to specify the role of State Load Despatch Centre (SLDC), State Transmission Utility (STU), Regional Load Despatch Centre (RLDC), Regional Power Committees (RPC), the Central Electricity Authority (CEA), the State Co-ordination Forum, the Central Transmission Utility (CTU) etc. and their organizational linkages so as to facilitate development and smooth operation of State Power Grid and the Regional Grid. This Chapter defines the functions of the various organizations connected with the functioning and operations of the State Power Grid, as envisaged in Electricity Act, 2003 and rules and regulations made thereunder.

#### 2.2 Regional Load Despatch Centre

2.2.1 The RLDC is the apex body to ensure integrated operation of the power system within the concerned regional grid. In respect of wheeling, optimum scheduling and despatch of electricity through Inter- State transmission lines, the RLDC shall comply with the principles, guidelines and methodology as specified by the CERC in the IEGC or otherwise. The RLDC may give such directions and exercise such supervision and control as may be required for ensuring integrated Grid operations and for achieving the economy and efficiency in the operation of the power system in the region under its control. All licensees, generating companies, and any other person connected with and/or utilizing the ISTS shall comply with the directions issued by the RLDC.

#### 2.3 Regional Power Committee

2.3.1 Regional Power Committees have been constituted by resolution dated 25.05.2005 of Central Government for all the five regions for facilitating the integrated operation of the power system in each region. Regional Power Committee, established by the Government of India for the region may, from time to time, issue guidelines on matters concerning the stability and smooth operation of the Grid and economy and efficiency in the operation of the power system in that region. Such directions shall be binding on all the entities covered by this Code to the extent they are applicable to the State Power Grid.

2.3.2 RPC would perform the following functions to facilitate the stability and smooth operation of the integrated grid:

- (a) To undertake Regional Level operation analysis for improving grid performance.
- (b) To facilitate Inter-State/Inter-regional transfer of power.
- (c) To facilitate all functions of planning relating to Inter-State/Intra-State Transmission System with CTU/STU.

- (d) To coordinate planning of maintenance of generating machines of various generating companies of the region including those of Interstate generating companies supplying electricity to the Region on annual basis and also to undertake review of maintenance programme on monthly basis.
- (e) To undertake planning of outage of transmission system on monthly basis.
- (f) To undertake operational planning studies including protection studies for stable operation of the grid.
- (g) To undertake planning for maintaining proper voltages through review of reactive compensation requirement through system study committee and monitoring of installed capacitors.
- (h) To evolve consensus on all issues relating to economy and efficiency in the operation of power system in the region.

## **2.4 Central Transmission Utility**

- 2.4.1 Power Grid Corporation of India Limited (PGCIL) is the Central Transmission Utility as notified by Government of India. CTU is responsible for the entire Inter- State transmission of electricity and in that context, the relevance of this Code shall be limited to the connectivity between the Intra-State Transmission System and the Inter-State Transmission System.

## **2.5 Central Electricity Authority**

- 2.5.1 The Central Electricity Authority, established under Section 3 of the Electricity (Supply) Act, 1948, continues to operate as the Central Electricity Authority under the provisions of Section 70(2) of the Act.
- 2.5.2 Under Section 3(4) of the Act, CEA would prepare and notify once in five years a National Electricity Plan in accordance with the National Electricity Policy notified by the Central Government.
- 2.5.3 The Central Electricity Authority in accordance with the provisions of Section 177 of the Act may make regulations, which may provide for the following matters:
  - (a) Grid Standards as stipulated in Section 34 of the Act.
  - (b) Measures relating to safety and Electricity Supply as stipulated in Section 53 of the Act.
  - (c) Installation and operation of meters as stipulated in Section 55 of the Act.
  - (d) Technical standards for construction of electrical plants and electric lines and connectivity to the Grid and all other matters as stipulated in Section 73 of the Act.
  - (e) The form and manner in which and the time at which the State Government and Licensees shall furnish statistics, returns or other information under Section 74 of the Act.
  - (f) Any other matter as may be specified under the Act.

2.5.4 Irrespective of whether the provisions under the regulations stated above are explicitly provided for or not in this Code, they shall apply to all the entities covered by this Code to the extent it applies to them.

## **2.6 State Load Despatch Centre**

2.6.1 The State Government shall establish a center to be known as the State Load Despatch Centre for the purpose of exercising the powers and discharging the functions under sub-section (1) of Section 32 of the Act. This State Load Despatch Centre shall be operated by a Government company, or any authority or corporation established or constituted by or under any State Act, as may be notified by the State Government. Till such time the State Government notifies the same, STU shall operate SLDC.

2.6.2 The SLDC shall be the apex body to ensure integrated operation of the power system in the State. The SLDC shall be responsible for:

- (a) Optimum scheduling and despatch of electricity within the State, in accordance with the contracts entered into with the licensees or the generating companies operating in the State.
- (b) Monitoring of grid operations.
- (c) Keeping accounts of the quantity of electricity transmitted through the State Power Grid.
- (d) Supervision and control over the Intra-State Transmission System.
- (e) Carrying out real time operations for grid control and despatch of electricity within the State through secure and economic operation of the State Power Grid in accordance with the Grid Standards and the Grid Code.

2.6.3 In addition to above functions under the Act SLDC shall also discharge the following function as per the provisions of this Grid Code:

- (a) System operation and control covering contingency analysis and operational planning on a real time basis;
- (b) Re-scheduling of despatch and drawl schedules as per system conditions and request of Generating Stations and Distribution Licensees;
- (c) System restoration following grid disturbances;
- (d) Specifying metering points and data collection;
- (e) Compiling and furnishing data pertaining to system operation;
- (f) Operation of State UI pool account and State reactive energy account;
- (g) In case of open access in Intra-State transmission, the SLDC shall be the nodal agency for the short-term open access. The procedure and modalities in regard to short-term Open Access shall be as per the HPERC (Terms and Conditions for Open Access) Regulations, 2005 as amended from time to time.

2.6.4 SLDC may give such direction and exercise such supervision and control as may be required for ensuring the integrated Grid operation and for achieving the

maximum economy and efficiency in the operation of the State Power System. All Users shall comply with the directions issued by the SLDC.

- 2.6.5 The SLDC shall ensure compliance of the directions of the RLDC by issuing suitable directions to the Users.
- 2.6.6 If any dispute arises with reference to the quality of electricity or, safe, secure and integrated operation of the State Power Grid or in relation to any direction given by the SLDC, it shall be referred to the Commission for decision. Pending the decision of the Commission, the Licensee or Generating Company shall comply with the directions of the SLDC.
- 2.6.7 If any licensee, generating company or any other person fails to comply with the directions issued by SLDC, he shall be liable to a penalty, as per the provisions of the Act.

## **2.7 State Transmission Utility**

- 2.7.1 The State Transmission Utility as notified by the State government shall be deemed to be a transmission licensee under Section 14 of the Electricity Act, 2003.
- 2.7.2 As per the Act, the STU shall be responsible for:
  - (a) Transmission of electricity through Intra-State Transmission System.
  - (b) Discharging all functions of planning and coordination relating to Intra-State Transmission System with:
    - (i) Central Transmission Utility,
    - (ii) State Government,
    - (iii) Generating Companies,
    - (iv) Regional Power Committee,
    - (v) Central Electricity Authority,
    - (vi) All Licensees,
    - (vii) Any other person notified by the State Government in this behalf.
  - (c) Ensuring development of an efficient, coordinated and economical system of Intra-state transmission lines for smooth flow of electricity from a generating station to the load centres.
  - (d) Providing non-discriminatory open access to its transmission system for use by:
    - (i) any licensee or generating company on payment of the transmission charges, or
    - (ii) any customer, as and when such open access is provided by the 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.
- 2.7.3 STU, in discharge of its functions under the Act and this Code, shall take into consideration recommendations, if any, of the State Co-ordination Forum.
- 2.7.4 STU shall act as nodal agency for all long-term open access customers.

## **2.8 Transmission Licensee**

- 2.8.1 Every Transmission Licensee shall comply with such technical standards of construction of electrical plants, electric lines and connectivity with the grid and safety requirements as specified by the CEA, and follow the principles and procedures as specified in this Code and /or Indian Electricity Grid Code as applicable to the Intra-State Transmission System.
- 2.8.2 It shall be the duty of the transmission licensee:
- (a) to maintain and operate the part of the IaSTS which are licensed to him and comply with the directions of RLDC and SLDC as the case may be;
  - (b) to provide non-discriminatory open access in pursuance of open access to its transmission system for use by any licensee or generating company or other Users on payment of the charges as determined by the Commission.

## **2.9 Generating Company**

- 2.9.1 Any generating company may establish, operate and maintain a generating station without obtaining a licence under the Act if it complies with the technical standards relating to connectivity with the grid referred to in clause (b) of Section 73 of the Act.
- 2.9.2 As per the provisions of Section 10 of the Act, the duties of a generating company shall be:
- (a) to establish, operate and maintain generating stations, tie-lines, sub-stations and dedicated transmission lines connected therewith in accordance with the provisions of the Act or the rules or regulations made thereunder;
  - (b) to supply electricity to any licensee in accordance with the Act and the rules and regulations made thereunder and may, subject to the regulations made under sub-section (2) of Section 42, supply electricity to any consumer;
  - (c) to submit technical details regarding its generating stations to the Appropriate Commission and the Authority;
  - (d) to co-ordinate with the Central Transmission Utility or the State Transmission Utility, as the case may be, for transmission of the electricity generated by it.

## **2.10 Distribution Licensee**

- 2.10.1 Any person granted licence under Section 14 of Act for distribution of electricity in a particular area should develop and maintain an efficient, co-ordinated and economical distribution system for supplying electricity to the consumers in his area of supply in accordance with the provisions of the Act.
- 2.10.2 It shall also be the duty of the distribution licensee:
- (a) to provide open access to the consumers in its area of supply in such phases as may be specified by the Commission on payment of wheeling charge, surcharge and additional surcharge as may be determined by the Commission;

- (b) to give supply of electricity, on an application by the owner or occupier of any premises, within a period of one month after receipt of the application requiring such supply:

Provided that where such supply requires extension of distribution mains, or commissioning of new sub-stations, the distribution licensee shall supply the electricity to such premises immediately after such extension or commissioning or within such period as may be specified by the Commission.

## **2.11 State Coordination Forum**

- 2.11.1 As per Section 166 (4) of the Act, Government of Himachal Pradesh shall constitute a State Coordination Forum for smooth and coordinated development of the power system in the State. State Coordination Forum may give its recommendations on matters related to overall planning and development of the State Power System.

## **2.12 Himachal Pradesh Electricity Regulatory Commission**

- 2.12.1 The functions of HPERC relevant to HPEGC are:

- (a) To determine the rates, charges and terms for the use of the transmission facilities of licensees.
- (b) To specify the fees and charges payable to SLDC.
- (c) To issue directions on matters of non-compliance of HPEGC or any dispute referred to it regarding interpretation of any provisions of the HPEGC.
- (d) To issue transmission/distribution licences.
- (e) To issue amendments to the HPEGC as and when required.

## **2.13 Government of Himachal Pradesh**

- 2.13.1 The State Government may issue directions to SLDC; to take such measures as may be necessary for maintaining smooth and stable transmission and supply of electricity in the State. SLDC shall abide by such directions if they are not inconsistent with the provisions of the Act and this Code.

## CHAPTER-3

### PLANNING CODE FOR INTRA -STATE TRANSMISSION

#### 3.1 Introduction

- 3.1.1 In accordance with Section 39(2)(b) of Electricity Act, 2003, the State Transmission Utility (STU) shall discharge all functions of planning and coordination relating to Intra-State Transmission System in coordination with CTU, State Governments, Generating Companies, Regional Power Committees, Central Electricity Authority (CEA), licensees and any other person notified by the State Government in this behalf. The Act also envisages role of Generating Companies and CTU, apart from the Central Government and State Governments in the process of transmission planning at various levels.
- 3.1.2 This Planning Code comprises various aspects of planning and development relating to Intra-State Transmission System.

#### 3.2 Objective

- 3.2.1 The objectives of Planning Code are as follows:
- (a) To specify the principles, procedures and criteria to be applied in the planning and development of IaSTS.
  - (b) To promote co-ordination amongst all Users in any proposed development of the IaSTS.
  - (c) To provide methodology and information exchange requirement amongst SLDC, STU and Users in the planning and development of IaSTS.

#### 3.3 Scope

- 3.3.1 This Planning Code applies to STU, other licensees, State Sector Generating Stations (SSGS), connected to and/or using and/or involved in developing the IaSTS including those intending to connect their system to IaSTS. This shall also apply to the other Stakeholders like CTU, Generating Stations connected to (or intending to connect) to the Inter State Transmission System by laying transmission lines through the territory of Himachal Pradesh.

#### 3.4 Planning Policy

- 3.4.1 The STU shall prepare and submit to the Commission a long-term transmission system plan (time span 5 years) for the expansion of the IaSTS to meet the future demand within six months from the date of notification of this Grid Code. In preparing the above plan, the following shall be considered in addition to the data of authentic nature collected from and in consultation with SSGS, licensees, SLDC, etc.:
- (a) Perspective plan for development of the electricity system formulated by the CEA under the provisions of clause (a) of Section 73 of the Act.
  - (b) Electric Power Survey of India report of the CEA.

- (c) Transmission Planning Criteria and Guidelines issued by the CEA.
  - (d) National Electricity Policy issued by the Government of India to the extent applicable for the development of Intra-State Transmission System.
  - (e) Recommendations/inputs, if any, of the Regional Power Committee and the State Coordination Forum.
  - (f) Any other information/data source suggested by the Commission.
- 3.4.2 The STU shall submit to the Commission an updated long-term transmission system plan by 28<sup>th</sup> February every year taking care of the revisions in electricity load projections, additions in the generation capacity and all (approved/pending) applications for open access.
- 3.4.3 The primary responsibility of load forecasting of a particular supply area shall be that of the respective Distribution Licensees. The Distribution Licensees shall forecast the peak load and energy requirement of their areas for each category of loads for the succeeding 5 years and submit the same annually by 31<sup>st</sup> December to STU along with forecast methodology, assumptions and daily load curve on which the forecasts are based. These forecasts shall be reviewed annually or whenever major changes are made in the existing system and updated accordingly. While indicating requirements of a single consumer (one MW or higher), the Distribution Licensee shall personally satisfy itself, as to the degree of certainty of the demand materializing. STU shall apply an appropriate diversity factor and also satisfy itself regarding the probability of materialization of bulk loads of consumers with demands above 1MW in consultation with concerned Distribution Licensee.

The Generating Companies intending to connect their stations with the IaSTS and those intending to connect the generating stations with the Inter State Transmission System by erecting transmission lines(whether dedicated or otherwise) during succeeding five years shall also submit complete details to the STU as well as to Government of H.P. at the earliest possible, but in any case before applying for open access to STU/CTU or seeking transmission licence for erection of any line in Himachal Pradesh.

- 3.4.4 STU in consultation with SLDC and the concerned Distribution Licensee, may review the methodology and assumptions, used in making the load forecast and shall further re-work:
- (a) Projected loads and losses of the system, the net energy requirement and peak load requirement at generation end. The installed capacity, peak availability, surplus and deficit both in generation and demand shall also be worked out by STU.
  - (b) Additional transmission capacity required after taking into account, the existing capacity, projects under construction, proposed projects, availability from captive power plants, co-generators & NCES, bilateral trades and also share of the State from Central sector Power Projects both within and outside the State. STU shall also examine the economic, technical and environmental aspects of all the available alternatives.
- 3.4.5 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 planning studies would be finalised by STU based on the inputs received from various stakeholders i.e. generating companies and distribution licensees, SLDC and any committee created for the transmission planning purposes by the Commission.

- 3.4.6 In case long term open access cannot be allowed due to system constraints, the prospective open access customer may request STU to carry out system studies to identify system strengthening requirements and cost estimates. In case of Long Term Open Access applications requiring any strengthening in the Inter-State Transmission System to absorb/evacuate power beyond IaSTS, the applicant shall also coordinate with CTU.
- 3.4.7 The long term transmission system plan prepared by STU shall contain a chapter on additional transmission requirement, which may include not only Intra-State transmission lines, but also additional equipment requirement such as transformers, capacitors and reactors, etc.
- 3.4.8 The long term transmission system plan shall also indicate the action taken to fulfill the additional requirement and actual progress made on new schemes. The planning report and power map shall be made available to any party interested for making investments decision/ connection decisions to the IaSTS.
- 3.4.9 As voltage management plays an important role in the Intra- State transmission of energy, special attention shall be accorded to planning of capacitors, reactors, SVC and Flexible Alternating Current Transmission Systems (FACTS), etc.
- 3.4.10 Based on the Plan prepared by the STU, other Transmission Licensees/ Distribution Licensees shall plan their systems to further evacuate power from the IaSTS.
- 3.4.11 The Inter-State Transmission System and associated Intra-State Transmission System are complementary and inter-dependent and therefore planning of one affects the planning and performance of the other. The STU shall accordingly plan the development of associated Intra-State Transmission System in line with the development of the Inter-State Transmission System. However, it is expected that CTU shall also duly consider the constraints of transmission corridors in the State while planning the Inter State Transmission System, so as to ensure the optimum utilization of the scarce transmission corridors in the State.
- 3.4.12 Generating Companies intending to evacuate the power from the generating stations through Intra State Transmission System shall also duly co-ordinate in advance with STU and shall also abide by all such requirements as may be intimated by STU keeping in view the constraints of transmission corridors in the State.  
  
In case of any difference of opinion in this regard for the system to be erected in Himachal Pradesh the matter shall be suitably referred to HPERC.
- 3.4.13 STU's planning department shall use load flow, short circuit, transient and steady state stability study, relay coordination study and other techniques for transmission system planning.

- 3.4.14 STU's planning department shall simulate the contingency and system constraint conditions for the IaSTS and incorporate the results in the long-term transmission system plan.
- 3.4.15 STU should maintain a historical database based on operational data supplied by SLDC and use advance software tools for demand forecasting.
- 3.4.16 STU shall extend full support to CTU to finalise the annual planning corresponding to a 5 year forward term for identification of major Inter-State Transmission System including inter-regional schemes which shall fit in with the long term plan developed by CEA.
- 3.4.17 STU shall furnish the requisite planning data to CTU as required by it from time to time.

### **3.5 Planning Criterion**

- 3.5.1 The planning criterion are based on the security philosophy on which the IaSTS has been planned. The security philosophy may be as per the Transmission Planning Criterion and other guidelines as given by CEA. The general criterion shall be as detailed below:
  - (a) As a general rule, the IaSTS 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:
    - (i) Outage of 66 kV/132 kV D/C Line or,
    - (ii) Outage of 220 kV D/C Line or,
    - (iii) Outage of 400 kV S/C Line or,
    - (iv) Outage of Single Inter-Connecting Transformer or,
    - (v) Outage of one pole of HVDC Bipole line or,
    - (vi) Outage of a 765 S/C line.
  - (b) The above contingencies shall be considered assuming a pre-contingency system depletion (planned outage) of another 66kV/132 kV D/C line or 220 kV S/C line or 400 kV S/C line in another corridor and not emanating from the same sub-station. All the Generating Units may operate within their reactive capability curves and the network voltage profile shall also be maintained within voltage limits specified.
  - (c) In exceptional cases like transmission corridors constraints and environment concerns, the STU may deviate from the above stated criterion provided that the STU shall duly bring out the details of deviations alongwith the reasons thereof in this regard while submitting the long term transmission system plan as per section 3.5.
- 3.5.2 The IaSTS shall be capable of withstanding the loss of most severe single system in feed without loss of stability.
- 3.5.3 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) Unacceptable overloading of IaSTS elements.

3.5.4 The Transmission System should therefore have sufficient additional capacities and redundancies to cater to the above needs.

3.5.5 STU shall carry out planning studies for Reactive Power compensation of IaSTS including reactive power compensation requirement at the SSGS's Switchyard.

### **3.6 Planning Data Requirement**

3.6.1 To enable the STU to discharge its responsibilities to conduct system studies and prepare long term transmission system plan, Users shall provide the required planning data/information pertaining to their systems in the formats as may be devised by STU. In devising these formats, the STU shall also be guided by the formats, developed under the provisions of the Grid Code specified by the Central Commission under clause (h) of sub-section (1) of Section 79 of the Electricity Act, 2003.

3.6.2 The generating companies connected or those intending to connect their stations to the IaSTS as well as those connected to or intended to connect their stations to the ISTS through transmission lines(dedicated or otherwise) and transmission licensee erecting or intended to erect transmission lines in the territory of Himachal Pradesh shall also provide requisite planning data or information pertaining to their stations in the formats as may be devised by STU. The CTU shall also provide similar data for the system pertaining to its system connected to or to be connected to any of the transmission lines passing through territory of Himachal Pradesh in the formats as may be devised by STU in-accordance with section 3.6.1.

3.6.3 The one time data shall be submitted by all the Users to STU within 4 months from the date of notification of this Grid Code. Users shall thereafter submit yearly data to STU latest by 31<sup>st</sup> December for the ensuing year.

3.6.4 STU shall supply the data as may required by the Users for the coordinated planning, design and operation of their plants and systems with the transmission system.

### **3.7 Implementation of Transmission Plan**

3.7.1 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 Users. The completion of these works, in the required time frame, shall be ensured by STU.

3.7.2. Users shall mean any person/agency using IaSTS (or intending to use IaSTS) and shall also include a person/agency using the ISTS(or intending to use the ISTS) through their transmission lines(or otherwise) erected or to be erected in State of Himachal Pradesh.

**CHAPTER-4**  
**CONNECTIVITY CONDITIONS CODE**

**4.1 Introduction**

4.1.1 The Connectivity Conditions specify the minimum technical and design criteria which shall be complied with by STU and any User connected to, or seeking connection to the IaSTS. This chapter also sets out the procedures by which STU shall ensure compliance by all Users with the above criteria as a pre-requisite for the establishment of an agreed connection.

**4.2 Objective**

4.2.1 The connection conditions are designed to ensure that:

- (a) The basic rules for connections are complied with and all Users are treated in a non-discriminatory manner.
- (b) Any new or modified connections, when established, shall neither suffer unacceptable effects due to its connection to IaSTS nor impose unacceptable effects on the system of any other connected User.
- (c) The ownership and responsibility for all the equipments is clearly specified in a schedule (Site Responsibility Schedule) for every site, where a connection is made.

**4.3 Scope**

4.3.1 The Connectivity Conditions Code shall apply to STU and all Users connected to and/or involved in developing the State Power Grid and includes Generating Companies/Transmission Licensee/Distribution Licensee, which are engaged in or are intending to engage in generation/ transmission /distribution of power through the State Power System.

**4.4 Procedure for connection**

4.4.1 Prior to being connected to the IaSTS, User shall ensure that all the necessary conditions outlined in the HPEGC in addition to mutually agreed requirements, have been complied by it.

4.4.2 Any User seeking to establish new or modified arrangements for connection to and/or use of the assets of the Intra-State Transmission System, shall submit the following report, data and undertaking along with an application on standard format to STU along with the following details:

- (a) Report stating the purpose of the proposed connection and/or modification, transmission licensee in whose system the connection is proposed, connection point, description of apparatus to be connected or modification to the apparatus already connected and beneficiaries of the proposed connection.
- (b) Construction schedule and target completion date.

- (c) Undertaking that the User shall abide by HPEGC, Indian Electricity Rules and various standards including Grid Connectivity Standards made pursuant to the Act.
- 4.4.3 The STU shall forward a copy of the application to the Transmission Licensee in whose system the connection is being sought, to SLDC and to every Transmission Licensee within the State whose transmission system is likely to be affected by such application.
- 4.4.4 The STU on receipt of application, complete in all respects and after considering all suggestions and comments from the parties identified in section 4.4.3 make a formal offer to the applicant within thirty days from the date of receipt of all details along with the proposed changes, if any. The offer shall be subject to obtaining the required consents, approvals, and permissions for right of way or any other requirements as per the provisions of this Grid Code, Electricity Act, 2003 and rules and regulations made thereunder. A copy of the offer shall also be furnished to the transmission licensee in whose system the connection is being sought.
- 4.4.5 The offer shall specify, and take into account, any works required for the extension or reinforcement of the existing transmission system and/or supply system as necessitated by the applicant's proposal.
- 4.4.6 The estimated time schedule for completion of such works should also be specified in the offer, taking into account the time required to obtain statutory clearances etc., wherever necessary. In respect of offers for modifications to the existing connections, the offers shall also take into account the terms of the existing Connection Agreement, if any.
- 4.4.7 A User whose development/connection requires the STU/Transmission Licensee to obtain any consents, approvals, permissions, and right of ways or compliance with any other requirements mentioned in the HPEGC shall:
  - (a) Provide necessary assistance, supporting information or evidence; and
  - (b) Ensure attendance by such witnesses as the transmission licensee may reasonably request.
- 4.4.8 The User shall give its consent to the offer and submit the same to STU within a fortnight from the date the offer was made by the STU. Final decisions on applications for connection to the IaSTS shall be provided by the STU within 45 days from the date of submission of the consent to it by the User.
- 4.4.9 If the nature of complexity of the proposed development is such that the specified time limit for making the offer is not considered adequate, the STU shall make a preliminary offer within the specified time limit indicating the necessity and the extent of further time required for more detailed analysis of the issues.
- 4.4.10 The STU shall make a revised offer, upon request by a User, if necessitated by changes in data furnished earlier by the User.
- 4.4.11 The STU shall, upon compliance of the required conditions by the concerned User, notify that the User can be connected to the IaSTS.
- 4.4.12 The applicant and the Transmission Licensee, in whose system the connection is being sought, shall enter into a Connection Agreement on acceptance of the offer

by the applicant. The copy of the Connection Agreement shall also be provided to the STU and the SLDC by the Transmission Licensee.

- 4.4.13 All offers (other than preliminary offers) including revised offers shall remain valid for a period of 60(sixty) days from the date of issue of the offer. In the event of an offer becoming invalid or rejected by the applicant, STU shall not be required to consider any further application from the same applicant within twelve months from the date of offer unless the new application is substantially different from the original application with regard to system changes.
- 4.4.14 The User shall furnish the relevant Planning Data to the STU within thirty days of acceptance of an offer or such longer period as the STU may agree in a particular case.
- 4.4.15 The STU may reject any application for connection to and/or use of the IaSTS under the following conditions:
- (a) If such proposed connection is likely to cause breach of any of the provisions of Transmission Licence/Grid Code/ IEGC/Grid Standards and Technical Standards set out by CEA/Electricity Act, 2003, or any provision of planning criteria/any covenants/deeds/regulations by which the STU is bound, or
  - (b) If the applicant fails to give the undertakings in accordance with section 4.4.2(c) of this chapter.
- 4.4.16 In the event of any dispute with regard to rejection of application by the STU, the User may approach the Commission.

#### **4.5 Connection Agreement**

- 4.5.1 All Users connected to or seeking connection to the IaSTS shall enter into a connection agreement with the STU/Transmission Licensee. However, in respect of existing connections a relaxation of one year is allowed so that present arrangement may continue in the interim. The process of re-negotiation of the connection conditions shall be completed within this period of one year. In case it is determined that the compliance of connection conditions would be delayed further, the Commission may consider further relaxation for which a petition will have to be filed by the concerned User along with STUs recommendation/comments. The cost of modification, if any, shall be borne by the concerned User.
- 4.5.2 A connection agreement shall include (but not limited to), as appropriate, within its terms and conditions, the following:
- (a) The basic rules for connections are complied with and all Users are treated in a non-discriminatory manner.
  - (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, RTU etc. and demarcation of the same between the concerned parties.
  - (d) Details of equipment and plant to be connected.

- (e) General philosophy, guidelines, etc., on protection and telemetry.
- (f) A “Site Responsibility Schedule” detailing the division of responsibility at Connection Sites in relation to ownership, control, operation and maintenance of plant & apparatus and to safety of persons.

## **4.6 IaSTS Parameter Variations**

### **4.6.1 General**

Within the power system, instantaneous values of the system frequency and voltage are subject to variation from their nominal value. All Users shall ensure that their plants and apparatuses requiring service from/ to the IaSTS are of such design and construction that satisfactory operation is not hampered by such variation.

### **4.6.2 Frequency Variations**

Rated frequency of the system shall be 50.0 Hz and shall normally be controlled within the limits as per regulations/standards framed by the Authority.

### **4.6.3 Voltage Variations**

- (a) The variation of the voltage may not be more than the voltage range specified in the regulations/standards framed by the Authority.
- (b) The agencies engaged in sub-transmission and distribution shall not depend upon the IaSTS for reactive energy compensation when connected. The agencies shall estimate and provide the required reactive energy compensation in its transmission and distribution network to meet its full reactive power requirement.

## **4.7 Equipment at Connection Points**

### **4.7.1 Sub-Station Equipment**

- (a) All EHV sub-station equipments shall comply with Bureau of Indian Standards (BIS)/IEC/ prevailing Code of practice.
- (b) All equipment shall be designed, manufactured and tested and certified in accordance with the quality requirements as per IEC/BIS standards.
- (c) Each connection between the User and the IaSTS shall be controlled by a circuit breaker capable of interrupting, at the connection point, the short circuit current as advised by STU in the specific connection agreement.

### **4.7.2 Fault Clearance Times**

- (a) The primary protection system shall be such that the fault clearance time of all equipments/lines connected to the IaSTS and for a three phase fault (close to the bus-bars) on IaSTS connected to User's equipment, shall not be more than:
  - (i) 100 milli seconds (ms) for 400 kV
  - (ii) 160 milli seconds (ms) for 220 kV & 132 kV
  - (iii) 300 milli seconds (ms) for 66 kV

- (b) Back-up protection shall be provided for required isolation/protection in the event of failure of the primary protection systems to isolate the faulty element within the above fault clearance time requirements. If a Generating Unit is connected directly to the IaSTS, it shall have the capability to withstand disturbances, until clearing of the fault by back - up protection on the IaSTS side.

#### 4.7.3 Protection Planning

- (a) Protection systems are required to be provided by all Users in coordination with the Protection Committee (to be constituted by STU with the approval of HPERC). In case of installation of any device, which necessitates modification/replacement of existing protection relays/scheme in the network, owner of respective part of network shall carry out such modification/replacement.
- (b) Protection systems are required to isolate the faulty equipments and protect the other components of the system against all types of faults, internal/external to them, within the specified fault clearance time with reliability, selectivity and sensitivity.
- (c) All Users connected to the IaSTS shall provide protection systems as specified in the connection agreement.
- (d) Relay setting coordination shall be done at regional level by RPC.

### **4.8 Generating Units and Generating Stations**

- 4.8.1 A Generating unit shall be capable of continuously supplying its normal rated active/reactive output within the system frequency and voltage variation range indicated at section 4.6 above, subject to the design limitations specified by the manufacturer.
- 4.8.2 Generating units must be provided with AVR and protective & safety devices, as set out in connection agreements.
- 4.8.3 Each Generating Unit must be fitted with a turbine speed governor having an overall droop characteristic within the range of 3% to 6%, which shall always be in service.
- 4.8.4 Each generating unit must be capable of instantaneously increasing output by 5% when the frequency falls, limited to 105% MCR. Ramping back to the previous MW level (in case the increased output level cannot be sustained) shall not be faster than 1% per minute.
- 4.8.5 No generating units shall be synchronized with the State Power Grid without the necessary instructions from SLDC.

### **4.9 Reactive Power Compensation**

- 4.9.1 Reactive power compensation and/or other facilities should be provided by the Transmission Licensee/Distribution Licensees, as far as possible close to the load points thereby avoiding the need for exchange of reactive power to/from the IaSTS and to maintain IaSTS voltage within the specified range.



- 4.9.2 Line Reactors may be provided to control temporary over voltage within the limits as set out in connection agreements.
- 4.9.3 The additional reactive compensation to be provided by the User shall be indicated by STU in the connection agreement for implementation.

#### **4.10 Data and Communication Facilities**

- 4.10.1 Reliable and efficient speech and data communication systems shall be provided to facilitate necessary communication and data exchange and supervision/control of the grid by the SLDC, under normal and abnormal conditions. All Users (i.e. all 66kV and above sub-stations and all SSGS) shall provide systems to telemeter power system parameter such as power 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, shall also be established by the concerned User as specified by STU in connection agreement. All Users 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**

- 4.11.1 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. Users shall provide all the requisite recording instruments as specified in the connection agreement according to the agreed time schedule.

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

- 4.12.1 STU/Transmission Licensee and the concerned User shall be responsible for safety as indicated in Site Responsibility Schedules for each connection point.

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

- 4.13.1 A Site responsibility schedule shall be produced by STU/transmission licensee and User detailing the ownership responsibilities of each, before execution of the project or connection including, safety responsibilities.
- 4.13.2 The Site Responsibility Schedule shall be prepared by STU/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.
  - (e) Responsibility for all matters relating to safety of any person at the connection point.

- 4.13.3 All Users 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-stations or lines being connected to IaSTS.
- 4.13.4 The Formats, principles and basic procedure to be used in the preparation of Site Responsibility Schedules shall be formulated by STU and shall be provided to each User seeking connection or modification of existing connection to the IaSTS.

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

- 4.14.1 Single Line Diagram shall be furnished to SLDC and STU for each connection point by the connected Users. These diagrams shall include all HV 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.
- 4.14.2 Whenever, any equipment is proposed to be changed, the concerned User shall intimate the necessary changes to STU and to all concerned. When the changes are implemented, revised single line diagram shall be circulated by the User to SLDC and STU.

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

- 4.15.1 Site Common Drawings shall be prepared by STU for each Connection Point and will include site layout, electrical layout, details of protection and common services drawings. Users shall provide the necessary details to STU.
- 4.15.2 The detailed drawings for the portion of the User and STU/ transmission licensee at each connection point shall be prepared individually and copies of the same shall be made available to the other party.
- 4.15.3 If any change in the drawing is found necessary, the details will be furnished to the other party as soon as possible.

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

- 4.16.1 The Connection Agreement will also indicate any procedure necessary for Site access, Site operational activities and maintenance standards for equipment of the STU/transmission licensee at User's premises and vice versa.
- 4.16.2 The User owning the Connection Site shall provide reasonable access and other required facilities for other Users whose equipments are installed /proposed to be installed at the Connection Site for installation, operation, maintenance, etc.
- 4.16.3 Written procedures and agreements shall be developed between entities to ensure that mandatory access is available to the entity concerned, and at the same time safeguarding the interests of both the entities at the connection site.

#### **4.17 Schedule of Assets of the State Power Grid**

- 4.17.1 STU shall submit annually to the Commission by 30<sup>th</sup> September each year schedule of transmission assets in electronic form, which constitute the State Power Grid as on 31<sup>st</sup> March of that year indicating ownership on which SLDC has operational control and responsibility.

## **SECTION-5**

### **OPERATION PLANNING AND SYSTEM SECURITY CODE**

#### **5.1 Introduction**

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

#### **5.2 Operating Policy**

- 5.2.1 Participant Utilities shall cooperate with each other and adopt Good Utility Practices at all times for satisfactory and beneficial operation of the State Power Grid.
- 5.2.2 Overall operation of the State Power Grid shall be supervised from the State Load Despatch Centre (SLDC). All Users are accordingly required to comply with the directions given by the SLDC.
- 5.2.3 All Users shall comply with this operation planning and system security code, for deriving maximum benefits from the integrated operation and for equitable sharing of obligations.
- 5.2.4 A set of detailed internal operating procedures for State Power Grid shall be developed by SLDC in consultation with Users which shall be consistent with the provisions of HPEGC and IEGC to enable compliance with the requirement of the Grid Code and IEGC.
- 5.2.5 For efficient and secure operation of the State Power Grid the control rooms of the SLDC, power generating plants, sub-stations of 66 kV and above, and any other control centres established by the Transmission Licensee/ Users shall be manned round-the-clock by qualified and adequately trained personnel. Detailed personnel records shall be supplied for evaluation to HPERC by all concerned on an annual basis.

#### **5.3 System Security Aspects**

- 5.3.1 All Users shall endeavor to operate their respective power systems and power generating stations in synchronism with each other at all times, such that the entire system within the State operates as one synchronized mode.
- 5.3.2 No part of the State Power Grid shall be deliberately isolated from the rest of the State Power Grid, except:
- (a) under an emergency, and conditions in which such isolation would prevent a total grid collapse and/or would enable early restoration of power supply;
  - (b) when serious damage to a costly equipment is imminent and such isolation would prevent it;
  - (c) when such isolation is specifically instructed by SLDC under operating conditions.

- 5.3.3 On isolation due to any of the above mentioned causes under section 5.3.2, complete synchronism of grid shall be restored as soon as the conditions again permit it. The restoration process shall be supervised by the SLDC, as per operating procedures separately formulated by it.
- 5.3.4 No important element of the State Power Grid shall be deliberately opened or removed from service at any time, except when specifically instructed by the 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 STU and Users and shall be available with SLDC, STU and the Users. In case of opening/removal of any important element of the State Power Grid under an emergency situation, the same shall be communicated to SLDC at the earliest possible time after the event.
- 5.3.5 Any tripping, whether manual or automatic, of any of the above elements of the State Power Grid shall be precisely intimated by the concerned 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.
- 5.3.6 All generating units, which are synchronized with the grid, irrespective of their ownership, type and size, shall have their governors in normal operation at all times. If any Generating Unit of over fifty (50) MW size is required to be operated without its governor in normal operation, the SLDC shall be immediately informed about the reason and duration of such operation. All governors shall have a droop of between 3% to 6%.
- 5.3.7 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.
- 5.3.8 All Generating Units, 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 five percent (5%) extra load when frequency falls due to a system contingency. The generating units operating at above 100% of their MCR shall be capable of (and shall not be prevented from) going at least up to 105% of their MCR 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 of over fifty (50) MW size not complying with the above requirements shall be kept in operation (synchronized with the State Power Grid) only after obtaining the permission of SLDC.
- 5.3.9 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) percent per minute or as per manufacturer's limits. However, if frequency falls below 49.5 Hz, all partly loaded generating units shall pick up additional load at a faster rate, according to their capability.

- 5.3.10 Except under an emergency, or to prevent an imminent damage to costly equipment, no SSGS shall suddenly reduce its generating unit output by more than fifty (50) MW without prior intimation to and consent of the SLDC, particularly when frequency is falling or is below 49.0Hz. Similarly, no User shall cause a sudden increase in its load by more than fifty (50) MW without prior intimation to and consent of the SLDC.
- 5.3.11 All Generating Units shall normally have their AVRs in operation, with appropriate settings. In particular, if a generating unit of over fifty (50 MW) is required to be operated without its AVR in service, the SLDC shall be intimated immediately about the reason and duration of such operation, and its permission obtained. Power System Stabilizers (PSS) in AVRs of generating units (wherever provided), shall be got properly tuned by the respective generating unit owner as per a plan prepared for the purpose by the STU from time to time. STU will be allowed to carry out checking of PSS and further tuning it, wherever considered necessary.
- 5.3.12 Provision of protections and relay settings shall be coordinated periodically throughout the State Power Grid, as per a plan to be separately finalized by the STU in coordination with all Users and the RPC, wherever required.
- 5.3.13 All Users shall make all possible efforts to ensure that the grid frequency always remains within the 49.0 –50.5 Hz band.
- 5.3.14 Users shall provide automatic under-frequency & df/dt relay based load shedding in their respective systems, wherever applicable to arrest frequency decline that could result in a collapse/disintegration of the grid, as per the plan separately finalised by the SLDC in consultation with STU/RPC, and shall ensure its effective application to prevent cascade tripping of generating units in case of any contingency. All Users shall ensure that the above under frequency and df/dt relay based load shedding/islanding schemes are always functional. However, in case of extreme contingencies, these relays may be temporarily kept out of service with prior consent of SLDC. STU shall carry out periodic inspection of the under frequency relays and produce the report to the SLDC. SLDC shall maintain the record of the under-frequency and/or df/dt relay operation.
- 5.3.15 All Users shall also facilitate identification, installation and commissioning of System Protection Schemes (including inter-tripping and run-back) in the power system to protect against situations such as voltage collapse and cascading. 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.
- 5.3.16 Procedures shall be developed to recover from partial/total collapse of the grid and periodically updated in accordance with the requirements given under section 5.8. These procedures shall be followed by all Users to ensure consistent, reliable and quick restoration.
- 5.3.17 Each User shall provide adequate and reliable communication facility internally and also with SLDC/ other Users 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.

- 5.3.18 All Users shall send information/data including disturbance recorder/sequential event recorder output etc., to SLDC for purpose of analysis of any grid disturbance/event. No User shall block any data/information required by the SLDC for maintaining reliability and security of the grid and for analysis of an event.
- 5.3.19 All Users shall make all possible efforts to ensure that the grid voltage always remains within the following operating range:

**Voltage - (kV rms)**

<b>Nominal</b>	<b>Maximum</b>	<b>Minimum</b>
400 kV	420 kV	360 kV
220 kV	245 kV	200 kV
132 kV	145 kV	120 kV
66 kV	73 kV	60 kV

**5.4 Demand Estimation for Operational Purposes**

5.4.1 Introduction

- (a) This section describes the procedures/responsibilities of the SLDC and Users for demand estimation for both Active Power and Reactive power.
- (b) The demand estimation is to be done on daily/weekly/monthly basis for current year.
- (c) SLDC shall carry out its own demand estimation from historical data and weather forecast data from time to time.
- (d) While the demand estimation for operational purposes is to be done on 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.

5.4.2 Objective

- (a) The objective of this procedure is to enable the SLDC to estimate the demand over a particular period.
- (b) The demand estimates are to enable the SLDC to conduct system studies for operational planning purposes.

5.4.3 Procedure

- (a) SLDC shall develop methodologies/mechanisms for daily/weekly/monthly/yearly demand estimation (MW, MVar and MWh) for operational purposes and set out the responsibilities of Users for the same. It shall also provide for procedures as well as timelines to be followed for exchange of information between the concerned entities for arriving at these estimates.

- (b) The data for the estimation shall also include load shedding, power cuts, etc. SLDC shall also maintain historical database for demand estimation.

## **5.5 Demand Management**

### **5.5.1 Introduction**

This section is concerned with the provisions to be made by SLDC to effect a reduction of demand in the event of insufficient generating capacity, and energy transfers from external interconnections being not available to meet demand, or in the event of breakdown or operating problems (such as frequency, voltage levels or thermal overloads) on any part of the grid.

### **5.5.2 Demand Management Process**

- (a) Users shall endeavour to restrict their net electricity drawal from the grid to within their respective drawal schedules whenever the system frequency is below 49.5 Hz. When the frequency falls below 49.0 Hz, requisite load shedding shall immediately be carried out in the State.
- (b) For effective and automatic demand control under frequency relays shall be installed at the Sub-stations of the STU/Transmission Licensee. The number and size of the discrete blocks, which shall get isolated at a particular frequency, shall be determined on rotational basis in consultation with every Distribution Licensee.
- (c) SLDC shall issue instructions for manual disconnection of loads whenever demand control, for effective grid management, is not possible through under frequency relays, within a reasonable time and there is danger of grid collapse. The Distribution Licensees shall immediately disconnect the quantum of load as instructed by SLDC.
- (d) Further, in case of certain contingencies and/or threat to system security, the SLDC shall direct the distribution licensees; and open access customers to decrease drawl by a certain quantum. Such directions shall immediately be acted upon.
- (e) All Users shall make such arrangements that enable manual demand disconnection to take place, as instructed by the SLDC, under normal and/or contingent conditions.
- (f) The Distribution Licensees shall provide in advance to SLDC, estimates of loads that may be shed on the instructions of SLDC, when required, in discrete blocks, with details of arrangements of such load shedding.
- (g) SLDC shall issue instructions for manual disconnection of loads whenever demand control, for effective grid management, is not possible through under frequency relays, within a reasonable time and there is danger of grid collapse. The Distribution Licensees shall immediately disconnect the quantum of load as instructed by SLDC.
- (h) Planned manual Disconnection shall be implemented by the SLDC whenever there is a shortfall in generation, or constraints in Transmission System, or reduction of imports through external connection or any other



reason, requiring demand control over prolonged period. However, in such cases SLDC shall adopt a rotational load-shedding scheme to ensure equitable treatment to all consumers as far as practicable.

- (i) Emergency Manual Disconnection to deal with unacceptable voltage and frequency levels etc. may be implemented by the SLDC only when there is major loss of generation resulting into mismatch of generation and drawal or there are constraints in the Transmission System. SLDC may also direct manual disconnection in cases of persistent over-drawal from the grid in excess of respective drawl schedule affecting the frequency of the State/Regional grid to fall below 49.0 Hz.
- (j) The measures taken to reduce the Users' drawal from the grid shall not be withdrawn as long as the frequency/voltage remains at a low level, unless specifically permitted by the SLDC.

## **5.6 Periodic Reports**

5.6.1 A weekly report shall be issued by SLDC to all Users and shall cover the performance of the State Power 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 essentially contain the following:

- (a) Frequency profile: Maximum and Minimum frequency recorded daily on 15 minutes time block basis and also average frequency during peak, off-peak and normal period;
- (b) Voltage profile: The voltage profile of 66 KV and above substations;
- (c) Major Generation and Transmission Outages;
- (d) Transmission Constraints; and
- (e) Instances of persistent/significant non-compliance of HPEGC

5.6.2 Other Reports

- (a) The SLDC shall also 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 Users and the User(s) responsible for causing the constraints.
- (b) 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

- (a) This section 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:
  - (i) The State Power Grid
  - (ii) The Inter State Transmission Links
  - (iii) The system of a User

- (b) The operational liaison generally relates to notifying of what is expected to happen or what has happened and does not relate to the reasons of the same.
- (c) The operational liaison function is a mandatory built-in hierarchical function of the SLDC and Users, 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

- (a) Operations and events on the State Power Grid
  - (i) Before any operation is carried out on the State Power Grid, the SLDC will inform each User, whose system may, or will, experience an operational effect, and give details of the operation to be carried out.
  - (ii) Immediately following an event on State Power Grid, the SLDC will inform each User, 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.
- (b) Operations and events on a User's system
  - (i) Before any Operation is carried out on a User's system, the User will inform the SLDC, in case the State Power Grid may, or will, experience an operational effect, and give details of the operation to be carried out.
  - (ii) Immediately following an event on a User's system, the User will inform the SLDC, in case the State Power 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.

### 5.8 Outage Planning

#### 5.8.1 Introduction

- (a) This section sets out the procedure for preparation of outage schedules for the elements of the State Power Grid in a coordinated and optimal manner keeping in view the State power system operating conditions and the balance of generation and demand. (List of elements of grid covered under these stipulations shall be prepared by SLDC in consultation with the STU and all other Users).
- (b) The generation output and transmission system should be adequate after taking into account the outages to achieve the State Power Grid security standards.
- (c) The State's 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.

#### 5.8.2 Objective

- (a) To produce a coordinated generation outage programme for the State Power 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 electricity demand and energy and help operate system within Security Standards.
- (c) To optimise the transmission outages of the elements of the State Power Grid without adversely affecting the grid operation but taking into account the generation outage schedule, outages of distribution system and transmission systems and maintaining system security standards.

### 5.8.3 Scope

This section is applicable to SLDC, STU and all other Users connected to the State Power Grid.

### 5.8.4 Outage Planning Process

- (a) The SLDC shall be responsible for analyzing the outage schedule given by all the Users, preparing a draft annual outage schedule and finalization of the annual outage plan for the following financial year by 15<sup>th</sup> February of each year.
- (b) All Generating Companies and Licensees including STU shall furnish their proposed outage programme in writing for the next financial year by 15<sup>th</sup> of October each year. These shall contain identification of each generating unit/line/ICT, the preferred date of each outage and its duration and where there is flexibility, the earliest start date and latest finishing date.
- (c) The SLDC shall prepare a draft outage plan for the next financial year by 15<sup>th</sup> November each year for the State Power Grid taking into account the proposed outage programme given by the generating companies and licensees, the available resources in an optimal manner and the need to maintain security standards. This will be done after carrying out necessary system studies and, if necessary, the outage plan shall be rescheduled. Adequate balance between generation and load requirement shall be ensured while finalizing outage programme.
- (d) The SLDC shall make available the draft outage plan to the RPC Secretariat in writing for the next financial year by 30<sup>th</sup> November of each year.
- (e) The final outage plan shall be intimated to all the Users for implementation latest by 15<sup>th</sup> February each year after considering the final outage plan for the State prepared by the RPC secretariat.
- (f) SLDC is authorized to defer the planned outage in case of any of the following, taking into account the statutory requirements:
  - (i) Major grid disturbance (total black out in the State)
  - (ii) System isolation
  - (iii) Black out in the User system
  - (iv) Any other event in the system that may have an adverse impact on the system security by the proposed outage.
- (g) Generating Companies and Licensees shall plan their activities as per the latest annual scheduled outage plan finalized by the SLDC.
- (h) All Users shall obtain the final approval from SLDC prior to availing an outage.

## **5.9 Recovery Procedures**

- (a) Detailed plans and procedures for restoration of the State Power Grid under partial/total blackout shall be developed by SLDC in consultation with all Users and RLDC/RPC and shall be reviewed/ updated annually.
- (b) Detailed plans and procedures for restoration after partial/total blackout of each Users' system within the State, will be finalised by the concerned User in coordination with the SLDC. The procedure will be reviewed, confirmed and/or revised once every subsequent year. Mock trial runs of the procedure for different sub-systems shall be carried out by the Users at least once every six months under intimation to the SLDC.
- (c) 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 SLDC and shall remain available with it.
- (d) The SLDC is authorized during the restoration process following a blackout, to operate with reduced security standards for voltage and frequency as necessary in order to achieve the fastest possible recovery of the grid.
- (e) All communication channels required for restoration process shall be used for operational communication only, till grid normally is restored.

## **5.10 Event Information**

### **5.10.1 Introduction**

This section deals with reporting procedures in writing of reportable events in the system to all Users and SLDC.

### **5.10.2 Objective**

The objective of this section 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 section covers all Users, and SLDC.

### **5.10.4 Responsibility**

- (a) The SLDC shall be responsible for reporting events to all Users/RLDC/ RPC Secretariat.
- (b) All Users shall be responsible for collection and reporting of all necessary data to SLDC for monitoring, reporting and event analysis.

### **5.10.5 Reportable Events**

Any of the following events require reporting by SLDC/User:

- (i) Violation of security standards.
- (ii) Grid indiscipline.
- (iii) Non-compliance of SLDC's instructions.

- (iv) System islanding/system split.
- (v) State black out/partial system black out.
- (vi) Protection failure on any element of IaSTS.
- (vii) Power system instability.
- (viii) Tripping of any element of the State Power Grid.

#### 5.10.6 Reporting Procedure

- (a) All reportable incidents occurring in the systems of Users shall be intimated orally to the SLDC as early as possible, say within a period of ten minutes. A report in writing shall also be submitted to SLDC within one hour of the oral communication. If the reporting incident is of major nature, the initial written report may be submitted within two hours duly followed by a comprehensive report within 48 hours of the submission of the initial written report. In other cases, the reporting User shall submit a report within five working days to SLDC.
- (b) If the event is likely to impact the operation of the regional grid the SLDC shall report the event orally and as soon as possible in writing to the RLDC. Wherever it is required to bring the matter to the knowledge of the RPC, SLDC may while making a written report to RLDC request RLDC for the same.
- (c) The following details shall form part of the written report:
  - (i) Time and date of event.
  - (ii) Location.
  - (iii) Plant and/or Equipment directly involved.
  - (iv) Description and cause of event.
  - (v) Antecedent conditions.
  - (vi) Demand and/or Generation (In MW) interrupted and duration of interruption.
  - (vii) All Relevant system data including copies of records of all recording instruments including Disturbance Recorder, Event Logger, DAS etc.
  - (viii) Sequence of trippings with time.
  - (ix) Details of Relay Flags.
  - (x) Remedial measures.
  - (xi) Estimated time of return to service.
  - (xii) Any other relevant information.
  - (xiii) Name and designation of reporting officer.

**CHAPTER - 6**  
**SCHEDULING AND DESPATCH**

**6.1 Introduction**

6.1.1 This Chapter sets out the:

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

**6.2 Objective**

The objective of this Code is to specify the procedures to be adopted for scheduling of despatches from the SSGS and imports from ISGS and BBMB Generating Stations or any other person and net drawals by the beneficiaries on a daily basis and also the modality of the flow of information between the SLDC, RLDC, SSGS and the beneficiaries of the State. The procedure for submission of capability declaration by each SSGS and submission of drawal schedule by each beneficiary is intended to enable SLDC to prepare the despatch schedule for each SSGS and drawal schedule for each beneficiary. It also provides methodology of issuing real time despatch/drawal instructions and rescheduling, if required, to SSGS and beneficiaries along with the commercial arrangement for the deviations from schedules, as well as, mechanism for reactive power pricing. The provisions contained in this chapter are without prejudice to the powers conferred on SLDC under section 32 and 33 of the Electricity Act, 2003.

**6.3 Scope**

This Code will be applicable to SLDC, STU and other Users of the State Power Grid.

**6.4 Demarcation of responsibilities**

6.4.1 SLDC shall have the total responsibility for:

- (a) Scheduling/despatching the generation of all SSGS connected to the State Power Grid,
- (b) Scheduling drawals by beneficiaries from the SSGS, ISGS and BBMB generating stations (within their share in the respective plant's expected capability),
- (c) Regulating the demand of the Distribution Licensees and other beneficiaries in the State,

- (d) Arranging bilateral interchanges,
- (e) the procedure for scheduling and despatch.
- (f) Rescheduling of despatch/drawl schedules as per intimation received from RLDC and on the request of SSGS and / or beneficiaries as well as those resulting from Transmission system failure/constraints, and procedure for scheduling and despatch.
- (g) Implementation of ABT procedures and free governor operation at generating stations wherever possible.

6.4.2 Beneficiaries shall always endeavor to restrict their net drawl from SSGS, ISGS and BBMB generating stations and bilateral trades within their respective drawl schedules and the guidelines of ABT. 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 loadings. Deviations from net drawal schedule shall however be appropriately priced through the Unscheduled Interchange (UI) mechanism, the pricing for which shall be applicable from the date the Commission introduces Intra-State ABT.

Provided that the beneficiaries, shall always endeavor to restrict their net drawal from the State Power Grid to within their respective drawal schedules, whenever the system frequency is below 49.5 Hz. Whenever the frequency falls below 49.0 Hz, SLDC shall direct the beneficiaries to carry out the requisite load shedding for frequency correction and restricting over-drawals, if any. However, it shall be obligatory on the part of the beneficiaries to act on their own and to curtail their demand in the event of frequency falling below 49.5 Hz.

6.4.3 The SLDC/ STU shall regularly carry out the necessary exercises regarding short-term and long-term demand estimation for the State, to enable them to plan in advance as to how they would meet the total demand without overdrawing from the grid.

6.4.4 The SSGS shall be responsible for power generation generally according to the daily schedules advised to them by the SLDC on the basis of the requisitions received from the Distribution Licensees & Open Access Consumers and for proper operation and maintenance of their generating stations, such that these stations achieve the best possible long-term availability and economy.

6.4.5 While the SSGS shall be responsible for power generation generally according to the daily schedules advised to them by the SLDC, however, in line with the flexibility allowed to the beneficiaries, the SSGS may also deviate from the given schedules depending on the plant and system conditions. In particular, they would be allowed/encouraged to generate beyond the given schedule under deficit (low system frequency) conditions. Deviations from the ex-power plant generation schedules shall be appropriately priced through the UI mechanism as and when Intra-State ABT is introduced by the Commission.

Provided that when the frequency is higher than 50.5 Hz, the actual net injection shall not exceed the scheduled despatch for that period. Also, while the frequency is above 50.5 Hz, the SSGS may (at their discretion) back down without waiting for an advice from SLDC to restrict the frequency rise. When the frequency falls below 49.5 Hz, the generation at all SSGS (except those on peaking duty) shall be maximized, at least upto the level, which can be sustained, without waiting for an advice from SLDC.

- 6.4.6 Notwithstanding the above, the SLDC may direct the SSGS/beneficiaries to increase/decrease their generation/ drawals 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 check whether the situation has arisen due to deviations from schedules or due to any power flows pursuant to short-term open access. In case of curtailment of load, provisions of the HPERC (Terms and Conditions for Open Access) Regulations, 2005 as amended by the Commission from time to time shall be followed.
- 6.4.7 For all outages of generation and transmission system, which may have an effect on the State Power Grid, all Users shall cooperate with each other and co-ordinate their actions as per the procedures laid down by SLDC or as per the advice of SLDC in absence of such procedure. In particular, outages, requiring restriction of generation, which a beneficiary could receive (and which may have a commercial implication), shall be planned carefully to achieve the best optimization.
- 6.4.8 The beneficiaries of the SSGS shall enter into separate joint/bilateral agreement(s) to identify their shares in SSGS projects (based on the allocations by the Government of Himachal Pradesh, where applicable), scheduled drawal pattern, tariffs, payment terms etc. A copy of such agreements shall be filed with the SLDC for being considered in scheduling and State energy accounting. Any bilateral agreements between beneficiaries for scheduled interchanges on long-term/short-term basis shall also specify the interchange schedule, which shall be duly filed in advance with the SLDC.
- 6.4.9 All Users are required to abide by the concept of frequency linked load despatch and pricing of deviations from schedule, i.e., unscheduled interchanges as and when Intra State ABT becomes operational within the State as per orders of the Commission. All SSGS shall normally be operated according to the standing frequency linked load despatch guidelines issued by the SLDC to the extent possible, unless otherwise advised by the SLDC.
- 6.4.10 It shall be incumbent upon the SSGS 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 SSGS to explain the situation with necessary backup data.



- 6.4.11 It shall be the responsibility of the STU to install special energy meters on all connection points for recording of actual net MWh interchanges and MVARh drawals. The type of meters to be installed, metering scheme, metering capability, testing and calibration requirements and the scheme for collection and dissemination of metered data are detailed in the enclosed Annexure-2. All concerned entities (in whose premises the special energy meters are installed) shall fully cooperate with the STU/SLDC and extend the necessary assistance by taking weekly meter readings and transmitting them to the SLDC.
- 6.4.12 The SLDC shall be responsible for computation of actual net MWh injection by SSGS and through bilateral trade and actual net drawal of each beneficiary, 15-minute time block wise, based on the above meter readings and for preparation of the State Energy Accounts. All computations carried out by SLDC shall be open to all Users 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.
- 6.4.13 SLDC shall periodically review the actual deviation from the despatch and net drawal schedules being issued, to check whether any of the beneficiaries/SSGS are indulging in unfair gaming or collusion. In case any such practice is detected, the matter shall be reported to the Commission.

## **6.5 Scheduling and Despatch Procedure**

[to be read with HPERC( Terms and Conditions for Determination of Hydro Generation Tariff) Regulations, 2007]

- 6.5.1 Each day, starting from 00.00 hours to 24.00 hours, shall be divided into 96 time blocks of 15 minutes intervals for the purposes of scheduling and despatch and energy accounting.
- 6.5.2 By 9.00 hrs every day, all SSGS shall advise the SLDC, the station wise ex-power plant MW and MWh capability as foreseen for each time block of the next day i.e. from 00.00 hours to 24.00 hours of the following day.
- 6.5.3 The SLDC shall also receive information from RLDC regarding the MW and MWh entitlements for the State from ISGS and BBMB generating stations for each 15 minute time blocks for the next day by 10:00AM.
- 6.5.4 SLDC shall compile the above information, taking into account bilateral exchanges, if any, and apportion it for the next day based on the entitlements of the beneficiaries in the SSGS, ISGS and BBMB generating stations and bilateral exchanges and communicate the same to all the beneficiaries by 11.00 AM.
- 6.5.5 The beneficiaries shall prepare the drawl schedule according to their foreseen load pattern and there own generating capability (if any, from generating plants such as that owned by the beneficiary itself, Captive Plants and NCES based plants connected to their distribution system), and advise the SLDC by 1.00 PM,

their drawal schedule for each of the SSGS, ISGS and BBMB generating stations and long term and short term bilateral trades in which they have shares.

- 6.5.6 SLDC shall compile the drawal schedules received from beneficiaries and convey by 3.00 PM, the drawal schedule for each of ISGS and BBMB generating stations to RLDC and to SSGS in which the beneficiaries have shares, long term bilateral interchanges and approved short-term bilateral interchanges.
- 6.5.7 By 5.00 PM each day, the SLDC shall receive the “net drawal schedule” for the State in MW from RLDC for each 15 minute time block, for the next day.
- 6.5.8 SLDC shall apportion the net drawal schedule for the State received from RLDC among the beneficiaries based on their entitlements as approved by GoHP in the ISGS and BBMB generating stations and bilateral trades. SLDC shall also revise the despatch schedule of each of the SSGS (if necessary) in the light of net drawal schedule communicated by RLDC. SLDC shall convey by 6.00 PM each day, the following:
  - (i) The ex-power plant “despatch schedule” to each of the SSGS in MW for each 15-minute time bloc, for the next day.
  - (ii) The “net drawal schedule” from SSGS, ISGS and BBMB generating stations and bilateral trades to each of the beneficiary in MW for each 15-minute time block, for the next day.
- 6.5.9 While finalizing the drawal and despatch schedules as above, the SLDC shall ensure that the same are operationally reasonable, particularly in terms of ramping up and ramping down rates and ratio between minimum and maximum generation levels. SLDC shall also check that the resulting power flows do not give rise to any transmission constraints. In case of any foreseen generation/transmission constraints, the SLDC shall moderate the schedules to the required extent, under intimation to the concerned beneficiaries/SSGS.
- 6.5.10 The summation of the station-wise ex-power plant generation schedules for all the SSGS, ISGS and BBMB generating stations, along with bilateral exchanges, if any, after deducting the apportioned transmission losses (estimated), shall constitute the beneficiaries net drawal schedule.
- 6.5.11 The beneficiaries, may inform SLDC about any modification/changes to be made in the drawal schedule and bilateral interchanges, if any, to SLDC by 9.00 PM. Similarly, State Sector Generating Companies, may inform SLDC about any modification/changes in the foreseen despatch capabilities, if any, to SLDC by 9.00 PM.
- 6.5.12 The SLDC shall inform any modification/changes to be made in the station wise drawal schedule of ISGS and BBMB generating stations and bilateral interchanges, if any, to RLDC by 10.00 PM.
- 6.5.13 The SLDC shall receive from RLDC the final ‘drawal schedule’ of ISGS and BBMB generating stations alongwith bilateral exchanges of power, if any, by 11.00 PM.

- 6.5.14 The SLDC shall review and revise the despatch schedules of the SSGS and drawal schedules of the beneficiaries in the light of final drawal schedule received from RLDC and convey by 11.30 PM:
- (i) The ex-power plant “despatch schedule” to each of the SSGS in MW for each 15-minute time bloc, for the next day.
  - (ii) The final “net drawal schedule” from ISGS and BBMB generating stations, SSGS and bilateral trades to each beneficiary in MW for each 15-minute time block, for the next day.

- 6.5.15 In case of forced outage of SSGS unit, SLDC shall revise the schedules on the basis of revised declared capability by the SSGS. The revised declared capability and revised schedules shall become effective from the 4<sup>th</sup> time block, counting the time block in which the revision is advised by the SSGS to be the first one.

In case of forced outage of an ISGS and BBMB generating station unit, SLDC shall receive revised schedule from RLDC drawn on the basis of revised declared capability by ISGS and BBMB generating station. The revised declared capability and revised schedules shall become effective from the 4<sup>th</sup> time block, counting the time block in which the revision is advised by the Inter-State/BBMB generating station to be the first one.

- 6.5.16 In the event of bottleneck in evacuation of power due to any constraint, outage, failure or limitation in the Intra-State 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 4<sup>th</sup> time block, counting the time block in which the bottleneck in evacuation of power has taken place to be the first one. During the first, second and third time blocks of such an event, the scheduled generation of the SSGS 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.

In the event of bottleneck in evacuation of power due to any constraint, outage, failure or limitation in the Inter-State Transmission System, necessitating reduction in generation of ISGS and BBMB generating station, the SLDC shall receive revised schedules from RLDC which shall become effective from the 4<sup>th</sup> time block, counting the time block in which the bottleneck in evacuation of power has taken place to be the first one.

- 6.5.17 In case of any grid disturbance, scheduled generation of all the SSGS 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 RLDC/SLDC.
- 6.5.18 Revision of declared capability by the SSGS and drawal requisition by beneficiary (ies) during any time block shall also be permitted based on advance

notice. Revised schedules/declared capability in such cases shall become effective from the 6<sup>th</sup> time block, counting the time block in which the request for revision has been received in the SLDC to be the first one.

6.5.19 Revision of declared capability by the ISGS and BBMB generating stations and requisition by beneficiary (ies) during any time block shall also be permitted on intimation from RLDC. Revised schedules/declared capability in such cases shall become effective from the 6<sup>th</sup> time block, counting the time block in which the request for revision has been revised in the RLDC to be the first one. SLDC shall intimate all the State beneficiaries about such modifications in the drawal/despatch schedules and advise them to effect corresponding change in their drawal schedules.

6.5.20 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 4<sup>th</sup> time block, counting the time block in which the revised schedule is issued by the SLDC to be the first one.

If, at any point of time, the RLDC 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 4<sup>th</sup> time block, counting the time block in which the revised schedule is issued by the RLDC to be the first one. On intimation of such revision by RLDC, SLDC shall intimate all the State beneficiaries about such modifications in the drawal/despatch schedules and advise them to effect corresponding change in their drawal schedules.

6.5.21 To discourage frivolous revisions, the SLDC may, at its sole discretion, refuse to accept schedule/capability changes of less than two (2) percent of the previous schedule/capability.

6.5.22 After the operating day is over at 2400 hours, the schedule finally implemented during the day (taking into account all before-the-fact changes in despatch in 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 SSGS shall also be worked out based on all before-the-fact advice to SLDC.

6.5.23 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.

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

- 6.5.25 A procedure for recording the communication regarding changes to schedules duly taking into account the time factor shall be evolved by SLDC in consultation with STU and Users.
- 6.5.26 SLDC shall assign suitable functions to the ALDCs (established across the State) to help it in discharge of its different functions under section 32 of the Act including scheduling and despatch.
- 6.5.27 While availability declaration by SSGS may have a resolution of one (1) MW and one (1) MWh, all entitlements, requisitions and schedules shall be rounded off to the nearest decimal, to have a resolution of 0.1 MW.

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

6.6.1 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 reactive power compensation/ generation such that they do not draw reactive power from the EHV grid, particularly under low-voltage condition. However, considering the present limitations, this is not being insisted upon. Instead, to discourage reactive power drawals by beneficiaries connected to the State Power Grid, reactive power exchanges amongst beneficiaries shall be priced as follows:

- (i) The Beneficiary pays for reactive power drawal when voltage at the metering point is below 97%
- (ii) The Beneficiary gets paid for reactive power return when voltage is below 97%
- (iii) The Beneficiary gets paid for reactive power drawal when voltage is above 103%
- (iv) The Beneficiary pays for reactive power return when voltage is above 103%

Provided that there shall be no charge/payment for reactive power drawal/return by a Beneficiary on its own line emanating directly from a generating station.

- 6.6.2 The charge/payment for reactive power, shall be applicable with effect from such date and shall be at a nominal paise/kVArh rate as may be specified by the Commission from time to time, and will be between the Beneficiary and the State Reactive Pool Account operated by SLDC for reactive power interchanges.
- 6.6.3 Notwithstanding the above, SLDC may direct a beneficiary to curtail its reactive power drawal/ injection in case the security of grid or safety of any equipment is endangered.
- 6.6.4 In general, the Beneficiaries shall endeavour to minimize the reactive power drawal at an interchange point when the voltage at that point is below 95% of rated, and shall not inject reactive power when the voltage is above 105%. ICT taps at the respective drawal points may be changed to control the reactive power interchange as per a Beneficiary's request to the SLDC, but only at reasonable intervals.

- 6.6.5 Switching in/out of all 400 kV bus and line Reactors throughout the State Power 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.
- 6.6.6 The SSGS 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 reactive power generation/absorption.
- 6.6.7 Reactive power 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 Power Grid. Accordingly, the management/control and commercial handling of the reactive power exchanges on such lines shall be as per following provisions, on case-by-case basis:
- (i) The two concerned Beneficiaries may mutually agree not to have any charge/payment for VAr exchanges between them on an interconnecting line.
  - (ii) 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 on IaSTS. If the agreed scheme requires any additional metering, the same shall be arranged by the concerned Beneficiaries.
  - (iii) 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-3 shall be applied. The per kVArh rate shall be as specified by the Commission for VAr exchanges on IaSTS.
  - (iv) The computation and payments for such VAr exchanges shall be effected as mutually agreed between the two Beneficiaries.

## **Annexure-1**

### **COMPLEMENTARY COMMERCIAL MECHANISMS**

#### **[Refer Section 6.1.1(d)]**

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

1. The beneficiaries shall pay to the respective SSGS, Capacity charges corresponding to plant availability and Energy charges for the scheduled despatch, as per the relevant notifications and orders of HPERC. The respective generating stations shall issue the bills for these charges to each beneficiary on monthly basis.
2. The sum of the above two charges from all beneficiaries shall fully reimburse the SSGS for generation according to the given despatch schedule. In case of a deviation from the despatch schedule, the concerned SSGS shall be additionally paid for excess generation through the UI mechanism. In case of actual generation being below the given despatch schedule, the concerned SSGS shall pay back to the concerned beneficiary through the UI mechanism for the shortfall in generation.
3. The summation of station-wise ex-power plant despatch schedules from each generating station 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 UI mechanism for the excess drawal of energy. In case of underdrawal, the beneficiary shall be paid back through the UI mechanism, for the energy not drawn.
4. When requested by a beneficiary, SLDC shall assist the beneficiary in locating a buyer/seller and arranging a scheduled interchange within or outside 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 User shall be overstressed by such interchange/trade, and (ii) incorporating the agreed interchange/trade in the net interchange schedules for the concerned Beneficiary.
5. State Energy Accounts and the statement of UI charges shall be prepared by the SLDC on a weekly basis and these shall be issued to all the Beneficiaries by Saturday for the seven-day period ending on the previous Sunday mid-night. Payment of UI charges shall have a high priority and the concerned Beneficiaries shall pay the indicated amounts within 10 (ten) days of the statement issue into a State UI pool account operated by the SLDC. The Beneficiaries who have to receive the money on account of UI charges would then be paid out from the State UI pool account, within three (3) working days.
6. The UI charges billed on the State Transmission Utility by RLDC under section 6.1 (d) of IEGC shall be allocated to the beneficiaries based on the State Energy

Account prepared by SLDC within two working days from the receipt of the Weekly Bill. The State Transmission Utility/concerned beneficiary shall settle the bill within seven days from the date of issue of the Bill.

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 Account operated by the SLDC within 10 (ten) days of issue of statement. The Beneficiaries who have to receive the money on account of VAr charges would then be paid out from the State Reactive Pool Account, within three (3) working days. SLDC shall also make/receive payments from the regional reactive account for reactive VARs drawn/supplied for inter/regional transfer of power.
8. If payments against the above UI and VAr charges are delayed by more than two days i.e. beyond twelve (12) days from statement issue, the defaulting beneficiary shall have to pay simple interest @ 0.04% for each day or delay. The interest so collected shall be paid to the beneficiaries who had to receive the amount, payment of which got delayed.
9. The money remaining in the State reactive 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 Power Grid.
10. In case the voltage profile of a State Power Grid improves to an extent that the total pay-out from the regional 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 that week, and if the State reactive account has no balance to meet the deficit, the pay-outs to the beneficiaries shall be proportionately reduced according to the total money available in the above account.
11. All 15-minute energy figures (net scheduled, actually metered and UI) shall be rounded off to the nearest 0.01 MWh.



## Annexure-2

### REQUIREMENT OF SPECIAL ENERGY METERS

1. Special energy meters of a uniform technical specification shall be provided at all connection points and interface point including Generating Stations, Switching Stations, Sub-stations and Cross Boundary Locations, to determine the actual net interchange with the State Power Grid. Each interconnection shall have one main meter and one Standby/check meters so that correct computation of net interchange at all connection points/interface points even when a Main meter, a CT or a VT has a problem.
2. The Special energy meters shall be static type, composite meters, installed circuit-wise, a self contained devices for measurement of active and reactive energy, and certain other parameters as described in the following paragraphs. The meters shall be suitable for being connected directly to voltage transformers (VTs) having rated secondary line-to line voltage of 110 volt, and to current transformers (CTs) having a rated secondary current of 1 A (model-A) or 5A (model-B). The reference frequency shall be 50HZ.
3. The meters shall have a non-volatile memory in which the following shall be automatically stored:
  - (i) Average frequency for each successive 15 minute block, as a two digit code (00 to 99 for frequency from 49.0 to 51.0 Hz).
  - (ii) Net Wh transmittal during each successive 15-minutes block, upto second decimal, with plus/minus sign.
  - (iii) Cumulative Wh transmittal at each midnight, in six digits including one decimal.
  - (iv) Cumulative VARh transmittal for voltage high condition, at each midnight, in six digits including one decimal.
  - (v) Cumulative VARh transmittal for voltage low condition, at each midnight, six digits including one decimal.
  - (vi) Date and time blocks of failure of VT supply on any phase, as a star (\*) mark.
4. The meters shall store all the above listed data in their memories for a period of minimum forty (40) days. The data older than minimum forty (40) days shall get erased automatically. Each meter shall have an optical port on its front for tapping all data stored in its memory using a hand held data collection device.
5. The active energy (Wh) measurement shall be carried out on 3- phase, 4 wire principle, with accuracy as per class 0.2 S of IEC-687/IEC-62053-22. In model – A, the energy shall be computed directly in CT and VT secondary quantities, and indicated in watt-hours. In model-B, the energy display and recording shall be one fifth of the Wh computed in CT and VT secondary quantities.
6. The reactive energy measurement shall also be on 3-phase, 4-wire principle, with accuracy as per class 2 of IEC-62053-23 or better. In model-A, the VAR and VARh computation shall be directly in CT and VT secondary quantities. In model-B, these shall be displayed and recorded as one fifth of those in CT and VT secondary quantities. There shall be two reactive energy registers, one for the

period when average RMS voltage is above 103% and the other for the period the voltage is below 97%.

7. The 15-minute Wh shall have a +ve sign when there is a net Wh export from substation bus bars, and a –ve sign when there is a net Wh import. The integrating (cumulative) registers for Wh and VARh shall move forward when there is Wh/VARh export from substation busbars, and backward when there is an import.
8. The meters shall also display (on demand), by turn, the following parameters:
  - (i) Unique identification number of the meter
  - (ii) Data and Time
  - (iii) Cumulative Wh register reading
  - (iv) Average frequency of the previous 15-minute block
  - (v) Net Wh transmittal in the previous 15-minute block, with +/-sign
  - (vi) Average percentage voltage
  - (vii) Reactive power, with +/-sign
  - (viii) Voltage-high and Voltage-low VARh register reading
9. The three phase line-to- neutral voltages shall be continuously monitored, and in case any of these fall below 70%, the condition shall be suitably indicated and recorded. The meters shall operate with the power drawn from the VT secondary circuits, without the need for any auxiliary power supply. Each meter shall have a built –in calendar and clock, having an accuracy of 30 seconds per month or better.
10. The meters shall be totally sealed and tamper-proof, with no possibility of any adjustment at site, except for a restricted clock correction. The harmonics shall preferably be filtered out while measuring Wh, VAr and Varh, and only fundamental frequency quantities shall be measured/computed.
11. All metering equipment shall be of proven quality, fully type-tested, individually tested and accepted by the STU before despatch from manufacturer's works.
12. On-site functional checking and rough testing of accuracy shall be carried out for all meters once a year by the STU, with standard reference meter of better accuracy class than the meter under test.
13. Full testing for accuracy for every meter shall be carried out by the STU at an accredited laboratory, once every five (5) years.
14. The current and voltage transformers to which the above special energy meters are connected shall have a measurement accuracy class of 0.2 or better. Main and Standby/check meters shall be connected to different sets of CTs and VTs, wherever available.
15. Only functional requirement from regulatory perspective are given in this code. Detailed specifications for the meters, their accessories and testing, and procedures for collecting their weekly readings shall be finalized by the STU.

### Annexure-3

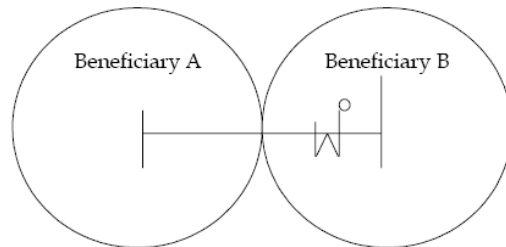
#### Payment for Reactive Energy Exchanges on Lines owned by Beneficiaries

[Refer section 6.6.7(iii)]

##### Case-1:

Interconnecting line owned by Beneficiary-A

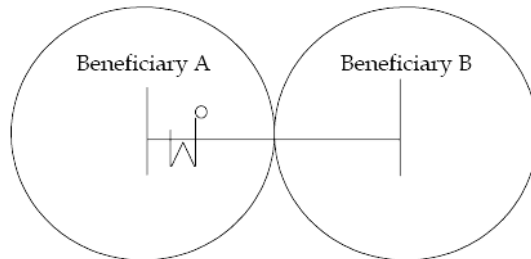
Metering Point: Substation of Beneficiary-B



##### Case-2:

Interconnecting line owned by Beneficiary-B

Metering Point: Substation of Beneficiary –A



Beneficiary-B pays to Beneficiary-A for

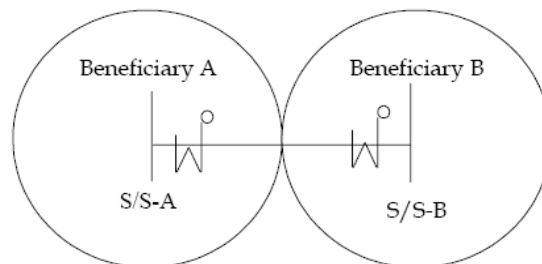
- (i) Net VARh received from Beneficiary-A while voltage is below 97%, and
- (ii) Net VARh supplied to Beneficiary –A while voltage is above 103%

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

##### Case-3:

Interconnecting line is jointly owned by Beneficiary-A and Beneficiary -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:**
- (i) Net VARh and net payment may be positive or negative.
  - (ii) In case X1 is positive and X3 is negative, or vice-versa, there would be no payment under (i) above.
  - (iii) In case X2 is positive and X4 is negative, or vice-versa, there would be no payment under (ii) above.

## **CHAPTER-7**

### **MANAGEMENT OF H.P. ELECTRICITY GRID CODE**

#### **7.1 Management of HPEGC**

- 7.1.1 Himachal Pradesh Electricity Grid Code (HPEGC) has been specified by the Himachal Pradesh Electricity Regulatory Commission (HPERC) as per sub-section (1)(h) of section 86 of the Electricity Act, 2003. Any amendments to HPEGC shall also be specified by HPERC only.
- 7.1.2 To facilitate smooth implementation and periodic review of HPEGC, HPERC may order or authorize formation of Grid Code Review Committee / Committees on receipt of proposal from STU or otherwise.
- 7.1.3 The HPEGC and its amendments shall be finalized and notified adopting the prescribed procedure followed for regulations issued by HPERC. The requests for amendments to / modifications in the HPEGC and for removal of difficulties shall be addressed to Secretary, HPERC, for periodic consideration, consultation and disposal.
- 7.1.4 Any dispute or query regarding interpretation of HPEGC may be addressed to Secretary, HPERC and clarification issued by the HPERC shall be taken as final and binding on all concerned.

**By Orders of the Commission**

**Secretary**