



WEST BENGAL ELECTRICITY REGULATORY COMMISSION



Ref No. WBERC/Regu-71/21-22 (Grid Code)/2603 Dated, Kolkata, the 22nd July, 2022

NOTICE

In reference to Public Notice No WBERC/REGU-71/21-22 (Grid Code)/2467 dated 28th June, 2022 and Corrigendum No WBERC/Regu-71/21-22 (Grid Code)/2491 dated 30 June 2022 of WBERC published in this Newspaper on 29.06.2022 and 01.07.2022 respectively, inviting suggestions/objections/comments on the Draft West Bengal Electricity Regulatory Commission (State Electricity Grid Code) Regulations, 2022, the last date for submission as such has been extended upto **31st August 2022 (3 PM)**

By Order of the Commission

Sd/-

Secretary

Place : Kolkata

Dated : 22nd July 2022



WEST BENGAL ELECTRICITY REGULATORY COMMISSION



Ref No. WBERC/Regu-71/21-22 (Grid Code)/2491

Dated, Kolkata, the 30th June, 2022

CORRIGENDUM

Public Notice No WBERC/Regu-71/21-22 (Grid Code)/2467 dated, 28th June, 2022 of WBERC published in this Newspaper on 29.06.2022 invites suggestions/objections/comments of the Draft West Bengal Electricity Regulatory Commission (State Electricity Grid Code) Regulations, 2022 and in short will be referred as "Grid Code Regulation", the last date should be read as **20th July 2022 (3 PM)** instead of 20th August.2022 (3 PM).

By Order of the Commission

Sd/-

Secretary

Place : Kolkata

Dated : 30th June 2022



WEST BENGAL ELECTRICITY REGULATORY COMMISSION



Ref No. WBERC/Regu-71/21-22 (Grid Code)/²⁴⁶⁷ Dated, Kolkata, the 28th June, 2022

PUBLIC NOTICE

Sub : **Draft West Bengal Electricity Regulatory Commission (State Electricity Grid Code) Regulations, 2022 and in short will be referred as "Grid Code Regulation"**

In exercise of the powers conferred by the sub-section (1) and Clause (zp) of sub-section (2) of section 181 and clause (h) of sub-section (1) of section 86 of the Electricity Act 2003 (36 of 2003) and powers enabling it on that behalf the West Bengal Electricity Regulatory Commission (WBERC), the West Bengal Electricity Regulatory Commission is pleased to notify the draft West Bengal Electricity Regulatory Commission (State Electricity Grid Code) Regulations, 2022.

All stakeholders/interested persons may submit suggestions/objections/comments on the draft to West Bengal Electricity Commission at Plot No : AH/5 (2nd and 4th Floor), Premises No : MAR 16-1111, Action Area-1A, New Down, Kolkata-700163) by **20th August 2022 (3 P.M.)**.

A copy of draft Regulation may be obtained from the office of the Commission between **11.00 hrs to 15.00 hrs** on any working day on payment of usual fees. Interested persons may visit the website of the Commission at www.wberc.gov.in for obtaining the copy of the said draft regulation.

By Order of the Commission

Sd/-

Place : Kolkata

Secretary

Dated : 28th June 2022

WEST BENGAL ELECTRICITY REGULATORY COMMISSION

(DRAFT STATE GRID CODE)

LIST OF ABBREVIATIONS

APM	Administered Price Mechanism
BIS	Bureau of Indian Standards.
CCGT	Combined Cycle Gas Turbine
CEA	Central Electricity Authority
CERC	Central Electricity Regulatory Commission
CPP	Captive Power Plant
CTU	Central Transmission Utility
DAS	Data Acquisition System
DR	Disturbance Recorder
DS	Deviation Settlement
EL	Event Logger
FACTS	Flexible Alternating Current Transmission Systems
FL	Fault Locator
IEC	The International Electro Technical Commission
IEGC	Indian Electricity Grid Code
IPP	Independent Power Producers
ISGS	Inter State Generating Station
ISTS	Inter State Transmission System
InSTS	Intra State Transmission System
MCR	Maximum Continuous Rating
RPC	Regional Power Committee
RGMO	Restricted Governor Mode of Operation
RLDC	Regional Load Despatch Centre
RLNG	Regasified Liquefied Natural Gas
SLD	Single Line Diagram
SLDC	State Load Despatch Centre
SPC	State Power Committee
SPS	State Power System
SSGS	State Sector Generating Station
STS	State Transmission System
STU	State Transmission Utility
SVC	Static VAR Compensator
WBERC	West Bengal Electricity Regulatory Commission
WBEGC	West Bengal Electricity Grid Code
WBREDA	West Bengal Renewable Energy Development Agency

LIST OF ACRONYMS

ACE :	Area Control Error
AEC :	Auxiliary Energy Consumption
AG :	Actual Generation
ALC :	Automatic Load Control
AGC :	Automatic Generation Control
AMR :	Automatic Meter Reading
ATC :	Available Transfer Capability
ATRS :	Automatic Turbine Run-Up Scheme
AVR :	Automatic Voltage Regulator
BUL :	Block Unit Loading
CEA :	Central Electricity Authority
CERC :	Central Electricity Regulatory Commission
CVT :	Capacitive Voltage Transformer
CII :	Critical Information Infrastructure
CISO :	Chief Information Security Officer
COD :	Date of Commercial Operation
CT :	Current Transformer
CTU :	Central Transmission Utility
DAS :	Data Acquisition System
DC :	Declared Capacity
DOP :	Detailed Operating Procedure
DR :	Disturbance Recorder
DSM :	Deviation Settlement Mechanism
DVC :	Damodar Valley Corporation
EL :	Event Logger
EMS :	Energy Management System
ESS :	Energy Storage System
FACTS :	Flexible Alternating Current Transmission System
FGMO :	Free Governor Mode of Operation
FL :	Fault Locator
FRAS :	Fast Response Ancillary Services
FRC :	Frequency Response Characteristics
FRL :	Full Reservoir Level
FRO :	Frequency Response Obligation
FRP :	Frequency Response Performance
FRS :	Frequency Response Service
FOLD :	Forum of Load Despatchers
GD :	Grid Disturbance
GI :	Grid Incident
HVDC :	High Voltage Direct Current
HP :	High Pressure
HVRT :	High Voltage Ride Through

IEEE :	Institute of Electrical and Electronics Engineers
IEGC :	Indian Electricity Grid Code
IEM :	Interface Energy Meters
IMD :	Indian Meteorological Department
ISC :	Information Security Committee
ISGS :	Inter State Generating Station
ISTS :	Inter State Transmission System
LGBR :	Load Generation Balance Report
LP :	Low Pressure
LTA :	Long Term Access
LVRT :	Low Voltage Ride Through
MCR :	Maximum Continuous Rating
MDDL :	Minimum Drawdown Level
MSC :	Mechanically Switched Capacitor Banks
MSR :	Mechanically Switched Reactor Banks
MTOA :	Medium Term Open Access
NER :	North Eastern Region
NCIIPC :	National Critical Information Infrastructure Protection Centre
NLDC :	National Load Despatch Center
NPC :	National Power Committee
PAF :	Plant Availability Factor
PLCC :	Power Line Carrier Communication
PMU :	Phasor Measurement Unit
PPA :	Power Purchase Agreement
POD :	Power Oscillation Damping
PSS :	Power System Stabilizers
PT :	Potential Transformer
QCA :	Qualified Co-ordinating Agency
RAS :	Reserves Ancillary Service
RE :	Renewable Energy
REA :	Regional Energy Account
RGMO :	Restricted Governor Mode of Operation
RLDC :	Regional Load Despatch Center
RPC :	Regional Power Committee
RRAS :	Reserves Regulation Ancillary Services
RSD :	Reserve Shutdown
RTA :	Regional Transmission Account
RTM :	Real Time Market
SCADA :	Supervisory Control and Data Acquisition
SCED :	Security Constrained Economic Despatch
SCUC :	Security Constrained Unit Commitment
SERC :	State Electricity Regulatory Commission
SG :	Scheduled Generation
SHR :	Station Heat Rate

SLD :	Single Line Diagram
SLDC :	State Load Despatch Center
SPS :	System Protection Scheme
STOA :	Short Term Open Access
STU :	State Transmission Utility
SVC :	Static Var Compensators
TCSC :	Thyristor Controlled Series Capacitor
TRM :	Transmission Reliability Margin
TTC :	Total Transfer Capability
UFLS :	Under Frequency Load Shedding
UFR :	Under Frequency Relays
UVLS :	Under Voltage Load Shedding
VSC :	Voltage Source Converter
VDCOL :	Voltage Dependent Current Order Limiter
VWO :	Valve Wide Open

WEST BENGAL ELECTRICITY REGULATORY COMMISSION

(DRAFT STATE GRID CODE)

Notification

No. xx/WBERC

Date: xx.xx.2022

In exercise of the power conferred by sub-section (1) and clause (zp) of sub-section (2) of section 181 read with clause (h) of sub-section (1) of section 86 of the Electricity Act 2003 (36 of 2003) and powers enabling it on that behalf the West Bengal Electricity Regulatory Commission (WBERC) hereby makes the following Regulations, namely:

1. Short title, extent and commencement

- (1) These Regulations may be called the West Bengal Electricity Regulatory Commission (State Electricity Grid Code) Regulations, 2022 or in short WBEGC or State Grid Code.
- (2) These Regulations shall extend to the whole of the State of West Bengal.
- (3) These Regulations shall come into force with effect from the date of their publication in the official gazette and superseding the existing West Bengal Electricity Regulatory Commission (State Electricity Grid Code) Regulations, 2007 along with all amendments.

2. Definitions

2.1. In these Regulations, the following words and expressions shall, unless context otherwise requires, bear the following meaning:

- i) "Act" means The Electricity Act, 2003 (36 of 2003);
- ii) "actual drawal" in a Time Block means electricity drawn by a buyer, as the case may be, measured by the interface meters;
- iii) "actual injection" in a Time Block means electricity generated or supplied by the seller, as the case may be, measured by the Interface meters;
- iv) "Agency / Entity" in relation to various sections of WBEGC refers to SSGS /Licensee/ Open access customers that utilize the InSTS;
- v) "Ancillary Services" means in relation to State Power System (or State Power Grid) operation, the services necessary to support the State Power System or State Power Grid operation in maintaining power quality, reliability and security

of the State Power Grid and includes secondary response, tertiary response, active power support for load following, reactive power support and black start;

- vi) "Area Control Error" or "ACE" means the instantaneous difference between a control area's net actual and scheduled interchange, taking into account the effects of Frequency Bias and correction of meter error. Mathematically, it is equivalent to:

$$\text{ACE} = \text{Deviation } (\Delta P) + (\text{Frequency Bias}) (K) * (\text{Deviation from nominal frequency}) (\Delta f) + \text{meter error};$$

- vii) "Area Load Despatch Centre (ALDC)" means a Load Despatch Centre established by the Distribution Licensees in the State in pursuance to CERC Grid Standards for load dispatch and Control in the area of supply of the Distribution Licensee.
- viii) "Authority" means the same as defined in the Act;
- ix) "Automatic Generation Control" or "AGC" means a mechanism that automatically adjusts the generation of a control area to maintain its interchange schedule plus its share of frequency response;
- x) "Automatic Load Control" or "ALC" means a mechanism that automatically adjusts the load of a control area to maintain its interchange schedule and its effective role of frequency control;
- xi) "Automatic Voltage Regulator (AVR)" means a continuously acting automatic excitation control system to control the voltage of a Generating Unit measured at the generator terminals;
- xii) "Availability" means the same as defined in Tariff Regulations;
- xiii) "Backing down" means reduction of Generation by a Generating Unit on instructions from SLDC under abnormal conditions such as high frequency, low system demand or network constraints;
- xiv) "Balancing and Settlement Code" means West Bengal Electricity Regulatory Commission (Balancing and Settlement Code) Regulations, 2008 or any other regulation of the Commission known as Balancing and Settlement Code in short and in force after repealing of West Bengal Electricity Regulatory Commission (Balancing and Settlement Code) Regulations, 2008;
- xv) "Black Start Procedure" means the procedure necessary to recover from a partial or a total blackout;

- xvi) "beneficiary" means a person who has a share in a State Sector Generating Stations or Bilateral Transactions including open access Users and Energy Storage System in energy storing operation;
- xvii) "Bilateral Transaction" means a transaction for exchange of energy (MWh) between a specified Buyer and a specified Seller, directly or through a trading licensee or discovered at Power Exchange through anonymous bidding, from a specified point of injection to a specified point of drawal for a fixed or varying quantum of power (MW) for any time period during a specified period;
- xviii) "Bulk Consumer" for the purpose of these regulations only means any consumer who avails supply at voltage of 33KV or above;
- xix) "Buyer" means a person, including Distribution Licensee or Open Access Consumer, purchasing electricity through a transaction scheduled in accordance with the regulations applicable for Short-Term Open Access, Medium-Term Open Access and Long-Term Open Access;
- xx) "Captive Generating Plant (CGP)" or "Captive Power Plant (CPP)" means a power plant as defined in the Act read with Rule 3 of Electricity Rules, 2005 notified by the Ministry of Power or any amendment to such rules or any other rules related to qualifying criteria for captive status of a generating plant as prescribed by any appropriate government;
- xxi) "Capacitor" means an electrical gadget provided for generation of reactive power;
- xxii) "CEA Communication Regulations" means Central Electricity Authority (Technical Standards for Communication System in Power System Operation) Regulations, 2020 as amended including any amendment, modification or re-notification thereof under any name whatsoever;
- xxiii) "CEA Distributed Generation Connectivity Regulations" means Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Sources) Regulations, 2013 as amended including any amendment, modification or re-notification thereof under any name whatsoever;
- xxiv) "CEA Grid Connectivity Regulations" means Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 as

amended including any amendment, modification or re-notification thereof under any name whatsoever;

xxv) "CEA Grid Standards" means the Grid Standards as per definition in the Act and specified by the Authority;

xxvi) "CEA Meter Regulations" means Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 as amended including any amendment, modification or re-notification thereof under any name whatsoever;

xxvii) "CEA Plant Safety Regulations" means Central Electricity Authority (Safety Requirements for construction, operation and maintenance of electrical plants and electric lines) Regulations, 2011 as amended including any amendment, modification or re-notification thereof under any name whatsoever;

xxviii) "CEA Supply Safety Regulations" means Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2011 as amended including any amendment, modification or re-notification thereof under any name whatsoever;

xxix) "CEA Technical Standard Regulations" means Central Electricity Authority (Technical standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010

as amended including any amendment, modification or re-notification thereof under any name whatsoever;

xxx) "CERC Grid Code" or "Grid Code" or "Indian Electricity Grid Code" or "IEGC" means the Grid Code as defined in the Act and specified by CERC.

xxxi) "Collective transactions" means a set of transactions discovered in power exchange through anonymous, simultaneous competitive bidding by Buyers and Sellers;

xxxii) "Commission" or "WBERC" means the West Bengal Electricity Regulatory Commission;

xxxiii) "Congestion" means a situation where the demand for transmission capacity exceeds the Available Transfer Capacity;

xxxiv) "Connectivity Agreement" means an Agreement between the STU/licensee and a User setting out the terms relating to a connection to and/or use of the Intra State Transmission System or the Distribution System, as the case may be;

Or

"Connectivity Agreement" means the same as defined in Open Access Regulations;

xxxv) "Connection point" means a point at which any User's plant and/or apparatus connects to the Intra State Transmission System/ Inter State Transmission System/ Distribution System;

xxxvi) "control area" means an electrical system bounded by interconnections (tie lines), metering and telemetry which controls its generation and/or load to maintain its interchange schedule with other control areas and contributes to regulation of frequency as specified;

xxxvii) "Data Acquisition System" or "DAS" means a device provided to record the sequence of operations in time, of the relays/equipment/system parameters at a location;

xxxviii) "Declared Capacity" in relation to a generating station means, the capability to deliver ex-bus electricity in MW declared by such generating station in relation to any time-block of the day as defined in the State Grid Code or whole of the day, duly taking into account the availability of fuel or water, and subject to further qualification in the relevant regulations;

xxxix) "Demand" means the demand of Active Power in MW and Reactive Power in MVAR of electricity, unless specified otherwise;

xl) "Demand Response" means variation in electricity usage by end customers/control area manually or automatically, as per system requirement identified by concerned load despatch centre;

xli) "Despatch Schedule" means the ex-power plant MW/MWH output of a generating station scheduled to be exported/despached to the Grid against different time block within a period;

xliv) "Deviation" means the same as defined in the DSM Regulations.

- xliv) "Deviation and Settlement Mechanism" or "DSM" means the same as defined in DSM Regulations;
- xliv) "df/dt relays" means a relay which operates when the rate of change of system frequency with respect to time goes higher than a specified limit and initiate load-shedding;
- xliv) "distributed generation resource" means the same as defined in CEA Distributed Generation Connectivity Regulations;
- xlvi) "Distribution Licensee" means a person exempted either under section 13, or under proviso 8th of section 14, or a person who has been granted a licence by the Commission under section 14 of the Act including a deemed licensee under first , third, fourth and fifth proviso to the section 14 of the Act to distribute electricity within its area of supply;
- xlvi) "Distribution System" means the distribution system as defined in the Act for any Distribution Licensee or for the State as a whole as the case may be.
- xlvi) "Disturbance Recorder" or "DR" means a device provided to record the behavior of the pre-selected digital and analog values of the system parameters during an Event;
- xlix) "Drawal Schedule" means the ex-power plant MW/MWHR that a beneficiary is scheduled to receive against different time block within a period from a SSGS/ISGS or any other sources including Bilateral Transaction;
- i) "DSM Regulations" means the DSM Regulations framed by the Commission and in force in the concerned time of applicability of such regulations;
- ii) "Embedded Generating Station" means a generating station connected with the Distribution network of any Distribution Licensee is to be considered as embedded generating stations of the Distribution System as well as of the Distribution Licensee;
- iii) "Energy Storage System" or "ESS" means any system or device capable of storing electrical energy in any form using any technology and delivering it back in the form of electrical energy including of any form of pumped storage system;

- liii) "entitlement" means share of a beneficiary (in MW or MVA) in the installed capacity/output capability/ capacity of an SSGS/ISGS;
- liv) "Event" means an unscheduled or unplanned occurrence in the Grid including faults, incidents, breakdowns and forced outages;
- lv) "Event Logger" or "E" means a device provided to record the sequence of operations of the relays and other equipment at a location during occurrence of an Event along with time or period of occurrence of such operations and/or events;
- lvi) "ex-power plant MW/MWH" means net MW/MWH output of a generating station, after deducting auxiliary consumption and transformation losses;
- lvii) "Extra High Voltage" or "EHV" means where the voltage exceeds 33,000 volts under normal conditions, subject, however, to the percentage variation allowed by the Authority;
- lviii) "Fault Locator" or "FL" means a device provided at the end of a transmission line to measure/indicate the distance at which a line fault may have occurred;
- lix) "Final Implemented Schedule" means the same as explained under regulation 54.39 of this State Grid Code;
- lx) "Flexible Alternating Current Transmission Systems" or "FACTS" means a power electronics-based system and other static equipment that provide control of one or more AC Transmission System parameters to enhance controllability and increase power transfer capability;
- lxi) "Force Majeure" means any event or circumstance which is beyond the control of the persons involved which they could not foresee or with a reasonable amount of diligence could not have foreseen or which could not be prevented and which substantially affects the performance by person such being the following including but not limited to:
 - a) Natural phenomena, fire, explosion, earthquake, volcanic eruption, landslide, flood, tsunami, draughts, cyclone, geological surprises, collapsing of structure of any facilities or epidemics;

- b) Act of any Government, domestic or foreign, war declared or undeclared, hostilities, priorities, quarantines, embargoes, terrorist or military action;
- c) Riot or civil commotion;
- d) Grid's failure not attributable to the person;

lxii) "Forced Outage" means an outage of a Generating Unit or a transmission facility due to a fault or other reasons that has not been planned;

lxiii) "gaming" in relation to these Regulations, shall mean an intentional mis-declaration of declared capacity by any Seller or intentional mis-declaration of drawal schedule by any Buyer or any other mean in order to make an undue commercial gain;

Or

"gaming" shall mean the same as defined in DSM Regulations

lxiv) "Generating Company" means the generating company as defined in the Act;

lxv) "Generating Station" means the generating station as defined in the Act;

lxvi) "Generating Unit" means an electrical Generating Unit coupled to a turbine within a Power Station together with all Plant and Apparatus at that Power Station (up to the Connection Point) which relates exclusively to the operation of that turbo- generator;

lxvii) "Good Utility Practices" means any of the practices, methods and acts engaged in or approved by a significant portion of the electric utility industry during the relevant time period which could have been expected to accomplish the desired results at a reasonable cost consistent with good business practices, reliably, safely and with expedition;

lxviii) "Governor Droop" in relation to the operation of the governor of a Generating Unit means 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;

lxix) "grid" means the grid as defined in the Act;

- lxx) "High Voltage" or "HV" means where the voltage exceeds 650 volts but does not exceeding 33,000 volts under normal conditions, subject, however, to the percentage variation allowed under these Regulations or as specified in the Regulations made by the authority as the case may be.
- lxxi) "Infirm Power" means electricity injected into the grid prior to the date of commercial operation of a unit of the generating station;
- lxxii) "IT Act" means The Information Technology Act 2000 as amended including any amendment, modification or re-notification thereof under any name whatsoever;
- lxxiii) "IT Security Rules" means Information Technology (Information Security Practices and Procedures for Protected System) Rules, 2018 as amended including any amendment, modification or re-notification thereof under any name whatsoever;
- lxxiv) "Initial drawal Schedule" means the same as explained in regulation 10.4.19 of this State Grid Code;
- lxxv) "Initial Injection Schedule" means the same as explained in regulation 10.4.19 of this State Grid Code;
- lxxvi) "interface meters" means interface meters as defined by the Central Electricity Authority under the CEA Meter Regulations;
- lxxvii) "Inter State Generating Station" or "ISGS" shall mean generating station whose power is Scheduled by the RLDC;
- lxxviii) "Inter State Transmission System" or "ISTS" means the inter-State transmission system as defined in the Act;
- lxxix) "Intra State Transmission System" or "InSTS" means the intra-State transmission system as defined in the Act for the State;
- lxxx) "Licensee" means a person who has been granted licence by the Commission under section 14 of the Act for distribution and / or transmission of electricity aid also includes ma deemed licensee under first to fifth proviso to section 14 of the

Act or persons exempted under section 13 or proviso 8th of section 14 of the Act in the State;

lxxxi) "Load Despatch Centre" means State Load Despatch Centre or ALDC, as the case may be, responsible for coordinating scheduling in accordance with the provisions of State Grid Code;

lxxxii) "Long-Term Open Access" means the same as defined under Open Access Regulations;

lxxxiii) "Low voltage" or "LV" means where the voltage does not exceed 250 volts under normal conditions, subject, however, to the percentage variation allowed under these Regulations;

lxxxiv) "Maximum Continuous Rating" or "MCR" means the normal rated full load MW output capacity of a Generating Unit which can be sustained on a continuous basis under specified conditions at the generator terminals as guaranteed by the manufacturer at rated parameters or as may be approved by the Commission from time to time in case of derating of such generation unit;

lxxxv) "Medium-term open access" means the same as defined under Open Access Regulations;

lxxxvi) "Medium voltage" or "MV" means where the voltage exceeds 250 volts but not exceeding 650 volts under normal conditions, subject, however, to the percentage variation allowed under these Regulations;

lxxxvii) "Minimum Turndown Level" or "technical minimum operating level" means minimum station loading corresponding to the units on bar upto which a regional entity generating stations is required to be on bar on account of less schedule by its buyers or as per the direction of RLDC as detailed in Chapter 10;

lxxxviii) "National Grid" means the entire inter-connected electric power network of the country;

lxxxix) "MFCA" means Monthly Fuel Cost Adjustment as specified in Tariff Regulations;

xc) "MVCA" means Monthly Variable Cost Adjustment as specified in Tariff Regulations;

- xcii) "Net Drawal Schedule" means the drawal schedule of a beneficiary after deducting the apportioned estimated transmission losses and /or distribution losses as applicable;
- xciii) "NLDC" means the National Load Despatch Centre established under sub-section (1) of Section 26 of the Act.
- xciv) "Open Access Customer" means the same as defined under the Open Access Regulations;
- xcv) "Open Access Regulations" means such regulations specified by the Commission which in short is called as Open Access Regulations and which is/was in force with reference to the time of occurrence of any issue.
- xcvi) "Operation" means a scheduled or planned action relating to the operation of a system;
- xcvii) "Person" means any company or body corporate or association of body of individuals, whether incorporated or not, or artificial juridical person;
- xcviii) "Pool Account" means Regional / State account for payments regarding Deviation Settlement or reactive energy exchanges, as the case may be;
- xcix) "Pooling Station" means the sub-station where pooling of generation of individual wind generators or solar generators is done for interfacing with the next higher voltage level. Provided that where there is no separate pooling station for a wind / solar generator and the generating station is connected through common feeder and terminated at a sub-station of Distribution Licensee /STU, the sub-station of Distribution Licensee / STU shall be considered as the pooling station for such wind/solar generator, as the case may be.
- c) "PPA" means an agreement for purchase or sale of power.
- ci) "Power System" means the same as defined under the Act;
- ci) "Primary Reserve" means the maximum quantum of power which will immediately come into service through governor action of the generator in the event of sudden change in frequency.

- cii) "Qualified Coordinating Agency" or "QCA" means the lead generator or any authorized agency on behalf of wind, solar and hybrid generators including Energy Storage Systems connected to one or more pooling station(s) for coordinating with concerned load despatch centre for scheduling, operational coordination and deviation settlement;
- ciii) "Reactor" means an electrical plant specifically designed to absorb Reactive Power;
- civ) "reference contingency" means the maximum positive power deviation occurring instantaneously between generation and demand and considered for dimensioning of reserves;
- cv) "Regional Power Committee" or "RPC" means the same as defined in the Act;
- cvi) "Regional Energy Account" or "REA" means a regional energy account prepared on monthly basis by the RPC for the billing and settlement of Capacity Charge, Energy Charge and Transmission charges;
- cvi) "Regional Grid" means the entire synchronously connected electric power network of the concerned Region;
- cvi) "Regulation Down Service" means an Ancillary Service that provides capacity that can respond to signals or instruction of the SLSC/ALDC Agency for decrease in generation, within the technical limit and time limit, to respond to changes in system frequency or congestion in the system;
- cix) "Regulation Up Service" means an Ancillary Service that provides capacity that can respond to signals or instruction of the SLDC/ALDC Agency for increase in generation, within the technical limit and time limit to respond to changes in system frequency or congestion in the system;
- cx) "Renewable Source" or "RE source" means the same as defined in RE Regulations;
- cxi) "RE Regulations" means West Bengal Electricity Regulatory Commission (Cogeneration and Generation of Electricity from Renewable Sources of Energy) Regulations, 2013 as amended including any amendment, modification or re-notification thereof under any name whatsoever;

- cxii) "Reserves Regulation Ancillary Services or RRAS" means Ancillary Services that consist of either Regulation Down Service or Regulation Up Service;
- cxiii) "Reserves Regulation Ancillary Services Provider" or "RRAS Provider" means the State Sector Generating Stations eligible to participate in the Reserves Regulation Ancillary Services, for providing Regulation Up or Regulation Down service;
- cxiv) "Scheduled generation" at any time or for a Time Block or any period means schedule of generation in MW or MWh ex-bus given by the concerned Load Despatch Centre;
- cxv) "Scheduled drawal" at any time or for a Time Block or any period time block means schedule of drawal in MW or MWh ex-bus given by the concerned Load Despatch Centre;
- cxvi) "Secondary Reserve" means the maximum quantum of power which can be activated from reserve of Ancillary Services through Automatic Generation Control (AGC) to free the capacity engaged by the primary control. This reserve response shall come into service starting from 30 seconds and shall sustain up to 15 minutes;
- cxvii) "Security Constrained Economic Despatch" or "SCED" means operation of generation facilities to produce energy at lowest cost to reliably serve consumers, recognizing any operational and technical limits of generation and transmission facilities;
- cxviii) "Security Constrained Unity Commitment" or "SCUC" means committing/de-committing generating units while respecting limitations of the transmission system and unit operating characteristics;
- cxix) "Seller" means a person, including a generating station, supplying electricity through a transaction scheduled in accordance with the regulations applicable for Short-Term Open Access, Medium-Term Open Access and Long-Term Open Access;
- cxx) "Share" means percentage share of a beneficiary in an SSGS/ISGS notified by Government of India/ Government of W.B. or as agreed to in the agreement between SSGS/ISGS and its Beneficiaries;

- cxxi) "Short-Term Open Access" means the same as defined under Open Access Regulations;
- cxxii) "Single Line Diagram" or "SLD" means the 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;
- cxxiii) "Site Common Drawing" means the drawings prepared for each Connection Point, which incorporates layout drawings, electrical layout drawings, common protection/control drawings and common service drawings;
- cxxiv) "SLDC Detailed Procedures" same as defined in the Open Access Regulations;
- cxxv) "Spinning Reserve" means part loaded generating capacity with some reserve margin that is synchronized to the system and is ready to provide increased generation at short notice pursuant to despatch instruction or instantaneously in response to a frequency drop;
- cxxvi) "State" means the same as defined in Tariff Regulations;
- cxxvii) "State Load Despatch Centre" or "SLDC" means a Centre established by the State Government of the State under subsection (1) of Section 31 of the Act;
- cxxviii) "State Transmission Utility" or "STU" means the Government Company notified by the State Government of the State under sub-section (1) of Section 39 of the Act;
- cxxix) "State Sector Generating Stations" or "SSGS" shall mean the generating stations connected with the State Power System including generating stations of any generating company or any Licensee;
- cxxx) "State Power Committee" or "SPC" means a Committee constituted under the provisions of regulation 3.8 of this State Grid Code;
- cxxxi) "State Power Grid" means the high voltage (including EHV) backbone system of interconnected transmission lines, sub-stations and generating plants within the State excluding the assets under Inter State Transmission System in the state;

- cxxxii) "State Power System" includes the State Power Grid and ~~entire~~ Distribution System of all Distribution Licensees within the State including Embedded Generating Stations of Distribution System of the Distribution Licensees.
- cxxxiii) "Static VAR Compensator" or "SVC" means an electrical facility designed for the purpose of generating or absorbing Reactive Power;
- cxxxiv) "STU Detailed Procedures" means same as defined in the Open Access Regulations;
- cxxxv) "First Commissioning Synchronization" for the purpose of these regulations means the first synchronization for the purpose of starting of commissioning activities (except test synchronization) of an unit of a generating station prior to Trial Run Operation and thereby injecting electricity in the State Grid with full availability of all load bearing equipment and all systems of the generating station subject to specific deviations as specified in regulation 7.1.2 of these regulations and excluding the instances of Test Synchronization;
- cxxxvi) "Tariff Regulations" means the regulations specified by the Commission under section 61 of the Act;
- cxxxvii) "Technical Minimum Schedule" in respect of generating stations shall have the same meaning as provided in regulation 57.1 of this State Grid Code.
- cxxxviii) "Tertiary Reserve" means the quantum of power which can be activated, in order to restore an adequate secondary reserve. Fast Tertiary Reserve Response shall come into service starting from five (5) minutes and shall sustain upto thirty (30) minutes. Slow Tertiary Reserve Response shall come into service starting from fifteen (15) minutes and shall sustain upto sixty (60) minutes;
- cxxxix) "Test Synchronization" means the commissioning of any unit with its full/ partial installed capacity and thereby injecting the electricity in the State Grid for the purpose of test operation of such unit;
- cxl) "Time Block" means the same as defined in the CERC Grid Code;
- cxli) "Transmission License" means a License granted under Section 14 of the Act to transmit electricity;

- cxlii) "Transmission Licensee" means the Licensee authorized to establish or operate transmission lines in the State by the Commission or the State Government of the State;
- cxliii) "Transmission Planning Criteria" means the policy, standards and guidelines issued by the CEA for the planning and design of the Transmission System;
- cxliv) "Transmission Reliability Margin" or "TRM" means the amount of margin kept in the total transfer capability/capacity necessary to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in system conditions;
- cxlv) "Transmission System" means a transmission lines with associated sub-stations or a group of transmission lines inter-connected together along with associated sub-stations and the term includes equipment associated with transmission lines and sub-stations;
- cxlvi) "Trial Operation" or "Trial Run" shall have the same meaning as provided in Regulation 7.3 of these regulations;
- cxlvii) "Under Frequency Relay" means a relay which operates when the system frequency falls below a specified limit and initiate load-shedding;
- cxlviii) "un-requisitioned surplus" means the reserve capacity in a generating station that has not been requisitioned and is available for despatch and is computed as the difference between the declared capacity of the generation station and its total schedule under long-term, medium-term and short-term transactions, as per the relevant regulations of the Commission.
- cxlix) "User" in relation to various sections of the WBEGC refers to the persons/agencies, including Generating Station, Distribution Licensees, persons availing open access who are connected to and/or using the InSTS, as more particularly identified in each section of WBEGC
- cl) "Virtual Ancillary Entity" means a virtual entity participating in Deviation Settlement Mechanism under the InSTS operation of the State, as operationalized under DSM Regulations and deemed to connected to InSTS or any distribution system of Distribution Licensees, which shall act as the

counterparty for the schedule prepared for despatch of Reserves Regulation Ancillary Services Providers;

1.3 General rule for definition of other words/ phrases:

Words and expressions used and not defined in this State Grid Code but defined in the Act shall have the meanings assigned to them in the said Act. Expressions used herein but not specifically defined in this State Grid Code or in the said Act but defined under any law passed by a competent legislature and applicable to the electricity industry in the State shall have the meaning assigned to them in such law. Subject to the above, expressions used herein but not specifically defined in this State Grid Code or in the Acts or any law passed by a competent legislature shall have the meaning as is generally assigned in the electricity industry.

CHAPTER- 2 GENERAL

2.0 Objective

The West Bengal Electricity Grid Code (WBEGC) lays down the rules, procedures, guidelines and standards to be followed by the various Users and participants in the power system to jointly plan, develop, maintain and operate the power system, in the most efficient, reliable, economic and secure manner while facilitating healthy competition in the generation, transmission, distribution and supply of electricity. It accordingly provides the following:

- a) Relationship between the various Users of the InSTS
- b) Technical Standards, Rules and Procedures (technical, operational, and for information sharing) to be adopted by SLDC, STU and Users connected to the State Power Grid.
- c) Facilitation of the operation, maintenance, development and planning of economic and reliable State Power Grid.
- d) Common basis of operation of the State Power System to facilitate Open Access and trading of electricity.

2.1 Scope of State Grid Code and extent of application

- a) The State Grid Code shall apply to
 - i) The State Load dispatch Centre;
 - ii) Every Transmission Licensee of the State including STU;
 - iii) Every Users who is connected to and/or uses the InSTS;

Provided that the State Grid Code shall not apply to the persons who is not connected to the InSTS and also exempted under section 13 of the Act or under eighth proviso of section 14 of the Act.

- b) STU, SLDC and all Users shall abide by this code to the extent it applies to them.
- c) This State Grid Code shall apply for the Intra-State transmission of electricity.
- d) This State Grid Code shall not affect the obligations of the STU, SLDC and Users as laid down under the Indian Electricity Grid Code notified by CERC, and/or the Electricity Act, 2003 and rules and regulations made there under.
- e) In case of any inconsistency between CEA Grid Standards and WBEGC, the provision of CEA Grid Standards shall prevail.

2.2 Non-compliance

In case of a persistent non-compliance of any of the stipulations of the WBEGC by any User, the matter shall be reported by any User/SLDC to the Commission. WBERC, in turn after due process, may order the defaulting User for compliance, failing which; the WBERC may take appropriate action. SLDC shall maintain appropriate records of such violations. In case of a non-compliance of any of the stipulations of the WBEGC by SLDC, the matter shall be reported to the WBERC by any User.

2.3 Inter-relationship of SGC with Other Regulations:

There are important inter-relationships of this State Grid Code with the CERC Grid Code, DSM Regulations and Balancing and Settlement Code as detailed below

- a) There are ten parameters in this State Grid Code which are required to be kept in alignment with the CERC Grid Code for seamless operational integration between InSTS and ISTS. Those parameters are detailed out in regulation 2.4 of this State Grid Code.
- b) The deviation by actual injection or actual drawal from the scheduled injection and scheduled drawal done under State Grid Code will be regulated under DSM Regulations.
- c) Balancing and Settlement Code will be used for post operational commercial settlement of deviation and different charges as specified in this State Grid Code, DSM Regulations and Tariff Regulations.

2.4 Important parameters used under general nomenclature:

There are ten parameters in this State Grid Code which have been used in general nomenclature under different Chapters and Annexures of this State Grid Code. Such ten parameters are as follows:

- a) The effective Time Block from which a revision of declared schedule or injection schedule or drawal schedule will become effective has been used as general nomenclature of Nth Time Block.
- b) Targeted frequency band of operation as per regulation 8.2.2 of this State Grid Code has been used in general nomenclature of $FREQ_L - FREQ_u$.
- c) The general nomenclature used in relation to primary response from reserve of generating stations as per regulation 8.2.9 are as follows:
 - i) Maximum Time for primary response from primary reserve = T_{max}
 - ii) Minimum Time for primary response from primary reserve = T_{min}

- iii) Maximum steady state frequency deviation allowed = ΔF
- d) The general nomenclature used in relation to secondary response from secondary reserve of generating stations as per regulation 8.2.10 are as follows:
 - i) Time to start responding from secondary reserve through Automatic Generation Control = $T_{\min SRR}$
 - ii) Minimum threshold limit of Area Control Error on exceeding of which response from secondary reserve through AGC will start = ACE_{TL}
 - iii) Time to reach full delivery of secondary reserve through Automatic Generation Control = T_{SRR}
 - iv) Time for which full delivery of secondary reserve is to be sustained = T_{SRRS}

Actual value of such ten parameters are provided in Schedule-A so that any changes on those ten parameters due to change in CERC Grid Code or due to meeting any other need such changes can be quickly given effect in the State Grid Code by substituting the Schedule through an order by the Commission under section 13.3 of this State Grid Code.

2.5 Exemptions

Any exemption from the provisions of WBEGC 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.

2.6 Interpretations

In the interpretation of this Code, unless the context otherwise requires:

- a) words in the singular or plural term, as the case may be, shall also be deemed to include the plural or the singular term, respectively;
- b) the headings are inserted for convenience and may not be taken into account for the purpose of interpretation of this State Grid Code;
- c) references to the statutes, regulations or guidelines shall be construed as including all statutory provisions consolidating, amending or replacing such statutes, regulations or guidelines, as the case may be.

CHAPTER-3: FUNCTIONAL RESPONSIBILITIES OF VARIOUS ORGANIZATIONS

3.0 Introduction

This chapter defines the functions of the various organizations which has an important role in effective implementation and operationalization of this State Grid Code.

3.1 State Load Despatch Centre (SLDC)

3.1.1 The exclusive functions of State Load Despatch Centre has been provided in section 31,32 and 33 of the Act.

3.1.2 For proper discharge of functional responsibility bestowed by the Act on SLDC, SLDC shall also discharge the following functions as per the provisions of this State Grid Code:

- a) System operation and control of the State Power Grid covering contingency analysis and operational planning on real time basis;
- b) Scheduling / re-scheduling of despatch and drawal schedules as per system conditions and request of Generating Stations, Distribution Licensees and any other Open Access Customer;
- c) Ensuring must-run status of hydro sources and/or renewable sources of energy;
- d) Ensuring adequate primary, secondary and tertiary reserves;
- e) Implementing the role assigned to SLDC under DSM Regulations and Balancing and Settlement Code;
- f) In case of inter-state bilateral and collective short-term open access transactions having any Buyer or a Seller as defined under this State Grid Code, SLDC shall accord concurrence or no objection or a prior standing clearance, as the case may be, in accordance with this State Grid Code;
- g) System restoration following grid disturbances;
- h) Specifying metering points and data collection;
- i) Compiling and furnishing data pertaining to system operation;
- j) Operation of State pool account;
- k) SLDC shall ensure to comply all the responsibilities bestowed on it in the Open Access Regulations in the manner specified there including the framing of following documents:
 - i) Detailed Procedure of SLDC;

- ii) Different Standard Connectivity Agreements as specified in the Open Access Regulations;
- l) SLDC being the nodal agency for the Short-Term Open Access in case of intra-state transmission, shall ensure all possible means to provide Short Term Open Access to the Distribution Licensees and the Open Access Customers in accordance with Open Access Regulations.
- m) SLDC shall ensure to display all the information related to Open Access under the Information Dissemination System in a manner as specified in the Open Access Regulations. SLDC shall ensure to display all the information related to provisions made under Information Dissemination System of this State Grid Code in a manner as specified in this State Grid Code. SLDC shall also host the Open Access Regulations, State Grid Code and DSM Regulations in their Web Page.
- n) Any other activities assigned to SLDC under this State Grid Code.

Provided that, notwithstanding anything contrary to the above SLDC shall also discharge any other functions specifically mentioned in any other regulations or orders of the Commission.

3.2 Area Load Despatch Centre (ALDC)

3.2.1 All Distribution Licensees operating in the State shall establish an Area Load Despatch Centre (ALDC) to carry out the operating directives of SLDC and assist SLDC for safe and integrated operation of the concerned distribution network. ALDC must have a 24 x 7 control room with adequate numbers of qualified manpower.

3.2.2 ALDC shall be responsible for:

- a) Supervision and control over the Distribution System including load management from high voltage level to low voltage level;
- b) Responsible for dispatching of electricity from its pool of power at Distribution System – STU periphery or Embedded Generating Station of Distribution System to load of consumer at last mile connectivity or to any other destination as required under non-discriminatory open access;
- c) Data acquisition and transfer to SLDC;
- d) Assist SLDC to ensure safe and integrated operation of the power system of the State;
- e) Assist SLDC for monitoring grid operations;
- f) Carry out the real-time instructions of SLDC for safe and integrated operation of the State Power Grid;
- g) Maintain the drawal and/ or injection schedule as finalized by SLDC;

h) Any other activities assigned to ALDC under this State Grid Code.

3.2.3 ALDC shall comply all the directives given by SLDC and provide all relevant information as and when required by the SLDC.

3.2.4 In addition to whatever is mentioned in regulation 3.2.1 to 3.2.3 of this State Grid Code. ALDC shall also discharge any other functions specifically mentioned in any other regulations or orders of the Commission.

3.3 State Transmission Utility (STU)

3.3.1 The functions of STU have been provided in sub-section (2) of Section 39 of the Act.

3.3.2 In addition to functional responsibility bestowed by section 39 of the Act on STU, STU shall also discharge the following functions for proper discharge of its responsibility under Act as per the provisions of this State Grid Code:

a) in discharge of its functions under the Act and this Code, shall take into consideration recommendations, if any, of the State Government of the State and SLDC subject to investment approval under Tariff Regulations where it is necessary and also prior approval of Commission in case it has impact in tariff.

b) STU shall ensure to comply all the responsibilities bestowed on it in the Open Access Regulations in the manner specified there including the framing of following documents:

i) Detailed Procedure of STU;

ii) Different Standard Connectivity Agreements as specified in the Open Access Regulations and as applicable on STU;

c) STU shall ensure to provide all the information to SLDC as required under the Information Dissemination System in a manner as specified in the Open Access Regulations.

d) Any other activities assigned to STU under this State Grid Code.

Providing that, notwithstanding anything contrary to the above STU shall also discharge any other functions specifically mentioned in any other regulations or orders of the Commission.

3.4 Transmission Licensee

3.4.1 The section 40 of the Act shows the functional responsibilities of the person who has been granted license under section 14 of Act for transmission of Electricity or being authorize for transmission of electricity as a deemed licensee under the Act.

3.4.2 In addition to the responsibility provided in the above section 40 of the Act, every Transmission Licensee shall also comply with 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 CERC Grid Code as applicable to the intra State transmission system.

- 3.4.3 Any other activities assigned to Transmission Licensee under this State Grid Code.

3.5 Generating Company

- 3.5.1 The duties of generating companies has been provided under section 10 of the Act.
- 3.5.2 In addition to the duties provided for a generating company in the Act, any generating company complies with the technical standards relating to connectivity with the grid referred to in clause (b) of section 73 of the Act.
- 3.5.3 Any other activities assigned to generating company under this State Grid Code.

3.6 Distribution Licensee

Any person granted licence under section 14 of Act for distribution of Electricity area or being authorized for distribution of electricity as a deemed licensee under the Act should develop and maintain an efficient, coordinated and economical Distribution System for supplying electricity to the consumers in his area of supply in accordance with the provisions of the Act. Such person shall also have the following duties:

- a.) to provide non-discriminatory 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.

3.7 Exempted Persons Under Section 13 and 8th Proviso of Section 14 of the Act

The detail functional responsibilities of any person exempted under section 13 or 8th proviso of section 14 of the Act is only be detailed out in the notification by State Government for such exemptions. However, any persons exempted under Section 13 and 8th proviso shall be allowed to connect to the State Power System if he through tripartite agreement with the STU and SLDC agree to follow the State Grid Code.

3.8 State Power Committee (SPC)

3.8.1 Head of SLDC shall be the Chairman of the State Power Committee and it shall comprise of the following other members:

- (a) One member from State Transmission Utility;
- (b) One member representing State-owned Generating Stations having installed capacity of 300 MW or above;
- (c) One member from WBREDA;
- (d) One member from each generating company not control by the State Government and having at least one power station of installed capacity of 300MW and more;
- (e) One member from each Transmission Licensee in the State other than the State Transmission Utility;
- (f) One member from each Distribution Licensee in the State;
- (g) One member from each Electricity Trader in the State;
- (h) Member Secretary, senior officer from State Load Dispatch Centre as may be nominated by the Chairman, State Power Committee - Convener
- (i) Such other persons as may be nominated by the Commission.

3.8.2 The Committee shall have a secretariat of its own which will be headed by the Member Secretary of the Committee. Other staff for the secretariat shall be provided by the SLDC.

3.8.3 The Headquarters of the Committee will be located at the Office of Chief Engineer SLDC.

3.8.4 Operationalization of the Committee shall be done in following steps:

- a) The Chairman, State Power Committee, shall invite nominations from various organizations and shall ensure that the nominations referred to in clauses (b) to (i) of Regulation 15.1 are received within thirty (30) days of notification of these Regulations and that the Committee becomes functional within sixty (60) days from the date of notification of these Regulations.
- b) The Committee will frame its own rules of business for the conduct of its meeting and other related matters.
- c) The tenure of the members shall be co-terminus with their association with the respective organization. However, any organization/group may suitably re-nominate some other person for representation in the State Power Committee. In such a case earlier nominated person shall cease to be a member of the State

Power Committee. All organizations shall nominate alternative member to represent at the State Power Committee in absence of the member.

- d) Members nominated by each of the organization shall be persons holding senior position in their respective organization not below the rank of Chief Engineer or equivalent.

3.8.5 The Committee shall assist SLDC in discharging its function in the following areas by providing necessary inputs to formulate the decision of the SLDC or STU in different issues:

- a) State Level operation analysis for improving grid performance;
- b) In facilitating intra-state transfer of power;
- c) In facilitating all functions of planning relating to intra-state transmission system with STU;
- d) In reviewing of progress of crucial transmission projects;
- e) In coordinating planning of maintenance and outage of generating machines of various generating companies of the State on annual basis and also to undertake review of maintenance programme on monthly basis.
- f) In planning and monitoring of outage of Transmission System on monthly basis.
- g) In undertaking operational planning studies including protection studies for stable operation of the grid.
- h) In planning for maintaining proper voltages through review of reactive power compensation requirement and monitoring of installed capacitors.
- i) To evolve consensus on all issues relating to economy and efficiency in the operation of power system in the State.

3.8.6 The Committee may constitute its Sub-committees, Task Forces, Ad hoc Committees and Standing Committees, as envisaged under the State Grid Code or otherwise considered necessary for efficient functioning. Specifically, Protection Sub-Committee is to be constituted. It may also set up, if required, Groups / Committees of eminent experts to advise it on issues of specific nature. The level of the representative to the Sub Committees etc. would depend on the nature of the issue concerned.

3.8.7 A metering Committee and also a Protection Committee shall be constituted under SPC consisting of members from all Users, STU, SLDC and Transmission Licensees to assist the SLDC in resolving all meter and protection related issues or disputes. Chairman of SPC shall nominate one senior officer of SLDC as the chairman of each of such Committee and one officer of SLDC will act as the convener of each of such

Committee. Each Committee shall quarterly review the metering issues and submit report to the SPC.

3.8.8 The decisions of Committee arrived at by consensus regarding operation of the State Power Grid and scheduling and dispatch of electricity will be reviewed by SLDC and final decision will be taken by SLDC according to law by applying prudence and due diligence on the issue subject to directions of the Commission, if any. The Committee shall meet at least once in a quarter and at such other time as may be considered necessary.

3.9 The role & functions of different Users/Organizations as described in this chapter shall be read with the provisions of the Act and different regulations of the Central and the State Electricity Regulatory Commission notified under the Act.

CHAPTER- 4: PLANNING CODE FOR STATE POWER SYSTEM

4.0 Introduction

- (a) In accordance with Section 39(2)(b) of Electricity Act, 2003, the State Transmission Utility (STU) shall discharge all functions of planning and co-ordination relating to Intra-State transmission system in coordination with CTU, State Governments, Generating Companies, Regional Power Committees, CEA, licensees and any other person notified by the State Government in this behalf.
- (b) Requirement for reinforcement / extension / new transmission line may arise for a number of reasons including, but not limited to:
 - i) Development on the system of any User already connected to the Intra State Transmission System;
 - ii) Introduction of a new Connection point between a User's system and the Intra State Transmission System;
 - iii) Need to increase system capacity, to remove operational constraints and to maintain standards of security to accommodate a general increase in the demand;
 - iv) For evacuation of power from generating stations within and outside the State;
 - v) Reactive power compensation;
 - vi) To accommodate Long-Term Open Access requirements;
 - vii) To ensure Transient and steady state stability considerations;
 - viii) To provide reliable and quality power;
 - ix) Smooth flow of power of electricity from a generating station to the load centers;
 - x) To provide non-discriminatory open access to its transmission system for use by Generating Company or Licensee or any other Open Access Customer;
 - xi) The cumulative effects of combination of any of (i) to (x) above.
- (c) The development of the Intra State Transmission System must therefore be planned with sufficient lead-time to allow time for any necessary statutory consents/ right-of-way permission to be obtained and detailed engineering design/construction work to be completed. To achieve this statutory requirement and to meet the burgeoning need of transmission infrastructure a Planning Code is required. For availing the required transmission infrastructure in time,
- (d) Planning Code has specified the following aspects:
 - i) the principles, procedures and criteria to be applied in the planning and development of the InSTS.
 - ii) imposing procedure to promote co-ordination amongst all Users in any proposed development of the InSTS;

- iii) introducing regulatory direction with timelines in materializing information exchange requirement amongst SLDC, STU and Users in the planning and development of the InSTS.

4.1 Objective

The objective of the Planning Code is to set out principles for planning of generation and transmission resources for reliably meeting the projected demand in compliance with specified reliability standards for serving the load with optimum generation mix, and to create framework for integration of environmentally benign technologies for electricity generation. It factors large scale absorption of cleaner energy, including flexible resources, storage systems for energy shift and demand response measures for managing the intermittency and variability of renewable energy sources.

4.2 Load Forecasting

- 4.2.1** The primary responsibility of load forecasting of an area of supply of a Distribution Licensee shall be lied with respective Distribution Licensee. Distribution Licensee 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 31st December to STU along with forecast methodology, assumptions and daily load curve on which the forecasts are based. While making such load forecast the Distribution Licensee shall considered all the demand that may arises in addition to normal growth in demand due to Commission approved schemes that has been undertaken for system strengthening or virgin area electrification but yet not has been commissioned. For load/demand forecasting Distribution Licensee shall consider the demand and sale forecasting methodology used in Tariff Regulation. In case if there are new schemes which is under preparation or in process of approval from Commission the also the additional demand arises out of those schemes shall also be considered in load forecasting. Further, projected load curve shall be moderated taking into account anticipated change in load pattern and magnitude for reasons such as introduction of energy efficiency devices, rooftop solar, solar pumps, electric vehicles and energy shift due to deployment of ESS. The additional demand arises out of each such approved and new schemes shall also show separately to assess the contribution of each factor distinctly. Such load forecast should take into consideration also the demand forecasted in the application for Multi Year Tariff determination. In case of any significant deviation that shall be explained with reasons. To meet such demand Distribution Licensee shall also provide the supply side planning in such load forecasting report showing separately the demand meeting capacity of the existing sources as well as the future sources for which PPA has been already executed. While making supply side planning the Distribution Licensee shall take into consideration the planning criteria that has been adopted in Tariff Regulation for availability of existing and future generators, spinning reserve and cold spinning reserve. In fact, according to such load forecast only annual power purchase planning is to be done by the Distribution Licensee and that shall be the basis for approval of power purchases under Tariff Regulations. STU may ask for any additional information

from the Distribution Licensees regarding load and energy details. These forecasts shall be reviewed annually or whenever major changes are made in the existing system and updated accordingly. While indicating requirements of single consumer with large demand (on MW or higher) the Distribution Licensee shall satisfy itself, as to the degree of certainty of the demand materializing. STU shall apply appropriate diversity factor and satisfy itself regarding probability of materialization of bulk loads of consumers with demands above 1MW in consultation with concerned Distribution Licensee. Distribution Licensees shall also submit the data regarding voltage wise distribution losses to the STU every year by 31st October or the share from international sources.

4.2.2 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 the following:

- (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 generating capacity required after taking into account, the existing capacity, projects under construction, proposed projects, and availability from captive power plants, co- generators, NCES, Long-Term Open Access and also share of the State from Central sector Power Projects both within and outside the State.

4.2.3 In fact, such load forecast will be one of the bases for annual power purchase planning to be done by the Distribution Licensee/STU and that shall be the basis for approval of power purchases under Tariff Regulations after due prudence check by the Commission.

4.3 Supply Side Resource Planning:

4.3.1 Each Distribution Licensee shall ensure demonstrable resource adequacy for supply of power to meet the forecasted demand as per regulation 4.2 for the next five (5) years starting 1st April of the next year. Adequacy statement containing a list of such resources along with associated capacities shall be submitted to the respective STU along with the load forecast report as specified in regulation 4.2.1. Such list shall show the existing sources as well as the future sources for which PPA has been already executed.

4.3.2 While making supply side planning the Distribution Licensee shall take into consideration the planning criteria that has been adopted in Tariff Regulation for availability of existing and future generators, spinning reserve and cold spinning reserve. The generation pattern of last three (3) years from different sources, hydro

generation forecast for next year, expected addition of new generation for the state, must run power Contracted and availability of other contracted power shall be part of the supply side planning. In addition to above, while preparing the Load Generation Balancing Report (LGBR) reserves, transmission losses and auxiliary consumption shall be factored and shown.

4.3.3 While making such supply side resource planning Distribution Licensee shall consider The National Electricity Plan and specially on the following aspects from grid operation perspective;

- a) Generation flexibility, ramping and minimum turndown level and start-stops;
- b) Requirement of energy storage systems and demand response measures;
- c) Generation reserve requirement;
- d) System inertia for grid stability;
- e) Fuel security.

4.3.4 On the basis of its review as per regulation 4.2.2, STU shall finalize the load forecast as well as Supply Side Resource Planning for each Distribution Licensee within two months from the date of submission of load forecast report to STU by such Distribution Licensee. Such forecast shall be shown for each month separately for the year concern.

4.4 Planning of Intra State Transmission System

4.4.1 The STU shall prepare and submit to the Commission a long-term transmission system plan for a time span of five years for expansion and strengthening of the InSTS to meet the future demand. Such plan shall be developed by STU after taking into consideration of the load forecast and supply sources to meet such load as finalized by STU for each Distribution Licensee in accordance with regulation 4.3.4. In preparing the above plan STU should take into consideration the inputs from following resources:

- a) Perspective plan for development of the electricity system as prepared by CEA under section 73 (a) of the EA-2003;
- b) Latest Electric Power Survey of India published by CEA;
- c) CEA Grid Standards;
- d) CEA Grid Connectivity Regulations;
- e) Transmission Plan formulated by CTU under the provisions of CERC Grid Code;
- f) Manual on Transmission Criteria issued by CEA;
- g) National Electricity Plan issued by the Government of India to the extent applicable to the development of Intra-State Transmission System;
- h) Load forecast reports submitted by the Distribution Licensees in the State in pursuance to regulation 4.2 of this State Grid Code;
- i) Any other authentic report recommended by the Government of West Bengal;

- j) Requirement of evacuation system for upcoming generating stations and evacuation of power from Renewable sources;
- k) Plans prepared by CTU in order to evacuation of power as required for State Power System;
- l) On 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.

4.4.2 While finalizing transmission plan for implementation, STU shall

- a) Make validation of adequacy in transmission resources through system study based on simulation of the economic despatch considering grid security under various scenarios based on adequacy statement furnished by Distribution Licensee and demand generation scenario including must run generation;
- b) share the transmission planning alternatives with the Licensees and Users for taking their feedback before finalization of the said plan;
- c) keep provision of adequate generation reserves and demand response for maintaining grid stability;
- d) Make validation of power transfer capacity in term of following:
 - i) Import and export capability for each Distribution Licensee;
 - ii) Import and export capability of Intra State Transmission System with different region through Inter State Transmission System;
 - iii) Adequate power transfer capability across each flow-gate;

4.4.3 The STU shall submit to the Commission the long-term transmission system plan by 31st March every year taking care of the revisions in the electricity load projection and additions in the generation capacity in accordance with regulation 4.4.1 based on the finalized load forecast of each distribution licensee as per regulations 4.3.4.

4.4.4 Based on above mentioned inputs, besides 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.

4.4.5 In case system strengthening is required for Long-Term Open Access as per Open Access Regulations, STU shall carry out system studies to identify system strengthening requirements in harmony with the long-term system planning. In case of Long-Term Open Access applications requiring any strengthening in the Inter State Transmission System to absorb/evacuate power beyond InSTS, the applicant shall also co- ordinate with CTU for integrated planning.

4.4.6 All the Users shall supply the desired planning data to STU by 31st December every year to enable STU to review and revise the long-term transmission system plan.

- 4.4.7** 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.
- 4.4.8** The long-term transmission system Plan shall also indicate the action taken to fulfill the additional requirement and actual progress made on new schemes. It shall also give the status of progress in execution level of the recommendations of long-term transmission system plan in last three years. The planning report and power map shall be made available to any party interested in making investments decision/connection decisions to the InSTS.
- 4.4.9** As voltage management plays an important role in intra-state transmission of energy, special attention shall be accorded to planning of capacitors, reactors, SVC and Flexible Alternating Current Transmission Systems (FACTS), etc.
- 4.4.10** Based on Plan prepared by the STU, other Transmission Licensees/Distribution Licensees shall plan their systems to further evacuate power from the InSTS.
- 4.4.11** The STU shall plan the development of associated Intra State Transmission system after taking into consideration the development of Inter State Transmission System.
- 4.4.12** STU should maintain a historical database based on operational data supplied by SLDC and use advance software tools for validation of the demand forecasting submitted by the Distribution Licensees.
- 4.4.13** STU's planning department shall use load flow, short circuit, transient stability study, relay coordination study, simulation study for contingency and system constraint conditions of InSTS and other techniques for transmission system planning.
- 4.4.14** Based on the inputs compiled and collated by STU for preparation of transmission planning, load generation balance scenarios of each distribution licensee for each month shall be prepared by STU and disseminated in public domain. The finalized long-term transmission system plan of five years shall also be made available in public domain along with mentioning of existing infrastructure, infrastructure under construction and infrastructure under plan separately.

4.5 Planning Criterion for InSTS

- 4.5.1** The planning criteria are based on the security philosophy on which the InSTS has been planned. The security philosophy shall be as per the transmission planning criteria and other guidelines as given by CEA. The Intra State Transmission System 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:

- Outage of a 132 kV D/C line (except for radial lines) or,
- Outage of a 220 kV D/C line (except for radial lines) or,
- Outage of a 400 kV S/C line (except for radial lines) or,
- Outage of single Interconnecting Transformer or,
- Outage of one pole of HVDC Bipole line, or one pole of HVDC back-to-back station or,
- Outage of S/c line.

Provided that the above contingencies shall be considered assuming a pre-contingency system depletion (Planned outage) of another 220 kV D/C line or 400 kV S/C line in another corridor and not emanating from the same substation.

4.5.2 All the Generating Units may operate within their reactive capability curves and the network voltage profile shall also be maintained within voltage limits specified.

4.5.3 The system shall be designed to maintain synchronism and system integrity under the following disturbances:

- a) Outage of one of the largest sizes generating unit. For this the generating companies should get clearance from STU regarding the choice of unit size if the capacity of unit exceeds 500 MW.
- b) A single line to ground fault on a 400 KV line, single pole opening of the faulted phase (5 cycles) with unsuccessful reclosure (dead time 1 sec) followed by three pole opening (5 cycles) of the faulted line.
- c) A permanent three phase fault with duration of 8 cycles in 220 KV and 132 KV systems assuming three poles opening.

4.5.4 The Intra State Transmission System shall be capable of withstanding the loss of most severe single system in feed without loss of stability.

4.5.5 Any one of these events defined above shall not cause:

- a) Loss of supply
- b) Prolonged operation of the system frequency below and above specified limits.
- c) Unacceptable high or low voltage
- d) System instability
- e) Unacceptable overloading of InSTS elements.

4.5.6 In all substations (66kV and above), at least two transformers shall be provided and the transmission capacity of any single sub-station for meeting loads at different voltage levels shall not exceeds the MVA capacity mentioned under CEA Technical Standard Regulations.

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

- 4.5.8 STU shall carry out planning studies for Reactive Power compensation of InSTS including reactive power compensation requirement at the SSGS's Switchyard.
- 4.5.9 Suitable system protection scheme may be planned by STU either for enhancing transfer capability or to take care of contingencies beyond that indicated in regulation 24.1 above.
- 4.5.10 At the end of each year, the projected load forecast as per regulation 4.3.4 shall be compared with the actual load of the Distribution Licensee. In case of incidents of variation exceeding $\pm 5\%$, analysis shall be carried out by the ALDC indicating reasons. The analysis shall be submitted to the SLDC. SLDC shall review such report and give a report along with the report of the ALDC to the Commission and also STU. The learning inputs from such analytical report shall also be considered as planning criteria for load forecast as well as planning for Intra State Transmission System.

4.6 Distribution planning:

- 4.6.1 The Distribution System shall be developed to meet the load demand of all existing consumers and intending consumers seeking connection for supply including programme of intensification and green field area electrification. The Distribution System is to be planned based on load forecast and its spatial distribution. Wherever necessary distribution licensees shall consider the National Electricity Plan prepared by CEA in developing their system. Power flow studies shall be carried out wherever necessary. The perspective plan as per Tariff Regulations shall be evolved for achieving target levels in aspects like reduction of losses by proper choice of the length and size of Low Tension (LT) lines, improvement of power factor, voltage control, etc.
- 4.6.2 Separate High Tension (HT) overhead / underground lines are to be planned to cater to discrete load blocks to facilitate load management during emergency operations. Use of sectionalizers or other devices to reduce interruption is to be progressively introduced. Use of modern technology shall be judiciously introduced with an aim to improve the performance of the network as well as reduce the system loss.
- 4.6.3 The Distribution System shall have alternative feeding arrangements for high load density areas and for essential services wherever possible.
- 4.6.4 In addition to catering to the active power demand, reactive power components of power requirement should be studied and adequate VAR compensation are to be installed by Distribution Licensees at different voltage levels to improve power factor and reduction of losses. The Distribution Licensees in their supply conditions to consumers shall include installation of reactive compensation at load end depending on the type of load used.
- 4.6.5 Voltage in the distribution system shall be controlled and maintained at statutory levels. Voltages at the consumer terminals shall be maintained as specified below:

- a) For LT / LV the percentage variation by not more than 6%;
- b) For MT / MV the percentage variation by not more than 6%;
- c) For HT / HV the percentage variation by not more than 6% on the higher side or not more than 9% on the lower side.

4.6.6 The level of harmonics generated by consumer's equipment is to be controlled as per the limits specified in the CEA Grid Connectivity Regulations;

4.6.7 Voltage flickers caused by consumers' loads shall have to be controlled within the permissible limits as per CEA Grid Standards.

4.6.8 Appropriate metering facilities shall be installed with all lines, transformers and consumers as per CEA Meter Regulations;

4.7 Planning Data

4.7.1 To enable the STU to discharge its responsibilities to conduct system studies and prepare long term transmission system plan based on load forecast data as submitted under regulation 22.1 of this State Grid Code. Users shall furnish the necessary data related to the transmission capacity and generation availability to the STU. All Users including Distribution Licensee shall provide the required planning data/information in the formats as may be devised by STU.

4.7.2 STU shall supply the data as may be required by the Users for the coordinated planning, design and operation of their plants and systems with the Transmission System.

4.8 Implementation of Transmission and Distribution Plan

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

4.8.2 The actual program of implementation of High Voltage distribution lines, Inter-connecting Transformers, reactors/capacitors and other related elements of Distribution System will be determined by Distribution Licensee in consultation with the concerned User. The completion of these works, in the required time frame, shall be ensured by Distribution Licensee. Regular updates of such project work will be shared with STU.

CHAPTER-5: CONNECTION CONDITIONS

5.0 Introduction

The Connectivity Conditions Code specify the minimum technical and design criteria that shall be complied with by STU/Transmission Licensee and all Users connected to or seeking connection to the Intra State Transmission System. 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.

5.1 Objective

The Connection Conditions are designed to ensure following:

- a) Safe operation, integrity and reliability of the grid;
- b) The basic rules and regulations for connections are complied with and all Users are treated in a non-discriminatory manner;
- c) Any new or modified connections, when established, shall neither impose any adverse effect on existing Users nor shall new connection suffer adversely due to existing Users;
- d) To specify how the issues related to the ownership and responsibility for all the equipment for every site, where a connection is made, is to be covered through Site Responsibility Schedule;
- e) Any person seeking a new connection to the grid or any modification in the existing connectivity is required to be aware, in advance of the procedure for connectivity to InSTS or the modification of the exiting connectivity, as the case may be. The person shall be also kept aware also the standards and conditions his system has to meet for being integrated into the gird through the said connectivity.

5.2 Technical and Safety Standard

The applicable technical standards and safety stand to be followed during construction as well as for operation and maintenance while providing connectivity are as follows:

- a) CEA Grid Connectivity Regulations;
- b) CEA Distributed Generation Connectivity Regulations;
- c) CEA Technical Standard Regulations;
- d) CEA Grid Standards;
- e) CEA Plant Safety Regulations;
- f) CEA Supply Safety Regulations;
- g) CEA Communication Regulations
- h) CEA Meter Regulations

5.3 Procedure for connection

5.3.1 Prior to a being connected to the InSTS, User shall ensure that all the necessary conditions outlined in the WBEGC in addition to mutually agreed requirements, have been complied by it. Any User seeking to establish new or modified arrangements of connection to or use of assets of the Intra State transmission system shall submit an application on standard format to the State Transmission Utility (STU) along with the following details:

- a) Report stating the purpose of the proposed connection and/or modification, Transmission Licensee in whose network the connection is proposed, connection site, description of apparatus to be connected or modification to the apparatus already connected and Beneficiaries of the proposed connection.
- b) Undertaking that the prospective installation shall comply with the provisions of State Grid Code and regulations referred under regulation 5.2 of these regulations.
- c) Construction Schedule and target completion date.
- d) For special loads like arc furnaces, rolling mills etc., Real and Reactive Power values of the Load with time and harmonic level.
- e) All prospective Users shall be required to pay to the STU all charges as specified in connectivity procedure prepared by STU under STU Detailed Procedure. and subsequently approved by WBERC for the purpose of conducting the initial interconnection studies, additional study as well as for processing the application.

5.3.2 On receipt of an application for new connection/ modification of existing connection, complete in all respect, the Transmission Licensee shall forward a copy of the application to the SLDC and STU (in case User is intending to be connected to the network of any Transmission Licensee other than STU).

5.3.3 The Transmission Licensee / STU shall, within 30 days, from the receipt of an application under regulation 34.1 and after considering all suggestions and comments received from SLDC and STU as mentioned in regulation 34.2 of these Regulations, shall make a formal offer to the User.

Provided that Transmission Licensee / STU shall mandatorily carry out power system study as considered appropriate before allowing any new connection or modification of existing connection.

5.3.4 The formal offer by the STU / Transmission Licensee shall at least specify the following issues:

- a) voltage level at which the applicant is offered to be connected;
- b) all details of the requirement and procedure for connection to the InSTS;

- c) a draft Connection Agreement along with all such information as may be necessary.
 - d) any works required for the extension or reinforcement of existing Transmission System and/or Supply System as necessitated by the applicant's proposal.
 - e) The estimated time schedule for completion of works taking into account the time required to obtain consents, approvals, and permissions or any other requirements as per the provisions of this State Grid Code, Electricity Act 2003 and rules and regulations made thereunder and any other statutory clearances like right of way under any other act, wherever necessary.
- 5.3.5** 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 this State Grid Code shall provide necessary assistance, supporting information or evidence. The User shall ensure attendance by such witnesses as the STU/Transmission Licensee may reasonably request.
- 5.3.6** In the event of User requesting for any specific information / study / data from STU / Transmission Licensee for the purposes of grid connectivity, the STU / Transmission Licensee shall make the same available to the User.
- 5.3.7** 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.
- 5.3.8** If the nature of complexity of the proposed development is such that the prescribed time limit for making the offer is not considered adequate, the STU/Transmission Licensee shall make a preliminary offer within the specified time limit indicating the extent of further time required for more detailed analysis of the issues.
- a) On receipt of the preliminary offer, the User shall indicate whether Licensee should proceed further to make a final offer within the extended time limit that is to mentioned clearly by STU/Transmission Licensee which shall not be more than 90 days from the date of consent of the User to proceed or the date of submission Planning Data as per(b), whichever is later.
 - b) STU/Transmission Licensee may require the User to furnish some or all of the Planning Data at this stage i.e. in advance of the normal time limit.
- 5.3.9** The Transmission Licensee shall make a revised offer, upon request by a User, if necessitated by changes in data furnished earlier by the User.
- 5.3.10** All offers (other than the preliminary offers) including revised offers shall remain valid for 120 (one hundred and twenty) days from the date of issue of the offer.

- 5.3.11** The User shall furnish the relevant Planning Data to the STU/ Transmission Licensee within thirty days of acceptances of an offer or such longer period as the STU/Transmission Licensee may agree in a particular case.
- 5.3.12** Upon compliance of required conditions, STU shall notify the concerned User that it can be connected to the InSTS.
- 5.3.13** The User and the STU / Transmission Licensee in whose system the connection is being sought shall finalize a Connection Agreement on acceptance of the offer by the User. STU/Transmission Licensee shall forward a copy of the connection agreement entered into with the User to the STU and SLDC.
- 5.3.14** In the event of an offer becoming invalid or rejected by an applicant, STU/Transmission Licensee shall not be required to consider any further application from the same User within twelve months from the date of the offer letter unless the new application is substantially different from the original application with regard to system changes.
- 5.3.15** STU/Transmission Licensee may reject an application for connection to /or use of Transmission System on the following conditions.
- a) If such proposed connection is likely to cause breach of any of the provisions of transmission licence /WBEGC/ CERC Grid Code/ CEA 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/Transmission licensee is bound, or
 - b) If the applicant fails to give the undertakings as per clause (b) of regulation 5.3.1 of this State Grid Code.
- 5.3.16** In the event of any dispute with regard to rejection of application by the STU/Transmission Licensee, the User/Transmission Licensee may approach the Commission.
- 5.3.17** STU shall prepare a detailed connectivity procedure including of all Forms, rates and charges, etc. under STU Detailed Procedure.

5.4 Connection Agreements

- 5.4.1** All Users connected to or seeking connection to the InSTS shall enter into a connection agreement with the STU/Transmission Licensee in line with Standard Connectivity Agreement as applicable for the User under Open Access Regulations or the standard agreement of the Distribution Licensee applicable on a consumer who is not availing the open access. 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 STU's recommendation/comments. The cost of modification, if any, shall be borne by the concerned User.

5.4.2 Such Standard Connectivity Agreement shall include (but not limited to), as appropriate within its terms and conditions, the following:

- a) A condition requiring both parties to comply with the provisions of the WBEGC;
- b) Details of connection, technical requirements;
- c) Details of any capital expenditure arising from necessary reinforcement of extension of the system, data communication, RTU etc. and demarcation of the same between the concerned parties;
- d) the details of commercial arrangements regarding payment of transmission charges, payment of charges towards construction of bays at STU sub-stations, payment of O&M charges for dedicated transmission line, if any, and arrangement of capital expenditure, if any, like expenditure as agreed under any agreement in line with Standard Additional Transmission Asset Creation Agreement or Standard Additional Wheeling Asset Creation Agreement as specified in Open Access Regulations;
- e) Details of equipment and plant to be connected;
- f) The metering arrangement;
- g) Protection System and telemetry;
- h) System Recording Instrument;
- i) Data and Communication Facilities;
- j) Any other facility /information feel appropriate by STU;
- k) Reactive Power Compensation arrangement;
- l) Procedure necessary for Site access, Site operational activities and maintenance standards for equipment of the STU/ Transmission Licensee at STU/User's premises and vice versa;
- m) Standards of site operational activities and maintenance of equipment of the STU/ Transmission Licensee at STU/User's premises and vice versa;
- n) A 'Site Responsibility Schedule' detailing the division of responsibility at Connection Sites in relation to ownership, control, operation and maintenance of plant & apparatus, safety arrangement of persons and equipment;

5.5 Connection Point

Different requirement of connection point of the InSTS with different constituents are as follows:

- a) For Generating Station, the switchyard voltage of connection point may be 400 / 220 / 132 KV or as agreed with the Licensee with whose network the connection is to be effected. Unless specifically agreed with the Licensee with whose network the connection to be effected, the connection point shall be the outgoing feeder gantry of generating station switchyard. All the terminals, communication, protection and metering equipment owned by the generating company within the perimeter of its site shall be maintained by it. From the outgoing feeder gantry onwards, all electrical equipment shall be maintained by the Licensee or the owner of the dedicated transmission lines with whose network the connection is to be effected.
- b) For Distribution Licensee, the voltage of connection point may be as agreed with Generating Station or the Licensee with whose network the connection is to be effected but the same cannot be below 6 KV. The connection point shall be the outgoing feeder gantry of Generating Station switchyard or the sub-station in case of the Licensee. However, in case of connection with dedicated transmission lines, it may be the point as agreed by the Distribution Licensee and the owner of the dedicated transmission line. All the terminal, communication, protection and metering equipment within the premises of the sub-station shall be maintained by owner of the substation. From the outgoing feeder gantry onwards, all electrical equipment shall be maintained by the respective Distribution Licensee.
- c) For the InSTS of the regional grid, the connection point, protection scheme, metering scheme, metering point and the voltage shall be in accordance with the mutual agreement between owners of two connecting systems, until and unless they are specified by CEA in its Regulations under the Act.
- d) For CPPs and EHT/HT Consumers, voltage may be 400/220/132/66/33 KV or as agreed with Licensee with whose network the connection is to be effected. Sub-stations, owned by CPPs and EHT / HT Consumers, shall be maintained by them or as mentioned in the connection agreement. The connection point shall be the feeder gantry on their premises in case of EHT / HT consumers and at Licensee's gantry in case of CPPs.

5.6 InSTS Parameter Variations

- 5.6.1** General: Within the power system, instantaneous values of system frequency and voltage are subject to variation from their nominal value. All Users shall ensure that Plant and Apparatus requiring service from/to the InSTS is of such design and construction that satisfactory operation is not hampered by such variation.

5.6.2 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.

5.6.3 Voltage Variations:

- a) The variation of voltage in EHV may not be more than the voltage range specified in regulations/standards framed by the Authority.
- b) The variation of voltage in HV, MV & LV may not be more than the voltage range specified in regulation 4.6.5 of these Regulations.
- c) The agencies engaged in sub-transmission and distribution shall not depend upon the InSTS 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.

5.7 Equipment at Connection Points

5.7.1 Sub-station Equipment

- a) All EHV sub-station equipment 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 InSTS shall conform to Connection Standard mentioned under regulations 5.2 of these Regulations.

5.7.2 Fault Clearance Times

- (a) The primary protection system shall be such that the fault clearance time of all equipment/lines connected to the InSTS whether of Users or of STU / Transmission Licensee, shall not be more than:
 - i) 100 milli seconds (ms) for 800 kV & 400 kV;
 - ii) 160 milli seconds (ms) for 220 kV & 132 kV;
 - iii) 400 milli seconds (2nd Zone) for 132kV and above;
 - iv) 200 milli seconds for 33 kV.

- (b) Back-up protection shall be provided for system at 132 kV and above 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. The protection system shall comply with the provisions mentioned under CEA Grid Connectivity Regulations;

5.7.3 Protection Planning

- a) Protection systems are required to be provided by all Users in coordination with STU.
- b) 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.
- c) Protection systems are required to isolate the faulty equipment 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.
- d) All Users connected to the InSTS shall provide protection systems as specified in the connection agreement.
- e) Relay setting co-ordination at the state level shall be done by STU in consultation with SLDC after taking view of Protection Sub-Committee under SPC.
- f) Relay setting coordination shall be done at regional level by RPC. The RPCs would also identify critical locations where bus bar protection needs to be provided, if not available.

5.7.4 Generating Units and Power Stations:

- i) A Generating Unit shall be capable of continuously supplying its normal rated active/reactive output within the system frequency and voltage variation range specified in the CEA Grid Standards, subject to the design limitations specified by the manufacturer.
- ii) All Generating Units and associated electrical equipment connected to the State Power Grid shall be provided with adequate protection and safety in line with connectivity standards and safety standards as per relevant regulations as specified in Regulations 5.2 of these Regulations and as detailed out in connectivity agreement so that the State Power Grid does not suffer due to any disturbance originating from the generating unit. For connectivity of generator with 33 KV and above the applicable regulation of CEA is CEA Grid Connectivity Regulations. For distributed generation resource CEA Distributed Generation Connectivity Regulations will be applicable for connectivity with the power system;

5.7.5 Transmission Line Requirements:

Every EHT line taking off from a generating station or a sub-station shall have suitable protection schemes in line with the relevant regulations as specified in regulations 5.2 of this State Grid Code. STU shall in the connection agreement specify the details and also notify the Users of any changes in its policy on protection from time to time.

5.7.6 Distribution Line Requirements:

All 33KV and 11/6 kV lines at connection points shall be provided with a minimum of over current and earth fault protection with or without directional features as given below:

- (a) Single Radial Feeders: Non-directional time lag over current and earth fault relay with suitable settings to obtain discrimination between adjacent stations;
- (b) Parallel Feeders/ Ring Feeders: Directional time lag over current and earth fault relays;
- (c) Long Feeders / Transformer Feeders: For long feeders or transformer feeders, the relays should incorporate a high set instantaneous element or highest definite time in addition to BU protection.

5.7.7 The consumers connected to Distribution System or Transmission System shall comply with the connection and safety standards and shall not energise Transmission System or Distribution System by injecting supply from his generators or any other source either by controls or manually unless specifically requested / permitted by the Transmission Licensee or Distribution Licensee.

5.8 Metering:

5.8.1 The agency who has to provide, operate and maintain the metering arrangements at various locations shall be specified by the STU in the connection agreement in accordance with the CEA Meter Regulations and subsequent amendments made by Central Electricity Authority under sub-section 1 of section 55 of the Electricity Act, 2003.

5.8.2 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 is possible even when a Main meter, a CT or a VT has a problem. Such meter shall be installed in a manner as specified in CEA Meter Regulations. The main meter and the check meter shall be connected to same core of CTs and VTs. The standby meter should be connected to CT and VT, other than those used for main and check meter.

5.8.3 Special energy meters termed as "Interface meters" shall be provided at all the point of interconnection between electrical systems of generating company, Distribution

Licensee, STU and consumers directly connected to the Intra State Transmission System who have to be covered under ABT and/or have been permitted open access under relevant regulations of the Appropriate Commission.

- 5.8.4 Commercial meters are to be used for accounting and billing of electricity supplied to the consumers / Beneficiaries of generating stations but excluding those consumers/ Beneficiaries covered under Interface Meters.
- 5.8.5 Energy Accounting and Audit Meters are to be installed at power stations and at sub-stations for accounting of the electricity to various segments of electrical system so as to carry out further analysis to determine the consumption and loss of energy there in over a specified time period.
- (a) Records of calibration shall be maintained for reference and shall be made available to the STU/ SLDC on request;
 - (b) Generating companies shall furnish recorded data of all electric measurements and events recorded by the energy accounting and audit metering to the STU/SLDC as and when requested by them.
- 5.8.6 All meters shall comply with the technical specifications mentioned under CEA Meter Regulations.
- 5.8.7 Wherever a meter becomes defective, consumption recorded by the check meter shall be referred for a mutually agreed period. And wherever both main and check meters become defective the reading of standby meters are to be considered.
- 5.8.8 If the main as well as the check metering systems become defective and there is no standby meter, the assessment of energy consumption for the outage period shall be done by the concerned parties on mutually agreed basis.
- 5.8.9 If the main as well as the check metering systems become defective and there is no standby meter, the assessment of energy consumption for the outage period shall be done by the concerned parties on mutually agreed basis.
- a) A procedure shall be drawn up between the STU and the entities covering summation, collection, processing meter readings at various connection sites. This may be revised from time to time as needed.
 - b) Any disputes relating to inter-entity metering between the STU / Transmission Licensee and Generating Company / Distributing Licensee / Open Access Users / Transmission Licensee shall be settled in accordance with the procedures stipulated under relevant Power Purchase Agreement / Connection Agreement as the case may be. In case of unresolved dispute, the matter may be referred to WBERC for adjudication and reference for arbitrations.
- 5.8.10 Notwithstanding anything contrary to any regulation of the Commission, STU / SLDC shall not permit any synchronization of any new unit of any generating station unless ABT compliant meters are installed and commissioned for recording the gross

generation and ex-bus generation amount along with proper online real time display of such information at SLDC as specified in this State Grid Code.

5.9 Reactive Power Compensation

- 5.9.1 Reactive Power compensation and/or other facilities should be provided by Transmission Licensee/Distribution Licensees as far as possible close to the load points thereby avoiding the need for exchange of Reactive Power to/from InSTS and to maintain InSTS voltage within the specified range.
- 5.9.2 Line Reactors may be provided to control temporary over voltage within the limits as set out in Connectivity Agreements.
- 5.9.3 The additional reactive compensation to be provided by a User and shall be indicated by STU in the Connectivity Agreement for implementation.
- 5.9.4 Users shall endeavour to minimize the lagging Reactive Power drawal at an interchange point when the voltage at that point is below 97% of rated voltage and shall not inject lagging Reactive Power when the voltage is above 103% of rated voltage. Interconnecting Transformer taps at the respective drawal points may be changed to control the Reactive Power interchange as per a User's request to the State Load Despatch Centre, but only at reasonable intervals. SLDC will arrange to publish the Reactive Charges bills for all constituents on weekly basis in accordance with Balancing and Settlement Code.

5.10 Data and Communication Facilities

Reliable and efficient speech and data communication systems shall be provided to facilitate necessary communication and data exchange, and supervision/control of the grid by the SLDC, under normal and abnormal conditions. All Users 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/RLDC. The associated communication system to facilitate data flow up to SLDC/RLDC, as the case may be 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. Such data and communication facilities shall henceforth be developed by considering the CEA Communication Regulations. The existing system may be gradually developed according to the said regulations.

5.11 System Recording Instruments

Recording instruments such as Data Acquisition Systems/Disturbance Recorder/Event Logger/Fault Locator (including time synchronization equipment) shall be provided in

the InSTS 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. All such instruments shall be kept in working conditions.

5.12 Cyber Security

All the Users and Transmission Licensee shall have in place a cyber security framework to identify the cyber assets and protect them so as to support reliable operation of the grid. In this context for communication asset the provisions specified in CEA Communication Regulations have to take into consideration.

5.13 International Connections to InSTS

The procedure for international connection to InSTS and the execution of the agreement for the same shall be determined by STU in consultation with State Government of the State and other persons as and when require.

5.14 Responsibilities for operational safety

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

5.14.1 Site Responsibility Schedule

- a) A Site Responsibility Schedule shall be produced by the STU/ Transmission Licensee and User detailing the ownership, control, maintenance and operational responsibilities of each, before execution of the project or connection including safety responsibilities.

For connection to the InSTS, a schedule shall be prepared by STU/Transmission Licensee pursuant to the relevant Connectivity Agreement, which shall state for each item of plant and apparatus at the connection point including the followings:

- i) Ownership of the Plant/apparatus;
 - ii) Responsibility for control of the Plant/Apparatus
 - iii) Responsibility for operation of the Plant/Apparatus;
 - iv) Responsibility for maintenance of the Plant/Apparatus;
 - v) Responsibility for all matters relating to the safety of any person at the connection Point; and
 - vi) The designation of in-charge of site along with his communication address, email address, fax number, mobile and telephone number.
- b) The formats, principles and basic procedure to be used in the preparation of the Site Responsibility Schedules shall be formulated by STU and shall be provided to each User seeking connection or modification of existing connection to the InSTS. The STU shall put up the information related to

above mentioned formats, principles and procedures in the website of the STU.

- c) All Users connected to or planning to connect to InSTS would ensure providing of RTU and other communication equipment, as specified by SLDC, for sending real-time data to SLDC at least before the date of commercial operation of the generating stations or sub-stations or lines being connected to InSTS.
- d) STU/Transmission Licensee and Users should be responsible for safety as indicated in the site responsibility schedule for each connection point in accordance with CEA Plant Safety Regulations and CEA Supply Safety Regulations.

5.14.2 Single Line Diagrams

- a) Single Line Diagram shall be furnished for each Connection Point by the connected Users or Transmission Licensee to the SLDC and /or the STU. These diagrams shall include all EHV/ 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 EHV/HV apparatus and related plant.
- b) Whenever any equipment is proposed to be changed, then concerned User shall intimate the necessary changes to STU and to SLDC. When the changes are implemented, revised Single Line Diagram shall be circulated by the User to SLDC/STU.

5.14.3 Site Common Drawings

- a) Site Common Drawing shall be prepared for each Connection Point and will include the following information:
 - i) Site Layout;
 - ii) Electrical Layout;
 - iii) Details of protection/ control; and
 - iv) common services drawings;
- b) The detailed drawings for the portion of the User and STU/ Transmission Licensee at each Connection Point shall be prepared individually and copies shall be handed over to other party. A copy shall be provided to the STU where STU is not a party.
- c) If any change in the drawing is found necessary, the details will be furnished to other party as soon as possible.

5.15 Schedule of assets of State Power Grid

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

5.16 Conditionality of Connectivity

Notwithstanding anything contained contrary elsewhere in any other regulation of the Commission, no licensee can deny connectivity to any generating station and/or no Transmission Licensee can deny connectivity to any Distribution Licensee intends to have connectivity for injection/ drawal of power on the ground of non-availability of power purchase agreement, if the applicant of the connectivity is ready to bear the cost of connectivity. However, power cannot be injected into the Transmission System or Distribution System as the case may be or power cannot be drawn from the system until there is a PPA on the basis of which open access has been duly accorded through wheeling or transmission agreement as per Open Access Regulations. But, the power transaction through power exchanges will be allowed to injected into Distribution System or Transmission System.

5.17 Test Synchronisation:

The test synchronization can continue upto 24 hours at a stretch subject to following conditions: -

- a) Prior to any test synchronization notice is to be provided to the SLDC along with mentioning the maximum possible injection and the duration of such trial operation.
- b) Prior to first test synchronization PPA between the generating station and purchaser of such electricity is to be submitted to the Commission mandatorily, where prior approval has not been taken yet, for clearance at least six months before such test synchronization except where the generating station and the purchaser are same person.
- c) Only after receiving of clearance of SLDC on the basis of notice issued under clause (a) above, clearance under clause (b) above and satisfaction of conditions as specified in regulation 5.8.10, test synchronization can be undertaken.
- d) The electricity generated under test synchronization shall be deemed to be scheduled among the beneficiaries in proportion to the allocation under PPA or

as will be instructed by the generator through written communication in case the beneficiary does not agree to draw such power.

- e) Between two test synchronization there shall be a gap of at least 24 hours.

5.18 Tests Prior to Trial Run for Declaration of Commercial Operation:

Notwithstanding the requirements in other standards, codes and contracts, the following tests shall be scheduled and carried out in coordination with SLDC by the generating company and transmission licensee, as the case may be, before being allowed to proceed for the trial run for declaration of commercial operation. For this testing purpose wherever Test Synchronisation is required it shall be done in accordance with the regulations 5.17 of this State Grid Code. These tests shall be performed for ensuring grid security and relevant reports shall be submitted to SLDC.

5.18.1 Tests required for thermal (coal/lignite) generating stations:

The testing to be conducted are as follows:

- a) Operation of control load of fifty (50) percent of MCR as per CEA standards for a sustained period of four (4) hours;
- b) Ramp-up from fifty (50) percent MCR to rated capacity at a ramp rate of at least three (3) percent of MCR per minute. Sustained operation at MCR for one (1) hour;
- c) To demonstrate overload capability with valve wide open as per CEA Technical Standard Regulations. Sustained operation at this level for at least five (5) minutes;
- d) Ramp-down from MCR to fifty (50) percent of MCR at a ramp rate of at least three (3) percent of MCR per minute;
- e) Testing primary response through injecting a frequency test signal with a step change of ± 0.1 Hz at 60%, 75% and 100% load;
- f) Reactive power capability test as per the generator capability curve considering over-excitation and under-excitation limiter settings.

5.18.2 Tests/Documents required for hydro stations Documents:

- (a) The generating company shall submit the document for turbine characteristics curve indicating the operating zone(s) and prohibited zone(s). In order to demonstrate operating flexibility of generating unit, it shall be operated below and above the prohibited zone(s).
- (b) The testing to be conducted are as follows:

- i) Testing primary response through injecting a frequency test signal with a step change of ± 0.1 Hz for various loadings within the operating zone;
- ii) Reactive power capability test as per the generator capability curve considering over-excitation and under-excitation limiter settings;
- iii) Black start capability;
- iv) Operation in synchronous condenser mode wherever designed;
- v) The tests will be performed considering the water availability and head.

5.17.3 Tests/Documents required for gas turbine based generating stations

Documents:

- a. Submit documents having information about starting time of gas turbine from cold and warm conditions and ramping up from no load to full load at design ramp rate.
- b. The testing to be conducted are as follows:
 - i. Testing primary response through injecting a frequency test signal with a step change of ± 0.1 Hz for various loadings within the operating zone;
 - ii. Reactive power capability test as per the generator capability curve considering over-excitation and under-excitation limiter settings;
 - iii. Test to validate Black start capability upto 100 MW capacity wherever designed;
 - iv. Test to validate Operation in synchronous condenser mode wherever designed.

5.17.4 Tests/Documents required for wind/solar generating stations Documents:

- 1. Submission of certificate confirming compliance to CEA Grid Connectivity Regulations;
- 2. The testing to be conducted are as follows:
 - i) To demonstrate the frequency response of machines as per CEA Grid Connectivity Regulations;
 - ii) Reactive power capability test as per OEM rating at the available irradiance or the wind energy, as the case may be;
 - iii) To demonstrate the Grid forming capability, wherever provided.

5.17.5 Tests/Documents required for Energy Storage Systems (ESS) Documents

- i. Submission of certificate confirming compliance to CEA connectivity standards.
- ii. The testing to be conducted are as follows:

- i) To demonstrate the frequency response of ESS;
- ii) To demonstrate the ramping capability as per design;
- iii) To demonstrate rated power output capability in MW and energy output capacity in MWh.

5.17.6 Tests/Documents required for HVDC transmission elements Documents

- (b) Submission of technical particulars including operating guidelines such as filter bank requirements at various operating loads and monopolar/bipolar configuration, reactive power controller, power demand overrides, run-back features, frequency controller, reduced voltage mode of operation, power oscillation damping.
- (c) The testing to be conducted are as follows:
 - i) Minimum load operation.
 - ii) Ramp rate
 - iii) Overload capability
 - iv) Black start capability in case of Voltage source convertor (VSC) HVDC.

5.17.7 Tests /Documents required for SVC/STATCOM Documents:

- a) Submission of technical particulars including operating guidelines such as number of blocks and rating of each block, single line diagram, V/I characteristics, rating of coupling transformer, MSR/MSC design parameters, different operating modes, IEEE standard Model, Power Oscillation Damping (POD) enabled and tuned (if not then reasons for same). The results for Offline simulation-based study to validate the performance of POD;
- b) Tests to validate full reactive power capability of SVC/STATCOM in both the directions i.e. absorption as well as injection mode, POD performance, dynamic performance testing.

CHAPTER - 6: PROTECTION CODE

6.0 Introduction:

The Protection Code specify the minimum protection requirement that is to be ensured for smooth and healthy operation of the State Power System.

6.1 Objective:

- a) To have a common protection philosophy amongst users of the grid;
- b) To provide proper co-ordination of protection system in order to isolate the faulty equipment and avoid unintended operation of protection system;
- c) To have a repository of protection system and settings at regional level;
- d) To have a repository of events, timelines for submission of data and ensure healthiness of recording equipment's along with time synchronization;
- e) To provide for periodic audit of protection system.

6.2 Basic Features

- a) All users connected to the integrated grid shall provide and maintain effective protection system having reliability, selectivity, speed and sensitivity to isolate faulty section and protect element(s) as per CEA Grid Standards, CEA Grid Connectivity Regulations, CEA Technical Standard Regulations and CEA Communication Regulations.
- b) Back-up protection system shall be provided to protect an element in the event of failure of the primary protection system.

6.3 Protection Philosophy and Settings

6.3.1 Protection philosophy

- a) SLDC shall develop the protection philosophy, and review and revise from time to time, in consultation with STU and Users, and in doing so shall be guided by minimum electrical protection functions for equipment connected with the grid shall be provided as per CEA Grid Connectivity Regulations, CEA Technical Standard Regulations, CEA Supply Safety Regulations, CEA Communication Regulations and any other CEA standards specified from time to time.
- b) The protection philosophy in a particular system may vary depending upon operational experience in the broad contours of above protection design guidelines. However, such changes shall be carried out after deliberation at Protection Sub Committee of SPC /SPC and as approved by SLDC after dur consultation with STU where required.

6.3.2 Protection Setting

- a) SLDC shall undertake review of the protection settings, assess the requirement of revisions in protection setting and develop revised protection settings in consultation with Users in the State Power System. The necessary studies in this regard shall be carried out by SLDC with due consultation with Protection Sub Committee of SPC /SPC.
- b) All Users connected to the InSTS shall:
 - i) ensure correct and appropriate settings of protection as per SLDC approved protection philosophy.
 - ii) cooperate for proper coordinated protection settings.
 - iii) report any changes in network to other Users for changes required in protection settings.
 - iv) furnish the implemented protection settings of each element to SLDC in a format as prepared by SLDC. Any implemented changes in protection system or protection setting shall also be intimated to SLDC.
 - v) Protective relay settings shall not be altered or protection bypassed and/or disconnected, without consultation and agreement of SLDC and STU and/or affected User.
 - vi) If protection is bypassed and / or disconnected by agreement, then the cause must be rectified and protection shall be restored to normal condition as quickly as possible. If agreement is not reached, the electrical equipment, in question, shall be removed from service forthwith in a case where it affects the security of the system.
 - vii) Any shortcoming due to shut down or outage shall be reported by all Users to SLDC and STU on time to time basis.
- c) SLDC shall:
 - i) maintain a centralized database containing details of relay settings for grid elements connected to InSTS and high voltage line of distribution system;
 - ii) provide the database access to all Users, ALDCs, Transmission Licensees and STU. The database may have different access rights for different Users or ALDC or Transmission Licensees according to the need of such. However, SLDC and STU shall have rights over whole database.
 - iii) carry out system wide studies, twice a year, for protection settings and advise modifications/ changes, if any, to all users, CTU and STU.
- d) STU shall:
 - i) STU either suo-motu or on direction of SLDC shall investigate into any malfunctioning of protection or other unsatisfactory protection issues. The

concerned Users / Transmission Licensee shall take prompt action to correct any protection malfunction or issues as identified by the STU.

- ii) Proper documentation of settings provided change of settings, bypass/disconnection of protective arrangement, if any, with date and time punching shall be responsibility of the STU.

6.4 Protection Audit Plan

- 6.4.1** All Users shall conduct internal audit of their protection system annually and any shortcomings identified shall be rectified and informed to SLDC.
- 6.4.2** All Users shall also conduct third party protection audit of each sub-station (33 kV and above in) once in five years or earlier as advised by SLDC.
- 6.4.3** After analysis of an event, SLDC shall identify a list of substations/generating stations where third-party protection audit is required and accordingly advise the respective users to complete third party audit within three months. The third-party protection audit report shall inter-alia contain points given in format enclosed as Annexure –1.
- 6.4.4** The audit reports, along with action plan for rectification of deficiencies found, if any, shall be submitted to SLDC within a month of submission of report by auditor.
- 6.4.5** Annual audit plan shall be submitted by Users to SLDC by 31st October for the next financial year. Users shall adhere to the submitted plan and report the compliance to SLDC.
- 6.4.6** Users shall submit the following protection performance indices to SLDC on monthly basis. The performance indices shall also be reviewed by respective SLDC during Protection Sub-Committee meeting of SPC so that all the Users could come to know the actual health status of the protection system of State Power System:

- (a) The Dependability Index defined as $D = \frac{N_c}{N_c + N_f}$

$$N_c + N_f$$

Where,

N_c = number of correct operations during the given time interval,

N_f = number of failures to operate at internal power system faults.

- (b) The Security Index defined as $S = \frac{N_c}{N_c + N_u}$

$$N_c + N_u$$

Where,

N_u = number of unwanted operations.

- (c) The Reliability Index defined as $R = \frac{N_c}{N_c + N_i}$

Where

Where

N_i = number of incorrect operations and is the sum of N_r and N_u

6.4.7 Each User shall also submit the reasons behind the fall in performance indices of individual element wise protection system to SLDC and Action plan along with deadline for corrective measures. The action plan will be followed up regularly in the monthly protection sub-committee meeting of SPC.

6.4.8 The SLDC shall report to the Commission if the above indices are less than one in a year and if any user has failed to undertake any remedial action identified by SLDC.

6.5 System Protection Schemes (SPS)

6.5.1 SPS design shall duly factor redundancies in measurement of inputs, logic as well as communication paths involved upto the last mile to ensure security and dependability.

6.5.2 For the operational SPS, SLDC shall perform regular dynamic studies and mock testing for reviewing SPS parameters & functions, at least once in a year. The respective users and SLDC shall report the SPS operation in the format specified by SLDC within 3 days of operation to SLDC.

6.6 Recording Instruments

6.6.1 All users shall ensure the healthiness of recording instruments (disturbance recorder and event logger) in the station.

6.6.2 The disturbance recorder should have a standard format for analogue and digital signals, time synchronization and capture time as per guideline given by SLDC.

CHAPTER - 7: COMMISSIONING CODE

7.0 Introduction

The commissioning of important elements in power system has been discussed in this chapter with reference to certain points that will help in to ensure stable operation of the power system to the possible extent in the initial period of stabilization of such element when operation starts. This been also done with another objective of ensuring the availability of those elements for full load operation at earliest so that after COD of those elements fixed charge can be kept at most reasonable from the point of its utilization.

7.1 First Commissioning Synchronization:

7.1.1 The First Commissioning Synchronization of an unit of a generating station connected to State Power System shall be subject to following conditions.

- a) At least 15 days before First Commissioning Synchronization the owner of the generating station shall submit to the Commission status of all load bearing equipment, system and facilities along with certification of availability for full load operation of these equipment / facilities / system from the manufacturers and / or erection contractor along with validation by the in-charge of the generating station.
- b) On the basis of documents as above the Commission will provide approval for 'go-ahead' for First Commissioning Synchronization of the generating unit for commissioning activities prior to Trial Operation in order to make the generating unit stabilized and ready for Trial Operation. This period between such First Commissioning Synchronization and Trial Operation will be termed a commission period.
- c) Only on the basis of such approval for 'go-ahead' SLDC will allow the generating station to make First Commissioning Synchronization after getting prior notice from the generating station in accordance with the provisions to this State Grid Code.
- d) For the purpose of tariff determination and also for start of commercial operation ninety days from the date of First Commissioning Synchronization or the date as declared by the owner of the generating station as COD, whichever is earlier shall be treated as COD.
- e) Such unit will be under ABT operation from the Date of Commercial Operation (COD) as specified in these regulations with reference to such date of above First Commissioning Synchronization.

- f) The generation between date of synchronization and COD shall be treated as infirm power.
- g) In case of generating station for whom tariff is to be determined by the Commission by virtue of any PPA with any Distribution Licensee of the State, the owner of the generating station has filed the tariff application and is being admitted by the Commission as per Tariff Regulation.
- h) The condition of regulation 5.8.10.

7.1.2 In case of shortage of power in the State the Commission may allow First Commissioning Synchronization of a new generating station with partial availability of all load bearing equipment / facilities / systems subject to following conditions:

- (i) Licensee or generating company who owns the generating station cannot ask for any special dispensation in tariff due to partial availability in installed capacity.
- (ii) For the purpose of tariff determination and also for start of commercial operation ninety days from the date of synchronization with such partial installed capacity or the date as declared by the owner of the generating station as COD, whichever is earlier shall be treated as COD.
- (iii) From the date of commercial operation such generating station shall be under ABT operation and no special dispensation will be provided on the ground of lower availability of installed capacity.
- (iv) The available installed capacity is at least 60% of the MCR of the generating unit under consideration.
- (v) The conditions of regulation 5.8.10 of these regulations are satisfied.

7.2 Notice for Trial Run

7.2.1 The generating company offering its unit for trial run or repeat of trial run shall give a notice of not less than three days to the concerned SLDC, as the case may be, and the beneficiaries/long-term customers of the generating station wherever identified. However, if for that generating unit if any tariff is to be determined by the Commission then prior to issuing such notice for trial run the concern Generating Company shall obtained the certificate of "go-ahead" for synchronisation from the Commission in pursuance to the provisions of the Tariff Regulation. Without this Certificate SLDC will not allowed trial run for that generating unit. The trial run shall commence from the time and date to be informed by the SLDC. The SLDC shall endeavour to commence the trial run from the requested date or in case of any system constraints not later than seven (7) days from the proposed date of trial run.

7.2.2 In case the repeat trial run is to take place within twenty-four (24) hours of the failed trial run, fresh notice shall not be required.

7.2.3 The transmission licensee shall give a notice of not less than seven days to the concerned RLDC or SLDC, as the case may be, including long term transmission customers.

7.3 Trial Run of Generating Unit/Station

7.3.1 Trial run for thermal generating unit

- a) Continuous operation at MCR for seventy-two (72) hours on designated fuel provided that short interruption or load reduction shall be permissible with corresponding increase in duration of test:

Provided that:

- i) interruption or partial loading maybe allowed with the condition that the average load during the duration of trial run shall not be less than MCR excluding period of interruption but including the corresponding extended period.
 - ii) cumulative interruption of more than four (4) hours shall call for a repeat of trial run.
- b) Where on the basis of the trial run, a unit of the generating station fails to demonstrate the unit capacity corresponding to MCR, the generating company has the option to derate the capacity or to go for repeat trial run. Where the generating company decides to de-rate the unit capacity, the demonstrated capacity in such cases shall be more or equal to 105% of de-rated capacity.

7.3.2 Trial run for hydro station

- a) Continuous operation at MCR for twelve (12) hours provided that any interruption shall call for a repeat of trial run:

Provided that:

- i) the partial loading maybe allowed with the condition that the average load during the duration of trial run shall not be less than MCR excluding period of interruption but including the corresponding extended period.
 - ii) If it is not possible to demonstrate the MCR due to insufficient reservoir or pond level or insufficient inflow, the same shall be demonstrated immediately when sufficient water is available after the date of declaration of COD.
 - iii) In case the generation is reduced on the directions of the RLDC due to system constraints, the RLDC shall permit corresponding increase in duration of test.

- b) Where on the basis of the trial run, a unit of the generating station fails to demonstrate the unit capacity corresponding to MCR, the generating company shall have the option to either de-rate the capacity or to go for repeat trial run. If the generating company decides to de-rate the unit capacity, the demonstrated capacity in such cases shall be more or equal to 110% of de-rated capacity.

7.3.3 Trial run for wind/solar/ESS/hybrid/ generating unit

- a) Successful trial run of a solar inverter unit(s) aggregating to 50 MW and above shall mean flow of power and communication signal for not less than the period between sunrise to sunset in a single day with the requisite metering system telemetry and protection system in service. The generating company shall record the output of the station during the trial run and corroborate its performance with the solar irradiation during the day and plant design parameters. Further, a declaration would be given that no unit tripped during period of the trial operation:

Provided that:

- i) The output below the corroborated performance level with the solar irradiation of the day shall call for repeat of the trial run.
 - ii) If it is not possible to demonstrate the rated capacity of the plant due to insufficient solar irradiation, the same shall be demonstrated immediately when sufficient solar irradiation is available after the date of declaration of COD.
- b) Successful trial run of a wind turbine(s) aggregating to 50 MW and above shall mean flow of power and communication signal for a period of not less than four (4) hours during periods of wind availability with the requisite metering system telemetry and protection system in service. The generating company shall record the output of the station during the trial run and corroborate its performance with the wind speed during the day and plant design parameters. Further, a declaration would be given that no unit tripped during period of the trial operation:

Provided that:

- i) the output below the corroborated performance level with the wind speed of the day shall call for repeat of the trial run.
 - ii) If it is not possible to demonstrate the rated capacity of the plant due to insufficient wind velocity, the same shall be demonstrated immediately when sufficient wind velocity is available after declaration of date of COD.

- c) Successful trial run of standalone energy storage device shall mean one (1) cycle of charging and discharging of energy as per the design capability with the requisite metering system telemetry and protection system in service.
- d) Successful trial run of hybrid systems shall mean individual compliance as per above definitions with the requisite metering system telemetry and protection system in service.

7.3.4 Trial Run of Intra State Transmission System

Trial run in relation to a transmission system or an element thereof under Intra State Transmission System shall mean successful energisation of the transmission system or an element thereof at rated nominal voltage through interconnection with the grid with continuous twenty-four (24) hours flow of power, and communication signal from the sending end to the receiving end and with requisite metering system, telemetry and protection system.

Provided that under exceptional circumstances and with the prior approval of CEA, a transmission element can be energized at next lower nominal voltage as per CEA planning criteria for the purpose of trial run.

7.4 Declaration of Date of Commercial Operation (COD)

7.4.1 Thermal generating station

- a) Date of commercial operation in case of a unit of thermal generation stations shall mean the date declared by the Generating Company after a successful trial run at MCR or de-rated capacity, as the case may be, and after getting clearance from the SLDC and in case of the generating station as a whole, the date of commercial operation of the last unit of the generating station.
- b) The Generating Company shall certify that:
 - i) The generating station meets the relevant requirements and provisions of the technical standards of CEA Technical Standard Regulations, CEA Grid Connectivity Regulations and this State Grid Code, as applicable.
 - ii) The main plant equipment and auxiliary systems including balance of plant, such as fuel oil system, coal handling plant, DM plant, pre-treatment plant, fire-fighting system, ash disposal system and any other site-specific system have been commissioned and are capable of full load operation of the units of the generating station on sustained basis.

- iii) Permanent electric supply system including emergency supplies and all necessary instrumentation, control and protection systems and auto loops for full load operation of unit have been put in service.
- c) Above mentioned certificates as per (b) shall be signed by the CMD/CEO/MD of the Generating Company and a copy of the certificate shall be submitted to the head of the SLDC before declaration of COD. The Generating Company shall submit approval of Board of Directors to the certificates to SLDC and Commission as required within a period of 3 months of the COD.

7.4.2 Hydro generating unit/station

- a) Date of commercial operation (COD) in relation to a generating unit of hydro generating station including pumped storage hydro generating station shall mean the date declared by the generating company after demonstrating peaking capability corresponding to the installed capacity of the generating station through a successful trial run, and after getting clearance from the respective RLDC or SLDC, as the case may be, and in relation to the generating station as a whole, the date of commercial operation of the last generating unit of the generating station.
- b) The generating company shall certify that:
 - i) The generating station or unit thereof meets the requirement and relevant provisions of the technical standards of CEA Technical Standard Regulations, CEA Grid Connectivity Regulations and this State Grid Code, as applicable.
 - ii) The main plant equipment and auxiliary systems including drainage de-watering system, primary and secondary cooling system, LP and HP air compressor and firefighting system have been commissioned and are capable for full load operation of units on sustained basis.
 - iii) Permanent electric supply system including emergency supplies and all necessary Instrumentations Control and Protection Systems and auto loops for full load operation of the unit are put into service.
- c) Above mentioned certificates as per (b) shall be signed by the CMD/CEO/MD of the Generating Company and a copy of the certificate shall be submitted to the head of the SLDC before declaration of COD. The Generating Company shall submit approval of Board of Directors to the certificates to SLDC and Commission as required within a period of 3 months of the COD.

7.4.3 Transmission System

- a) Date of commercial operation in relation to an Inter-State Transmission System or an element thereof shall mean the date declared by the transmission licensee from 0000 hours of which an element of the transmission system is in regular service after successful trial operation for transmitting electricity and communication signal from the sending end to the receiving end.
- b) In case a Transmission System or an element thereof of the Intra State Transmission System is prevented from regular service on or after the scheduled COD for reasons not attributable to the Transmission Licensee or its supplier or its contractors but is on account of the delay in commissioning of the concerned generating station or in commissioning of the upstream or downstream Transmission System of other Transmission Licensee, the Transmission Licensee shall approach the Commission through an appropriate application for approval of the date of commercial operation of such Transmission System or an element thereof.

Provided that in case of Intra State Transmission System executed through Tariff Based Competitive Bidding, the Transmission Licensee shall declare deemed COD of the InSTS in accordance with the provisions of the Transmission Service Agreement.

- c) An element shall be declared to have achieved COD only after all the elements which are pre-required to achieve COD as per the Transmission Services Agreement between the Transmission Licensees and STU are commissioned. In case any element is required to be commissioned prior to the commissioning of pre-required element, the same can be done if CEA confirms that such commissioning is in the interest of the power system.
- d) The transmission licensee shall submit a certificate from the CMD/CEO/MD of the company that the transmission line, sub-station and communication system conform to the relevant Grid Standard and Grid Code and are capable of operation to their full capacity.

7.4.4 Wind/Solar/Storage/Hybrid generating station

- a) Date of commercial operation in case of units of a renewable generating station aggregating to 50 MW and above shall mean the date declared by the Generating Company after undergoing successful trial run and after getting clearance from SLDC.
- b) The Generating Company shall certify that the generating station including main plant equipment such as wind turbines/solar inverters, auxiliary systems, as the case may be, has complied with all relevant provisions of CEA Grid Connectivity

Regulations and Commission approved any other procedures or regulations as applicable.

- c) The certificates as mentioned above shall be duly signed by the MD/CEO/CMD of the Generating Company.

7.4.5 All Generating Companies shall declare the Date of Commercial Operation of unit or plant thereof within fifteen (15) days from the date of clearance by SLDC.

7.4.6 Scheduling of generating unit/station shall start from 0000 hours of the date of declaration of Commercial Operation.

CHAPTER - 8: OPERATING CODE

8.0 Operating Policy

- (a) The primary objective of integrated operation of the State Power Grid in the state is to enhance the overall operational economy and reliability of the entire State Power System. Participant utilities in State Power Grid shall therefore co-operate with each other and adopt Good Utility Practice at all times for satisfactory and beneficial operation of the State Power Grid.
- (b) Overall real time grid operation and monitoring of the InSTS shall be carried out by the State Load Despatch Centre (SLDC). The responsibility of supervision and control of the High Voltage distribution backbone will with be ALDC who will work in co-ordination with SLDC to ensure a steady real time grid operation of the State Power Grid. All Users and Transmission Licensees are accordingly required to comply with the directions given by the SLDC.
- (c) Distribution Licensee shall establish at least one ALDC to discharge its functional responsibility as specified in regulation 3.2 of this State Grid Code.
- (d) All Users and Transmission Licensees shall comply with this operating code, for deriving maximum benefits from the integrated grid operation and for equitable sharing of obligations.
- (e) SLDC shall prepare a draft operational manual/procedure within 60 days from notification of this regulation in accordance with WBEGC, CERC Grid Code and CEA Grid Standards which shall be followed by staff of SLDC, all Users and Transmission Licensees. Such operational manual/procedures shall be finalized after due consultation with all the ALDCs and Users.
- (f) ALDC shall also prepare a draft operational manual within 45 days from notification of this regulation in accordance with WBEGC in consultation and guidance of SLDC, CERC Grid Code and CEA Grid Standards which shall be followed by staff of ALDC, all Users and the Distribution Licensees itself.
- (g) SLDC shall also review and coordinate the maintenance plan of Generating Stations and also of transmission asset of STU/Transmission Licensees and all other Users connected with the InSTS.
- (h) ALDC shall also review and coordinate the maintenance plan of Generating Stations, Distribution System of Distribution Licensees and all other Users connected with the Distribution System.
- (i) For efficient and secure operation of the State Power Grid the control rooms of the SLDC, ALDC, power generating plants, substation of 132 kV & above, and any other control centers established by the Transmission Licensee/Users shall be

automated or manned round the clock by qualified and adequately trained personnel. Alternatively, the same may be operated from a remotely located control centres ensuring physical security of the infrastructure and its cyber security. Remote operation of any generating station or substation shall not adversely delay the execution of any switching instruction and/or information flow:

Provided that a transmission licensee not having its own substation terminating with the line shall also be required to have a coordination centre. QCA, representing renewable generators shall have a coordination centre manned by qualified and competent personnel round the clock, wherever required, for operational coordination and information exchange with the concerned load despatch centre and generators

8.1 System Security Aspects

8.1.1 All Users and Transmission Licensee shall endeavor to operate their respective power systems and generating stations in an integrated manner at all times, such that the State Power System operates as one synchronized system.

8.1.2 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) for safety of human life,
- c) when serious damage to a costly equipment is imminent and such isolation would prevent it,
- d) when such isolation is specifically instructed by SLDC or ALDC, as the case may be.

Complete synchronization of grid shall be restored as soon as the conditions again permit it. The restoration process shall be supervised by SLDC or ALDC, as per operating procedures separately formulated by it.

8.1.3 No important element of the State Power Grid shall be deliberately opened or removed from service at any time, except when specifically instructed by SLDC or ALDC, as the case may be, or with specific and prior clearance of SLDC or ALDC, as the case may be. The list of such important grid elements on which the above stipulations apply shall be prepared by the SLDC in consultation with the Transmission Licensees, STU, ALDC and Users, and shall be available at the website of SLDC. 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.

- 8.1.4** Any tripping, whether manual or automatic, of any of the above elements of State Power Grid shall be precisely intimated by the concerned agency to SLDC immediately explaining the reasons (to the extent determined). The reasons in detail and the expected time of restoration shall also be intimated to the SLDC at the earliest. All reasonable attempts shall be made for the elements' restoration as soon as possible. All logs, data, records, etc. are to be preserved for future analysis.
- 8.1.5** Any prolonged outage of power system elements of any Users / Transmission Licensees, which is causing or cause danger to the State Power Grid or sub-optimal operation of the grid, shall regularly be monitored by SLDC. SLDC or ALDC, as the case may be, shall finalize action plan and give instructions to restore such elements in a specified time period.
- 8.1.6** Except under an emergency, or to prevent an imminent damage to costly equipment, no SSGS shall suddenly reduce his generating unit output by more than one hundred (100) MW without prior intimation to and consent of the SLDC. Similarly, no Users shall cause a sudden increase in its load by more than one hundred MW (100 MW) without prior intimation to and consent of the SLDC.
- 8.1.7** All generating units shall normally have their automatic voltage regulators (AVRs) in operation, with appropriate settings. In particular, if a generating unit of over fifty (50) MW size is required to be operated without its AVR in service, the SLDC shall be immediately intimated about the reason and duration, and its permission obtained. AVR, Power System Stabilizers (PSS) in AVRs of generating units (wherever provided), voltage or reactive power controller of wind, solar generating unit or ESS 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. The above tuning, including for low and high voltage ride through capability of wind and solar generators shall be carried out –
- at least once every five (5) years,
 - based on operational feedback provided by the SLDC after analysis of a grid event or disturbance, and
 - in case of a major change in excitation system or major network changes/ fault level changes near to generating plant as reported by SLDC.
- STU will be allowed to carry out checking of PSS and further tuning it, wherever considered necessary.
- 8.1.8** In order to provide basic requirement of PSS tuning for system security, the PSS tuning procedure shall be prepared by SLDC. The generating stations shall submit the detailed list of proposed tuning of AVR/PSS or reactive power controllers to SLDC prior to 31st December for the next financial year. SLDC shall compile a list before 31st March and share with all Users. After completing the PSS tuning, the report shall be submitted

by the generating station. The report shall comprise of requisite power system mapping, simulation study and field testing, and report shall be submitted to SLDC. SLDC may carry out field checking of AVR, Power System Stabilizers (PSS) or voltage or reactive power controller of wind, solar generating unit or ESS, whenever considered necessary. Behaviour of the generating station during actual system event would also be recorded and retuning advised by SLDC, if necessary.

- 8.1.9** Provision of protections and relay settings shall be coordinated periodically throughout the State Power grid, as per a plan to be separately finalized by SLDC. All Users and Transmission Licensee shall ensure that installation and operation of protection system shall comply with the provisions of CEA Grid Standards and as per Protection Code of this State Grid Code.
- 8.1.10** SLDC shall prepare and review islanding schemes in accordance with CEA Grid Standards, wherever deemed necessary. Such scheme shall be prepared in consultation with RPC. Mock drill of the islanding scheme shall be carried out once in a year in coordination with RLDC, ALDC and other users involved with the islanding scheme. The islanding schemes shall be reviewed and augmented depending on assessment of critical loads once in three (3) years.
- 8.1.11** Distribution Licensees and bulk consumers shall provide automatic under-frequency relay and/or df/dt relay for load shedding in their respective systems, to arrest frequency decline that could result in a collapse/disintegration of the grid, as per the plan separately finalized by the SLDC/ STU, and shall ensure its effective application to prevent cascade tripping of generating units in case of any contingency. While preparing such plan following issues to be factored for design and implementation of the plan:
- a) All Users shall ensure that the above automatic under-frequency relay (UFR) and automatic 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. The provisions regarding under frequency and df/dt relays of relevant CEA regulations shall be complied with.
 - b) Demand disconnection shall not be set with any intentional time delay in addition to the operating time of the relays and circuit breakers,
 - c) SLDC or ALDC, as the case may be, shall ensure the implementation of the automatic under-frequency relay and automatic df/dt relay-based load shedding schemes.
 - d) SLDC or ALDC, as the case may be, shall ensure telemetered data of feeders (MW power flow in real time and circuit breaker status) on which UFR and df/dt relay are installed is available at their control centre. Where, such telemetered data of ALDC shall also made available to SLDC control room. The combined load in MW of these feeders shall be monitored all the time. SLDC and ALDC shall provide exception report on monthly basis to the Commission. ALDC shall inform SLDC

on quarterly basis, duration during the quarter when combined load in MW of these feeders for UFR and df/dt scheme was below the desired value. SLDC shall take corrective measures and inform to SLDC within reasonable period.

- e) SLDC shall carry out random periodic inspection of underfrequency and df/dt relays and maintain proper records of the inspection.
- f) The details of load shedding scheme based on automatic UFR and df/dt relay for all Distribution Licensees shall be monthly reviewed and displayed on website by SLDC and exception report given to the commission.

8.1.12 SLDC shall inform SPC about instances when the desired load relief is not obtained through these relays in real time operation for their views. SLDC / ALDC shall decide and intimate the action required by Users and Transmission Licensees to get required load relief from Under Frequency and df/dt relays. Users and Transmission Licensees shall abide by this decision. SLDC shall keep comparative record of expected load relief and actual load relief obtained in real time operation. A monthly report on expected load relief vis-a vis actual load relief shall be sent to SPC for their views to consider by SLDC for taking decision.

8.1.13 All Users and Transmission Licensee shall also facilitate identification, installation and commissioning of System Protection Schemes (including inter-tripping and run-back) in the HV/ EHV line of power system to operate the Transmission System or Distribution System within limits and to protect against situations such as voltage collapse and cascade tripping. Such schemes would be finalized by SLDC, and shall be kept in service. For HV system of Distribution Licensee such scheme will be finalized by ALDC in consultation with SLDC. If any SPS is to be taken out of service, permission of SLDC shall be taken.

8.1.14 During the process of demand management grid security which affects integrated grid operation has to be looked into from following aspects also:

- a) STU shall ensure transmission adequacy of intra-state system for secure grid operation;
- b) SLDC shall ensure reserves adequacy for secure grid operation;
- c) Each Distribution Licensee shall ensure resource and distribution network adequacy to meet demand of consumption centres and all category of consumers all the time.
- d) Each Distribution Licensee shall endeavour to contract automated demand response schemes with willing consumers.
- e) In case the Power System is in alert or emergency state as assessed by SLDC or advised by RLDC, the respective Distribution Licensee shall abide by directions of SLDC to secure the system, and extreme measures like load shedding may be carried out as a last resort.

- f) SLDC may direct Distribution Licensee to restrict drawal from grid or curtail load for ensuring the stability of grid: Provided that load shedding shall be resorted to after the demand response schemes have been exhausted.
- g) The disconnected load, if any, shall be restored as soon as possible on clearance from SLDC after the system has been normalized.

8.1.15 All Users and Transmission Licensee shall make all possible efforts to ensure that the grid voltage always remains within the voltage range as specified in the CEA Grid Standards.

8.1.16 All Transmission Licensees shall provide adequate defence mechanism through under-voltage load shedding scheme (UVLSS) as finalized by SLDC, to prevent voltage collapse and shall ensure its effective application to prevent voltage collapse/cascade tripping. Similarly, all Distribution Licensees shall provide adequate defence mechanism through UVLSS as finalized by ALDC in consultation with SLDC, to prevent voltage collapse and shall ensure its effective application to prevent voltage collapse/cascade tripping.

8.1.17 Procedures shall be developed by SLDC in consultation with all Users and Transmission Licensees to recover from partial/total collapse of the grid and periodically updated in accordance with CEA Grid Standards and with the requirements given under regulation 53 of these Regulations. These procedures shall be followed by all Users to ensure consistent, reliable and quick restoration.

8.1.18 Each Users and Transmission Licensee shall provide and maintain 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 e.g. generating stations and/or ALDC to SLDC.

8.1.19 All Users and Transmission Licensee shall send information/data including disturbance recorder/sequential event recorder output etc., to SLDC within 2 hours after achieving steady state conditions for purpose of analysis of any grid disturbance/event. No Users and Transmission Licensee shall block any data/information required by the SLDC for maintaining reliability and security of the grid and for analysis of an event.

8.1.20 Design of all systems or equipment including its operating or communication procedure should ensure cyber security aspects and adherence to all legal guidelines in this respect.

8.2 Generation Response and Frequency Control

- 8.2.1** The National Reference Frequency is 50.000 Hz. All Users, SLDCs and ALDCs shall measure the grid frequency with a resolution of ± 0.001 Hz. The frequency data shall be archived at the rate of one sample every second.
- 8.2.2** All Users shall make all possible efforts to ensure that the grid frequency always remains within the targeted frequency band of operation $[FREQ_L - FREQ_u]$ where value of $FREQ_L$ and $FREQ_u$ are provided in Schedule in line with the value specified in CERC Grid Code. Any changes of such value in CERC Grid Code will be reflected in these State Grid Code by inter-alia modifying Schedule in these State Grid Code through an order issued under regulation 13.3 of these State Grid Code by the Commission.
- 8.2.3** There shall be different levels of reserves such as primary, secondary and tertiary for the purpose of frequency control and regulating area control error. The reserves shall be deployed by each control area connected with the grid. The reserve shall be of following type
- Provision for primary reserve (governor droop response) shall be mandatory as per this code. The primary response of machines shall be verified by the load despatch centres during grid events.
 - Secondary reserves (automatic generation control) shall be deployed by a control area as per this code.
 - Tertiary reserves shall be deployed by control area as per this code.
 - Any other type of reserves required to be deployed in the interest of grid security as per the direction of the SLDC, RLDC or NLDC.
 - ESS reserves may be deployed by SLDC, RLDC or NLDC if required depending on the impact of variability of renewable generation and the need for frequency control.

For the purpose of this State Grid Code each area of supply by each Distribution Licensee shall be considered as separate a separate control area.

Or

For the purpose of this State Grid Code the whole of West Bengal except area of supply of DVC shall be considered as a control area. In such cases the expenses of secondary and tertiary reserves are to be shared by the Distribution Licensees as specified in Tariff Regulations.

Or

For the purposed of this State Grid Code the control area will be subsequently declared by the Commission along with mechanism of cost sharing of secondary and tertiary reserves by the Distribution Licensees through an order under regulation 13.3 of this State Grid Code. However, the area of supply of DVC will be considered as a separate control area and be governed under CERC Grid Code

- 8.2.4** All Coal / lignite based thermal generating units of 200 MW and above, Open Cycle Gas Turbine/ Combined Cycle generating stations having gas turbines of capacity

more than 50 MW each and all hydro units of 25 MW and above (except those with upto 3 hours pondage), which are synchronized with the grid, irrespective of their ownership, shall have their governor under Restricted Governor Mode of Operations (RGMO) at all times. The restricted governor mode of operation shall have the same features as detailed in CERC Grid Code.

- 8.2.5** If any thermal generator of 200 MW and above rating and any hydro units of 25 MW and above rating (except those with upto 3 hours pondage) is required to be operated without its governor in normal operation, SLDC shall be immediately informed about the reason and duration of such operation.

Provided also that if any generator seeks an exemption from the above requirement, it shall file a petition justifying the same in advance to the Commission, which may, at its sole discretion, allow the same.

Provided further that the hydro units having pondage upto 3 hours, and nuclear power stations shall be exempted from the above requirement of RGMO and also of regulations, regulation 8.2.7, regulation 8.2.8, and clause (a) of regulation 8.2.9, of this State Grid Code till the Commission reviews the situation.

- 8.2.6** All Governors shall have a droop setting of between 3% and 6%

- 8.2.7** The recommended rate for changing the governor setting, i.e., supplementary control for increasing or decreasing the output (generation level) for all generating units, irrespective of their type and size, would be one (1.0) per cent per minute or as per manufacturer's limits.

- 8.2.8** 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 and no dead bands and/or time delays shall be deliberately introduced except as required under CERC Grid Code. In case of RE sources, reactive power limiter or power factor controller or voltage limiter shall not suppress the primary frequency response within its capability. The inherent dead band of a generating unit/frequency controller shall not exceed +/- 0.03 Hz.

Provided that for solar and wind generator (commissioned between 6th Aug 2019 to 31st March 2022) the dead band of frequency controller shall not exceed +0.05 Hz/- 0.03 Hz.

Provided that periodic check-ups by third party should be conducted at regular interval once in two years through independent agencies selected by SLDC or ALDCs, as the case may be. The cost of such tests shall be recovered by the SLDC or ALDCs from the Generators. If deemed necessary by SLDCs/ ALDCs, the test may be conducted more than once in two years.

- 8.2.9 To Combat the situation of sudden fall in system frequency, the generators with minimum capacity as mentioned in Table-1 have to provide primary response. For such purpose the generating units shall have their governors in operation at all times with droop settings of between 3% and 6 % as per the requirements mentioned separately for each category in Table-1.

Table-1

Type of Generator	Minimum Capacity to fall in primary response purview	Upper Ceiling Limit for picking up (% of MCR)
Coal / Lignite based	200 MW and above	105%
Hydro	25 MW and above & non-canal based	110%
Gas Based	Gas Turbine above 50 MW	105% (corrected for ambience temperature)
Wind/Solar/Hybrid	More Than 10 MW and connected at 33 KV and above	105%

For effective primary response capacity within State Power System following are to be ensured:

- All generating stations mentioned in Table-1 meant for providing primary response normally be capable of__ (and shall not in any way be prevented from) instantaneously picking upto minimum 105% of their operating level or 105% or 110% of their MCR, as the case may be, when frequency falls suddenly. After an increase in generation as above, a generating unit may slide back to the original level at a rate of about 1% per minute, in case continued operation at the increased level is not sustainable. Any generating unit (synchronized with State Power Grid) not complying with the above requirement, shall be kept in operation only after obtaining the permission of the SLDC;
- For the purpose of ensuring primary response, SLDC or ALDCs for Embedded Generating Station shall not schedule the generating station or unit (s) thereof beyond ex-bus generation corresponding to 100% of the Installed capacity of the generating station or unit (s) thereof. The generating station shall not resort to Valve Wide Open (VWO) operation of units whether running on full load or part load and shall ensure that there is margin available for providing Governor action as primary response. In case of gas/liquid fuel-based units, suitable adjustment in Installed Capacity should be made by SLDC/ALDCs for scheduling in due consideration of prevailing ambient conditions of temperature and pressure vis-à-vis site ambient conditions on which installed capacity of the generating station or unit (s) thereof have been specified;

Provided that the hydro stations shall be permitted to schedule ex-bus generation corresponding to 110% of the installed capacity during high inflow period to avoid spillage:

Provided further that the VWO margin shall not be used by SLDC to schedule Ancillary Services;

- c) The generating station shall not resort to Valve Wide Open (VWO) operation of units whether running on full load or part load, and shall ensure that there is margin available for providing Governor action as primary response.
- d) The minimum primary reserve required for reference contingency shall be declared by SLDC at the start of each financial year.
- e) The primary reserves shall be activated immediately (within few seconds) when the frequency deviates from 50 Hz and for the reference contingency the maximum steady state frequency deviation should not cross ΔF Hz as specified in Schedule A.
- f) The primary reserve response shall start immediately and attain its peak in less than T_{min} seconds, and shall sustain up to T_{max} minutes as specified in Schedule A.

8.2.10 Secondary and Tertiary Control will become applicable in the following manner:

- a) Secondary control is area-wise automatic generation control which regulates reserve power to bring area control error close to zero (0), consequentially restoring the frequency.
- b) Secondary control signals are generated at SLDC/ALDC as the Area Control Error deviates from zero (0) and transmitted to generating stations/units within the control area jurisdictions for responding with desired change in generation.
- c) The method of computation of ACE shall be issued by Commission through order under regulation 13.3 of this State Grid Code.

Or

ACE of each control area/region shall be calculated as per following formula:

$$ACE = (I_a - I_s) - 10 * B_f * (F_a - F_s) + \text{Offset}$$

Where,

I_a = Actual net interchange in MW (positive value for export)

I_s = Scheduled net interchange in MW (positive value for export)
 B_f = Frequency Bias Coefficient in MW/0.1 Hz (negative value)
 F_a = Actual system frequency in Hz
 F_s = Schedule system frequency in Hz
 Offset = means provision for compensating measurement error

Tie-line bias mode means AGC is correcting ACE according to the above equation, factoring deviation in area interchange ($I_a - I_s$) as well as frequency deviation ($F_a - F_s$).

- i) Frequency Bias shall normally be equal to median FRC during previous financial year of each control area and refined from time to time.
 - ii) Offset shall be used to account for metering errors and shall be decided by SLDC/RLDC for its respective control area.
 - iii) Schedule system frequency (F_s) would normally be reference frequency of 50.000 Hz unless otherwise specified by NLDC for time correction.
 - iv) If AGC is operating in frequency sensitive mode only ignoring difference in area interchange i.e. ($I_a - I_s$), it would mean *flat frequency control*.
 - v) If AGC is operating in area interchange sensitive mode only ignoring difference in frequency i.e. ($F_a - F_s$), it would mean *flat tie-line control*.
- d) The Secondary Reserves through Automatic Generation Control shall start responding within T_{minSRR} seconds of ACE of a particular control area going beyond the minimum threshold limit of ACE_{TL} as specified in Schedule A.
- e) The required Secondary Reserves through Automatic Generation Control shall be fully delivered within T_{SRR} minutes and shall be capable of sustaining for the next T_{SRRS} minutes thereafter. T_{SRR} and T_{SRRS} are specified in Schedule A.
- f) The SLDC/ALDC shall considered Secondary Reserve capacity for any control area as equal to the 110 % of largest unit size in that control area plus load forecast error plus wind forecast error plus solar forecast error.

Provided that the Secondary Reserve capacity for the control area shall be equal to the reference contingency for that control area.

- g) This Secondary Reserve capacity as per above clause (f) shall be calculated by respective control area by 1st February every year for next financial year and submitted to SLDC. SLDC would work out the minimum quantum of Secondary Reserves to be maintained for each control area or for the State excluding DVC area. SLDC will publish the information on its website by 15th March every year which will be implemented for next financial year from 1st April onwards by control areas or by State excluding DVC area.

- h) Energy Storage Systems (ESS) and/or demand response may also be deployed for providing adequate secondary response.
- i) Secondary control through automatic generation control shall be provided by generating stations/ ESS of the State Power System within a date which will be notified by the Commission through an order under regulation 60 this State Grid Code;
- j) SLDC or ALDC would indicate the short fall in secondary reserves, if any, and announce emergency alerts for such periods.
- k) Normal mode of operation of AGC would be tie-line bias control. SLDC may also operate automatic generation control on flat frequency control mode during anticipated congestion free period or flat tie-line mode.
- l) Tertiary Reserves may be arranged from the generating stations, ESS and/or demand response. Tertiary reserve shall be greater or equal to Secondary Reserves to take care of contingencies, and shall be maintained at both regional entity level as well as state control area. Tertiary Reserves activation would restore the Secondary Reserves to the desired level.
- m) The Tertiary Reserve shall be fully activated within T_{SRR} minutes of operator's instructions from appropriate load despatch centre and shall be capable of delivering until next 60 minutes. Instruction for tertiary reserve activation shall be given by SLDC or ALDC, as the case may be, based on the following:
 - i) When ACR (more than 100 MW) persists for more than T_{SRR} minutes in one direction;
 - ii) In the event of loss of generation or loss of load of more than 100 MW in the control area;
 - iii) In case the secondary reserve has been deployed continuously in one direction for T_{SRR} minutes for more than 100 MW, then tertiary reserves shall be triggered in order to replenish the secondary reserve;
 - iv) Any other condition such as mitigating local congestion due to transmission lines.
- n) Each Distribution Licensee/ State shall keep reserve capacity one day in advance and inform SLDC as outlined in the scheduling code.
- o) The secondary and tertiary reserves shall be arranged by SLDC according to the mechanism decided by the Commission.

- p) The control area wise performance of secondary and tertiary control shall be evaluated in accordance with the detailed procedure prepared by SLDC.

8.2.11 Special requirements for Solar / wind generators:

SLDC and ALDC shall make all efforts to evacuate the available solar and wind power and treat them as a must-run station. However, system operator may instruct the solar/ wind generator to back down generation on consideration of grid stability, security or safety of any equipment or personnel is endangered and Solar/ wind generator shall comply with the same. For this, Data acquisition System facility shall be provided for transfer of information to concerned ALDC and/or SLDC, as the case may be.

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

8.3 Demand Estimation for Operational Purposes

8.3.1 This section describes the demand estimation procedures/responsibilities of the SLDC, ALDC, STU and other Users for both Active Power and Reactive Power on daily/weekly/monthly basis for current year for operational purposes at this stage. However, mechanisms and facilities at SLDC and ALDC shall be created at the earliest to facilitate on-line estimation of demand for daily operational use.

8.3.2 Each Distribution Licensee shall carry out its own demand estimation from the historical data and weather forecast data from time to time.

8.3.3 This demand estimation is to be used by SLDC and ALDC to conduct system studies for operational planning purposes.

8.3.4 Each Distribution Licensee shall develop methodologies/mechanisms for daily/ weekly/monthly/quarterly/yearly demand estimation (MW, MVAR and MWh) for operational purposes. SLDC shall submit node-wise morning peak, evening peak, day shoulder and night off-peak estimated demand in MW and MVAR on monthly and quarterly basis at all nodes including and above 132 kV in the Intra State Transmission System-Distribution System periphery for the Distribution Licensee. The data for the estimation shall also include load shedding, power cuts, etc. Licensees shall also maintain historical database for demand estimation. Each Distribution Licensee have to submit this demand estimation data to SLDC on regular basis.

8.3.5 The Distribution Licensee shall at regular interval review the status of loads materialized as per the previous load forecast. Distribution Licensee shall further take

the base data (i.e. actual energy and demand requirement of the previous financial year) and relate it to past trend.

8.3.6 SLDC based on the data received from Distribution Licensees and all other Users carry out the InSTS based demand estimation on daily/weekly/monthly/yearly basis for current year for load-generation balance planning and operational planning. Mechanism and facilities at SLDC shall be created at the earliest to facilitate on-line estimation of demand for daily operational use for each 15 minutes time block.

8.3.7 Distribution Licensees and SLDC shall take into account forecasting of the Solar and Wind energy, if any, to meet the active and reactive power requirement.

8.4 Demand Management

8.4.1 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 inadequate energy transfers from external interconnections 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 or over-drawal of power by the licensee / open access customers beyond the limits mentioned under Deviation Settlement Mechanism.

8.4.2 Demand Management Process

- (a) All the Users / SLDC / ALDC shall endeavor to restrict their net electricity drawal from the grid to within their respective net drawal schedules.
- (b) Users / SLDC / ALDC shall ensure that requisite load shedding is carried out in its control area so that there is no over-drawal.
- (c) Energy Storage System or ESS may varied its drawal during energy storing operation as per command under Automatic Load Control from SLDC. SLDC shall normally take steps in consultation with concern ALDC, if any. In case of urgency SLDC can take such steps with subsequent intimation to concern ALDC.
- (d) If require for system frequency control unit (s) of Energy Storage System plant may operate in generation mode while simultaneously other units may operate in energy storing operation.
- (e) For effective and automatic demand control under-frequency relays shall be installed at the Substations of the STU/Transmission Licensee. The number and size of the discrete blocks, which shall get isolated for load shedding at a

particular frequency, shall be determined by SLDC on rotational basis in consultation with every Distribution Licensee, ALDC after taking the views of SPC.

- (f) 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 ALDC shall immediately disconnect the quantum of load of Distribution Licensees as instructed by SLDC.
- (g) Each User and Transmission Licensees shall formulate contingency procedures and make arrangements that will enable demand disconnection to take place as instructed by SLDC or ALDC as the case may be. These contingency procedures and arrangements shall regularly be updated by the Users and Transmission Licensees and monitored by SLDC/ ALDC. SLDC / ALDC may direct any User or Transmission Licensee, as applicable, to modify the above procedures/ arrangement, if required, in the interest of grid security and the concerned Users / Transmission Licensee shall abide by these directions.
- (h) Further, in case of certain contingencies and/or threat to system security, SLDC/ALDC shall issue necessary directions to all Users to decrease their drawal by a certain quantum. Such direction shall immediately be acted upon.
- (i) 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. SLDC/ALDC shall devise standard instantaneous message format in order to give directions in case of contingencies and / or threat to the system security to reduce deviation from schedule by the Users or demand disconnections, as the case may be.
- (j) The ALDC shall provide in advance to SLDC, estimates of loads of the Distribution Licensees that may be shed on the instructions of SLDC, when required, in discrete blocks, with details of arrangements of such load shedding. The interruptible loads shall be arranged in four groups of loads:
 - (i) For scheduled power cuts/ load shedding;
 - (ii) Loads for unscheduled load shedding;
 - (iii) Loads to be shed through Under Frequency Relays and/or df/dt relays;

- (iv) Loads to be shed under any system protection scheme identified at SLDC or RPC level;

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

The loads under (iii) and (iv) shall not be shed under normal conditions.

- (k) 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 ALDC shall adopt a rotational load-shedding scheme to ensure equitable treatment to all consumers as far as practicable at this Stage. Subsequently if Commission comes out with any policy on load shedding through an order after public consultation, then that policy will have to be followed by the persons granted with distribution license.
- (l) 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 drawal schedule.
- (m) 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.
- (n) Within a time frame of two years, SLDC through the Distribution Licensee shall formulate and implement state-of-art demand management schemes for automatic demand management like rotational load shedding, demand response (which may include lower tariff for interruptible load) etc. to reduce over drawal in order to comply with different provisions of regulation 8.4.2 of these Regulations. SPC shall monitor the progress of the scheme and a report detailing the scheme shall be sent to the Commission by the SLDC.

8.4.3 Periodic Reports

- a) The daily and monthly report shall be issued by SLDC to all the Users and SPC Secretariat, which shall cover the performance of the State Power System for the

previous month and shall be displayed in Website of SLDC. The monthly report shall essentially contain the following: -

- i) Frequency profile giving at least the value of maximum, minimum, and average frequency of the month;
 - ii) Source wise generation for each area of Distribution Licensee;
 - iii) Demand Met for each Distribution licensee and the State as whole;
 - iv) Drawal from the InSTS by the Distribution Licensee and ARC in the area of Supply of Distribution Licensee.
 - v) Demand unserved in MW and MWh for each Distribution Licensee
 - vi) Renewable source wise generation;
 - vii) Instances and quantum of Curtailment of Renewable Energy.
 - viii) Voltage profile of all EHV substations;
 - ix) Voltage profile of all 11 KV and above of Distribution Licensees;
 - x) Major Generation and Transmission Outages;
 - xi) Transmission Constraints in detail along with name of congested transmission corridor;
 - xii) Constraints in Distribution system of Distribution Licenses at HV level in detail along with name of congested corridor;
 - xiii) Instances of persistent/significant non-compliance of WBEGC;
 - xiv) Instances of incorrect operations of protection system;
 - xv) Instances of inordinate delays in restoration of transmission elements and generating units;
 - xvi) Monthly load-duration curve with date;
- b) Each ALDC shall provide for their area of supply of the Distribution Licensee daily demand profile consisting of:
- i) Daily maximum demand (MW) with corresponding frequency (HZ) and energy (MU) with corresponding average frequency;
 - ii) Daily load shedding at peak hours (MW);
 - iii) Daily load shedding in MU;
 - iv) Daily technical interruption losses in MW at peak hours;
 - v) Daily technical interruption losses in MU;

8.4.4 Other Reports

- (a) The SLDC shall prepare a quarterly report, which shall bring out the system constraints, reasons for not meeting the requirements, if any, of security

standards and quality of service, along with details of various actions taken by different Users, and the User(s) responsible for causing the constraints.

- (b) The SLDC shall also provide information/report, as desired by SPC in the interest of smooth operation of State Power Grid.

8.5 Operation Liaison

8.5.1 Introduction

- (a) This section covers the requirement for the exchange of information in relation to operations and/or events on the State Power Grid which have had or may have an effect on:

1. National Grid,
2. The Regional Grid,
3. The State Power Grid,
4. A User System,

- (b) 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.
- (c) All operational instructions given by SLDC through telephone, fax, e-mail, etc. shall have a unique operating code number and SLDC shall maintain a voice recorder for recording and reproduction of conversation with time tag or stamp. Such record of instructions shall be kept for at least six months.

8.5.2 Procedure for Operational Liaison

- (a) Operations and events in the State Power Grid:
 - i) Before any Operation is carried out on State Power Grid, the SLDC or ALDC, as the case may be, will inform all Users, 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 or ALDC, as the case may be, will inform all Users, whose system may, or will, experience an operational effect following the event, and give details of what has happened in the event.
 - iii) The SLDC shall inform the RLDC in case such an event of (i) and (ii) impacts the Regional Grid.

- iv) Forced outages of important network elements in the State Power Grid Shall be closely monitored by SLDC level. SLDC shall sent a monthly report of prolonged outage of generators or transmission facilities to the Commission

(b) Operations and events on a User system.

- i) Barring day to day operation carried out by Distribution Licensee for maintaining load generation balance, before any operation is carried out on a User's system, the User/ALDC shall inform the SLDC or ALDC as applicable, in case the State Power Grid may, or will, experience an Operational effect. User shall also 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.
- iii) The SLDC shall inform the RLDC in case such an event of (i) and (ii) impacts the Regional Grid.

8.6 Outage Planning

8.6.1 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 so that the shortfall in supply with respect to demand can be minimized. Accordingly, procedure for generation outage programme for the State Power Grid, considering all the available resources and taking into account transmission constraints, as well as, different type of demand requirements are required to be developed. The outage planning of hydro plant, wind and solar power plant and its associated evacuation network shall be planned to extract maximum power from these renewable sources of energy. Outage of wind generator should be planned during lean wind season, outage of solar, if required, during the rainy season and outage of hydro power plant in the lean water season. In parallel optimum management of transmission outages is required to be done without adversely affecting the grid operation but taking into account the generation outage schedules, planned outages of Distribution System and Transmission Systems and maintaining of system security standards. Transmission Licensee shall make condition based preventive maintenance planning based on diagnostic techniques for condition monitoring as specified in CEA Grid Standards. Distribution Licensee shall also make condition based preventive maintenance planning based on diagnostic techniques for condition

monitoring as per Schedule-B. Based on such planning only the outage planning is to be done both by Transmission Licensee and Distribution Licensee.

- b) Protection relay related works, auto – re-closure outages and SPS testing shall be planned on monthly basis with prior permission of SLDC.
- c) A List of elements of the State Power Grid covered under these stipulations shall be prepared by SLDC in consultation with the STU and all other Users.
- d) The generation capacity and Transmission System should be adequate after taking into account the outages to achieve the security standards.
- e) The annual outage plan under the State Power Grid shall be prepared in advance for the financial year by the SLDC and reviewed during the year on quarterly and monthly basis.

8.6.2 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, which shall be in line with the Regional annual outage plan finalized by RPC for the following financial year.
- (b) All Generating Companies and Licensees including STU shall furnish their proposed scheduled outage program of all HV and EHV lines indicating the Units/Lines/Sub-stations/ICTs etc., date of start of outage and duration of outage in writing to the SLDC for the ensuing financial year by 15th of September each year. Distribution Licensees are however not required to intimate outages, which might induce load loss of less than 20 MW demand in their area of supply. Transmission Licensee and Distribution Licensee shall also give the condition-based monitoring schedule of each substation and lines while submitting the outage plan to the SLDC.
- (c) The SLDC shall prepare an optimum draft outage plan minimizing interruption to the consumers on the basis of data submitted by the Generating Companies and the Licensees. SLDC shall make available the draft Scheduled Outage Plan to RPC by 31st October each year.
- (d) Based on refinement by the RPC secretariat in the draft inter- State outage Plan, the SLDC shall also review and revise the State's Scheduled Outage Plan and intimate all Users and ALDC, the final Scheduled Outage Plan for implementation latest by 31st January each year and that shall be displayed in the Website of SLDC.

- (e) While preparing the outage plan under (c) and (d) above SLDC shall carry out necessary system studies to ensure security standard of the State Power Grid.
- (f) The above annual outage plan shall be reviewed by SLDC on quarterly basis in coordination with all parties and considering updated Regional outage plan and adjustments made wherever found to be necessary.
- (g) In case of emergency in the system viz., loss of generation, breakdown of transmission line affecting the system, grid disturbance, system isolation, the SLDC, may conduct studies again before clearance of the planned outage.
- (h) The SLDC is authorized to defer the planned outage in case of any of the following, taking into account the statutory requirements:
 - i) Major grid disturbances (Total black out in the State/Region).
 - ii) System isolation
 - iii) Partial Black out in the State
 - iv) Any other event in the system that may have an adverse impact on the system security by the proposed outage.
- (i) Generating Companies and Licensees shall plan their activities as per the latest annual scheduled outage plan finalized by the SLDC (with all adjustments made to date).
- (j) All Users shall obtain the prior approval from SLDC for availing an outage of HV and EHV element of 11KV and above.
- (k) User's requests for additional outages will be considered by SLDC to accommodate to the extent possible.
- (l) SLDC shall submit quarterly reports to the Commission indicating the deviation in planned outages from the original annual plan and also approved revised plan. Such report shall also include any deviation in condition-based monitoring from the submitted schedule along with reasons. This report shall also be hosted in the Website of the SLDC and shall be kept in the website at least for two years.

8.7 Operational Planning Study

8.7.1 SLDC, ALDC, SPC and different study Committee has to undertake different operational planning study on real time / intra-day, day ahead, weekly, monthly, yearly basis based on analysis of operational data collected for planning purpose.

8.7.2 SLDC and ALDC shall utilize network estimation tool integrated in their EMS/SCADA system for the real time operational planning study. All users shall ensure that real time

operational data for successful execution of network analysis using EMS/SCADA is made available in healthy condition throughout. Any prolonged outage of data shall be immediately reported to SLDC or ALDC, as applicable depending on control area, along with firm timeline for its restoration. The performance of online network estimation tools at SLDC and ALDC shall be discussed in the operational meeting organized by SPC. Telemetry related issues impacting the online network estimation tool shall be monitored by SLDC for early resolution.

8.7.3 SLDC and ALDC shall also perform day-ahead/ weekly/ monthly/ yearly operational study on the following aspect to the extent applicable under their jurisdiction:

- i) Assessment of TTC/ATC of the InSTS;
- ii) Assessment of TTC/ATC of the InSTS to ISTS;
- iii) Assessment of TTC/ATC from Distribution System of Distribution licensee to InSTS and ISTS;
- iv) Planned outage assessment;
- v) Special scenario assessment;
- vi) System protection scheme assessment;
- vii) Natural disaster assessment;
- viii) Any other study relevant in operational scenario

8.7.4 SLDC and each ALDC, as applicable to their jurisdiction, shall also carry out TTC and ATC on three months ahead basis and any changes required during real time/day ahead operation due to change in operating scenario considered and declare it on their website for each time block. The SLDC shall also furnish the constraints considered and assumption made during the declaration of TTC / ATC.

8.7.5 Operational planning analysis shall be done to assess whether the planned operations will not exceed any of the operational limits defined under this State Grid Code, CEA Grid Standards and any other WBERC/CEA regulations, as applicable, and CEA Manual on Transmission Planning Criteria.

8.7.6 SLDC and ALDC shall have evidence of a completed operational planning study. These evidences shall include dated power flow study results, operational plan and minutes of meeting on operational study.

8.7.7 SLDC, SPC and ALDC shall have evidence that it has an operating plan to address potential violation of system operational limit identified as a result of the operational planning study as above. These plans shall be intimated to users in advance to take corrective measures. In case any User is unable to adhere with the operational plan submitted, they shall intimate the SLDC or concern ALDC, as applicable on the User, in advance with appropriate explanation. These explanations shall also be discussed in the meeting of SPC. SLDC will submit a quarterly feedback report to WBERC for long-term measures.

8.7.8 SLDC shall perform study for new element to be commissioned in InSTS in the next six (6) months for its impact on the InSTS. In case within this period if there is likely any addition of new element in ISTS as per report of RLDC and which has impact on the InSTS of the State, then that should also be taken into account.

8.7.9 Defence mechanisms like system protection scheme, load-rejection scheme, generation run-back or any other scheme for system security shall be proposed by concerned User or ALDC or SLDC shall be discussed in SPC and then finalised by SLDC in consultation with STU if required.

8.8 Restoration Procedures

8.8.1 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 shall be reviewed / updated annually. Such plan shall develop by coordinating with generating stations and Distribution Licensees and it shall have the following schemes:

- a) Number of alternative discrete power islands with one generating unit feeding some local demand considering different grid situations that may be encountered during partial or total blackout;
- b) Corresponding to each alternative gradual creation of additional islands by adding more generating units and more demand in a coordinated manner maintaining load generations balance;
- c) Plan for gradual synchronizing islands to form a larger, more stable island.

8.8.2 Detailed plans and procedures for restoration after partial/ total blackout of each Users' system within the state, will be finalized 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 to be coordinated by SLDC. Diesel generators or any dedicated generator sets meant for black start would be tested on weekly basis and test report shall be sent to SLDC on quarterly basis.

8.8.3 Simulation studies shall be carried out for preparing restoration procedures considering the following factors:

- a) Black start capability of generator;
- b) Ability of black start generator to build cranking path and sustain island;
- c) Impact of block load switching in or out;
- d) Line/transformer charging;
- e) Reduced fault levels;
- f) Protection settings under restoration condition;

8.8.4 The thermal and nuclear generating station shall ensure preparedness for house load operation as per design. User/SLDC shall report the performance of house load operation of a generating station in the event where such operation was required.

8.8.5 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 SLDCs and shall remain always available with it.

8.8.6 The SLDC is authorized during the restoration process following a black out, to operate with reduced security standards for voltage and frequency as necessary and may direct upon such operational measures viz. suspension of secondary or tertiary frequency control, power market activities, defence schemes, reduced governor droop setting as necessary, in order to achieve the fastest possible recovery of the grid.

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

8.9 Real Time Operation

8.9.1 Principles for real time operation

a) Classification of system state:

Power system condition shall be categorized under various stages depending on the type of contingencies and states of power system variables/ parameters. These shall be broadly classified as normal, alert, emergency, extreme emergency and restoration state.

i) Normal: Power system is operating within the operational limits and equipment are within their loading limits. The system is secure and capable of maintaining stability under contingencies defined in the CEA Transmission Planning Criteria.

ii) Alert: Operational parameters are within operational limit but single contingency would lead to violation of security criteria. In this state, system operator shall take corrective measures to bring back the system to normal state. The power system remains intact under such operational state.

iii) Emergency: Under this state of operation, many of the power system variables are outside their operating limit or many of the equipment are above their operational limit. The system can be brought to alert/ normal state by taking:

- a. extreme measures such as load shedding, generation unit tripping, line tripping/closing,
- b. emergency control action such as HVDC Control, Excitation Control, HP-LP Bypass, tie line flow rescheduling on critical lines, and
- c. automated action such as system protection scheme, load curtailment scheme and generation run-back scheme.

Such operation can arise out of multiple contingencies or any major grid disturbance in the system. The power system remains intact under such operational state.

- iv) **Extreme Emergency:** System reaches extreme emergency state if the control actions taken during Emergency state are not able to bring the system to Alert or Normal state. In this state of system, system parameters are beyond operation limits and equipment are critically loaded. System may or may not remain intact (splitting may occur) and extreme events like Generation plant tripping, bulk load shedding, under frequency load shedding (UFLS) and under voltage load shedding (UVLS) operation may occur. Such situation may also arise due to high impact low frequency events like natural disasters.
 - v) **Restorative State:** It represents a condition in which control action is being taken to reconnect the system elements and to restore system load. The system transits from this state to either the alert state or the normal state, depending on the system conditions.
- b) SLDC shall endeavour to maintain the grid in a normal state by taking suitable measures. In case system is drifting away from normal state, appropriate measures shall be taken to bring the system back to normal operating state. In case system has moved to Extreme Emergency state, SLDC/ALDC shall take emergency action and initiate restorative measures of system immediately.
- c) Procedure to be followed during an event:
- i) Immediately following an event on Distribution System which may significantly impact the InSTS, the concerned ALDC shall inform the SLDC;
 - ii) Following an event on InSTS, the SLDC shall inform each user and/or ALDC for necessary action.
 - iii) Any warning in respect of system security issued by NLDC/ RLDC/ SLDC shall be taken note of immediately by User who shall take the necessary steps to withstand the said disturbance or to minimize the effect.
- d) Operational coordination:
- i) Each intra-state Transmission Licensee shall have a coordination centre in the State in which its assets are located for round the clock operational coordination.
 - ii) Each conventional generating station shall have a coordination centre in the State in which it is located for round the clock operational coordination.
 - iii) Each QCA, representing the renewable generator shall have a coordination centre within the State in which it is located for round the clock operational coordination. Provided that where a QCA is not appointed by the renewable generator, the respective generating station shall undertake operational coordination.

- iv) Any planned operation activity in InSTS system (transmission element opening or closing (including breakers), protection system outage, SPS outage and testing etc.) should be done by taking operational code from SLDC as per the jurisdiction. The operational code shall have validity of thirty (30) minutes from the time of issue. In case such operation does not take place within validity period, the entity shall obtain the operational code again.

8.10 Reactive Power Management

- 8.10.1** All users shall endeavour to maintain the voltage at interconnection point in the range specified in the State Grid Code.
- 8.10.2** The commercial settlement for reactive power shall be governed as per Annexure - 2 of this State Grid Code.
- 8.10.3** 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.
- 8.10.4** In general, the Beneficiaries shall endeavor 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 or suo-motu direction by the SLDC to the Users, but only at reasonable intervals as may be decided by the SLDC.
- 8.10.5** SLDC or ALDC, as the case may be, may direct the users about reactive power set-points, voltage setpoints and power factor control to maintain the voltage at interconnection point.
- 8.10.6** SLDC or ALDC, as the case may be, shall assess the dynamic reactive power reserve available at various substations or generating stations under any credible contingency on a regular basis based on technical details and data provided by the users.
- 8.10.7** Switching in/out of all reactive compensatory devices throughout the State Power System shall be carried out in accordance with SLDC or ALDC where applicable. SLDC or ALDC, as the case may be, shall take appropriate measures to maintain the voltage within limits inter-alia using following facilities:
- a) shunt reactors
 - b) shunt capacitors
 - c) TCSC
 - d) VSC based HVDC
 - e) synchronous/non-synchronous generator voltage control
 - f) synchronous condenser;

- g) static VAR compensators (SVC), STATCOM and other FACTS devices
- h) transformer tap change: generator transformer and inter-connecting
- i) transformer
- j) HVDC power order or HVDC controller selection to optimise filter bank

Owner of the facilities shall abide by the instructions of SLDC or ALDC as applicable.

- 8.10.8** Reactive power facility shall be in operation at all times and shall not be taken out without the permission of SLDC or ALDC, as applicable.
- 8.10.9** Periodic/seasonal tap changing of inter-connecting transformers and generator transformers shall be carried out to optimize the voltages and if required other options such as tap staggering may be carried out in the network. Tap changing on all ICTS at 400 KV/ /220 kV/ 132 kV/ 66kV buses shall be done as per SLDCs instructions only.
- 8.10.10** All generating stations connected to grid shall generate/absorb reactive power as per instructions of SLDC or ALDC, as applicable, within capability limits of the respective generating units. Such instructions shall ensure that active power generation is not sacrificed under normal conditions. No payments shall be made to the generating companies for such reactive power generation/absorption.
- 8.10.11** Hydro and gas generating units having capability shall operate in synchronous condenser mode operation as per instructions of SLDC or ALDC, as applicable. Standalone synchronous condenser units shall operate as per instructions of RLDC or SLDC.
- 8.10.12** If voltages are outside acceptable limits and the means of voltage control set out in the above clause are exhausted, SLDC shall take all reasonable actions necessary to restore the voltages to within the relevant limits including dropping of lines considering security of system.
- 8.10.13** 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 WBERC for VAr exchanges on Intra State Transmission System. 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-2 shall be applied. Per kVArh rate shall be as specified by WBERC for VAr exchanges on Intra State Transmission System.
- iv) The computation and payments for such VAr exchanges shall be effected as mutually agreed between the two Beneficiaries.

8.10.14 On commencement of these DSM Regulations, SLDC shall create a fund for receiving and making payment for charges related to reactive energy and name of such fund will be SLDC-RE-FUND-WBSETCL. The SLDC-RE FUND- WBSETCL shall be managed as following:

- a) All deposits for Reactive Charges payable by any entity shall be made through electronic clearance system. Cost of services shall be payable by the depositor.
- b) DS Charges receivable by any entity shall be remitted through electronic clearance system and cost of services shall be borne by the entity.
- c) SLDC shall maintain the accounts of the SLDC-RE FUND-WBSETCL A/c separately and such account shall not be considered as the part of the accounts of the SLDC.
- d) Accounts of SLDC-RE FUND-WBSETCL shall be audited by a Chartered Accountant / Cost Accountant in full time practice for every financial year within 30th June of the succeeding year and such audited accounts shall be subsequently submitted to the Commission within 31st July of that year for approval.
- e) The entity shall pay the RE Charges within seven (7) days of the billing date in pursuance of regulation 7.2 of the State Electricity Grid Code. The DDO will activate the Letter of Credit (LC) if the amount receivable from any entity is not received fully or partly within seven (7) days from date of issuance of the weekly DS statement.
- f) Such account shall be operated by the DDO with the cheque signing authority for payment upto Rs.5 lacs. For payment above Rs. 5 Lacs such cheque signing authority shall be jointly with the DDO and the Officer in-charge of SLDC.

8.11 Event Information

8.11.1 Introduction

This section deals with reporting procedures in writing of reportable events in the system to all Users, STU, SLDC / ALDCs to ensure consistent approach in the reporting of incidents/events, information to be supplied and reporting route to be followed.

8.11.2 Responsibility

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

8.11.3 Reportable Events

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

- a) Violation of security standards and/ or grid discipline.
- b) Non-compliance of SLDC's instructions.
- c) System islanding/system split
- d) State black out/partial system black out
- e) Protection failure on any element of InSTS.
- f) Power system instability
- g) Tripping of any element of the State Power Grid.
- h) Major fire incidents
- i) Sudden load rejection by any User Loss of major generating unit
- j) Excessive Drawal deviations

8.11.4 Reporting Procedure

- (a) All reportable incidents occurring in the systems of Users shall be intimated orally to the SLDC, immediately. 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 twenty-four hours duly followed by a comprehensive report after achieving steady state conditions. 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) Following detail for example shall form part of the written report:

- i) Time and date of event
- ii) Location
- iii) Plant and/or Equipment directly involved Description and cause of event
- iv) Antecedent conditions of load and generation, including frequency, voltage and flows in the affected area at the time of tripping including weather condition prior to the event
- v) Demand and/or Generation (in MW) interrupted and duration of interruption
- vi) All Relevant system data including copies of records of all recording instruments including Disturbance Recorder, Event Logger, DAS etc.
- vii) Sequence of tripping with time. Details of Relay Flags.
- viii) Remedial measures.
- ix) Estimated time of return to service, Any other relevant information,
- x) Name and designation of reporting officer.

8.11.5 All the above reporting shall not relieve any Users from the obligation to report events in accordance with any regulations related to safety under the Act or any other law.

8.12 Field Testing for Model Validation:

8.12.1 Objective:

This section specifies the periodicity and tests to be carried out on power system elements for ascertaining correctness of mathematical models used for simulation studies as well as ensuring desired performance during an event in the system.

8.12.2 General provisions regarding testing:

- a) The owner of the element of State Power System shall be responsible to carry out test as described in respective sections and submission of report to SLDC.
- b) All equipment owner shall submit a testing plan for the next year to SLDC for information to all by 31st October for ensuring proper coordination during testing as per the schedule. In case of any change in schedule, the owner shall inform SLDC in advance.

- c) The tests shall be performed once every five (5) years or whenever major retrofitting is done or if necessitated earlier due to any adverse performance observed during any grid event.
- d) The owner of the power system elements shall implement recommendations if any suggested in the test reports in consultation with SLDC or any changes suggested by the latter.

8.12.3 Testing requirements:

The following tests shall be carried out on respective power system elements:

Power System Elements	Tests	Applicability
Synchronous Generator	(1) Real and Reactive Power Capability assessment. (2) Reactive Power Control Capability (As per CEA Grid Connectivity Regulations assessment). (3) Model Validation and verification test for the complete Generator and Excitation System model including PSS. (4) Model Validation and verification of Turbine/Governor and Load Control or Active Power/ Frequency Control Functions. (5) Testing of Governor performance and Automatic Generation Control	Individual Unit of rating 100 MW and above for Coal / lignite, 50 MW and above gas turbine and 25 MW and above for Hydro.
Non-synchronous Generator (Solar/Wind)	(1) Real and Reactive Power Capability for Generator. (2) Power Plant Controller Function Test.	Applicable as per CEA Grid Connectivity Regulations

	<p>(3) Frequency Response Test.</p> <p>(4) Fault Ride through Test (sample testing of a unit in the generating stations).</p>	
HVDC/FACTS Devices	<p>(1) Damping capability of HVDC/FACTS Controller.</p> <p>(2) Frequency Controller Capability of HVDC Controller.</p> <p>(3) Reactive Power Controller (RPC) Capability for HVDC/FACTS.</p> <p>(4) Validation of voltage dependent current order limiter (VDCOL) characteristic for ensuring proper validation of HVDC performance.</p> <p>(5) Filter bank adequacy assessment based on present grid condition.</p> <p>(6) Validation of response by FACTS devices as per settings.</p>	<p>To all ISTS HVDC as well as Intra-State HVDC/FACTS</p>

CHAPTER - 9: Ancillary Services

9.0 Introduction

The objective of introduction of ancillary services is to restore the frequency at desired level and to relieve the congestion in the transmission network. State Sector Generating Stations whose tariff is determined or adopted by the Commission for their full capacity shall provide RRAS. All other State Generating Stations whose tariff is not determined or adopted by the commission may also be considered for RRAS. In such case the consolidated tariff may be considered as Cap Rate as defined under DSM Regulations.

9.1 Role of SLDC

9.1.1 SLDC shall prepare merit order stack of State Sector Generating Stations as stipulated in regulation 9.1.2 and take despatch decision.

9.1.2 For Regulation-Up, the SLDC shall prepare stack of un-requisitioned surplus capacities available in respect of SSGSs from lowest variable cost to highest variable cost in each time block, and taking into account ramp up or ramp down rate, response time, transmission congestion and such other parameters as stipulated in the Detailed Procedure for Ancillary Services as specified under regulation 9.8 of this State Grid Code. For Regulation-Down, a separate merit order stack from highest variable cost to lowest variable cost incorporating technical parameters as above shall be prepared.

9.1.3 SLDC shall prepare merit order stack factoring InSTS constraints, if any.

9.1.4 SLDC shall monitor the frequency during continuous low frequency or high frequency period, any system contingency, loading on tie line etc.

9.1.5 SLDC shall direct the selected RRAS Provider(s) based on the merit order for economical despatch for Regulation Up and Regulation Down, as and when requirement arises in the system on account of any of the following events:

- a) Extreme weather forecasts and/or special day;
- b) Generating unit or transmission line outages;
- c) Trend of load met;
- d) Trends of frequency;
- e) Any abnormal event such as outage of hydro generating units due to silt, coal supply blockade etc.;
- f) Excessive loop flows leading to congestion; and
- g) Such other events.

- 9.1.6 SLDC shall direct the selected RRAS Provider(s) to withdraw their services after the circumstances leading to triggering of RRAS no longer exist. The time-frame for withdrawal of service shall be determined as per the Detailed Procedure for Ancillary Services as specified under regulation 9.8 of this State Grid Code.

9.2 Role of Reserves Regulation Ancillary Services Provider (RRAS Provider)

- 9.2.1 The RRAS Provider shall on monthly basis submit the following to the SLDC/ ALDC.

- a) Capacity Charges rate (paise/kWh upto one decimal place)
- b) Energy Charge rate (paise/kWh upto one decimal place)
- c) MFCA Charges (paise/kWh upto one decimal place)
- d) Any other applicable statutory charges
- e) Maximum possible ex-bus generation (MW) including overload if any (Pmax)
- f) Minimum turn down level (MW) (Pmin)
- g) Type of fuel
- h) Ramp up rate (MW/min) for each unit
- i) Ramp down rate (MW/min) for each unit
- j) Start-up time from cold start (in minutes)
- k) Start-up time from warm start (in minutes)
- l) Minimum up time for a unit after synchronization (in minutes)
- m) Minimum down time for a unit after desynchronization (in minutes)
- n) Maximum number of units that can be started up simultaneously
- o) Any other information / constraints

- 9.2.2 The RRAS Provider shall inject or back down generation as per the instruction of the SLDC for Regulation Up and Regulation Down respectively.

- 9.2.3 SLDC shall use the details of capacity charges, energy charges, MFCA charges and any other statutory charges applicable for the RRAS Providers for preparation of their energy/ Deviation Accounts.

9.3 Dispatch of Reserves Regulation Ancillary Services

- 9.3.1 Generation under the RRAS shall be scheduled to the Virtual Ancillary Entity as decided by the SLDC.

- 9.3.2 Once the time period as specified by the SLDC in the scheduled procedure starts, RRAS shall be deemed to have been triggered.

- 9.3.3 The schedules of the RRAS Provider(s) shall be considered as revised by the quantum scheduled by the SLDC under RRAS.

- 9.3.4 Any deviations in schedule of RRAS Provider(s) beyond the revised schedule shall be treated in accordance with the DSM Regulations.

9.4 Withdrawal of Reserves Regulation Ancillary Services

The SLDC, having been satisfied that the circumstances leading to triggering of RRAS no longer exist, shall direct the RRAS Provider(s) to withdraw with effect from the Time Block as specified in the Detailed Procedure for Ancillary Services as specified under regulation 9.8 of this State Grid Code.

9.5 Scheduling of Reserves Regulation Ancillary Services

- 9.5.1 The quantum of generation dispatched shall be directly incorporated in the schedule of respective RRAS Provider(s).
- 9.5.2 For Regulation Up Service, power shall be scheduled from the generating station to the Virtual Ancillary Entity by SLDC, until such time the SLDC gives instruction for withdrawal of service.
- 9.5.3 For Regulation Down Service, power shall be scheduled from the Virtual Ancillary Entity to the generating station, so that effective scheduled injection of the generating station comes down, until such time SLDC gives instruction for withdrawal of service.
- 9.5.4 Separate statement shall be maintained along with state level Deviation Settlement Account for RRAS.
- 9.5.5 The energy despatched under RRAS shall be deemed as delivered ex-bus.

9.6 Energy Accounting

- 9.6.1 Energy Accounting shall be done by SLDC on weekly basis along with Deviation Settlement Account based on interface meters data and schedule.
- 9.6.2 SLDC shall issue an Ancillary Services Statement along with the Deviation Settlement Mechanism Account.

9.7 Reserves Regulation Ancillary Services Settlement

- 9.7.1 The settlement shall be done by SLDC under the Deviation Settlement Account under separate account head of Reserves Regulation Ancillary Services.
- 9.7.2 The payment to RRAS Provider(s) shall be from the SLDC-DS-FUND-WBSETCL. Deficit, if any, in the SLDC-DS-FUND-WBSETCL maintained by an SLDC due to despatch of Ancillary Services, shall be made up by all the Users in proportion to

their Daily Base DSM Charges as per DSM Regulations or in proportion to any other mean.

Or

In case of a deficit pool, dispatch under RRAS is not envisaged.

- 9.7.3** The RRAS Provider(s) shall be paid from SLDC-DS-FUND-WBSETCL at their Capacity Charges, Energy Charges, MFCA charges, and other statutory charges, if any, with mark-up on Capacity Charges, as decided by the Commission through a separate order from time to time in case of Regulation Up services for the quantum of RRAS scheduled.

Provided that, the Capacity Charges, Energy Charges, MFCA charges, and other statutory charges allowed by the Commission and as applicable at the time of delivery of RRAS shall be used to calculate the payment for this service and no retrospective settlement of Capacity or Energy charges shall be undertaken even if the Capacity or Energy charges are revised at a later date.

- 9.7.4** The RRAS Provider(s) shall adjust the Capacity charges to the original beneficiaries for the quantum of un-requisitioned surplus scheduled under Regulation Up service.
- 9.7.5** For Regulation Down service, the RRAS Provider(s) shall pay back 75% of the Energy Charges corresponding to the quantum of Regulation Down services scheduled, to the SLDC-DS-FUND-WBSETCL.
- 9.7.6** Any deviation from the schedule given under RRAS shall be in accordance with the DSM Regulations.
- 9.7.7** Sustained failure to provide the RRAS (barring unit tripping) by RRAS Provider(s) shall attract penalties on account of gaming. Violation of directions of SLDC for RRAS shall also make the RRAS Provider(s) liable for penalties in terms of section 29 of the Act.
- 9.7.8** No commitment charges shall be payable to the RRAS Provider(s) for making themselves available for the RRAS.

9.8 Detailed Procedure for Ancillary Services

- 9.8.1** SLDC shall, after obtaining prior approval of the Commission, issue the Detailed Procedure for Ancillary Services within a period of 3 months of notification of these regulations.
- 9.8.2** The Detailed Procedure for State Grid Operation shall contain the guidelines regarding operational aspects of RRAS including scheduling and dispatch and any residual matter.

CHAPTER - 10: SCHEDULING AND DESPATCH CODE

10.0 Introduction

This chapter deals with the procedure to be adopted for scheduling of the net injection/drawal of Users and the modalities for information exchange including scheduling for intra-state power transaction of power through InSTS as well as for power transaction through ISTS by using InSTS. This chapter covers a) control area jurisdiction b) procedure for scheduling and despatch in a decentralized manner c) mechanism for unit commitment d) framework for Security Constrained Economic Despatch (SCED) of State Sector Generating Station and e) compensatory mechanism for part load operation of generating stations.

10.1 Control Area Jurisdiction

- a) For scheduling and despatching the jurisdiction of SLDC are as follows:
 - i) Generating station connected only to the InSTS;
 - ii) Generating station connected only to the ISTS where full share is allocated to State;
 - iii) Generating station connected to both ISTS and state network with more than 50% of installed capacity tied up with the State through long term PPAs;
 - iv) The Distribution Licensee connected to the InSTS;
 - v) The Embedded Generating Station of a Distribution Licensee for the power that is despatched by using InSTS;
 - vi) Any person other than mentioned in (i) to (v) and connected to InSTS or using InSTS through open access to the extent of power being transacted by using InSTS.
- b) For scheduling and despatching the jurisdiction of ALDC of a Distribution Licensee are as follows:
 - i) Embedded Generating Station of the Distribution Licensee
 - ii) Any other person, other than generating station, connected to the Distribution System of the Distribution Licensee and transacting power through open access
- c) Notwithstanding above, there may be exceptions to above provisions, for reasons of operational expediency subject to approval of CERC or WBERC, as applicable.
- d) In case a generating station is connected to both InSTS and Distribution System of Distribution Licensee, the load despatch centres involved shall

coordinate with each other while scheduling with a view to ensuring grid security. In case of any difference of view on scheduling, the directions of the SLDC shall be binding.

10.2 General Provisions for scheduling and Despatching

10.2.1 Responsibility of SLDC:

With regard to grid operation specially with reference to scheduling and despatching, SLDC shall have the total responsibility for:

- a) Scheduling/ despatching the generation of
 - i) all SSGS connected to the InSTS or using InSTS for dispatch of power,
 - ii) Generating Station connected to the ISTS and where full share is allotted to the State,
 - iii) and generating stations connected to both ISTS and InSTS where State has more than 50% of share.
- b) Requisitioning and Scheduling drawals by Beneficiaries from
 - i) the SSGS connected to InSTS, and
 - ii) generating stations to ISTS (within their share in the respective plant's expected capability).
- c) Scheduling Bilateral Transactions.
- d) Rescheduling of injection / drawal 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.
- e) Regulating the demand of the InSTS by regulating the net drawal schedule of the Distribution Licensees and other Beneficiaries in the State depending on ATC.
- f) While making requisition or scheduling SLDC shall have to ensure following issues:
 - i) Balancing of demand and supply to minimize Area Control Error (ACE) during any scheduling.
 - ii) Running a Security Constraint Unit Commitment on State Power System Basis
 - iii) Maintaining and ensuring despatch of reserves of various kinds such as specified in this State Grid Code such as, secondary and tertiary reserves to minimize ACE.
 - iv) Implementation of

- ABT procedures including Security Constrained Economic Despatch, and
 - restricted governor mode operation or free governor mode operation at power stations wherever specified under these Regulations.
- g) Maintenance and compilation of all relevant information for generating monthly statement of all commercial parameters in accordance with the Balancing and Settlement Code and DSM Regulations;
- h) Based on Final Implemented Schedule taking action to issue all the information as needed under Balancing and Settlement Code to the User of the InSTS and/or who is connected to the InSTS.

10.2.2 Responsibilities of ALDC:

With regard to grid operation specially with reference to scheduling and despatching, ALDC of a Distribution Licensee shall have the total responsibility for:

- a) Requisition to SLDC for drawal of power
- i) by the Distribution Licensee from generating station connected to InSTS and/or ISTS and with whom PPA exist as per Open Access Regulations;
 - ii) by the Distribution Licensee from any Seller with whom PPA exist as per Open Access Regulations;
 - iii) by other beneficiaries connected to the Distribution system of the Distribution Licensee.
- b) Intimating the Declared Capacity to SLDC of the Embedded Generating Stations owned by
- i) the Distribution Licensee, and
 - ii) other persons whose power to be despatched by using the InSTS.
- c) Scheduling of Embedded Generating Stations owned by the Distribution Licensee.
- d) Scheduling of drawal by the beneficiary and Scheduling for Injection by the Embedded Generator where both beneficiary and Embedded Generating Station are connected to the same Distribution system of the Distribution Licensee.
- e) Maintaining and ensuring despatch of reserves of various kinds such as specified in this State Grid Code such as, secondary and tertiary reserves to minimize ACE.

- f) Based on Final Implemented Schedule taking action to raise the bill for DSM related charges to the entity under (C) and declaration of other parameters for the month that is required for commercial settlement between the beneficiary and Embedded Generating Station in pursuance to the provisions as laid down in Open Access Agreement as specified under Open Access Regulations.

- 10.2.3** The State Power System shall be operated as power pool, where system of each Beneficiary shall be treated and operated as a notional control area. The algebraic summation of scheduled drawal from different sources of supply through Long-Term Open Access, Medium-Term Open Access and Short-Term Open Access arrangements after due adjustment of applicable transmission losses and/or distribution losses shall provide the Net Drawal Schedule of each Beneficiary. This net drawal schedule would be reflected at the periphery of the control area of the Beneficiary and this shall be determined in advance on day-ahead basis.
- 10.2.4** The SSGS and Users shall be responsible for power generation/power injection generally according to the daily injection schedules advised to them by the SLDC, on the basis of the contracts/ requisitions received from the concern Users and also the basis of the principle of merit order despatch. Where applicable due adjustment of transmission losses and/ or distribution losses is to be done for determination of injection schedule at the point of injection.
- 10.2.5** The applicable transmission losses for regulation 10.2.3 and regulation 10.2.4 of the State Grid Code shall be the transmission loss as determined by applying the regulation 13.1 of this State Grid Code.
- 10.2.6** Users shall always endeavor to adhere to net drawal schedule or injection schedule, as applicable. Deviations from net drawal schedule shall be appropriately priced through the DSM as specified in DSM Regulations. Such deviations should not cause any system parameter to deteriorate beyond permissible limits or do not lead to overloading of the Transmission System.
- 10.2.7** SLDC shall always exercise control to restrict the net drawal/ injection of the Users from the State Power Grid within their respective net drawal/ injection schedules within the limits specified in DSM Regulations, as the case may be. SLDC shall direct the Beneficiaries to carry out the requisite load shedding for restricting over drawal, if any. The Beneficiaries shall ensure that their automatic demand management scheme mentioned in regulation 8.4 in this State Grid Code acts to ensure that there is no over drawal. If automatic demand management scheme has not yet commissioned, then action shall be taken as per manual demand management scheme to restrict the net drawl from the grid within the schedules and all actions for early commissioning of Automatic Demand Management Scheme (ADMS) shall be initiated. 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 $FREQ_L$ as per Schedule of this State Grid Code.

- 10.2.8** The SLDC/ concerned ALDC/ bulk consumer connected to State Power Grid shall ensure that their automatic demand management scheme is kept in service. The generation, storage and demand response reserves shall be efficiently deployed to minimize the ACE. In order to sustain ACE close to zero (0), the algebraic sign of ACE shall traverse the zero (0) error line at least once in six (6) time-blocks.

Provided that the requirement of algebraic sign of ACE shall not be applicable to wind, solar, hybrid of wind and solar, run of the river hydro generation without pondage:

Provided further that the requirement of algebraic sign of ACE shall not be applicable to injection of infirm power and drawal for start-up power by a generating station, and post forced outage of a generating station transacting through collective day ahead or real time transactions on a power exchange.

10.2.9 Important Principles on Merit Order Despatch:

- (a) For the purpose of merit order despatch from any generating stations on Nth month, SLDC/ALDC shall consider the energy charge rate of (N-2)th month. For this purpose the Generating Company of the SSGS or the ALDC shall submit within 25th of (N-1)th month, the energy charge rate of the generating stations for (N-2)th month before the SLDC with required adjustment for changes due to Monthly Fuel Cost Adjustment (MFCA) or Monthly Variable Cost Adjustment(MVCA) for that month.
- (b) While scheduling the injection schedule by ALDC of a Distribution Licensee for Embedded Generating Station of Distribution Licensee for supplying power to the Distribution Licensee on the basis of declared capacity by that generating stations, ALDC shall also consider the firm allocation of capacity or power provided by the other suppliers (henceforth called as firm supplier) to the licensee with same weightage along with the Embedded Generating Station of the Distribution Licensee following the principle of merit order dispatch/supply based on landed / summated amount of energy charge at the distribution boundary and social cost charge, if available, against each unit of injection for preparation of the injection schedule for the generating stations of the licensee and drawal schedule from its firm suppliers. In absence of separate energy charges the single part tariff will itself be considered as energy charge till two part tariff is introduced. In case of deviation is to be taken from merit order dispatch principle by ALDC due to any grid security or congestion management, then that shall be communicated to SLDC for approval.
- (c) On submission of such injection schedule of generating station of the licensee and drawal schedule of the Distribution Licensee prepared as per regulation

9.2.9 of this State Grid Code by ALDC to SLDC, the SLDC shall check those schedules to ensure that there is no deviation from the principles of merit order dispatch/supply and in case of any deviation, SLDC shall make appropriate modifications before releasing of injection and drawal schedule in pursuance to State Grid Code.

10.2.10 Power to Revise Schedules:

- a) Irrespective of finalized injection/drawal schedules, in case of contingencies such as overloading of lines, transformers, abnormal voltages, threat to system security, SLDC may direct the ALDCs/ Bulk Consumers to increase/decrease their drawal / injection. Such directions shall be immediately acted upon.

In case the situation does not call for urgent action, and SLDC has some time for analysis, it shall check whether the situation has arisen due to deviations from schedules. In case if there are any deviations then that deviations shall be got terminated first, through appropriate measure like opening of feeders, if considered necessary by SLDC, before an action, which would affect the scheduled supplies to the Short-Term Customers or Medium-Term Customers or Long-Term Customers.

- b) In case of overloading of lines, transformers, abnormal voltages or threat to system security, the following steps may be taken by SLDC as the case may be:
 - i. Issue directions to adhere to the schedules and ensure deviations are stopped.
 - ii. Despatching ancillary services.
 - iii. Take appropriate measures like tripping of pump storage plants operating in pumping mode or Storing operation of ESS.
 - iv. Despatching emergency demand response measures.
- c) RLDC may *suo-motu* revise the schedule of any regional entity generating station to operate at or above minimum turndown in the interest of reliable system operation. While doing so, it is possible that the requisition of some beneficiaries may go up to ensure technical minimum. In this case, SLDCs may surrender power from some other inter-state generating station(s) or intra-state generating station(s) out of merit order.
- d) In the event of transmission or system security constraint, the renewable generation may be curtailed after harnessing available flexible resources including energy storage systems.
- e) In case it becomes necessary to curtail scheduled transactions, then the guide lines as specified in the Open Access Regulations shall be followed. In case

Short-Term Open Access/ Medium-Term Open Access or Long-Term Open Access are curtailed, SLDC shall submit a report to the SPC regarding the reasons to which it was not able to curtail deviations from schedule and agencies which had not taken necessary actions. SLDC, as the case may be, shall publish such report on the website.

- f) In the event of extreme circumstances when any MUST RUN plant has to be curtailed, the details shall be published on the RLDC/SLDC website the following day, as the case may be, giving the date, name of RE generation plant, installed capacity, curtailment quantum in MWh, duration of curtailment and detailed reasons thereof.
- g) Notwithstanding above, SLDC may revise the drawal and/or injection schedule of Users in the interest of reliable system operation.
- h) SLDCs would curtail a transaction if required.
- i) Whenever SLDC revises final schedules due to reasons of grid security or contingency, the short reason shall be informed immediately to the concerned followed by a detailed explanation to be posted on the website within 24 hours.

10.2.11 Third Party Sale Out of Long Term PPA:

- a) The SSGS shall be allowed to sell the power of any long term PPA holder in the market with express consent of the PPA holder. The PPA holder shall communicate its consent for a day or standing consent for longer duration to the SSGS about the quantum and duration for which power shall not be requisitioned. Where the consent has been given by the PPA holder to the SSGS, the PPA holder shall not be allowed to recall such power. The SSGS shall submit the details to the SLDC regarding such power sold in the market along with details of PPA holder who had surrendered its power.
- b) Without prejudice to above, scheduling for third party sale may also be carried out in accordance with this State Grid Code.

10.2.12 Requirement for Commencement of Scheduling:

- (a) The following documents shall be submitted to SLDC before commencement of the scheduling of transactions under long-term and medium-term access:
 - i) Grant of long-term or medium-term open access by the STU;
 - ii) PPA between generator or seller and the beneficiary or buyer by either of the parties;
 - iii) Letter of operationalization of long-term or medium-term open access by the STU;

- (b) The scheduling of short-term open access and collective power exchange transactions shall be based on approval as specified in Open Access Regulations.

10.2.13 Declared Capacity for Scheduling:

- a) The SSGS shall make an advance declaration of ex-power plant MW capacities foreseen for the next day, i.e., from 0000hrs to 2400 hrs. on a daily basis, ramping up/down capability foreseen for the next seven (7) days on a rolling basis:

Provided that:

- i) In case of a hydro generating stations, the generating station shall declare MWh capabilities foreseen for the next day along with maximum generation capacity in MW for continuous three hours.
 - ii) In case of a gas turbine generating station or a combined cycle generating station, the generating station shall declare fuel-wise MWh energy capability on differently priced fuels separately along with the combined maximum capacity in MW for units/modules.
 - iii) The renewable generating stations (including hybrid systems) in the State Power System shall make an advance declaration of forecast and available capacity foreseen for the next day, i.e., from 00:00 hrs. to 24:00 hrs.
- b) During fuel shortage conditions the coal fired thermal generating stations shall in line with Tariff Regulation, declare the capacity for both the situations as mentioned below:
 - i) Actual Declared Capacity taking into consideration existing actual shortage in coal supply and this is to be known as declared capacity.
 - ii) Notional Declared Capacity considering no shortage notionally in coal supply.

SLDC shall verify the claim of shortage of coal. The generating stations will submit such data and information as may be required by SLDC to verify the claim. In case of gas turbine generating station or a combined cycle generating station, the generating station shall declare the capacity for units and modules on APM gas, RLNG and liquid fuel separately, and these scheduled separately,

- c) While making or revising its declaration of capacity, except in case of Run of the River (with up to three hours pondage) hydro stations and RE generators, the SSGS shall ensure that the declared capacity during peak hours is not less than that during other hours. However, exception to this rule shall be allowed in case of tripping/ re-synchronization of units as a result of forced outage of units.
- d) It shall be incumbent upon the SSGS to declare the plant capacity faithfully, i.e. according to their best assessment. In case, it is suspected that they have deliberately over/under declared the plant capacity contemplating to deviate from the schedules given on the basis of their capacity 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.
- e) The SSGS under ABT may be required to demonstrate the declared capacity of its generating station as and when asked by the SLDC on the basis of request from any beneficiary or suo-motu. SLDC shall ask each SSGS to demonstrate the Declared Capacity at least for three times in a year and report mis-declaration if any. The Schedule decided by the SLDC shall be binding on the beneficiaries for such demonstrating of Declared Capacity. For coal fired thermal generating station such demonstration shall be applicable for both actual declared capacity (normally called as declared capacity) and Notional Declared Capacity as explained in clause (b) of this regulation 9.2.13 of this State Grid Code. On a day when there is difference between Actual Declared Capacity and Notional Declared Capacity, SLDC, on the basis of request from any beneficiary or suo-motu shall mandatorily ask for at least one demonstration covering number of Time Blocks at a stretch of a duration of 15 to 20 minutes against Notional Declared Capacity where such demonstration period excludes the ramp-up and ramp down time. In the event the generating station fails to demonstrate any of such declared capacity, the capacity charges due to the generating station shall be reduced as a measure of penalty as specified in Tariff Regulations.
- f) If the captive generating plant / generating station sell a portion of its power to the licensee, then the coal shortage against total installed capacity is required and the respective proportion for Notional Declared Capacity under sale to licensee will be determined as per ratio of allocation in PPA to the licensee. For such captive generating plant the demonstration is to be given for Notional Declared Capacity against total installed capacity and for that period if there is any surplus generation the licensee will consume such surplus generation. Moreover, for such declaration in such demonstration penalty will be imposed and other measures will be taken proportionately to

the extent of its installed capacity which is agreed for allocation for sale to the licensee under PPA.

- g) No separate cost of demonstration will be allowed for either type of the declared capacity for a unit which is kept idle for want of demand or shortage in coal-supply. This means that, for such demonstration, corresponding capacity charge and fuel cost as determined under normative parameter as provided in tariff order will be applicable.
- h) While giving notice for demonstration of Declared Capacity, to a coal fired thermal generating station SLDC shall clearly mention whether such demonstration is to demonstrate the Actual Declared Capacity or Notional Declared Capacity. In case of demonstration of Notional Declared Capacity, same demonstration will also be treated as the demonstration for Actual Declared Capacity. For generating stations other than coal fired thermal generating stations, demonstration of declared capacity means Actual Declared Capacity only.
- i) During demonstration of Actual Declared Capacity or Notional Declared Capacity the actual injection will be treated as the revised schedule of injection for those Time Blocks and the period of ramp-up and ramp-down under which such demonstration takes place in accordance with prior intimation to all entities by SLDC about undertaking of such demonstration. The impact of such additional injection due to such demonstration will be distributed as additional drawal schedule among the purchaser of electricity of that generating station in proportion to their original drawal schedule or as per direction of SLDC where such additional generation can be scheduled for any licensee who has shortage of power or to the licensee (s) who has asked for such demonstration.
- j) The quantum of penalty for the first mis-declaration for any duration/block in a day shall be the charges corresponding to two days capacity charges. For the second miss-declaration the penalty shall be equivalent to capacity charges for four days and for subsequent miss-declarations, the penalty shall be multiplied in the geometrical progression till the recoverable monthly capacity charge becomes zero in that month. In the mis-declaration where demonstrated capacity against Notional Declared Capacity is less than the corresponding Actual Declared Capacity, then the penalty will be applicable against failure for any one type of declared capacity only. The penalty arising out of mis-declaration shall be recorded by SLDC as specified in the Balancing and Settlement Code and its cumulative amount shall be adjusted with the recoverable revenue through tariff after adjusting the ARR with the amount determined in APR.

- k) In case of no mis-declaration against Actual Declared Capacity/ Declared Capacity in a day, the Actual Declared Capacity/ Declared Capacity for each time block of the day shall be treated as resultant/ achieved actual availability. Similarly, in case of no mis-declaration against Notional Declared Capacity in a day, the Notional Declared Capacity for each time block of the day shall be treated as achieved/ resultant notional declared availability. In case of mis-declaration(s), the availability to be determined against Actual Declared Capacity/ Declared Capacity and Notional Declared Capacity of the generating station for the whole day shall be as specified in the Balancing Settlement Code. In case of mis-declaration against Notional Declared Capacity, following methodology is to be adopted for determination of Actual and Notional availability.
- l) If demonstrated capacity/ availability lies between Actual Declared Capacity and Notional Declared Capacity, then during the time block when such demonstration takes place the notional availability will be the demonstrated capacity. Based on such value the notional availability for the whole day will be calculated as per the Balancing Settlement Code.
- m) If demonstrated capacity/ availability lies below the Actual Declared Capacity then during the time block when such demonstration takes place the notional availability as well as actual availability will be the demonstrated capacity. Based on such value the notional availability and actual availability for the whole day will be calculated as per the Balancing Settlement Code.
- n) When there is no demonstration but at frequency below 50Hz, if there is failure to inject by the generating station at least to the level of 95% of the schedule of injection for any time block, the actual availability as well as notional availability will be reduced to the actual injection for the concerned time block in order to determine the amount for recovery as capacity charge and that failure shall not be treated as a mis-declaration.
- o) Provided that if during that block the generation is under back down condition as per direction of SLDC, then the actual availability/notional availability will be reduced by the extent equal to the difference of revised schedule due to back down and the actual injection.
- p) In case of dispute on the issue of mis-declaration, the same shall be referred to the Commission.

10.2.14 Optimum Utilisation of Hydro Energy:

- i) Run-of-river power station with pondage and storage type power stations are designed to operate during peak hours to meet system peak demand. Maximum capacity of the station declared for the day shall be equal to the

installed capacity including overload capability (during water spillage condition only), if any, minus auxiliary consumption, corrected for the reservoir level. SLDC or ALDC, where applicable, shall ensure that generation schedules of such type of stations are prepared and the stations despatched for optimum utilization of available hydro energy except in the event of specific system constraints.

- ii) During high inflow period and spillage condition, subject to availability of margins in transmission system, SLDC or ALDC, where applicable, shall allow scheduling of power from hydro generating stations (irrespective of ownership) corresponding to overload capacity upto 10% of existing LTOA even without obtaining additional LTA/ MTOA/ STOA for the overload capacity:

Provided that SLDC or ALDC, where applicable, shall allow the Declared Capacity declared by the generator for the purpose of PAF calculation of the generating station.

Provided that in case of beneficiaries with PPAs for fixed quantum of power, the beneficiary shall have the first right of refusal in such overload capacity. In the scenario of the beneficiary deciding not to avail such power under overload capacity, the generating station shall be free to sell the same to any other entity or in power exchanges and shall be liable to pay the applicable STOA charges, instead of additional LTOA charges, for the scheduled overload capacity.

- iii) The schedule finalized by the concerned load despatch centre for hydro generating station, shall normally be such that the scheduled energy for a day shall be close to the total energy (ex-bus) declared by the generating station.

10.2.15 Flexibility in Scheduling from various contracts upto approved LTOA/MTOA

- a) A Distribution Licensees / buyer shall have the flexibility to requisition/ schedule such quantum of power as per its preference from its portfolio of power contracts (long/medium/short term agreements) upto the approved quantum of long-term access and/or medium-term open access to such User.

Provided that:

- i) for scheduling power under short-term bilateral contract, the user shall be required to obtain STOA as per Open Access Regulations.
- ii) If the user does not fully requisition its short-term access before the opening of day-ahead bidding in power exchanges, the unused corridor(s) against such access shall be forfeited, and released in the day ahead and real time markets. SLDC shall include the modalities of implementation in the SLDC Detailed Procedures as specified under Open Access Regulations.

10.2.16 Ramping Rate to be Declared for Scheduling

The generating stations shall declare the ramping rate along with the declaration of day ahead availability in the following manner. The same shall be accounted for in the preparation of generation schedules.

- a) Coal/lignite fired stations shall declare a ramp up/down rate of not less than 1% of MCR on bar per minute.
- b) Gas power stations shall declare a ramp up/down rate of not less than 3% of MCR on bar per minute.
- c) Hydro power stations shall declare a ramp up/down rate of not less than 10% of MCR on bar per minute.
- d) Wind, solar and wind-solar hybrid power stations shall declare a ramp up/down rate as per CEA Grid Connectivity Regulations.
- e) The drawee beneficiaries shall ensure that the ramp rate in the drawal/ injection schedule is not more than 10% of previous time block schedule.
- f) All the trade transactions, bilateral as well as collective transaction shall ensure that ramp rate in the drawal/injection schedule is not more than 10% of previous time block schedule.

10.2.17 Scheduling of wind and solar generation by QCA

- a) The wind, solar or hybrid generator including Energy Storage Systems shall, on their behalf, appoint the QCA by mutual consent to undertake scheduling for a particular pooling station in the State Power System or combined scheduling for more than one pooling station.

Provided that:

- i) where there is no consensus among wind, solar or hybrid generator, the QCA may be appointed by majority vote (51% of installed capacity) by the concerned generators. The voting rights allocated to each generator shall be based on the capacity connected to the concerned pooling station(s) of the State Power System;
- ii) Till the QCA has not been appointed, the lead generator or the individual generator, as the case may be, shall undertake the responsibilities of QCA.
- iii) SLDC shall notify a procedure for aggregation of pooling stations for the purpose of combined scheduling and deviation settlement for multiple pooling stations wind/solar/hybrid generating stations within six (6) month.

- iv) SLDC shall recognise QCA as user, on submission of authorisations from the concerned generating station and after registration with the concerned SLDC.
- b) For the purpose of scheduling clause (a) above, the QCA shall undertake the activities to the extent of authorisation by wind, solar or hybrid generators which shall include:
 - i) facilitate the concerned SLDC or ALDC, where applicable, in the scheduling of power including periodic revisions and settlement of energy accounts in accordance with grid code;
 - ii) responsible for metering, data collection and submission, coordination with SLDC or ALDC, where applicable;
 - iii) undertake commercial settlement of deviation pool account with SLDC or ALDC, where applicable in accordance with State Grid Code, DSM Regulations and applicable other regulations.
- c) the concerned wind, solar or hybrid generators including Energy Storage System shall indemnify SLDC or ALDC, where applicable, for all act or conduct of QCA including compliance with the State Grid Code and settlement of its financial liability in the pooled account.
- d) The scheduling, energy accounting and settlement among the concerned wind, solar or hybrid generators, the terms and the extant of authorization of the QCA will be governed as per their mutually agreed terms:

Provided that any dispute arising between the generators and QCA shall be resolved in accordance with the contract. During the period of dispute, the generators and QCA shall not suspend any activities with regard to compliance of the State Grid Code.

10.2.18 Minimum turndown level for thermal generating Stations

The minimum turndown level for operation in respect of a unit (s) of a thermal generating stations among SSGS shall be 55% of MCR loading or installed capacity of the unit of such generating station. Such generating station may be directed by SLDC or ALDC, where applicable, to operate its unit(s) at or above the minimum turndown level on account of grid security or due to the lesser schedules given by the beneficiaries.

Provided that:

- a) the generating station on its own option may declare suitability for operation at minimum turndown level below the aforesaid 55% limit.

- b) The thermal generating stations shall be compensated for generation below the normative level as per the mechanism given in Annexure-3

10.2.19 Energy Metering and Accounting

- a) In accordance with the regulation 5.8, the STU shall install Interface Energy Meters (IEMs) on all inter-connections between the Users except Bulk Consumers and Embedded Generating Stations, Transmission Licensees and other points as identified by SLDC for recording of actual net active and reactive energy interchange in each time-block. In case of Bulk Consumer and Embedded Generating Stations such IEMs shall be installed by the concern Distribution Licensee. The other issues related to Metering are as follows:
 - i) The installation, operation and maintenance of Interface Energy Meters (IEMs) shall be in accordance with CEA Meter Regulations;
 - ii) All concerned Users (in whose premises the IEMs are installed) shall take weekly meter readings and transmit them to the SLDC or ALDC, where applicable by Tuesday noon.
 - iii) All concerned Users shall be responsible for monitoring the healthiness of the CT/PT inputs and shall ensure that the time drift of IEM within the limits as specified in CEA Meter Regulations.
 - iv) Users shall promptly intimate the changes in CT and PT ratio to SLDC or ALDC, where applicable.
 - v) ALDCs must ensure that the meter data from all installations within their control area are transmitted to SLDC within the specified time schedule for those meters whose data are require to be submitted to SLDC.
- b) SLDC or ALDC, where applicable shall be responsible for computation of actual net injection/drawal of concerned Beneficiaries, based on the IEM readings.
 - i) This data along with the processed data of meters and the Final Implemented Schedule shall be used by the concern Load Despatch Centre for preparation of weekly statement on Deviation Settlement Mechanism (DSM), reactive charges, congestion, ancillary services, SCED, heat rate compensation charges and regional transmission deviation account in accordance Balancing and Settlement Code.
 - ii) All computations carried out by concern Load Despatch Centre shall be open to all Users for checking/verifications for a period of fifteen (15) days.
 - iii) In case any error/omission is detected, the SLDC shall forthwith make a complete check and rectify the same.

- c) STU in consultation with SLDC shall, within 30 days from notification of these Regulations, develop a detail procedure for collecting and sending the weekly meter reading to the SLDC and submit it before the Commission for approval. The procedure shall specifically mention the role and responsibility of various Users including STU.

10.2.20 Inspection of Records

The operating logbooks of the generating station and Transmission Licensees under Intra State Transmission Licensee shall be available for review by the SLDC and Commission. These books shall keep record of machine & equipment operation and maintenance. For hydro-generating stations, the logbook shall also have records of reservoir level and spill way gate operation

10.2.21 Oversight of Injection and Drawal

SLDC shall periodically review the persistent over drawal and under injection. In case any such practice is detected, the matter shall be reported to the Commission for further investigation/action.

10.2.22 Oversight against gaming

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, then matter shall be reported to the Commission.

10.3 Security Constrained Unit Commitment

- a) The SCUC exercise shall be carried out to facilitate reliability of supply to the beneficiaries taking into account optimal cost, adequate reserves, ramping requirements factoring security constraints:

Provided that, the payment of carrying cost for the generation reserves committed through SCUC shall be as specified by the commission.

- b) In order to ensure availability of adequate secondary and tertiary reserves with sufficient ramping capability, SLDC shall identify the generating unit for purpose of unit commitment for the State three (3) days in advance of actual day of scheduling for SSGS on a rolling basis. SLDC shall advise the SSGS who are

connected with InSTS to commit or de-commit the unit. In case of Embedded Generating Station SLDC shall advise those generating stations through ALDC to commit or de-commit the unit. (Refer ANNEXURE – 5: *Detailed Operating Procedure for Backing Down of Coal/Lignite/Gas unit(s) of the SSGS and for taking such units under Reserve Shut Down on scheduling below Minimum Turndown Schedule.*)

Provided that as and when enabling framework is in place, reserves may be procured through the market.

- c) Based on the SCUC instructions from SLDC, the generating station shall revise the on-bar DC (with due consideration to ramp up/down capability), off-bar DC and ramp up/down rate.

10.4 Scheduling and Despatch procedure

10.4.1 For all SSGS the station capacities and allocated / contracted shares of different Beneficiaries under long term, medium term PPAs and balance capacity shall be duly listed with SLDC and shall be displayed in the website of SLDC. Any changes in this regard shall be immediately informed to SLDC and accordingly updated in the website also

10.4.2 While submitting information for listing to SLDC as per regulation 9.4.1 the following details, as applicable, shall be furnished by each generating station including coal, lignite, gas, Hydro, Wind, Solar, Hybrid, ESS/ Pumped Storage Plant.

DETAILS NEEDED FOR STATE SECTOTR GENERATING STATIONS

Description	Units
Installed Capacity of station	MW
Installed Capacity of station	MWh
Number x unit size	No x MW
Time required for cold start	Minute
Time required for warm start	Minute
Time required for hot start	Minute
Time required for combined cycle operation under cold conditions	Minute
Time required for combined cycle operation under warm conditions	Minute
Ramping up capability	% per minute
Ramping down capability	% per minute
Minimum turndown level	% of ex-bus capacity
Inverter Loading Ratio (DC/AC capacity)	
Name of QCA	
Full reservoir level (FRL)	Metre
Design Head	Metre
Minimum draw down level (MDDL)	Metre
Water released at Design Head	M ³ / MW

Notes:

- a) The minimum up-time for coal fired units shall be eight (8) hours while for combined cycle shall be three (3) hours.
- b) The minimum down-time for coal fired units shall be eight (8) hours while for combined cycle shall be three (3) hours. After tripping of any unit, the same maybe revived in lesser time also.
- c) The SSGS must be capable of receiving the load set point signals from the SLDC as per CEA Grid Connectivity Regulations

10.4.3 All drawee beneficiaries shall be duly listed and updated regularly on the SLDC website along with allocated and/or contracted quantum from different generating stations and other sources under long-term and medium-term PPAs.

10.4.4 Each beneficiary/state shall be entitled to a proportionate MW/MWh despatch corresponding to declared capability of the generating station and its share/contracted capacity (foreseen ex-power plant MW capability of the block) x (beneficiary's share in the station capacity).

10.4.5 By 9.00 a.m. every day all SSGS shall submit to SLDC, the station wise following information of the next day i.e. from 00.00 hours to 24.00 hours of the following day:

- (a) For Thermal Generating Station
 - i) On-bar Declared Capacity (MW) and on-bar units for each Time Block;
 - ii) Off-bar Declared Capacity (MW) and off-bar units for each Time Block;
 - iii) ramp up/down rate (MW/min) for on-bar capacity, and
 - iv) Minimum turndown level (MW) and in percentage (%) of ex-bus capacity on-bar;

The declaration against (i) and (ii) shall be both for Actual Declared Capacity and Notional Declared Capacity for coal/ lignite-based power station as specified in clause (b) of regulation in 9.2.13 of this State Grid Code.

- (b) For Hydro Generating Station
 - i) Ex-bus declared capacity for each Time Block;
 - ii) Ex-bus peaking capacity in MW and MWh
 - iii) Ramp up/down rate (MW/min) for on-bar capacity
 - iv) Unit-wise forbidden zones in MW and percentage (%) of ex-bus installed capacity Minimum MW and duration corresponding to requirement of water release for irrigation, drinking water and other considerations.

For Hydro generating station, the declaration shall be made for a period of time not less than 3 hours within a 24 hours period for pondage and storage type of stations and for the entire day for purely run-of-river type stations. For hydro-generating stations, the declaration should also include limitation on generation during specific time periods, if any, on account of restriction on water use due to irrigation, drinking water, industrial, environmental considerations, etc.

(c) For Gas Based Generating Station

- i) Declared Capacity (DC) for the station in MW for each Time Block.
- ii) Capacity to deliver energy in MWh separately for each fuel such as domestic gas, RLNG and/or liquid fuel for each Time Block.
- iii) Ramp up/down rate (MW/min) for on-bar capability
- iv) Minimum turndown level (MW) and in percentage (%) of ex-bus capacity on-bar

10.4.6 By 9.00 a.m. every day all SSGS in the category of wind, solar, hybrid, storage plants, ESS including pumped storage plant, individually or represented by lead generator or QCA on their behalf, shall submit aggregate available capacity of the pooled generation and aggregate schedule for each Time Block of the next day i.e. from 00.00 hours to 24.00 hours of the following day along with PPA-wise breakup for the same.

The declaration for generation capacity of Energy Storage System shall be made for different Time Blocks of the day after considering the involvement of such generator in energy storing (i.e pumping mode for pumped storage scheme) in different Time Blocks. Similarly, the drawal schedule of power in energy storing operation of the Energy Storage System shall also be provided separately along with the sources of such power. For both these purposes, the formats of will be prepared by SLDC.

10.4.7 Based on the above information of availability as per regulation 9.4.5 and 9.4.6 and respective requisition of beneficiaries, SLDC shall schedule the generating station in an optimal manner subject to technical limitations, if any. The gas-based generation stations and hydro generating station shall adhere to the flexible scheduling and ramping requirement decided by the SLDC.

10.4.8 Though the infirm power from generating station prior to COD is not under DSM or ABT mechanism, the generating company or the Distribution Licensee who is the owner of such generating station shall submit to the SLDC their daily declared capacity for Infirm Power separately for operational facility. Without any PPA or any arrangement as mentioned for supplying such power the generating station will not be allowed to inject the power in the InSTS or Distribution System in case of embedded generating stations in the DSM Regulations.

- 10.4.9** The SLDC shall also receive information from RLDC regarding the MW and MWh entitlements for the State Beneficiaries from ISGSs for each Time Blocks for the next day by 8.00 AM or as will be specified under CERC Grid Code.
- 10.4.10** ISGS power station's Beneficiaries under SLDC's control shall communicate its consent to the ISGS by 9.45 AM or the time as specified under CERC Grid Code each day about the quantum and duration of power for next day for sale in the Day Ahead market. The original beneficiary may also provide a standing consent to the ISGS for sale of power in the Day Ahead Market for specified duration and specified quantum. For operational facilities in both cases SLDC shall be provided with a copy of such consent or withdrawal of such consent, if any.
- 10.4.11** SLDC shall compile the above information, taking into account Bilateral Transactions, if any, and apportion it for the next day based on the entitlements of the Beneficiaries in the State Sector Generating Stations, Inter State Generating Stations and Bilateral Transactions and communicate the same to all the Beneficiaries / ALDCs by 11.00 AM.
- 10.4.12** The Beneficiaries/ ALDCs or ESS shall prepare the drawal schedule according to their foreseen load pattern and their own generating capacity for the next day (if any, from generating plants such as that owned by the beneficiary itself, Captive Plants and RE sources connected to their Distribution System), and submit their drawal schedule from SSGS and ISGS and long term, short term Bilateral Transactions in which they have shares to the SLDC by 1.00 PM.
- Provided that where Distribution Licensee has Embedded Generating Station ALDC shall follow the principles laid down under clause (b) of regulation 9.2.9 while preparing the dispatch schedule for own generating stations and submit the same to SLDC along with its drawal schedule.
- Provided further that the beneficiary / ALDC shall also show Time Block wise projected demand under normal conditions along with reasons of restriction in drawal, if any, and its quantum.
- 10.4.13** SLDC shall compile the drawal schedules received from Beneficiaries and ESS including pumped storage project and determine the requirement from ISGS and injection schedule for SSGS considering the merit order despatch, ramp-up & ramp-down rate of generating stations, technical limitations of generating stations and network conditions. SLDC shall convey by 3.00 PM. or the time as specified under CERC Grid Code the requirement from each of ISGS to RLDC. [
- 10.4.14** After considering the net drawal/injection schedule for the State for each Time Block along with the entitlements from ISGS and all interstate transactions, as intimated by RLDC by 6 PM or the time as specified under CERC Grid Code each day, the SLDC shall convey by 7 PM.

- a) the ex-power plant "injection schedule" to each of the SSGS in MW for each Time block for the next day. The summation of the ex-power plant drawal schedules advised by all Beneficiaries shall constitute the ex-power plant station-wise / stage-wise injection schedule for SSGS.
 - b) the "net drawal schedule" to each beneficiary, in MW for each Time block, for the next day. The summation of the station-wise ex-power plant drawal schedules from all the SSGS/ ISGS along with any drawal from / injection to State Power Grid corresponding to Bilateral Transactions and after deducting the transmission losses (estimated), shall constitute the beneficiary-wise net drawal schedule. The Time Block wise injection schedule for the generating stations of the licensee shall be mentioned separately.
- 10.4.15 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. 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.
- 10.4.16 The Beneficiaries, shall inform SLDC about any modification / changes to be made in the drawal schedule or Bilateral Transactions or injection schedule of its own generating station, 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.
- 10.4.17 The SLDC accordingly shall inform any modification / changes to be made in the station wise drawal schedule of ISGS and Bilateral Transactions, if any, to RLDC by 10.00 PM or the time as specified under CERC Grid Code.
- 10.4.18 The SLDC shall finally receive from RLDC the modified 'drawal schedule' against Central allocation along with Bilateral Transactions, if any, by 11.00 PM or the time as specified under CERC Grid Code of the day.
- 10.4.19 The SLDC shall review and revise the despatch schedules of the SSGS and drawal schedules of the Beneficiaries in the light of the modified drawal schedule received from RLDC and convey by 11.30 PM or the time as specified under CERC Grid Code of the day:
- i. The upto dated ex-power plant "injection schedule" to each SSGS in MW for each Time Block, for the next day.

- ii. The upto dated "net drawal schedule" to each of the beneficiary in MW for each Time Block, for the next day along with the injection schedule of its embedded generating stations, if any.

Such drawl schedule and injection schedule shall be termed as Initial Injection Schedule and Initial Drawal Schedule respectively for the next day.

10.4.20 In case of any revision of declared capacity, injection schedules and drawal schedules on the basis of revision requested by the Users or Suo- moto decision of SLDC, such revised declared capacity and revised schedules shall become effective from the Nth Time Block. Nth time block represents the Time Block from which revision of revised schedule and revised declared capacity become effective as per CERC Grid Code and as detailed out in Schedule-A. The counting of the Time Block starts from the Time Block in which the revision of schedule or the revision of declared capacity is advised by the Users to be the first one.

10.4.21 In case of forced outage of a SSGS unit, SLDC shall revise the schedules on the basis of revised declared capacity by the SSGS. The revised declared capacity and revised schedules shall become effective from the Nth Time Block as per Schedule-A.

In case of forced outage of a unit of a generating station and selling power under Short Term Bilateral Transaction (excluding collective transactions in day ahead market and real time market through power exchange) to a person within the State Power System, the Seller shall immediately intimate the outage of the unit along with the requisition for revision of schedule and estimated time of restoration of the unit to both SLDC. The schedule of Beneficiaries, Sellers and Buyers of power from this generating unit shall be revised accordingly. The revised schedules shall become effective from the Time Block and in the manner as specified in Schedule-A. The SLDC shall inform the revised schedule to the Seller and the Buyer. The original schedule shall become effective from the estimated time of restoration of the unit. However, the transmission charges as per original schedule shall continue to be paid for two days.

Provided that the schedule of the Buyers and Sellers shall be revised after forced outage of a unit, only if the source of power for a particular transaction has clearly been indicated during Short-Term Open Access application and the said unit of that generating station goes under forced outage.

Provided that the generator or trading licensee any other agency selling power from the generating station or unit (s) thereof may revise it's estimated restoration time once in a day and the revision schedule shall become effective from the Nth Time Block as per Schedule-A.

10.4.22 In case of forced outage of an ISGS unit, SLDC shall receive revised schedule from RLDC drawn on the basis of revised declared capacity by the ISGS. The revised

declared capacity and revised schedules shall become effective from the Nth Time Block as per Schedule-A

- 10.4.23 A SSGS availing short term open access, which has to take one or more of units under reserve shutdown due to scheduling less than Minimum turndown level under long term or medium term PPA shall be allowed to revise its schedule from Nth Time Block, as applicable, for such short-term open access.
- 10.4.24 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 Nth Time Block as per Schedule-A. During the first to (N-1)th 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.
- 10.4.25 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, the SLDC shall receive revised schedules from RLDC which shall become effective from the Time Block as applicable under CERC Grid Code.
- 10.4.26 In case of any grid disturbance of category GD-5 as defined in CEA Grid Standards, scheduled generation of all the SSGS or scheduled injection of seller, as the case may be, shall be deemed to have been revised to be equal to their actual generation or actual injection, as the case may be, and scheduled drawal of all the Beneficiaries/buyer shall be deemed to have been revised to be equal to their actual 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.
- 10.4.27 If any running unit(s) of Bandel Thermal Power Station's except 5th Unit go out of operation from running condition at any Time Block, then from the next block of time, the generation of such generating plant shall be considered as scheduled generation upto Nth block as per Schedule-A or till revised schedule is obtained, whichever is earlier, and the injection schedule of the generating station shall be modified by SLDC accordingly.
- 10.4.28 Revision of declared capacity by the SSGS or any other supplier and drawal requisition by beneficiary (ies) for the remaining period of the day shall also be permitted based on advance notice. On the basis of such revised declared capacity SLDC shall revise the injection schedule. Revised schedules/declared capacity in such cases shall become effective from the Time Block as specified in the Schedule-A.

- 10.4.29 Provided that if there is load-shedding in the area of the Distribution Licensee, then with the consent of the generator or the supplier SLDC may revise the schedule from any Time Block which is earlier to the Time Block as specified in Schedule-A as applicable for such revision of schedule and revision of declared capacity.
- 10.4.30 In case of revision of declared capacity by the ISGS and requisition by beneficiary (ies) during any time block shall also be permitted on intimation from RLDC. Revised schedules/declared capacity in such cases shall become effective from the Time Block as specified in CERC Grid Code. 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.
- 10.4.31 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 Nth Time Block as per Schedule-A.
- 10.4.32 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. On intimation of such revision by RLDC, SLDC shall intimate all the Beneficiaries in the State about such modifications in the drawal/ despatch schedules and advise them to effect corresponding change in their drawal schedules.
- 10.4.33 In case of revision of schedule of a generating unit, the schedules of all transactions under the Long-Term Open Access, Medium-Term Open Access and Short-Term Open Access shall be reduced to pro-rata basis except those transactions which had been excluded from this principle in CERC Grid Code.
- 10.4.34 To discourage frivolous revisions, the SLDC may, at its sole discretion, refuse to accept schedule/capacity changes of less than two (2) percent of the previous schedule/capacity.
- 10.4.35 Since variation of generation in purely run-of-river hydro generating stations may lead to spillage, these shall be treated as must run power stations. All Renewable Sources, except for biomass power plants and non-fossil fuel-based cogeneration plants whose tariff is determined or adopted by CERC or WBERC shall be treated as must run power stations and shall not be subject to merit order dispatch principles. For purely run-of-river hydro generating stations the maximum available capacity in each time block, duly taking into account the over load capability, shall be equal to or greater than that required to make full use of the available water of that time block.

The run-of-river hydro-generating station with pondage, storage type hydro-generating stations and pumped storage hydro-generating stations are designed to operate during peak hours to meet system peak demand. The maximum available capacity of a station declared for the day shall be equal to the installed capacity including overload

capability, minus auxiliary consumption and transformation losses, corrected for the reservoir level. However, in case of spillage of water such plant may also be considered as must run power stations. The ALDC/ SLDC shall ensure that generation schedules of such type of stations are prepared and dispatched for optimum utilization of available hydro energy except in the event of specific system requirements/constraints.

The schedule finalized by the concern load dispatch center for hydro generating station , shall normally be such that scheduled energy for a day equals the total energy (ex-bus) expected to be available on that day, as declared by the generating station , based on foreseen /planned water availability release It is also expected that the total net energy actually supplied by the generating station on that day would equal the declared total energy, in order that the water release requirement is met.

10.4.36 Scheduling for Wind and Solar generators

- a) Wind and solar generators connected to STS shall mandatorily provide to the SLDC, in a format as prescribed by SLDC, the technical specifications at the beginning and wherever there is any change, the data relating to power system parameters and whether related data as applicable shall also be mandatorily provided by such generators to SLDC in real time. In case of wind and solar generators (including rooftop PV solar plants) connected to Distribution Licensee and sales its power to the Distribution Licensee they shall submit their above mentioned information to respective ALDC.
- b) Forecasting shall be done by wind and solar generator independently or QCA on their behalf for pool arrangement.
- c) The schedule by wind and solar generators who are connected with Intra State Transmission System (excluding collective transactions) may be revised by giving advance notice to the SLDC, as the case may be. Such revisions shall be effective from Nth Time Block as per Schedule-A. There may be one revision for each time slot of one and half hours starting from 00:00 hours of a particular day subject to maximum of 16 revisions during the day.
- d) The schedule of wind and solar generators who are connected to any Distribution Licensee network and whose power is purchased by the same Distribution Licensee shall be prepared by the ALDC based on availability forecasted by the generators or ALDC as per the PPA entered between them. ALDC shall revise the schedule suo-motu or on advance notice from the generators based on revised availability, if any. ALDC may, if required, ask SLDC to revise its net drawal schedule from the grid. However, in all cases ALDC shall restrict its net drawal / injection from the State Power Grid within its

net drawal schedule. Commercial settlement between Distribution Licensee and wind and solar generation in case of any mismatch will be dealt as per PPA entered between them.

- e) The schedule of solar generators shall be based on availability of the generator, weather forecasting, solar insolation/ irradiance, season and normal solar generation curve, etc.

- 10.4.37 At the end of each day, the Time Block wise actual generation and actual injection from the concerned generating units injecting Infirm Power shall be considered as Final Implemented Injection schedule by the concerned generating company or the Distribution Licensee as the case may be.
- 10.4.38 The scheduled injection and actual injection for generation station shall be ex-bus generation at the generating station. For Beneficiaries on whom this State Grid Code are applicable, the Net Drawal Schedule shall be at their respective receiving points as mentioned in the PPA.
- 10.4.39 For calculating the Net Drawal Schedules of Beneficiaries on whom this State Grid Code are applicable, the applicable intra State transmission losses shall be as specified in regulation 13.1 of this State Grid Code.
- 10.4.40 Generation schedules and drawal schedules issued / revised by the SLDC shall become effective from designated Time Block irrespective of communication success.

Or

Drawal / injection schedules issued/revised by the SLDC shall become effective from designated Time Block. Every endeavor shall be made by the SLDC to communicate the revision to the concerned entities unless there are extra-ordinary circumstances for only upon such communication the time block shall be reckoned to commence.

- 10.4.41 For any revision of scheduled generation or scheduled injection, including post facto deemed revision, there shall be a corresponding revision of scheduled drawals of the Beneficiaries.
- 10.4.42 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.
- 10.4.43 When for reason of transmission constraints e.g. congestion or in the interest of grid security, it become necessary to curtail power flow on a transmission corridor, the exchanges already scheduled may be curtailed by the SLDC. In the process the Short-Term Customers shall be curtailed first followed by the Medium-Term Customers,

which shall be followed by the Long-Term Customers and among the customers of a particular category, curtailment shall be carried out on pro-rata basis.

- 10.4.44 After the operating day is over at 2400 hours, the provisional schedule implemented during the day (taking into account all before-the-fact changes in despatch schedule of generating stations, injection schedule and drawal schedule of the Users/Beneficiaries) shall be issued by SLDC by 6:00 A.M. of the next day. Such schedule shall be termed as Provisional Implemented Schedule for the day.
- 10.4.45 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.
- 10.4.46 The provisional final schedules issued by SLDC, shall be open to all Users for any checking/verification, for a period of 3 days. In case any mistake/omission is detected, SLDC shall forthwith make a complete check and rectify the same and issue such rectified schedule by the fifth day. This rectified schedule shall be termed as Final Implemented Schedule for the day. These Final Implemented Schedule shall be the datum for commercial accounting. Any request for revision of schedule or errors pointed out later after issuance of Final Implemented Schedule, would be corrected at the sole discretion of the SLDC.
- 10.4.47 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 Electricity Act-2003 including scheduling and despatch.
- 10.4.48 SLDC shall develop the formats for scheduling and modify the same as and when required in consultation with SPC and put before the Commission for approval. Such approved forms will be used for all Scheduling and Despatching purpose.
- 10.4.49 While availability declaration by SSGS may have a resolution of two decimal (0.01) MW and three decimal (0.001) MWh, all entitlements, requisitions and schedules shall be rounded off to the nearest two decimals, to have a resolution of 0.01 MW. Note: Any change in the schedule by SLDC shall be intimated to all the Beneficiaries, SSGS and SLDC as may be necessary.

10.5 Ancillary services including Spinning Reserves

- 10.5.1 The detailed frame work of scheduling and despatch, withdrawal, energy accounting and commercial settlement for Ancillary Services will be issued by the Commission through order when it is necessary.
- 10.5.2 Any power draw by any beneficiary from any Ancillary Services approved under this State Grid Code will be dealt in accordance with such regulations only.

10.5.3 Detailed framework of ancillary services and spinning reserve is required to be formulated by SLDC in line with above.

10.6 Technical Minimum Schedule for State Sector Generating Station:

10.6.1 The technical minimum for operation in respect of a unit or units of a State Sector Generating Station shall be 55% of MCR loading or installed capacity of the unit of at generating station.

10.6.2 The SSGS may be directed by concerned SLDC to operate its unit(s) at or above the technical minimum but below the normative plant availability factor on account of grid security or due to the fewer schedules given by the beneficiaries.

10.6.3 For the thermal generating station having normative plant availability factor is 85% or above, for them in case of part load operation at any time block of a day due to schedule generation as declared by the SLDC being less than the declared capacity of the generator then the generator shall be compensated as per Annexure – 3 of this State Grid Code.

10.7 Commercial Activities Consequence to Final Implemented Schedule:

In order to raising the commercial bills by the generator, licensees and SLDC for recovery of Capacity Charge, Energy Charge, DSM related charges and for computation of different incentive and compensation amount, based on Final Implemented Schedule of each day SLDC shall take action in accordance with the Balancing and Settlement Code for determination of different parameters:

- a) Resultant Actual and Notional Availability on monthly basis and cumulatively for the year for generator in order to raise capacity charge;
- b) Total energy in the month under initial schedule of injection as well as Final Implemented Schedule for injection and cumulative energy under the Final Implemented Schedule of injection upto the month for the financial year;
- c) Different parameters on monthly and annual basis that are required for determination of incentive as per Tariff Regulations.
- d) Deviation amount and applicable deviation related charges and reactive energy charges on weekly basis.

CHAPTER-11: CYBER SECURITY

11.0 Introduction

For imposition of appropriate Cyber Security protocol across the entities in State Power System, this chapter has dealt with certain provisions.

11.1 Identification of Critical Information Infrastructure

All users, SLDC and STU shall undertake the due process for identification of Critical Information Infrastructure (CII) immediately on notification of these regulations.

11.2 Appointment and Responsibilities of Information Security Committee and Chief Information Security Officer

11.2.1 All Users, SLDC and ST shall, within six (6) months of enforcement of the regulations, appoint an Information Security Committee (ISC) and Chief Information Security Officer (CISO) in accordance with the IT Security Rules.

11.2.2 The ISC, under the chairmanship of Chief Executive Officer/Managing Director /Secretary of the organization shall comprise of IT Head or equivalent, Financial Advisor or equivalent, CISO, Representative of National Critical Information Infrastructure Protection Centre (NCIIPC) and any other expert(s) to be nominated by the organization. The ISC shall carry out the responsibilities in accordance with IT Security Rules.

11.2.3 The CISO shall carry out the responsibilities as per latest "Guidelines for Protection of Critical Information Infrastructure" and "Roles and Responsibilities of Chief Information Security Officers (CISOs) of Critical Sectors in India" released by NCIIPC.

11.3 Measures to be Undertaken for Ensuring Cyber Security:

All users, CEA, NLDC, RLDC, SLDC, CTU and STU shall take necessary measure in accordance with Guidelines for the Protection of National Critical Information Infrastructure by NCIIPC. These shall, amongst others, necessarily include the following:

a) Planning related measures:

- i) All entities shall have an information security policy to prevent unauthorized access, use, disclosure, disruption, modification, recording or destruction, including incident management. All entities shall ensure that CII is governed by necessary access control policies;
- ii) All entities shall have necessary protection mechanisms such as firewalls for all systems interfacing with the network;
- iii) All entities shall develop a vulnerability, risk and threat (VRT) assessment process which shall be reviewed regularly. The VRT shall comprise of the following:

- Vulnerabilities are defined as gaps/weaknesses in the system that allow
- an attacker to reduce the systems information assurance.
- Threats are defined as actors / actions targeting the vulnerabilities in a system.
- Risks are the possibilities that a particular threat will successfully exploit
- vulnerability and the resultant impact of that exploitation on the
- information assurance of the system.

iv) All entities shall ensure necessary security measures are undertaken by the supply chain. Security precautions including Non-Disclosure Agreements, confidentiality clauses must be ensured wherever required.

v) All entities shall take all steps to achieve the necessary security certifications that are required for CII.

b) Operational control:

- i) All entities shall take necessary back-up and protection measures for classified and sensitive data.
- ii) All entities shall develop necessary training, awareness and skill development program to ensure compliance.

11.4 Contingency Measures:

11.4.1 All users shall plan adequate redundancies for CII which are capable of taking over in case of malfunction or failure.

11.4.2 All entities shall develop Cyber Crisis Management Plan case of any major cyberattack. This may include continuity plans, recovery plans, communication plans, cyber incident response plan, disaster recovery plan and priority resource and manpower allocation plan.

11.5 Mechanism Reporting:

11.5.1 All entities shall immediately report to the appropriate government agencies under IT Act in case of any cyber-attack.

11.5.2 SLDC and the Commission shall also be informed in case of any instance of cyber-attack.

CHAPTER-12: MONITORING AND COMPLIANCE CODE

12.0 Introduction

The monitoring of compliance has been dealt in this chapter

12.1 Assessment of Compliance

The performance of all Users, STU and SLDC with respect to grid code compliance shall be assessed periodically.

12.2 Monitoring of Compliance

12.2.1 In order to ensure compliance, two methodologies shall be followed:

- (a) Self-Audit
- (b) Compliance Audit

12.2.2 Self –Audit:

- a) All Users, STU and SLDC shall conduct annual self audits to review compliance of the regulations and submit by 31st July of every year.
- b) The self-audit report, amongst other aspects shall necessary contain the following information:
 - i) Sufficient information to understand how and why the non-compliance occurred
 - ii) Extent of damage caused by non-compliance
 - iii) Steps and timeline planned to rectify the same
 - iv) Steps taken to mitigate any future recurrence
- c) The self-audit reports by Users shall be submitted to the concerned SLDC. The self-audit reports of SLDC and STU shall be submitted to the Commission.
- d) The deficiencies shall be rectified in a time bound manner within a reasonable time.
- e) The monitoring agency for User shall be SLDC. The monitoring agency shall track the progress of compliances of users and exceptional reporting for non-compliance shall be submitted to the Commission.
- f) The monitoring agency for STU and SLDC shall be the Commission.

12.2.3 Independent Third-Party Compliance Audit:

Commission may order independent third-party compliance audit for any User, STU and SLDC as deemed necessary.

CHAPTER -13: MISCELLANEOUS

13.0 Introduction

Different ancillary regulations needed for smooth implementation of this State Grid Code are discussed in these chapter.

13.1 Determination of Transmission Loss

The summation of all inflows at any Time Block recorded in special energy meter (also termed as interface meter) at the connection points of the InSTS with generating stations, Distribution Licensees and interconnection point with CTU and other entities gives the total inflow into the InSTS for that time block. Similarly, the summation of all outflow at any 15-minute time block recorded in special energy meter (also termed as interface meter) at the connection points of the InSTS with generating stations, Distribution Licensees and interconnection point with CTU and other entities gives the total outflow into the STS for that time block. The difference between the total inflow and outflow of any particular time block is the transmission loss for that particular time block. SLDC shall base on the interface meter data determine the transmission loss for each Time Block and derive the average transmission loss percentage (%) for the week. Such average transmission loss percentage shall be published by SLDC along with weekly Deviation Settlement Account and this percentage transmission loss shall be considered while determining the drawal schedule for the Beneficiaries / Distribution Licensees for the coming second week.

13.2 Information Dissemination System

SLDC shall arrange to host the following information in the Website:

- a) The STU shall put up the information in their web side related to following aspects:
 - i) formats, principles and procedures as mentioned in clause (b) of regulation 5.14.1 of these regulations;
 - ii) The finalized monthly load generation balance scenario considered for long-term transmission system planning and the planned intra-state transmission plan shall be hosted in the website of STU in accordance with regulation 4.4.14 of this State Grid Code.
- b) SLDC shall put up the information in their web side related to following aspects:
 - i) The list of important grid elements of State Power Grid which cannot be opened or removed without prior clearance of SLDC and ALDC according to

regulation 8.1.3 of this State Grid Code. In case of opening/removal of any important element of the State Power Grid or for which such programme has been taken, those shall also be under display during the period it is out of service or till such programme is completed along with the reasons for such out of service.

- ii) The monthly review of load shedding scheme based on automatic UFR or df/dt relay shall be hosted in pursuance to clause (f) of regulation 8.1.11 of this State Grid Code.
- iii) The information of Secondary Reserve Capacity for any year in pursuance to clause (g) of regulation 8.2.10 of this State Grid Code.
- iv) Rotational load shedding plan, if any, in terms of clause(i) of regulation 8.4.2 of this State Grid Code shall be hosted in the Web-site.
- v) The periodic reports as per regulation 8.4.3 depicting monthly State Power System performance shall be displayed in the Website of SLDC for at least last 24 months.
- vi) Annual Outage Plan in terms of clause (d) of regulation 8.6.2 of the State Grid Code and also the revised plan from time to time for every financial year. Along with it, the Load Forecast and Supply Side Planning report of each Distribution Licensee as per regulation 4.3.4 shall also be displayed.
- vii) Quarterly report of deviation from outage planning and deviation from condition-based monitoring schedule in terms of clause (l) of regulation 8.6.2 of the State Grid Code.
- viii) In terms of regulation 8.7.4 of this State Grid Code following are to be displayed in SLDC website:
 - Nodewise ATC and TTC between Distribution System of each Distribution Licensee to InSTS;
 - Nodewise ATC and TTC between InSTS to ISTS;
 - ATC and TTC of Intra State Transmission System

Above TTC/ATC shall be shown along with all the assumptions and limiting constraints; .

- ix) Report on curtailment of scheduled transactions in pursuance to clause (c) of regulations 9.1.12 of this State Grid Code.
- x) List for all SSGS with capacities, allocated / contracted shares for different Beneficiaries under long term, medium term PPAs and balance capacity as listed with SLDC in pursuance to regulation 9.4.1 of these State Grid Code.
- xi) List of all beneficiaries with allocated and/or contracted quantum from different SSGS in pursuance to regulation 9.4.3 of this State Grid Code.

13.3 Issue of Order and Practice Directions:

Subject to the provisions of the Act, the Commission may from time to time issue orders and practice directions with regard to the implementation of these DSM Regulations. Such orders or practice directions may be issued suo-motu by the Commission or upon an application made by any affected party.

Provided that the Commission shall maintain all the relevant records related to such order for a period of at least twelve years from the date of issue of the order and which can be accessed by public on demand in accordance with the procedure stipulated by the Commission for such purpose.

13.4 Complain Management:

All complaints regarding unfair practices, delays, discrimination, inadequate display of information in website as specified in regulations of Commissions, supply of wrong information or any other matter related to open access in intra-state transmission shall be resolved under Open Access Regulations

13.5 Review of performance of State Power Grid

The State Power Committee shall review the performance of the State Power Grid in line with various provisions of the WBEGC at least once in every twelve (12) months or as may be directed by the Commission and upon completion of the review SPC shall send a report to the Commission.

13.6 Power to Amend

The Commission may, at any point of time, at its sole discretion, vary, alter, modify, add or amend any provisions of these Regulations.

13.7 Power to remove difficulties

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

13.8 Power to dispense with Regulations

Nothing in these Regulations shall be deemed to limit or otherwise affect the inherent powers of the Commission to make such orders as may be necessary for meeting ends of justice or to prevent the abuse of the process of the Commission

13.9 Repeal and Savings

The West Bengal Electricity Regulatory Commission (West Bengal Electricity Grid Code) Regulations, 2007 issued under Notification No. 34/WBERC dated 4th April 2007 and published in the Kolkata Gazette, Extraordinary on 4th April 2007, with all its amendments is hereby repealed. Notwithstanding such repeal, anything done or any action already taken under the repealed Regulations, shall in so far as it is not inconsistent with the West Bengal Electricity Regulatory Commission (State Electricity Grid Code) Regulations, 2020, be deemed to have been done or taken under the corresponding provisions of the West Bengal Electricity Regulatory Commission (State Electricity Grid Code) Regulations, 2020.

Place: Kolkata
Date: _____ 2022

By order of the Commission

Secretary of the Commission

Schedule-A

1) Starting Time Block for revised schedule and revised declared capacity:

The starting Time Block for revised schedule and revised declared capacity under general nomenclature of N^{th} Time Block will be as follows:

- a) For any revision in schedule made in odd time blocks shall become effective from 7th Time Block counting the Time Block in which the request for revision has been received by the SLDCs or in which SLDC has communicated its suo-motu decision of revision of schedule to be the first one. Hence in this case N^{th} Time Block = 7th Time Block.
- b) For any revision in schedule made in even time blocks shall become effective from 8th time block, counting the Time Block in which the request for revision has been received by the SLDCs or in which SLDC has communicated its suo-motu decision of revision of schedule to be the first one. Hence in this case N^{th} Time Block = 8th Time Block.

Note:

Odd Time Blocks referred in this clause, are the Time Blocks 00:00 to 00:15, 00:30 to 00:45, 01:00 to 01:15 and so on. Even Time Blocks referred in this clause, are the Time Blocks 00:15 to 00:30, 00:45 to 01:00 and 01:15 to 01:30 and so on.

Illustration:

If a request for revision in schedule or declared capability has been made in Time Block 17:00 to 17:15 (odd Time block) of a day D, it shall be effective from Time Block 18:30 to 18:45 of the day D (7th Time block from the Time block in which the request for revision was made). Similarly, if a request for revision in schedule or declared capability has been made in Time Block 17:15 to 17:30 (even Time Block) of a day D, it shall be effective from Time Block 19:00 to 19:15 of the day (D) (8th Time Block from the Time Block in which request of revision was made).

2) Limit of Grid Frequency Band (See regulation 8.2.2):

$FREQ_L = 49.90 \text{ Hz}$

$FREQ_U = 50.05 \text{ Hz}$

3) Different Limit for Primary Response:

[See Regulation clause (e) and (f) of regulation 8.2.9]

$\Delta F = 0.30 \text{ Hz}$: $T_{\min} = 30 \text{ seconds}$: $T_{\max} = 5 \text{ minutes}$

4) Different Limits for Secondary and Tertiary Response

[See Regulation clause (e) and (g) of regulation 8.2.8]

$ACE_{TL} = \pm 10 \text{ MW}$: $T_{\min SRR} = 30 \text{ second}$: $T_{SRR} = 15 \text{ minutes}$: $T_{SRRS} = 30 \text{ minutes}$

Schedule-B

Following diagnostic tests to be done as a part of Condition Monitoring of various equipment at 33/11kV Sub-Stations

- a) Detection of internal Partial Discharge using Transient Earth Voltage Method
- b) Detection of surface discharge using Ultrasound measurement Method
- c) Temperature measurement using Infrared Thermometer
- d) Thermal Imaging using Infrared Camera
- e) Health status check of Vacuum Interrupter Bottle of VCB using VI Tester
- d) Visual Inspection of all installations, which was very much important
- e) Routine test of transformer oil at least once a year and DGA (Dissolved Gas Analysis) every two year for 10MVA transformer.
- f) Total harmonic Distortion (THD) at voltage level of from 33kV and above.

ANNEXURE – 1
(See Regulation 6.4.3)

**THIRD PARTY PROTECTION SYSTEM CHECKING & VALIDATION
TEMPLATE FOR A SUBSTATION**

The audit reports, along with action plan for rectification of deficiencies found, if any, shall be submitted to RPC or RLDC within a month of submission of report by auditor.

The third-party protection system checking shall be carried at site by the designated agency. The agency shall furnish two reports:

- I. Preliminary Report: This report shall be prepared on the site and shall be signed by all the parties present.
- II. Detailed Report: This report shall be furnished by agency within one month after carrying out detailed analysis.

The protection system checklist shall contain information as discussed in subsequent paras.

- 1) General Information (to be provided prior to the checking as well as to be included in final report):
 - a) Substation name
 - b) Name of Owner Utility
 - c) Voltage Level (s) or highest voltage level?
 - d) Short circuit current rating of all equipment (for all voltage level)
 - e) Date of commissioning of the substation
 - f) Checking and validation date
 - g) Record of previous tripping's (in last one year) and details of protection operation
 - h) Previous Relay Test Reports
 - i) Overall single line diagram (SLD)
 - j) AC aux SLD
 - k) DC aux SLD
 - l) SAS architecture diagram
 - m) SPS scheme implemented (if any)
- 2) The preliminary report shall be drafted at site and shall be signed by all the parties present and shall contain information not less than following:

Sl No	Issues	Remarks
1	Recommendation of last protection checking and validation.	Status of works and pending issues if any
2	Review of existing settings at substation	Recommended Action
3	Disturbance Recorder out available for last 6 tripping's (Y/N)	Recommended Action
4	Chronic reason of tripping, if any	Recommended Action
5	Major non-conformity/deficiency observed	Recommended Action

- 3) The relay configuration checklist for available power system elements at station:
- Transmission Line
 - Bus Reactor/Line Reactor
 - Inter-connecting Transformer
 - Busbar Protection Relay
 - AC auxiliary system
 - DC auxiliary system
 - Circuit Breaker Details
 - Current Transformer Details
 - Capacitive Voltage Transformers Details
 - Any other equipment/system relevant for protection system operation
- 4) The minimum set of points on which checking and validation will be carried out is given below. The detailed list shall be prepared by checking and validation team in consultation with concerned entity, RLDC and RPC.
- Transmission Line Distance Protection/Differential Protection
 - Name and Length of Line
 - Whether series compensated or not
 - Mode of communication used (PLCC/OPGW)
 - Relay Make and Model for Main-I and Main-II
 - List of all active protections & settings
 - Carrier aided scheme if any
 - Status of Power Swing/Out of Step/SOTF/Breaker Failure/Broken Conductor/STUB/Fault Locator/DR/VT fuse fail/ Overvoltage Protection/Trip Circuit supervision/Auto-reclose/Load encroachment etc.
 - Relay connected to Trip Coil-1 or 2 or both
 - CT ratio and PT ratio
 - Feed from DC supply-1 or 2
 - Connected to dedicated CT core (mention name)
 - Other requirements for protection checking and validation
 - Shunt Reactor & Inter-connecting Transformer Protection
 - Whether two groups of protections used (Group A and Group B)
 - Do the groups have separate DC sources
 - Relay Make and Model
 - List of all active protections along with settings

- Status of Differential Protection/Restricted Earth Fault Protection/Back-up Directional Overcurrent/Backup Earth fault/ Breaker Failure
 - Status of Oil Temperature Indicator/Winding Temperature Indicator/Buchholz/ Pressure Release Device etc.
 - Relay connected to Trip Coil-1 or 2 or both
 - CT ratio and PT ratio
 - Feed from DC supply-1 or 2
 - Connected to dedicated CT core (mention name)
 - Other requirements for protection checking and validation
- g) Busbar Protection Relay
- Busbar and redundant relay makes and models
 - Type of Busbar arrangement
 - Zones
 - Dedicated CT core for each busbar protection (Yes/No)
 - Breaker Failure relay included (Yes/No), if additional then furnish make and model
 - Trip issued to both Busbar protection in case of enabling
 - Isolator indication and check relays
 - Other requirements for protection checking and validation
- h) AC auxiliary system
- Source of AC auxiliary system
 - Supply changeover between sources (Auto/Manual)
 - Diesel generator (DG) details
 - Maintenance plan and supply changeover periodicity in DG
 - Single Line Diagram
 - Other requirements for protection checking and validation
- i) DC auxiliary system
- Type of Batteries (Make, vintage, model)
 - Status of battery Charger
 - Measured voltage (positive to earth and negative to earth)
 - Availability of ground fault detectors
 - Protection relays and trip circuits with independent DC sources
 - Other requirements for protection checking and validation
- j) Communication system
- Mode of communication for Main-1 and Main-2 protection
 - Mode of communication for data and speech communication
 - Status of PLCC channels
 - Time synchronization equipment details
 - OPGW on geographically diversified paths for Main-1 and main-2 relay
 - Other requirements for protection checking and validation
- k) Circuit Breaker Details
- Details and Status

- Healthiness of Tripping Coil and Trip circuit supervision relay
- Single Pole/Multi pole operation
- Pole Discrepancy Relay available(Y/N)
- Monitoring Devices for checking the dielectric medium
- Other requirements for protection checking and validation

l) Current Transformer (CT)/Capacitive Voltage Transformer (CVT) Details

- CT/CVT ID name and voltage level
- CT/CVT core connection details
- Accuracy Class
- Whether Protection/Metering
- CT/CVT ratio available and ratio adopted
- Details of last checking and validation of CT/CVT healthiness
- Other requirements for protection checking and validation
- Other protections: Direction earth fault, negative sequence, over current, over voltage, over frequency, under voltage, under frequency, forward power, reverse power, out of step/power swing, HVDC protection etc.

5) Summary of Checking: The summary shall specifically mention minimum following points:

- The settings and scheme adopted are in line with agreed protection philosophy or any accepted guidelines (e.g. Ramakrishna guidelines or CBIP manual based).
- The deviations from the RPC protection philosophy, if any and reasons for taking the deviations shall be recorded.
- All the major general deficiency shall be listed in detail along with remedial recommendations.
- The relay settings to be adopted shall be validated with simulation based or EMTP studies and details shall be enclosed in report.
- The cases of protection maloperation shall be analysed from protection indices report furnished by concerned utility, the causes of failure along with corrective actions and recommendations based on the findings shall be noted in the report.

ANNEXURE -2

REACTIVE POWER COMPENSATION

- (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. To discourage VAr drawals by Beneficiaries, VAr exchanges with State Power System shall be priced as follows:

Reactive power exchanges among Beneficiaries shall be priced as follows:

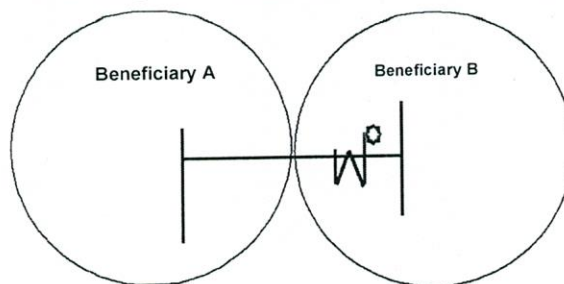
- The Beneficiary pays for reactive power drawal when voltage at the metering point is below 97%
- The Beneficiary gets paid for reactive power return when voltage is below 97%
- The Beneficiary gets paid for reactive power drawal when voltage is above 103%
- The Beneficiary pays for reactive power return 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 SSGS.

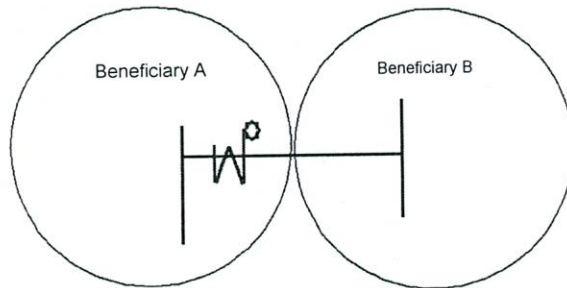
- (2) The charge/payment for reactive power, shall be at a nominal paise/kVArh rate as may be specified by the Commission from time to time through tariff order.

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 net payment may be positive or negative

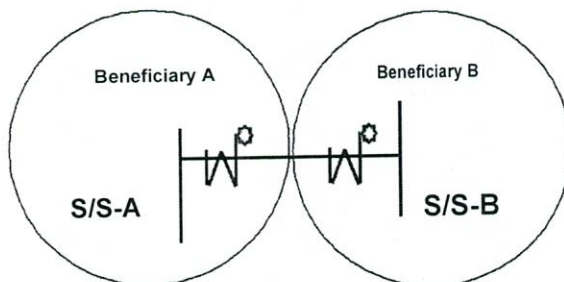
Case – 3: Interconnecting line is jointly owned by Beneficiary -A and -B.
 Metering points: Substations of Beneficiary -A and Beneficiary -B

Net VARh exported from S/S-A, while voltage < 97% = X1 Net
 VARh exported from S/S-A, while voltage > 103% = X2 Net VARh
 imported at S/S-B, while voltage < 97% = X3 Net VARh imported
 at S/S-B, while voltage > 103% = X4

- (i) Beneficiary -B pays to Beneficiary -A for
 X1 or X3, whichever is smaller in magnitude, and
- (ii) Beneficiary -A pays to Beneficiary -B for
 X2 or X4, whichever is smaller in magnitude.

Note:

- 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.



ANNEXURE -3

MINIMUM TURNDOWN LEVEL FOR OPERATION OF REGIONAL ENTITY GENERATING STATIONS

- 1) Where any SSGS is directed by the SLDC or ALDC, as applicable, to operate below normative plant availability factor after following principle of merit order despatch, the SSGS may be compensated for increase in the unit heat rate and the auxiliary energy consumption depending on the unit loading in each time block duly taking into account the forced outages and planned outages of the units, generation at generator terminal, energy sent out ex-bus, and in due consideration of degraded and normative operating parameters of station heat rate, auxiliary energy consumption and secondary fuel oil consumption etc on monthly basis duly supported by relevant data verified by SLDC, as the case may be. The compensation shall be applicable to all SSGS whose tariff is determined under section 62 or under section 63.
- 2) For the thermal generating station having normative plant availability factor 85% or above, for them in case of part load operation at any Time Block of a day due to schedule generation being less than the declared capacity of the generator, then generator will require to be compensated for heat rate degradation and enhanced auxiliary consumption due to such part load operation as per clause (a) to (e) below:
 - a) In case of coal / lignite based generating stations, following station heat rate (SHR) degradation shall be considered for the purpose of compensation

Sl No	Unit Loading as % Installed Capacity of the Unit	Admissible Unit Heat Rate Degradation in %	
		Sub-Critical	Super-Critical
1	85 and above	0	0
2	80	0.76	0.66
3	75	1.45	1.19
4	70	2.40	1.96
5	65	3.56	2.84
6	60	4.79	3.67
7	55	6.59	4.92
8	50	8.60	6.15
9	45	10.21	7.40
10	40	12.14	8.81

In case of any part load operation at Unit loading between any two consecutive Unit Loading of above table then the degradation in SHR for such part operation shall be carried on pro-rata basis upto second decimal place. For instance, if SHR have to be calculated for a sub-critical plant unit operating at 77% load factor the methodology shall be as follows:

$$\begin{aligned}\text{Degradation in SHR at 77\%} &= \text{Degradation in SHR at 80\%} + \text{pro-rate degradation} \\ &\quad \text{at 77\% calculated between 80\% and 75\%} \\ &= [0.76 + (1.45-0.76)] * 3/5 = 1.17\%\end{aligned}$$

- b) In case of coal / lignite based generating stations, following station Auxiliary Energy Consumption (AEC) degradation shall be considered for the purpose of compensation:

SI No	Unit Loading (% of MCR)	Admissible degradation in auxiliary energy consumption (% Point)
1	85 and above	0
2	80	0.10
3	75	0.25
4	70	0.40
5	65	0.55
6	60	0.75
7	55	0.95
8	50	1.20
9	45	1.55
10	40	2.10

In case of any part load operation at Unit loading between any two consecutive Unit Loading of above table then the degradation in AEC for such part operation shall be carried on pro-rata basis upto second decimal place. For instance, if AEC have to be calculated for a sub-critical plant unit operating at 77% load factor the methodology shall be as follows:

$$\begin{aligned}\text{Degradation in AEC at 77\%} &= \text{Degradation in AEC at 80\%} + \text{pro-rate degradation at 77\%} \\ &\quad \text{calculated between 80\% and 75\%} \\ &= [0.10 + (0.25-0.1)] * 3/5 = 0.19\%\end{aligned}$$

- c) Where scheduled generation falls below minimum turndown level, the concerned SSGS shall have the option to go for reserve shut down and in such cases, start-up fuel cost over and above seven (7) start / stop in a year shall be considered as additional compensation based on following norms or actual, whichever is lower:

SI No	Unit Size (MW)	Oil Consumption per start up (KI)		
		Hot	Warm	Cold
1	200/210/250/300 MW or lower size	20	30	50
2	500 MW	30	50	90
3	600 MW	40	60	110

- d) In case of gas based generating stations, following station heat rate (SHR) degradation shall be considered for the purpose of compensation

Sl No	Unit Loading as % Installed Capacity of the Unit	Increase in SHR (%)
1	85 and above	0
2	80	0.91
3	75	2.50
4	70	4.17
5	65	6.33
6	60	8.54
7	55	10.68
8	50	13.63

In case of any part load operation at Unit loading between any two consecutive Unit Loading of above table then the degradation in SHR for such part operation shall be carried on pro-rata basis upto second decimal place. For instance, if SHR have to be calculated for a gas-based plant unit operating at 77% load factor the methodology shall be as follows:

$$\begin{aligned}
 \text{Degradation in SHR at 77\%} &= \text{Degradation in SHR at 80\%} + \text{pro-rate degradation at} \\
 &\quad \text{77\% calculated between 80\% and 75\%} \\
 &= [0.91 + (2.50-0.91)] \times \frac{3}{5} = 1.86\%
 \end{aligned}$$

- e) In case of gas based generating stations, following Auxiliary Energy Consumption (AEC) degradation shall be considered for the purpose of compensation:

Sl No	Unit Loading (% of MCR)	Admissible degradation in auxiliary energy consumption (% Point)
1	85 and above	0
2	80	0.12
3	75	0.29
4	70	0.47
5	65	0.68
6	60	0.88
7	55	1.09
8	50	1.34

In case of any part load operation at Unit loading between any two consecutive Unit Loading of above table then the degradation in AEC for such part operation shall be carried on pro-rata basis upto second decimal place. For instance, if AEC have to be calculated for a gas-based plant unit operating at 77% load factor the methodology shall be as follows:

$$\begin{aligned}\text{Degradation in AEC at 77\%} &= \text{Degradation in AEC at 80\%} + \text{pro-rate degradation at 77\%} \\ &\quad \text{calculated between 80\% and 75\%} \\ &= [0.12 + (0.29-0.12)] * 3 \div 5 = 0.22\%\end{aligned}$$

- f) Compensation for the Station Heat Rate and Auxiliary Energy Consumption shall be worked out in terms of energy charges.

For this purpose, Commission will in its tariff order bring out price of per unit of heat in Rs per Kcal on the basis of which energy Charge is computed. During MVCA or MFCA computation the concern licensee shall also publish the adjustment in prices again per unit of heat in Rs per Kcal. Based on such annual price of per unit heat in tariff order and monthly adjustment on such price in MVCA and MFCA process

- g) The compensation so computed shall be borne by the entity who has caused the plant to be operated at schedule lower than corresponding to Normative Plant Availability Factor based on the compensation mechanism as per Annexure-4. In case of part untied capacity of a plant for which there is no long term or medium-term PPA, the compensation for backing down corresponding to the unutilized capacity shall be to the account of the generating company.
- h) No compensation for Heat Rate degradation and Auxiliary Energy Consumption shall be admissible if the actual Heat Rate and / or actual Auxiliary Energy Consumption are lower than the normative Station Heat Rate and / or normative Auxiliary Energy Consumption applicable to the unit or the generating station.

or

Compensation shall be calculated in each month as per the detailed procedure as in Annexure-4. In case the energy charges calculated based on actual SHR and AEC is less than the sum of energy charges calculated based on normative SHR and AEC or quoted energy charges/SHR as the case may be, and compensation payable for that month to the generating station, then such gains over the actual energy charges, restricted to compensation payable to generating station, shall be shared between generating station and beneficiaries in the ratio of 60:40.

- i) There shall be reconciliation of the compensation at the end of the financial year in due consideration of actual weighted average operational parameters of station heat rate, auxiliary energy consumption and secondary oil consumption.
- j) No compensation for Heat Rate degradation and Auxiliary Energy Consumption shall be admissible if the actual Heat Rate and / or actual Auxiliary Energy Consumption are lower

than the normative station Heat Rate and / or normative Auxiliary Energy Consumption applicable to the unit or the generating station in a month or after annual reconciliation at the end of the year.

- k) The computation of compensation as specified in (a) to (i) above shall ensure that such compensation shall represent the excess heat or auxiliary consumption or excess oil consumptions, as the case may be, shall be calculated after considering unit station heat rate or auxiliary consumption or oil consumption for unit loading at the declared Capacity and unit loading at scheduled generation.
- l) For this purpose of compensation for each month SLDC shall issue a certificate to each generator within 15th of the next month the amount of excess heat (in terms of Kcal) and excess auxiliary energy (MU) is being allowed over the normative heat and auxiliary energy consumption. In accordance with that certificate the price impact for such excess heat and auxiliary energy consumption can be recovered through MVCA/ MFCA and FPPCA mechanism also.
- m) The Automatic Generation Control (AGC) shall not be considered for compensation.
- n) The compensation on account of change in schedule under the provisions of Security Constrained Economic Despatch (SCED) shall be as per the detailed procedures.
- o) Mechanism for compensation for station heat rate and auxiliary energy consumption for low unit loading on monthly basis in terms of energy charges and compensation for secondary fuel oil consumption for additional start-ups in excess of 7 start-ups, shall be as per Annexure – 4.
- p) The detailed operating procedure for taking units under reserve shut down containing the role of different agencies, data requirements, procedure for taking the units under reserve shut down and the methodology for identifying the generating stations or units thereof to be backed down up to the minimum turndown level in specific grid conditions such as low system demand, regulation of power supply and incidence of high renewables etc., based on merit order stacking is given at Annexure – 5.

ANNEXURE – 4

MECHANISM FOR COMPENSATION CALCULATION FOR DEGRADATION OF HEAT RATE, AUX CONSUMPTION AND SECONDARY FUEL OIL CONSUMPTION, DUE TO PART LOAD OPERATION AND MULTIPLE START/ STOP OF UNITS

1.0 Introduction

The State Grid Code inter-alia contains provisions relating to Technical Minimum Schedule for operation of State Sector Generating Station and also provides for compensation to those Generating Stations for degradation of Heat Rate, Auxiliary Consumption and Secondary Fuel Oil consumption due to part load operation and multiple start-ups of units. This mechanism is for compensation for station heat rate and auxiliary energy consumption for low unit loading and for secondary fuel oil consumption for additional start-ups in excess of 7 start-ups (hereinafter referred to as "Compensation Mechanism").

2.0 Applicability

This Compensation Mechanism is applicable to Coal/lignite/Gas based State Sector Generating Stations, (hereinafter called as "designated generating stations").

3.0 Definitions and abbreviations:

3.1 In this Compensation Mechanism, unless the context otherwise requires:

- i) "Block Unit Loading (BUL) of the Station" (in %) means loading of the station during a particular Time Block of Calculation Period determined as follows:

$$BUL (\%) = \{ \text{Higher of } (AG \text{ or Basic SG}) / EC \text{ in Time Block} \times (1 - AEC) \} \times 100$$

Where

- EC means Effective Capacity in the Time Block;
- AG means *Actual Generation (Ex Bus) of Station in MWhr for a Time Block*;
- Basic SG (*Scheduled Generation*) means *only SSGS Part of Schedule given by SLDC i.e., Excluding Open Access (Bilateral), Collective (Exchanges), RRAS, AGC, SCED MW parts, expressed in MWhr for a Time Block*
- AEC means *Normative Auxiliary Energy Consumption*

- ii) "Calculation Period" means the month for which compensation calculation shall be carried out.

- iii) "Comp (F)" means reconciled final compensation in rupees to be received by generator during the calculation period based on actual, normative parameters and degraded SHR and AEC based on block unit loading.
- iv) "Comp (P)" means provisional compensation in rupees computed for the calculation period based on the normative parameters and degraded SHR and AEC based on block unit loading.
- v) "EC (A)" means total energy charges in rupees computed for a designated generating station during the calculation period on actual furnished parameters of SHR and AEC and sum of basic scheduled energy for all blocks in that calculation period.
- vi) "EC (N)" means total energy charges in rupees computed for a designated generating station during the calculation period on normative parameters and sum of basic scheduled energy for all blocks in that calculation period.
- vii) "Effective Capacity" or "EC" in MWhr means maximum possible generation from a station during a time period and shall be calculated as: Total Installed Capacity of the designated generating station (in MWhr) minus Installed Capacity (MW) of the Unit(s) of the said station under outage (planned or forced outage) and under reserve shut down during the time period X outage time.
- viii) "ECR (Comp)" means increase over normative Energy Charge Rate in Rupees / kWh considering degraded SHR and AEC based on block unit loading.
- ix) "ECR (DC)" means Energy Charge Rate in Rupees/kWh based on degraded SHR and AEC considering unit loading corresponding to Declared Capacity (DC) of the block
- x) "ECR (SE)" means Energy Charge Rate in Rupees/kWh based on degraded SHR and AEC considering block unit loading of generating station.
- xi) "Effective Generation" in MWhr means the actual generation ex-bus of the designated generating station or the Generation for Basic SG Schedule as in (i) during the calculation period, whichever is higher.
- xii) "RRAS Regulation" means Central Electricity Regulatory Commission (Ancillary Services Operations) Regulations, 2015.

3.2 Terms and abbreviations used in this Compensation Mechanism but not defined herein shall have the meaning as assigned to them in Electricity Act, 2003 or the State Grid Code or other Regulations of the Commission as notified from time to time.

4.0 Mechanism for working out Compensation

4.1 Compensation for degradation of Heat Rate (SHR) and Auxiliary Energy Consumption (AEC)

- i) The Compensation shall be worked out at the end of each month considering degradation in SHR and AEC based on Block Unit Loading (%) for each Time Block.
- ii) Energy scheduled under RRAS Regulations shall be taken as +ve for upregulation and –ve for down regulation. Similarly, energy scheduled under AGC, SCED shall be taken as +ve for increase and –ve for decrease.
- iii) The Normative Auxiliary Consumption of competitively bid projects shall be considered based on the normative AEC of similar units as per Tariff Regulation of the Commission or the difference between the Installed Capacity and the ex-bus Contracted Capacity as a percentage of Installed Capacity of the generating station, whichever is less. For projects where, entire capacity is not tied up in long term or medium-term contracts, the Normative AEC shall be considered based on the normative AEC of similar units as per the Tariff Regulations of the Commission.
- iv) Compensation for part load operation shall be calculated based on Time Block of unit loading %, to work out incremental SHR and AEC in accordance with the Annexure – 3.

For each Time Block the amount of additional heat required and additional Auxiliary Energy Consumption Require are to be calculated according to following formula:

$$\text{HEAT}_{\text{Add}} = \text{SHR} \times D_{\text{HR}} \times 0.01 \times \text{Energy} \times 1000$$

$$\text{AEC}_{\text{Add}} = \text{Energy} \times D_{\text{AEC}} \times 0.01$$

Where

HEAT_{Add} = Additional Heat in Kcal

SHR = Applicable normative station heat rate of the generating station in Kcal/Kwhr

D_{HR} = Applicable % increase in heat rate as per Annexure-3 corresponding to BUL

Energy = Energy in MWhr for the concern Time Block

AEC_{Add} = Additional auxiliary energy consumption in MWhr

D_{AEC} = Applicable degradation in % for Auxiliary Energy Consumption as per Annexure-3

- v) Based on the values of increased SHR and AEC arrived above, Energy Charge Rate (ECR) for Block Unit Loading %, i.e. ECR (SE) for the station shall be calculated for a time block using the formula specified for MFCA Calculation in Tariff Regulations of the Commission:

Provided that for generating stations whose tariff has been determined under Section 63 of the Act, the ECR(SE) shall be worked out as per the following formula:

- d) Where ECR is quoted without specifying SHR and AEC:

$$\text{ECR(SE)} = \text{quoted ECR or quoted Variable Charge} \times (1 + \% \text{ degradation in heat rate based on block unit loading corresponding to Effective Generation}/100) / (1 - \% \text{ degradation in Aux Consumption based on block unit loading corresponding to Effective Generation}/100)$$

- e) Where ECR is computed based on normative net Heat Rate and PPA already provides for energy charge payment corresponding to degradation in net station heat rate:

$$\text{ECR(SE)} = \text{ECR worked out based on net station heat rate (without \% degradation in heat rate based on block unit loading corresponding to Effective generation)} / (1 - \% \text{ degradation in Aux Consumption based on block unit loading corresponding to Effective generation}/100)$$

Note: Model PPA notified by Gol provides for energy charge payment corresponding to degradation in net station heat rate and hence as such no separate compensation is allowed under this procedure.

- f) Where ECR is computed based on normative net Heat Rate and PPA does not provide for energy charge payment corresponding to degradation in net station heat rate:

$$\text{ECR(SE)} = \text{ECR worked out based on net station heat rate} \times (1 + \% \text{ degradation in heat rate based on block unit loading corresponding to Effective generation}/100) / (1 - \% \text{ degradation in Aux Consumption based on block unit loading corresponding to Effective generation}/100)$$

- vi) ECR corresponding to Declared Capacity (DC) i.e. ECR (DC) for the Time Block shall also be calculated using the formula specified in Tariff Regulations of the Commission and used as reference for calculating compensation. This is because, the effect of less declaration (with respect to normative ex-bus Installed capacity), if any, on the SHR and AEC should be to the account of regional entity generating station/ISGS:

Provided that for generating stations whose tariff has been adopted by Commission under Section 63 of the Act, the ECR(DC) shall be worked out as per following formula:

- a) Where ECR is quoted without specifying Heat Rate or Aux Consumption:

$$\text{ECR (DC)} = \text{ECR quoted or variable Charge quoted} \times (1 + \% \text{ degradation in heat rate based on block unit loading corresponding to DC/100}) / (1 - \% \text{ degradation in Aux Consumption based on block unit loading corresponding to DC /100})$$

- b) Where ECR is computed based on net Heat Rate and PPA already provides for energy charge payment corresponding to degradation in net station heat rate:

$$\text{ECR (DC)} = \text{ECR worked out based on net station heat rate (without \% degradation in heat rate based on unit loading) corresponding to DC} / (1 - \% \text{ degradation in Aux Consumption based on block unit loading corresponding to DC /100})$$

Note: Model PPA already provides for energy charge payment corresponding to degradation in net station heat rate as such no separate compensation under this procedure.

- (c) Where ECR is computed based on normative net Heat Rate and PPA does not provide for energy charge payment corresponding to degradation in net station heat rate:

$$\text{ECR(DC)} = \text{ECR worked out based on net station heat rate} \times (1 + \% \text{ degradation in heat rate based on block unit loading corresponding to DC /100}) / (1 - \% \text{ degradation in Aux Consumption based on block unit loading corresponding to DC/100})$$

The compensation to be paid to designated generating stations for each Time Block, ECR (Comp) shall be difference in the ECR (SE) and ECR (DC) for that Block.

$$\text{ECRn (Comp)} = \text{ECRn(SE)} - \text{ECRn(DC)}$$

Provided that the ECR (Comp) shall be worked out separately for each PPA of the station but annual reconciliation shall be on over all considerations of all PPAs after due prudence by RPC Secretariat.

- vii) The compensation $Comp_n(P)$ payable to State Sector Generating Station for a month shall be calculated as below:

$$Comp_n(P) = \sum Basic\ SG\ in\ kWhr \times ECR_n(Comp)\ for\ all\ time\ blocks\ of\ month\ n$$

- viii) $ECR_n(A)$ for the calculation period at the end of month n shall be calculated using actual values of SHR and Aux Consumption furnished by SSGS at the end of the calculation period and normative secondary fuel oil consumption as per Tariff Regulation for which the requisite information shall be submitted by the generating station to the SLDC.

Similarly, $ECR_n(N)$ shall be calculated using normative values of SHR and Aux Consumption and normative secondary fuel oil consumption as per Tariff Regulation furnished by SSGS.

Provided that in case of generating stations whose tariff has been adopted by Commission under Section 63 of the Act, $ECR_n(N)$ shall be calculated using normative net SHR or the ECR quoted for the relevant month as the case may be.

- ix) Now, following values shall be calculated:

- (a) Total Energy Charges for the station computed on actual parameters

$$EC_n(A) = ECR_n(A) \times \sum Basic\ SG\ in\ kWhr\ for\ all\ time\ blocks\ of\ month\ n$$

- (b) Total Energy Charges payable to station based on Normative parameters

$$EC_n(N) = ECR_n(N) \times \sum Basic\ SG\ in\ kWhr\ for\ all\ time\ blocks\ of\ month\ n$$

- x) Compensation payable for the calculation period to SSGS would be shared with beneficiaries as per following:

- a) If $EC_n(A) \leq \text{Sum of } \{EC_n(N) \text{ and } Comp_n(P)\}$, then such gain i.e., difference between the sum of $\{EC_n(N) \text{ and } Comp_n(P)\}$ and $EC_n(A)$ amount restricted to $Comp_n(P)$, shall be shared between generating station and beneficiaries in the ratio of 60:40. In that case $Comp_n(F)$ for the month shall be $Comp_n(P)$ less the amount of gain to be shared with the beneficiary.
- b) If $EC_n(A)$ is more than the sum of $\{EC_n(N) \text{ and } Comp_n(P)\}$, there shall be no sharing of compensation between the generating station and the beneficiary and $Comp_n(P)$ shall be $Comp_n(F)$ for the month.

- xi) Compensation payable for the calculation period to Final Compensation payable by K^{th} beneficiary for the calculation period:

- a) No compensation shall be payable by beneficiaries if it has requisitioned at least 85% of its entitlement during the calculation period.
- b) The compensation amongst other beneficiaries shall be shared in the ratio of un-requisitioned energy below 85% of their entitlement i.e. compensation payable by k th beneficiary for the calculation period entitlement during the calculation period.

$$FCB_{kn} = \text{Comp}_n(F) \times \{UE_{kn} / \sum_k UE_{kn}\}$$

Where UE_{kn} is un-requisitioned energy of kth beneficiary below 85% of its entitlement during the calculation period.

4.2 Calculation for Secondary Fuel Oil consumption:

- i) No compensation for degradation of Secondary Fuel oil consumption is payable for the year if total number of start-ups is equal to or less than (7 x no. of units in the generating station) or the Actual Secondary Fuel Oil consumption is less than Normative Fuel Oil Consumption.
- ii) Compensation (in terms of KL of Secondary Oil) shall be payable to SSGS for the year due to degradation of Secondary Fuel Oil Consumption shall be calculated by multiplying no. of start-ups exceeding 7 per unit and solely attributable to reserve shut-downs with the appropriate value of additional secondary oil consumption specified in Regulation.
- iii) Compensation in terms of Rupees shall be calculated by multiplying compensation in terms of KL as calculated in step (b) and average landed price of Secondary fuel oil for the year.
- iv) Any saving on account of oil, limited to amount received from the compensation, shall be shared with the beneficiaries in 60:40 ratio.
- v) Each start-up due to reserve shutdown shall be attributed to the beneficiaries, who had requisitioned below 55% of their entitlement.
- vi) Compensation (in terms of Rupees) shall be shared amongst the beneficiaries in the following manner:

Compensation payable

$$\left[N_i \times \frac{A_i}{\sum (N_i \times A_i)} \right] \times \text{Compensation payable to SSGS}$$

Where

N_i = Number of Start-Ups attributable to the beneficiary i

A_i = Weighted Average Percentage share of the beneficiary i in the generating station

- vii) The SSGS is to take all due care to keep a check on secondary oil use during part operations and during start-ups to the extent possible.

4.3 In case generating station runs below technical minimum schedule it shall be entitled for compensation corresponding to technical minimum schedule.

4.4 Calculation of Compensation, Billing and Submission of Data by the Generator

- i) Generating station shall calculate the compensation as specified in these procedures and bill the same to beneficiaries along with its monthly bill which shall be subject to adjustment based on compensation statement issued by SLDC subsequently.
- ii) Generating station shall submit the requisite data along with compensation calculation to SLDC as prescribed in Appendix-1 to this procedure for a month by 15th day of the following month. For stations where the PPAs are not unit-wise, the information for the station shall be furnished. The data to be submitted is for the month and reconciled up to the month.

4.5 Issuance of compensation statement

- i) SLDC will issue the compensation statement along with final State Level Energy Accounts for the month.
- ii) In case any anomaly or discrepancy is noticed by any Utility, the same may be brought to the notice SLDC within 15 days of issuance of Compensation Statement.

Appendix-1

Information to be submitted by SSGS to the SLDC by 15th of each month (say in May) for the previous month (say of April)

Sr No (a)	(b)	Unit No 1 (c)	Unit No 2 (d)	Unit No 3 (e)	Unit No 4 (f)	-----	Total (g)
1	Installed capacity /MCR					---	
2	Planned outage / Tripped (Hrs)					---	
3	On bar Hrs					---	
4	Normative SHR or Net SHR as the case may be					---	
5	Normative SFC					---	
6	CVSF					---	
7	LPPF					---	
8	LPSFi					---	
9	Normative LC					---	
10	LPL					---	
11	Normative Aux Cons					---	
12	Actual GHR*SHR					---	
13	Actual SFC					----	
14	Actual LC					----	
15	Actual Aux. Cons					----	
16	RSD start /stop in the month					----	
17	RSD start, /stop cumulative					----	
18	Total no. of Start /stop during year					----	
19	CVPF					----	

ANNEXURE – 5

DETAILED OPERATING PROCEDURE FOR COMMITTING AND DECOMMITTING OF COAL/LIGNITE/GAS UNIT(S) OF THE STATE SECTOR ENTITY GENERATING STATIONS

1.0 Objective

The objective of this Procedure is to lay down

- i) the methodology for identifying the SSGS or units thereof to be de-committed in specific grid conditions such as low system demand, during regulation of power supply, incidence of high renewables etc.;
- ii) the procedure for committing or de-committing generating units;

2.0 Methodology for committing and de-committing generating station or unit(s)

- 2.1 The SSGS shall submit the Time Block wise Declared Capacity (DC) of generating station and other information, by 0900 hours of the day for next three (3) days on rolling basis in line with this State Grid Code.
- 2.2 SLDCs shall compile the above information along with the entitlement for each beneficiary and advise the same to all ALDC/beneficiaries by 1100 hours for next three (3) days as per State Grid Code. Entitlements shall be calculated based on the DC. The beneficiaries shall furnish their requisition for the next three (3) day to SLDC by 1300 hours of the day based on the entitlements given by the SLDC in accordance with this State Grid Code.
- 2.3 Ex-Power Plant (Ex-PP) dispatch schedule of a generating station for each Time Block shall be computed by SLDC by taking algebraic sum of requisitions of all beneficiaries of that generating station.
- 2.4 The SLDC shall carryout a security constrained unit commitment (SCUC) in order to fulfill the projected requisitions as well as for maintaining reserves at SSGS for the State Power System and also economizing the operations.
- 2.5 The SCUC mechanism by SLDC shall also factor following:
 - a) On bar and off bar requisitions by beneficiaries
 - b) Extreme variation in Weather Conditions
 - c) High Load Forecast
 - d) To maintain reserves on regional or all India basis

- e) Network Congestion
 - f) Any other event which in the opinion of SLDC shall affect the grid security.
- 2.6 The results of SCUC along with time to commit unit (s) on bar or de-commit unit (s) off bar shall be informed to generating stations. The generating stations shall bring or take out unit (s) accordingly.
- 2.7 The SCUC shall also be carried out by SLDC on daily and intraday basis as well and results shall be conveyed to generating stations accordingly with advance information for action by generating stations.
- 2.8 The generating stations/units committed through SCUC shall normally be provided the schedule above or upto minimum turn down level through security constrained economic dispatch (SCED) mechanism.
- 2.9 During the day of operation if net EX-PP injection schedule for a generating station is less than minimum turn down level, generating station can keep unit on bar and generate accordingly and would get compensation as given in this State Grid Code.
- 2.10 If the requisition of some beneficiaries go up to ensure minimum turn down level as above, beneficiaries may surrender power from some other regional entity generating station(s) or intra-State generating station(s) out of merit order.
- 2.11 The eligibility conditions for the generating stations to participate in SCUC and SCED mechanism shall be separately announced by SLDC based on the orders of the Commission.
- 2.12 The generating stations not covered under the SCUC and SCED mechanism shall commit / de-commit units as per their respective Power Purchase Agreement (PPA) conditions. Before de-committing unit(s), the generating station shall revise the On-Bar DC (with due consideration to ramp up/down capability), Off Bar DC, DC and Ramp UP/RAMP Down rate. The generator shall ensure that the Off-Bar DC is not more than the MCR less Normative Auxiliary Consumption of the machines to be de-committed. The beneficiaries shall continue to bear the capacity charge corresponding to Total DC.
- 2.13 When the machine is being de-committed:
- a) In case the total requisitioned power can be supplied through other units in the same generating station on bar, the generator shall be scheduled according to the requisitions received.

- b) In case total requisitioned power cannot be supplied through other units in the same generating station on bar or through SCED mechanism, the requisition of the beneficiaries from off bar DC shall be reduced in the ratio of such requisitioned power.
- 2.14 In the special case of a generating station where the only running machine is decommitted, the beneficiaries who have requisitioned power may not get scheduled for few blocks. No maintenance activities on unit to be de-committed shall be undertaken by the generating station so that the de-committed unit is always readily available for revival/synchronization. If a generating station requires maintenance on any machine to be de-committed, then the same shall be done in due consultation with RLDC. The DC shall be reduced appropriately.
- 2.15 Regulation of Power Supply: When injection schedule of a regional entity generating station falls below technical minimum due to imposition of regulation of power supply by the generating company or transmission licensee under any statutory provisions or order of court, the generator may endeavour to sell the surplus power through STOA or Power Exchange(s) before opting to de-commit.
- 3.0 Methodology for committing or de-committing generating station or unit(s) thereof (Real Time Schedule Revision)**
- 3.1 A beneficiary can surrender its part or full entitlement during the day of operation in accordance with the relevant provisions of State Grid Code.
- 3.2 In case, the schedule of a generating station goes below minimum turn down level, due to this surrender of power:
 - a) SLDC may provide technical minimum schedule considering the system conditions in accordance with the State Grid Code and SCED mechanism.
 - b) In case the system condition does not require, SLDC shall direct the generating station to take any unit or the generating station to be de-committed. In such a scenario, SLDC shall display the station likely to go under RSD on its website. In case, the schedule is still less than the technical minimum and generating station decides to de-commit unit(s), it shall inform the same to concerned RLDC.
 - c) In order to meet peak load and to maintain reserves, the generating station should endeavour to plan as far as possible the de-committing in such a manner that maximum number of units are kept on bar keeping in view economy and efficiency of the units of the generating station.

4.0 Methodology for committing or de-committing generating station or unit(s) thereof (Real Time Schedule Revision)

- 4.1 Once a unit is de-committed, the generating station shall notify the period for which the unit will remain off bar and the unit can be recalled any time after 8 hours. In case of system requirements, the generating unit can be revived before 8 hrs as well. The time to start a machine under different conditions such as HOT, WARM and COLD shall be as per the declaration given by the generating station in the requisite format under the Detailed Procedure for Ancillary Services to be published by SLDC as specified in regulation 9.8 of this State Grid Code.
- 4.2 One or more beneficiaries of the generating station as well as the generating station may decide for revival of unit(s) de-committed with commitment for technical minimum schedule with minimum run time of 8 hrs for Coal based generating stations and 3 hrs for Gas based generating stations post revival. In such situations, the generating station shall revise the On Bar and Off Bar DC (with due consideration to ramp up/down capability).
- 4.3 SLDC may also advise the generating stations to revive unit(s) which are decommitted for better system operation.
- 4.4 In case the machine is not revived as per the revival time declared by the generating station under different types of start, the machine shall be treated under outage for the duration starting from the likely revival time and the actual revival time. RLDC shall ensure that intimation is sent to the generating station sufficiently in advance keeping in view its start-up time.

ANNEXURE – 6

Procedure for forecasting, scheduling and imbalance handling for renewable energy (re) generating stations at intra-state level

1.0 Introduction

The responsibility to coordinate with SLDC and provide forecast and the data required under the Procedure shall be that of Qualified Coordinating Agency on behalf of all generating stations it is representing.

Provided that where Qualified Coordinating Agency is not identified, individual renewable energy generating station with installed capacity of more than 50 MW or lead generator or Principal generator shall be responsible for the same.

2.0 Role of Entities

2.1 QCA or Renewable Energy Generating Station

2.1.1 The individual generating station or lead generator or principal generator shall submit one-time details to concerned SLDC/ALDC as per Appendix-I. Further, if there is any change in the information furnished, then the updated information shall be shared with the concerned SLDC not later than 7 working days of the change.

2.1.2 QCA shall undertake the following activities:

- a) All the technical coordination amongst the generators connected at a pooling station shall be done by the QCA.
- b) Provide available capacity, Day ahead forecast (based on their own forecast or on the forecast done by SLDC/ALDC) and Schedule as per Appendix-II through web-based application maintained by SLDC.
- c) Provide real time availability (at turbine/inverter level) and generation data (at pooling station level) as per Appendix -III.
- d) Provide Monthly data transfer (as per Appendix – IV):

- i) For wind plants, at the turbine level- average wind speed, average power generation at Time Block level
- ii) For solar plants, for all inverters* ≥ 1 MW- average solar irradiation, average power generation at Time Block level

* if a solar plant uses only smaller string inverters, then data may be provided at the plant level

- e) Be Responsible for metering and data collection, transmission and co-ordination with SLDC, ALDC, STU and other agencies as per WBEGC and extant WBERC Regulations.
- f) Undertake commercial settlement of all deviation-settlement charges as per applicable DSM Regulations.
- g) Submit a copy of the agreement to concerned SLDC/ALDC wherein it is mentioned that QCA shall undertake all operational and commercial responsibilities on behalf of generating stations as per the applicable regulations of WBERC. Further Connectivity grantee shall also submit the application for connectivity which was submitted to STU to the respective SLDC or ALDC as applicable.
- h) Use Automatic meter reading technologies for transfer, analysis and processing of interface meter data
- i) Perform commercial settlement beyond the connection point (De-pooling arrangement) and technical coordination amongst the generators within the pooling station and upto the connection point as the case may be.
- j) Shall furnish the PPA rates on notarized affidavit for the purpose of Deviation charge account preparation to SLDC/ALDC supported by copy of the PPA.
- k) Keep SLDC indemnified at all times and shall undertake to indemnify, defend and save the SLDC/ALDCs harmless from any and all damages, losses including commercial losses due to forecasting error, claims and actions including those relating to injury to or death of any person or damage to property, demands, suits, recoveries,

costs and expenses, court costs, attorney fees, and all other obligations by or to third parties, arising out of or resulting from the transactions undertaken by the Generators.

2.2 SLDC/ALDC

- a) The concerned SLDC / ALDC shall be responsible for scheduling, communication, coordination with QCA or generating station or Lead Generator or Principal Generator. Forecasting of the renewable energy generation shall be done by the SLDC / ALDC and the forecast will be available on the website of the SLDC /concerned ALDC. The generation forecast shall be done on the basis of the weather data provided by IMD or on the basis of other methods used by the Forecasting Agency whose service may be availed by SLDC. However, the forecast by the concerned SLDC shall be with the objective of ensuring secure grid operation.
- b) The SLDC will be responsible for processing the interface meter data and computing the net injections at pooling station represented by each QCA as specified in Appendix - V.
- c) SLDC may, appoint additional manpower for carrying out the additional responsibility assigned in these Procedures, if required.

3.0 Forecasting

- a) State Level forecasting shall be done by the concerned SLDC to facilitate secure grid operation. The concerned SLDC may engage a forecasting agency to undertake forecasting of renewable generation for each pooling station.
- b) QCA shall provide the forecast to the SLDC or concerned ALDC which may be based on their own forecast or SLDC's or ALDC's forecast as per Appendix-II. In case QCA is utilizing service of SLDC/ALDC for its forecasting, necessary fees shall be paid by generator to SLDC/ALDC as approved by WBERC.
- c) The SLDC shall consolidate and forecast based on various parameters as mentioned in the enclosed Annexures and weather data obtained from IMD or from any other forecast service provider (which could be different from that provided by QCA)
- d) QCA may prepare their schedule based on the forecast done by SLDC or their own forecast. Any commercial impact on account of deviation from schedule based on the forecast chosen by the QCA shall be borne by the respective QCA.

4.0 Scheduling and Despatch

- 4.1 Following alternatives exist for Scheduling and Despatch for Generators within Solar / Wind /Hybrid Power parks due to multiple generation developers within the Park injecting at various points within the park and ultimately injecting at interface with InSTS:

Case-1: QCA shall be responsible for the scheduling, communication, coordination with generating stations connected at a pooling station which is under RLDC control area.

Case-2: Where QCA at a pooling station is not identified following situations may arise.

Case-A: The SLDC shall be responsible for the scheduling, communication, coordination with RE Generators of 50 MW and above and connected to Intra State Transmission System (ISTS).

Case-B: Lead generator or Principal generator shall be responsible for the coordination and communication with RLDC, SLDC, RPC and other agencies for scheduling of RE Generators individually having less than 50 MW, but collectively having an aggregate installed capacity of 50 MW and above and connected within the solar park.

- 4.2 For Case-1, QCA shall be responsible for doing de-pooling of DSM charges as per the mutual agreement between generators and QCA.
- 4.3 For Case- 2, where scheduling and accounting is to be coordinated by SLDC, a representative sketch showing the scheduling for Case-A and Case-B is attached as Appendix-IV.
- 4.4 The change of QCA would need a notice period of fifteen (15) days and the changeover shall take place with effect from 0000 hours of a Monday, the first day of weekly settlement cycle.
- 4.5 In case of any payment default by the QCA, the generators shall be liable to pay the DSM charges in proportion to their MW capacity.

5.0 Metering

- 5.1** Interface Energy Meters shall be installed under the supervision of STU as per State Grid Code to facilitate boundary metering, accounting and settlement for RE Generators. Automated meter reading (AMR) system shall be used for communicating interface meter data at SLDCs. Internal Clock of the interface meter shall be time synchronized with GPS.
- 5.2** QCA shall ensure availability of data telemetry at the turbine/inverter level to the concerned SLDC and shall ensure the correctness of the real-time data and undertake the corrective actions, if required. Frequency of real-time data updation to be shared with SLDC shall be 10 second or less as per prevailing practice followed by SLDCs. Further, turbine/inverter outage plan shall also be forwarded to the concerned SLDC. The suggested data telemetry requirement for RE Generators is enclosed at Appendix -III.

6.0 Treatment of RECs

Deviation by RE Generator will have to be dealt under DSM Regulations in same line with other generators.

7.0 SLDC Fees and Charges

- 7.1** The Solar Power Park Developer and Wind Power Park Developer and Renewable Generating stations with installed capacity of more than 50 MW or lead generator or principal generator shall be registered as User with the SLDC responsible for scheduling, metering and energy accounting. (what about ALDC)
- 7.2** Generating stations with installed capacity of more than 50 MW or lead generator or principal generator shall pay SLDC fees and charges as per State Grid Code or Open Access Regulations.

8.0 Removal of Difficulties

- 8.1** In case of any difficulty in implementation of this procedure, SLDC may approach the Commission for review or revision.
- 8.2** Notwithstanding anything contained in this Procedure, SLDC's may take appropriate decisions in the interest of System Operation. Such decisions shall be taken under intimation to WBERC and the procedure shall be modified /amended, as necessary.

Appendix-I

Details to be submitted by the Wind/Solar generating stations which are intra-state connected generator/ lead generator, principal generator	
Type: Wind/Solar Generator	
Individual / on Behalf of Group of generators	
If on Behalf Group of generators then details of agreement to be attached	
Total Installed Capacity of Generating Station	
Total Number of Units with details	
Physical Address of the RE Generating Station	
Whether any PPA has been signed: (Y/N)	If yes, then attach details
Connectivity Details	Location/Voltage Level
Metering Details	Meter No. 1. Main 2. Check
Connectivity Diagram	(Please Enclose)
Static data	As per attached sheet
Contact Details of the Nodal Person	Name: Designation: Number: Landline Number- Fax Number- Mobile Number- Email Address
Contact Details of the Alternate Nodal Person	Name: Designation: Number: Landline Number, - Fax Number- Mobile Number- Email Address-

Data to be submitted by the RE Generator / lead generator, principal generator for Wind turbine generating plants

S No	Particulars
1	Type
2	Manufacturer
3	Make /Model
4	

5	Capacity
6	COD
7	Hub height
8	Total height
9	RPM range
10	Rated wind speed
Performance Parameters	
11	Rated electrical power at rated wind speed
12	Cut in speed
13	Cut out speed
14	Survival speed (Max wind speed)
15	Ambient temperature for out of operation
16	Ambient temperature for in operation
17	Survival temperature
18	Low Voltage Ride Through (LVRT) setting
19	High Voltage Ride Through (HVRT) setting
20	Lightning strength (KA & in coulombs)
21	Noise power level (db)
22	Rotor
23	Hub type
24	Rotor diameter
25	Number of blades
26	Area swept by blades
27	Rated rotational speed
28	Rotational Direction
29	Coning angle
30	Tilting angle
31	Design tip speed ratio
Blade	
32	Length
33	Diameter

34	Material
35	Twist angle
Generator	
36	Generator Type
37	Generator no of poles
38	Generator speed
39	Winding type
40	Rated Gen. Voltage
41	Rated Gen. frequency
42	Generator current
43	Rated Temperature of generator
44	Generator cooling
45	Generator power factor
46	KW/MW @ Rated Wind speed
47	KW/MW @ peak continuous
48	Frequency Converter
49	Filter generator side
50	Filter grid side
Transformer	
51	Transformer capacity
52	Transformer cooling type
53	Voltage
54	Winding configuration
Weight	
55	Rotor weight
56	Nacelle weight
57	Tower weight
58	Over speed Protection
59	Design Life
60	Design Standard
61	Latitude

62	Longitude
63	COD Details
64	Past Generation History from the COD to the date on which DAS facility provided at RLDC, if applicable
65	Distance above mean sea level

For Solar generating Plants: Static data points:

1. Latitude
2. Longitude
3. Turbine Power Curve
4. Elevation and orientation angles of arrays or concentrators
5. The generation capacity of the Generating Facility
6. Distance above mean sea level etc.
7. COD details
8. Rated voltage
9. Details of Type of Mounting: (Tracking Technology If used, single axis or dual axis, auto or manual)
10. Manufacturer and Model (of Important Components, Such as Turbine, Concentrators, Inverter, Cable, PV Module, Transformer, Cables)
11. DC installed Capacity
12. Module Cell Technology
13. I-V Characteristic of the Module
14. Inverter Rating at different temperature
15. Inverter Efficiency Curve
16. Transformer Capacity & Rating, evacuation voltage, distance form injection point

Appendix-II

Forecast and Schedule Data to be submitted by QCA, generator-wise

FORMAT: A (to be submitted a day in advance)

15 Min time block (96 Block in a day)	TIME	Available Capacity (MW) - Day Ahead	Day Ahead Forecast (MW)	Day Ahead Schedule (MW)
1	00:00-00:15			
2	00:15-00:30			
3	00:30-00:45			
4	00:45-01:00			
94				
95				
96				

Note: The forecast should ideally factor forecasting errors. As such schedule should ordinarily be same as forecast.

FORMAT: B (to be submitted on the day of actual generation, revision of availability and schedule, if any, shall be done as per CERC(IEGC) Regulations.

15 Min time block(96 Block in a day)	TIME	Day ahead schedule (MW)	Current Available Capacity (MW)	Revised Schedule (MW)
1	00:00-00:15			
2	00:15-00:30			
3	00:30-00:45			
4	00:45-01:00			
94				
95				
96				

Appendix-III

Real-time Data Telemetry requirement (Suggested List)

Wind turbine generating plants

1. Turbine Generation(MW/MVAR)
2. Wind Speed(meter/second)
3. Generator Status (on/off-line)- this is required for calculation of availability of the WTG
4. Wind Direction (degrees from true north)
5. Voltage (Volt)
6. Ambient air temperature (° C)
7. Barometric pressure(Pascal)
8. Relative humidity (in percent)
9. Air Density(kg/m³)

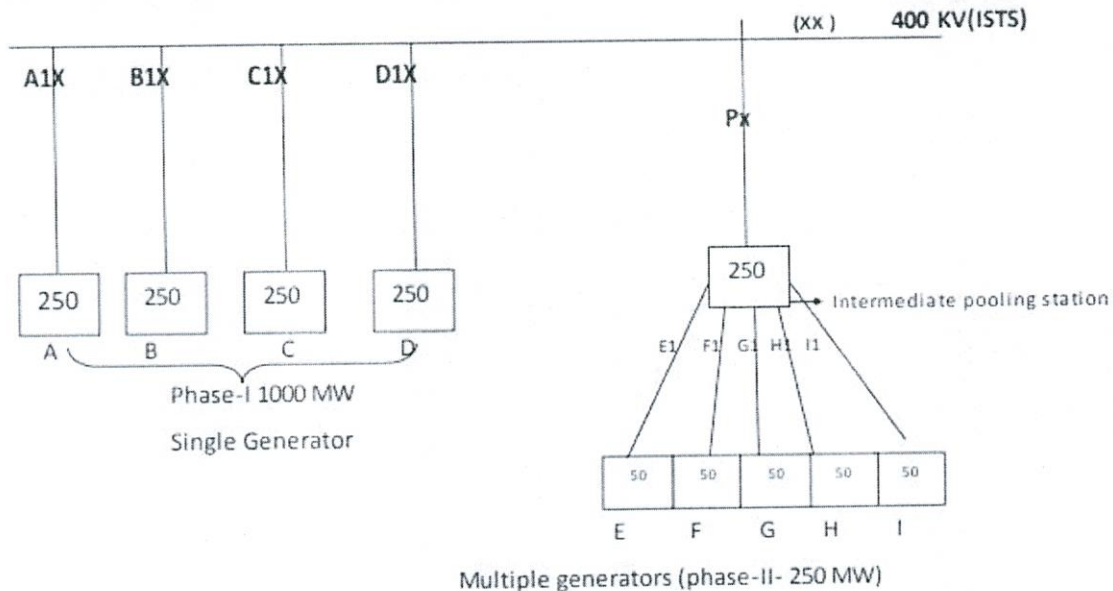
For Solar generating Plant s

1. Solar Generation unit/ Inverter-wise (MW and MVAR)
2. Voltage at interconnection point (Volt)
3. Generator/Inverter Status (on/off-line)
4. Global horizontal irradiance (GHI)- Watt per meter square
5. Ambient temperature (oC)
6. Diffuse Irradiance- Watt per meter square
7. Direct Irradiance- Watt per metersquare
8. Sun-rise and sunsettimings
9. Cloud cover-(Okta)
10. Rainfall (mm)
11. Relative humidity (%)
12. Performance Ratio-

Appendix-IV

Block Diagram showing the case wise Scheduling and Forecasting considering a sample case

Case-I: 50 MW and above (Phase-I &II)



Phase-I – 1000 MW,

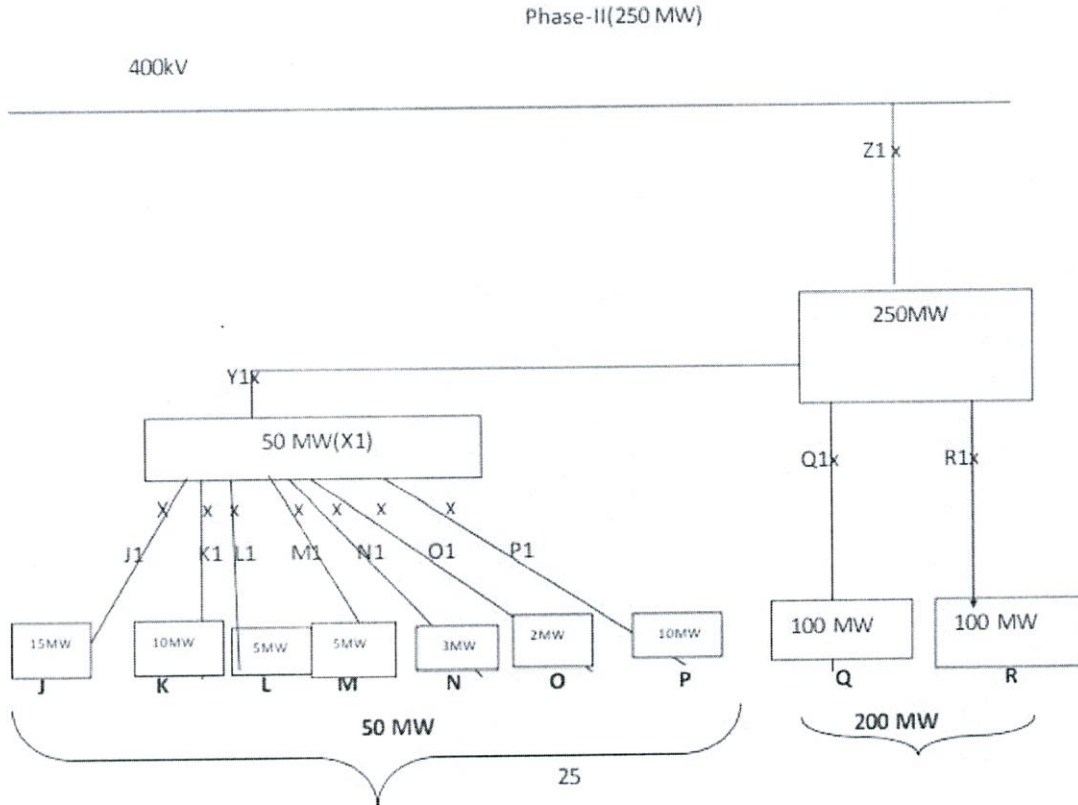
A single generator of 1000 MW capacity is developing the generating station in phase-1 in four blocks namely A, B, C & D of 250 MW capacity each and is directly connected to point A1, B1, C1 & D1 respectively at InSTS. At the interface point scheduling and forecasting will be done by SLDC.

Phase-II- 500 MW (Separate Generator/Entities)

- (1) Let multiple generators of 50 MW each aggregating to 250 MW (5 Nos. Multiple Generator of 50 Mw each (as separate entities), be connected to inter mediate pooling stations.
- (2) In this case Solar generating station may be developed by single or Multiple generators. Here we have considered as multiple generators namely E, F, G, H & I each having the capacity of 50 MW each, the RE generators are connected to interface point E1, F1, G1, H1 & I1 and thereby connected to InSTS at XX point.
- (3) In such a case scheduling, accounting, forecasting for these generators needs to be segregated at point E1, F1, G1, H1, I1. Scheduling shall be done at point P and shall be segregated at E1, F1, G1, H1, I1 by SLDC.

- (4) Further, there may be case where multiple generators less than 50MW (<50MW) capacity are connected to the intermediate pooling station are stated as under: -

Case-II Below 50 MW



- (5) For remaining 250 MW of Phase-II, let us consider, multiple generators of 7 Nos (J, K, L, M, N, O&P) each having capacity less than 50 MW but collectively having an aggregate installed capacity of 50 MW or more. Further Generators Q & R each of 100 MW are connected at Q1 & R1. All these generators are connected to InSTS at point Z1.
- (6) Scheduling and forecasting for the generators J, K, L, M, N, O& P shall be done at Point Z1, but need to be segregated at Point J1, K1, L1, M1, N1, O1& P1 and for generators Q & R needs to be segregated at Q1 and R1. In this case, SLDC shall schedule at point Z1 and segregate at Y1, Q1& R1. The lead generator shall provide aggregated schedule to SLDC at Y1. Further the lead generator shall do segregation of schedules and other operational & commercial activities for generators J, K, L, M, N, O, P at points J1, K1, L1, M1, N1, O1& P1.