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CENTRAL ELECTRICITY REGULATORY COMMISSION NEW DELHI

F. No. L-1/18/2010-CERC

Dated: 28th April, 2010

PREAMBLE

The Indian Electricity Grid Code (IEGC) is a regulation made by the Central Commission in exercise of powers under clause (h) of sub-section (1) of Section 79 read with clause (g) of sub-section (2) of Section 178 of the Act. The IEGC also lays down the rules, guidelines and standards to be followed by various persons and participants in the system to plan, develop, maintain and operate the power system, in the most secure, reliable, economic and efficient manner, while facilitating healthy competition in the generation and supply of electricity.

NOTIFICATION

In exercise of powers conferred under clause (h) of sub-section (1) of Section 79 read with clause (g) of sub-section (2) of Section 178 of the Electricity Act, 2003 (36 of 2003), and

all other powers enabling it in this behalf, the Central Electricity Regulatory Commission hereby makes the following regulations.

1. Short title, extent and commencement

- (1) These Regulations may be called the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010.
- (2) These Regulations shall come into force from [3.5.2010]¹.
- (3) These regulations shall supersede the Indian Electricity Grid Code, 2006 which came into effect from 1.4.2006.

2. Definitions

- (1) In these Regulations unless the context otherwise requires:
 - a) **'Act'** means the Electricity Act, 2003 as amended from time to time;
 - b) **'Ancillary Services'** means in relation to power system (or grid) operation, the services necessary to support the power system (or grid) operation in maintaining power quality, reliability and security of the grid, e.g. active power support for load following, reactive power support, black start, etc;
 - c) **'Automatic Voltage Regulator (AVR)'** means a continuously acting automatic excitation control system to control the voltage of a Generating Unit measured at the generator terminals;

¹ Initially Clauses (5) and (7) of Annexure-I of these Regulations came into force w.e.f. 01.01.2011. Later the date of coming into force of Clauses (5) and (7) of Annexure-I of these Regulations was decided to be 01.01.2012 vide notification published in Part III, Section 4, No. 10 of the Gazette of India (Extraordinary) dated 19.01.2011.

- d) **‘Available Transfer Capability (ATC)’** means

the transfer capability of the inter-control area transmission system available for scheduling commercial transactions (through long term access, medium term open access and short term open access) in a specific direction, taking into account the network security. Mathematically ATC is the Total Transfer Capability less Transmission Reliability Margin;
- e) **‘Beneficiary’** means

a person who has a share in an ISGS;
- f) **‘Bilateral Transaction’** means

a transaction for exchange of energy (MWh) between a specified buyer and a specified seller, directly or through a trading licensee or discovered at Power Exchange through anonymous bidding, from a specified point of injection to a specified point of drawal for a fixed or varying quantum of power (MW) for any time period during a month;
- g) **‘Black Start Procedure’** means

the procedure necessary to recover from a partial or a total blackout in the region;
- (h) **‘BIS’** means

the Bureau of Indian Standards;
- i) **‘Bulk Consumer’** means

any Consumer who avails supply at voltage of 33 kV or above;
- j) **‘Capacitor’** means

an electrical facility provided for generation of reactive power;

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| k) | ‘Central Generating Station’ means | the generating stations owned by the companies owned or controlled by the Central Government; |
| l) | ‘Central Transmission Utility (CTU)’ means | any Government company, which the Central Government may notify under sub-section (1) of Section 38 of the Act, |
| m) | ‘Collective Transaction’ means | a set of transactions discovered in power exchange through anonymous, simultaneous competitive bidding by buyers and sellers; |
| n) | ‘Congestion’ means | a situation where the demand for transmission capacity exceeds the Available Transfer Capability; |
| o) | ‘Connection Agreement’ means | an Agreement between CTU, inter-state transmission licensee other than CTU (if any) and any person setting out the terms relating to a connection to and/or use of the Inter State Transmission System; |
| p) | ‘Connection Point’ means | a point at which a Plant and/ or Apparatus connects to the Transmission/Distribution System; |
| q) | ‘Connectivity’ means | the state of getting connected to the inter-State transmission system by a generating station, including a captive generating plant, a bulk consumer or an inter-State transmission licensee; |

- r) **‘Control Area’** means an electrical system bounded by interconnections (tie lines), metering and telemetry which controls its generation and/or load to maintain its interchange schedule with other control areas whenever required to do so and contributes to frequency regulation of the synchronously operating system;
- s) **‘Demand’** means the demand of Active Power in MW and Reactive Power in MVAR of electricity unless otherwise specified;
- t) **‘Demand response’** means reduction in electricity usage by end customers from their normal consumption pattern, manually or automatically, in response to high UI charges being incurred by the State due to overdrawal by the State at low frequency, or in response to congestion charges being incurred by the State for creating transmission congestion, or for alleviating a system contingency, for which such consumers could be given a financial incentive or lower tariff;
- u) **‘Despatch Schedule’** means the ex-power plant net MW and MWh output of a generating station, scheduled to be exported to the Grid from time to time;

- v) **‘Disturbance Recorder (DR)’** means a device provided to record the behaviour of the pre-selected digital and analog values of the system parameters during an Event;
- w) **‘Data Acquisition System (DAS)’** means a system provided to record the sequence of operation in time, of the relays/ equipments as well as the measurement of pre-selected system parameters;
- x) **‘Drawal Schedule’** means the summation of the station-wise ex-power plant drawal schedules from all ISGS and drawal from/injection to regional grid consequent to other long term access, medium term and short term open access transactions;
- y) **‘DVC’** means the Damodar Valley Corporation established under sub-section (1) of Section 3 of the Damodar Valley Corporation Act, 1948;
- z) **‘Entitlement’** means a Share of a beneficiary (in MW / MWh) in the installed capacity/output capability of an ISGS;
- aa) **‘Event’** means an unscheduled or unplanned occurrence on a Grid including faults, incidents and breakdowns;
- bb) **‘Event Logging Facilities’** means a device provided to record the chronological sequence of operations, of the relays and other equipment;

- cc) **‘Ex-Power Plant’** means net MW/MWh output of a generating station, after deducting auxiliary consumption and transformation losses;
- dd) **‘Fault Locator (FL)’** means a device provided at the end of a transmission line to measure/ indicate the distance at which a line fault may have occurred;
- ee) **‘Flexible Alternating Current Transmission System(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;
- ff) **‘Force Majeure’** means any event which is beyond the control of the persons involved which they could not foresee or with a reasonable amount of diligence could not have foreseen or which could not be prevented and which substantially affects the performance by person such being the following including but not limited to:-
- a) Acts of God, natural phenomena, floods, droughts, earthquakes and epidemics;
 - b) Enemy acts of any Government domestic or foreign, war declared or undeclared, hostilities, priorities, quarantines, embargoes;
 - c) Riot or Civil Commotion;
 - d) Grid’s failure not attributable to the person.

- gg) **'Forced Outage'** means an outage of a Generating Unit or a transmission facility due to a fault or other reasons which has not been planned;
- hh) **'Generating Company'** means any company or body corporate or association or body of individuals, whether incorporated or not, or artificial juridical person, which owns or operates or maintains a generating station.
- ii) **'Generating Unit'** means an electrical Generating Unit coupled to a turbine within a Power Station together with all Plant and Apparatus at that Power Station which relates exclusively to the operation of that turbo-generator;
- jj) **'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;
- kk) **'Governor Droop'** means in relation to the operation of the governor of a Generating Unit, the percentage drop in system frequency which would cause the Generating Unit under restricted/free governor action to change its output from zero to full load;
- ll) **'Grid Standards'** means the standards specified by the Authority under clause (d) of the Section 73 of the Act;

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| mm) ‘Extra High Voltage (EHV)’ means | where the voltage exceeds 33,000 volts under normal conditions, subject, however, to the percentage variation allowed by the Authority; |
| nn) ‘Independent Power Producer (IPP)’ means | a generating company not owned/controlled by the Central/State Government; |
| oo) ‘Indian Electricity Grid Code (IEGC) or Grid Code’ means | these regulations specifying the philosophy and the responsibilities for planning and operation of Indian power system ; |
| pp) ‘Inter-State Generating Station (ISGS)’ means | a Central generating station or other generating station, in which two or more states have Shares; |
| qq) ‘Inter State Transmission System (ISTS)’ means | <p>i) Any system for the conveyance of electricity by means of a main transmission line from the territory of one State to another State</p> <p>ii) The conveyance of electricity across the territory of an intervening State as well as conveyance within the State which is incidental to such inter-state transmission of energy</p> <p>(iii) The transmission of electricity within the territory of State on a system built, owned, operated, maintained or controlled by CTU;</p> |
| rr) ‘Licensee’ means | a person who has been granted a license under Section 14 of the Act; |

ss)	'Load' means	the MW/MWh /MVAR/MVARh consumed by a utility/ installation;
tt)	'Long-term Access' means	the right to use the inter-State transmission system for a period exceeding 12 years but not exceeding 25 years;
uu)	'Long-term customer' means	a person who has been granted long-term access and includes a person who has been allocated central sector generation that is electricity supply from a generating station owned or controlled by the Central Government;
vv)	'Maximum Continuous Rating (MCR)' means	the maximum continuous output in MW at the generator terminals guaranteed by the manufacturer at rated parameters;
ww)	'Medium-term Open Access' means	the right to use the inter-State transmission system for a period exceeding 3 months but not exceeding 3 years;
xx)	'Medium-term customer' means	a person who has been granted medium-term open access;
yy)	'National Grid' means	the entire inter-connected electric power network of the country;
zz)	'Net Drawal Schedule' means	the drawal schedule of a Regional Entity after deducting the apportioned transmission losses (estimated);
aaa)	'NLDC' means	the Centre established under sub-section (1) of Section 26 of the Act;

- bbb) **‘Operation’** means a scheduled or planned action relating to the operation of a System;
- ccc) **‘Operation Coordination Sub-Committee (OCC)’** means a sub-committee of RPC with members from all the regional entities which decides the operational aspects of the Regional Grid,
- ddd) **‘Operating Range’** means the operating range of frequency and voltage as specified under the operating code (Part-5);
- eee) **‘Pool Account’** means [Pool Account’ means regional account for (i) payments regarding Deviation Charges (Deviation Charge Account) or (ii) reactive energy exchanges (Reactive Energy Account) (iii) Congestion Charge, as the case may be;]²
- fff) **‘POWERGRID’** means Power Grid Corporation of India Limited which has been notified as CTU;
- ggg) **‘Power Exchange’** means the power exchange which has been granted registration in accordance with CERC (Power Market Regulations), 2010 as amended from time to time;

² Substituted vide Third Amendment Regulations, 2015 w.e.f. 01.11.2015

- h) **'Power System'**
means all aspects of generation, transmission, distribution and supply of electricity and includes one or more of the following, namely:
- (a) generating stations;
 - (b) transmission or main transmission lines;
 - (c) sub-stations;
 - (d) tie-lines;
 - (e) load despatch activities;
 - (f) mains or distribution mains;
 - (g) electric supply lines;
 - (h) overhead lines;
 - (i) service lines;
 - (j) works;
- iii) **'Protection Co-ordination Sub-Committee'** means a sub-committee of RPC with members from all the regional entities which decides on the protection aspects of the Regional Grid;
- jj) **'Reactor'** means an electrical facility specifically designed to absorb Reactive Power;
- kk) **'Regional Entity'**
means such persons who are in the RLDC control area and whose metering and energy accounting is done at the regional level;
- ll) **'Regional Power Committee (RPC)'**
means a Committee established by resolution by the Central Government for a specific region for facilitating the integrated operation of the power systems in that region;

mmm)	'RPC Secretariat' means	the Secretariat of the RPC.
nnn)	'Regional Energy Account (REA)' means	a regional energy account prepared on monthly basis by the RPC Secretariat for the billing and settlement of 'Capacity Charge', 'Energy Charge' and transmission charges;
ooo)	'Regional Grid' means	the entire synchronously connected electric power network of the concerned Region;
ppp)	'Regional Load Despatch Centre (RLDC)' means	the Centre established under sub-section (1) of Section 27 of the Act;
qqq)	'Share' means	percentage share of a beneficiary in an ISGS either notified by Government of India or agreed through contracts and implemented through long term access;
rrr)	'Short-term Open Access' means	open access for a period up to one (1) month at one time;
sss)	'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;

ttt)	‘Standing Committee for Transmission Planning’ means	a Committee constituted by the CEA to discuss, review and finalise the proposals for expansion or modification in the ISTS and associated intra-state systems;
uuu)	‘SEB’ means	State Electricity Board which term includes State Electricity Department;
vvv)	‘SERC’ means	State Electricity Regulatory Commission
www)	‘State Load Despatch Centre (SLDC)’ means	the Centre established under subsection (1) of Section 31 of the Act;
xxx)	‘State Transmission Utility (STU)’ means	the Board or the Government Company specified as such by the State Government under sub-section (1) of Section 39 of the Act;
yyy)	‘Static VAR Compensator (SVC)’ means	an electrical facility designed for the purpose of generating or absorbing Reactive Power;
zzz)	‘Technical Co-ordination Committee (TCC)’ means	the committee set up by RPC to coordinate the technical and commercial aspects of the operation of the regional grid;
aaaa)	‘Time Block’ means	block of 15 minutes each for which Special Energy Meters record values of specified electrical parameters with first time block starting at 00.00 Hrs;

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| bbbb) ‘Total Transfer Capability (TTC)’
means | the amount of electric power that can be transferred reliably over the inter-control area transmission system under a given set of operating conditions considering the effect of occurrence of the worst credible contingency; |
| cccc) ‘Transmission License’
means | a License granted under Section 14 of the Act to transmit electricity; |
| dddd) ‘Transmission Planning Criteria’ means | the policy, standards and guidelines issued by the CEA for the planning and design of the Transmission system; |
| eeee) ‘Transmission Reliability Margin (TRM)’ means | the amount of margin kept in the total transfer capability necessary to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in system conditions; |
| ffff) ‘Unscheduled Interchange (UI)’
means | in a time block for a generating station or a seller means its total actual generation minus its total scheduled generation and for a beneficiary or buyer means its total actual drawal minus its total scheduled drawal; |

- gggg) **'User'** means a person such as a Generating Company including Captive Generating Plant or Transmission Licensee (other than the Central Transmission Utility and State Transmission utility) or Distribution Licensee or Bulk Consumer, whose electrical plant is connected to the ISTS at a voltage level 33kV and above;
- “[hhhh) **'Deviation Settlement Mechanism Regulations'** means Central Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters) Regulations, 2014 including any subsequent amendments thereof;
- iiii) **'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 company/ STU/ CTU, the sub-station of distribution company/STU/CTU shall be considered as the pooling station for such wind/solar generator, as the case may be.]³
- [jjjj) Date of Commercial Operation or 'COD' shall have the same meaning as provided in Sub-Regulation 6.3A.1, 6.3A.2 and 6.3A.4 of these Regulations.
- kkkk) Trial Operation or Trial Run shall have the same meaning as provided in Sub-Regulation 6.3A.3 and 6.3A.5 of these Regulations.

³ Added vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

- III) Technical Minimum Schedule in respect of Central Generating Stations and inter-State Generating Stations shall have the same meaning as provided in Sub-Regulation 6.3B of these Regulations.]⁴
- (2) Words and expressions used in these regulations and not defined herein but defined in the Act shall have the meaning assigned to them under the Act.

PART-1

GENERAL

1.1 Introduction

The Indian Power System is a conglomeration of a number of agencies. Power system means all aspects of generation, transmission, distribution and supply of electricity and includes one or more of the following, namely:-

- (a) generating stations;
- (b) transmission or main transmission lines;
- (c) sub-stations;
- (d) tie-lines;
- (e) load despatch activities;
- (f) mains or distribution mains;
- (g) electric supply-lines;
- (h) overhead lines;
- (i) service lines;
- (j) works;

1.2 Objective

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

- Documentation of the principles and procedures which define the relationship

⁴ Added vide Fourth Amendment Regulations, 2016 w.e.f. 29.04.2016

between the various Users of the inter-State transmission system (ISTS), National Load Despatch Centre, as well as the Regional and State Load Despatch Centers

- Facilitation of the optimal operation of the grid, facilitation of coordinated and optimal maintenance planning of generation and transmission facilities in the grid and facilitation of development and planning of economic and reliable National / Regional Grid
- Facilitation for functioning of power markets and ancillary services by defining a common basis of operation of the ISTS, applicable to all the Users of the ISTS,
- Facilitation of the development of renewable energy sources by specifying the technical and commercial aspects for integration of these resources into the grid.

1.3 Scope

- i) All Users, SLDCs, RLDCs, NLDC, CEA, CTU, STUs, licensees, RPCs and Power Exchanges are required to abide by the principles and procedures defined in the IEGC in so far as they apply to that party.
- ii) For the purpose of the IEGC, the Damodar Valley Corporation (DVC) will be treated similar to a SEB, in view of the fact that DVC is a vertically integrated utility like a SEB and has its own generation, transmission and distribution in the identified command area. Accordingly Central Load Despatch at Maithon shall perform functions of SLDC envisaged in this code for the area of DVC.
- iii) For the purpose of the IEGC, the generating stations of the Bhakra Beas Management Board (BBMB) and Sardar Sarovar Project (SSP) shall be treated as intra-State generating stations, though their transmission systems shall be a part of the ISTS. This is because of the fact that only some of the States of Northern Region/ Western Region have a Share in BBMB/ SSP, and their generating units have to be scheduled and dispatched in a very special manner (in coordination with the irrigational requirements). The scheduling and despatch of the BBMB/ SSP generation shall continue to be the responsibility of the BBMB/ Narmada Control Authority (NCA), with a proviso that it shall be duly coordinated with the respective Regional Load Despatch Centre and the beneficiaries.

- iv) Any neighbouring country inter-connected with Indian (National) Grid shall be treated as a separate control area.

1.4 Structure of the IEGC

This IEGC contains the following:

i) Part 2: Role of various Organizations and their linkages

This Part defines the functions of the various Organizations as are relevant to IEGC.

ii) Part 3: Planning Code for inter-State transmission

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

iii) Part 4: Connection Code

This Part specifies minimum technical and design criteria to be complied with by STU, CTU and any User connected to the system or seeking connection to the ISTS, to maintain uniformity and quality across the system. This also includes procedure for connection to the ISTS.

iv) Part 5: Operating Code

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

(a) Operating Philosophy

(b) System security aspects

This section describes the general security aspects to be followed by generating companies and all Regional Entities, CTU, STU, and all other Users of the Grid.

(c) Demand Estimation for operational purposes

This section details the procedures to estimate the demand by the SEB/ distribution licensees for their systems / SLDCs in their control area for the day/week/month/year ahead, which shall be used for operational planning.

(d) Demand management

This section identifies the methodology to be adopted for demand control by each SEB/SLDC/Distribution Licensee/ bulk consumer depending on, overdrawal by the entity, frequency, voltage and transmission congestion and any other requirement of grid security.

(e) Periodic Reports

This section provides various provisions for reporting of the operating parameters of the grid such as frequency profile etc.

(f) Operational liaison

This section sets out the requirement for the exchange of information in relation to normal operation and/or events in the grid.

(g) Outage Planning

This section indicates procedure for outage planning.

(h) Recovery procedures

This section contains the procedures to be adopted following a major grid

disturbance, for black start and resynchronization of islands, etc.

(i) Event Information

This section indicates the procedure by which events are reported and the related information exchange requirements etc.

v) [Part 6: Scheduling and Despatch Code]

This section deals with the procedure to be adopted for scheduling and despatch of generation of the Inter-State Generating Stations (ISGS) and scheduling for other transactions through long-term access, medium-term and short-term open access including complementary commercial mechanisms, on a day-ahead and intra-day basis with the process of the flow of information between the ISGS, National Load Despatch Centre (NLDC), Regional Load Despatch Centre (RLDC), Power Exchanges and the State Load Despatch Centres (SLDCs), and other concerned persons.

Most of the wind and solar energy generators are presently connected to intra-State network and in future are likely to be connected to the inter-state transmission system (ISTS) as well. Keeping in view the variable nature of generation from such sources and the effect such variability has on the inter-state grid, and in view of the large-scale integration of such sources into the grid envisaged in view of the Government of India's thrust on renewable sources of energy, scheduling of wind and solar generators which are regional entities, has been incorporated in this code.]⁵

vi) Part 7: Miscellaneous

1.5 Compliance Oversight

- (i) RLDCs shall report to the Commission instances of serious or repeated violation of any of the provisions of the IEGC and incidences of persistent non-compliance of the directions of the RLDCs issued in order to exercise supervision and control required for ensuring stability of grid operations and for achieving the

⁵ Substituted vide Third Amendment Regulations, 2015 w.e.f. 01.11.2015

maximum economy and efficiency in the operation of the power system in the region under its control.

- (ii) The Regional Power Committee (RPC) in the region shall also continuously monitor the instances of non-compliance of the provisions of IEGC and try to sort out all operational issues and deliberate on the ways in which such cases of non-compliance are prevented in future by building consensus. The Member Secretary RPC may also report any issue that cannot be sorted out at the RPC forum to the Commission. The RPC shall also file monthly reports on status of UI payment and installation of capacitors by states vis-à-vis the requirement/targets, as decided in the RPC.
- (iii) The Commission may initiate appropriate proceedings upon receipt of report of [RLDCs or RPCs]⁶ referred to in (i) and (ii) above respectively.
- (iv) In case of non-compliance of any provisions of the IEGC by NLDC, RLDC, SLDC, RPC and any other person the matter may be reported by any person to the CERC through petition.
- (v) Notwithstanding anything contained in these regulations, the Commission may also take suo-motu action against any person, in case of non-compliance of any of the provisions of the IEGC.

⁶ Substituted vide Corrigendum dated 03.07.2010

PART-2

ROLE OF VARIOUS ORGANIZATIONS AND THEIR LINKAGES

2.1 Introduction

2.1.1. This Part defines the functions of the various organizations involved in the field of grid operation and management and their organizational linkages so as to facilitate development and smooth operation of Regional Grids and National Grid at large so far as it relates to the IEGC.

2.2. Role of NLDC

2.2.1 According to notification dated 2nd March 2005, by the Ministry of Power, Government of India, under Section 26(2) of the Act NLDC shall be the apex body to ensure integrated operation of the national power system and shall discharge the following functions. This would also include such other functions assigned by the Government of India through resolutions issued from time to time;

- (a) supervision over the Regional Load Despatch Centers.
- (b) scheduling and despatch of electricity over inter-regional links in accordance with Grid Standards specified by the Authority and Grid Code specified by Central Commission in coordination with Regional Load Despatch Centers.
- (c) coordination with Regional Load Despatch Centers for achieving maximum economy and efficiency in the operation of National Grid.
- (d) monitoring of operations and grid security of the National Grid.
- (e) supervision and control over the inter-regional links as shall be required for ensuring stability of the power system under its control.
- (f) coordination with Regional Power Committees for regional outage

schedule in the national perspective to ensure optimal utilization of power resources.

- (g) coordination with Regional Load Despatch Centers for the energy accounting of inter-regional exchange of power.
- (h) coordination for restoration of synchronous operation of national grid with Regional Load Despatch Centers.
- (i) coordination for trans-national exchange of power.
- (j) providing operational feed back for national grid planning to the Authority and the Central Transmission Utility.
- (k) levy and collection of such fee and charges from the generating companies or licensees involved in the power system, as shall be specified by the Central Commission.
- (l) dissemination of information relating to operations of transmission system in accordance with directions or regulations issued by Central Electricity Regulatory Commission and the Central Government from time to time.

2.2.2 NLDC shall also carry out the following functions:

- (i) NLDC shall be the nodal agency for collective transactions.
- (ii) NLDC would act as the Central control room in case of natural & man made emergency/disaster where it affects the power system operation.
- (iii) Any other function as may be assigned by the Commission by order or regulations from time to time.

2.3 Role of RLDC

2.3.1 According to sections 28 and 29 of Electricity Act, 2003, the functions of RLDCs are as follows:

- (1) The Regional Load Despatch Centre shall be the apex body to ensure integrated operation of the power system in the concerned region.
- (2) The Regional Load Despatch Centre shall comply with such principles, guidelines and methodologies in respect of wheeling and optimum scheduling and despatch of electricity as may be specified in the Grid Code.
- (3) The Regional Load Despatch Centre shall-
 - (a) be responsible for optimum scheduling and despatch of electricity within the region, in accordance with the contracts entered into with the licensees or the generating companies operating in the region;
 - (b) monitor grid operations;
 - (c) keep accounts of quantity of electricity transmitted through the regional grid;
 - (d) exercise supervision and control over the Inter-State transmission system ; and
 - (e) be responsible for carrying out real time operations for grid control and despatch of electricity within the region through secure and economic operation of the regional grid in accordance with the Grid Standards and the Grid Code.
- (4) The Regional Load Despatch Centre may give such directions and exercise such supervision and control as may be required for ensuring stability of grid operations and for achieving the maximum economy and efficiency in the operation of the power system in the region under its control.
- (5) Every licensee, generating company, generating station, substation and any other person connected with the operation of the power system shall comply with the directions issued by the Regional Load Despatch Centers.

- (6) All directions issued by the Regional Load Despatch Centers to any transmission licensee of State transmission lines or any other licensee of the State or generating company (other than those connected to inter-State transmission system) or substation in the State shall be issued through the State Load Despatch Centre and the State Load Despatch Centers shall ensure that such directions are duly complied with by the licensee or generating company or sub-station.
- (7) If any dispute arises with reference to the quality of electricity or safe, secure and integrated operation of the regional grid or in relation to any direction given by the Regional Load Despatch Centre, it shall be referred to Central Commission for decision. However, pending the decision of the Central Commission, the directions of the Regional Load Despatch Centre shall be complied with by the State Load Despatch Centre or the licensee or the generating company, as the case may be.

2.3.2 The following are contemplated as exclusive functions of RLDCs:

- (a) System operation and control including inter-state transfer of power, covering contingency analysis and operational planning on real time basis;
- (b) Scheduling / re-scheduling of generation;
- (c) System restoration following grid disturbances;
- (d) [Meter data processing]⁷;
- (e) Compiling and furnishing data pertaining to system operation;
- (f) Operation of regional UI pool account, regional reactive energy account and Congestion Charge Account, provided that such functions will be undertaken by any entity(ies) other than RLDCs if the Commission so directs.

⁷ Substituted vide First Amendment Regulations, 2012 w.e.f. 02.04.2012.

(g) Operation of ancillary services

2.3.3 In cases of Short-term Open access bilateral transaction in Inter-state Transmission, the Regional Load Despatch Centre of the region where point of drawal of electricity is situated, shall be the nodal agency for the short-term open access. The procedure and modalities in regard to short-term Open Access shall be in accordance with the Central Electricity Regulatory Commission (Open Access in Inter-state Transmission) Regulations, 2008, as amended from time to time.

2.4 Role of RPC

2.4.1 In accordance with the Electricity Act, 2003, RPCs have been constituted by the Central Government for the specified Region(s) for facilitating the integrated operation of the power system in the Region. The Secretariat of the RPC is headed by the Member Secretary, who is appointed by the Central Electricity Authority (CEA), together with the other staff for the RPC Secretariat. Under Section 29(4) of the Electricity Act, 2003, the Regional Power Committee in the region may, from time to time, agree on matters concerning the stability and smooth operation of the integrated grid and economy and efficiency in the operation of the power system in that region.

2.4.2 The following functions which go to facilitate the stability and smooth operation of the systems are identified for the RPC:

- (a) To undertake Regional Level operation analysis for improving grid performance.
- (b) To facilitate inter-state/inter-regional transfer of power.
- (c) To facilitate all functions of planning relating to inter-state/ intra-state transmission system with CTU/STU.
- (d) To coordinate planning of maintenance of generating machines of various generating companies of the region including those of interstate generating companies supplying electricity to the Region on annual basis

and also to undertake review of maintenance programmed on monthly basis.

- (e) To undertake planning of outage of transmission system on annual / monthly basis.
- (f) To undertake operational planning studies including protection studies for stable operation of the grid.
- (g) To undertake planning for maintaining proper voltages through review of reactive compensation requirement through system study committee and monitoring of installed capacitors.
- (h) To evolve consensus on all issues relating to economy and efficiency in the operation of power system in the region.

2.4.3 The decisions of RPC, arrived at by consensus regarding operation of the regional grid and scheduling and despatch of electricity, if not inconsistent with the provisions of IEGC / CERC Regulations, shall be followed by the concerned RLDC/SLDC/CTU/STU and Users, subject to directions of the Central Commission, if any.

2.4.4 Member Secretary, RPC shall, certify transmission system availability factor for regional AC and HVDC transmission systems separately for the purpose of payment of transmission charges:

2.4.5 [RPC Secretariat or any other person as notified by the Commission from time to time, shall prepare monthly Regional Energy Account (REA), weekly deviation charge account, reactive energy account, and congestion charge account, based on data provided by RLDC, and deviation charge account for wind and solar generators which are regional entities, based on data provided by SLDC/RLDC of the State/Region in which such generators are located and any other charges specified by the Commission for the purpose of billing and payments of various charges.]⁸

⁸ Substituted vide Third Amendment Regulations 2015 w.e.f. 01.11.2015

2.5 Role of CTU

2.5.1 In accordance with the Section 38 of Electricity Act, 2003, the functions of the Central Transmission Utility (CTU) shall be –

- (1) (a) to undertake transmission of electricity through inter-State transmission system;
- (b) to discharge all functions of planning and co-ordination relating to inter-State transmission system with-
 - i) State Transmission Utilities
 - ii) Central Government;
 - iii) State Governments;
 - iv) Generating companies;
 - v) Regional Power Committees;
 - vi) Authority;
 - vii) Licensees;
 - viii) Any other person notified by the Central Government in this behalf;
- (c) to ensure development of an efficient, co-ordinated and economical system of inter-State transmission lines for smooth flow of electricity from generating stations to the load centers;
- (d) to provide non-discriminatory open access to its transmission system for use by-
 - i) any licensee or generating company on payment of the transmission charges; or

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

(2) []⁹

2.5.2 CTU shall not engage in the business of generation of electricity or trading in electricity.

2.5.3 In case of Inter-state Transmission System, Central Transmission Utility shall be the nodal agency for the connectivity, long-term access and medium-term open access. The procedure formulated by CTU and approved by CERC and modalities in regard to connectivity, long-term access and medium-term open access shall be in accordance with the Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) Regulations, 2009, as amended from time to time.

2.6 Role of CEA

2.6.1 According to the Section 73 of Electricity Act, 2003, the functions of CEA as relevant to IEGC are as under:

- (1) (i) CEA shall formulate short-term and perspective plans for development of the electricity system and co-ordinate the activities of the planning agencies for the optimal utilization of resources to sub-serve the interests of the national economy and to provide reliable and affordable electricity for all consumers.
- (ii) to specify the technical standards for construction of electrical plants, electric lines and connectivity to the grid;
- (iii) to specify the safety requirements for construction, operation and maintenance of electrical plants and electric lines;

⁹ Deleted vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

- (iv) to specify the Grid Standards for operation and maintenance of transmission lines; and
 - (v) to specify the conditions for installation of meters for transmission and supply of electricity.
 - (vi) to promote and assist in the timely completion of schemes and projects for improving and augmenting the electricity system;
 - (vii) to collect and record the data concerning the generation, transmission, trading, distribution and utilisation of electricity and carry out studies relating to cost, efficiency, competitiveness and such like matters;
 - (viii) to carry out, or cause to be carried out, any Investigation for the purposes of generating or transmitting or distributing electricity.
- (2) CEA shall prepare a National Electricity Plan in accordance with the National Electricity Policy published by the Central Government under the provisions of Section 3(1) of Electricity Act, 2003. The CEA shall notify the National Electricity Plan once in five years.

2.7 Role of SLDC

2.7.1 In accordance with section 32 of Electricity Act, 2003, the State Load Despatch Centre (SLDC) shall have following functions:

- (1) The State Load Despatch Centre shall be the apex body to ensure integrated operation of the power system in a State.
- (2) The State Load Despatch Centre shall-
 - (a) be responsible for optimum scheduling and despatch of electricity within a State, in accordance with the contracts entered into with the licensees or the generating companies operating in that State;

- (b) monitor grid operations;
- (c) keep accounts of the quantity of electricity transmitted through the State grid;
- (d) exercise supervision and control over the intra-State transmission system; and
- (e) be responsible for carrying out real time operations for grid control and despatch of electricity within the State through secure and economic operation of the State grid in accordance with the Grid Standards and the State Grid Code.

2.7.2 In accordance with Section 33 of the Electricity Act, 2003, the State Load Despatch Centre in a State may give such directions and exercise such supervision and control as may be required for ensuring the integrated grid operations and for achieving the maximum economy and efficiency in the operation of power system in that State. Every licensee, generating company, generating station, sub-station and any other person connected with the operation of the power system shall comply with the directions issued by the State Load Despatch Centre under sub-section (1) of Section 33 of the Electricity Act, 2003.

The State Load Despatch Centre shall comply with the directions of the Regional Load Despatch Centre.

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

2.8. Role of STU

2.8.1 Section 39 of the Electricity Act, 2003, outlines that the functions of the State Transmission Utility (STU) shall be-

- (1) (a) to undertake transmission of electricity through intra-State transmission system;
- (b) to discharge all functions of planning and co-ordination relating to intra-state transmission system with-
 - i) Central Transmission Utility;
 - ii) State Governments;
 - iii) Generating companies;
 - iv) Regional Power Committees;
 - v) Authority;
 - vi) licensees;
 - vii) any other person notified by the State Government in this behalf
- (c) to ensure development of an efficient, co-ordinated and economical system of intra-State transmission lines for smooth flow of electricity from a generating station to the load centers;
- (d) to provide non-discriminatory open access to its transmission system for use by-
 - (i) any licensee or generating company on payment of the transmission charges; or
 - (ii) any consumer as and when such open access is provided by the State Commission under sub-section (2) of Section 42 of the Act, on payment of the transmission charges and a surcharge thereon, as may be specified by the State Commission .

- (2) Until a Government company or any authority or corporation is notified by the State Government, the State Transmission Utility shall operate the State Load Despatch Centre.

PART-3

PLANNING CODE FOR INTER-STATE TRANSMISSION

This Part comprises various aspects of Planning relating to inter-State transmission systems.

3.1 Introduction

- i) In accordance with Section 38(2) (b) of Electricity Act, 2003, the Central Transmission Utility (CTU) shall discharge all functions of planning and co-ordination relating to inter-State transmission system in coordination with State Transmission Utility, Central Government, State Governments, Generating Companies, Regional Power Committees, Central Electricity Authority (CEA), licensees and any other person notified by the Central Government in this behalf.
- ii) In accordance with Section 38(2) (d) of Electricity Act, 2003, the Central Transmission Utility (CTU) shall inter-alia provide non-discriminatory open access to its transmission system for use by
 - (a) any licensee or generating company on payment of the transmission charges; or
 - (b) any consumer as and when such open access is provided by the State Commission under sub-section (2) of Section 42, on payment of the transmission charges and a surcharge thereon, as may be specified by the Central Commission.
- iii) Similarly, in accordance with Section 39(2)(b) of Electricity Act, 2003, the State Transmission Utilities (STUs) shall discharge all functions of planning and coordination relating to intra-State transmission system with Central Transmission Utility, State Governments, Generating Companies, Regional Power Committees, Central Electricity Authority (CEA), licensees and any

other person notified by the State Government in this behalf.

- iv) In accordance with Section 39(2) (d) of Electricity Act, 2003, the State Transmission Utility (STU) shall inter-alia provide non-discriminatory open access to its transmission system for use by-
 - (a) any licensee or generating company on payment of the transmission charges; or
 - (b) any consumer as and when such open access is provided by the State Commission under sub-section (2) of Section 42, on payment of the transmission charges and a surcharge thereon, as may be specified by the State Commission.
- v) In accordance with Section 40 of Electricity Act, 2003, the transmission licensee shall inter-alia provide non-discriminatory open access to its transmission system for use by:-
 - (a) any licensee or generating company on payment of the transmission charges; or
 - (b) any consumer as and when such open access is provided by the State Commission under sub-section (2) of Section 42, on payment of the transmission charges and a surcharge thereon, as may be specified by the State Commission.
- vi) In accordance with Section 3 (4) of Electricity Act, 2003, CEA shall inter-alia prepare a National Electricity Plan in accordance with the National Electricity Policy and notify such plan once in five (5) years. In accordance with Section 3 (5) of Electricity Act, 2003, CEA may review or revise the National Electricity Plan in accordance with the National Electricity Policy.
- vii) In accordance with Section 73 (a) of Electricity Act, 2003, CEA is responsible to advise the Central Government on the matters relating to the National Electricity Policy, formulate short-term and perspective plans for development of the electricity system and co-ordinate the activities of planning agencies

for optimal utilization of resources to sub-serve the interests of the national economy and to provide reliable and affordable electricity for all consumers.

- viii) The Planning Code specifies the philosophy and procedures to be applied in planning of National Grid, Regional Grids and Inter Regional links.

3.2 Objective

The objectives of Planning Code are as follows:

- (a) To specify the principles, procedures and criteria which shall be used in the planning and development of the ISTS and inter regional links.
- (b) To promote co-ordination amongst all Users, STU/SLDC and CTU/RLDC, NLDC, RPC and CEA in any proposed development of the ISTS.
- (c) To provide methodology and information exchange amongst Users, STU/SLDC and CTU/RLDC, RPC, NLDC and CEA in the planning and development of the ISTS.

3.3 Scope

The Planning Code applies to CTU, other Transmission licensees, Inter-State Generating Station (ISGS), connected to and/or using and involved in developing the ISTS. This Planning Code also applies to Generating Companies, IPPs, SEBs/STUs and /licensees, regarding generation and/or transmission of energy to/from the ISTS.

3.4 Planning Philosophy

- (a) CEA would formulate perspective transmission plan for inter-State transmission system as well as intra-State transmission system. These perspective transmission plans would be continuously updated to take care of the revisions in load projections and generation scenarios considering the seasonal and the time of the day variations. In formulating perspective transmission plan the transmission requirement for evacuating power from renewable energy sources shall also be taken care of. The transmission system required for open access

shall also be taken into account in accordance with National Electricity Policy so that congestion in system operation is minimized.

- (b) The CTU shall carry out planning process from time to time as per the requirement for identification of inter-State transmission system including transmission system associated with Generation Projects, regional and inter-regional system strengthening schemes which shall fit in with the perspective plan developed by CEA. While planning schemes, the following shall be considered in addition to the data of authenticated nature collected from and in consultation with users by CTU:
 - i) Perspective plan formulated by CEA.
 - ii) Electric Power Survey of India published by the CEA.
 - iii) Transmission Planning Criteria and guidelines issued by the CEA
 - iv) Operational feedback from RPCs
 - v) Operational feedback from NLDC/RLDC/SLDC
 - vi) Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-state Transmission and related matters) Regulations, 2009.
 - vii) Renewable capacity addition plan issued by Ministry of New and Renewable Energy Sources (MNRES), Govt. of India
- (c) In addition to the inter-State transmission system, the CTU shall plan, from time to time, system strengthening schemes, need of which may arise to overcome the constraints in power transfer and to improve the overall performance of the grid. The inter-state transmission proposals including system strengthening scheme identified on the basis of the planning studies would be discussed, reviewed and finalized in the meetings of Regional Standing Committees for Transmission Planning constituted by CEA, in consultation with the Regional Entities, RPC, CEA, NLDC and the RLDC and action may be taken by CTU on the basis of

Power Purchase Agreements (PPAs) signed with the beneficiaries. [In case of associated transmission system where all PPAs have not been signed, and where agreement could not be reached in respect of system strengthening schemes, the CTU may approach the Commission for the regulatory approval in accordance with Central Electricity Regulatory Commission (Grant of Regulatory Approval for execution of Inter-State Transmission Scheme to Central Transmission Utility) Regulations, 2010.]¹⁰

- (d) All, STUs and Users will supply to the CTU, the desired planning data from time to time to enable to formulate and finalize its plan.
- (e) As voltage management plays an important role in inter-state transmission of energy, special attention shall be accorded, by CTU, for planning of capacitors, reactors, SVC and Flexible Alternating Current Transmission Systems (FACTS), etc. Similar exercise shall be done by STU for intra-State transmission system to optimize the utilisation of the integrated transmission network.
- (f) Based on Plans prepared by the CTU, State Transmission Utilities (STU) shall have to plan their systems to further evacuate power from the ISTS and to optimize the use of integrated transmission network.
- (g) In case Long Term Access Applications require any strengthening in the intra-State transmission system to absorb/evacuate power beyond ISTS, the applicant shall coordinate with the concerned STU. STU shall augment the intra-state transmission system in a reasonable time to facilitate the interchange of such power.
- (h) The Inter-State Transmission System and associated intra-State transmission system are complementary and inter-dependent and planning of one affects the other's planning and performance. Therefore, the associated intra-State transmission system shall also be discussed and reviewed before implementation during the discussion for finalizing ISTS proposal indicated at 3.4 (b) above.

¹⁰ Substituted vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

3.5 Planning Criterion

General Philosophy

- (a) The planning criteria are based on the security philosophy on which the ISTS has been planned. The security philosophy may be as per the Transmission Planning Criteria and other guidelines as given by CEA. The general policy shall be as detailed below:
- i) As a general rule, the ISTS shall be capable of withstanding and be secured against the following contingency outages
- a. without necessitating load shedding or rescheduling of generation during Steady State Operation:
- Outage of a 132 kV D/C line or,
 - Outage of a 220 kV D/C line or,
 - Outage of a 400 kV S/C line 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 765 kV S/C line
- b. without necessitating load shedding but could be with rescheduling of generation during steady state operation-
- Outage of a 400 kV S/C line with TCSC, or
 - Outage of a 400kV D/C line, or
 - Outage of both pole of HVDC Bipole line or both poles of HVDC back to back Station or

- Outage of a 765kV S/C line with series compensation.
- ii) 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. The planning study would assume that all the Generating Units operate within their reactive capability curves and the network voltage profile are also maintained within voltage limits specified.
- (b) The ISTS shall be capable of withstanding the loss of most severe single system infeed without loss of stability.
- (c) Any one of these events defined above shall not cause:
 - i. Loss of supply
 - ii. Prolonged operation of the system frequency below and above specified limits.
 - iii. Unacceptable high or low voltage
 - iv. System instability
 - v. Unacceptable overloading of ISTS elements.
- (d) In all substations (132 kV and above), at least two transformers shall be provided.
- (e) CTU shall carry out planning studies for Reactive Power compensation of ISTS including reactive power compensation requirement at the generator's /bulk consumer's switchyard and for connectivity of new generator/ bulk consumer to the ISTS in accordance with Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-state Transmission and related matters) Regulations, 2009.
- (f) Suitable System Protection Schemes may be planned by NLDC/RLDC in consultation with CEA, CTU, RPC and the Regional Entities, either for

enhancing transfer capability or to take care of contingencies beyond that indicated in a (i) above.

3.6 Planning Data

Under this Planning Code, the Regional entities/STUs/State Generating Companies/ IPPs/licensees are to supply data in accordance with the detailed procedures mentioned in the Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) Regulations, 2009.

3.7 Implementation of Transmission Plan

The actual program of implementation of transmission lines, Inter-connecting Transformers, reactors/capacitors and other transmission elements will be in accordance with the detailed procedures mentioned in the Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) Regulations, 2009.

PART-4

CONNECTION CODE

4.1 Introduction

CTU, STU and Users connected to, or seeking connection to ISTS shall comply with Central Electricity Authority (Technical Standards for connectivity to the Grid) Regulations, 2007 which specifies the minimum technical and design criteria and Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) Regulations, 2009.

4.2 Objective

The objective of the code is as given below:

- a) To ensure the safe operation, integrity and reliability of the grid.
- b) That the basic rules for connectivity are complied with in order to treat all users in a non-discriminatory manner.
- c) Any new or modified connections, when established, shall neither suffer unacceptable effects due to its connectivity to the ISTS nor impose unacceptable effects on the system of any other connected User or STU.
- d) Any person seeking a new connection to the grid is required to be aware, in advance, of the procedure for connectivity to the ISTS and also the standards and conditions his system has to meet for being integrated into the grid.

4.3 Scope

The Connection code applies to CTU, STU and all Users connected to or seeking connection to the ISTS. The Connection code does not apply to Generating Units, transmission/distribution systems embedded in the intra-State systems, and not connected to the ISTS. However, such entities shall abide by the CEA (Technical Standards for connectivity to the Grid) Regulations, 2007, in order to ensure that the integrated grid is not adversely affected.

4.4 Procedure for connection

A User seeking to establish new or modified arrangement of connection to or for use of ISTS, shall submit an application on standard format to CTU in accordance with Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-state Transmission and related matters) Regulations, 2009.

The CTU shall process the application for grant of connectivity in accordance with these regulations.

4.5 Connection Agreement

A Connection agreement shall be signed by the applicant in accordance with the

Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) Regulations, 2009.

4.6 Important Technical Requirements for Connectivity to the Grid

4.6.1 Reactive Power Compensation

- a) Reactive Power compensation and/or other facilities shall be provided by STUs, and Users connected to ISTS as far as possible in the low voltage systems close to the load points thereby avoiding the need for exchange of Reactive Power to/from ISTS and to maintain ISTS voltage within the specified range.
- b) The person already connected to the grid shall also provide additional reactive compensation as per the quantum and time frame decided by respective RPC in consultation with RLDC. The Users and STUs shall provide information to RPC and RLDC regarding the installation and healthiness of the reactive compensation equipment on regular basis. RPC shall regularly monitor the status in this regard.

4.6.2 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 RLDC, under normal and abnormal conditions. All Users, STUs and CTU shall provide Systems to telemeter power system parameter such as flow, voltage and status of switches/ transformer taps etc. in line with interface requirements and other guideline made available by RLDC. The associated communication system to facilitate data flow up to appropriate data collection point on CTU's system, shall also be established by the concerned User or STU as specified by CTU in the Connection Agreement. All Users/STUs in coordination with CTU shall provide the required facilities at their respective ends as specified in the Connection Agreement.

4.6.3 System Recording Instruments

Recording instruments such as Data Acquisition System/Disturbance Recorder/Event

Logging Facilities/Fault Locator (including time synchronization equipment) shall be provided and shall always be kept in working condition in the ISTS for recording of dynamic performance of the system. All Users, STUs and CTU shall provide all the requisite recording instruments and shall always keep them in working condition.

4.6.4 Responsibilities for safety

CTU/STU and the concerned Users shall be responsible for safety in accordance with Central Electricity Authority (Technical Standards for connectivity to the Grid) Regulations, 2007, Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-state Transmission and related matters) Regulations, 2009 and CEA (Safety Requirements for construction, operation and maintenance of electrical and electric lines) Regulations, 2008.

4.6.5 Cyber Security

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

4.7 International Connections to ISTS

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

4.8 Schedule of assets of Regional Grid

CTU and other transmission licensees granted license by CERC shall submit annually to CERC by 30th September each year a schedule of transmission assets, which constitute the Regional Grid as on 31st March of that year indicating ownership on which RLDC has operational control and responsibility.

PART-5

OPERATING CODE

5.1 Operating philosophy

- (a) The primary objective of integrated operation of the National/ Regional grids is to enhance the overall operational reliability and economy of the entire electric power network spread over the geographical area of the interconnected system. Participant utilities shall cooperate with each other and adopt Good Utility Practice at all times for satisfactory and beneficial operation of the National/ Regional grid.
- (b) Overall operation of the National / inter-regional grid shall be supervised from the National Load Despatch Centre (NLDC). Operation of the Regional grid shall be supervised from the Regional Load Despatch Centre (RLDC). The roles of NLDC, RLDC, RPC and SLDC shall be in accordance with the provisions made in Part-2 of the IEGC.
- (c) All persons shall comply with this Operating Code, for deriving maximum benefits from the integrated operation and for equitable sharing of obligations.
- (d) All licensees, generating company, generating station and any other person connected with the operation power system shall comply with the directions issued by the respective RLDC /SLDC to ensure integrated grid operation and for achieving the maximum economy and efficiency in the operation of the power system.
- (e) A set of detailed operating procedures for the National grid shall be developed and maintained by the NLDC in consultation with the RLDCs, for guidance of the staff of the NLDC and it shall be consistent with IEGC to enable compliance with the requirement of this IEGC.
- (f) A set of detailed operating procedures for each regional grid shall be developed and maintained by the respective RLDC in consultation with the regional entities for guidance of the staff of RLDC and shall be consistent with IEGC to enable

compliance with the requirement of this IEGC.

- (g) A set of detailed operating procedures for each state grid shall be developed and maintained by the respective SLDC in consultation with the concerned persons for guidance of the staff of SLDC and shall be consistent with IEGC to facilitate compliance with the requirement of this IEGC.
- (h) The control rooms of the NLDC, RLDC, all SLDCs, power plants, substation of 132 kV and above, and any other control centers of all regional entities shall be manned round the clock by qualified and adequately trained personnel. Training requirements may be notified by the Commission from time to time, by orders.

5.2 System Security Aspects

- (a) All Users, CTU and STUs shall endeavor to operate their respective power systems and power stations in an integrated manner at all times.
- (b) No part of the grid shall be deliberately isolated from the rest of the National/Regional grid, except (i) under an emergency, and conditions in which such isolation would prevent a total grid collapse and/or would enable early restoration of power supply, (ii) for safety of human life (iii) when serious damage to a costly equipment is imminent and such isolation would prevent it, (iv) when such isolation is specifically instructed by RLDC. Complete synchronization of grid shall be restored as soon as the conditions again permit it. The restoration process shall be supervised by RLDC, in co-ordination with NLDC /SLDC in accordance with operating procedures separately formulated NLDC/RLDC.
- (c) No important element of the National/Regional grid shall be deliberately opened or removed from service at any time, except when specifically instructed by RLDC or with specific and prior clearance of RLDC. The list of such important grid elements on which the above stipulations apply shall be prepared by the RLDC in consultation with the concerned Users, CTU and STUs, and be available at the websites of NLDC/RLDC/SLDCs. In case of opening/removal of any important element of the grid under an emergency situation, the same shall be communicated to RLDC at the earliest possible time after the event. RLDC

shall inform the opening/removal of the important elements of the regional grid, to NLDC, and to the concerned Regional Entities (whose grid would be affected by it) as specified in the detailed operating procedure by NLDC.

- (d) Any tripping, whether manual or automatic, of any of the above elements of Regional grid shall be precisely intimated by the concerned SLDC/CTU/User to RLDC as soon as possible, say within ten minutes of the event. The reason (to the extent determined) and the likely time of restoration shall also be intimated. All reasonable attempts shall be made for the elements' restoration as soon as possible. RLDC shall inform the tripping of the important elements of the regional grid, to NLDC, and to the concerned Regional Entities (whose grid would be affected by it) as specified in the detailed operating procedure by NLDC.
- (e) [Maintenance of their respective power system elements shall be carried out by users, STUs and CTU in accordance with the provisions in Central Electricity Authority (Grid Standards) Regulations, 2010.]¹¹ Any prolonged outage of power system elements of any User/CTU/STU, which is causing or likely to cause danger to the grid or sub-optimal operation of the grid, shall regularly be monitored by RLDC. RLDC shall report such outages to RPC. RPC shall finalise action plan and give instructions to restore such elements in a specified time period.
- (f) All thermal generating units of 200 MW and above and all hydro units of 10 MW and above, which are synchronized with the grid, irrespective of their ownership, shall have their governors in operation at all times in accordance with the following provisions:

Governor Action

- i) Following Thermal and hydro (except those with upto three hours pondage) generating units shall be operated under restricted governor mode of operation with effect from the date given below:

¹¹ Added vide First Amendment Regulations, 2012 w.e.f. 02.04.2012.

- (a) Thermal generating units of 200 MW and above,
 - 1) Software based Electro Hydraulic Governor (EHG) system: 01.08.2010
 - 2) Hardware based EHG system 01.08.2010
- (b) Hydro units of 10 MW and above 01.08.2010
- ii) The restricted governor mode of operation shall essentially have the following features:
 - a) [There should not be any reduction in generation in case of improvement in grid frequency below 50.05 Hz (for example, if grid frequency changes from 49.9 to 49.95 Hz, there shall not be any reduction in generation). For any fall in grid frequency, generation from the unit should increase by 5% limited to 105% of the MCR of the unit subject to machine capability.]¹²
 - b) Ripple filter of +/-0.03 Hz. shall be provided so that small changes in frequency are ignored for load correction, in order to prevent governor hunting.
 - c) If any of these generating units is required to be operated without its governor in operation as specified above, the RLDC shall be immediately advised about the reason and duration of such operation. All governors shall have a droop setting of between 3% and 6%.
 - d) After stabilisation of frequency around 50 Hz, the CERC may review the above provision regarding the restricted governor mode of operation and free governor mode of operation may be introduced.
- iii) All other generating units including the pondage upto 3hours Gas turbine/ Combined Cycle Power Plants, wind and solar generators and Nuclear

¹² Modified vide Second Amendment Regulations 2014 w.e.f. 17.02.2014

Power Stations shall be exempted from Sections 5.2 (f), 5.2 (g), 5.2 (h) and 5.2 (i) till the Commission reviews the situation.

[Provided that if a generating unit cannot be operated under restricted governor mode operation, then it shall be operated in free governor mode operation with manual intervention to operate in the manner required under restricted governor mode operation.]¹³

- (g) 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 specified in para 5.2(f) above.
- (h) All thermal generating units of 200 MW and above and all hydro units of 10 MW and above operating at or up to 100% of their Maximum Continuous Rating (MCR) shall normally be capable of (and shall not in any way be prevented from) instantaneously picking up to 105% and 110% of their MCR, respectively, when frequency falls suddenly. After an increase in generation as above, a generating unit may ramp back to the original level at a rate of about one percent (1%) per minute, in case continued operation at the increased level is not sustainable. Any generating unit not complying with the above requirements, shall be kept in operation (synchronized with the Regional grid) only after obtaining the permission of RLDC.
- (i) 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. []¹⁴
- (j) Except under an emergency, or to prevent an imminent damage to a costly equipment, no User shall suddenly reduce his generating unit output by more than one hundred (100) MW (20 MW in case of NER) without prior

¹³ Inserted vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

¹⁴ Deleted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

intimation to and consent of the RLDC[]¹⁵. Similarly, no User / SEB shall cause a sudden variation in its load by more than one hundred (100 MW) without prior intimation to and consent of the RLDC. [All users and SEBs shall ensure that temporary over voltage due to sudden load rejection and the maximum permissible values of voltage unbalance shall remain within limits specified under Central Electricity Authority (Grid Standards) Regulations, 2010.]¹⁶

- (k) All generating units shall normally have their automatic voltage regulators (AVRs) in operation. In particular, if a generating unit of over fifty (50) MW size is required to be operated without its AVR in service, the RLDC shall be immediately intimated about the reason and duration, and its permission obtained. Power System Stabilizers (PSS) in AVRs of generating units (wherever provided), shall be got properly tuned by the respective generating unit owner as per a plan prepared for the purpose by the CTU/RPC from time to time. CTU /RPC will be allowed to carry out checking of PSS and further tuning it, wherever considered necessary.
- (l) Provision of protections and relay settings shall be coordinated periodically throughout the Regional grid, as per a plan to be separately finalized by the Protection sub-Committee of the RPC. [RPC shall also prepare islanding schemes and ensure its implementation in accordance with Central Electricity Authority (Grid Standards) Regulations, 2010. All users and SEBs shall ensure that installation and operation of protection system shall comply with the provisions of Central Electricity Authority (Grid Standards) Regulations, 2010.]¹⁷
- (m) All Users, SEB, SLDCs, RLDCs, and NLDC shall take all possible measures to ensure that the grid frequency always remains within the [49.90-50.05 Hz]¹⁸ band.
- (n) All SEBS, distribution licensees / STUs shall provide automatic under-frequency and df/dt relays for load shedding in their respective systems, to

¹⁵ Deleted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

¹⁶ Added vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

¹⁷ Added vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

¹⁸ Initially substituted vide First Amendment Regulations, w.e.f. 02.04.2012 and later Substituted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

arrest frequency decline that could result in a collapse/disintegration of the grid, as per the plan separately finalized by the concerned RPC and shall ensure its effective application to prevent cascade tripping of generating units in case of any contingency. All, SEBs, distribution licensees, CTU STUs and SLDCs shall ensure that the above under-frequency and df/dt load shedding/islanding schemes are always functional. RLDC shall inform RPC Secretariat about instances when the desired load relief is not obtained through these relays in real time operation. The provisions regarding under frequency and df/dt relays of relevant CEA Regulations shall be complied with. SLDC shall furnish monthly report of UFR and df/dt relay operation in their respective system to the respective RPC.

RPC Secretariat shall carry out periodic inspection of the under frequency relays and maintain proper records of the inspection. RPC shall decide and intimate the action required by SEB, distribution licensee and STUs to get required load relief from Under Frequency and Df/Dt relays. All SEB, distribution licensee and STUs shall abide by these decisions. RLDC shall keep a comparative record of expected load relief and actual load relief obtained in Real time system operation. A monthly report on expected load relief vis-a-vis actual load relief shall be sent to the RPC and the CERC.

- (o) All Users, STU/SLDC , CTU/RLDC and NLDC, shall also facilitate identification, installation and commissioning of System Protection Schemes (SPS) (including inter-tripping and run-back) in the power system to operate the transmission system closer to their limits and to protect against situations such as voltage collapse and cascade tripping, tripping of important corridors/ flow-gates etc.. Such schemes would be finalized by the concerned RPC forum, and shall always be kept in service. If any SPS is to be taken out of service, permission of RLDC shall be obtained indicating reason and duration of anticipated outage from service.
- (p) [Procedures shall be developed to recover from partial/total collapse of the grid in accordance with Central Electricity Authority (Grid Standards) Regulations, 2010 and to periodically update the same in accordance with the requirements given under Regulation 5.8. These procedures shall be followed by all the Users,

STU/SLDC, CTU, RLDC and NLDC to ensure consistent, reliable and quick restoration.]¹⁹

- (q) Each User, STU, RLDC, NLDC and CTU shall provide and maintain adequate and reliable communication facility internally and with other Users/STUs / RLDC/SLDC to ensure exchange of data/information necessary to maintain reliability and security of the grid. Wherever possible, redundancy and alternate path shall be maintained for communication along important routes, e.g., SLDC to RLDC to NLDC.
- (r) All the Users, STU/SLDC and CTU shall send information/data including disturbance recorder/sequential event recorder output to RLDC within [24 hours]²⁰ for purpose of analysis of any grid disturbance/event. No User, SLDC/STU or CTU shall block any data/information required by the RLDC and RPC for maintaining reliability and security of the grid and for analysis of an event.
- (s) All Users, RLDC, SLDC STUs, CTU and NLDC shall take all possible measures to ensure that the grid voltage always remains within the following operating range.

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

- (t) All Users, CTU and STUs shall provide adequate voltage control measures through voltage relay as finalized by RPC, to prevent voltage collapse and shall ensure its effective application to prevent voltage collapse/ cascade tripping. [Voltage fluctuation limits and voltage wave-form quality shall be maintained as

¹⁹ Substituted vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

²⁰ Substituted vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

specified in Central Electricity Authority (Grid Standards) Regulations, 2010.]²¹

(u) Special requirements for Solar/ wind generators

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

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

5.3 Demand Estimation for Operational Purposes

- (a) This section describes the procedures/responsibilities of the SLDCs for demand estimation for both Active Power and Reactive Power.
- (b) The demand estimation is to be done on daily/weekly/monthly /yearly basis for current year for load-generation balance planning. The SLDC shall carry out system studies for operational planning purposes using this demand estimate.
- (c) Each SLDC shall develop methodologies/mechanisms for daily/ weekly/ monthly/yearly demand estimation (MW, MVar and MWh) for operational purposes. Based on this demand estimate and the estimated availability from different sources, SLDC shall plan demand management measures like load shedding, power cuts, etc. and shall ensure that the same is implemented by the SEB/distribution licensees. SLDCs. All SEBs/distribution licensees shall abide

²¹ Added vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

by the demand management measures of the SLDCs and shall also maintain historical database for demand estimation.

- (d) Each SLDC shall carry out its own demand estimation from the historical data and weather forecast data from time to time. All distribution licensees and other concerned persons shall provide relevant data and other information as required by SLDC for demand estimate.
- (e) While the demand estimation for operational purposes is to be done on a daily/ weekly/monthly basis initially, mechanisms and facilities at SLDCs shall be created at the earliest but not later than 1.1.2011 to facilitate on-line estimation of demand for daily operational use for each 15 minutes block.
- (f) The monthly estimated demand by the SLDC shall be provided to RLDC and RPC for better operation planning.
- (g) The SLDC shall take into account the Wind Energy forecasting to meet the active and reactive power requirement.
- (h) In order to facilitate estimation of Total Transfer Capability /Available Transfer Capability on three month ahead basis, the SLDC shall furnish estimated demand and availability data to RLDCs.

5.4 Demand Management

5.4.1 Introduction

This section is concerned with the provisions to be made by SLDCs to effect a reduction of demand in the event of insufficient generating capacity, and inadequate transfers from external interconnections to meet demand, or in the event of breakdown or congestion in intra-state or inter-state transmission system or other operating problems (such as frequency, voltage levels beyond normal operating limit, or thermal overloads , etc.) or overdrawl of power vis-à-vis of the regional entities beyond the limits mentioned in UI regulation of CERC.

5.4.2 Demand Disconnection

- (a) SLDC/ SEB/distribution licensee and bulk consumer shall initiate action to restrict the drawal of its control area, from the grid, within the net drawal schedule []²².
- (b) The SLDC/ SEB/distribution licensee and bulk consumer shall ensure that requisite load shedding is carried out in its control area so that there is no overdrawl []²³.
- (c) Each User/STU/SLDC shall formulate contingency procedures and make arrangements that will enable demand disconnection to take place, as instructed by the RLDC/SLDC, under normal and/or contingent conditions. These contingency procedures and arrangements shall regularly be/updated by User/STU and monitored by RLDC/SLDC. RLDC/SLDC may direct any User/STU to modify the above procedures/arrangement, if required, in the interest of grid security and the concerned User/STU shall abide by these directions.
- (d) The SLDC through respective State Electricity Boards/Distribution Licensees shall also formulate and implement state-of-the-art demand management schemes for automatic demand management like rotational load shedding, demand response (which may include lower tariff for interruptible loads) etc. before 01.01.2011, to reduce overdrawl in order to comply para 5.4.2 (a) and (b). A Report detailing the scheme and periodic reports on progress of implementation of the schemes shall be sent to the Central Commission by the concerned SLDC.
- (e) In order to maintain the frequency within the stipulated band and maintaining the network security, the interruptible loads shall be arranged in four groups of loads, for scheduled power cuts/load shedding, loads for unscheduled load shedding, loads to be shed through under frequency relays/ df/dt relays and loads to be shed under any System Protection Scheme identified at the RPC level. These loads shall be grouped in such

²² Deleted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

²³ Deleted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

a manner, that there is no overlapping between different Groups of loads. In case of certain contingencies and/or threat to system security, the RLDC may direct any SLDC/ SEB/distribution licensee or bulk consumer connected to the ISTS to decrease drawal of its control area by a certain quantum. Such directions shall immediately be acted upon. SLDC shall send compliance report immediately after compliance of these directions to RLDC.

- (f) To comply with the direction of RLDC, SLDC may direct any SEB/ distribution licensee/bulk consumer connected to the STU to curtail drawal from grid. SLDC shall monitor the action taken by the concerned entity and ensure the reduction of drawal from the grid as directed by RLDC.
- [(g) RLDCs shall devise standard instantaneous message formats in order to give directions in case of contingencies and/or threat to the system security to reduce deviation from schedule by the bulk consumer, SLDC/ State Utility/ ISGS/Regional Entity/Injecting Utility at different overdrawal/ under-drawal/ over-injection/ under-injection conditions depending upon the severity. The concerned SLDC/other regional entity shall ensure immediate compliance with these directions of RLDC and send a compliance report to the concerned RLDC.]²⁴
- (h) All Users, SLDC/ SEB/distribution licensee or bulk consumer shall comply with direction of RLDC/SLDC and carry out requisite load shedding or backing down of generation in case of congestion in transmission system to ensure safety and reliability of the system. The procedure for application of measures to relieve congestion in real time as well as provisions of withdrawal of congestion shall be in accordance with Central Electricity Regulatory Commission (Measures to relieve congestion in real time operation) Regulations, 2009.
- (i) The measures taken by the User's, SLDC SEB/distribution licensee or bulk consumer shall not be withdrawn as long as the frequency remains at

²⁴ Substituted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

a level lower than the limits specified in para 5.2 or congestion continues, unless specifically permitted by the RLDC/SLDC.

5.5 Periodic Reports

- 5.5.1** a) A weekly report covering performance of the national/integrated grid in previous week shall be prepared by NLDC. Such weekly report shall be available on the website of the NLDC for at least 12 weeks. A monthly report covering performance of the national/integrated grid shall be prepared by NLDC and shall be sent to CERC, CEA, RLDCs and RPCs and made available on its web site.
- b) [A daily report covering the performance of the regional grid shall be prepared by each RLDC based on the inputs received from SLDCs / Users and shall be put on its website. This report shall also cover the wind and solar power generation and injection into the grid]²⁵
- c) A weekly report shall be put on its website by RLDC and shall cover the performance of the Regional grid for the previous week. Such weekly report shall also be available on the website of the RLDC concerned for at least 12 weeks.

The weekly reports shall contain the following:-

- (a) Frequency profile
- (b) Voltage profile of important substations and sub-stations normally having low /high voltages
- (c) Major Generation and Transmission Outages
- (d) Transmission Constraints
- (e) Instances of persistent/significant non-compliance of IEGC.

²⁵ Substituted vide Third Amendment Regulations, 2015 w.e.f. 01.11.2015

- (f) Instances of congestion in transmission system
- (g) Instances of inordinate delays in restoration of transmission elements and generating units
- (h) Non-compliance of instructions of SLDC by SEB/distribution licenses / bulk consumers, to curtail drawal resulting in non-compliance of IEGC.

5.5.2 Other Reports

- (a) The RLDC shall prepare a quarterly report which shall bring out the system constraints, reasons for not meeting the requirements, if any, of security standards and quality of service, along with details of various actions taken by different persons, and the persons responsible for causing the constraints.
- (b) The RLDC shall also provide information/report to the RPC in the interest of smooth operation of ISTS.

5.6 Operational Liaison

5.6.1 Introduction

- (a) This section sets out the requirements for the exchange of information in relation to Operations and/or Events on the total grid system which have had or will have an effect on:
 - 1. National grid
 - 2. The Regional grid
 - 3. The ISTS in the Region
 - 4. The system of a User and STU

The above generally relates to notifying of what is expected to happen or

what has happened and not the reasons why.

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

5.6.2 Procedure for Operational Liaison

- (a) Operations and events on the Regional grid:
 - Before any Operation is carried out on Regional grid, the RLDC will inform each User/SLDC/CTU, whose system may, or will, experience an operational effect, and give details of the operation to be carried out;
 - Immediately following an event on Regional grid, the RLDC will inform each User/SLDC/CTU, whose system may, or will, experience an operational effect following the event, and give details of what has happened in the event;
 - Any operation in a region having impact on other region(s) shall be intimated by the concerned RLDC to NLDC;
 - Immediately following an event in the National / integrated Grid, NLDC would keep all RLDCs informed about such events.
- (b) Operations and events on a User/STU/ system:
 - Before any operation is carried out on a User/STU system, the User's/SLDC will inform the RLDC, in case the Regional grid may, or will, experience an Operational effect, and give details of the operation to be carried out. In case such operation is likely to have impact on other regions, the RLDC of those Regions shall also be informed through NLDC;

- Immediately following an event on User's/STU system, the User's/SLDC will inform the RLDC, in case the Regional grid may, or will, experience an operational effect following the event, and give details of what has happened in the event but not the reasons why. In case such event is likely to have impact on other regions, the RLDCs of concerned those regions shall also be informed through NLDC;
- Forced outages of important network elements in the grid shall be closely monitored at the RPC level. RPC shall send a monthly report of prolonged outage of generators or transmission facilities to the Commission;
- [All operational instructions given by RLDC and SLDC shall have unique codes which shall be recorded and maintained as specified in Central Electricity Authority (Grid Standards) Regulations, 2010.]²⁶

5.7 Outage Planning

5.7.1 Introduction

- a) This section sets out the procedure for preparation of outage schedules for the elements of the National/Regional grid in a coordinated and optimal manner keeping in view the Regional system operating conditions and the balance of generation and demand. (List of elements of grid covered under these stipulations shall be prepared and be available with NLDC, RLDC and SLDCs).
- b) The generation output and transmission system should be adequate after taking into account the outages to achieve the security standards.
- c) Annual outage plan shall be prepared in advance for the financial year by the RPC Secretariat in consultation with NLDC and RLDC and reviewed during the year on quarterly and Monthly basis. All, Users, CTU, STU

²⁶ Added vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

etc shall follow these annual outage plans. If any deviation is required the same shall be with prior permission of concerned RPC and RLDC. The outage planning of run-of-the-river hydro plant, wind and solar power plant and its associated evacuation network shall be planned to extract maximum power from these renewable sources of energy. Outage of wind generator should be planned during lean wind season, outage of solar, if required during the rainy season and outage of run-of-the river hydro power plant in the lean water season.

5.7.2 Objective

- a) To produce a coordinated generation and transmission outage programme for the National/Regional grid, considering all the available resources and taking into account transmission constraints, as well as, irrigational requirements.
- b) To minimize surplus or deficits, if any, in the system requirement of power and energy and help operate system within Security Standards.
- c) To optimize the transmission outages of the elements of the National/Regional grid without adversely affecting the grid operation but taking into account the Generation Outage Schedule, outages of User/STU/CTU systems and maintaining system security standards.

5.7.3 Scope

This section is applicable to NLDC, RLDC, SLDCs, CTU, STU, RPCs, and all Users.

5.7.4 Outage Planning Process

- [(a) The RPC Secretariat shall be primarily responsible for finalization of the Annual Load Generation Balance Report (LGBR) and the annual outage plan for the following financial year by 31st December of each year. The LGBR shall be prepared by the respective RPC secretariat for peak as

well as off-peak scenarios.]²⁷

- [(b) All SEBs/STUs, transmission licensees, CTU, ISGS, IPPs, MPPs and other generating stations shall provide to the respective RPC Secretariat their proposed outage plan in writing for the next financial year by 31st October of each year. These shall contain identification of each generating unit/transmission line/ICT etc., the preferred date for each outage and its duration and where there is flexibility, the earliest start date and latest finishing date. Each SLDC shall submit LGBR for its control area, for peak as well as off-peak scenario, by 31st October for the next financial year, to respective RPC Secretariat. The annual plans for managing deficits/surpluses in respective control areas shall clearly be indicated in the LGBR submitted by SLDCs.]²⁸
- [(c) RPC Secretariat shall compile LGBR for peak as well as off peak scenario and also prepare annual outage plan in the respective region. RPC Secretariat shall then come out with the draft LGBR and draft outage plan for the next financial year by 30th November of each year for the regional grid taking into account the utilization of available resources in an optimal manner and to maintain security standards. This will be done after carrying out necessary system studies and, if necessary, the outage plan shall be rescheduled and LGBR shall be modified, accordingly. Adequate balance between generation and load requirement shall be ensured while finalising outage plan. The draft LGBR and draft outage plan shall be uploaded by the RPCs on their websites.]²⁹
- [(d) The outage plan shall be finalized in consultation with NLDC and RLDCs. The final LGBR after considering comments/observations of the stakeholders shall be prepared by RPC secretariat by 31st December of each year. The final outage plan and the final LGBR shall be intimated to NLDC, Users, STUs, CTU, other generating stations connected to the ISTS and the RLDC by 31st December of each year for implementation. The final outage plan and the final LGBR shall be made available on the

²⁷ Substituted vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

²⁸ Substituted vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

²⁹ Substituted vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

websites of the respective utilities and on the websites of RPCs, RLDCs and NLDC.]³⁰

- e) The above annual outage plan shall be reviewed by RPC Secretariat on quarterly and monthly basis in coordination with all parties concerned, and adjustments made wherever found to be necessary.
- f) In case of emergency in the system, viz., loss of generation, break down of transmission line affecting the system, grid disturbances, system isolation, RLDC may conduct studies again before clearance of the planned outage.
- g) NLDC/RLDC are authorized to defer the planned outage in case of any of the following, taking into account the statutory requirements:
 - i. grid disturbances
 - ii. System isolation
 - iii. Partial Black out in a state
 - iv. Any other event in the system that may have an adverse impact on the system security by the proposed outage.
- h) The detailed generation and transmission outage programmes shall be based on the latest annual outage plan (with all adjustments made to date).
- i) Each User, CTU and STU shall obtain the final approval from RLDC prior to availing an outage.
- j) RPCs shall submit quarterly, half-yearly reports to the Commission indicating deviation in outages from the plan alongwith reasons. These reports shall also be put up on the RPC website.

5.8 Recovery Procedures

- a) Detailed plans and procedures for restoration of the regional grid under partial/ total blackout shall be developed by RLDC in consultation with NLDC, all Users, STU, SLDC, CTU and RPC Secretariat and shall be reviewed / updated annually.

³⁰ Substituted vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

- b) Detailed plans and procedures for restoration after partial/total blackout of each User's/STU/CTU system within a Region will be finalized by the concerned User's/STU/CTU in coordination with the RLDC. 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/CTU/STU at least once every six months under intimation to the RLDC. Diesel Generator sets for black start would be tested on weekly basis and test report shall be sent to RLDC on quarterly basis.
- c) List of generating stations with black start facility, inter-State/inter-regional ties, synchronizing points and essential loads to be restored on priority, shall be prepared and be available with NLDC, RLDC and SLDC.
- d) The RLDC is authorized during the restoration process following a black out, to operate with reduced security standards for voltage and frequency as necessary in order to achieve the fastest possible recovery of the grid.
- e) All communication channels required for restoration process shall be used for operational communication only, till grid normalcy is restored.

5.9 Event Information

5.9.1 Introduction

This section deals with reporting procedures in respect of events in the system to all Users/STU/CTU, RPC Secretariat and NLDC/RLDC/SLDC. The reporting procedure shall be in accordance with the relevant CEA Regulations.

5.9.2 Objective

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

5.9.3 Scope

This section covers all Users, STU, CTU, RPC Secretariat, NLDC, RLDCs and SLDCs.

5.9.4 Responsibility

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

5.9.5 Reportable Events

Any of the following events require reporting by RLDC/ Users, SLDC, STU, CTU:

- i) Violation of security standards
- ii) Grid indiscipline
- iii) Non-compliance of RLDC's instructions.
- iv) System islanding/system split
- v) Regional black out/partial system black out
- vi) Protection failure on any element of ISTS, and on any item on the 'agreed list' of the intra-State systems
- vii) Power system instability
- viii) Tripping of any element of the Regional grid
- ix) Sudden load rejection by any User

5.9.6 Reporting Procedure

- (a) Written reporting of Events by Users, STU, CTU and SLDC to RLDC: In the case of an event which was initially reported by a User, STU, CTU or a SLDC to RLDC orally, the User, STU, CTU, SLDC will give a written report to RLDC in accordance with this section. RLDC in turn give a report to NLDC.
- (b) Written Reporting of Events by RLDC to Users, STU, CTU and SLDC: In the case of an event which was initially reported by RLDC to Users, STU, CTU, SLDC, NLDC orally, the RLDC will give a written report to the Users, STU, CTU, SLDC, NLDC in accordance with this section.
- (c) Form of Written Reports: A written report shall be sent to NLDC, RLDC, a User, STU, CTU, SLDC, as the case may be, in the reporting formats as devised by the appropriate load despatch Centre and will confirm the oral notification together with the following details of the event:
 - i Time and date of event
 - ii Location
 - iii Plant and/or Equipment directly involved
 - iv Description and cause of event
 - v Antecedent conditions of load and generation, including frequency, voltage and the flows in the affected area at the time of tripping including Weather Condition prior to the event
 - vi Duration of interruption and Demand and/or Generation (in MW and MWh) interrupted
 - vii All Relevant system data including copies of records of all recording instruments including Disturbance Recorder, Event Logger, DAS etc.
 - viii Sequence of trippings with time
 - ix Details of Relay Flags
 - x Remedial measures

PART-6

SCHEDULING AND DESPATCH CODE

6.1 Introduction

This Part sets out the:-

- a) Demarcation of responsibilities between various regional entities, SLDC, RLDC and NLDC in scheduling and despatch
- b) the procedure for scheduling and despatch
- c) the reactive power and voltage control mechanism
- d) Complementary commercial mechanisms (in the Annexure-1)
- e) [Procedure for declaration of commercial operation of Central Generating Stations, inter-State Generating Stations and inter-State Transmission Systems, and technical minimum schedule for operation of the Central Generating Stations and inter-State Generating Stations]³¹

6.2 Objective

This code deals with the procedures to be adopted for scheduling of the net injection / drawals of concerned regional entities on a day ahead basis with the modality of the flow of information between the NLDC / RLDCs / SLDCs/Power Exchange and regional entities. The procedure for submission of capability declaration by each ISGS and submission of requisition / drawal schedule by other regional entities is intended to enable RLDCs to prepare the despatch schedule for each ISGS and drawal schedule for each regional entity. It also provides methodology of issuing real time despatch/drawal instructions and rescheduling, if required, to regional entities along with the commercial arrangement for the deviations from schedules, as well as, mechanism for reactive power pricing. [This code also provides the methodology for re-scheduling of wind and solar energy generators which are regional entities, on one and half

³¹ Added vide Fourth Amendment Regulations, 2016 w.e.f. 29.04.2016

hourly basis and the methodology of handling deviations of such wind and solar energy generators. Appropriate meters shall be provided for accounting of charges for deviation under DSM Regulations. Telemetry/communication system & Data Acquisition System shall also be provided for transfer of information to the concerned SLDC and RLDC.]³²

[This code also provides for the procedure and mechanism for declaration of commercial operation of Central Generating Stations, inter-State Generating Stations and inter-State Transmission System and technical minimum schedule for operation of Central Generating Stations and inter-State Generating Stations.]³³

The provisions contained in this Part are without prejudice to the powers conferred on RLDC under Sections 28 and 29 of the Electricity Act, 2003

6.3 Scope

This code will be applicable to NLDC, RLDC/SLDCs, ISGS, Distribution Licensees/ SEBs/STUs/ regional entities, Power Exchanges, wind and solar generating stations and other concerned persons in the National and Regional grid.

The scheduling and despatch procedure for the generating stations of Bhakra Beas Management Board (BBMB) shall be as per the procedure formulated by the BBMB in consultation with NRLDC.

[Similarly, the scheduling and despatch procedure for the generating stations of Sardar Sarovar Project (SSP) shall be as per the procedure formulated by Narmada Control Authority (NCA) in consultation with the Western Regional Load Despatch Centre (WRLDC).]³⁴

[6.3A Commercial operation of Central generating stations and inter-State Generating Stations

1. Date of commercial operation in case of a unit of thermal Central Generating Stations or inter-State Generating Station shall mean the date

³² Substituted vide Third Amendment Regulations, 2015 w.e.f. 01.11.2015

³³ Added vide Fourth Amendment Regulations, 2016 w.e.f. 29.04.2016

³⁴ Substituted vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

declared by the generating company after demonstrating the unit capacity corresponding to its Maximum Continuous Rating (MCR) or the Installed Capacity (IC) or Name Plate Rating on designated fuel through a successful trial run and after getting clearance from the respective RLDC or SLDC, as the case may be, and in case of the generating station as a whole, the date of commercial operation of the last unit of the generating station:

Provided that:

- (i) Where the beneficiaries / buyers have been tied up for purchasing power from the generating station, the trial run or each repeat of trial run shall commence after a notice of not less than seven days by the generating company to the beneficiaries/buyers and concerned RLDC or SLDC, as the case may be.
- (ii) Where the beneficiaries / buyers have not been tied up for purchasing power from the generating station, the trial run or each repeat of trial run shall commence after a notice of not less than seven days by the generating company to the concerned RLDC or SLDC, as the case may be.
- (iii) The generating company shall certify that:
 - (a) The generating station meets the relevant requirements and provisions of the technical standards of Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010 and Indian Electricity Grid Code, as applicable.
 - (b) 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.

- (c) 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.
- (iv) The certificates as required under clause (iii) above shall be signed by the CMD/CEO/MD of the generating company and a copy of the certificate shall be submitted to the Member Secretary of the concerned Regional Power Committee and the concerned RLDC / SLDC before declaration of COD. The generating company shall submit approval of Board of Directors to the certificates as required under clause (iii) within a period of 3 months of the COD.
- (v) Trial run shall be carried out in accordance with Regulation 6.3A.3 of these Regulations.
- (vi) Partial loading may be allowed with the condition that average load during the duration of the trial run shall not be less than Maximum Continuous Rating or the Installed Capacity or the Name Plate Rating excluding period of interruption and partial loading but including the corresponding extended period.
- (vii) Where on the basis of the trial run, a unit of the generating station fails to demonstrate the unit capacity corresponding to Maximum Continuous Rating or Installed Capacity or Name Plate Rating, the generating company has the option to de-rate 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.
- (viii) The concerned RLDC or SLDC, as the case may be, shall convey clearance to the generating company for declaration of COD within 7 days of receiving the generation data based on the trial run.
- (ix) If the concerned RLDC or SLDC, as the case may be, notices

any deficiencies in the trial run, it shall be communicated to the generating company within seven (7) days of receiving the generation data based on the trial run.

- (x) Scheduling of power from the generating station or unit thereof shall commence from 0000 hrs after declaration of COD.
2. 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.

Provided that:

- (i) Where beneficiaries have been tied up for purchasing power from the generating station, trial run or each repeat of trial run shall commence after a notice of not less than seven days by the generating company to the beneficiaries and concerned RLDC or SLDC, as the case may be;
- (ii) Where the beneficiaries/buyers have not been tied up for purchasing power from the generating station, the trial run shall commence after a notice of not less than seven days by the generating company to concerned RLDC or SLDC, as the case may be;
- (iii) The generating company shall certify that:
 - (a) The generating station or unit thereof meets the requirement and relevant provisions of the technical standards of Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010 and Indian Electricity Grid Code, as applicable.

- (b) The main plant equipment and auxiliary systems including Drainage Dewatering system, Primary and Secondary cooling system, LP and HP air compressor, Firefighting system, etc. have been commissioned and are capable for full load operation of units on sustained basis.
- (c) 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.
- (iv) The certificates as required under clause (iii) above shall be signed by the CMD/CEO/MD of the generating company and a copy of the certificate shall be submitted to the Member Secretary of the concerned Regional Power Committee and concerned RLDC or SLDC, as the case may be, before declaration of COD. The generating company shall submit approval of Board of Directors to the certificates as required under clause (iii) within a period of 3 months of COD.
- (v) Trial run shall be carried out in accordance with sub-Regulation 6.3A.3 of this Regulation.
- (vi) Where on the basis of the trial run, a unit of the generating station fails to demonstrate the unit capacity corresponding to Maximum Continuous Rating or Installed Capacity or Name Plate Rating, 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.
- (vii) In case a hydro generating station with pondage or storage is not able to demonstrate the peaking capability corresponding to the installed capacity for the reasons of insufficient reservoir or pond level, the date of commercial operation of the last unit of the generating

station shall be considered as the date of commercial operation of the generating station as a whole, and it will be mandatory for such hydro generating station to demonstrate peaking capability equivalent to installed capacity of the generating station or unit thereof as the case may be, as and when such reservoir/pond level is achieved.

- (viii) If a run-of-river hydro generating station or a unit thereof is declared under commercial operation during lean inflows period when the water inflow is insufficient for such demonstration of peaking capability, it shall be mandatory for such hydro generating station or unit thereof to demonstrate peaking capability equivalent to installed capacity as and when sufficient water inflow is available. In case of failure to demonstrate the peaking capacity, the unit capacity shall be de-rated to the capacity demonstrated with effect from the COD.
 - (ix) The concerned RLDC or SLDC as the case may be, shall accord clearance to the generating company within seven (7) days of receiving the generation data based on the trial run.
 - (x) If the concerned RLDC or SLDC as the case may be, notices any deficiency in trial run, it shall be communicated to the generating company within seven (7) days of receiving the generation data based on trial run.
 - (xi) Scheduling shall commence from 0000 hrs after declaration of COD.
3. Trial Run or Trial Operation: Trial Run or Trial Operation in relation to a thermal Central Generating Station or inter-State Generating Station or a unit thereof shall mean successful running of the generating station or unit thereof on designated fuel at Maximum Continuous Rating or Installed Capacity or Name Plate Rating for a continuous period of 72 hours and in case of a hydro Central Generating Station or inter-state

Generating Station or a unit thereof for a continuous period of 12 hours:

Provided that:

- (i) The short interruptions, for a cumulative duration of 4 hours, shall be permissible, with corresponding increase in the duration of the test. Cumulative Interruptions of more than 4 hours shall call for repeat of trial operation or trial run.
 - (ii) The partial loading may be allowed with the condition that average load during the duration of the trial run shall not be less than Maximum Continuous Rating, or the Installed Capacity or the Name Plate Rating excluding period of interruption and partial loading but including the corresponding extended period.
 - (iii) Where the beneficiaries have been tied up for purchasing power from the generating station, the trial run or each repeat of trial run shall commence after a notice of not less than seven days by the generating company to the beneficiaries and concerned RLDC or SLDC, as the case may be.
 - (iv) Units of thermal and hydro Central Generating Stations and inter-State Generating Stations shall also demonstrate capability to raise load upto 105% or 110% of this Maximum Continuous Rating or Installed Capacity or the Name Plate Rating as the case may be.
4. 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 hour 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:

Provided that:

- (i) In case of inter-State Transmission System executed through

Tariff Based Competitive Bidding, the transmission licensee shall declare COD of the ISTS in accordance with the provisions of the Transmission Service Agreement.

- (ii) Where the transmission line or substation is dedicated for evacuation of power from a particular generating station and the dedicated transmission line is being implemented other than through tariff based competitive bidding, the concerned generating company and transmission licensee shall endeavour to commission the generating station and the transmission system simultaneously as far as practicable and shall ensure the same through appropriate Implementation Agreement in accordance with relevant provisions of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2014 or any subsequent amendment or re-enactment thereof. In case the transmission line or sub-station dedicated to a generator is being implemented through tariff based competitive bidding, then matching of commissioning of the transmission line/sub-station and generating station shall be monitored by Central Electricity Authority.
- (iii) Where the transmission system executed by a transmission licensee is required to be connected to the transmission system executed by any other transmission licensee and both transmission systems are executed in a manner other than through tariff based competitive bidding, the transmission licensee shall endeavour to match the commissioning of its transmission system with the transmission system of the other licensee as far as practicable and shall ensure the same through an appropriate Implementation Agreement. Where either of the transmission systems or both are implemented through tariff based competitive bidding, the progress of implementation of the transmission systems in a matching time schedule shall be monitored by the Central Electricity Authority.
- (iv) In case a transmission system or an element thereof is prevented from regular service on or before 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.

- (v) 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 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.
- (vi) 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.

Note: Transmission Licensee referred to in this Sub-Regulation shall include 'Deemed Transmission Licensee' as per the provision of the Act.

- 5. Trial run and Trial operation in relation to a transmission system or an element thereof shall mean successful charging of the transmission system or an element thereof for 24 hours at continuous flow of power, and communication signal from the sending end to the receiving end and with requisite metering system, telemetry and protection system in service enclosing certificate to that effect from concerned Regional Load Despatch Centre.
- 6. Date of commercial operation in relation to a communication system or an element thereof shall mean the date declared by the transmission licensee from 0000 hour of which a communication system or element thereof

shall be put into service after completion of site acceptance test including transfer of voice and data to respective control centre as certified by the respective Regional Load Dispatch Centre.

7. In the event of inconsistency between the provisions relating to trial operation and commercial operation as specified in Sub-Regulation 6.3A.1 to 6.3A.6 of these regulations and the provisions of Central Electricity Regulatory Commissions (Terms and Conditions of Tariff) Regulations, 2014 or any subsequent enactment thereof, the provisions of these regulations shall prevail.

[6.3B Technical Minimum Schedule for operation of Central Generating Stations and Inter-State Generating Stations

1. The technical minimum for operation in respect of a unit or units of a Central Generating Station of inter-State Generating Station shall be 55% of MCR loading or installed capacity of the unit of at generating station.
2. The CGS or ISGS may be directed by concerned RLDC 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.
3. Where the CGS or ISGS, whose tariff is either determined or adopted by the Commission, is directed by the concerned RLDC to operate below normative plant availability factor but at or above technical minimum, the CGS or ISGS may be compensated depending on the average unit loading duly taking into account the forced outages, planned outages, PLF, generation at generator terminal, energy sent out ex-bus, number of start-stop, secondary fuel oil consumption and auxiliary energy consumption, in due consideration of actual 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 RLDC or SLDC, as the case may be.

Provided that:

- (i) In case of coal / lignite based generating stations, following station heat rate degradation or actual heat rate, whichever is lower, shall be considered for the purpose of compensation:

S.No.	Unit loading as a % of Installed Capacity of the Unit	Increase in SHR (for supercritical units) (%)	Increase in SHR (for sub-critical units) (%)
1	85-100	Nil	Nil
2	75-84.99	1.25	2.25
3	65-74.99	2	4
4	55-64.99	3	6

- (ii) In case of coal / lignite based generating stations, the following Auxiliary Energy Consumption degradation or actual, whichever is lower, shall be considered for the purpose of compensation:

Sl. No.	Unit Loading (% of MCR)	% Degrading in AEC admissible
1	85-100	Nil
2	75-84.99	0.35
3	65-74.99	0.65
4	55-64.99	1.00

- (iii) Where the scheduled generation falls below the technical minimum schedule, the concerned CGS or ISGS 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:

Unit Size (MW)	Oil Consumption per start up (KI)		
	Hot	Warm	Cold
200/210/250 MW	20	30	50
500 MW	30	50	90
660 MW	40	60	110

- (iv) In case of gas based Central Generating Station or inter-State Generating Station, compensation shall be decided based on

the characteristic curve provided by the manufacturer and after prudence check of the actual operating parameters of Station Heat Rate, Auxiliary Energy Consumption, etc.

- (v) Compensation for the Station Heat Rate and Auxiliary Energy Consumption shall be worked out in terms of energy charges.
- (vi) 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 up to technical minimum based on the compensation mechanism finalized by the RPCs.
- (vii) 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.
- (viii) 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.
- (ix) 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.
- (x) The change in schedule of power under the provisions of Central Electricity Regulatory Commission (Ancillary Services Operations) Regulations, 2015 shall not be considered for compensation.

4. In case of a generating station whose tariff is neither determined nor adopted by the Commission, the concerned generating company shall

have to factor the above provisions in the PPAs entered into by it for sale of power in order to claim compensations for operating at the technical minimum schedule.

5. The generating company shall keep the record of the emission levels from the plant due to part load operation and submit a report for each year to the Commission by 31st May of the year.
6. NLDC shall prepare a Detailed Operating Procedure in consultation with the generators and beneficiaries at RPC forums within 2 months' time and submit to the Commission for approval. The Detailed Operating Procedure shall contain 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 upto the technical minimum in specific Grid conditions such as low system demand, Regulation of Power Supply and incidence of high renewables etc., based on merit order stacking.
7. The RPCs shall work out a 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 over and above the norm of 0.5 ml/kWh for additional start-ups in excess of 7 start-ups, in consultation with generators and beneficiaries at RPC forum and its sharing by the beneficiaries.]³⁵³⁶

6.4 Demarcation of responsibilities:

1. The national interconnected grid is divided into control areas, like Regional ISTS, States, DVC, etc. where the load dispatch centre or system operator of the respective control area controls its generation and/or load to maintain its interchange schedule with other control areas whenever required to do so and contributes to frequency regulation of the synchronously operating system. The Load Despatch Centre of a control area therefore is responsible for coordinating the scheduling of a generating station, within the control area,

³⁵ Added vide Fourth Amendment Regulations, 2016 w.e.f. 29.04.2016

³⁶ Sub-Regulation 6.3B shall come into force on such date as the commission may appoint by notification in the Official Gazette.

real-time monitoring of the station's operation, checking that there is no gaming (gaming is an intentional mis-declaration of a parameter related to commercial mechanism in vogue, in order to make an undue commercial gain) in its availability declaration, or in any other way revision of availability declaration and injection schedule, switching instructions, [meter data processing]³⁷, collections/disbursement of UI payments, outage planning, etc. The following clause gives the criteria for demarcation of control area jurisdiction.

2. The following generating stations shall come under the respective Regional ISTS control area and hence the respective RLDC shall coordinate the scheduling of the following generating stations :
 - a) Central Generating Stations (excluding stations where full Share is allocated to host state),
 - b) [Ultra Mega Power Projects including projects based on wind and solar resources and having capacity of 500 MW and above]³⁸
 - c) In other cases, the control area shall be decided on the following criteria:
 - (i) If a generating station is connected only to the ISTS, RLDC shall coordinate the scheduling, except for Central Generating Stations where full Share is allocated to one State.
 - (ii) If a generating station is connected only to the State transmission network, the SLDC shall coordinate scheduling, except for the case as at (a) above.
 - (iii) If a generating station is connected both to ISTS and the State network, scheduling and other functions performed by the system operator of a control area will be done by SLDC, only if state has more than 50% Share of power, The role of concerned RLDC, in such a case, shall be limited to consideration of the schedule for inter state exchange of power on account of this ISGS while

³⁷ Substituted vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

³⁸ Substituted vide Third Amendment Regulations, 2015 w.e.f. 01.11.2015

determining the net drawal schedules of the respective states. If the State has a Share of 50% or less, the scheduling and other functions shall be performed by RLDC.

- (iv) In case commissioning of a plant is done in stages the decision regarding scheduling and other functions performed by the system operator of a control area would be taken on the basis of above criteria depending on generating capacity put into commercial operation at that point of time. Therefore it could happen that the plant may be in one control area (i.e. SLDC) at one point of time and another control area (i.e. RLDC) at another point of time. The switch over of control area would be done expeditiously after the change, w.e.f. the next billing period.
3. There may be exceptions with respect to above provisions, for reasons of operational expediency, subject to approval of CERC. Irrespective of the control area the jurisdiction, if a generating station is connected both to the ISTS and the STU, the load dispatch centre of the control area under whose jurisdiction the generating station falls, shall take into account grid security implication in the control area of the other load dispatch centre.
 4. For those generating station supplying power to any state other than host state and whose scheduling is not coordinated by RLDC, the role of the concerned RLDC shall be limited to consideration of the schedule for inter-State exchange of power on account of this generating station while determining the net drawal schedules of the respective control area.
 5. The Regional grids shall be operated as power pools with decentralized scheduling and despatch, in which the States shall have operational autonomy, and SLDCs shall have the total responsibility for-
 - (i) scheduling/despatching their own generation (including generation of their embedded licensees),
 - (ii) regulating the demand of its control area,

- (iii) scheduling their drawal from the ISGS (within their share in the respective plant's expected capability),
 - (iv) permitting long term access, medium term and short term open access transactions for embedded generators/consumers, in accordance with the contracts, and
 - (v) regulating the net drawal of their control area from the regional grid in accordance with the respective regulations of the CERC.
6. [The system of each regional entity shall be treated and operated as notional control area. The algebraic summation of scheduled drawal from ISGS and from contracts through long-term access, medium-term and short-term open access arrangements shall provide the drawal schedule of each regional entity, and this shall be determined in advance on day-ahead basis. The regional entities shall regulate their generation and/or consumers' load so as to maintain their actual drawal from the regional grid close to the above schedule. Maximum inadvertent deviation allowed during a time block shall not exceed the limits specified in the Deviation Settlement Mechanism Regulations. Such deviations should not cause system parameters to deteriorate beyond permissible limits and should not lead to unacceptable line loadings. Inadvertent deviations, if any, from net drawal schedule shall be priced through the Deviation Settlement mechanism as specified by the Central Commission from time to time. Every regional entity shall ensure reversal of sign of deviation from schedule at least once after every twelve time blocks.]³⁹
7. [The SLDC, SEB / distribution licensee shall always restrict the net drawal of the state from the grid within the drawal schedules keeping the deviations from the schedule within the limits specified in the Deviation Settlement Mechanism Regulations. The concerned SEB/distribution licensee/User, SLDC shall ensure that their automatic demand management scheme mentioned in clause 5.4.2 acts to ensure that there is no over-drawal. If the automatic demand management scheme has not yet been commissioned, then action shall be taken as per manual demand management scheme to restrict the net drawal from grid to

³⁹ Substituted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

within schedules and all actions for early commissioning of Automatic Demand Management Scheme (ADMS) shall be initiated]⁴⁰

8. The SLDCs/STUs /Distribution Licensees shall regularly carry out the necessary exercises regarding short-term demand estimation for their respective States/area, to enable them to plan in advance as to how they would meet their consumers' load without overdrawing from the grid.
 9. The ISGS, other generating stations and sellers shall be responsible for power generation/power injection generally according to the daily schedules advised to them by the RLDC/SLDC on the basis of the contracts/ requisitions received from the SLDCs/buyers/Power Exchanges.
 10. [The ISGS is normally expected to generate power according to the daily schedules advised to them barring any inadvertent deviations. Maximum deviation allowed during a time block shall not exceed the limits specified in the Deviation Settlement Mechanism Regulations. Such deviations should not cause system parameters to deteriorate beyond permissible limits and should not lead to unacceptable line loadings. Inadvertent deviations, if any, from the ex-power plant generation schedules shall be appropriately priced in accordance with Deviation Settlement Mechanism Regulations. In addition, deviations from schedules causing congestion, shall also be priced in accordance with the Central Electricity Regulatory Commission (Measure to relieve congestion in real time operation) Regulations, 2009.]⁴¹
- [10(a) The treatment of injection of infirm power by generating stations during testing shall be in accordance with Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) Regulations, 2009, and the Central Electricity Regulatory Commission (Unscheduled Inter-Change Charges and related matters) Regulations, 2009, amended time to time.]⁴²

⁴⁰ Substituted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

⁴¹ Substituted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

⁴² Added vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

11. []⁴³
12. [Notwithstanding the above, the RLDC may direct the SLDCs/ISGS/ other regional entities to increase/decrease their drawal/generation in case of contingencies e.g. overloading of lines/transformers, abnormal voltages, threat to system security. Such directions shall immediately be acted upon. In case the situation does not call for very urgent action, and RLDC has some time for analysis, it shall be checked whether the situation has arisen due to deviations from schedules. These shall be got terminated first, through appropriate measure like opening of feeders , if considered necessary by SLDC/RLDC, before an action, which would affect the scheduled supplies to the long term, medium term customers or short term customers is initiated in accordance with Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in Inter State Transmission and Related matters) Regulations, 2009 and Central Electricity Regulatory Commission (Open Access in Inter-State Transmission) Regulations, 2008.

In case Short Term/Medium Term Open Access or Long Term Access are curtailed, RLDC(s) shall submit a report regarding the reasons due to which it was not able to curtail deviations from Schedule and agencies which had not taken necessary actions.]⁴⁴

13. For all outages of generation and transmission system, which may have an effect on the regional grid, all Regional entities shall cooperate with each other and coordinate their actions through Operational Coordination Committee (OCC) for outages foreseen sufficiently in advance and through RLDC (in all other cases), as per procedures finalized separately by OCC. In particular, outages requiring restriction of ISGS generation and/or restriction of ISGS Share which a beneficiary can receive and curtailment of other long term transactions shall be planned carefully to achieve the best optimization.
14. The regional entities shall enter into separate joint/bilateral agreement(s) to identify the beneficiary's Shares in ISGS (based on the allocations by the Govt. of India, where applicable), scheduled drawal pattern, tariffs, payment terms

⁴³ Deleted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

⁴⁴ Substituted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

etc. All such agreements shall be filed with the concerned RLDC(s) and RPC, Secretariat, for being considered in scheduling and regional energy accounting. Any bilateral agreements between buyer and seller for scheduled interchanges on long-term, medium-term basis shall also specify the interchange schedule, which shall be duly filed with CTU and CTU shall inform RLDC and SLDC, as the case may be about these agreements in accordance with Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) Regulations, 2009.

15. []⁴⁵
16. The ISGS shall make an advance declaration of ex-power plant MW and MWh capabilities foreseen for the next day, i.e., from 0000 hrs to 2400 hrs. During fuel shortage condition, in case of thermal stations, they may specify minimum MW, maximum MW, MWh capability and declaration of fuel shortage. The generating stations shall also declare the possible ramping up / ramping down in a block. In case of a gas turbine generating station or a combined cycle generating station, the generating station shall declare the capacity for units and modules on APM gas, RLNG and liquid fuel separately, and these shall be scheduled separately.
17. While making or revising its declaration of capability, except in case of Run off the River (with up to three hour pondage) hydro stations, the ISGS shall ensure that the declared capability during peak hours is not less than that during other hours. However, exception to this rule shall be allowed in case of tripping/re-synchronisation of units as a result of forced outage of units.
18. It shall be incumbent upon the ISGS to declare the plant capabilities faithfully, i.e. according to their best assessment. In case, it is suspected that they have deliberately over/under declared the plant capability contemplating to deviate from the schedules given on the basis of their capability declarations (and thus make money either as undue capacity charge or as the charge for deviations from schedule), the RLDC may ask the ISGS to explain the situation with necessary backup data.

⁴⁵ Deleted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

19. The ISGS shall be required to demonstrate the declared capability of its generating station as and when asked by the Regional Load Despatch Centre of the region in which the ISGS is situated. In the event of the ISGS failing to demonstrate the declared capability, the capacity charges due to the generator shall be reduced as a measure of penalty.
20. The quantum of penalty for the first mis-declaration for any duration/block in a day shall be the charges corresponding to two days fixed charges. For the second mis-declaration the penalty shall be equivalent to fixed charges for four days and for subsequent mis-declarations, the penalty shall be multiplied in the geometrical progression over a period of a month.
21. The CTU shall install special energy meters on all inter connections between the regional entities and other identified points for recording of actual net MWh interchanges and MVarh drawals. The installation, operation and maintenance of special energy meters shall be in accordance with Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006. All concerned entities (in whose premises the special energy meters are installed) shall take weekly meter readings and transmit them to the RLDC by Tuesday noon. The SLDC must ensure that the meter data from all installations within their control area are transmitted to the RLDC within the above schedule.
22. The RLDC shall be responsible for computation of actual net injection / drawal of concerned regional entities, 15 minute-wise, based on the above meter readings. The above data along with the processed data of meters shall be forwarded by the RLDC to the RPC secretariat on a weekly basis by each Thursday noon for the seven day period ending on the previous Sunday midnight, to enable the latter to prepare and issue the Unscheduled inter-change (UI) account in accordance with the CERC (Unscheduled Interchange charges and related matters) Regulations, 2010, as amended from time to time. All computations carried out by RLDC shall be open to all regional entities for checking/verifications for a period of 15 days. In case any mistake/omission is detected, the RLDC shall forthwith make a complete check and rectify the same.
23. The operating log books of the generating station shall be available for review

by the Regional Power Committee. These books shall keep record of machine operation and maintenance.

24. [Hydro generating stations are expected to respond to grid frequency changes and inflow fluctuations. Maximum deviation allowed during a time block shall be as per the CERC Deviation Settlement Mechanism Regulations.]⁴⁶
25. RLDC shall periodically review the actual deviation from the despatch and net drawal schedules being issued, to check whether any of the regional entities are indulging in unfair gaming or collusion. In case any such practice is detected, the matter shall be reported to the Member Secretary, RPC for further investigation/action.
26. NLDC shall be responsible for scheduling and despatch of electricity over inter-regional links in accordance with the grid code specified by Central Commission in coordination with Regional Load Despatch Centers. NLDC shall be responsible for coordination with Regional Load Despatch Centers for the energy accounting of inter-regional exchange of power. NLDC shall also be responsible for coordination for trans-national exchange of power.
27. NLDC shall develop a procedure for scheduling of collective transaction through Power Exchanges, scheduling of inter-regional power exchanges including HVDC setting responsibility and power exchanges of the country with other countries.

6.5 Scheduling and Despatch procedure for long-term access, Medium-term and short-term open access (to be read with provisions of Open Access Regulations 2008 as amended from time to time, The scheduling procedure for medium-term open access transactions shall be similar to the scheduling procedure for long-term access transactions and is as given below, except where it is specifically mentioned for collective transactions):

1. All inter-State generating stations (ISGS) shall be duly listed on the respective RLDC and SLDC web-sites. The station capacities and allocated/contracted Shares of different beneficiaries shall also be listed out.

⁴⁶ Substituted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

2. Each State shall be entitled to a MW despatch up to (foreseen ex-power plant MW capability for the day) x (State's Share in the station's capacity) for all such stations. In case of hydro-electric stations, there would also be a limit on daily MWh despatch equal to (MWh generation capacity for the day) X (State's Share in the station's capacity).
3. By 8 AM every day, the ISGS shall advise the concerned RLDC, the station-wise ex-power plant MW and MWh capabilities foreseen for the next day, i.e. from 0000 hrs to 2400 hrs of the following day.
4. The above information of the foreseen capabilities of the ISGS and the corresponding MW and MWh entitlements of each State, shall be compiled by the RLDC every day for the next day, and advised to all beneficiaries by 10 AM. The SLDCs shall review it vis-à-vis their foreseen load pattern and their own generating capability including bilateral exchanges, if any, and advise the RLDC by 3 PM their drawal schedule for each of the ISGS in which they have Shares, long-term and medium-term bilateral interchanges, approved short-term bilateral interchanges.
5. Scheduling of collective transaction:
 - a. NLDC shall indicate to Power Exchange(s), the list of interfaces/control areas/regional transmission systems on which unconstrained flows are required to be advised by the Power Exchange(s) to the NLDC. Power Exchange(s) shall furnish the interchange on various interfaces/control areas/regional transmission systems as intimated by NLDC. Power Exchange(s) shall also furnish the information of total drawal and injection in each of the regions. Based on the information furnished by the Power Exchanges, NLDC shall check for congestion. In case of congestion, NLDC shall inform the Exchanges about the period of congestion and the available limit for scheduling of collective transaction on respective interface/control area/transmission systems during the period of congestion for Scheduling of Collective Transaction through the respective Power Exchange. The limit for scheduling of collective transaction for respective Power Exchange shall be worked out in

accordance with CERC directives. Based on the application for scheduling of Collective Transaction submitted by the Power Exchange(s), NLDC shall send the details (Scheduling Request of Collective Transaction) to different RLDCs for final checking and incorporating them in their schedules. After getting confirmation from RLDCs, NLDC shall convey the acceptance of scheduling of collective transaction to Power Exchange(s). RLDCs shall schedule the Collective Transaction at the respective periphery of the Regional Entities.

- b. The individual transactions for State Utilities/intra-State Entities shall be scheduled by the respective SLDCs. Power Exchange(s) shall send the detailed break up of each point of injection and each point of drawal within the State to respective SLDCs after receipt of acceptance from NLDC. Power Exchange(s) shall ensure necessary coordination with SLDCs for scheduling of the transactions.
 - c. Timeline for above activities will be as per detailed procedure for Scheduling of Collective Transaction issued in accordance with CERC (Open-access in inter-State transmission) Regulations, 2008 and as amended from time to time.
6. The SLDCs may also give standing instructions to the RLDC such that the RLDC itself may decide the best drawal schedules for the States.
 7. By 6 PM each day, the RLDC shall convey:
 - (i) The ex-power plant 'despatch schedule' to each of the ISGS, in MW for different 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 despatch schedule.
 - (ii) The 'net drawal schedule' to each regional entity, in MW for different time block, for the next day. The summation of the station-wise ex-power plant drawal schedules from all ISGS and drawal from /injection to regional grid consequent to other long term access, medium term and short-

term open access transactions, after deducting the transmission losses (estimated), shall constitute the regional entity-wise drawal schedule.

8. The SLDCs/ISGS shall inform any modifications/changes to be made in drawal schedule/foreseen capabilities, if any, to RLDC by 10 PM or preferably earlier.
9. []⁴⁷
10. The declaration of the generating capability by hydro ISGS should include limitation on generation during specific time periods, if any, on account of restriction(s) on water use due to irrigation, drinking water, industrial, environmental considerations etc. The concerned Load Despatch Centre shall periodically check that the generating station is declaring the capacity and energy sincerely, and is not manipulating the declaration with the intent of making undue money through UI.
11. Since variation of generation in run-of-river power stations shall lead to spillage, these shall be treated as must run stations. All renewable energy power plants, except for biomass power plants, and non-fossil fuel based cogeneration plants whose tariff is determined by the CERC shall be treated as 'MUST RUN' power plants and shall not be subjected to 'merit order despatch' principles.
12. Run-of-river power station with pondage and storage type power stations are designed to operate during peak hours to meet system peak demand. Maximum capacity of the station declared for the day shall be equal to the installed capacity including overload capability, if any, minus auxiliary consumption, corrected for the reservoir level. The Regional Load Despatch Centers shall ensure that generation schedules of such type of stations are prepared and the stations despatched for optimum utilization of available hydro energy except in the event of specific system requirements/constraints.
13. [The schedule finalized by the concerned load despatch centre for hydro generating station, shall normally be such that the scheduled energy for a day equals the total energy (ex-bus) expected to be available on that day, as declared by the generating station, based on foreseen/planned water availability/release.

⁴⁷ Deleted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

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.]⁴⁸

Illustration

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

$S4=E4+(A1-(E1[]^{49}))$, Similarly,

$S5=E5+(A2-(E2[]^{50}))$,

$S6=E6+(A3-(E3[]^{51}))$,

$S7=E7+(A4-(E4[]^{52}))$, and so on.

14. While finalizing the above daily despatch schedules for the ISGS, RLDC shall ensure that the same are operationally reasonable, particularly in terms of ramping-up/ramping-down rates and the ratio between minimum and maximum generation levels. A ramping rate of upto 200 MW per hour should generally be acceptable for an ISGS and for a regional entity (50 MW in NER), except for hydro-electric generating stations which may be able to ramp up/ramp down at a faster rate.
15. While finalizing the drawal and despatch schedules as above, the RLDC shall also check that the resulting power flows do not give rise to any transmission constraints. In case any impermissible constraints are foreseen, the RLDC shall moderate the schedules to the required extent, under intimation to the concerned

⁴⁸ Substituted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

⁴⁹ Deleted vide Corrigendum dated 03.07.2010

⁵⁰ Deleted vide Corrigendum dated 03.07.2010

⁵¹ Deleted vide Corrigendum dated 03.07.2010

⁵² Deleted vide Corrigendum dated 03.07.2010

regional entities. Any changes in the scheduled quantum of power which are too fast or involve unacceptably large steps, may be converted into suitable ramps by the RLDC.

16. In the event of bottleneck in evacuation of power due to any constraint, outage, failure or limitation in the transmission system, associated switchyard and substations owned by the Central Transmission Utility or any other transmission licensee involved in inter-state transmission (as certified by the RLDC) necessitating reduction in generation, the RLDC shall revise the schedules which shall become effective from the 4th time block, counting the time block in which the bottleneck in evacuation of power has taken place to be the first one. Also, during the first, second and third time blocks of such an event, the scheduled generation of the ISGS 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 accordingly.
17. [In case of any grid disturbance, scheduled generation of all the ISGSs supplying power under long term / medium term/[]⁵³ shall be deemed to have been revised to be equal to their actual generation and the scheduled drawals of the beneficiaries/buyers shall be deemed to have been revised accordingly for all the time blocks affected by the grid disturbance. Certification of grid disturbance and its duration shall be done by the RLDC.

The declaration of disturbance shall be done by the concerned RLDC at the earliest. A notice to this effect shall be posted at its website by the RLDC of the region in which the disturbance occurred. Issue of the notice at RLDC web site shall be considered as declaration of the disturbance by RLDC. All regional entities shall take note of the disturbance and take appropriate action [at]⁵⁴ their end.

For Bilateral short term and collective transactions, the methodology of settlement of accounts for the period of Grid Disturbance shall be formulated by National Power Committee(NPC) and same shall be put up to the Commission for approval. The methodology shall cover all possible scenarios with illustrative

⁵³ Deleted vide Corrigendum dated 21.02.2014

⁵⁴ Added vide Corrigendum dated 21.02.2014

examples to cover the instances where the Grid disturbance is either partial or it affects only one region.]⁵⁵

18. [Revision of declared capability by the ISGS(s) having two part tariff with capacity charge and energy charge []⁵⁶ and requisition by beneficiary (ies) for the remaining period of the day shall also be permitted with advance notice. Revised schedules/declared capability in such cases shall become effective from the 4th time block, counting the time block in which the request for revision has been received in the RLDC to be the first one.]⁵⁷

[18(a) Notwithstanding anything contained in Regulation 6.5.18, in case of forced outages of a unit, for those stations who have a two part tariff based on capacity charge and energy charge for long term and medium term contracts, the RLDC shall revise the schedule on the basis of revised declared capability. The revised declared capability and the revised schedules shall become effective from the fourth time block, counting the time block in which the revision is advised by the ISGS to be the first one.]⁵⁸

19. Notwithstanding anything contained in Regulation 6.5.18, in case of forced outage of a unit of a generating station (having generating capacity of 100 MW or more) and selling power under Short Term bilateral transaction (excluding collective transactions through power exchange), the generator or electricity trader or any other agency selling power from the unit of the generating station shall immediately intimate the outage of the unit along with the requisition for revision of schedule and estimated time of restoration of the unit, to SLDC/ RLDC, as the case may be. The schedule of beneficiaries, sellers and buyers of power from this generating unit shall be revised accordingly. The revised schedules shall become effective from the 4th time block, counting the time block in which the forced outage is declared to be the first one. The SLDC/ RLDC as the case may be shall inform the revised schedule to the seller and the buyer. The original schedule shall become effective from the estimated time

⁵⁵ Substituted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

⁵⁶ Deleted vide Corrigendum dated 21.02.2014

⁵⁷ Substituted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

⁵⁸ Added vide Addendum dated 03.07.2010

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 also that the provisions of this sub-regulation in respect of revision of schedule by electricity traders and any other agency (except the generating station) shall be operative with effect from 1st July 2012.]⁵⁹

[19A. In case of revision of schedule of a generating unit, the schedules of all transactions under the long-term access, medium-term open access and short-term open access (except collective transactions through power exchange), shall be reduced on pro-rata basis.]⁶⁰

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

21. To discourage frivolous revisions, an RLDC may, at its sole discretion, refuse to accept schedule/capability changes of less than two (2) percent of previous schedule/capability. The schedule of thermal generating stations indicating fuel shortage while intimating the Declared Capacity to the RLDC shall not be revised except in case of forced outage of generating unit.

Provided that in case of gas based ISGS, for optimum utilization of gas, this shall be permitted, i.e. in case of tripping of a unit, this gas may be diverted to another unit using the same gas.

22. The Regional Load Despatch Centre shall also formulate the procedure

⁵⁹ Replaced vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

⁶⁰ Added vide First Amendment Regulations, 2012 w.e.f. 02.04.2012

for meeting contingencies both in the long run and in the short run (Daily scheduling).

- [23. (i) Wind and Solar generators shall mandatorily provide to the concerned RLDC, in a format as prescribed by RLDC, the technical specifications at the beginning and whenever there is any change. The data relating to power system parameters and weather related data as applicable shall also be mandatorily provided by such generators to concerned RLDC in real time. The frequency and other details in this regard shall be provided in the Detailed Procedure to be prepared by NLDC and approved by the Commission.
- (ii) Forecasting shall be done by wind and solar generators which are regional entities as well as the concerned RLDC. The concerned RLDC may engage forecasting agency (ies) and prepare a schedule for such generating stations. The forecast by the concerned RLDC shall be with the objective of ensuring secure grid operation. The forecast by the wind and solar generator shall be generator centric. The wind and solar generators which are regional entities will have the option of accepting the concerned RLDC's forecast for preparing its schedule or provide the concerned RLDC with a schedule based on its own forecast. Any commercial impact on account of deviation from schedule based on the forecast chosen by the wind and solar generator shall be borne by it.
- (iii) The schedule by wind and solar generators which are regional entities (excluding collective transactions) may be revised by giving advance notice to the concerned RLDC, as the case may be. Such revisions shall be effective from 4th time block, the first being the time-block in which notice was given. There may be one revision for each time slot of one and half hours starting from 00:00 hours of a particular day subject to maximum of 16 revisions during the day.
- (iv) The schedule of solar generators which are regional entities shall be given by the generator based on availability of the generator, weather forecasting,

solar insolation/irradiance, season and normal solar generation curve.]⁶¹

24. Generation schedules and drawal schedules issued/revised by the Regional Load Despatch Centre shall become effective from designated time block irrespective of communication success.
25. For any revision of scheduled generation, including post facto deemed revision; there shall be a corresponding revision of scheduled drawals of the beneficiaries.
26. A procedure for recording the communication regarding changes to schedules duly taking into account the time factor shall be evolved by the Central Transmission Utility.
27. When for the reason of transmission constraints e.g. congestion or in the interest of grid security, it becomes necessary to curtail power flow on a transmission corridor, the transactions already scheduled may be curtailed by the Regional Load Despatch Centre.
28. The short-term customer shall be curtailed first followed by the medium-term customers, which shall be followed by the long-term customers and amongst the customers of a particular category, curtailment shall be carried out on pro rata basis.
29. After the operating day is over at 2400 hours, the schedule finally implemented during the day (taking into account all before-the-fact changes in despatch schedule of generating stations and drawal schedule of the States) shall be issued by RLDC. These schedules shall be the datum for commercial accounting. The average ex-bus capability for each ISGS shall also be worked out based on all before-the-fact advice to RLDC.
30. Collective Transaction through Power Exchange(s) would normally be curtailed subsequent to the Short Term Bilateral Transaction(s).
31. RLDCs would curtail a Transaction at the periphery of the Regional Entities. SLDC(s) shall further incorporate the inter-se curtailment of intra-State Entities to implement the curtailment.

⁶¹ Substituted vide Third Amendment Regulations, 2015 w.e.f. 01.11.2015

32. RLDC 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 regional entities, all schedules issued by the RLDC, and all revisions/updating of the above.
33. The procedure for scheduling and the final schedules issued by RLDC, shall be open to all regional entities and other regional open access customers entities for any checking/verification, for a period of 5 days. In case any mistake/omission is detected, the RLDC shall forthwith make a complete check and rectify the same.
34. [While availability declaration by ISGS shall have a resolution of one decimal (0.1) MW and one decimal (0.1) MWh, all entitlements, requisitions and schedules shall be rounded off to the nearest two decimals at each control area boundary for each of the transaction, and shall have a resolution of 0.01 MW.]⁶²

6.6 Reactive Power and Voltage Control

1. Reactive power compensation should ideally be provided locally, by generating reactive power as close to the reactive power consumption as possible. The Regional Entities except Generating Stations are therefore expected to provide local VAR compensation/generation such that they do not draw VARs from the EHV grid, particularly under low-voltage condition. To discourage VAR drawals by Regional Entities except Generating Stations, VAR exchanges with ISTS shall be priced as follows:
 - The Regional Entity except Generating Stations pays for VAR drawal when voltage at the metering point is below 97%;
 - The Regional Entity except Generating Stations gets paid for VAR return when voltage is below 97%;
 - The Regional Entity except Generating Stations gets paid for VAR drawal when voltage is above 103%;

⁶² Substituted vide Second Amendment Regulations, 2014 w.e.f. 17.02.2014

- The Regional Entity except Generating Stations pays for VAr return when voltage is above 103%;

Provided that there shall be no charge/payment for VAr drawal/return by a Regional Entity except Generating Stations on its own line emanating directly from an ISGS.

2. The charge for VArh shall be at the rate of 10 paise/kVArh w.e.f. [3.5.2010]⁶³ and this will be applicable between the Regional Entity, except Generating Stations, and the regional pool account for VAr interchanges. This rate shall be escalated at 0.5paise/kVArh per year thereafter, unless otherwise revised by the Commission.
3. Notwithstanding the above, RLDC may direct a Regional Entity except Generating Stations to curtail its VAr drawal/injection in case the security of grid or safety of any equipment is endangered.
4. In general, the Regional Entities except Generating Stations shall endeavor to minimize the VAr drawal at an interchange point when the voltage at that point is below 95% of rated, and shall not return VAr when the voltage is above 105%. ICT taps at the respective drawal points may be changed to control the VAr interchange as per a Regional Entity except Generating Stations' request to the RLDC, but only at reasonable intervals.
5. Switching in/out of all 400 kV bus and line Reactors throughout the grid shall be carried out as per instructions of RLDC. Tap changing on all 400/220 kV ICTs shall also be done as per RLDC's instructions only.
6. The ISGS and other generating stations connected to regional grid shall generate/absorb reactive power as per instructions of RLDC, within capability limits of the respective generating units, that is without sacrificing on the active generation required at that time. No payments shall be made to the generating companies for such VAr generation/absorption.
7. VAr exchange directly between two Regional Entities except Generating

⁶³ Substituted vide Corrigendum dated 03.07.2010

Stations 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 regional grid. Accordingly, the management/control and commercial handling of the VAr exchanges on such lines shall be as per following provisions, on case-by-case basis:

- i) The two concerned Regional Entities except Generating Stations may mutually agree not to have any charge/payment for VAr exchanges between them on an interconnecting line.
- ii) The two concerned Regional Entities except Generating Stations may mutually agree to adopt a payment rate/scheme for VAr exchanges between them identical to or at variance from that specified by CERC for VAr exchanges with ISTS. 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 Regional Entities except Generating Stations (e.g. one party wanting to have the charge/payment for VAr exchanges, and the other party refusing to have the scheme), the scheme as specified in Annexure-2 shall be applied. The per kVArh rate shall be as specified by CERC for VAr exchanges with ISTS.
- iv) The computation and payments for such VAr exchanges shall be effected as mutually agreed between the two Beneficiaries.

PART 7

MISCELLANEOUS

- (1) Nothing in these Regulations shall be deemed to limit or otherwise affect the power of the Commission to pass such orders as may be necessary for meeting the ends of justice or to prevent the abuse of the process of the Commission.
- (2) Nothing in these Regulations shall bar the Commission from adopting in conformity with the provisions of the Act, a procedure, which is at variance with any of the provisions of these Regulations including summary procedures, if the Commission, in

view of the special circumstance of a matter or class of matters and for reasons to be recorded in writing, deems it necessary or expedient for so dealing with such a matter or class of matters.

- (3) Nothing in these Regulations shall bar the Commission to deal with any matter or exercise any power under the Act for which no regulations have been framed, and the Commission may deal with such matters, powers and functions in a manner it thinks fit.
- (4) The Commission may by general or special order, for reasons to be recorded in writing, and after giving an opportunity of hearing to the parties likely to be affected by grant of relaxation, may relax any of the provisions of these regulations on its own motion or on an application made before it by an interested person.

Sd/-
(ALOK KUMAR)
Secretary

Note: The Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010 were notified in Part III, Section 4 No. 115 of the Gazette of India (Extraordinary) dated 28.04.2010 and amended vide-

- (a) Addendum published in Part III, Section 4, No. 168 of the Gazette of India (Extraordinary) dated 03.07.2010.
- (b) Corrigendum published in Part III, Section 4, No. 168 of the Gazette of India (Extraordinary) dated 03.07.2010.
- (c) First Amendment Regulations, 2012 published in Part III, Section 4, No. 60 of the Gazette of India (Extraordinary) dated 06.03.2012.
- (d) Second Amendment Regulations, 2014 published in Part III, Section 4, No. 08 of the Gazette of India (Extraordinary) dated 07.01.2014.
- (e) Corrigendum published in Part III, Section 4, No. 64 of the Gazette of India (Extraordinary) dated 21.02.2014.

- (f) Third Amendment Regulations, 2015 published in Part III, Section 4, No. 271 of the Gazette of India (Extraordinary) dated 10.08.2015.
- (g) Fourth Amendment Regulations, 2016 published in Part III, Section 4, No. 162 of the Gazette of India (Extraordinary) dated 29.04.2016.

Annexure-1
(Refer section 6.1 (d))

Complementary Commercial Mechanisms

1. The beneficiaries shall pay to the respective ISGS Capacity charges corresponding to plant availability and/or Energy charges for the scheduled dispatch, in accordance with the relevant contracts /orders of CERC. The bills for these charges shall be issued by the respective ISGS to each beneficiary on monthly basis.
2. The sum of the above two charges from all beneficiaries shall fully reimburse the ISGS for generation according to the given dispatch schedule. In case of a deviation in actual generation from the dispatch schedule, the concerned ISGS shall receive or shall pay in accordance with UI regulation of CERC. Similarly, the deviation of actual drawl by any regional entity from the net drawl schedule shall be treated as UI. All 15-minute energy figures (net scheduled, actually metered and UI) shall be rounded off to the nearest 0.01 MWh. The UI charges and the modalities of settlement of UI shall be in accordance with UI Regulation of CERC.
3. Wind energy being of variable nature, needs to be predicted with reasonable accuracy for proper scheduling and dispatching of power from these sources in the interconnected system. Hence wind generation forecasting is necessary for increased penetration. Wind generation forecasting can be done on an individual developer basis or joint basis for an aggregated generation capacity of 10 MW and above connected at a connection point of 33 kV and above. If done jointly, the wind forecasting facility shall be built and operated by wind developers in the area and sharing of the cost shall be mutually discussed and agreed.
4. [The wind and solar generators which are regional entities shall forecast renewable energy generation at the following time intervals:
 - (i) Day ahead forecast: Wind and solar energy generation forecast with an interval of 15 minutes for the next 24 hours for the aggregate generation capacity of 50 MW and above.
 - (ii) The schedule by such wind and solar generators which are regional entities,

supplying inter-state power under long-term access or medium-term open access or short-term open access may be revised by giving advance notice to RLDC. Such revisions shall be effective from 4th time-block, the first being the time-block in which notice was given. There may be one revision for each time slot of one and half hours starting from 00:00 hours of a particular day subject to maximum of 16 revisions during the day.]⁶⁴

5. [The charges payable for deviation from schedule by the wind and solar generators which are regional entities, shall be delinked from frequency and shall be accounted for and settled in accordance with the provisions of the Central Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters) Regulations, 2014 as amended from time to time.]⁶⁵
6. []⁶⁶
7. []⁶⁷
8. All Regional Energy Accounting calculations carried out by RPC Secretariats shall be open to all regional entities for any checking/verification for a period of 15 days. In case any mistake is detected, RPC Secretariats shall forthwith make a complete check and rectify the mistakes.
9. []⁶⁸
10. Regional Energy Accounts on monthly basis shall be prepared and issued by the RPC Secretariats for the purpose of billing and payment of various charges. Regional Energy Account for a month shall be issued in the following month based on the data provided by RLDC.
11. RPC Secretariats shall also issue the weekly statement for VAR charges, to all regional entities who have a net drawal/injection of reactive energy under low/high voltage conditions. These payments shall also have a high priority and the concerned regional

⁶⁴ Substituted vide Third Amendment Regulations, 2015 w.e.f. 01.11.2015

⁶⁵ Substituted vide Third Amendment Regulations, 2015 w.e.f. 01.11.2015

⁶⁶ Deleted vide Third Amendment Regulations, 2015 w.e.f. 01.11.2015

⁶⁷ Deleted vide Third Amendment Regulations, 2015 w.e.f. 01.11.2015

⁶⁸ Deleted vide Third Amendment Regulations, 2015 w.e.f. 01.11.2015

entities and other regional entities shall pay the indicated amounts into regional reactive pool account operated by the RLDC within 10 (ten) days of statement issue, provided that the Commission may direct any entity other than RLDC to operate the regional reactive pool account. The regional entities who have to receive the money on account of VAR charges would then be paid out from the regional reactive pool account, within two(2) working days from the receipt of payment in the Reactive pool account.

12. If payments against the above VAR charges are delayed by more than two days, i.e., beyond twelve (12) days from statement issue, the defaulting regional entity shall have to pay simple interest @ 0.04% for each day of delay. The interest so collected shall be paid to the regional entities who had to receive the amount, payment of which got delayed. Persistent payment defaults, if any, shall be reported by the RLDC to the Member Secretary, RPC, for initiating remedial action.
13. The money remaining in the regional reactive account after pay-out of all VAR charges upto 31st March of every year shall be utilized for training of the SLDC operators, and other similar purposes which would help in improving/streamlining the operation of the respective regional grids, as decided by the respective RPC from time to time.
14. In case the voltage profile of a regional grid improves to an extent that the total pay-out from the regional VAR charges account for a week exceeds the total amount being paid-in for that week, and if the regional reactive account has no balance to meet the deficit, the pay-outs shall be proportionately reduced according to the total money available in the above account.
15. [The RLDC shall place the complete statement of the regional UI account, the regional Reactive Energy pool account and Congestion Charge Account before the RPC's Commercial Committee meeting, on a quarterly basis, for audit]⁶⁹
16. [Interfaces for Scheduling of Inter-regional Exchanges]⁷⁰
 1. The regional boundaries for scheduling, metering []⁷¹ of inter-regional exchanges shall be as follows:

⁶⁹ Substituted vide First Amendment Regulations, 2012 dated 06.03.2012 w.e.f. 02.04.2012

⁷⁰ Substituted vide First Amendment Regulations, 2012 dated 06.03.2012 w.e.f. 02.04.2012

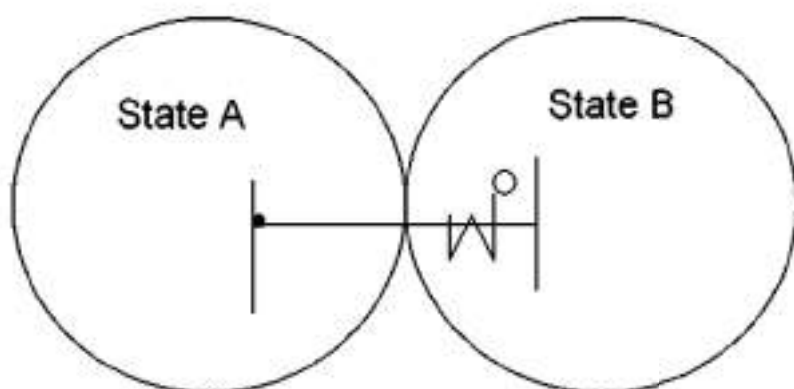
⁷¹ Deleted vide First Amendment Regulations, 2012 dated 06.03.2012 w.e.f. 02.04.2012

- Eastern Region end of inter-regional links between Eastern Region and Southern, Western and Northern Regions;
 - North-eastern end of inter-regional links between Eastern and North Eastern Region;
 - Western Region end of inter-regional links between Southern and Western Region;
 - Western Region end of inter-regional links between and Northern and Western Region.
2. No attempt shall be made to split the inter-regional schedules into link-wise schedules (where two regions have two or more interconnections).

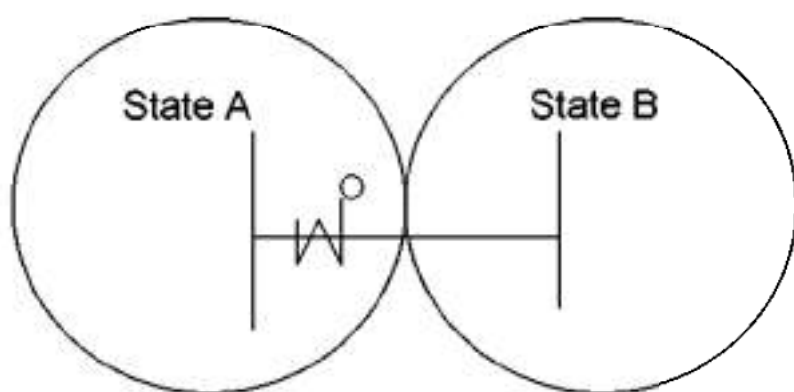
Annexure-2
(refer section 6.6.7(iii))

Payment For Reactive Energy Exchanges on State-Owned Lines

Case-1: Interconnecting line owned by State-A Metering Point: Substation of State-B



Case-2: Interconnecting line owned by State-B Metering point: Substation of State-A

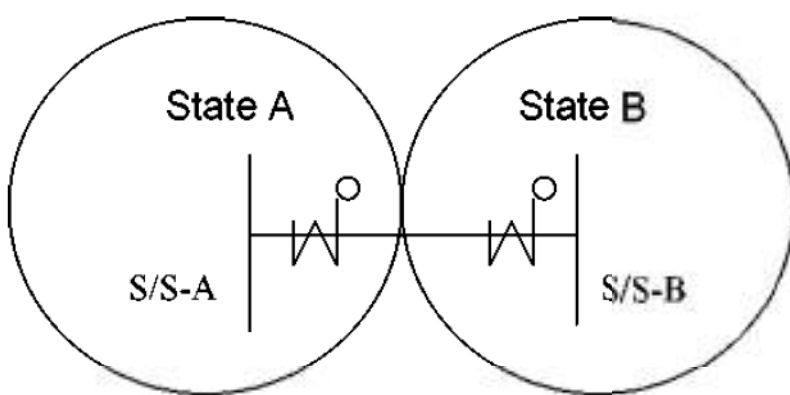


State-B pays to State-A for

- (i) Net VARh received from State-A while voltage is below 97%, and
- (ii) Net VARh supplied to State-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 States-A and-B. Metering points: Substations of State-A and State-B



Net VARh exported from S/S-A, while voltage $< 97\%$ = X_1 Net VARh exported from S/S-A, while voltage $> 103\%$ = X_2 Net VARh imported at S/S-B, while voltage $< 97\%$ = X_3 Net VARh imported at S/S-B, while voltage $> 103\%$ = X_4

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

X_1 or X_3 , whichever is smaller in magnitude, and

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

X_2 or X_4 , whichever is smaller in magnitude.

NOTE:

1. Net VARh and net payment may be positive or negative.
2. In case X_1 is positive and X_3 is negative, or vice-versa, there would be no payment under (i) above.
3. In case X_2 is positive and X_4 is negative, or vice-versa, there would be no payment under (ii) above.

[]⁷²

⁷² Appendix to the Principal Regulations was deleted vide First Amendment Regulations, 2012 w.e.f. 02.04.2012.