



THE ASSAM GAZETTE

অসাধাৰণ

EXTRAORDINARY

প্ৰাপ্ত কৰ্তৃত্বৰ দ্বাৰা প্ৰকাশিত

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GOVERNMENT OF ASSAM

ASSAM ELECTRICITY REGULATORY COMMISSION

NOTIFICATION

The 7th August, 2004

ASSAM ELECTRICITY GRID CODE

No. AERC. /2004/10.— In exercise of powers under Sections 181 of the Electricity Act, 2003 read with Section 86(1) clause (h) and all powers enabling it in that behalf, the Assam Electricity Regulatory Commission hereby frames the following Regulations as appended:-

1. Short title, commencement and interpretation:-

- 1.1 This Regulation may be called the Assam Electricity Regulatory Commission (Assam Electricity Grid Code) Regulations, 2004.
- 1.2 The Assam Electricity Grid Code Regulation applies to all intra-State Transmission System participants, including
 1. Assam Gridco The State Transmission Utility and Transmission Licensees
 2. Generating Stations connected to intra State Transmission System
 3. Distribution Licensees connected with intra State Transmission System
 4. EHV Consumers of Distribution Licensee directly connected to intra State Transmission System
 5. Open access customers availing open access on intra state Transmission system
 6. Captive Generators connected to intra State Transmission System
- 1.3 This Regulation extends to the whole of the State of Assam
- 1.4 This Regulation shall come into force with effect from the date of its publication in Assam Gazette.

PART-I
GENERAL CODE

CHAPTER 1: GENERAL

1.1 Introduction

The Electricity Act 2003 [section 86 (1) (h)] requires that State Commission should specify a State Grid Code that is consistent with the Grid Code specified by Central Electricity Regulatory Commission under section 79 (h). The State Load Despatch Centre (SLDC) shall be responsible for carrying out real time operations for grid control and despatch of electricity within the State through secure and economic operation of the State grid in accordance with Grid Standards and the State Grid Code. The State Grid Code lays down the rules, guidelines and standards to be followed by all users of the State Grid to operate and maintain an efficient and coordinated power system in the State in integration with the North-Eastern Regional Grid as per the provisions of Indian Electricity Grid Code (IEGC). The Grid Code lays down what is technically optimal with respect to operation and defines standards and common terms to reduce ambiguity and avoid discrimination.

1.2 Objectives

The Grid Code governs the boundary between Assam Gridco and Users and establishes guidelines for operation of facilities for those who are connected and will use the State Grid. It lays down both the information requirements and procedures governing the relationship between Assam Gridco and Users. The principal objectives of the Grid Code are:

- (a) To provide clarity and certainty to the Assam Gridco, Generation Companies, Distribution Licensees, IPP/CPP and any open access customers connected to the State Grid by specifying their respective roles, responsibilities and obligations with respect to the operation of the State Grid.
- (b) To improve the grid stability and achieve minimum standards of system performance.
- (c) To define connection requirement for new entrants i.e. future new generating companies, distribution/trading licensees, open access customers and consumers.
- (d) To document the common knowledge or normal practice in writing for ease of reference and help in compliance.
- (e) To agree with generators what performance characteristics their plant must provide.
- (f) To improve co-operation by providing a mechanism for clear and consistent disclosure of all information.
- (g) To provide a level playing field.
- (h) To indicate how generation is to be scheduled and dispatched.
- (i) To actually enforce what is verbally agreed.

1.3 Structure of Grid Code

The Grid Code has been divided into following parts:

I. General Code

The General Code is intended to ensure that all other sections of the Grid Code work together in the management of the Grid Code and establishment of a procedure for review of Grid Code and the modifications needed from time to time.

II. Planning Code

Planning Code includes sections on:

- (a) System Planning specifying the procedures to be applied by Assam Gridco in the planning and development of the transmission system and by other Users connected or seeking Connection to the Assam Gridco transmission system. This section deals with procedure to be followed by Assam Gridco in the development of the EHV transmission system in the long term taking into account the requirements for new connection of generation and demand and the transmission system performance standards issued by the Commission.
- (b) Connection Issues specifying the technical requirements and standards to be complied with by Assam Gridco and other Users connected or seeking connection to the EHV transmission system.

III. Load Despatch & System Operation Code

Load Despatch & System Operation Code includes sections on:

- (c) **System Operation:** specifying the conditions under which Assam Gridco shall operate the EHV transmission system, the Generating Companies shall operate their plants and the Distribution Licensees shall operate their Distribution Systems in so far as necessary to protect the security and quality of supply and safe operation of the State Grid by SLDC under both normal and abnormal operating conditions.
- (d) **Schedule and Despatch:** specifying the procedures relating to the scheduling and despatch of Generating Units and drawal by Distribution Licensees to meet State demand and Drawal allocation.
- (e) **Outage Planning:** specifying the procedures relating to the co-ordination of outages for scheduled maintenance of the EHV transmission system, generating units and distribution system operating in the State Grid.

IV. Protection Code

Protection Code specifies the requirement and co-ordination responsibility and optimum standards of protection that are required to be installed by Users of the State Grid.

V. Metering Code

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

VI. Data Registration

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

1.4 Scope

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

All users that connect with and/or utilize the State Grid are required to be abide by the principles and procedures as laid down in the Grid Code in so far as they apply to that user.

The Grid Code shall be complied with by Assam Gridco in its capacity as holder of the Transmission License and by State Sector Generating Station (SSGS), Distribution Licensee, Open Access customers and non-licensee (like EHV consumers) connected with EHV transmission system, in the course of generation, transmission, supply and utilisation of electricity.

1.5 Interpretation

The meaning of certain terms used in the Grid Code shall be in accordance with the definitions listed in Section 2, "Definitions", of the Grid Code.

Section 2 of this Code has been developed on the premise that accepted engineering terms do not require additional definitions.

The term "Grid Code" means any or all parts of this document.

1.6 Implementation and Operation of the Grid Code

- (a) The Assam Electricity Grid Code shall be effective from such date as the Commission may decide in these regards. The Commission may specify different dates for implementation of different sections and all users accordingly shall commence its implementation.
- (b) The connectivity criteria, protection and other provisions of the Grid Code shall be applicable to the new Connections and equipments procured/provided for new works/ replacements from the date the Grid Code is made effective.
- (c) The Grid Code intended to address the existing as well as future requirements of intra-State transmission system. The Grid Code accordingly includes the requirements of 400 kV transmission lines, transformers, disturbance recorders, sequence of event recorders, UFR relays islanding schemes etc. although not existing, but may be provided in the future.
- (d) The existing connections and equipment shall continue to operate till such time the Operating Coordination Committee considers alterations necessary. However operational aspects of the Grid Code shall have no such relaxation and shall apply with immediate effect.
- (e) The Grid Code shall apply to Users, Assam Gridco and future transmission licensee. The Assam Gridco as a STU has the obligation to implement the Grid

Code.

- (f) All Users are required to comply with Grid Code, which shall be enforced by Assam Gridco. Users must provide Assam Gridco reasonable rights of access; service and facilities necessary to discharge its responsibilities in the Users premises and to comply with instructions as issued by Assam Gridco reasonably required to implement and enforce the Grid Code.
- (g) Assam Gridco as a STU shall not unduly discriminate against or unduly prefer:
 - (i) any one or any group of persons; or
 - (ii) in the conduct of any business other than the Transmission Business.
- (h) If any User fails to comply with any provision of the Grid Code, it shall, inform Grid Code Review Committee without delay of the reason for its non-compliance and shall remedy its non-compliance promptly. Consistent failure to comply with the Grid Code provisions may lead to disconnection of the User's plant and /or facilities.
- (i) The operation of the Grid Code will be reviewed regularly by the Grid Code Review Committee in accordance with the provisions of the relevant section of the Grid Code.

1.7 General Requirements

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

Users must therefore understand and accept that Assam Gridco in such unforeseen circumstances may be required to act decisively to discharge its obligations as STU. SSGS and Distribution Licensees shall provide such reasonable co-operation and assistance as Assam Gridco may request in such circumstances.

1.8 Code Responsibilities

In discharging its duties under the Grid Code, Assam Gridco has to rely on information, which Users supply regarding their requirements and intentions.

Assam Gridco shall not be held responsible for any consequences that arise from its reasonable and prudent actions on the basis of such information.

1.9 Confidentiality

Under the terms of the Grid Code, Assam Gridco will receive information from Users relating to their intentions in respect of their Generation or Supply businesses.

Assam Gridco shall not, other than as required by the Grid Code, disclose such information to any other person without the prior written consent of the provider of the information.

1.10 Dispute Settlement Procedures

In the event of any dispute regarding interpretation of any part of the Grid Code provision between any Users and Assam Gridco, the matter may be referred to the Commission for its decision. The Commission's decision shall be final and binding.

In the event of any conflict between any provision of the Grid Code and any contract or agreement between Assam Gridco and Users, the provision of the Grid Code will prevail.

1.11 Communication between Assam Gridco and Users

All communications between Assam Gridco and Users shall be in accordance with the provision of the relevant section of the Grid Code and shall be made to the designated nodal officer appointed by Assam Gridco.

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

The voice shall be recorded at SLDC and such record shall be preserved for a reasonable time to be decided.

1.12 Partial Invalidity

If any provision or part of a provision of the Grid Code should become or be declared unlawful for any reason, the validity of all remaining provisions or parts of provisions, of the Grid Code shall not be affected.

1.13 Directive

State Government may issue policy directives in certain matters as per the Electricity Act 2003. Assam Gridco shall promptly inform the Commission and all Users of the requirement of such directives.

1.14 Consistency between Grid Code and Existing Connection Agreements

- (a) This Grid Code applies to:
 - (i) all connection agreements made before and after the Code commencement date;
 - (ii) All requests to establish connection or modify an existing connection after the Code commencement date.
- (b) This Grid Code is neither intended to, nor is it to be read or construed as having the effect of:
 - (i) altering any of the terms of an existing *connection agreement*; or
 - (ii) altering the contractual rights or obligations of any of the parties under the existing *connection agreement* as between those parties; or
 - (iii) relieving the parties under any such *connection agreement* of their contractual obligations under such an *agreement*; or

- (iv) Notwithstanding the provisions of sub-clauses (1) through (3) above, if any obligation; imposed or right conferred on a User or Transmission Licensee by this Code is inconsistent with the terms of an existing connection agreement to which this Code applies and the application of the inconsistent terms of the connection agreement would adversely affect the quality or security of network service to other intra State transmission system Users, the parties to the connection agreement must observe the provisions of this Code as if they prevail over the connection agreement to the extent of the inconsistency.

1.15 Compatibility with Indian Electricity Grid Code

This Grid Code is prepared such that it is consistent/ compatible with the IEGC (March 02 revision). However, in matters relating to inter-State transmission, if any provisions of the Assam Grid Code are inconsistent with the provisions of the IEGC, then the provisions of IEGC as approved by CERC shall prevail.

The Assam Grid Code shall be reviewed and revised to make it consistent/ compatible in accordance with National Grid Code having regard to Grid Standards as and when specified by the Central Electricity Regulatory Commission under section 79 (h) of the Electricity Act, 2003.

CHAPTER 2: DEFINITIONS

Defined Term	Definition
Act	The Electricity Act 2003 (Central Act No. 36 of 2003)
Active Energy	Active Energy means the electrical energy produced, flowing or supplied by an electrical circuit during a time interval, and being the integral of the instantaneous power with respect to time, measured in units of watt hours or standard multiples thereof
Active Power	Active Power means the product of voltage and the in-phase component of alternating current measured in units of watts and standard multiples thereof.
Apparent Power	Apparent Power means the product of voltage and current measured in units of volt amperes and standard multiples thereof.
Apparent Energy	Apparent Energy means the integral of the Apparent Power with respect to time. It is measured in Volt Ampere hour and standard multiple thereof.
Agency	A term used in various sections of the Grid Code to refer to utilities that utilise State Grid
Apparatus	Electrical apparatus and includes all machines, fittings, accessories and appliances in which conductors are used.
Appendix	An Appendix to a section of the Grid Code.
Area of Supply	Area within which a distribution licensee is authorised by his license to supply electricity.
Assam Gridco	Assam Gridco means Assam Electricity Grid Corporation Limited registered under the Companies Act, 1956. Assam Gridco is successor entity of ASEB under the provisions of section 131 of the Act and is the State Transmission Utility for Assam as notified by the State Government under section 39 of the Act and holder of the License for transmission for the State of Assam.
Automatic Voltage Regulator or AVR	A continuously acting automatic excitation system to control the voltage of a Generating Unit as measured at the Generator Terminals.
Auxiliaries	All the plant and machinery required for the Generating Unit's functional operation that do not form part of generating unit.
Availability	The capability of the Generating Unit expressed in MW. "Fully Available" shall mean that the generating Unit is available to its contracted capacity. In respect of transmission system, "Availability
Backing Down	SLDC instructions or NERLDC instructions conveyed through SLDC for reduction of generation from generating unit under abnormal conditions such as high frequency, low system demand or network constraints.

Defined Term	Definition
Black Start Procedure	The process of recovery from a total or partial blackout of the Regional /State Grid.
Board	The Board refers to Assam State Electricity Board (ASEB).
Breakdown	An occurrence relating to equipment of supply system which prevents its normal functioning
Captive Power Plant / CPP	For the purpose of Grid Code, a Power Station that is primarily operated to meet a captive demand and is connected to State Grid but not supplying power to the Grid under normal circumstances.
CEA	Central Electricity Authority
CERC	Central Electricity Regulatory Commission
Connection	The electric lines and electrical equipment used to effect a Connection of a User's (other than STU) system to the State Transmission System.
Connection Agreement	An agreement between STU and a User setting out the terms relating to the Connection to and/or use of the State Transmission System.
Connection Conditions	The technical conditions to be complied with by any User having a Connection to the State Transmission System as laid down in: "Connection Conditions" of the Grid Code.
Consumer	Any person who is supplied with electricity for his own use by a licensee or the Government or by any other person engaged in the business of supplying electricity to the public under the Act or any other law for the time being in force and includes any person whose premises are for the time being connected for the purpose of receiving electricity with the works of a licensee, the Government or such other person, as the case may be.
Demand	The demand of active power MW and reactive power MVAR of electricity unless otherwise stated.
Designated Officer	A person identified as having responsibility for inter user safety under section 13 of the Grid Code.
Despatch Instruction	An instruction by SLDC to SSGS (other than CPP) to despatch generation and to Distribution Company to regulate drawal in accordance with the Scheduling & Despatch procedure of Grid Code.
Disconnection	The act of physically separating a User's or EHV Consumer's electrical equipment from the State Transmission System.
Distribution Company/ Discoms	Distribution Company or Discoms shall mean a company engaged primarily in the business of distribution & supply of electricity in its area of supply including Upper Assam Electricity Distribution Company Limited.(UAEDCL), Central Assam Electricity Distribution Company Limited.(CAEDC) and Lower Assam Electricity Distribution Company Limited. (LAEDCL).
Distribution System	The system of wires and associated facilities between the delivery points on the transmission lines or the generating station connection and the point of connection to the installation of the consumers

Defined Term	Definition
Drawal	The import from, or export to, North-Eastern Region, of electrical energy and power or both active/ reactive power. In respect of a Discom, drawal means import from or export to STU of electrical energy and power or both active/reactive.
Grid	The combination of the State Transmission System, Distribution System and Power Stations.
External Interconnection	Electric lines and electrical equipment used for the transmission of electricity between the State Transmission System and the Regional Transmission System and other State systems.
Extra High Voltage (EHV)	Nominal voltage levels of higher than 33 kV.
EHV Consumer	A person to whom electricity is provided and who has a dedicated supply at 66 kV or above.
Forced Outage	An Outage of a SSGS or any of Power Station Equipment, generally due to sudden failure of one or more parts of equipment at a generating station, of which no notice can be given by the Generator to STU and also include outage of transmission line and any substation equipment of which no notice can be given by STU or transmission licensee to Discom or vice versa.
Generator	A person or agency who generates electricity and who is subjected to Grid Code either pursuant to any agreement with STU or otherwise and include SSGS, ISGS or inter-state generation/transmission/trading company.
Generating Unit	The combination of an alternator and a turbine set (whether steam, gas, Liquid fuel, water or wind driven) or a reciprocating engine and all of its associated equipment, which together represents a single electricity generating machine.
Grid Code / Code	The set of principles and guidelines prepared in accordance with the terms of section 86 (1) (h) of the Electricity Act 2003.
Grid Contingencies	Abnormal operating conditions brought out by tripping of generating units, transmission lines, transformers or abrupt load changes or by a combination of the above leading to abnormal voltage and/or frequency excursions and/or overloading of network equipment.
Grid Disturbance	Grid Disturbance is the situation where disintegration and collapse of grid either in part or full take place in an unplanned and abrupt manner, affecting the power supply in a large area of the region.
Grid Code Review Committee/Committee	The Committee set up under “Management of Grid Code” of the Grid Code.
IE Rules	Indian Electricity Rules 1956.
Independent Power Produce (IPP)	Independent Power Producer being a Power Station within the State, owned by a Generator who is not part of MPPGCL, STU or Central Sector Generation and is not classified as a CPP.
Indian Electricity Grid Code (IEGC)	A document describing the philosophy and the responsibilities for planning and operation of Indian power system approved by CERC.

Defined Term	Definition
Inter Connecting Transformer (ICT)	Transformer connecting EHV lines of different voltage levels.
Inter-State Generating Station (ISGS)	A Central /MPP /other generating station in which two or more than two states have a share and whose scheduling is to be coordinated by the RLDC.
Inter-State Transmission System (ISTS)	<p>Any system for conveyance of energy by means of a main transmission line from territory of one state to another state and includes:</p> <p>The conveyance of energy 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>The transmission of energy within the territory of a state on a system built, owned, operated and maintained by the CTU or by any agency/person under supervision and control of CTU.</p>
Licensee	Licensee means a person who has been granted a license under section 14 of the Act
Load Crash	Sudden or rapid reduction of electrical load connected to a system that could be caused due to tripping of major transmission line(s), feeder(s), power transformer(s) or natural causes like rain etc.
Maximum Continuous Rating (MCR)	The normal rated full load MW output capacity of a Generating Unit, which can be sustained on a continuous basis at specified conditions.
Merit Order Operation	Priority order of various generating units under ISGS/ SSGS, operating in synchronism with North East Grid System, compiled by SLDC pursuant to schedule and despatch requirements, generally in ascending order of cost of energy.
AERC / Commission	Assam Electricity Regulatory Commission.
APGCL	Assam Power Generation Corporation Limited
NTPC	National Thermal Power Corporation Limited.
Open Access	The non-discriminatory provision for the use of transmission lines or distribution system or associated facilities with such lines or system by any licensee or consumer or a person engaged in generation in accordance with the regulations specified by the Commission
Open Access Customer	Open Access Customer means a consumer permitted by the Commission to receive supply of electricity from a person other than distribution licensee of his area of supply, and the expression includes a generating company and a licensee, who has availed of or intends to avail of open access
Outage	In relation to a Generator/ Transmission/ Distribution facility, an interruption of power supply whether manually or by protective relays in connection with the repair or maintenance of the SSGS/Transmission facility or resulting from a breakdown or failure of the Transmission /Distribution facility/SSGS unit or defect in its Auxiliary system.
Peak Period	That period in a day when electrical demand is at its highest.

Defined Term	Definition
Planned Outage	An Outage in relation to a SSGS unit for Power Station Equipment or Transmission facility which has been planned and agreed with SLDC, in advance in respect of the year in which it is to be taken.
Power Station	An installation of one or more Generating Units (even when sited separately) owned and/or operated by the same SSGS and which may reasonably be considered as being managed as a single integrated generating complex.
Power System	“Power System” means all aspects of generation, transmission, distribution and supply of electricity and includes one or more of the following, namely: generating stations; transmission or main transmission lines; sub-stations; tie-lines; load despatch activities; mains or distribution mains; electric supply lines; overhead lines; service lines; works;
Power Grid/ PGCIL	The Power Grid Corporation of India Limited.
PTW (Permit to Work)	Safety documentation issued to any person to allow work to commence on inter-user boundary after satisfying that all the necessary safety precautions have been established.
Rotational Load Shedding	Planned Disconnection of Customers on a Rotational basis during periods when there is a significant short fall of power required to meet the total Demand.
Regional Transmission System	The combination of EHV electric lines and electrical equipment owned or operated by Power Grid / utilities.
Section	A section or part of this Grid Code, which is, identified as covering a specific topic.
Shut Down	The condition of a Generating Unit where it is at rest or on barring gear isolated from grid or Transmission facility, which is at rest or isolated from Grid.
Spinning Reserve	Unloaded generating capacity, which is synchronised to the System and is ready to provide increased generation at short notice pursuant to despatch Instruction or instantaneously in response to frequency drop.
State	The State of Assam.
State Load Despatch Centre (SLDC)	The State Load Despatch Centre having its control room at Kahlipara is the apex body to ensure integrated operations of the power system in the state
State Sector Generating Station (SSGS)	Any power station within the State, except the Inter-State Generating Station (ISGS) located within the State.
State Transmission System (STS)	The system of EHV electric lines and electrical equipment operated and/or maintained by STU or any Transmission Licensee for the purpose of the transmission of electricity between Power Stations, External Interconnections and the Distribution System.
State Transmission Utility (STU)	“State Transmission Utility” means the Board or the Government Company specified as such by the State Government under sub-section (1) of the section 39 of the Act. Assam Electricity Grid Corporation Limited (ASSAM

Defined Term	Definition
	GRIDCO) has been notified as State Transmission Utility under section 39 of the Act by GoA.
Supervisory Control and Data Acquisition (SCADA)	Supervisory Control and Data Acquisition (SCADA) means the combination of transducers, RTU, communication links and data processing systems which provides information to the SLDC on the operational state of the State Transmission System.
Synchronised	“Synchronised” means the state where connected alternating current systems, machines, or a combination of these operate at the same frequency, and where the phase angle displacements between voltages in them are constant or vary about a steady and stable average value.
Transmission License / License	The Licensee authorised to establish or operate transmission lines through a License granted under section 14 of Electricity Act 2003 by the Commission.
Unscheduled Generation	Any generation that is in violation of SLDC / NERLDC instructions and parameters described in relevant sections of the Grid Code.
User	A person, including Generating Stations within Assam, Transmission Licensees or Distribution Licensees within Assam and open access customer who use the State Transmission System and who must comply with the provisions of the Grid Code.
North-East Region / Region	Region comprising of the States and Union Territory of Arunachal Pradesh Assam, Meghalaya, Manipur, Mizoram, Nagaland and Tripura.
North-East Regional Grid System	North-East Regional Grid System means power systems of SEBs/ Utilities/ IPP/ CPPs of the States of the North-Eastern Region and of NTPC & PGCIL having integrated operation.
NEREB	North East Regional Electricity Board.
NERLDC	North East Regional Load Despatch Centre.

CHAPTER 3: MANAGEMENT OF THE GRID CODE

3.1 Introduction

- (a) Assam Electricity Grid Corporation Limited (Assam Gridco), which is the State Transmission Utility (STU) for the State of Assam, is required to implement and comply with the Assam Electricity Grid Code (AEGC), herein after called GRID CODE and to carry out periodic review and amend the same. A Grid Code Management Committee shall be constituted by the Assam Gridco, as detailed in this section for review, revision, managing and sorting out implementation issues of the Grid Code.
- (b) Subject to the conditions in the next paragraph of this section, all revision in the Grid Code shall be made by consensus in the meeting of Grid Code Management Committee with majority of members voting for the revision. In the event of no consensus being reached, the matter shall be referred to the Commission for decision. The Commission shall approve all revisions in the Grid Code.
- (c) In any unusual situation where normal day-to-day operation is not possible without revision of some section(s) of the Grid Code, a provisional revision may be implemented before approval of Commission is received, but only after discussions at a special meeting of Grid Code Management Committee convened on emergency basis. The Commission shall be intimated at the earliest but not later than 15 days about the provisional revision by recorded means of communication.
- (d) The changes/revisions proposed by the Grid Code Management Committee shall be consistent/ compatible with IEGC.
- (e) The Commission may issue directives requiring Assam Gridco to revise, supplement or replace the Grid Code in such manner as may be specified in those directives and Assam Gridco shall forthwith comply with any such directives.
- (f) This document defines the procedure to be followed by Assam Gridco in maintaining the Grid Code and also in pursuing any change.

3.2 Objective

The objective of this section is to define the method of managing the Grid Code, submitting and pursuing of any proposed change to the Grid Code and the responsibilities of all Users to effect that change.

3.3 Responsibilities

Assam Gridco will be responsible for managing and servicing the Grid Code.

Assam Gridco shall establish and service the requirements of the Grid Code Management Committee

in accordance with provisions of section **Error! Bookmark not defined.** of the Grid Code.

3.4 Grid Code Management Committee

Assam Gridco will inform all Users of the names and addresses of the Committee Chairman and Member Secretary within 15 days of the approval of the Grid Code, and shall inform Users in writing of any subsequent changes.

NEREB, NERLDC, AERC shall inform the Grid Code Management Committee Member Secretary of the name and designation of their Committee Representative within 30 days of the approval of Grid Code by AERC and shall inform the Committee Member Secretary, in writing, of any subsequent change.

The Committee shall be chaired by Assam Gridco in its capacity as the State Transmission Utility and Transmission Licensee and consist of the following members:

- (a) Chairman & Managing Director of Assam Gridco - **Chairman**
- (b) Chief Engineer of Assam Gridco as Member Secretary
- (c) Chairman & Managing Director of Assam Power Generation Corporation Limited - **Member**
- (d) Chairman & Managing Director of Upper Assam Electricity Distribution Company Limited - **Member**
- (e) Chairman & Managing Director of Central Assam Electricity Distribution Company Limited - **Member**
- (f) Chairman & Managing Director of Lower Assam Electricity Distribution Company Limited - **Member**
- (g) In-charge SLDC - **Member**
- (h) One member representing Open Access Customer
- (i) One representative from **AERC** - **Member**
- (j) One representative of **IPP/CPP** - **Member**
- (k) One representative from **NERLDC** - **Member**
- (l) Further, one representative from **NEREB** may participate in the **Committee** as a special invitee.

A member may nominate his alternative for one or more meetings.

3.5 Grid Code Managing Committee Proceedings

The Rules to be followed by the Committee in conducting their business shall be formulated by the Committee themselves and shall be approved by the AERC. The Committee will meet at least once in three months.

The functions of the Grid Code Management Committee are as follows:

- (a) To keep the Grid Code and its workings under scrutiny and review.

- (b) To propose any revision, if necessary, in the Grid Code consequent of analysis report on major grid disturbance soon after its occurrence. The recommendations of the Committee may be submitted to Commission for approval and issuing directives to the Users for taking necessary remedial measures, as may be deemed fit, to prevent recurrence.
- (c) To consider all requests for amendment to the Grid Code which any User makes.
- (d) To issue guidance on the interpretation and implementation of the Grid Code.
- (e) To examine problems raised by Users.

Sub-meetings may be held by Assam Gridco with a User to discuss individual requirements and with groups of Users to prepare proposals for the Committee meeting. The Committee may set up sub-committees for detail studies of related problems.

3.6 Grid Code Review and Revisions

- (a) Assam Gridco shall, in consultation with Users and NEREB and such other persons as the Commission may direct, every three years, or earlier if required by the Commission, review the Grid Code and its implementation.
- (b) Commission shall reserve the right to review the Grid Code as and when required.
- (c) The Member Secretary shall present all proposals for revisions of the Grid Code to the Committee for its consideration.
- (d) Assam Gridco shall send to the Commission following reports at the conclusion of each review meeting of the Committee.
 - (i) A report on the outcome of such review;
 - (ii) Any proposed revisions to the Grid Code from time to time as STU reasonably thinks necessary for the achievement of the objectives of this Code.
 - (iii) All written representations or objections from Users arising during the review / consultation process.
- (e) All revisions to the Grid Code shall require the prior written approval of the Commission.
- (f) Assam Gridco shall convey to all concerned, revisions to the Grid Code after approval by the AERC and the same shall be incorporated in the subsequent version of the Grid Code.
- (g) The revision number and date of issue shall appear on every page of the Grid Code.
- (h) Every change from the previous version shall be clearly marked in the margin. In addition, a revision sheet shall be placed at the front of the revision that lists the number of every changed sub-section, together with a brief statement of change.
- (i) Assam Gridco shall present proposals to the AERC to allow relaxation, where

Users have difficulties in meeting the Grid Code requirements.

- (j) Assam Gridco shall make available a copy (other than service copy) of the respective parts of Grid Code in force for sale to any person requesting it.
- (k) Assam Gridco shall keep an up-to-date list of the recipients and locations of all serviced copies of the Grid Code.

3.7 Functional Committees

The Assam Gridco is responsible for servicing/implementation of Grid Code whereas the Grid Code Management Committee shall be responsible for management of Grid Code for any changes, modifications in the Grid Code. The Grid Code Management Committee shall constitute following committees for implementation of the Grid Code:

- (a) System Operation Code: Operation and Co-ordination Committee (OCC)
- (b) Protection Code: Protection Co-ordination Committee (PCC)
- (c) Transmission Metering Code: Transmission Metering Committee (TMC)

The Grid Code Management Committee shall nominate the members of the functional committees. Chairman and Member Secretary of the functional committees shall be from Assam Gridco.

However, Assam Gridco can formulate any other operational committee as it deems fit for the implementation of the Grid Code.

3.8 Operation and Co-ordination Committee (OCC)

Operation and Co-ordination Committee shall coordinate the implementation of Load Despatch & System Operation Code to ensure that respective Generators and Distribution Licensees using Intra State transmission system discharge their obligations under the Grid Code.

OCC shall comprise of a Chief Engineer level members from each User of Intra State transmission system, to be appointed by the Grid Code Management Committee, which shall meet once every six months and deliberate on all technical and operational aspects of Load Despatch and System Operation and shall give their recommendations to the Grid Code Management Committee. It shall conduct the following functions.

The rules to be followed by the committee in conducting their business shall be formulated by the Committee itself and shall be approved by Grid Code Management Committee. The committee shall meet once in six months.

- (a) Review of existing interconnection and equipment for alteration, if necessary, so as to comply with the Connection Conditions provided for in the Code.
- (b) Deliberation on connectivity criterion for voltage un-balance as specified in clause 6.1 of Transmission Performance Standards and taking remedial measure for cases failing to meet such criterion.
- (c) Review the load forecast and the methodology and assumptions made by each of the Distribution Licensees.
- (d) Review the load shedding through under frequency relays.

- (e) Transmission system planning coordination for the State as a whole.
- (f) Review and finalise the proposals identified on the basis of planning studies.

3.9 Protection Co-ordination Committee (PCC)

Protection Co-ordination Committee shall coordinate the implementation of Protection Code to ensure that respective Users using Intra State transmission system discharge their obligations under the Protection code.

Protection Co-ordination Committee shall consist of following members:

- (a) Chairman who is an officer designated by Assam Gridco.
- (b) Member Secretary who is also an officer from Assam Gridco.
- (c) One representative from APGCL
- (d) One representative from each Distribution Licensees.
- (e) One representative from SLDC.

The rules to be followed by the Protection Co-ordination Committee in conducting their business shall be formulated by the committee itself and shall be approved by Grid Code Review Committee. The committee shall meet at least once in three months and conduct the following functions.

- (f) To keep Protection Code and its implementation under scrutiny & review.
- (g) To consider all requests for amendment to the Protection code which any user makes.
- (h) To publish recommendations for changes to the Protection code together with the reason for the change and any objection if applicable.
- (i) To issue guidance on the interpretation & implementation of the Protection code.
- (j) To deliberate and decide various protection settings testing procedure and periodicity.
- (k) To review and specify the optimum protection requirements for User's system connected to the Intra State transmission system.
- (l) To deliberate and prepare the Under Frequency Load Shedding Schemes and the mechanism to be adopted for the same for various sub-stations to ensure that the frequent tripping of same feeder is avoided.
- (m) Preparation and finalisation of technical requirement of various protections, Disturbance recorders, Event Loggers.

3.10 Transmission Metering Committee (TMC)

Metering Committee shall be constituted as per the provisions of the Grid Metering Code.

The rules to be followed by the Metering Committee in conducting their business shall be formulated by the Metering Committee itself and shall be approved by Grid Code Management Committee. The Metering Committee shall meet at least once in six months.

3.11 Non-Compliance & Derogation

- (a) If any User fails to comply with any of the provision(s) of the Grid Code, it shall inform Assam Gridco without delay of the reason for its non-compliance and shall remedy its non-compliance promptly.
- (b) Wrong declaration of capacity, non-compliance of SLDC's load dispatch instructions, non-compliance of SLDC's instructions for backing down without adequate reasons, non-furnishing data etc. shall constitute non-compliance of Grid Code and shall be subject to financial penalty as may be decided by the Commission.
- (c) Consistent failure to comply with the Grid Code may lead to disconnection of the User's plant and/or facilities.
- (d) Derogation if any for any particular section or chapter of the Grid Code shall be with the express permission of the Commission for a specified time. Derogation of any requirement of the Grid Code shall be exception and not the norm, and will be allowed only when it is impossible and not just difficult or inconvenient for the user to comply in the required time-scale. Failure to comply with fixed-time derogation by any User shall carry a financial penalty as may be decided by the Commission while allowing derogation.

PART -II

PLANNING CODE

CHAPTER 4: SYSTEM PLANNING

4.1 Introduction

This section specifies the method for data submissions by Users to Assam Gridco for the planning and development of the intra State transmission system. This section also specifies the procedure to be applied by Assam Gridco in the planning and development of the intra State Transmission System.

A requirement for reinforcement or extension of the Intra-State transmission system may arise for a number of reasons, including but not limited to the following:

- (a) Development on a User's system already connected to the intra State transmission system.
- (b) The introduction of a new Connection point between the User's system and the intra State transmission system.
- (c) Evacuation system for Generating Stations within or outside the State.
- (d) Reactive Compensation.
- (e) A general increase in system capacity (due to addition of generation or system load) to remove operating constraints including congestion that may result in increased outages and increase the cost of service significantly and maintain standards of security.
- (f) Transient or steady state stability considerations.
- (g) Cumulative effect of any of the above.

Accordingly, the reinforcement or extension of the intra State transmission system may involve work at an entry or exit point (Connection point) of a User to the intra State Transmission System. Since development of all User's systems must be planned well in advance to permit consents and right of way to be obtained and detailed engineering design/construction work to be completed, Assam Gridco will require information from Users and vice versa. To this effect the planning code imposes time scale, for exchange of necessary information between Assam Gridco, and Users having regard, where appropriate, to the confidentiality of such information.

4.2 Objective

The provisions of this section are intended to enable Assam Gridco to produce a plan in consultation with Users, to provide an efficient, coordinated, secure and economical Intra State transmission system to satisfy requirement of future demand in accordance with the transmission system performance standards. The Planning Code:

- (a) Defines the procedure for the exchange of information between Assam Gridco

and a User in respect of any proposed development on the User's system, which may have an impact on the performance of the intra State Transmission System.

- (b) Details the information which Assam Gridco shall make available to Users in order to facilitate the identification and evaluation of opportunities for use of or connection to intra State Transmission System;
- (c) Details the information required by Assam Gridco from Users to enable Assam Gridco to plan the development of its intra State Transmission System to facilitate proposed User developments;
- (d) Specifies planning and design standards, which will be applied by Assam Gridco in planning and development of the power system.

4.3 Planning Policy

Assam Gridco would develop a perspective transmission plan for next 5 years for Intra State transmission system. These perspective transmission plans would be updated every year to take care of the revisions in load projections and generation capacity additions.

Assam Gridco shall carry out annual planning process corresponding to a 5 year forward term for identification of major Intra State transmission system which shall fit into national power plan formulated by Central Government long term plan developed by CEA and the 5 year plan prepared by Central Transmission Utility.

Assam Gridco shall follow the following steps in planning:

- (a) Forecast the demand for power within the Area of Supply, based on the forecasts provided by Distribution Licensees, and provide to the Commission details of the demand forecasts, data, methodology and assumptions on which the forecasts are based. These forecasts would be annually reviewed and updated.
- (b) Forecast the future generation capacity within the Area of Supply, based on the forecasts provided by generators in the State of Assam of any planned capacity additions, major planned outages or plant retirements.
- (c) Gather information on the future generation capacity available to the Area of Supply from generating stations outside of the state taking into account future inter-state transmission capacity.
- (d) Prepare a forecast of the future generation surplus or deficiency taking into account future demand and generation capacity available from within and outside the state.
- (e) Prepare a transmission plan for the Intra State transmission system compatible with the above load forecast and generation forecast. This will include provision for VAR compensation needed in the Intra State transmission system.
- (f) The reactive power planning exercise to be carried out by Assam Gridco in consultation with NERLDC/NEREB, Distribution Licensees, as per AERC's directives and Programme for installation of reactive compensation equipment by Assam Gridco & Distribution Licensees.

- (g) Assam Gridco's planning department shall use load flow, short circuit, and transient stability study, relay coordination study and other techniques for transmission system planning.
- (h) Assam Gridco's planning department shall simulate the contingency and system constraint conditions for the system for transmission system planning.
- (i) Assam Gridco would maintain a historical database based on operational data supplied by SLDC using the state-of-the-art tools such as Energy Management System (EMS) for demand forecasting.
- (j) Assam Gridco shall be responsible to prepare and submit a long-term (5 years) plan to the Commission for transmission system expansion to meet the future demand growth and increases in generation capacity.

All the Users shall supply to Assam Gridco, the desired planning data by 31st March every year to enable Assam Gridco to formulate and finalise the plan by 30th September each year for the next 5 years on revolving basis.

4.4 Planning Standards and Procedures

The Intra State transmission system planning and generation expansion planning shall be in accordance with the provisions of the Planning Criterion as per IEGC Clause 3.5. However, some planning parameters of the Intra State transmission system may vary according to directives of AERC.

4.5 Planning Responsibility

The primary responsibility of load forecasting within Distribution Licensees' Area of Supply rests with respective Distribution Licensee. The Distribution Licensees shall determine peak load and energy forecasts of their areas for each category of loads for each of the succeeding 5 years and submit the same annually by 31st March to Assam Gridco along with details of the demand forecasts, data, methodology and assumptions on which the forecasts are based along with their proposals for transmission system augmentation. The load forecasts shall be made for each of the prevalent as well as proposed interconnection points between Assam Gridco and Distribution Licensees and shall include annual peak load and energy projections. The demand forecasts shall be updated annually or whenever major changes are made in the existing forecasts or planning. While indicating requirements of single consumers with large demands (1 MW or higher) the Distribution Licensee shall satisfy itself as to the degree of certainty of the demand materialising.

APGCL shall provide their generation capacity to Assam Gridco for evacuating power from their power stations for each of the succeeding 5 years along with their proposals for transmission system augmentation and submit the same annually by 31st March to Assam Gridco.

Assam Gridco shall initiate the planning for strengthening the Intra State transmission system for evacuation of power from outside state stations.

Operation and Co-ordination Committee consisting of members from each Distribution Licensee, Assam Gridco and APGCL shall review and approve the load forecasts and the methodology followed by each of the Distribution Licensees.

The Intra State transmission system proposals identified on the basis of planning studies would be discussed, reviewed and finalised by the OCC.

4.6 Planning Data

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

- (a) Standard Planning Data (Generation)/ Standard Planning Data (Distribution)
- (b) Detailed Planning Data (Generation)/ Detailed Planning Data (Distribution)

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

- (c) Standard System Data (Transmission).
- (d) Detailed System Data (Transmission).

Assam Gridco shall also furnish to all the Users, Annual Transmission Planning Report, Power Map and any other information as the Commission may prescribe.

CHAPTER 5: CONNECTION CONDITIONS

5.1 Introduction

Connection Conditions specify the minimum technical, design and operational criteria, which must be complied with by Assam Gridco and any person connected to, or seeking connection to Intra State transmission system. This section also set out procedures by which Assam Gridco shall ensure compliance by any person with above criteria as pre-requisite for establishment of an agreed connection.

5.2 Objective

The objective of this section is to ensure the following:

- (a) All Users or prospective Users are treated equitably.
- (b) Any new Connection shall not impose any adverse effects on existing Users, nor shall a new Connection suffer adversely due to existing Users.
- (c) By specifying optimum design and operational criteria, to assist Users in their requirement to comply with License obligations and hence ensure that a system of acceptable quality is maintained.
- (d) The ownership and responsibility for all items of equipment is clearly specified in a schedule (Site Responsibility Schedule) for every site where a Connection is made.

5.3 Procedure for Application

- (a) The User shall submit the application containing all the information as may be reasonable required to Assam Gridco.
- (b) Assam Gridco shall make a formal offer within 90 days of the receipt of the application. The offer shall specify and take into account any works required for the extension or reinforcement of the Intra State transmission system necessitated by the applicant's proposal and for obtaining any consent necessary for the purpose.
- (c) If the prescribed time limit for making the offer against any application is not adequate, Assam Gridco shall make a preliminary offer within the prescribed time indicating the extent of further time required for detailed analysis.
- (d) Any offer made by Assam Gridco shall remain valid for a period of 60 days and unless accepted before the expiry of such period shall lapse thereafter.
- (e) In the event of offer becoming invalid or not accepted by the applicant, Assam Gridco shall not be required to consider any further application from the same applicant within 12 months unless the new application is substantially different from the original application.
- (f) The applicant shall furnish the detailed planning data as per Appendix B
- (g) Assam Gridco shall be entitled to reject any application for connection to/or use

of Intra State transmission system on the following conditions apart from others as considered reasonable:

- (i) If such proposed connection is likely to cause breach of any provision of its license or any provision of the Grid Code or any provision of IEGC or any provision criteria or any covenants, deeds or regulations by which Assam Gridco is bound.
- (ii) If the applicant does not undertake to be bound, in so far as applicable, by the terms of Grid Code.
- (iii) If the applicant fails to give confirmation and undertakings according to this section.

5.4 Connection Agreement

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

- (a) A condition requiring both parties to comply with the Grid Code.
- (b) Details of connection and/or use of system charges.
- (c) Details of any capital related payments arising from necessary reinforcement or extension of the system.
- (d) Diagram of electrical system to be connected.
- (e) General philosophy, guidelines etc on protection.
- (f) A Site Responsibility Schedule

5.5 Site Responsibility Schedule

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

- (a) The ownership of equipment.
- (b) The responsibility for control of equipment.
- (c) The responsibility for maintenance of equipment.
- (d) The responsibility for operation of equipment.
- (e) The manager of the site.
- (f) The responsibility for all matters relating to safety of persons at site.

5.6 System Performance

- (a) All equipment connected to the Intra State transmission system shall be of such design and construction to enable Assam Gridco to meet the requirement of Transmission Standards of Performance. Distribution Licensees shall ensure that

their loads do not cause violation of these standards.

- (b) Any user seeking to establish new or modified arrangement(s) for Grid connection and/or use of transmission system of Assam Gridco shall submit the application in the form as may be specified by Assam Gridco.
- (c) For every new /modified Connection sought, Assam Gridco shall specify the Connection Point, technical requirements and the voltage to be used, along with the metering and protection requirements as specified in the Metering and Protection sections of the Code.
- (d) SSGS (except CPPs) shall make available to SLDC the up to date capability curves for all Generating Units, indicating any restrictions, to allow accurate system studies Assam Gridco and effective operation of the Intra State transmission system. CPPs shall similarly furnish the net reactive capability that will be available for Export to / Import from State Grid
- (e) The rated frequency of State Grid shall be 50.0 Hz and shall be regulated by the provisions of IEGC as given below:

Target range		Statutory acceptable limit	
Upper Limit	50.5 Hz	Upper Limit	51.5 Hz
Lower Limit	49.0 Hz	Lower Limit	48.5 Hz

- (f) The User shall however be subject to the Grid discipline prescribed by SLDC/NERLDC as per guidelines mutually agreed with NEREB / NERLDC.
- (g) The variation of voltage at the inter connection point may not be more than the voltage range specified below:

Limits of Voltage Variation			
Nominal	% Limit of variation	Maximum (kV)	Minimum (kV)
400	+5%/-10%	420	360
220	+/-10%	245	200
132	+/-10%	145	120

- (h) Distribution Licensees and Open access users shall ensure that their loads do not affect Assam Gridco system in terms of causing any:
 - (i) Unbalance in the phase angle and magnitude of voltage at the interconnection point beyond the limits prescribed by Transmission Performance Standards.
 - (ii) Harmonics in the system voltage at the interconnection point beyond the limits prescribed by Transmission Performance Standards.
- (i) Assam Gridco may direct the Distribution Licensees to take appropriate measures to remedy the situation.

- (j) In the event of Grid disturbances / Grid contingencies in the North-Eastern Regional grid, Assam Gridco shall not be liable to maintain the system parameters within the normal range of voltage and frequency.
- (k) Insulation Co-ordination of the User's equipment shall conform to values as specified by Assam Gridco from time to time out of those as per applicable Indian Standards / Codes. Rupturing capacity of switchgear shall not be less than that specified by Assam Gridco from time to time.
- (l) Protection schemes and metering schemes shall be as detailed in the Protection and Metering sections of the Code.
- (m) Detailed Performance Standards and its compliance requirements have been stated separately in the document namely "Assam Electricity Regulatory Commission (Transmission Licensee Performance Standards) Regulations, 2004" drafted under the provisions of section 57 (1) read with section 86 (1) (i) of the Act.

5.7 Connection Point

State Sector Generating Station (SSGS)

Voltage may be 400/220/132 kV or as agreed with Assam Gridco.

Unless specifically agreed with Assam Gridco the Connection point shall be the outgoing feeder gantry of Power Station Switchyard.

All the terminals, communication and protection equipment owned by SSGS within the perimeter of the Generator's site shall be maintained by the SSGS.

The provisions for the metering system shall be as per the Metering Code. The other User's equipment shall be maintained by respective Users. From the outgoing feeders' gantry onwards all electrical equipment shall be maintained by Assam Gridco.

Distribution Licensee

Voltage may be 33/11 kV or as agreed with Assam Gridco.

The Connection point shall be the outgoing feeder gantry/cable termination on transmission tower/pole at Assam Gridco's substation. Assam Gridco shall maintain all the terminals; communication and protection for the metering system shall be as per the Metering Code. From the outgoing feeder gantry / transmission line cable terminal structure onwards, all electrical equipment shall be maintained by the respective Distribution Licensee.

North-Eastern Regional Transmission System

For the North-Eastern Regional Transmission System, the Connection, protection scheme, metering scheme and the voltage shall be in accordance with the provisions of IEGC.

IPPs, CPPs, EHV Consumers and Open access customers

Voltage may be 220/132 kV or as agreed with Assam Gridco.

When sub-stations are owned by IPPs, CPPs, EHV Consumers or the Open access customers, the Connection point shall be the outgoing feeder gantry on their premises.

5.8 Data Requirements

Users shall provide to Assam Gridco with data for this section as specified in the Data Registration section.

Unless otherwise agreed in Connection Agreement, the equipments for data transmission and communication shall be operational and maintained by the user in whose premises it is installed irrespective of ownership.

CHAPTER 6: SYSTEM SECURITY ASPECTS

6.1 Introduction

All Users shall endeavour to operate their respective power system and generating stations in synchronism with each other at all times, such that the State Grid operates as synchronised system as integrated part of North-Eastern Regional Grid. Assam Gridco shall endeavour to operate the inter state links so that inter state transfer of power can be achieved smoothly when required. Security of the power system and safety of power equipment shall enjoy priority over economically optimal operations.

6.2 Scope

The System Security relates to entire inter-connected power system. The inter-connected power system consists of North-Eastern Regional System with Eastern Regional Grid. The system security aspect therefore affects all users of the two regional inter-connected power systems. However, the operation of the State Grid will be controlled and maintained by SLDC as per directions and instructions of NERLDC as per provisions of IEGC.

6.3 System Security

- (a) All switching operations, whether affected manually or automatic, will be based on policy guide lines of:
 - (i) IEGC
 - (ii) NERLDC's instructions/guidelines
 - (iii) Grid Code
 - (iv) Grid Code Management Committee's decisions
 - (v) State Government's directives
 - (vi) AERC's directives
- (b) No part of the Intra State transmission system shall be deliberately isolated from the integrated Grid, except
 - (i) Under an emergency, and conditions in which such isolation would prevent a total Grid collapse and/or enable early restoration of power supply,
 - (ii) When serious damage to a costly equipment is imminent and such isolation would prevent it
 - (iii) When such isolation is specifically advised by SLDC and
 - (iv) On operation of under frequency/islanding scheme as approved by NEREB/AERC.
- (c) All such isolations shall be either as per standing guidelines approved by NEREB/AERC or shall be put up in the Grid Code Management Committee for

ratification. Complete synchronisation of integrated Grid shall be restored, as soon as the conditions again permit it. The restoration process shall be supervised by SLDC in accordance with NERLDC System Operating Procedure.

- (d) The 132 kV and above transmission lines and ICTs (except radial lines which do not affect the operation of the Grid) shall not be deliberately opened or removed from service at any time except when advised by SLDC or with specific and prior clearance of SLDC. Where prior clearance from SLDC is not possible it should be intimated to SLDC at the earliest possible time after the incident. Any emergency tripping not advised or permitted by SLDC shall be put up to the Grid Code Management Committee for ratification in the next meeting.
- (e) Any tripping, whether manual or automatic, of any of the elements mentioned above, shall be precisely reported to SLDC at the earliest. The reason (to the extent determined) and the likely time of restoration shall also be intimated. All reasonable attempts shall be made for the elementary restoration at the earliest. The information/ data including disturbance recorder, sequential event recorder outputs etc. containing the sequence of tripping and restoration shall be sent to SLDC for the purpose of analysis.
- (f) All generating units, which are synchronized with the state grid, irrespective of their ownership, type and size, shall have their governors in normal operation at all times. If any generating unit of over fifty (50) MW size is required to be operated without its governor in normal operation, the NERLDC through SLDC shall be immediately advised about the reason and duration of such operation. All governors shall have a droop of between 3% and 6%. The exemption from free governor mode operation in respect of run of river hydro stations without any pondage, steam turbine of thermal and gas based power stations not having free governor mode facility shall be sought from CERC under clause 1.6 of IEGC.
- (g) Facilities available with/in Load Limiters, Automatic Turbine Run-up System (ATRS), Turbine Supervisory Coordinated Control system etc. shall not be used to by-pass the normal governor action in any manner. No dead bands and time delays shall be deliberately introduced.
- (h) All Generating Units, operating at/up to 100% of their Maximum Continuous Rating (MCR) shall normally be capable of (and shall not in any way be prevented from) instantaneously picking up five per cent (5%) extra load for at least five (5) minutes or within technical limits prescribed by the manufacturer when frequency falls due to a system contingency. The generating units operating at above 100% of their MCR shall be capable of (and shall not be prevented from) going at least up to 105% of their MCR when frequency falls suddenly. Any generating unit of over fifty (50) MW size not complying with the above requirement shall be kept in operation (synchronised with the Regional grid) only after obtaining the permission of NERLDC through SLDC. However, the constituent can make up the corresponding short fall in spinning reserve by maintaining an extra spinning reserve on the other generating units of the

constituent. Any generating unit not capable to complying with above provision either due to not having requisite facilities or otherwise shall be sought exemption from CERC under clause 1.6 of IEGC.

- (i) In case frequency falls below 49.5 Hz, all partly loaded Generating Units shall pick up additional load at a faster rate, according to their capability curve. SLDC in consultation with NEREB/NERLDC and Distribution Licensee shall prepare a plan for automatic load relief during the low frequency conditions. In case frequency rises to 50.5 Hz or higher, neither any generating unit shall be synchronized with the Grid nor shall generation at any generating station (irrespective of type of ownership) be increased without obtaining approval from SLDC.
- (j) Except under an emergency, or to prevent an imminent damage to costly equipment, no User shall suddenly decrease/increase its generation without prior intimation to the SLDC. Similarly, no User shall cause a sudden decrease/increase in its load due to imposition/lifting of power cuts etc., without prior intimation to and consent of the SLDC, particularly when frequency is deteriorating.
- (k) All Generating Units shall normally have their Automatic Voltage Regulators (AVRs) in operation, with appropriate settings. In particular, if a Generating Unit of over one hundred and twenty five (125) MW capacity is required to be operated without its AVR in service, the SLDC shall be immediately intimated about the reason and duration, and its concurrence obtained.
- (l) Each Generating Unit must be fitted with a turbine speed governor having an overall droop characteristic within the range of 3% to 6%, which shall always be in service.
- (m) Generating Stations shall follow the instructions of SLDC for backing down/ boxing up and shutting down the generating unit(s). SLDC shall provide the certificate for the period of the backing down/ boxing up or shutting down for the purpose of computing the deemed generation, if required.
- (n) Provision of protections and relay settings shall be coordinated in the Intra State transmission system, as per a plan to be separately finalised by the Protection Co-ordination Committee.
- (o) Various steps shall be taken for frequency management and voltage management under Chapter 9 so as to ensure system security from these considerations.
- (p) All Generating Units with capacity of 200 MW and above, sub-stations with operating voltage of 400 kV & above and important 220 kV sub-stations with 220/132 kV transformation capacities above 250 MVA shall be provided with the facilities of Disturbance Recorders (DRs) and Event Loggers (ELs) as per IE Rules.

PART III

LOAD DESPATCH & SYSTEM OPERATION CODE

CHAPTER 7: OPERATIONAL PLANNING

7.1 Introduction

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

7.2 Objective

The detailed provision is required to enable SLDC to achieve a reduction in demand to avoid Operating problems on all or part of the intra State transmission system. SLDC will utilise Demand Control in a manner, which does not unduly discriminate against any one or group of customers.

7.3 Demand Estimation

- (a) The long-term demand estimation/ load forecast (for more than 1 year) shall be done by the planning department of Assam Gridco in accordance with the provisions of System Planning Code. The SLDC shall be provided with a copy of the same as and when it is finalised. Demand estimation for period up to 1 year ahead shall be done by SLDC.
- (b) Distribution Licensees shall provide to the SLDC their estimates of demand for the year ahead on month-basis at each inter connection point for the next financial year by 15th November each year. Distribution Licensees shall also provide daily demand on month ahead at each inter connection point by 25th for the next month.
- (c) Distribution Licensees shall provide to SLDC estimates of load that may be shed when required, in discrete blocks with the details of arrangements of such load shedding.
- (d) Distribution Licensees shall also furnish realistic category-wise demand for their respective companies along with details of essential loads, supply hours to be maintained in rural areas, details of power cuts imposed or to be imposed and specific requirements, if any.
- (e) The demand estimation shall cover active power as well as reactive power requirements forecasted for each sub-station.
- (f) Assam Gridco and SLDC would maintain a historical database for the purpose of demand estimation and shall be equipped with the state-of-the-art tools such as Energy Management System (EMS) for demand forecasting.

- (g) SLDC shall furnish data for and participate in deliberations for load generation balance or annual demand & availability and shunt capacitors requirement studies of NEREB. It shall take into consideration their reports for demand estimation for operational planning.

7.4 Demand Control

- (a) Primarily the need for demand control would arise on account of the following conditions:
 - (i) Variations in demand from the estimated or forecasted values, which cannot be absorbed by the grid, and
 - (ii) Unforeseen generation / transmission outages resulting in reduced power availability, and
 - (iii) Heavy reactive power demand causing low voltages, and
- (b) SLDC shall match the consolidated demands of the Distribution Licensees with consolidated generation availability from various sources and exercise the demand control to ensure that there is a balance between the energy availability and the Distribution Licensees demand plus losses and any requirement of generation reserve.
- (c) SLDC would maintain a historical database for the purpose of Demand Estimation and shall be equipped with the state-of-the-art tools such as Energy Management System (EMS) for short-term demand estimation to plan in advance as to how the load would be met without overdrawing from the grid.
- (d) SLDC shall advice Assam Gridco for planning of Automatic load shedding schemes and rotational load shedding through installation of Under Frequency Relays.
- (e) The guidelines for under frequency load shedding shall be prepared, in accordance with the instructions from NERLDC/NEREB, by the Operation and Co-ordination Committee and shall be approved by the Grid Code Management Committee.
- (f) The particulars of feeders or group of feeders at a Assam Gridco sub-station which shall be tripped under under-frequency load shedding scheme whether manually or automatic on rotational basis or otherwise shall be placed on Notice board and will also available at the sub-station for information of the consumer(s).
- (g) Demand control can also be exercised by the SLDC through direct circuit breaker tripping affected from SLDC using RTUs and under frequency detection by SCADA or through telephonic instructions. No demand shed by operation of under frequency relays shall be restored without specific directions from SLDC.
- (h) Rotational Load Shedding Schemes using Under Frequency Relay (UFR) shall be prepared time to time by the Utility in accordance with the guidelines/instructions issued by NERLDC/NEREB and these schemes shall be

duly approved by AERC.

7.5 Load Crash

- (a) In the event of load crash in the system due to weather disturbance or any other reasons, the situation would be controlled by the SLDC by the following methods in descending priorities:
 - (i) Backing down of hydel stations for short period immediately
 - (ii) Lifting of the load restrictions, if any
 - (iii) Exporting the power to neighbouring regions
 - (iv) Backing down of thermal stations with a time lag of 5-10 minutes for short period
 - (v) Closing down of hydel units (subject to non spilling of water and effect on irrigation)
- (b) The above methodology shall be reviewed from time to time in Operation and Co-ordination Committee.
- (c) While implementing the above, the system security aspects should not be violated as per provisions in section 6.2 of IEGC. Further, in case of hydro generation linked with irrigation requirements, the actual backing down or closing down of such hydro units shall be subject to limitations on such account & to avoid spillage of water.

CHAPTER 8: SCHEDULE AND DESPATCH

8.1 Introduction

This section specifies the procedure to be adopted for the scheduling and despatch of generating units to meet demand and drawal requirements of Distribution Licensees.

8.2 Objective

The objective of this section is to detail the actions and responsibilities of SLDC in preparing and issuing a daily schedule of generation and specify the responsibilities of Users to furnish the necessary data for scheduling and to comply with that schedule.

8.3 General

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

- (a) SLDC will issue despatch instruction required to regulate all generation and imports from IPPs / CPPs according to the 15 minutes block-wise day ahead generation schedule, unless rescheduling is required due to unforeseen circumstances.
- (b) In absence of any despatch instruction by SLDC, generating stations shall generate/ export according to the day- ahead generation schedule.
- (c) Network constraints, if any such as expected duration of planned shutdowns and already existing forced outage of vital transmission elements during ensuing day
- (d) Overall economy to Distribution Licensees
- (e) However the SLDC shall regulate the overall state generation in such a manner that generation from following types of power stations where energy potential, if unutilized, goes as a waste shall not be curtailed:
 - (i) Run of river or canal based hydro stations.
 - (ii) Hydro-station where water level is at peak reservoir level or expected to touch peak reservoir level (as per inflows).
 - (iii) Wind power stations.
 - (iv) Solar power stations (Other than hybrid).

Despatch instructions shall be in standard format. These instructions will recognize declared availability and other parameters that have been made available by the generating stations to SLDC. These instructions shall include time, Power Station, Generating Units, (Total export in case of CPP) and names of operators sending and receiving the despatch instructions.

Standard despatch instructions may include:

- (f) To switch a SSGS into or out of Service.

- (g) Details of reserve to be carried on a unit.
- (h) To increase or decrease MVAR generation to assist with voltage profile as per unit capability at that time
- (i) To begin pre-planned Black Start procedures.
- (j) To hold spinning reserve.
- (k) To hold Generating Units of SSGS on standby.
- (l) To control MW/MVAR Drawl by Distribution Licensees.

8.4 Generation Scheduling

- (a) By 10.00 hrs every day each SSGS shall intimate to SLDC the station wise ex-power plant MW and MWh capabilities foreseen for the next day i.e. between 00.00 to 24.00 hrs of the following day, at 15 minutes interval. By 10.00 hours every day each Distribution Licensee and open access EHV consumer shall intimate SLDC the overall requirement in MW and MWh for the next day at 15 minutes interval. CPPs shall provide the hourly import/ figures also on the day ahead basis by 10.00 hours.
- (b) In working out the MW/MVAR availability, Hydro Power Stations shall take into account their respective reservoir levels and any other restrictions and shall report the same to SLDC.
- (c) By 10 hrs every day, the ISGS shall advice the NERLDC, the station-wise ex-power plant MW and MWH capabilities foreseen for the next day. The above information of the foreseen capabilities of the ISGS shall be compiled by NERLDC and the MW and MWh entitlements available to each state for the next day shall be intimated by NERLDC to SLDC by 11.00 hrs.
- (d) By 15 hrs the SLDC after consolidation of data provided by SSGS and NERLDC, the SLDC would finalise (i) generation schedule of SSGS and (ii) drawl schedule of each Distribution Licensee and open access EHV consumer connected to the transmission network . It shall accordingly advise each Distribution Licensee and open access EVH consumer of their drawl schedule and will workout and convey to NERLDC State's drawl schedule in each of the ISGS along with the bilateral exchanges agreed or intended to be had with the other state / states and the estimates of demand / availability in the state and additional power it would like to draw subject to availability.
- (e) SLDC shall intimate the generation schedule/import schedule for the following day to all Generators/CPPs (including any Generating Units not required to run) by 18.00 hours.
- (f) SSGS shall promptly report to SLDC, changes of Generating Units availability or capability, or any unexpected situation, which could affect its operation.
- (g) SLDC shall prepare the day ahead generation schedule keeping in view the followings:

- (i) Transmission System constraints from time to time.
- (ii) Hourly load requirements as estimated by SLDC.
- (iii) The need to provide operating margins and reserves required to be maintained.
- (iv) The availability of generation from SSG and, Central Sector Generators together with any constraint in each case.

8.5 Revision in drawal schedule on real time basis

During the day of operation, the drawal schedule may be revised by SLDC in case of forced outage of a unit of any ISGS or SSGS as per NE Region Operating Procedure.

8.6 Drawal Scheduling

SLDC is responsible for collection, examination and compilation of Drawal Schedule for each Distribution Licensee and open access EHV consumer in prescribed manner and at the prescribed time. Each Distribution Licensee and open access EHV consumer shall supply to SLDC Hourly averaged demand estimates in MW & MVA_r at each Connection point for the day ahead.

8.7 Generation Despatch

- (a) SSGS shall comply promptly with a despatch instruction issued by SLDC unless this action would compromise the safety of plant or personnel. SSGS shall promptly inform SLDC in the event of any unforeseen difficulties in carrying out an instruction.
- (b) Dispatch instructions shall be issued by E-Mail /Fax/ telephone, confirmed by exchange of name of operators sending and receiving the same and logging the same at each end. All such oral instructions shall be complied with forthwith and written confirmation shall be issued promptly by FAX, tele-printer or otherwise.

8.8 Data Requirements

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

CHAPTER 9: FREQUENCY AND VOLTAGE MANAGEMENT

9.1 Introduction

- (a) This section describes the method by which all Users of the State Grid shall co-operate with SLDC in contributing towards effective control of the system frequency and managing the grid voltage.
- (b) State Grid normally operates in synchronism with the North-Eastern Regional Grid and NERLDC has the overall responsibility of the integrated operation of the North-Eastern Regional Power System. The constituents of the Region are required to follow the instructions of NERLDC for the backing down generation, regulating loads, MVAR drawal etc. to maintain the system frequency and the grid voltage.
- (c) . SLDC shall instruct SSGS to regulate Generation/Export and hold reserves of active and reactive power within their respective declared parameters. SLDC shall also regulate the load as may be necessary to meet the objective.
- (d) System voltages levels can be affected by Regional operation. The SLDC shall optimise voltage management by adjusting transformer taps to the extent available and switching of circuits/ capacitors/ reactors and other operational steps. SLDC will instruct generating stations to regulate MVAR generation within their declared parameters. SLDC shall also instruct Distribution Licensees to regulate demand, if necessary.

9.2 Objective

The objectives of this section are as follows:

- (a) To define the responsibilities of all Users in contributing to frequency and voltage management.
- (b) To define the actions required to enable SLDC to maintain System voltages and frequency within acceptable levels in accordance Planning and Security Standards of IEGC.

9.3 Frequency Management

The rated frequency of the system shall be 50 Hz and shall normally be regulated within the limits prescribed in IEGC Clause 4.6(b). As a constituent of North-Eastern Region, the SLDC shall make all possible efforts to ensure that grid frequency remain within normal band of 49.0 – 50.5 Hz.

9.4 Basic philosophy of control

Frequency being essentially the index of load-generation balance conditions of the system, matching of available generation with load, is the only option for maintaining frequency within the desired limits. Basically, two situations arise, viz., a surplus situation and a deficit situation. The automatic mechanisms available for adjustment of load/generation are (i) Free governor

action; (ii) Maintenance of spinning reserves and (iii) Under-frequency relay actuated shedding. These measures are essential elements of system security. SLDC shall ensure that Users of the State Grid comply with provisions of clause 6.2 of the IEGC so far as they apply to them. The SLDC in coordination with Users shall exercise the manual mechanism for frequency control under following situations:

9.5 Falling frequency:

Under falling frequency conditions, SLDC shall take appropriate action to issue instructions, in co-ordination with NERLDC to arrest the falling frequency and restore it to be within permissible range. Such instructions may include dispatch instruction to SSGS and/or instruction to Distribution Licensees and Open access customers to reduce load demand by appropriate manual and/or automatic load shedding.

9.6 Rising Frequency

Under rising frequency conditions, SLDC shall take appropriate action to issue instructions to SSGS in co-ordination with NERLDC, to arrest the rising frequency and restore frequency within permissible range through backing down hydel generation and thermal generation to the level not requiring oil support.. SLDC shall also issue instructions to Distribution Licensees and Open access customers in coordination with NERLDC to lift Load shedding (if exists) in order to take additional load.

9.7 Responsibilities

SLDC shall monitor actual Drawal against scheduled Drawal and regulate internal generation/demand to maintain this schedule. SLDC shall also monitor reactive power drawal and availability of capacitor banks. Generating Stations within Assam shall follow the despatch instructions issued by SLDC. Distribution Licensees and Open access customers shall co-operate with SLDC in managing load & reactive power drawal on instruction from SLDC as required.

9.8 Voltage Management

- (a) Users using the Intra State transmission system shall make all possible efforts to ensure that the grid voltage always remains within the limits specified in IEGC at clause 6.2(q) and produced below:

Voltage (kV rms)		
Nominal	Maximum	Minimum
400	420	360
220	245	200
132	145	120

- (b) Assam Gridco and/or SLDC shall carry out load flow studies based on operational data from time to time to predict where voltage problems may be encountered and to identify appropriate measures to ensure that voltages remain

within the defined limits. On the basis of these studies SLDC shall instruct SSGS to maintain specified voltage level at interconnecting points. SLDC and Assam Gridco shall co-ordinate with the Distribution Licensees to determine voltage level at the interconnection points. SLDC shall continuously monitor 400/220/132kV voltage levels at strategic sub-stations to control System voltages.

- (c) SLDC in close coordination with NERLDC shall take appropriate measures to control System voltages which may include but not be limited to transformer tap changing, capacitor / reactor switching including capacitor switching by Distribution Licensees at 33 kV substations, operation of Hydro unit as synchronous condenser and use of MVAR reserves with SSGS within technical limits agreed to between Assam Gridco and Generators. Generators shall inform SLDC of their reactive reserve capability promptly on request.
- (d) APGCL and IPPs shall make available to SLDC the up to date capability curves for all Generating Units, as detailed in Chapter 5. indicating any restrictions, to allow accurate system studies and effective operation of the Intra State transmission system. CPPs shall similarly furnish the net reactive capability that will be available for Export to / Import from Intra State transmission system.
- (e) Distribution Licensees and Open access customers shall participate in voltage management by providing Local VAR compensation (as far as possible in low voltage system close to load points) such that they do not depend upon EHV grid for reactive support.

9.9 General

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

CHAPTER 10: MONITORING OF GENERATION AND DRAWAL

10.1 Introduction

The monitoring generation output and reserve capacity of SSGS by SLDC is important to evaluate the performance of generation plants.

The monitoring of scheduled drawal is important to ensure that Assam Gridco and Distribution Licensees and open access customers (???) contributes towards improving system performance, and observes Grid discipline.

10.2 Objective

The objective of this section is to define the responsibilities of all SSGS in the monitoring of Generating Unit reliability and performance, and Assam Gridco's/ Distribution Licensees and open access customers compliance with the scheduled Drawal to assist SLDC in managing voltage and frequency.

10.3 Monitoring Procedure

- (a) For effective operation of the Intra State transmission system, it is important that a SSGS declared availability is realistic and that any departures are continually invariably fed back to the Generator to help effect improvement.
- (b) The SLDC shall continuously monitor Generating Unit outputs and Bus voltages. More stringent monitoring may be performed at any time when there is reason to believe that a SSGS declared availability may not match the actual availability or declared output does not match the actual output.
- (c) SLDC can ask for putting a generating station to demonstrate the declared availability by instructing the generating station to come up to the declared availability within time specified by generators.
- (d) SLDC shall inform a SSGS, in writing, if the continual monitoring demonstrates an apparent persistent or material mismatch between the despatch instructions and the Generating Unit output or breach of the Connection Conditions. Continued discrepancies shall be resolved by the Grid Code Management Committee with a view to either improve performance in future, providing more realistic declarations or initiate appropriate actions for any breach of Connectivity Conditions.
- (e) SSGS (excluding CPPs) shall provide to SLDC hourly generation summation outputs where no automatically transmitted metering or SCADA/RTU equipment exists. CPPs shall provide to SLDC hourly export / import MW and MVar.
- (f) The SSGS shall provide any other logged readings that SLDC may reasonably require, for monitoring purposes where SCADA data is not available.

10.4 Generating Unit Tripping

- (a) SSGS (excluding CPPs) shall promptly inform the tripping of a Generating Unit, with reasons, to SLDC in accordance with the operational Event/Accident Reporting section. SLDC shall keep a written log of all such tripping, including the reasons with a view to demonstrating the effect on system performance and identifying the need for remedial measures.
- (b) SSGS (excluding CPPs) shall submit a more detailed report of Generating Unit tripping to SLDC monthly.

10.5 Monitoring of Drawal

- (a) SLDC shall continuously monitor actual MW Drawal by Distribution Licensees and open access customers against that scheduled by use of SCADA equipment where available, or otherwise using available metering. Assam Gridco shall request NERLDC and adjacent States as appropriate to provide any additional data required to enable this monitoring to be carried out.
- (b) SLDC shall continuously monitor the actual MVAr Drawal to the extent possible. This will be used to assist in Intra State transmission system voltage management.

10.6 Data Requirement

SSGS shall submit data to SLDC as listed in Data Registration section, termed as Monitoring of Generation.

CHAPTER 11: OUTAGE PLANNING

11.1 Introduction

This section describes the process by which Assam Gridco carries out the planning of Intra State transmission system Outages, including interface co-ordination with Users.

11.2 Objective

The objective of this section is to define the process, which will allow Assam Gridco to optimise transmission Outages with SSGS (other than CPP) and Distribution Licensees' Outages while maintaining system security to the extent possible.

11.3 Outage Planning Process

Each User shall provide their outage programme for ensuing financial year to the SLDC for preparing an overall outage plan for Intra State transmission system as a whole. SLDC shall be responsible for analysing the outage schedules of the SSGS, Distribution Licensees' and Assam Gridco schedule for outage of Transmission network and preparing a draft annual outage Plan for Intra State transmission system in coordination with the Outage Plan prepared for the region by the NEREB.

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

- (a) Major grid disturbance
- (b) System Isolation
- (c) Black out in the State
- (d) Any other event in the system that may have an adverse impact on system security by the proposed outage

Each User shall obtain approval of SLDC, prior to availing the Outage. SLDC while releasing the any circuit for outage shall issue specific code. Similarly no inter user boundary circuits shall be connected back to the Intra State transmission system the code without specific code/approval by SLDC. This restriction shall however not be applicable to individual Generating Unit(s) of a CPP.

11.4 Annual Outage Planning

- (a) Scheduled outage of power stations of capacity 5 MW & above will be subject to annual planning. (Note: In Assam we only have 100 MW of working generation capacity)
- (b) Provided that scheduled outage of power station of 50 MW and above and EHV lines as notified by NERLDC, will also be subject to annual planning by NERLDC in co-ordination with SLDC.
- (c) SSGS and CPP connected to State Grid shall furnish their proposed Outage programme for the next financial year in writing by 15th November of each year.
- (d) SSGS Outage programme shall contain details like identification of unit, reason

for outage, generation availability affected due to such outage, outage start date and duration of outage. SLDC will review the outage programme received from SSGS on monthly basis to chalk out the outage of intra State transmission system.

- (e) SLDC shall also obtain from Assam Gridco, the proposed outage programme for Transmission lines, equipments and sub-stations etc. for next financial year by 15th November each year. Assam Gridco outage programmes shall contain identification of lines/ substations, reason for outage, outage start date and duration of outage.
- (f) Scheduled outage of power stations and EHV transmission lines shall be affected only with the approval of NERLDC in co-ordination with SLDC.
- (g) In respect of scheduled outage a calendar shall be formulated in respect of annual outage planning for the ensuing financial year. The Assam Gridco, SSGS and the Distribution Licensees in the meeting of Operation and Co-ordination Committee (OCC) shall mutually decide outage programme. However, power stations & EHV lines specified in sub-clause 11.4.6 shall be decided by NEREB.

11.5 Availing of shutdowns schedule

SLDC would review on daily basis the outage schedule for the next two days and in case of any contingency or conditions described in section 6.7.4(g) of the IEGC, defer any planned outage as deemed fit clearly stating the reasons thereof. The revised dates in such cases would be finalized in consultation with the User.

The shutdowns for scheduled outage shall be taken in accordance with the provisions of Chapter 13 of Grid Code to ensure inter-user coordination.

CHAPTER 12: CONTINGENCY PLANNING

12.1 Introduction

This section describes the procedure to be followed/implemented by SLDC and all the Users of State Grid under the following abnormal system conditions:

- (a) Total system black out (Black Start mandatory)
- (b) Partial system black out
- (c) System Split or Islanding

12.2 Objective

- (a) To achieve restoration of total regional grid/state grid in shortest possible time taking into account essential loads, the generator capabilities and operational constraints of regional and intra State transmission system.
- (b) To achieve resynchronisation of the part of the State Grid which have become out of synchronism with Regional System/State Grid.
- (c) To ensure that all Users of State Grid are aware of the steps to be taken during major grid disturbances.

12.3 Contingency Planning Procedure

SLDC in close coordination with NERLDC shall be prepared to face and efficiently handle the following two types of contingencies:

- (a) Partial system black out in the state due to multiple tripping of the transmission lines emanating from power stations/sub-station
- (b) Total black out in the state/region
- (c) System Split

In case of partial black out in the system/state, priority is to be given for early restoration of power station units, which are tripped. Start up power for the power station shall be extended through shortest possible line and within shortest possible time from adjoining sub-station/power station where the supply is available. Synchronising facility at all power stations and 400/220kV sub-station shall be available.

In case of total regional black out, SLDC In-charge shall co-ordinate and follow the instructions of NERLDC for early restoration of the entire grid. After total collapse, for each power station, to avoid damage to the turbine, survival power is required. To meet the survival power, the diesel generating (DG) sets of sufficient capacity shall be available at each power station. The hydel stations and interstate supply, if available shall give start-up power to the thermal station. All possible efforts are made to extend the hydel supply to the thermal power stations through shortest transmission network so as to avoid high voltage problem due to low load condition. For safe and fast restoration of supply, Assam Gridco shall formulate the proper sequence of operation for major generating units,

lines, transformers and load within the state in consultations with NEREB. The sequence of operation shall include closing/tripping of circuit breakers, isolators, on-load tap-changers etc.

12.4 Restoration Procedure

The procedure for restoration of State Grid shall be prepared by the SLDC in close coordination with NERLDC for the following contingency and shall be in conformity to the System Restoration Procedure of the North-Eastern Region prescribed under IEGC.

- (a) Total system black out
- (b) Partial System Blackout
- (c) Synchronisation of System Islands and System Split

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

12.5 Special Considerations

During restoration process following State Grid or Regional system blackout conditions, normal standards of voltage and frequency shall not apply.

Distribution Licensees with essential loads will separately identify non-essential components of such loads, which may be kept off during system contingencies. Distribution Licensees shall draw up an appropriate schedule with corresponding load blocks in each case. The non-essential loads can be put on only when system normally is restored, as advised by SLDC.

All Users shall pay special attention in carrying out the procedures so that secondary collapse due to undue haste or inappropriate loading is avoided.

Despite the urgency of the situation, careful prompt and complete logging of all operations and operational messages shall be ensured by all Users to facilitate subsequent investigation into the incident and the efficiency of the restoration process. Such investigation shall be conducted promptly after the incident.

12.6 Post Disturbance Analysis

SLDC as per guidelines and instructions from NERLDC shall carryout the post disturbance analysis of all major grid disturbances resulting into total or partial system blackout and system split and out-off synchronism of any part of the State Grid. All users shall co-ordinate and furnish the data pertaining to the system disturbance to enable SLDC to analyse the system disturbance and furnish report to NERLDC in accordance with Section 6.9 of the IEGC.

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

CHAPTER 13: INTER USER BOUNDARY SAFETY

13.1 Introduction

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

13.2 Objective

The objective of this section is to achieve agreement and consistency on the principles of safety as prescribed in the Indian Electricity Rules, 1956 when working across a inter user boundary between one User and another User.

13.3 Designated Officers

Assam Gridco and all Users shall nominate suitably authorized persons to be responsible for the co-ordination of safety across that company boundary. These persons shall be referred to as Designated Officer.

13.4 Procedure

- (a) Assam Gridco shall issue a list of Designated Officer (names, designations and telephone numbers) to all Users who have a direct inter-connected boundary with Assam Gridco. This list shall be updated promptly whenever there is change of name, designation or telephone number.
- (b) All Users with a direct inter-connected boundary with Assam Gridco or other user system shall issue a similar list of their Designated Officer to Assam Gridco or other user, which shall be updated promptly whenever there is a change to the Designated Officer list.
- (c) Whenever work across an inter-connected boundary between Assam Gridco and any other User or between two users is to be carried out, the Designated Officer, of the User (which may be Assam Gridco), wishing to carry out work shall personally contact the other relevant Designated Officer. If the Permit to Work (PTW) cannot be obtained personally, the designated officers shall contact through telephone and exchange Code words to ensure correct identification of both parties.
- (d) Should the work extend over more than one shift the Designated Officer shall ensure that the relief Designated Officer is fully briefed on the nature of the work and the code words in operation.
- (e) The Designated Officers shall co-operate to establish and maintain the precautions necessary for the required work to be carried out in a safe manner. Both the established isolation and the established earth shall be locked in position, where such facilities exist, and shall be clearly identified.
- (f) Work shall not commence until the Designated Officer, of the User (who may be Assam Gridco), wishing to carry out the work, is satisfied that all the safety precautions have been established. This Designated Officer shall issue agreed

safety documentation (PTW) to the working party to allow work to commence. The PTW in respect of specified EHV lines and other interconnections shall be issued with the consent of SLDC.

- (g) When work is completed and safety precautions are no longer required, the Designated Officer who has been responsible for the work being carried out shall make direct contact with the other Designated Officer to return the PTW and removal of those safety precautions. Return of PTW in respect of specified EHV lines and interconnections shall be informed to SLDC.
- (h) The equipment shall only be considered as suitable for return to service when all safety precautions are confirmed as removed, by direct communication using code word contact between the two Designated Officers, and return of agreed safety documentation from the working party has taken place.
- (i) Assam Gridco shall develop an agreed written procedure for inter user boundary safety and continually update it.
- (j) Any dispute concerning Inter user Boundary Safety shall be resolved in accordance with Dispute Resolution Mechanism provided under Chapter 3.

13.5 Special Consideration

- (a) For inter user boundary between Assam Gridco and other Users circuits, all Users shall comply with the agreed safety rules, which must be in accordance with IE Rules.
- (b) All equipment on inter user boundary between Assam Gridco and other Users circuits which may be used for the purpose of safety co-ordination and establishment of isolation and earthing, shall be permanently and clearly marked with an identification number or name, that number or name being unique in that sub-station. This equipment shall be regularly inspected and maintained in accordance with manufacturer's specification.
- (c) Each Designated Officer shall maintain a legibly written safety log, in chronological order, of all operations and messages relating to safety co-ordination sent and received by them. All safety logs shall be retained for a period of not less than 5 years.

CHAPTER 14: OPERATIONAL EVENT/ACCIDENT REPORTING

14.1 Introduction

This section describes the reporting procedure in writing of reportable events affecting the State Grid.

14.2 Objective

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

14.3 Reportable Incidents

Any of the following events that could affect the State Grid requires reporting:

- (a) Exceptionally high / low system voltage or frequency.
- (b) Serious equipment problem i.e. major circuit breaker, transformer or bus bar.
- (c) Loss of major Generating Unit.
- (d) System split, Intra State transmission system breakaway or Black Start.
- (e) Tripping of Transmission Line, ICT (Inter connecting transformer and capacitor banks)
- (f) Major fire incidents.
- (g) Major failure of protection.
- (h) Equipment and transmission line overload.
- (i) Accidents-Fatal and Non-Fatal.
- (j) Load Crash / Loss of Load
- (k) Excessive Drawal deviations.
- (l) Minor equipment alarms.

The last two reportable incidents are typical examples of those, which are of lesser consequence, but which still affect the State Grid and can be reasonably classed as minor. They will require corrective action but may not warrant management reporting until these are repeated for sufficient time.

14.4 Reporting Procedure

Reporting Time for events and accidents

- (a) All reportable incidents occurring in lines and equipment of 33 kV and above affecting the State Grid shall promptly be communicated by the User whose equipment has experienced the incident (The Reporting User) to any other significantly affected Users and to SLDC.
- (b) Within 1 (one) hour of being informed by the Reporting User, SLDC may ask for a written report on any incident.
- (c) If the reporting incident cannot be classed as minor then the Reporting User shall

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

- (d) In other cases the Reporting User shall submit a report within 5 (five) working days to SLDC.

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

The format of such a report will be as agreed by the Grid Code Management Committee, but will typically contain the following information:

- (e) Location of incident.
- (f) Date and time of incident.
- (g) Plant or equipment involved.
- (h) Details of relay indications with nature of fault implications.
- (i) Supplies interrupted and duration if applicable.
- (j) Amount of generation lost if applicable.
- (k) Brief description of incident.
- (l) Estimate of time to return to service.
- (m) Name of originator.
- (n) Possibility of alternate arrangement of supply

The above shall not relieve any User from the obligation to report events in accordance with section 161 of the Act.

14.5 Reporting Form

The standard reporting form other than for accidents shall be as agreed from time to time by the Grid Code Management Committee. A typical form is attached as an Appendix 6.

14.6 Major Failure

Following a major failure, SLDC and other Users shall co-operate to inquire and establish the cause of such failure and produce appropriate recommendations. The SLDC shall report the major failure to Commission immediately for information and shall submit the enquiry report to the Commission within 2(two) months of the incident.

14.7 Accident Reporting

Reporting of accidents shall be in accordance with the Indian Electricity Rules, 1956, section 44-A. In both fatal and non-fatal accidents, the report shall be sent to the Electrical Inspector in the prescribed form.

PART IV

PROTECTION CODE

CHAPTER 15: PROTECTION

15.1 Introduction

In order to safeguard intra-State transmission system and Users' system from faults it is essential that certain optimum standards for protection be adopted. This section describes these optimum standards.

15.2 Objective

The objective of this section is to define the optimum protection requirements for any equipment connected to the intra-State transmission system and thereby minimise disruption due to faults.

15.3 General Principles

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

No item of electrical equipment shall be allowed to remain connected to the intra-State transmission system unless it is covered by optimum specified protection aimed at reliability, selectivity, speed and sensitivity.

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

Protection settings shall not be altered, or protection bypassed and/or disconnected without consultation and agreement of all affected Users. In the case where protection is bypassed and/or disconnected, by agreement, then the cause must be rectified and the protection restored to normal condition as quickly as possible. If agreement has not been reached the electrical equipment will be removed from service forthwith.

NERLDC shall advice Assam Gridco regarding:

- (a) Planning for upgrading and strengthening protection system based on analysis of grid disturbance and partial/total blackout in State Grid.
- (b) Planning of Islanding and system split schemes and installation of Under Frequency Relays and df/dt relays.

- (c) Under-Frequency relay for load shedding, Relays provided for islanding scheme, disturbance recorder and fault locator installed at various sub-stations shall be tested and calibrated. The Protection Practices and Protocol Manual shall have provision for the same.

15.4 Protection Coordination

A Protection Coordination Committee (PCC) shall be constituted of the Grid Code and shall be responsible for all the protection coordination functions defined under the same section. Assam Gridco shall be responsible for arranging periodical meetings of the Protection Coordination Committee. Assam Gridco shall investigate any malfunction of protection or other unsatisfactory protection issues. Users shall take prompt action to correct any protection mal-function or issue as discussed and agreed to in these periodical meetings

15.5 Fault Clearance Times & Short-time Ratings

From a stability consideration the minimum short circuit current rating and time and the maximum fault clearance times for faults on any User's system directly connected to the intra State transmission system, or any faults on the intra State transmission system itself, are as follows:

Nominal Voltage	Minimum Short Circuit current rating and duration of Switchgear		Target Fault clearance Time
kV	kA (rms)	Seconds	msec.
400 kV	40	1	100
220 kV	31/40	1	160
132 kV	25/31	3	160

Slower fault clearance times for faults on a Users system may be agreed to but only if, in Assam Gridco's opinion, system conditions allow this. Assam Gridco shall specify the required opening time and rupturing capacity of the circuit breakers at various locations for Assam Gridco and Distribution Licensee/ Open access customers directly connected to intra State transmission system. At generating stations, line faults should be cleared at the generation station end, within the critical clearing time, for the generators to remain in synchronism.

15.6 Generator Requirements

All Generating Units and all associated electrical equipment of the Generating Units connected to the intra State transmission system shall be protected by adequate protection so that the intra State transmission system does not suffer due to any disturbances originating from the Generation units. The generator protection schemes shall cover at least Differential protection, back up protection, Stator Earth fault protection, field ground/field failure protection (not applicable to brush-less excitation system), negative sequence protection, under frequency, over flux protection, back-up impedance protection and pole slipping protection (applicable to units above 200MW), loss of field protection, reverse power protection etc.

15.7 Transmission Line Requirements

General

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

For short transmission lines alternative appropriate protection schemes may be adopted.

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

400kV Transmission Lines

All 400kV transmission lines owned by Assam Gridco shall have two fast acting protection schemes, the voltage of the two relays shall be fed from two different cores of the line CVT and the currents of the two relays shall be fed from two different cores of the line CTs.

Main 1 protection scheme shall be numerical, three zone, non-switched fast acting distance protection scheme with permissible inter-trip at remote end (in case of zone-2 fault)

Main 2 protection scheme shall be either similar type of numerical, three zone, non-switched fast acting distance protection scheme with permissible inter-trip at remote end (in case of zone-2 fault) OR a unit protection scheme employing transient wave detection, directional comparison or phase comparison carrier relaying scheme.

One pole tripping and single shot auto-reclosing with adjustable dead-time shall be provided.

400kV Bus-bars

All 400kV sub-station shall have bus bus-bar differential protection scheme along with LBB and auto-reclosures for transmission lines.

220kV Transmission Lines

All 220kV transmission lines owned by Assam Gridco shall have single, numerical, three zone, non-switched fast acting distance protection scheme, preferably with permissible inter-trip feature at remote end (in case of zone-2 fault), single pole tripping and single-shot single pole auto-reclosing with adjustable dead-time shall be provided.

For back-up protection, three directional IDMTL over current relays and one directional earth fault relay shall be provided.

For short transmission lines, appropriate alternative protection schemes may be adopted.220kV Bus-bars

Identified important 220kV sub-station shall have bus bus-bar differential protection scheme along with LBB and auto-reclosures for transmission lines.

132 kV Lines

A single three zone, switched/non-switched static distance protection scheme shall be provided as main protection. The backup protection shall be at least two directional IDMTL over current relays and one directional earth fault relay.

For short transmission line, appropriate alternative protection schemes may be adopted.

15.8 Transformer Requirements

Generating station/ Intra State transmission system:

The protection of Auto Transformers, Power Transformers and Distribution Transformers shall be as per revised manual on transformers published by Central Board of Irrigation and Power (CBIP) Publication No. 275.

All windings of Auto Transformers and power transformer of EHT class shall be protected by differential relays having percent bias and harmonic restraint features.

Over-fluxing relays shall be provided for EHT transformers.

All 400 kV class transformers shall have Restricted Earth Fault (REF) protection for winding.

In addition there shall be back up IDMTL over current and earth fault protection.

For parallel operation, such back up protection shall have directional feature. For protection against heavy short circuits, the over current relays should incorporate a high set instantaneous element. However, it should not rip due to inrush of the magnetising current and should not be set to such a high value, which is not beneficial to transformer.

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

It is recommended that the following minimum protections should be provided for transformers:

- (a) All 400kV class power transformers shall be provided with differential, REF, open delta (Neutral Displacement Relay) and over-fluxing relays. In addition there shall be back up IDMTL over current and earth fault protection. For parallel operation, such back up protection shall have directional feature and inter-tripping of both HT and LT breakers. For protection against heavy short circuits, the over current relays should incorporate a high set instantaneous element. In addition to electrical protection, transformer own protection viz. buchholz, OLTC oil surge, gas operated relays, winding temperature protection, oil temperature protection, PRV relay shall be provided for alarm and trip functions. It is recommended to have Double Buchhloz Protection Scheme for transformer tank.
- (b) All 220kV class power transformers shall have same protections as mentioned in Section 15.8 (a) except REF protection.
- (c) For 132kV and 33kV class transformers of capacity 5 MVA and above, the protections shall be same as mentioned in Section 15.8 (a) above except over-fluxing relays, REF and PRV.
- (d) For 33kV class power transformers less than or equal to 5 MVA provided on either Transmission or Distribution System, over-current with high set

instantaneous element along with auxiliary relays for transformer trip and alarm functions as per transformer requirements, shall be provided.

Distribution System

For smaller transformers of HV class on the Distribution System, differential protection shall be provided for 7.5 MVA and above along with back up time lag over current and earth fault protection shall be installed for the windings.

Transformers of 1.0 MVA and above but less than 7.5 MVA shall be protected by non-directional IDMT over current relays (3 nos.) and earth fault relay (1 no.) on both HV and LV side.

In addition, all transformers of 1.0 MVA and above shall be provided with Buchholz relay, winding temperature and oil temperature protection in addition to the above mentioned relays wherever circuit breakers exist.

Provided that for existing transformers, where protection as above are not existing, above protection shall be deliberated in Protection Co-ordination Committee and provided in phased manner within 3 years.

15.9 Sub-Station Fire Protection

Adequate precautions shall be taken and protection shall be provided against fire hazards to all Apparatus of the Users conforming to relevant Indian Standard Specification and /or provisions in I.E. Rules.

15.10 Calibration & Testing:

The protection scheme shall be tested at each 400 kV, 220 kV, 132 kV 66 kV sub-station by Assam Gridco once in a year or immediately after any major fault, which ever is earlier. Setting, co-ordination, testing and calibration of all protection schemes pertaining to generating units/stations shall be responsibility of APGCL. The overall co-ordination between APGCL and Assam Gridco shall be decided in meeting of Protection Co-ordination Committee. The Protection Co-ordination Committee shall review the testing and calibration as and when needed.

15.11 Data Requirements

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

PART V

METERING CODE (Issued separately)

PART VI

DATA REGISTRATION CODE

CHAPTER 16: DATA REGISTRATION

16.1 Introduction:

This section contains a list of all data required by Assam Gridco and SLDC which is to be provided by Users and data required by Users to be provided by Assam Gridco at times specified in the Grid Code. Other section of the Grid Code contains the obligation to submit the data and defines the times when data is to be supplied by Users.

16.2 Objective

The objective of the section is to list out all the data required to be provided by Users to Assam Gridco and vice versa, in accordance with the provisions of the Grid Code.

16.3 Responsibility

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

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

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

Assam Gridco shall provide up-to-date data to Users as provided in the relevant schedule of the Grid Code.

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

16.4 Data Categories and Stages in Registration

Data required to be exchanged has been listed in the appendices of this section under various

categories with cross-reference to the concerned sections.

16.5 Changes to Users Data

Whenever any User becomes aware of a change to any items of data that is registered with Assam Gridco, the User must promptly notify Assam Gridco of the changes. Assam Gridco on receipt of intimation of the changes shall promptly correct the database accordingly. This shall also apply to any data compiled by Assam Gridco regarding to its own system.

16.6 Methods of Submitting Data

The data shall be furnished in the standard formats for data submission and such format must be used for the written submission of data to SLDC/Assam Gridco.

Where standard format are not enclosed these would be developed by SLDC / Assam Gridco in consultation with Users.

All data to be submitted under the Schedule(s) must be submitted to SLDC / Assam Gridco or to such other department and/or address as Assam Gridco may from time to time notify to Users. The name of the Person who is submitting each schedule of data must be indicated.

Where a computer data link exists between a User and SLDC/ Assam Gridco, data may be submitted via this link. The data shall be in the same format as specified for paper transmission except for electronic encoding for which some other format may be more suited. The User shall specify the method to be used in consultation with the SLDC/ Assam Gridco and resolve issues such as protocols, transmission speeds etc. at the time of transmission.

Other modes of data transfer, such as magnetic tape may be utilised if SLDC/ Assam Gridco gives its prior written consent.

16.7 Data not supplied

Users are obliged to supply data as referred to in the individual section of the Grid Code and listed out in the Data Registration Section Appendices. In case any data is missing and not supplied by any User, Assam Gridco or SLDC may, acting reasonably, if and when necessary, estimates such data depending upon the urgency of the situation. Similarly in case any data is missing and not supplied by Assam Gridco, the concerned User may, acting reasonably, if and when necessary, estimate such data depending upon urgency of the situation. Such estimates will in each case, be based upon corresponding data for similar plant or Apparatus or upon such other information, the User or Assam Gridco or SLDC, as the case may be, deemed appropriate.

16.8 Special Considerations

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

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

APPENDIX

Appendix A: STANDARD PLANNING DATA

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

Standard planning data covering (a) preliminary project planning

REFERENCE TO:

- SECTION - 4 SYSTEM PLANNING
- SECTION - 5 CONNECTION CONDITION

A-1 STANDARD PLANNING DATA (GENERATION)

For **SSGS** – Thermal

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

A.1.1.1 GENERAL

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

A.1.1.2 CONNECTION

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

A.1.1.3 STATION CAPACITY

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

A.1.1.4 GENERATING UNIT DATA

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

A.1.2 HYDRO ELECTRIC

For **SSGS – Hydro**

A.1.2.1 GENERAL

	Site	Give location map to scale showing roads, railway lines, and transmission lines.
	Site map (To scale)	Showing proposed canal, reservoir area, water conductor system, fore-bay, power house etc.
	Submerged Area	Give information on area submerged, villages submerged, submerged forest land, agricultural land etc
	Whether storage type or run of river type	
	Whether catchment receiving discharges from other reservoir or power plant.	
	Full reservoir level	
	Minimum draw down level.	
	Tail race level	
	Design Head	
	Reservoir level v/s energy potential curve	
	Restraint, if any, in water discharges	
	Approximate period of construction.	

A.1.2.2 CONNECTION

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

A.1.2.3 STATION CAPACITY

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

A.1.2.4 GENERATING UNIT DATA

i	Operating Head (in Metres)	a. Maximum b. Minimum c. Average.
	Hydro Unit	Capability to operate as synchronous condenser Water head versus discharges curve (at full and part load) Power requirement or water discharge while operating as synchronous condenser
i	Turbine	State Type and capacity
iii	Generator	Type Rating (MVA) Speed (RPM) Terminal voltage (kV) Rated Power Factor Reactive Power Capability (MVAr) in the range 0.95 of leading and 0.85 of lagging MW & MVAr capability curve of generating unit Short Circuit Ratio Direct axis transient (saturated) reactance (% on rated MVA) Direct axis sub-transient (saturated) reactance (% on rated MVA) Auxiliary Power Requirement (MW)
iv	Generator - Transformer	a. Type b. Rated Capacity (MVA) c. Voltage Ratio HV/LV d. Tap change Range (+% to -%) e. Percentage Impedance (Positive Sequence at Full Load).

A.2 STANDARD PLANNING DATA (TRANSMISSION)

For STU and Transmission Licensees

Note: The compilation of the data is the internal matter of ASSAM GRIDCO, and as such ASSAM GRIDCO shall make arrangements for getting the required data from different Departments of ASSAM GRIDCO/other transmission licensees (if any) to update its Standard Planning Data in the format given below:

- (i) Name of line (Indicating Power Stations and substations to be connected).
- (ii) Voltage of line (kV).
- (iii) No. of circuits.
- (iv) Route length (km).
- (v) Conductor sizes.
- (vi) Line parameters (PU values).
 - (a) Resistance/km
 - (b) Inductance/km
 - (c) Susceptance/ km (B/2)
- (vii) Approximate power flow expected- MW & MVAr.
- (viii) Terrain of the route- Give information regarding nature of terrain i.e. forest land, fallow land, agricultural and river basin, hill slope etc.
- (ix) Route map (to scale) - Furnish topographical map showing the proposed route showing existing power lines and telecommunication lines.
- (x) Purpose of Connection- Reference to Scheme, wheeling to other States etc.
- (xi) Approximate period of Construction.

A.3. STANDARD PLANNING DATA (DISTRIBUTION)

For Distribution Companies and distribution licensees

A.3.1 GENERAL

i	Area Map (to scale)	Marking the area in the map of Assam for which Distribution License is applied. .
ii	Consumer Data	Furnish categories of consumers, their numbers and connected loads.
iii	Reference to Electrical Divisions presently in charge of the Distribution.	

A.3.2 CONNECTION

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

A.3.3 LINES AND SUBSTATIONS

i	Line Data	Furnish lengths of line and voltages within the Area.
ii	Sub-station Data	Furnish details of 33/11kV sub-station, 11/0.4 kV sub-stations, capacitor installations

A.3.4 LOADS

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

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

i	Type of load	State whether furnace loads, rolling mills, traction loads, other industrial loads, pumping loads etc.
ii	Rated voltage and phase	
iii	Electrical loading of equipment	State number and size of motors, types of drive and control arrangements.
iv	Power Factor	
iv	Sensitivity of load to voltage and frequency of supply.	
v	Maximum Harmonic content of load.	
vi	Average and maximum phase unbalance of load.	
vii	Nearest sub-station from which load is to be fed.	
viii	Location map to scale	Showing location of load with reference to lines and sub-stations in the vicinity.

A.3.6 LOAD FORECAST DATA

	Peak load and energy forecast for each category of loads for each of the succeeding 5 years.
	Details of methodology and assumptions on which forecasts are based.
	If supply is received from more than one substation, the sub-station wise break up of peak load and energy projections for each category of loads for each of the succeeding 5 years along with estimated Daily load curve.
	Details of loads 1 MW and above. Name of prospective consumer. Location and nature of load/complex. Sub-Station from which to be fed. Voltage of supply. Phasing of load.

Appendix B: DETAILED PLANNING DATA

REFER TO:

SECTION – 4	<u>SYSTEM PLANNING</u>
SECTION -- 5	CONNECTION CONDITIONS

B.1 DETAILED PLANNING DATA (GENERATION)

PART-I FOR ROUTINE SUBMISSION

B.1.1 THERMAL POWER STATIONS

For SSGS – Thermal

B.1.1.1 GENERAL

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

B.1.1.2 PROTECTION AND METERING

- (ix) Full description including settings for all relays and protection systems installed on the **Generating Unit**, Generator unit Transformer, Auxiliary Transformer and electrical motor of major equipments listed, but not limited to, under Sec. 3 (General).
- (x) Full description including settings for all relays installed on all outgoing feeders from **Power Station** switchyard, Tie circuit breakers, and incoming circuit breakers.
- (xi) Full description of inter-tripping of circuit breakers at the point or points of **Connection** with the **Transmission System**.
- (xii) Most probable fault clearance time for electrical faults on the **User's** System.
- (xiii) Full description of operational and commercial metering schemes.

B.1.1.3 SWITCHYARD

In relation to interconnecting transformers:

- (i) Rated MVA.
- (ii) Voltage Ratio.
- (iii) Vector Group.

- (iv) Positive sequence reactance for maximum, minimum, normal Tap.(% on MVA).
- (v) Positive sequence resistance for maximum, minimum, normal Tap.(% on MVA).
- (vi) Zero sequence reactance (% on MVA).
- (vii) Tap changer Range (+% to -%) and steps.
- (viii) Type of Tap changer. (off/on load).

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

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

Lightning Arresters -

Technical data

Communication -

Details of communication equipment installed at points of connections.

Basic Insulation Level (kV) -

- (i) Bus bar.
- (ii) Switchgear.
- (iii) Transformer bushings.
- (iv) Transformer windings.

B.1.1.4 GENERATING UNITS

(a) Parameters of Generating Units:

- (i) Rated terminal voltage (kV).
- (ii) Rated MVA.
- (iii) Rated MW.
- (iv) Speed (rpm) or number of poles.
- (v) Inertia constant H (MW Sec./MVA).
- (vi) Short circuit ratio.
- (vii) Direct axis synchronous reactance (% on MVA) X_d .
- (viii) Direct axis (saturated) transient reactance (% on MVA) X_d' .
- (ix) Direct axis (saturated) sub-transient reactance (% on MVA) X_d'' .
- (x) Quadrature axis synchronous reactance (% on MVA) X_q .
- (xi) Quadrature axis (saturated) transient reactance (% on MVA) X_q' .
- (xii) Quadrature axis (saturated) sub-transient reactance (% on MVA) X_q'' .

- (xiii) Direct axis transient open circuit time constant (Sec) $T'd_0$.
 - (xiv) Direct axis sub-transient open circuit time constant (Sec) $T''d_0$.
 - (xv) Quadrature axis transient open circuit time constant (Sec) $T'q_0$.
 - (xvi) Quadrature axis sub-transient open circuit time constant (Sec) $T''q_0$.
 - (xvii) Stator Resistance (Ohm) R_a .
 - (xviii) Neutral grounding details.
 - (xix) Stator leakage reactance (Ohm) X_1 .
 - (xx) Stator time constant (Sec).
 - (xxi) Rated Field current (A).
 - (xxii) Open Circuit saturation characteristic for various terminal Voltages giving the compounding current to achieve the same.
 - (xxiii) MW and MVA_r Capability curve
- B.1.1.5 Parameters of excitation control system:
- (i) Type of Excitation.
 - (ii) Maximum Field Voltage.
 - (iii) Minimum Field Voltage.
 - (iv) Rated Field Voltage.
 - (v) Details of excitation loop in block diagrams showing transfer functions of individual elements using I.E.E.E. symbols.
 - (vi) Dynamic characteristics of over - excitation limiter.
 - (vii) Dynamic characteristics of under-excitation limiter.
- B.1.1.6 Parameters of governor:
- (i) Governor average gain (MW/Hz).
 - (ii) Speeder motor setting range.
 - (iii) Time constant of steam or fuel Governor valve.
 - (iv) Governor valve opening limits.
 - (v) Governor valve rate limits.
 - (vi) Time constant of Turbine.
 - (vii) Governor block diagram showing transfer functions of individual elements using I.E.E.E. symbols.
- B.1.1.7 Operational parameters:
- (i) Minimum notice required to synchronise a **Generating Unit** from de-synchronization.
 - (ii) Minimum time between synchronizing different **Generating Units** in a **Power Station**.
 - (iii) The minimum block load requirements on synchronizing.
 - (iv) Time required for synchronizing a **Generating Unit** for the following conditions:
 - a. Hot
 - b. Warm

- c. Cold
- (v) Maximum Generating Unit loading rates for the following conditions:
 - a. Hot
 - b. Warm
 - c. Cold
- (vi) Minimum load without oil support (MW).

B.1.1.8 GENERAL STATUS

- (i) Detailed Project report.
- (ii) Status Report
 - (a) Land
 - (b) Coal
 - (c) Water
 - (d) Environmental clearance
 - (e) Rehabilitation of displaced persons
- (iii) Techno-economic approval by Central Electricity Authority (CEA).
- (iv) Approval of **State** Government/Government of India.
- (v) Financial Tie-up.

B.1.1.9 CONNECTION

- (i) Reports of Studies for parallel operation with the **State Grid**.
 - (a) Short Circuit studies
 - (b) Stability Studies.
 - (c) Load Flow Studies.
- (ii) Proposed **Connection** with the **State Grid**.
 - (a) Voltage
 - (b) No. of circuits
 - (c) Point of **Connection**.

B.1.2 HYDRO - ELECTRIC STATIONS

For SSGS – Hydro

B.1.2.1 GENERAL

- (i) Name of Power Station.
- (ii) No and capacity of units. (MVA)
- (iii) Ratings of all major equipment.
 - (a) Turbines (HP)
 - (b) Generators (MVA)
 - (c) Generator Transformers (MVA)
 - (d) Auxiliary Transformers (MVA)
- (iv) Single line diagram of **Power Station** and switchyard.
- (v) Relaying and metering diagram.

- (vi) Neutral grounding of Generator.
- (vii) Excitation control.
- (viii) Earthing arrangements with earth resistance values.
- (ix) Reservoir Data.
 - (a) Salient features
 - (b) Type of Reservoir
 - (c) Multipurpose
 - (d) For Power
 - (e) Operating Table with
 - Area capacity curves and
 - Unit capability at different net heads

B.1.2.2 PROTECTION

- (i) Full description including settings for all relays and protection systems installed on the **Generating Unit**, Generator transformer, auxiliary transformer and electrical motor of major equipment included, but not limited to those listed, under Sec. 3 (General).
- (ii) Full description including settings for all relays installed on all outgoing feeders from **Power Station** switchyard, tiebreakers, and incoming breakers.
- (iii) Full description of inter-tripping of breakers at the point or points of **Connection** with the **Transmission System**.
- (iv) Most Probable fault clearance time for electrical faults on the **User's** System.

B.1.2.3 SWITCHYARD

Interconnecting transformers:

- (i) Rated MVA
- (ii) Voltage Ratio
- (iii) Vector Group
- (iv) Positive sequence reactance for maximum, minimum and normal Tap.(% on MVA).
- (v) Positive sequence resistance for maximum, minimum and normal Tap.(% on MVA).
- (vi) Zero sequence reactance (% on MVA)
- (vii) Tap changer range (+% to -%) and steps.
- (viii) Type of Tap changer (off/on load).
- (ix) Neutral grounding details.
- (x)

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

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

Lightning Arresters

Technical data

Communications

Details of Communications equipment installed at points of connections.

Basic Insulation Level (kV)

- (i) Bus bar.
- (ii) Switchgear.
- (iii) Transformer Bushings
- (iv) Transformer windings.

B.1.2.4 GENERATING UNITS

Parameters of Generator

- (i) Rated terminal voltage (kV).
- (ii) Rated MVA.
- (iii) Rated MW.
- (iv) Speed (rpm) or number of poles.
- (v) Inertia constant H (MW sec./MVA).
- (vi) Short circuit ratio.
- (vii) Direct axis synchronous reactance X_d (% on MVA).
- (viii) Direct axis (saturated) transient reactance (% on MVA) X'_d .
- (ix) Direct axis (saturated) sub-transient reactance (% on MVA) X''_d .
- (x) Quadrature axis synchronous reactance (% on MVA) X_q .
- (xi) Quadrature axis (saturated) transient reactance (% on MVA) X'_q .
- (xii) Quadrature axis (saturated) sub-transient reactance (% on MVA) X''_q .
- (xiii) Direct axis transient open circuit time constant (sec) T'_{d_0} .
- (xiv) Direct axis sub-transient open circuit time constant (sec) T''_{d_0} .
- (xv) Quadrature axis transient open circuit time content (sec) T'_{q_0} .
- (xvi) Quadrature axis transient open circuit time constant (sec) T''_{q_0} .
- (xvii) Stator Resistance (Ohm) R_a .
- (xviii) Stator leakage reactance (Ohm) X_l .
- (xix) Stator time constant (Sec).
- (xx) Rated Field current (A).
- (xxi) Neutral grounding details.

- (xxii) Open Circuit saturation characteristics of the Generator for various terminal voltages giving the compounding current to achieve this.
- (xxiii) Type of Turbine.
- (xxiv) Operating Head (Metres)
- (xxv) Discharge with full gate opening (cumecs)
- (xxvi) Speed Rise on total Load throw off(%).
- (xxvii) MW and MVA_r Capability curve

Parameters of excitation control system:

As applicable to thermal **Power Stations**

Parameters of governor:

As applicable to thermal **Power Station**

Operational parameter:

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

B.1.2.5 GENERAL STATUS

- (i) Detailed Project Report.
- (ii) Status Report.
 - (a) Topographical survey
 - (b) Geological survey
 - (c) Land
 - (d) Environmental Clearance
 - (e) Rehabilitation of displaced persons.
- (iii) Techno-economic approval by Central Electricity Authority.
- (iv) Approval of State Government/Government of India.
- (v) Financial Tie-up.

B.1.2.6 CONNECTION

- (i) Reports of Studies for parallel operation with the **State Grid**.
 - (a) Short Circuit studies
 - (b) Stability Studies.
 - (c) Load Flow Studies.
- (ii) Proposed **Connection** with the **State Grid**.
 - (a) Voltage
 - (b) No. of circuits
 - (c) Point of **Connection**.

B.1.2.7 RESERVOIR DATA

- (i) Dead Capacity
- (ii) Live Capacity

B.1.3 GAS POWER STATIONS

For SSGS – Gas

B.1.3.1 GENERAL

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

B.1.3.2 PROTECTION AND METERING

- (i) Full description including settings for all relays and protection systems installed on the Generating Unit, Generator unit Transformer, Auxiliary Transformer and electrical motor of major equipments listed, but not limited to, under Sec. 3 (General).
- (ii) Full description including settings for all relays installed on all outgoing feeders from Power Station switchyard, Tie circuit breakers, and incoming circuit breakers.
- (iii) Full description of inter-tripping of circuit breakers at the point or points of Connection with the Transmission System.
- (iv) Most probable fault clearance time for electrical faults on the User's System.
- (v) Full description of operational and commercial metering schemes.

B.1.3.3 SWITCHYARD

In relation to interconnecting transformers:

- (i) Rated MVA.
- (ii) Voltage Ratio.
- (iii) Vector Group.
- (iv) Positive sequence reactance for maximum, minimum, normal Tap.(% on MVA).
- (v) Positive sequence resistance for maximum, minimum, normal Tap.(% on MVA).
- (vi) Zero sequence reactance (% on MVA).
- (vii) Tap changer Range (+% to -%) and steps.
- (viii) Type of Tap changer. (off/on load).

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

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

Lightning Arresters -

Technical data

Communication -

Details of communication equipment installed at points of connections.

Basic Insulation Level (kV) -

- (i) Bus bar.
- (ii) Switchgear.
- (iii) Transformer bushings.
- (iv) Transformer windings.

B.1.3.4 GENERATING UNITS

(a) Parameters of Generating Units:

- (i) Rated terminal voltage (kV).
- (ii) Rated MVA.
- (iii) Rated MW.
- (iv) Speed (rpm) or number of poles.
- (v) Inertia constant H (MW Sec./MVA).
- (vi) Short circuit ratio.
- (vii) Direct axis synchronous reactance (% on MVA) X_d .
- (viii) Direct axis (saturated) transient reactance (% on MVA) X_d' .
- (ix) Direct axis (saturated) sub-transient reactance (% on MVA) X_d'' .
- (x) Quadrature axis synchronous reactance (% on MVA) X_q .
- (xi) Quadrature axis (saturated) transient reactance (% on MVA) X_q' .
- (xii) Quadrature axis (saturated) sub-transient reactance (% on MVA) X_q'' .
- (xiii) Direct axis transient open circuit time constant (Sec) $T'd_o$.
- (xiv) Direct axis sub-transient open circuit time constant (Sec) $T''d_o$.
- (xv) Quadrature axis transient open circuit time constant (Sec) $T'q_o$.
- (xvi) Quadrature axis sub-transient open circuit time constant (Sec) $T''q_o$.
- (xvii) Stator Resistance (Ohm) R_a .
- (xviii) Neutral grounding details.

- (xix) Stator leakage reactance (Ohm) X_1 .
- (xx) Stator time constant (Sec).
- (xxi) Rated Field current (A).
- (xxii) Open Circuit saturation characteristic for various terminal Voltages giving the compounding current to achieve the same.
- (xxiii) MW and MVar Capability curve

B.1.3.5 Parameters of excitation control system:

- (i) Type of Excitation.
- (ii) Maximum Field Voltage.
- (iii) Minimum Field Voltage.
- (iv) Rated Field Voltage.
- (v) Details of excitation loop in block diagrams showing transfer functions of individual elements using I.E.E.E. symbols.
- (vi) Dynamic characteristics of over - excitation limiter.
- (vii) Dynamic characteristics of under-excitation limiter.

B.1.3.6 Parameters of governor:

- (i) Governor average gain (MW/Hz).
- (ii) Speeder motor setting range.
- (iii) Time constant of steam or fuel Governor valve.
- (iv) Governor valve opening limits.
- (v) Governor valve rate limits.
- (vi) Time constant of Turbine.
- (vii) Governor block diagram showing transfer functions of individual elements using I.E.E.E. symbols.

B.1.3.7 Operational parameters:

- (i) Minimum notice required synchronising a Generating Unit from de-synchronization.
- (ii) Minimum time between synchronizing different Generating Units in a Power Station.
- (iii) The minimum block load requirements on synchronizing.
- (iv) Time required for synchronizing a Generating Unit for the following conditions:
 - (a) Hot
 - (b) Warm
 - (c) Cold
- (v) Maximum Generating Unit loading rates for the following conditions:
 - (a) Hot
 - (b) Warm
 - (c) Cold
- (vi) Minimum load without oil support (MW).

B.1.3.8 GENERAL STATUS

- (i) Detailed Project report.
- (ii) Status Report
 - (a) Land
 - (b) Gas/Liquid Fuel
 - (c) Water
 - (d) Environmental clearance
 - (e) Rehabilitation of displaced persons
- (iii) Approval of **State** Government/Government of India.
- (iv) Financial Tie-up.

B.1.3.9 CONNECTION

- (i) Reports of Studies for parallel operation with the State Grid.
 - (a) Short Circuit studies
 - (b) Stability Studies.
 - (c) Load Flow Studies.
- (ii) Proposed Connection with the State Grid.
 - (a) Voltage
 - (b) No. of circuits
 - (c) Point of Connection.

B.2 DETAILED SYSTEM DATA - TRANSMISSION

For **STU** and Transmission Licensees

B.2.1 GENERAL

- i. Single line diagram of the Transmission System down to 33 kV bus at Grid Sub-station detailing:
 - (a) Name of Sub-station.
 - (b) Power Station connected.
 - (c) Number and length of circuits.
 - (d) Interconnecting transformers.
 - (e) Sub-station bus layouts.
 - (f) Power transformers.
 - (g) Reactive compensation equipment.
- ii. Sub-station layout diagrams showing:
 - (a) Bus bar layouts.
 - (b) Electrical circuitry, lines, cables, transformers, switchgear etc.
 - (c) Phasing arrangements.
 - (d) Earthing arrangements.
 - (e) Switching facilities and interlocking arrangements.
 - (f) Operating voltages.

- (g) Numbering and nomenclature:
 - Transformers.
 - Circuits.
 - Circuit breakers.
 - Isolating switches.

B.2.2 LINE PARAMETERS (for all circuits)

- (i) Designation of Line.
- (ii) Length of line (km).
- (iii) Number of circuits.
- (iv) Per Circuit values.
 - (a) Operating voltage (kV).
 - (b) Positive Phase sequence reactance (pu on 100 MVA) X_1
 - (c) Positive Phase sequence resistance (pu on 100 MVA) R_1
 - (d) Positive Phase sequence susceptance (pu on 100 MVA) B_1
 - (e) Zero Phase sequence reactance (pu on 100 MVA) X_0
 - (f) Zero Phase sequence resistance (pu on 100 MVA) R_0
 - (g) Zero Phase sequence susceptance (pu on 100 MVA) B_0

B.2.3 TRANSFORMER PARAMETERS (For all transformers)

- (i) Rated MVA
- (ii) Voltage Ratio
- (iii) Vector Group
- (iv) Positive sequence reactance, maximum, minimum and normal (pu on 100 MVA) X_1
- (v) Positive sequence resistance, maximum, minimum and normal (pu on 100 MVA) R_1
- (vi) Zero sequence reactance (pu on 100 MVA).
- (vii) Tap change range (+% to -%) and steps.
- (viii) Details of Tap changer. (Off/On load).

B.2.4 EQUIPMENT DETAILS (For all substations)

- (i) Circuit Breakers
- (ii) Isolating switches
- (iii) Current Transformers
- (iv) Potential Transformers

B.2.5 RELAYING AND METERING

- (i) Relay protection installed for all transformers and feeders along with their settings and level of co-ordination with other Users.
- (ii) Metering Details.

B.2.6 SYSTEM STUDIES

- (i) Load Flow studies (Peak and lean load for maximum hydro and maximum thermal generation).
- (ii) Transient stability studies for three-phase fault in critical lines.

- (iii) Dynamic Stability Studies
- (iv) Short circuit studies (three-phase and single phase to earth)
- (v) Transmission and Distribution Losses in the Transmission System.

B.2.7 DEMAND DATA (For all substations)

- (i) Demand Profile (Peak and lean load).

B.2.8 REACTIVE COMPENSATION EQUIPMENT

- (i) Type of equipment (fixed or variable).
- (ii) Capacities and/or Inductive rating or its operating range in MVAR.
- (iii) Details of control.
- (iv) Point of Connection to the System.

B.3. DETAILED PLANNING DATA (DISTRIBUTION)

For Distribution Company/Licensees

B.3.1 GENERAL

- (i) Distribution map (To scale). Showing all lines up to 11 kV and sub-stations belonging to the Supplier.
- (ii) Single line diagram of Distribution System (showing distribution lines from points of Connection with the Transmission System, 33/11 kV substations, 11/0.4 kV substation, consumer bus if fed directly from the Transmission System).
- (iii) Numbering and nomenclature of lines and sub-stations (Identified with feeding Grid sub-stations of the Transmission and concerned 33/11 kV substation of Supplier).

B.3.2 CONNECTION

- (i) Points of Connection (Furnish details of existing arrangement of Connection).
- (ii) Details of metering at points of Connection.

B.3.3 LOADS

- (i) Connected load - Active and Reactive Load. Furnish consumer details, Number of Consumers category wise, details of loads 1 MW and above, power factor.
- (ii) Information on diversity of load and coincidence factor.
- (iii) Daily demand profile (current and forecast) on each 33/11 kV sub-station.
- (iv) Cumulative demand profile of Distribution System (current & forecast).

Appendix C: OPERATIONAL PLANNING DATA

C.1 OUTAGE PLANNING DATA

REFER TO:

SECTION 7 OUTAGE PLANNING

C.1.1 DEMAND ESTIMATES

For Distribution Company/Licensees

Item	Due date/ Time
Estimated aggregate annual sales of Energy in Million Units and peak and lean demand in MW & MVA _r at each Connection point for the next financial year.	15th November of current year
Estimated aggregate monthly sales of Energy in million Units and peak and lean demand in MW & MVA _r at each Connection point for the next month.	25th of current month
Hourly demand estimates for the day ahead.	10.00 Hours every day.

C.1.2 ESTIMATES OF LOAD SHEDDING

For Distribution Company/Licensees

Item	Due date/ Time
Details of discrete load blocks that may be shed to comply with instructions issued by SLDC when required, from each Connection point.	Soon after Connection is made.

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

C.1.3.1 GENERATOR OUTAGE PROGRAMME

For SSGS

Item	Due date/ Time
Identification of Generating Unit.	15 th November each year
MW which will not be available as a result of Outage.	15 th November each year
Preferred start date and start-time or range of start dates and start times and period of Outage.	15 th November each year
If outages are required to meet statutory requirements, then the latest- date by which Outage must be taken.	15 th November each year

C.1.3.2 YEAR AHEAD NEREB OUTAGE PROGRAMME

(Affecting Intra-State Transmission System)

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

C.1.3.3 YEAR AHEAD CPP's OUTAGE PROGRAMME

Item	Due date/ Time
MW which will not be available as a result of Outage.	30th November each year
Start-date and start time and period of Outage.	30th November each year

C.1.3.4 YEAR AHEAD DISTRIBUTION Licensee OUTAGE PROGRAMME

Item	Due date/ Time
Loads in MW not available from any Connection point.	15 th November each year
Identification of Connection point.	15 th November each year
Period of suspension of Drawal with start-date and start-time.	15 th November each year

C.1.3.5 ASSAM GRIDCO's OVERALL OUTAGE PROGRAMME

Item	Due date/ Time
Report on proposed Outage programme to <u>NEREB</u> .	15 th February each year
Release of finally agreed Outage plan.	15th February each year

C-2. GENERATION SCHEDULING DATA

REFER TO:

SECTION 9: SCHEDULE AND DESPATCH

For SSGS

Item	Due date/ Time
Day ahead hourly MW/MVAr availability (00.00 - 24.00 Hours) of SSGS.	10.00 hrs
Day ahead hourly MW import/export from CPP's.	10.00 hr
Status of Generating Unit Excitation AVR in service (Yes/No).	10.00 hr
Status of Generating Unit Speed Control System. Governor in service (Yes/No).	10.00 hr
Spinning reserve capability (MW).	10.00 hr
Backing down capability with/without oil support (MW).	10.00 hr
Hydro reservoir levels and restrictions.	10.00 hr
Generating Units hourly summation outputs (MW).	10.00 hr
Day ahead hourly MW entitlements from Central Sector Generation Power Stations from NERLDC.	11.00 hr

C-3 CAPABILITY DATA

REFER TO:

SECTION 10: FREQUENCY AND VOLTAGE MANAGEMENT

For SSGS

Item	
Generators and IPPs shall submit to Assam Gridco up-to-date capability curves for all Generating Units.	On receipt of request from Assam Gridco/ SLDC.
CPPs shall submit to Assam Gridco net return capability that shall be available for Export/Import from Transmission System.	On receipt of request from Assam Gridco/ SLDC.

C-4 RESPONSE TO FREQUENCY CHANGE

REFER TO:

SECTION 10 - FREQUENCY AND VOLTAGE MANAGEMENT

For SSGS

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

C-5 MONITORING OF GENERATION

REFER TO:

SECTION 11 MONITORING OF GENERATION AND DRAWAL

For SSGS

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

C-6 ESSENTIAL AND NON-ESSENTIAL LOAD DATA

REFER TO:

SECTION 12 CONTINGENCY PLANNING

For Discoms /Distribution Licensee

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

Appendix D: PROTECTION DATA

REFER TO:

SECTION 15 - PROTECTION

Item	Due date/ Time
<p>For SSGS Generators / CPPs / IPPs shall submit details of protection requirement and schemes installed by them as referred to in B-1. Detailed Planning Data under sub-section "Protection and Metering".</p>	As applicable to Detailed Planning Data
<p>For Assam Gridco /Transmission Licensee The Assam Gridco shall submit details of protection equipment and schemes installed by them as referred to in B-2. Detailed system Data, Transmission under sub-section "Relaying and Metering" in relation to Connection with any User.</p>	As applicable to Detailed Planning Data

Appendix E: METERING DATA

REFER TO:

SECTION – 16 METERING

Item	Due date/ Time
<p>For SSGS SSGS shall submit details of metering equipment and scheme installed by them as referred in B-1. Detailed Planning Data under sub-section "Protection and Metering".</p>	As applicable to Detailed Planning Data
<p>For Assam Gridco /Transmission Licensee Assam Gridco shall submit details of metering equipment and schemes installed by them as referred in B-2. Detailed System Data, Transmission under sub-section "Relaying and Metering" in relation to Connection with any User.</p>	As applicable to Detailed Planning Data

Appendix F: PLANNING STANDARDS

REFER TO:

SECTION – 4 SYSTEM PLANNING

General Policy

The State Grid planning and generation expansion planning shall be in accordance with the provisions of the Planning Criterion as per IEGC Clause 3.5 as detailed below. However, some planning parameters of the Intra State transmission system may vary according to directives of AERC.

Planning Criterion

- (b) The planning criterion is based on the security philosophy on which ISTS and Intra State transmission system has been planned. The security philosophy shall be as per the Transmission Planning Criteria and other CEA guidelines. The general policy shall be as detailed below:
 - (i) As a general rule, the ISTS shall be capable of withstanding and secured against the following contingency outages without necessitating load shedding or rescheduling of generation during Steady State Operations:
 - 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 a single Interconnecting Transformer, or,
 - Outage of one pole of HVDC Bipole line, or,
 - Outage of a 765 kV S/C line.
 - (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 same sub-station. All the generating Units may operate within their reactive capability curves and the network voltage profile shall also be maintained within voltage limits specified.
- (c) The ISTS/STS shall be capable of withstanding the loss of most severe single system in feed without loss of stability.
- (d) 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/STS elements

Appendix H: INCIDENT REPORTING

REFER TO:

SECTION – 14: OPERATIONAL EVENT /ACCIDENT REPORTING

FIRST REPORT.....

Date:

Time:

	Date and time of incident	
	Location of incident	
	Type of incident	
	System parameters before the incident (Voltage, Frequency, Flows, Generation, etc.)	
	Relay indications received and performance of protection	
	Damage to equipment	
	Supplies interrupted and duration, if applicable	
	Amount of Generation lost, if applicable	
	Possibility of alternate supply arrangement	
	Estimate of time to return service	
	Cause of incident	
	Any other relevant information and remedial action taken	
	Recommendations for future improvement/repeat incident	
	Name of the Organisation	

(By order of Commission)

**Sd/- ILLEGIBLE
Secretary,
Assam Electricity Regulatory Commission .**