

# GRID CODE CONTENTS

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## GRID CODE REVISIONS

REVISION NUMBER	DATE ISSUED	SECTION(S) REVISED
1	02.06.98	2(drawal), 2(IPP), 2(Licensee), 2(OHPC), 2(PPA), 2 (Eastern Region / Region)
1	02.06.98	3.4.7
1	02.06.98	7.3
1	02.06.98	8.5
1	02.06.98	12.4.1(i), 12.4.1(ii), 12.4.1(iii), 12.4.1(iv), 12.4.2, 12.5, 12.6, 12.7(Appendix)
1	02.06.98	13.4, 13.5, 13.7, 13.7.4, 13.11
1	02.06.98	14.2, 14.3.2, 14.3.4, 14.3.5, 14.4.2, 14.5.1, 14.5.2, 14.6.4, 14.6.6, 14.6.8, 14.6.9, 14.6.10, 14.6.11, 14.6.12, 14.7.4, 14.7.7, 14.7.8, 14.7.9, 14.8, 14.9.3, 14.9.4, 14.10, 14.10.1
1	02.06.98	15.1, 15.2, 15.3, 15.5, 15.6, 15.7
1	02.06.98	A.1.1, A.1.1.1(ii), A.1.1.3, A.1.1.4 (iii), A.1.1.4(iv), A.1.2.3, A.1.2.4(iii), A.2
1	02.06.98	B.1.1.4(d)(v), B.1.1.4(d)(vi), B.1.2.1(ix)(b)(i), B.1.2.1(ix)(b)(ii)
1	02.06.98	B.1.2.1(c), B.1.2.2(i), B(Part-2), B.1.3, B.2.1(i)
1	02.06.98	C.1.3.5, C.3(i) & (ii), C.5
1	02.06.98	D(ii)
1	02.06.98	E(ii)
2	28.08.98	2(Outage)
2	28.08.98	3.4
2	28.08.98	5.4
2	28.08.98	7.4, 7.6
2	28.08.98	12.4.1(i),12.6, Appendix(Item-13)
2	28.08.98	13.3
2	28.08.98	13.4
3	16.12.98	3.5
3	16.12.98	11.5
4	31.12.98	14.7.5

<b>REVISION NUMBER</b>	<b>DATE ISSUED</b>	<b>SECTION(S) REVISED</b>
5	20.05.00	2(Central Sector Generation), 2(Generator), 2(Inter State Generating Station(ISGS))
5	20.05.00	3.4
5	20.05.00	6.3, 6.4
5	20.05.00	7.1, 7.2, 7.3, 7.4
5	20.05.00	8.1, 8.2(ii), 8.3, 8.5
5	20.05.00	C1.1(i), C1.1(ii), C1.1(iii)
6	30.11.00	2(Distribution System), 2(Transmission System).
7	11.05.01	1.12
7	11.05.01	2[Automatic Voltage Regulator (AVR)], Extra High Voltage (EHV), Generating Unit, Independent Power Producer (IPP), Power Grid, Regional Transmission System, STU.
7	11.05.01	4.3.2 (iii)
7	11.05.01	5.4, 5.8(ii), 5.8 (v).
7	11.05.01	6.3, 6.4
7	11.05.01	7.3 (iv)
7	11.05.01	8.1, 8.4.1, 8.5
7	11.05.01	12.4.1 (iii), (iv)
7	11.05.01	13.4, 13.7
7	11.05.01	A.3.4, C.1.3, C.1.3.2, C.1.3.5
8	08.01.03	3.4
8	08.01.03	4.5.1, 4.5.2
9	29.08.03	6.3
10	28.08.04	1.2, 1.13
10	28.08.04	4.7
10	28.08.04	5.7
10	28.08.04	6.4
10	28.08.04	7.3, 7.4, 7.6
10	28.08.04	10.3.1, 10.6
11	03.05.05	6.3, 6.4
11	03.05.05	7.3, 7.4
11	03.05.05	15.8 (C.1.1, C.2)
11	03.05.05	16 (New Section)

# 1. INTRODUCTION

## 1.1 GENERAL

The **Transmission and Bulk Supply Licence** requires the **Licensee** to prepare, and at all times have in force, a **Grid Code** that shall include **Sections** on:

- i. **Planning:** specifying the technical and design criteria and procedures to be applied by the **Transmission Licensee (Licensee)** in the planning and development of the **Transmission System** and by other **Users** connected or seeking **Connection** to the **Transmission System**;
- ii. **Connection:** specifying the technical design criteria and standards to be complied with by the **Licensee** and other **Users** connected or seeking **Connection** to the **Transmission System**;
- iii. **Operations:** specifying the conditions under which the **Licensee** shall operate the **Transmission System** and other **Users** of the **Transmission System** shall operate their plant and/or systems for the generation and distribution of electricity in so far as necessary to protect the security and quality of supply and safe operation of the **Licensee's Transmission System** under both normal and abnormal operating conditions;
- iv. **Outage:** specifying the procedures relating to co-ordination of the **Outages** for scheduled maintenance of the **Transmission System, Generating unit** and **Distribution System** that will use the **Transmission System**;

- v. **Schedule and Despatch:** specifying the procedures to be followed by the **Licensee** and **Users** relating to the scheduling and despatch of **Generating Units** to meet **State** demand and **Drawal** allocation;
- vi. **Metering:** specifying the minimum operational and commercial metering to be provided by each **User**;
- vii. **Protection:** specifying the co-ordination responsibility and minimum standards of protection that are required to be installed by **Users** of the **Transmission System**.

The **Grid Code** is a document that governs the boundary between the **Licensee** and **Users** and establishes procedures for operations of facilities, which will use the **Transmission System**. It lays down both the information requirements and the procedures governing the relationship between the **Licensee** and **Users**. It should be noted that the **Grid Code** is not concerned with the detailed design and operation of **Generators' Power Stations** and **Suppliers' Distribution Systems**, provided that their overall compatibility with the **Transmission System** needs is assured.

The **Transmission and Bulk Supply Licence** requires that the **Licensee** in preparing, implementing and complying with the **Grid Code** shall neither discriminate against nor unduly prefer any one or any group of **Users**.

The **Grid Code** shall cover all material technical aspects relating to **Connections** to and operation and use of the **Transmission System** including the operation of electric lines and electrical plant connected to the **Transmission System** in so far as

is relevant to the operation and use of the **Transmission System**. It shall be designed so as to permit the development, maintenance and operation of an efficient, co-ordinated and economical system for the transmission of electricity in the **State**.

## 1.2 SCOPE

The **Grid Code** shall be complied with by **Gridco** in its capacity as holder of the **Transmission and Bulk Supply Licence** and by **Generators, Distribution Companies, Suppliers** and **Bulk Power Consumers** in the course of their generation, supply and utilisation of electricity.

<sup>1</sup>[All the Utilities that connect with and / or utilise the Intra State **Transmission System** are required to abide by the principles and procedures defined in the **Grid Code** so far as they apply to that Utility.]

## 1.3 INTERPRETATION

The meaning of certain terms (which are printed in bold letters and/or capitalised) 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.

## 1.4 IMPLEMENTATION AND OPERATION OF THE GRID CODE

The **Licensee** has the duty to implement the **Grid Code**. All **Users** are required to comply with the **Grid Code**, which will be enforced by the **Licensee**. **Users** must provide the **Licensee** reasonable rights of access, service and facilities necessary to

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1. Addendum in Rev. 10

discharge its responsibilities in the **Users'** premises and to comply with instructions issued by the **Licensee**, reasonably required to implement and enforce the **Grid Code**.

If any **User** fails to comply with any provision of the **Grid Code**, it shall inform the **Licensee** without delay of the reason for its non-compliance and shall remedy its non-compliance promptly. Consistent failure to comply with the **Grid Code** may lead to **Disconnection** of the **User's** plant and/or facilities.

The operation of the **Grid Code** will be reviewed regularly by the **Grid Code Review Panel** in accordance with the provisions of the relevant **Section** of the **Grid Code**.

## 1.5 GENERAL REQUIREMENTS

The **Grid Code** contains procedures to permit equitable management of day to day technical situations in the **Electricity Supply 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 the **Licensee** in such unforeseen circumstances may be required to act decisively to discharge its obligations under its **Licence**. **Users** shall provide such reasonable co-operation and assistance as the **Licensee** may request in such circumstances.



## 1.6 CODE RESPONSIBILITIES

In discharging its duties under the **Grid Code**, the **Licensee** has to rely on information, which **Users** supply regarding their requirements and intentions. The **Licensee** shall not be held responsible for any consequences that arise from its reasonable and prudent actions on the basis of such information.

## 1.7 CONFIDENTIALITY

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

## 1.8 PROCEDURES TO SETTLE DISPUTE

In the event of any dispute regarding interpretation of any part of the **Grid Code** provision between any **User** and the **Licensee**, 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 the **Licensee** and a **User**, the provision of the **Grid Code** will prevail.

## 1.9 COMMUNICATION BETWEEN THE LICENSEE AND USERS

All communications between the **Licensee** and **Users** shall be in accordance with the provisions of the relevant **Section** of the **Grid Code**.

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

## 1.10 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.

## 1.11 DIRECTIVE

Under the provisions of the **Act**, the **State** Government may issue policy **directives** in certain matters. The **Licensee** shall promptly inform the **Commission** and all **Users** of the requirement of such direction. The directions will be complied with by the **Users** subject to **Section 12(2)** of the **Act**.

<sup>1</sup>[**1.12 Gridco** being the State Transmission Utility (STU) is responsible for making the Orissa **Grid Code** consistent / compatible with the IEGC. In the event of any further inconsistencies, the provisions of IEGC shall prevail.]

## <sup>2</sup>[1.13 NON-COMPLIANCE

In case of a persistent non-compliance of any of the stipulations of the **Grid Code** by any **Generator, Distribution Company, CPP / IPP, Supplier** and **Bulk Power Consumer / STU**, the matter shall be reported to the Chairman, **Grid Code Review Panel**. The Chairman of the **Panel** shall verify and take up the matter with the defaulting agency for expeditious termination of the non-compliance. In case of inadequate response, non-compliance shall be reported to **OERC**. Thereafter, **OERC** may take appropriate action.]

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1. Addendum in Rev. 7
  2. Addendum in Rev. 10

## 2. DEFINITIONS

Defined Term	Definition
<b>Act</b>	The Orissa Electricity Reform Act, 1995.
<b>Apparatus</b>	Electrical <b>Apparatus</b> and includes all machines, fittings, accessories and appliances in which conductors are used.
<b>Appendix</b>	An <b>Appendix</b> to a <b>Section</b> of the <b>Grid Code</b> .
<b>Area of Supply</b>	As defined in the concerned <b>Licence</b> .
<sup>1</sup> [ <b>Automatic Voltage Regulator (AVR)</b>	A continuously acting automatic excitation control system to control the voltage of a <b>Generating Unit</b> measured at the generator terminals.]
<b>Black Start</b>	The process of recovery from a total or partial blackout of the <b>Transmission System</b> .
<b>Bulk Power Consumer</b>	A person to whom electricity is provided and who has a dedicated supply at 66 kV, 132 kV or 220 kV.
<b>Captive Power Plant / CPP</b>	For the purpose of <b>Grid Code</b> , a <b>Power Station</b> which is primarily operated to meet a captive demand and is connected to <b>Transmission System</b> .
<b>CEA</b>	Central Electricity Authority.

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1. Addendum in Rev. 7

<b>Defined Term</b>	<b>Definition</b>
<sup>1</sup> [.....]	<sup>2</sup> [.....]
<b>Commission / OERC</b>	Orissa Electricity Regulatory Commission.
<b>Connection</b>	The electric lines and electrical equipment used to effect a <b>Connection</b> of a <b>User's</b> system to the <b>Transmission System</b> .
<b>Connection Agreement</b>	An agreement between the <b>Licensee</b> and a <b>User</b> setting out the terms relating to the <b>Connection</b> to and/or use of the <b>Transmission System</b> .
<b>Connection Conditions</b>	The technical conditions to be complied with by any <b>User</b> having a <b>Connection</b> to the <b>Transmission System</b> as laid down in <b>Section 5: "Connection Conditions"</b> of the <b>Grid Code</b> .
<b>Control Person</b>	A person identified as having responsibility for cross-boundary safety under <b>Section 11: "Cross Boundary Safety"</b> of the <b>Grid Code</b> .

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1. Deleted "**Central Sector Generation**" in Rev.5.

2. Deleted "**Power Stations** operated by **NTPC** or **NHPC** or such other generation organisations classed as being part of the nationally / regionally shared generation." in Rev.5.

<b>Defined Term</b>	<b>Definition</b>
<b>Detailed Planning Data</b>	As referred to <b>Section 15</b> : regarding Data Registration.
<b>Directive</b>	A policy <b>Directive</b> issued by the Energy Department of the Government of Orissa under the provision of the <b>Act</b> .
<b>Disconnect</b>	The act of physically separating a <b>User's</b> or <b>Bulk Power Consumer's</b> electrical equipment from the <b>Transmission System</b> .
<b>Distribution Company</b>	An organisation who is licensed, or exempt from the requirements to be licensed to own and/or operate all or part of the <b>Distribution System</b> .
<b>Distribution System</b>	<sup>2</sup> [ <b>Distribution System</b> means any system, consisting mainly of cables, service lines and overhead lines, electrical plant and meters having design voltage of 33 kV and lower and used for the transportation of electricity from a Transmission System or Generating stations or other points to the point of delivery to end-users taking any supply of electricity at voltage of 33 kV and lower and includes any electrical plant and meters in connection with Distribution.]
<b>Drawal</b>	The import from, or export to, <b>Eastern Region</b> , of electrical energy and power or both active/ <sup>1</sup> [reactive] power.

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1. Inserted in Rev. 1

2. Substituted "The system of electric lines and electrical equipment at voltage levels of 33 kV and lower, including part of a **Transmission System**, where used for supply of electricity to a single consumer or group of consumers." in Rev. 6

**Defined Term**

**Definition**

**Eastern Region / Region**

Region comprising of the States of West Bengal, Bihar, <sup>1</sup>[Orissa], Sikkim and DVC for the integrated operation of the electricity system.

<sup>2</sup>[**Extra High Voltage (EHV)**

Where the voltage exceeds 33,000 volts under normal conditions subject, however, to the percentage variations allowed by Indian Electricity Rules, 1956.]

**Electricity Operator**

Any person who owns and / or operates generating plant or who holds a **Licence** under **Section - 14** of the **Act**, connected to the **Licensee’s Transmission System** and any bulk **Supplier**.

**Electricity Supply System (Grid)**

The combination of the **Transmission System, Distribution System** and **Power Stations**.

**EREB**

Eastern Regional Electricity Board.

**ERLDC**

Eastern Regional Load Despatch Centre.

**External Interconnection**

Electric lines and electrical equipment used for the transmission of electricity between the **Transmission System** and the **Regional Transmission System** and other State systems.

<sup>3</sup>[-----]

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1. Inserted in Rev. 1

2. Substituted “**EHT** Extra High Tension.” in Rev. 7

3. Deleted “**Extra High Tension** Nominal voltage levels of higher than 33 kV.” in Rev. 7

<b>Defined Term</b>	<b>Definition</b>
<b>Generating Unit</b>	<sup>2</sup> [An electrical Generating Unit coupled to a turbine within a <b>Power Station</b> together with all Plants and <b>Apparatus</b> at that <b>Power Station</b> (up to the connection point) which relates exclusively to the operation of that turbo-generator.]
<b>Generator</b>	An organisation <sup>1</sup> [(including Central or other Generating Station, in which the <b>State</b> has a full share)] that generates electricity and who is subject to the <b>Grid Code</b> .
<b>Grid Code / Code</b>	The set of principles and guidelines prepared by the <b>Licensee</b> in accordance with the terms of Condition 17 of the <b>Transmission and Bulk Supply Licence</b> and approved by the <b>OERC</b> .
<b>Grid Code Review Panel / Panel</b>	The <b>Panel</b> set up under <b>Section 3</b> : “Management of Orissa <b>Grid Code</b> ” of the <b>Grid Code</b> .
<b>Gridco</b>	Grid Corporation of Orissa Limited, registered under the Companies Act,1956.

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1. Inserted in Rev.5

2. Substituted “The combination of an alternator and a turbine set (whether steam, gas, water or wind driven) or a reciprocating engine and all of its associated equipment, which together represents a single electricity generating machine.” in Rev. 7

<b>Defined Term</b>	<b>Definition</b>
<b>IE Rules</b>	Indian Electricity Rules,1956.
<b>IEC</b>	International Electro-Technical Commission.
<sup>6</sup> <b>[Independent Power Producer (IPP)]</b>	A generating company not owned / controlled by the Central / State Government]
<sup>4</sup> <b>[Inter-State Generating Station (ISGS)]</b>	<sup>5</sup> [A Central/Mega Power Project (a generating station of an <b>IPP</b> having two or more states as beneficiaries) /other generating station in which two or more than two states have a share and whose scheduling is to be coordinated by the RLDC.]
<b>Lean Period</b>	That period in a day when electrical demand is at its lowest.
<b>Licensee</b>	The holder of the <sup>2</sup> [licence] for transmission and bulk supply <sup>3</sup> [.....] for the <b>State</b> of Orissa.
<b>NALCO</b>	National Aluminium Company Limited.
<b>NHPC</b>	National Hydro Power Corporation Limited.
<b>NTPC</b>	National Thermal Power Corporation Limited.

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1. Substituted "plant" in Rev. 1

2. Inserted in Rev. 1

3. "of power" omitted in Rev. 1

4 & 5 Inserted in Rev.5

6. Substituted " **IPP** Independent Power <sup>1</sup>[Producer] being a **Power Station** owned by a **Generator** who is not part of **OHPC**, **OPGC** or **Central Sector Generation** and is not classified as a **CPP**." in Rev. 7



<b>Defined Term</b>	<b>Definition</b>
<b>OHPC</b>	Orissa Hydro Power Corporation <sup>1</sup> [Limited.]
<b>Operating Co-ordination Committee / OCC</b>	The committee constituted by the <b>EREB</b> which co-ordinates the operation of the <b>Regional Transmission System</b> and <b>Central Sector Generation</b> .
<b>OPGC</b>	Orissa Power Generation Corporation Limited.
<b>Outage</b>	The reduction of <sup>2</sup> [capacity] or taking out of service of a <b>Generating Unit, Power Station</b> or part of the <b>Transmission System</b> or <b>Distribution System</b> <sup>3</sup> [.....].
<b>Peak Period</b>	That period in a day when electrical demand is at its highest.

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1. Inserted in Rev. 1

2. Substituted "capability" in Rev. 2

3. Deleted "for the purposes of maintenance or repair" in Rev. 2

**Defined Term**

**Definition**

**Power Purchase Agreement or PPA**

The agreement between a **Generator** and the **Licensee** in which, subject to certain conditions, the <sup>1</sup>[**Licensee**] agrees to purchase the electrical output of the **Generator's Generating Unit** and the **Generator** agrees to provide services from this Unit.

**Power Station**

An installation of one or more **Generating Units** (even when sited separately) owned and/or operated by the same **Generator** and which may reasonably be considered as being managed as a single integrated generating complex.

**PowerGrid**

The Power Grid Corporation of India Limited, <sup>2</sup>[which has been notified as CTU]

**Regional Transmission System**

The combination of <sup>3</sup>[**EHV**] electric lines and electrical equipment owned or operated by **PowerGrid**.

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1.Substituted "Gridco" in Rev. 1  
2.Inserted in Rev. 7  
3.Substituted "EHT" in Rev. 7

<b>Defined Term Section</b>	<b>Definition</b>
<b>Section</b>	A Section or part of this <b>Grid Code</b> , which is identified as covering a specific topic.
<b>State</b>	The State of Orissa.
<b>State Load Despatch Centre / SLDC</b>	The <b>Licensee's</b> control room situated in Bhubaneswar, operating round the clock for the purpose of managing the operation of the <b>Transmission System</b> and co-ordination of <b>State</b> generation and <b>Drawal</b> on a real time basis.
<b>Standard Planning Data</b>	As referred to in Data Registration Section.
<sup>1</sup> [STU	State Transmission Utility. <b>Gridco</b> has been notified as the <b>STU</b> .]
<b>Supervisory Control and Data Acquisition / SCADA</b>	The combination of transducers, communication links and data processing systems which provides information to the <b>SLDC</b> on the operational state of the <b>Transmission System</b> and the <b>Generators' Generating Units</b> .

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1. Addendum in Rev. 7

<b>Defined Term</b>	<b>Definition</b>
<b>Supplier</b>	A person authorised to supply electricity under a <b>Licence</b> granted under the <b>Act</b> and who is subject to the <b>Grid Code</b> . <b>Gridco</b> shall be treated as a <b>Supplier</b> until its distribution and bulk supply operations have been separated.
<b>Transmission and Bulk Supply Licence / Licence</b>	The <b>Licence</b> granted to <b>Gridco</b> by the <b>Commission</b> under <b>Section 14(1)</b> of the <b>Act</b> .
<b>Transmission System</b>	<sup>1</sup> [Transmission System means the system consisting of <b>extra high voltage</b> electric lines, having design voltage of 66 kV and higher owned and/or operated by the Licensee for the purposes of the transportation of electricity from one power station to a substation or to another power station or between substations or to or from any external interconnection including 33/11 kV bays/equipment up to the interconnection with the <b>Distribution System</b> , any plant and <b>apparatus</b> and meters owned or used in connection with Transmission, and such buildings or part thereof as may be required to accommodate such plant <b>apparatus</b> , other works and operating staff thereof.]
<b>TTPS</b>	Talcher Thermal Power Station.
<b>User</b>	A person, including the <b>Licensee</b> the <b>Supplier</b> and <b>PowerGrid</b> , who uses the <b>Transmission System</b> and who must comply with the provisions of the <b>Grid Code</b> .

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1. Substituted "The system of **EHT** electric lines and electrical equipment owned and/or operated by the **Licensee** for the purpose of the transmission of electricity between **Power Stations**, **External Interconnections** and the **Distribution System**." in Rev. 6

### 3. MANAGEMENT OF THE GRID CODE

#### 3.1 INTRODUCTION

Under the terms of the Orissa **Transmission and Bulk Supply Licence**, condition 17, the **Licensee** is required to implement and comply with the **Grid Code** and periodically review the same and its implementation. For the above purpose a **Grid Code Review Panel** comprising of representatives of all **Users** of the **Transmission System** shall be established.

Subject to the conditions in the next paragraph of this **Section**, a specific and important feature of the **Grid Code** is that no revision or modification of the **Code**, however large or small, may be made without being discussed at the **Grid Code Review Panel** meeting and approved by the **OERC**.

The **OERC** may issue directions requiring the **Licensee** to revise the **Grid Code** in such a manner as may be specified in those directions and the **Licensee** shall promptly comply with any such directions.

This document defines the procedure to be followed by the **Licensee** in maintaining the **Grid Code** and also in pursuing any change.

#### 3.2 OBJECTIVE

The objective of this procedure 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

The **Licensee** will be responsible for managing and servicing the **Grid Code** for discharging its obligations under the **Licence**.

The **Licensee** shall establish and service the requirements of the **Grid Code Review Panel** in accordance with provisions of **Section 3.4** of the **Code**.

### 3.4 GRID CODE REVIEW PANEL

The **Licensee** will inform all **Users** of the names and addresses of the **Panel** Chairman and Member Secretary at least seven days before the first **Panel** meeting, and shall inform **Users** in writing of any subsequent changes.

Each **User** shall inform the **Panel** Member Secretary of the name and designation of their **Panel** Representative not less than 3 days before the first **Panel** meeting and shall inform the **Panel** Member Secretary, in writing, of any subsequent change.

The **Panel** shall be chaired by **Gridco** in its capacity as the transmission **Licensee** and consist of the following members:

1. A Chairman who is an officer from **Gridco**;
2. A Member (Secretary) who is an officer from **Gridco**;

A Single representative from each of the following:

3. One Member from **OHPC**;
4. One Member from **OPGC**;
5. One Member from **TTPS (NTPC)**;

6. One Member from **PowerGrid (ERLDC)**;
7. One Member from <sup>1</sup>[major **CPPs** (with installed capacity exceeding 50 MW), connected to the **Licensee's Transmission System**, for tenure of one year each on rotation basis to be notified by the **Licensee**, to represent all the **CPP** in the **State**].
8. One Member from each of the **Distribution Companies** <sup>3</sup>[.....]

<sup>2</sup>[Further, one representative from **EREB** may participate in the Review **Panel** as a special invitee]

<sup>4</sup>[One representative from **OERC** may attend the meeting as an observer.]

The Rules to be followed by the **Panel** in conducting their business shall be formulated by the **Panel** themselves and shall be approved by the **OERC**. The **Panel** will meet at least once in <sup>5</sup>[six] months.

The functions of the **Panel** are as follows:

- i. To keep the **Grid Code** and its workings under scrutiny and review.
- ii. To analyse any major grid disturbances soon after the occurrence and evolve any consequent revision to the **Grid Code**.
- iii. To consider all requests for amendment to the **Grid Code** which any **User** makes.
- iv. To publish recommendations for changes to the **Grid Code** together with the reason for the change and any objections, if applicable.
- v. To issue guidance on the interpretation and implementation of the **Grid Code**.
- vi. To examine problems raised by **Users**.

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

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1. Substituted "M/s NALCO shall be responsible for representing all **CPPs** and shall ensure that all their views are presented to the **Panel** for consideration represent all **CPP's** in the **State**" in Rev. 1

2. Inserted in Rev. 2

3. Deleted "(presently Gridco)" in Rev. 5.

4. Addendum in Rev.8

5. Substituted "three" in Rev.8

### 3.5 GRID CODE REVIEW AND REVISIONS

The Member Secretary shall present all proposed revisions of the **Grid Code** to the **Panel** for its consideration.

The **Licensee** shall send to the **Commission** following reports at the conclusion of each Review Meeting of the **Panel**.

- (a) A report on the outcome of such review.
- (b) Any proposed revisions to the **Grid Code** as the **Licensee** reasonably thinks necessary for the achievement of the objectives referred to in sub-paragraph (b) of condition 17.1 of the **Transmission and Bulk Supply Licence**.
- (c) All written representations or objections from **Users** arising during the review.

All revisions to the **Grid Code** shall require approval of <sup>1</sup>[the] **Commission**. The **Licensee** shall publish revisions to the **Grid Code** once approved by the **OERC**.

The **Licensee** shall present proposals to the **OERC** to allow relaxation, where **Users** have difficulties in meeting the **Grid Code** requirements.

The revision number and date of issue shall appear on <sup>2</sup>[relevant] <sup>3</sup>[pages] of the **Grid Code**.

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1. Inserted "the" in Revision 3  
2. Substituted "every" in Revision 3  
3. Substituted "page" in Revision 3



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 revised version that lists the number of every changed sub-**Section**. <sup>1</sup>[-----] The **Licensee** shall keep an up-to-date list of the recipients and locations of all serviced copies of the **Grid Code**.

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1.Deleted “together with a brief statement of change” in Revision 3

## 4. SYSTEM PLANNING

### 4.1 INTRODUCTION

This **Section** identifies the method for data submissions by **Users** to the **Licensee** for the planning and development of the **Transmission System**. This **Section** also specifies the technical and design criteria and procedure to be applied by the **Licensee** in the planning and development of the **Transmission System**.

A requirement for reinforcement or extension of the **Transmission System** may arise for a number of reasons, including but not limited to the following.

- i. Development on a **User's** system already connected to the **Transmission System**.
- ii. The introduction of a new **Connection** point between the **User's** system and the **Transmission System**.
- iii. A general increase in system capacity to remove operating constraints and maintain standards of security.
- iv. Stability considerations.
- v. Cumulative effect of any of the above.

Accordingly, the reinforcement or extension of the **Transmission System** may involve work at an entry or exit point (**Connection** point) of a **Generator** or **Distribution Company** to the **Transmission System**.

Since development of all **Users'** systems must be planned well in advance to permit consents and wayleaves to be obtained and detailed engineering design / construction

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work to be completed, the **Licensee** will require information from **Users** and vice versa. To this effect the Planning Code imposes a time scale, for exchange of necessary information between the **Licensee** and **Users** having regard, where appropriate, to the confidentiality of such information.

## 4.2 OBJECTIVE

The provisions of this section are intended to enable the **Licensee** in consultation with **Users**, to provide an efficient, co-ordinated, secure and economical **Transmission System** to satisfy requirement of future demand.

## 4.3 PERSPECTIVE PLAN

**4.3.1** The **Licensee** is charged with the responsibility to prepare and submit a longterm (10 years) plan to the **Commission** for generation expansion and for **Transmission System** expansion to meet the future demand under condition 20 of the **Licence**.

**4.3.2** For fulfilment of the above requirement the **Licensee** shall:

- i. Forecast the demand for power within the **Area of supply** in each of the succeeding 10 years and provide to the **Commission** details of the demand forecasts, data, methodology and assumptions on which the forecasts are based.
- ii. Prepare a least cost generation plan for the **State** to meet the 10 years load demand as per the forecast, after examining the economic, technical and environmental aspects of all available alternatives taking into account the existing contracted generation resources and effects of demand side management.



- iii. Prepare a longterm (10 years) plan for the **Transmission System** compatible with the above load forecast and generation plan <sup>1</sup>[in consultation with **CEA**. Central Transmission Utility (CTU) shall have to be consulted in connection with systems to evacuate power from Inter-state **Transmission System**.]

#### 4.4 PLANNING STANDARDS AND PROCEDURES

The **Transmission System** shall be planned in accordance with the **Transmission System** planning and security standards under condition 20 of the **Licence**.

The generation expansion planning shall be carried out in accordance with the power supply planning and security standards under condition 20 of the **Licence**.

#### 4.5 PLANNING RESPONSIBILITY

**4.5.1** The primary responsibility of load forecasting within its area rests with each of the **Distribution Companies**. The **Distribution Companies** shall determine peak load and energy forecasts of their respective areas for each category of loads for each of the succeeding <sup>2</sup>[5] years and submit the same annually by 31st <sup>3</sup>[December] to the **Licensee** along with details of the demand forecasts, data, methodology and assumptions on which the forecasts are based. The load forecasts shall be made for each of the interconnection points between the **Licensee** and **User** and shall include annual peak load and energy projections and daily load curve. The demand forecasts shall be updated annually or whenever major changes are made in the existing forecasts or planning. While indicating requirements of single consumer with large demands (5 MW or higher) the **Distribution Company** shall satisfy itself as to the degree of certainty of the demand materialising.

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1. Inserted in Rev. 7

2. Substituted "10" in Rev.8

3. Substituted "March" in Rev.8

**4.5.2** The **Licensee** is responsible for integrating the load forecasts submitted by each of the **Distribution Companies** and determining the long term (10 years) load forecasts for the **State** <sup>1</sup>[within 90 days of the date on which the **Distribution Companies** furnished all the required information consistent to provisions of this Code.] In doing so the **Licensee** may apply appropriate diversity factors, and satisfy itself regarding probability of materialisation of bulk loads of consumers with demands above 5 MW in consultation with that **Distribution Company** concerned.

**4.5.3** The **Licensee** may also review the methodology and assumptions used by the **Distribution Company** in making the load forecast, in consultation with the **Distribution Company**. The resulting overall load forecast will form the basis of planning for expansion of generation and the **Transmission System**.

<sup>2</sup>[**4.5.4** In the event, **Distribution Companies** failed to provide all the requisite information within the time frame and in accordance with the form provided by the **Licensee**, the **Licensee** shall approach to the **Commission** for a directive.]

#### **4.6 PLANNING DATA REQUIREMENT**

**4.6.1** To enable the **Licensee** to discharge its responsibilities under the **Licence**, to conduct System Studies and prepare perspective plans for electricity demand, generation and transmission as detailed in paragraph 4.3 of this **Section**, the **Users** shall furnish data to the **Licensee** from time to time as detailed under Data Registration **Section** and categorised as Planning Data (PD).

**4.6.2** To enable **Users** to co-ordinate planning, design and operation of their plants and systems with the **Transmission System** they may seek certain salient data of **Transmission system** as applicable to them, which the **Licensee** shall supply from time to time as detailed under Data Registration **Section** and categorised as Detailed System Data (Transmission).

#### <sup>3</sup>[**4.7 IMPLEMENTATION OF TRANSMISSION PLAN**

The actual programme of implementation of transmission lines, elements will be determined by **STU** in consultation with the concerned agencies. The completion of these works, in required time frame, shall be ensured by **STU** through the concerned agency.]

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1 & 2. Inserted in Rev.8

3.Addendum in Rev.10

## 5. CONNECTION CONDITIONS

### 5.1 INTRODUCTION

**Connection Conditions** specify the technical, design and operational criteria which must be complied with by any **User** connected to the **Transmission System**.

### 5.2 OBJECTIVE

The objective of this **Section** is to ensure the following:

- i. All **Users** or prospective **Users** are treated equitably.
- ii. Any new **Connection** shall not impose any adverse effects on existing **Users**, nor shall a new **Connection** suffer adversely due to existing **Users**.
- iii. By specifying minimum design and operational criteria, to assist **Users** in their requirement to comply with **Licence** obligations and hence ensure that a system of acceptable quality is maintained.
- iv. 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 SITE RESPONSIBILITY SCHEDULE

For every **Connection** to the **Transmission System** for which a **Connection Agreement** is required, a schedule of equipment shall be prepared by the **Licensee**

with information supplied by the respective **Users**. This schedule, called a Site responsibility Schedule, shall state the following for each item of equipment installed at the **Connection Site**:

- i. The ownership of equipment.
- ii. The responsibility for control of equipment.
- iii. The responsibility for maintenance of equipment.
- iv. The responsibility for operation of equipment.
- v. The manager of the site.
- vi. The responsibility for all matters relating to safety of persons at site.

An illustrative Site Responsibility Schedule is provided at **Appendix**.

**5.3.1** The **User** owning the **Connection** site shall provide reasonable access and other required facilities to another **User** whose equipment is installed at the **Connection** site for installation, operation and maintenance, etc.

#### **5.4 SYSTEM PERFORMANCE**

All equipment connected to the **Transmission System** shall be of such design and construction as to satisfy at least the requirements of the relevant Indian Standard Specification, where no Standard exists the appropriate **IEC** Standard or other International Standard will apply.

Installation of all electrical equipment shall comply with **IE Rules**.



For every new **Connection** sought, the **Licensee** shall specify the **Connection Point** and the voltage to be used, along with the metering and protection requirements as specified in the Metering and Protection **Sections**.

<sup>3</sup>[The **Transmission System** rated frequency shall be 50.00Hz and shall normally be controlled within the limits as per Indian Electricity Rules, 1956 as amended from time to time. The **Users** shall however be subject to the Grid discipline imposed by **SLDC** as per guidelines mutually agreed in **EREB** forum.]

<sup>4</sup>[The variation of voltages on the **Transmission System** may not be more than the voltage range specified in the Indian Electricity Rules, 1956 as amended from time to time.]

Insulation co-ordination of the **Users'** equipment shall conform to applicable Indian Standards/Codes. Rupturing capacity of switchgear shall not be less than that notified by the **Licensee** from time to time.

Protection schemes and Metering schemes shall be as detailed in the Protection & Metering **Sections** of the **Code**.

For existing **Power Stations**, the equipment for data transmission and communications shall be owned and maintained by the **Licensee**, unless alternative arrangements are mutually agreed.

For new **Power Stations** the equipment for data transmission and communications shall be owned and maintained by the respective **Generator**.

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1.Replaced "imposed by **SLDC**" in Rev. 2

2.Inserted in Rev. 2

3. Substituted "The **Transmission System** frequency shall not go beyond the range 50 Hz  $\pm$  3 %.  
The **User** shall however be subject to the grid discipline <sup>1</sup>[prescribed by **SLDC/ ERLDC**] as per guidelines mutually agreed with **EREB** <sup>2</sup>[/ **ERLDC**]." in Rev. 7

4. Substituted "Voltage variation on the **Transmission System** shall be in accordance with the provisions of Planning and Security Standards for **Transmission System**." in Rev. 7

## 5.5 CONNECTION POINT

### 5.5.1 Generator

Voltage may be 400/220/132 kV or as agreed with the **Licensee**.

Unless specifically agreed with the **Licensee** the **Connection** point shall be the outgoing feeder gantry of **Power Station** switchyard. Metering point shall be at the outgoing feeder. All the terminal communication, protection and metering equipment owned by the **Generator** within the perimeter of the **Generator's** site shall be maintained by the **Generator**. Other **Users'** equipment shall be maintained by the respective **Users**. From the outgoing feeder gantry onwards, all electrical equipment shall be maintained by the **Licensee**.

### 5.5.2 Distribution Company

Voltage may be 33/11 kV or as agreed with the **Licensee**.

The **Connection** point shall be the outgoing feeder gantry of the **Licensee's** sub-station. The metering point shall be at the outgoing feeder. All the terminal, communication, protection and metering equipment within the premises of the **Licensee** shall be maintained by the **Licensee**. From the outgoing feeder gantry onwards, all electrical equipment shall be maintained by the respective **Distribution Company**.

### **5.5.3 Eastern Regional Transmission System**

For the **Eastern Regional Transmission System**, the **Connection**, protection scheme, metering scheme, metering point and the voltage shall be in accordance with the mutual agreement between **PowerGrid** and the **Licensee**.

### **5.5.4 CPPs & Bulk Power Consumers**

Voltage may be 220/132/33 kV or as agreed with the **Licensee**.

Sub-stations are owned by **CPPs** and **Bulk Power Consumers**. The **Connection** point shall be the feeder gantry on their premises. The metering point shall be at the **Licensee's** sub-station or as agreed with the **Licensee**.

## **5.6 DATA REQUIREMENTS**

**Users** shall provide the **Licensee** with data for this **Section** as specified in the Data Registration **Section**.

## **5.7 PROCEDURE FOR APPLICATIONS FOR CONNECTION TO AND USE OF THE TRANSMISSION SYSTEM**

**5.7.1** Any **User** seeking to establish new or modified arrangements for **Connection** to and/or use of the **Transmission System** shall submit the following report, data and undertaking along with an application to the **Licensee**:

- i. Report stating purpose of proposed **Connection** and/or modification, **Connection** site, description of **Apparatus** to be connected or modification to **Apparatus** already connected.

- ii. Data as applicable and as listed in the Data Registration **Section**.
- iii. Confirmation that the prospective installation complies with the provisions in the <sup>1</sup>[Electricity Act, 2003].
- iv. Construction schedule and target completion date.
- v. An undertaking that the **User** shall abide by **Grid Code** and provisions of **IE Rules**, for installation and operation of the **Apparatus**.

**5.7.2** The **Licensee** shall normally make a formal offer to the **User** within 2 months of receipt of the application complete with all information as may reasonably be required, subject to provision in paragraph 5.7.5.

**5.7.3** The offer shall specify and take into account any works required for the extension or reinforcement of the **Transmission System** to satisfy the requirements of the **Connection** application and for obtaining statutory clearances, wayleaves as necessary.

**5.7.4** In respect of offers for modification of existing **Connection**, the terms shall take into account, the existing **Connection Agreement**.

**5.7.5**

- i. If the nature of complexity of the proposal is such that the prescribed time limit for making the offer is not adequate, the **Licensee** shall make a preliminary offer within the prescribed time limit indicating the extent of further time required with the consent of the **Commission** for more detailed examination of the issues.

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1. Substitutes “Indian Electricity Act, 1910” in Rev. 10

- ii. On receipt of the preliminary offer, the **User** shall indicate promptly whether the **Licensee** should proceed further to make a final offer within the extended time limit.

**5.7.6** All offers (other than preliminary offers) including revised offers shall remain valid for 60 days of issue of offer.

**5.7.7** The **Licensee** shall make a revised offer, upon request by a **User**, if necessitated by changes in data earlier furnished by the **User**.

**5.7.8** In the event of the offer becoming invalid or not being accepted by any **User** within the validity period, no further action shall be taken by the **Licensee** on the **Connection** applications.

**5.7.9** The **Licensee** may reject any application for **Connection** to and/or use of **Transmission System**:

- i. If such proposed **Connection** will violate any provisions under condition 22.4 of the **Transmission and Bulk Supply Licence**.
- ii. If the proposed works stated in the application do not lie within the purview of the **Licence** or do not confirm to any provision of the **Grid Code**.
- iii. If the applicant fails to give confirmation and undertakings according to sub-**Section 5.7.1 (iii) and 5.7.1 (v) of this Section**.

## 5.8 CONNECTION AGREEMENTS

A **Connection Agreement** shall include, as appropriate, within its terms and conditions the following:

- i. a condition requiring both parties to comply with the **Grid Code**;
- ii. details of **Connection** <sup>1</sup>[technical requirements with specific references to reactive power compensation / operation of **Generating Units** and **Power Station**, if any, and commercial arrangements, (in accordance with relevant provision of Indian Electricity Grid Code wherever applicable).;]
- iii. details of any capital related payments arising from necessary reinforcement or extension of the system;
- iv. a Site Responsibility Schedule;
- <sup>2</sup>[v. general philosophy, guide lines etc. on protection.]

## 5.9 APPENDIX

General format for Site Responsibility Schedule.

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1. Substituted "and/or use of system charges" in Rev. 7

2. Addendum in Rev. 7

CONNECTION CONDITIONS

SITE RESPONSIBILITY SCHEDULE

Name of Power Station/Sub-station: .....

Site Owner: .....

Tel. Number: .....

Fax Number: .....

Item of Plant/Apparatus 1	Plant Owner 2	Safety Responsibility 3	Control Responsibility 4	Operation Responsibility 5	Maintenance Responsibility 6	Remarks 7
..... kV Switchyard						
All equipment including busbars						
Feeders						
Generating Units						

## 6. OUTAGE PLANNING

### 6.1 INTRODUCTION

This **Section** describes the process by which the **Licensee** carries out the planning of **Transmission System Outages**, including interface co-ordination with **Users**.

### 6.2 OBJECTIVE

The objective of this **Section** is to define the process, which will allow the **Licensee** to optimise transmission **Outages** with generator and other **Users' Outages** while maintaining system security to the extent possible.

### 6.3 DEMAND ESTIMATION

Demand estimation is necessary both in the long time scale to ensure adequate system plant margins and ratings and in the shorter time scale to assist with frequency control (see Schedule and Despatch **Section**).

<sup>1</sup>[**Distribution Companies** and other agencies involved in bilateral exchanges shall provide to the **Licensee** their estimates of demand / export for Active Power(MW), Reactive Power(MVAr) and Energy Consumption(MU) at each **connection / External Interconnection** point for the next financial year by 31<sup>st</sup> December of each year on daily / weekly / monthly basis. The **Distribution Companies** shall intimate to **Licensee** the methodology used in producing their forecasts.

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1. Substituted "**Distribution Companies** shall provide to the **Licensee** their estimates of demand at each inter-connection for the period from July to June by 31st March of each year on a year ahead, month ahead and dayahead basis as required.

Based on this, the **Licensee** shall make monthly peak and **lean period** demand estimates for the year ahead, daily peak and **lean period** demand estimates for the month ahead and hourly demand estimates for the dayahead.

The **Licensee** shall use hourly generation summation figures and **CPP** import/export figures provided under **Section** 9, to meet the demand estimation." in Rev.5.



The **Licensee** shall use this data

- (i) to assist in determination of the generation schedule for next day;
- (ii) to determine the most onerous conditions affecting constraints and voltage performance for next week;
- (iii) to check Outage Plan viability for peak and **lean periods** for next month.

The daily / weekly / monthly data shall be in the form of 24 hourly averaged demand figures for each day / each day of week / each day of month.

The demand / export estimates provided by the **Distribution Companies** and other agencies involved in bilateral exchanges shall be updated as necessary and sent each month to the **Licensee** 15 days ahead on same daily / weekly / monthly basis.

The demand estimates shall be further updated and sent to **SLDC** in accordance with the provision of Section 7, Scheduling and Despatch.

The **Licensee** shall make its own demand forecast using hourly <sup>1</sup>[demand summation of each sub-station] and **CPP** import / export figures provided under Section 9 or by using suitable computer program, to compare with demand estimates provided by **Users**.

<sup>3</sup>[**SLDC** shall notify a Contact Person who shall be responsible for dayahead demand forecast. The official and residential telephone numbers of the Contact Person shall be intimated to all the Distribution Companies. Similarly all the Distribution Companies shall notify the Contact Person with telephone numbers and intimate **SLDC**. In case of change of Contact Person, it should be intimated to **SLDC** and vice versa.]

**Distribution Companies** shall provide to **SLDC** estimates of load that may be shed, when required, in discrete blocks with the details of the arrangements of such load sheddings.

<sup>2</sup>[While the demand estimation for operational purposes is to be done on a daily/weekly/monthly basis initially, mechanisms and facilities at **SLDC** shall be created at the earliest to facilitate on-line estimation for daily operational use.]

All data shall be collected in accordance with procedures agreed between the **Licensee** and each **User**.

**SLDC** shall maintain a database of **State** demand on <sup>4</sup>[a fifteen minutes] basis.

- 
- 1. Substituted "generation summation figures" in Rev. 7
  - 2. Addendum in Rev. 7
  - 3. Addendum in Rev. 9
  - 4. Substituted "an hourly" in Rev. 11

## 6.4 TRANSMISSION OUTAGE PLANNING PROCESS

SLDC shall produce a yearly transmission **Outage** programme for the <sup>1</sup>[next financial year].

All **Generators** <sup>8</sup>[/ **Distribution Companies** / **CTU**] shall provide **SLDC** with their proposed **Outage** programmes in writing for the <sup>2</sup>[next financial year] by 1st August each year.

<sup>9</sup>[.....]  
**Outage** programmes shall contain identification of unit <sup>10</sup>[ / Transmission Elements], **Outage** start date and duration of **Outage** <sup>11</sup>[and where there is flexibility, the earliest start date and latest finishing date.]

SLDC shall produce a draft **Outage** programme based on the information received from **Generators**, <sup>12</sup>[**STU**] and **Distribution Companies**, taking into account demand estimation and shall carry out <sup>13</sup>[System] studies as required.

SLDC shall inform <sup>4</sup>[**EREB**] <sup>6</sup>[**Secretariat** of its proposed **Outages** in writing by 30<sup>th</sup> November for each financial year.]

<sup>7</sup>[**EREB** secretariat will then come out with a draft outage programme for the next financial year by 31<sup>st</sup> December of each year for the Regional Grid.]

SLDC shall interact with all **Users** as necessary to review and optimise the draft plan, agree to any changes and produce an acceptable co-ordinated generation and transmission **Outage** plan by 1st February each year.

SLDC shall release the finally agreed transmission **Outage** plan, which takes account of **Regional** and **User** requirements, to all **Users** by 1st March each year.

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1. Substituted “period July to June” in Rev.5

2 & 3. Substituted “year ahead (July to June)” in Rev.5

4 & 5. Substituted “**ERLDC**” in Rev.5

6. Substituted “of its proposed outages by 1<sup>st</sup> November each year” in Rev.7

7. Substituted “<sup>5</sup>[**EREB**] shall inform **SLDC** of its proposed **Outages** that would affect the **Transmission System** by 1st November each year. in Rev.7

8,10,11,12 & 13 Addendum in Rev.10

9 Deleted “All **Distribution Companies** shall provide **SLDC** with their proposed **Outage** programmes in writing for the <sup>3</sup>[next financial year] by 1st August each year.” in Rev.10.

SLDC shall review the final **Outage** plan quarterly <sup>1</sup>[and monthly basis] in

consultation with **ERLDC**<sup>2</sup> / **EREB**] and **Users**, who shall be informed by **SLDC** of any proposed changes. <sup>4</sup>[**SLDC** shall review the monthly outage plan, generation schedule and other operational aspects related to System Operation in the monthly Power System Operational Co-ordination meeting to be held by the **Licensee**.]

**Users'** requests for additional **Outages** will be considered by **SLDC** and accommodated to the extent possible.

**SLDC** shall inform **Users** promptly of any changes that affect them.

<sup>3</sup>[Each **User** shall obtain the final approval from **SLDC** prior to availing an outage].

## **6.5 RELEASE OF CIRCUITS AND GENERATOR UNITS INCLUDED IN OUTAGE PLAN**

Notwithstanding provision in any approved **Outage** plan, no cross boundary circuits or **Generating Unit** of a **Generator** shall be removed from service without specific release from **SLDC**. This restriction shall not be applicable to individual **Generating Unit** of a **CPP**.

Once an **Outage** has commenced, if any delay in restoration is apprehended, **SLDC** or **User** concerned shall inform the other party promptly together with revised estimation of restoration time.

## **6.6 DATA REQUIREMENTS**

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

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1,2 & 3 Addendum in Rev. 10

4. Addendum in Rev. 11

# **7. SCHEDULE AND DESPATCH**

## **7.1 INTRODUCTION**

This **Section** specifies the procedure to be adopted for the scheduling and despatch of **Generating Units** to meet demand and **Drawal** allocation requirements.

<sup>2</sup>[It further sets down the procedures to be followed by **Users** so that the **Licensee** can meet its daily Drawal Schedule whilst ensuring that Reactive Power drawals/returns are minimised.]

## 7.2 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 the responsibilities of **Users** to supply the necessary data and to comply with that schedule.

<sup>3</sup>[This **Section** details the responsibilities of **Users** to ensure that **SLDC** can meet its obligations to follow the daily Drawal Schedule.]

## 7.3 GENERATION SCHEDULING

All **Generators** shall provide the <sup>4</sup>[fifteen minutes block] MW/MVAr availability (00.00 - 24.00 hours) of all **Generating Units**, to **SLDC** on the dayahead basis by 10.00 hours. **CPPs** <sup>1</sup>[.....] shall provide the <sup>5</sup>[fifteen minutes block] import/export figures on the dayahead basis by 10.00 hours.

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**.

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1. Deleted "Generators" in Rev.1

2 & 3. Inserted in Rev.5.

4 & 5. Substituted "hourly" in Rev. 11

**SLDC** shall obtain from **ERLDC**, <sup>1</sup>[capabilities and <sup>5</sup>[fifteen minutes block] MW entitlements from **ISGS** and <sup>6</sup>[fifteen minutes block] MW and MWH in the case of] Chukha Hydro **Power Station**, by 11.00 hours on a dayahead basis. <sup>2</sup>[**SLDC** will review it after looking at availability data provided by **Generators**, export figures from **CPPs**, the <sup>7</sup>[fifteen minutes block] demand estimates from **Distribution**

**Companies** and any bilateral exchanges. **SLDC** will advise **ERLDC** by 15.00 hours of its Drawal Schedule for each **ISGS** and Chukha Hydro Power Station, in which the **Licensee** has shares.] In preparation of the schedule, **SLDC** shall take into account of the relative commercial costs to the **Licensee** of the operation of Generation units.

<sup>3</sup>[**SLDC** will receive <sup>8</sup>[fifteen minutes block] "net Drawal Schedule" in MW from **ERLDC** by 17.00 hours for the next day (00.00 hours to 24.00 hours) as summation of the station-wise ex-power plant drawal schedules for all **ISGS** and Chukha, after deduction of apportioned transmission losses (estimated).]

**SLDC** shall intimate the generation schedule / import schedule for the following day to all **Generators / CPPs** <sup>4</sup>[by 18.00 hours].

**Generators** shall promptly report to **SLDC**, changes of **Generating Unit** availability or capability, or any unexpected situation, which could affect its operation. All **CPPs** shall similarly report regarding their export to the **Licensee**.

**SLDC** shall advise **Users** as soon as possible of any necessary rescheduling.

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1. Substituted "the hourly MW entitlements from Central Generating Stations and" in Rev.5.

2. Substituted "**SLDC** shall produce a dayahead hourly generation schedule after consolidation of the data provided by the **Generators** and **ERLDC**. It will take into account the hourly demand estimates and latest planned **Drawal** schedule agreed with **ERLDC**." in Rev.5.

3. Inserted in Rev.5.

4. Substituted "(including any **Generating Unit** not required to run) by 16.00 hours." in Rev.5.

5, 6, 7 & 8 Substituted "hourly" in Rev. 11

<sup>1</sup>[If **Generators** or **CPPs** need to change availability, **SLDC** to inform **ERLDC** by 22.00 hours.

**SLDC** shall receive final Drawal Schedule from **ERLDC** by 23.00 hours.]

**SLDC** shall prepare the dayahead generation schedule keeping in view the followings:

- i. **Transmission System** constraints from time to time.
- ii. <sup>5</sup>[Fifteen minutes block] 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 **Generators**, <sup>2</sup>[**ISGS**] and **CPPs** together with constraints, <sup>3</sup>[if any,] in each case.
- v. Overall economy to the **Licensee** and Customers.

**SLDC** shall instruct **Generators** to hold capacity reserves (spinning and/or standby) to the agreed <sup>4</sup>[**ERLDC**] guidelines or as determined for local conditions.

**SLDC** may also require the **Generators/CPPs** to generate MVar within their respective capability limits to hold station bus bar voltages at specified levels.

- 
1. Inserted in Rev.5.
  2. Substituted "Central Sector Generators" in Rev. 7
  3. Inserted in Rev. 7
  4. Substituted "**EREB**" in Rev. 10
  5. Substituted "Hourly" in Rev. 11

## 7.4 GENERATION DESPATCH

All **Generators** shall regulate generation and **CPPs** regulate their export according to the daily generation schedule.

All **Generating Units**,<sup>3</sup>[.....] other than those in a **CPP**, will be subject to central despatch instructions. **CPPs** will be subject to these instructions as applicable to their respective exports to the **Licensee**.

**SLDC** will despatch by instruction all generation and imports from **CPPs** according to the<sup>4</sup>[fifteen minutes block] dayahead generation schedule, unless rescheduling is required due to unforeseen circumstances.

<sup>2</sup>[On the day of operation (00.00 to 24.00 hours), in the event of a contingency, **SLDC** may revise their Drawal Schedule from any / all **ISGS** and Chukha Hydro **Power Station** within entitlement. **ERLDC** will revise and issue Drawal Schedule in consultation with **SLDC**. All such revisions shall be effective one hour after first advice given to **ERLDC**.]

In absence of any despatch instructions by **SLDC**, **Generators** and **CPPs** shall generate/export according to the dayahead generation schedule.

Despatch instructions shall be in standard format. These instructions will recognise declared availability and other parameters, which have been made available by the **Generator** to **SLDC**. These instructions shall include time, **Power Station**, **Generating Units** (total export in the case of **CPP**), name of operators sending and receiving the same.

Despatch instructions may include:

- i. To switch a **Generator** into or out of service.
- ii. Details of reserve to be carried on an unit.
- iii. To increase or decrease MVAR generation to assist with voltage<sup>1</sup>[profile].
- iv. To begin pre-planned **Black Start** procedures.
- v. To hold spinning reserve.
- vi. To hold **Generating Units** on standby.

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1. Substituted "control" in Rev. 2  
2. Inserted in Rev.5.  
3. Deleted "above 5MW" in Rev. 10  
4. Substituted "hourly" in Rev. 11

## 7.5 COMMUNICATION WITH GENERATORS

Despatch instructions shall be issued by E-Mail/telephone, confirmed by exchange of names 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, teleprinter or otherwise.

## 7.6 ACTION REQUIRED BY GENERATORS

All **Generators** and **CPPs** shall comply promptly with a despatch instruction issued by **SLDC** unless this action would compromise the safety of plant or personnel.

The **Generator** and **CPPs** shall promptly inform **SLDC** in the event of any unforeseen difficulties in carrying out an instruction.

All **Generating Units** shall have **Automatic Voltage Regulator (AVR)** in service,<sup>1</sup>[with appropriate settings. In particular, if a **generating unit** of over fifty (50) MW size is required to be operated without its **AVR** in service, the **SLDC** shall be immediately intimated about the reason and duration, and its permission obtained. Power System Stabilisers (PSS) in **AVRs** of **generating units** (wherever provided), shall be properly tuned as per a plan prepared for the purpose by the **STU** from time to time. **STU** will be allowed to carryout tuning / checking of PSS wherever considered necessary.]

All **Generating Units** <sup>2</sup>[of over fifty (50) MW size] shall have the governor available and in service and must be capable of automatic increase or decrease in output within the normal declared frequency range and within their respective capability limit. <sup>3</sup>[If the **generating unit** is required to be operated without its governor in normal operation, the **SLDC** / **ERLDC** shall be immediately intimated about the reason and duration of such operation.]

**Generators** shall immediately inform **SLDC** by telephone of any loss or change (temporary or otherwise) to the operational capability of any **Generating Unit** which is synchronised to the system or which is being used to maintain system reserve. **Generators** shall inform **SLDC** any removal of **AVR** and/or governor from service with reasons.



1, 2 & 3 Addendum in Rev. 10

**CPPs** shall similarly inform any change in status affecting their ability in complying with despatch instructions.

**Generators** shall not de-synchronise **Generating Units**, other than in respect of **CPPs**, without instruction from **SLDC** except on the grounds of safety to plant or personnel, which shall be promptly reported to **SLDC**.

<sup>1</sup>[**Generators** and **CPPs** shall report any abnormal voltage and frequency related operation of **Generating Units** / feeders promptly to **SLDC**].

**Generators** shall not synchronise **Generating Units**, other than in respect of **CPPs**, without instruction from **SLDC**. <sup>2</sup>[In emergency situations, the **Generator** may synchronise Units with the grid without prior intimation in the interest of the operation of the grid following standing institutions developed for such purpose under “contingency planning”]

Should a **Generator** fail to comply with any of the above provisions, it shall inform **SLDC** promptly of this failure.

## 7.7 ENHANCEMENT OF SCHEDULE AND DESPATCH PROCEDURE

Schedule and despatch procedures shall be suitably enhanced to cater to tariff agreements as soon as any such agreement is reached with **Generators**, **IPPs**, and **CPPs**.

## 7.8 DATA REQUIREMENTS

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

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1. Substituted “**Generators** and **CPPs** shall report any low or high frequency trip operation if applicable, promptly to **SLDC**” in Rev.2  
2. Addendum in Rev. 2

## 8. FREQUENCY AND VOLTAGE MANAGEMENT

### 8.1 INTRODUCTION

This **Section** describes the method by which all **Users** of the **Transmission System** shall co-operate with the **Licensee** in contributing towards effective control of the system frequency and managing the <sup>2</sup>[-----] voltage of the **Transmission System**.

The **Licensee's** System normally operates in synchronism with the **Eastern Region** grid and **ERLDC** has the overall responsibility of enforcing grid discipline and managing the frequency in the **Region**. The constituents of the **Region** are required to follow the instructions of **ERLDC** for the backing down generation, regulating load, etc. to meet the objective. **SLDC** shall accordingly instruct **Generating Units** and **CPPs** to regulate generation/export and hold reserves of active and reactive power, within their respective declared parameters. **SLDC** shall also regulate load <sup>1</sup>[and bilateral exchange] as may be necessary to meet this objective.

**Transmission System** voltage levels can be affected by **Regional** operation. High voltages generally occur during high frequency and vice versa, therefore system frequency regulation must be recognised as an important method of voltage control. The **Licensee** shall optimise voltage management by adjusting transformer taps to the extent available and switching of circuits/reactors and other operational steps. **SLDC** will instruct **Generating Units** and **CPPs** to regulate MVar generation within their declared parameters. **SLDC** shall also instruct **Distribution Companies** to regulate demand if necessary.

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1. Inserted in Rev.5.

2. Deleted "EHT" in Rev. 7

## 8.2 OBJECTIVE

The objectives of this **Section** are as follows:

- i. To define the responsibilities of all **Users** in contributing to frequency management.
- ii. To define the actions required to enable the **Licensee** to maintain **Transmission System** voltages and frequency within acceptable levels in accordance with <sup>1</sup>[IEGC(Indian Electricity Grid Code)], **CEA** guidelines, and <sup>2</sup>[Transmission] Planning and Security Standards, <sup>3</sup>[as appropriate.]

## 8.3 FREQUENCY MANAGEMENT

<sup>4</sup>[**SLDC** in co-ordination with **ERLDC**, shall make all possible efforts to ensure that the grid frequency always remains within the 49.0 to 50.5 Hz band, the frequency range within which steam turbines conforming to the **IEC** specifications, can safely operate]. It shall however be the objective to maintain operational frequency within the limits as specified in **Connection Conditions**. Any frequency deviation beyond the normal range shall be jointly identified by **SLDC** and **ERLDC** and appropriate action taken.

<sup>5</sup>[**SLDC** shall always endeavour to restrict net drawal to within the Drawal Schedule whenever system frequency is below 49.5 Hz. When frequency falls below 49.0 Hz, **SLDC** shall explore and utilize internal generation capacity and then requisite load shedding as agreed with **Distribution Companies**, shall be carried out in the **State** by **SLDC** to curtail the over-drawal.]

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1 & 2. Inserted in Rev.5.

3. Substituted "for **Transmission System**" in Rev.5.

4. Substituted "The normal frequency range will be 50 Hz  $\pm$  3%." in Rev.5.

5. Inserted in Rev.5

#### 8.4 RESPONSIBILITIES

**SLDC** shall monitor actual **Drawal** against scheduled **Drawal** and regulate internal generation/demand to maintain this schedule.

**Generators, CPPs** and bilateral agencies shall follow the despatch instructions issued by **SLDC**.

**Distribution Companies** and bilateral agencies shall co-operate with **SLDC** in managing load on instruction from **SLDC** as required.

##### 8.4.1 Falling frequency

<sup>1</sup>[Whenever system frequency is below 49.5 Hz, **Gridco** through **SLDC** shall endeavor to restrict their net **drawal** from the Regional Grid within their drawal schedules. When the system frequency is below 49.0 Hz, requisite load shedding shall be carried out by **SLDC** by instructing **Distribution Companies** as per prearranged schedules.

All **Users** shall provide automatic under-frequency load shedding in their respective systems, to arrest frequency decline that could result in a collapse / disintegration of the grid, as per the plan separately finalised by the concerned REB forum, and shall ensure its effective application to prevent cascade tripping of **Generating Units** in case of any contingency. All **Users** shall ensure that the under frequency load shedding / is-landing schemes are functional and no under frequency relay is by-passed or removed without prior consent to **SLDC**, which shall independently check and keep a record of its findings.]

##### 8.4.2 Rising frequency

Under rising frequency conditions, **SLDC** shall take appropriate action to issue instructions to **Generators / CPPs**, in co-ordination with **ERLDC**, to arrest the rising frequency and restore frequency within normal range.

#### 8.5 VOLTAGE MANAGEMENT

The **Licensee** shall carry out load flow studies 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 **Generators** and **CPPs** to maintain specified voltage levels at interconnecting points.

The **Licensee** shall co-ordinate with the **Distribution Companies** to determine voltage levels at the interconnection points with **Distribution Companies**.

**SLDC** shall continuously monitor 400/220/132 kV voltage levels at strategic sub-stations.

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1. Substituted "Under falling frequency conditions, **SLDC** shall take appropriate action to issue instructions, in co-ordination with **ERLDC**, to arrest the falling frequency and restore it to be within normal range. Such instructions may include despatch instructions to **Generators / CPPs**, and/or instructions to **Distribution Companies** and bilateral agencies to reduce load demand by appropriate manual and / or automatic load sheddings." in Rev. 7

SLDC shall, in co-ordination with ERLDC, regulate voltage levels so that there is minimal reactive **drawal** from **Regional Transmission System**.

<sup>3</sup>[SLDC to minimise VAR **drawal** at an interchange point when the voltage at that point is below 95% of rated and shall not return VARS when the voltage is above 105%. ICT taps at the respective drawal points may be changed to control VAR interchange if request made by SLDC to RLDC, but only at reasonable intervals].

The <sup>1</sup>[SLDC] shall take appropriate measures to control **Transmission System** voltages, which may include but not be limited to <sup>2</sup>[transformer tap changing and use of MVar reserves with **Generating units** and **CPPs** within technical limits agreed to between the **Licensee** and **Generating units/CPPs**].

**Generators** and **CPPs** shall inform SLDC of their reactive reserve capability promptly on request.

**Generators** shall make available to SLDC the up-to-date capability curves for all **Generating Units**, as detailed in **Section 5**, indicating any restrictions, to allow accurate system studies and effective operation of the **Transmission System**. **CPPs** shall similarly furnish the net reactive capability that will be available for export to / import from **Transmission System**.

**Distribution Companies** shall participate in voltage management by regulating their **Drawal** as may be required.

<sup>4</sup>[The **Distribution Company** shall endeavor to minimize the VAR **drawal** at an inter-connection point.]

## 8.6 GENERAL

Close co-ordination between **Users** and the **Licensee** shall exist at all times for the purposes of effective frequency and voltage management.

- 
1. Substituted "**Licensee**" in Rev. 1
  2. Substituted "the use of **Generating unit** MVar reserves within the limits agreed between the **Licensee** and **Generators** and **CPPs** and transformer tap changing" in Rev. 1.
  3. Inserted in Rev.5.
  4. Addendum in Rev. 7

## 9. MONITORING OF GENERATION AND DRAWAL

### 9.1 INTRODUCTION

The monitoring by **SLDC** of **Generating Unit** output, and active and reactive reserve capacity is important to evaluate the performance of plant.

The monitoring of scheduled **Drawal** is important to ensure that the **Licensee** contributes towards improving **Regional** performance, and observes grid discipline.

### 9.2 OBJECTIVE

The objective of this **Section** is to define the responsibilities of all **Users** in the monitoring of **Generating Unit** reliability and performance, and the **Licensee's** compliance with the scheduled **Drawal**.

### 9.3 MONITORING PROCEDURE

**9.3.1** For effective operation of the **Transmission System**, it is important that a **Generator's** declared availability is realistic and that any departures are continually fed back to the **Generator** to help effect improvement.

The **Licensee** 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 **Generator's** declared availability may not match the actual availability or declared output does not match the actual output.

The **Licensee** shall inform a **Generator**, 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**. This more stringent monitoring may be carried out by **SLDC**, if agreement is not reached on the **Generating Unit** performance. The results of the stringent monitoring will be reported by **SLDC** to the **Generator**. Continual discrepancies shall be resolved at higher level with a view to either improving performance, providing more realistic declarations or correcting any breach of **Connection Conditions**.

**Generators** shall provide to **SLDC** hourly generation summation outputs where no automatically transmitted metering or **SCADA** equipment exists. **CPPs** shall provide to **SLDC** hourly export/import MW and MVA<sub>r</sub>.

The **Generator** shall provide other logged readings, that **SLDC** may reasonably require, for monitoring purposes where **SCADA** data is not available.

### **9.3.2 Generating Unit Trippings**

**Generators** 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 trippings, including the reasons with a view to demonstrating the effect on system performance and identifying the need for remedial measures.

**Generators** shall submit a more detailed report of **Generating Unit** trippings to **SLDC** monthly.

### **9.3.3 Monitoring of Drawal**

**SLDC** shall continuously monitor actual MW **Drawal** against that scheduled, by use of **SCADA** equipment where available, or otherwise using available metering. **SLDC** shall request **ERLDC** and adjacent States as appropriate to provide any additional data required to enable this monitoring to be carried out.

**SLDC** shall continuously monitor the actual MVar **Drawal** to the extent possible. This will be used to assist in **Transmission System** voltage management.

### **9.3.4 Data Requirements**

**Generators** and **CPPs** shall submit data to **SLDC** as listed in Data Registration **Section**, termed as Monitoring of Generation.



## 10. CONTINGENCY PLANNING

### 10.1 INTRODUCTION

This **Section** describes the recovery process to be followed by all **Users** in the event of **Transmission System** or **Regional System** total or partial blackouts.

### 10.2 OBJECTIVE

The objective of this **Section** is to define the responsibilities of all **Users** to achieve the fastest recovery in the event of a **Transmission System** or **Regional System** blackout, taking into account essential loads, **Generator** capabilities and system constraints.

### 10.3 STRATEGY

The situation prevailing prior to the occurrence of the contingency, e.g. availability of specific generators, transmission circuits and load demands, will largely determine the restorations process to be adopted in the event of a total blackout. **ERLDC** and **SLDC** shall co-ordinate to determine the extent of the problem. **SLDC** shall advise all **Users** of the situation and follow the strategy as outlined below for restoration.

**User's** persons authorised for operation and control shall be available at **User's** end for communication and acceptance of all operational communications throughout the contingency. Communication channels shall be restricted to operational communications only till normalcy is restored.

### **10.3.1 Total Regional Blackout**

**SLDC** shall instruct all relevant **Generators** having **Power Stations** with **Black Start** capability to commence their pre-planned **Black Start** procedure. **SLDC** may require **CPPs** to extend start-up power supply to **Generators** as may be feasible.

**SLDC** shall prepare the **Transmission System** for restoration by creating discrete power islands with no interconnection. Close co-ordination with concerned **Distribution Companies** shall be maintained during the restoration process to arrange for discrete demand blocks becoming available to stabilise **Generating Units**, as these become available in individual islands. **Generators** to whom start up power supply is made available shall sequence their start up to match their auxiliary power demand with supply available.

**Generators** shall inform **SLDC** as **Generating Units** become available to take load, in order that the **Licensee** may assess the MW demand which the **Generating Unit** is likely to pick up on circuit breaker closure.

**SLDC** shall co-ordinate with **Generators** and **Distribution Companies** to:

- i. Form discrete power islands with one **Generating Unit** feeding some local demand.
- ii. Extend islands by adding more **Generating Units** and more demand in a co-ordinated manner maintaining load generation balance.
- iii. Synchronise islands to form a larger, more stable island.

SLDC shall, taking into account sites where system synchronisers are available, gradually extend the synchronisation until all demand is restored.

SLDC shall utilise any **Regional** or interstate assistance available, if appropriate, at any time to assist in the above process.

<sup>1</sup>[SLDC shall prepare a detailed procedure for **Black Start** of its own System in consultation with ERLDC. The **Black Start** facility as and when upgraded shall be made available to ERLDC for updating the Regional Black Start Procedure.]

### 10.3.2 Total Transmission System Blackout

SLDC shall carry out the strategy as for total **Regional** blackout.

SLDC shall carry out simultaneous action to utilise radial feeders from **Eastern Region** and neighbouring States.

### 10.3.3 Partial Transmission System Blackout

SLDC shall ensure with **Users** that security of the healthy part of the **Transmission System** is maintained.

SLDC shall gradually extend the healthy system to provide start-up power to appropriate **Generating Units**.

SLDC with close co-ordination with **Distribution Companies** and **Generators** shall gradually restore demand to match generation as it becomes available.

All **Users** shall take care to ensure load generation balance is maintained at all times under SLDC's direction.

#### 10.4 RESPONSIBILITIES

**SLDC** shall maintain a record of **Power Station Black Start** capability and associated **Power Station Black Start** plans.

The **Licensee** shall prepare, distribute and maintain up-to-date **Black Start** procedures covering the restoration of the **Transmission System** following total or partial blackout.

**Users** shall agree regarding **Black Start** procedures with the **Licensee** and promptly inform **SLDC** when unable to follow the procedure.

**SLDC** shall be responsible for directing the overall **Transmission System** restoration process by co-ordination with all **Users** and **ERLDC**.

**Distribution Companies** shall be responsible for sectionalising the **Distribution System** into discrete, unconnected blocks of demand. They shall advise **SLDC** of the amount of MW likely to be picked up by the synchronising **Generator**.

**Generators** shall be responsible for commencing their planned **Black Start** procedure on the instruction of **SLDC** and steadily increasing their generation according to the demand which **SLDC** is able to make available.

## 10.5 SPECIAL CONSIDERATIONS

During the restoration process following **Transmission System** or **Regional System** blackout conditions, normal standards of voltage and frequency shall not apply.

A list of essential loads and priority of restoration is shown in the **Appendix**.

**Distribution Companies** with essential loads shall separately identify non-essential components of such loads, which may be kept off during System contingencies. **Distribution Companies** shall draw up an appropriate schedule with corresponding load blocks in each case. The non-essential loads can be put on only when system normalcy 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 in-appropriate 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.

## 10.6 APPENDIX

Essential loads and priority of restoration.

## CONTINGENCY PLANNING

## ESSENTIAL LOADS AND PRIORITY OF RESTORATION

Priority	Type of Load	Name of Sub-station
1.	<b>Mining</b>	Nandira Brajrajnagar Chainpal
2.	<b>Railway</b>	Barjamada Rourkela Rajgangapur Jharsuguda Jaynagar <sup>1</sup> [Kaipadar (from Khurda S/s) Solari (from Balugaon S/s) Jagannathpur (from Narendrapur S/s) Jaleswar (from Jaleswar S/s) Meramundali (from Meramundali S/s) Rambha (from Chhatrapur S/s)]
3.	<b>Port &amp; Industrial</b>	Paradeep Port Rourkela Steel Plant Paradeep Phosphates FCI, Talcher JCL, Ganjam
4.	<b>Important Cities</b>	Bhubaneswar Cuttack Berhampur Sambalpur Rourkela Balasore

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1. Addendum in Rev. 10

# 11. CROSS BOUNDARY SAFETY

## 11.1 INTRODUCTION

This **Section** sets down the requirements for maintaining safe working practices associated with cross 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.

## 11.2 OBJECTIVE

The objective of this **Section** is to achieve agreement and consistency on the principles of safety as prescribed in the **IE Rules** when working across a control boundary between the **Licensee** and another **User**.

## 11.3 CONTROL PERSONS

The **Licensee** and all **Users** shall nominate suitably authorised persons to be responsible for the co-ordination of safety across that company boundary. These persons shall be referred to as **Control Persons**.

## 11.4 PROCEDURE

The **Licensee** shall issue a list of **Control Persons** (names, designations and telephone numbers) to all **Users** who have a direct control boundary with the **Licensee**. This list shall be updated promptly whenever there is change of name, designation or telephone number.

All **Users** with a direct control boundary with the **Licensee** shall issue a similar list of their **Control Persons** to the **Licensee**, which shall be updated promptly whenever there is a change to the **Control Persons** list.

Whenever work across a control boundary is to be carried out, the **Control Person**, of the **User** (which may be the **Licensee**), wishing to carry out work shall directly contact the other relevant **Control Person**. Code words will be agreed at the time of work to ensure correct identification of both parties.

Contact between the **Control Persons** shall normally be by direct telephone. Should the work extend over more than one shift the **Control Person** shall ensure that the relief **Control Person** is fully briefed on the nature of the work and the code words in operation.

The **Control Persons** 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.

Work shall not commence until the **Control Person**, of the **User** (which may be the **Licensee**), wishing to carry out the work, is satisfied that all the safety precautions have been established. This **Control Person** shall issue agreed safety documentation to the working party to allow work to commence.

When work is completed and safety precautions are no longer required, the **Control Person** who has been responsible for the work being carried out shall make direct contact with the other **Control Person** to request removal of those safety precautions.



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 **Control Persons**, and return of agreed safety documentation from the working party has taken place.

The **Licensee** shall develop an agreed written procedure for cross boundary safety and continually update it.

Any dispute concerning Cross Boundary Safety shall be resolved at an appropriate higher level of authority.

## 11.5 SPECIAL CONSIDERATIONS

For cross boundary circuits all **Users** shall comply with the agreed safety rules which must be in accordance with **IE Rules**.

All equipment on cross boundary 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.

Each **Control Person** shall maintain a legibly written safety log, in chronological order, of all operations and messages relating to safety co-ordination sent and received by <sup>1</sup>[himself]. All safety logs shall be retained for a period of not less than <sup>2</sup>[5] years.

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1.Substituted "themselves" in Revision 3

2.Substituted "10" in Revision 3

## 12. OPERATIONAL EVENT/ACCIDENT REPORTING

### 12.1 INTRODUCTION

This **Section** describes the requirements for reporting in writing incidents, which were initially reported orally by / to other **Users**.

### 12.2 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 on the **Transmission System**.

### 12.3 REPORTABLE INCIDENTS

Typical examples of reportable incidents that could affect the **Transmission System** are the following:

- i. Exceptionally high/low system voltage or frequency.
- ii. Serious equipment problem, e.g. major circuit, transformer or bus-bar.
- iii. Loss of major **Generating Unit**.
- iv. System split, **Transmission System** breakaway or **Black Start**.
- v. Major fire incidents.
- vi. Major failure of protection.
- vii. Equipment and transmission line overload.
- viii. Excessive **Drawal** deviations.
- ix. Minor equipment alarms.

The last two reportable incidents are typical examples of those, which are of lesser consequence, but which still affect the **Transmission System** and can be reasonably classed as minor. They will require corrective action but may not warrant management reporting until a later, more reasonable time.

## 12.4 REPORTING PROCEDURE

### 12.4.1

- i. All reportable incidents occurring in lines and equipment of 11 kV and above <sup>6</sup>[at grid sub-stations] shall promptly be reported orally by the **User** whose equipment has experienced the incident (The Reporting **User**) to any other significantly affected **Users** and to <sup>1</sup>[**SLDC**].
- ii. Within 1 (one) hour of being informed by the Reporting **User**, <sup>2</sup>[**SLDC**] may ask for a written report on any incident.
- iii. 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 <sup>3</sup>[**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.

In other cases the Reporting **User** shall submit a report within 5 (five) working days to <sup>4</sup>[**SLDC**].

- <sup>7</sup>[iv. In the case of an event occurring in **EHV** system and Generating equipment which was initially reported by a Regional constituent or **SLDC** / the constituent / **SLDC** will give a written report to **ERLDC** within a week.]

**12.4.2** **SLDC** may call for a report from any **User** on any reportable incident affecting other **Users** and the <sup>5</sup>[**Licensee**] in case the same is not reported by such **User** whose equipment might have been source of the reportable incident.

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1, 2, 3 & 4 Substituted "**Licensee**" in Rev. 1

5. Substituted "**Gridco**" in Rev. 1

6. Inserted "at grid sub-stations" in Rev. 2

7. Addendum in Rev. 7

The above shall not relieve any **User** from the obligation to report events in accordance with the **IE Rules**.

The format of such a report will be as agreed at the **Grid Code Review Panel**, but will typically contain the following information:

- i. Location of incident.
- ii. Date and time of incident.
- iii. Plant or equipment involved.
- iv. Supplies interrupted and duration if applicable.
- v. Amount of generation lost if applicable.
- vi. Brief description of incident.
- vii. Estimate of time to return to service.
- viii. Name of originator.

#### <sup>4</sup>[12.5] **REPORTING FORM**

The standard reporting form other than for accidents, shall be as agreed from time to time by the **Grid Code Review Panel**. When such a form has been agreed in **Grid Code Review Panel** meeting held on 10.02.1998 and included as an **Appendix** in this **Section** of the **Grid Code**.]

#### <sup>5</sup>[12.6] **MAJOR FAILURE**

Following a major failure, the <sup>1</sup>[**Licensee**] and other **Users** shall co-operate to inquire and establish the cause of such failure and produce appropriate recommendations. The <sup>2</sup>[**Licensee**] <sup>7</sup>[shall report the major failure to the **Commission** immediately for information and] shall submit the enquiry report to the **Commission** within <sup>3</sup>[2(two) months] of the incident.

#### <sup>6</sup>[12.7] **ACCIDENT REPORTING**

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

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1 & 2. Substituted "**Gridco**" in Rev. 1  
3. Substituted "1(one month)" in Rev. 1  
4. Addendum inserted in Rev. 1

5. Replaced "12.5" in Rev. 1  
6. Replaced "12.6" in Rev. 1  
7. Addendum in Rev. 2

# <sup>1</sup>[APPENDIX

## INCIDENT REPORTING

FIRST REPORT \_\_\_\_\_

Date : .....

Time : .....

1. Date and time of incident :
2. Location of incident :
3. Type of incident :
4. System parameters before the incident :  
(Voltage, Frequency, Flows, Generation, etc.)
5. System parameters after the incident :
6. Network configuration before the incident :
7. Relay indications received and performance  
of protection :
8. Damage to equipment :
9. Supplies interrupted and duration,  
if applicable :
10. Amount of Generation lost, if applicable :
11. Estimate of time to return to service :
12. Cause of incident :
13. Any other relevant information <sup>2</sup>[*and  
remedial action taken*] :
14. Recommendations for future improvement/  
repeat incident :
15. Name of the Organisation : ]

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1. Addendum inserted in the entire page in Rev. 1

2. Inserted in Rev. 2

# 13.PROTECTION

## 13.1 INTRODUCTION

In order to safeguard a **User's** system from faults, which may occur on another **User's** system, it is essential that certain minimum standards of protection are adopted. This **Section** describes these minimum standards.

## 13.2 OBJECTIVE

The objective of this **Section** is to define the minimum protection requirements for any equipment connected to the **Transmission System** and thereby minimise disruption due to faults.

## 13.3 GENERAL PRINCIPLES

No item of electrical equipment shall be allowed to remain connected to the **Transmission System** unless it is covered by appropriate protection aimed at reliability, selectivity, speed and sensitivity. Guidelines mentioned in protection manuals of Central Bureau of Irrigation & Power (CBI & P) may be kept in view.

All **Users** shall co-operate <sup>1</sup>[with the **Licensee**] to ensure correct and appropriate settings of protection to achieve effective, <sup>2</sup>[discriminatory] removal of <sup>3</sup>[faulty] equipment within the <sup>4</sup>[time for] target clearance <sup>5</sup>[.....] 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

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1. Inserted in Rev. 2  
2. Substituted "selective" in Rev. 2  
3. Substituted "faulted" in Rev.2  
4. Inserted in Rev. 2  
5. Deleted the word "times" in Rev. 2

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.

#### 13.4 PROTECTION CO-ORDINATION

<sup>4</sup>[The] <sup>1</sup>[Licensee] shall be responsible for arranging periodical meetings between all **Users** to discuss co-ordination of protection. The <sup>2</sup>[Licensee] shall investigate any mal-function 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.

<sup>5</sup>[Relay setting coordination shall be done at Regional level by **EREB**.]

#### 13.5 FAULT CLEARANCE TIMES

From a stability consideration the maximum fault clearance times for faults on any **User's** system directly connected to the **Transmission System**, or any faults on the **Transmission System** itself, are as follows:

Target Clearance Times:

- |             |           |
|-------------|-----------|
| i. 400 kV   | 100 msec. |
| ii. 220 kV  | 160 msec. |
| iii. 132 kV | 160 msec. |

Slower fault clearance times for faults on a **Users** system may be agreed to but only if, in the <sup>3</sup>[Licensee's] opinion, system conditions allow this.

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1 & 2. Substituted "**Gridco**" in Rev. 1  
3. Substituted "**Gridco's**" in Rev. 1  
4. Inserted in Rev. 2  
5. Addendum in Rev. 7

## 13.6 GENERATOR REQUIREMENTS

All **Generating Units** and all associated electrical equipment of the **Generator** connected to the **Transmission System** shall be protected by adequate protection so that the **Transmission System** does not suffer due to any disturbance originating from the **Generating Unit**.

## 13.7 TRANSMISSION LINE REQUIREMENTS

Every <sup>2</sup>[EHV] line taking off from a **Power Station** or a sub-station shall have distance protection and back up protection as mentioned below. The <sup>1</sup>[Licensee] shall notify **Users** of any changes in its policy on protection from time to time.

### 13.7.1 400 kV Lines

Three zone static non-switched distance protection with permissive inter trip for accelerating tripping at remote end in case of a zone-2 fault as main-1 protection shall be provided. Main-2 protection shall be similar fast protection using direction comparison or phase comparison carrier relaying scheme. In addition to the above, single pole tripping and single shot single pole auto-reclosing after an adjustable dead time shall be provided. There need be no other back up protection.

### 13.7.2 220 kV Line

Three zone static non-switched distance protection with permissive inter trip for accelerating tripping at remote end in case of zone-2 fault as main protection is to be provided. The back up will be three phase directional over current and earth fault protection. One pole tripping and single shot single pole auto-reclosing with adjustable dead time shall be provided.

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1. Substituted "**Gridco**" in Rev. 1

2. Substituted "**EHT**" in Rev. 7



### 13.7.3 132 kV Line

Three zone static or electro-magnetic distance protection with permissive inter-trip for accelerating tripping at remote end in case of a zone-2 fault shall be provided as main protection. The backup will be directional three poles over current and earth fault protection.

### 13.7.4 General

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

Relay Panels for the protection of lines of the <sup>1</sup>[Licensee] taking off from a **Power Station** shall be owned and maintained by the <sup>2</sup>[Licensee]. **Generators** shall provide space, connection facility, access to the <sup>3</sup>[Licensee], for such purpose.

## 13.8 DISTRIBUTION LINE REQUIREMENTS

All 33 kV and 11 kV lines at **Connection** points shall be provided with a minimum of overcurrent and earth fault protection with or without directional features as given below.

### 13.8.1 Non-Parallel Radial Feeders

Non-directional time lag over current and earth fault relay with suitable settings to obtain discrimination between adjacent relay stations.

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1,2 & 3. Substituted "**Gridco**" in Rev. 1

### **13.8.2 Parallel Feeders/ Ring Feeders**

Directional time lag over current and earth fault relays.

### **13.8.3 Long Feeders/Transformer Feeders**

For long feeders or transformer feeders, the relays should incorporate a high set instantaneous element.

## **13.9 TRANSFORMER REQUIREMENTS**

### **13.9.1 Generating Station/ Transmission System**

All windings of auto-transformers and power transformers of **EHV** class shall be protected by differential relays and REF relays. In addition there shall be back up time lag 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. In addition to electrical protection, gas operated relays, winding temperature protection and oil temperature protection shall be provided.

### **13.9.2 Distribution system**

For smaller transformers of HV class on the **Distribution System** differential protection shall be provided for 10 MVA and above along with back up time lag over current and earth fault protection (with directional feature for parallel operations). Transformers 1.6 MVA and above and less than 10 MVA shall be protected by time lag over current, earth fault and instantaneous REF relays. In addition all transformers 1.6 MVA and above shall be provided with gas-operated relays, temperature protection and winding temperature protection and oil temperature protection.

## **13.10 SUB-STATION BUS BAR AND FIRE PROTECTION**

**13.10.1** All **Users** shall provide adequate bus zone protection for sub-station bus bars in all 400 kV and 220 kV class sub-stations.

**13.10.2** 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 **IE Rules**.

## **13.11 DATA REQUIREMENTS**

**Users** shall provide the <sup>1</sup>[**Licensee**] with data for this **Section** as specified in the Data Registration **Section**.

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1. Substituted "**Gridco**" in Rev. 1

## 14. METERING AND COMMUNICATION AND DATA ACQUISITION

### 14.1 INTRODUCTION

This **Section** specifies the minimum operational and commercial metering, communication and data acquisition requirements to be provided by each **User** at the inter-connection points and also at the cross boundary circuits.

### 14.2 OBJECTIVE

The objective of this **Section** is to define the minimum acceptable metering and communication and data acquisition requirements to enable the <sup>1</sup>[**Licensee**] to manage the **Transmission System** in a safe and economic manner consistent with **Licence** requirements.

### 14.3 GENERATION OPERATIONAL METERING

**14.3.1** This sub-**Section** specifies the facilities that shall be provided, certain practices that shall be employed for monitoring output and response of **Power Stations** and **Generating Units** and shall not apply to **Power Stations** with a capacity below 5 MW.

**14.3.2** The **Generator** shall install operational metering to the <sup>2</sup>[**Licensee's**] specification so as to provide operational information for both real time and recording purposes in relation to each **Generating Unit** at each **Power Station** in respect of:

- 
1. Substituted "**Gridco**" in Rev. 1
  2. Substituted "**Gridco's**" in Rev. 1

- i. Bus Voltage
- ii. Frequency
- iii. MW
- iv. MVA<sub>r</sub>

and any other additional data as agreed between the <sup>1</sup>[Licensee] and **Generator**.

**14.3.3** All current transformers and voltage transformers used in conjunction with operational metering shall conform to relevant Indian Standard Specifications or the relevant **IEC**, of accuracy class 0.5 and of suitable rating to cater to the meters and the lead wire burdens.

**14.3.4** Metering shall be calibrated, so as to achieve overall accuracy of operational metering in the limits as agreed between the <sup>2</sup>[Licensee] and **Generator**. Records of calibration shall be maintained for reference and shall be made available to the <sup>3</sup>[Licensee] upon request.

**14.3.5 Generators** shall furnish recorded data of all electrical measurements and events recorded by the operational metering to the <sup>4</sup>[Licensee] at least once in a week or more often if required.

#### **14.4 TRANSMISSION SYSTEM OPERATIONAL METERING**

**14.4.1** This sub-**Section** specifies the facilities that shall be provided, certain practices that shall be employed for monitoring electrical supply and load characteristic at each sub-station.

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1, 2, 3 & 4. Substituted "**Gridco**" in Rev. 1

**14.4.2** The <sup>1</sup>[Licensee] shall install operational metering so as to provide operational information for both real time and recording purposes in relation to each feeder, transformer and compensation device at each sub-station in respect of:

- i. Bus Voltage
- ii. Frequency
- iii. MW
- iv. MVA<sub>r</sub>
- v. Power Factor
- vi. Current.

#### **14.5 SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA)**

**14.5.1** The <sup>2</sup>[Licensee] shall install and make operative an operational metering data collection system under **SCADA** for storage, display and processing of operational metering data. All **Users** shall make available outputs of their respective operational meters to the **SCADA** interface equipment.

**14.5.2** The data collection, storage and display centre of the <sup>3</sup>[Licensee] shall be the **State Load Despatch Centre** at Bhubaneswar.

#### **14.6 GENERATION/ DRAWAL COMMERCIAL (TARIFF) METERING**

**14.6.1** This sub-Section specifies provision of commercial (Tariff) metering at **Connection** points between Generating Stations and **Transmission System** and between **External Interconnection** points and **Transmission Systems**. It also specifies metering facilities that shall be provided for the measurement of electricity produced by **Generating Units** and for measurement of electricity consumed at **Power Stations**.

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1, 2 & 3 Substituted "**Gridco**" in Rev. 1

**14.6.2** Metering shall be done to measure:

- i. Active energy for export.
- ii. Active energy for import.
- iii. Reactive energy for import.
- iv. Reactive energy for export.

**14.6.3** Each metering point associated with determination of energy exported or imported shall be provided with both main and a check meter.

**14.6.4** Minimum standard of accuracy of meters shall be of class 0.2 or as agreed between the **Generator** and the <sup>1</sup>[Licensee] and shall conform relevant Indian Standard Specification or relevant **IEC**.

**14.6.5** All current transformers and voltage transformers used in conjunction with commercial (Tariff) metering shall conform to relevant Indian Standard Specification or relevant **IEC**. These shall be of accuracy class 0.2 and of suitable rating to cater to the meter burden and lead wire burden.

**14.6.6** Data collection shall be used to integrate impulses from meters over each integration period as per agreement, store values and transmit values to the data collection system of the <sup>2</sup>[Licensee]. Data shall be collected from both main and check metering schemes.

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1 & 2. Substituted "**Gridco**" in Rev. 1

**14.6.7** Voltage supply to the metering shall be assured with necessary voltage selection schemes. Voltage failure relays shall be provided which will initiate alarm on loss of one or more phases of the voltage supply to any meter.

**14.6.8** Limit of overall accuracy of metering shall be as agreed between **Generator** and the <sup>1</sup>[**Licensee**].

**14.6.9** Meters shall be tested and calibrated at least once in every year or such period as mutually agreed between **Generator** and the <sup>2</sup>[**Licensee**] according to guidelines provided in relevant Indian Standard Specification or relevant **IEC** as applicable. Records of meter calibration test shall be maintained for future reference.

**14.6.10** A procedure shall be drawn up between the <sup>3</sup>[**Licensee**] and **Generators**, and between the <sup>4</sup>[**Licensee**] and **PowerGrid** covering summation, collection, processing of tariff meter readings, at various **Connection** sites. This may be revised from time to time as necessary.

**14.6.11** The ownership and responsibility of maintenance and testing of meters shall be as mutually agreed between the **Users** and the <sup>5</sup>[**Licensee**].

**14.6.12** A comprehensive Metering Code covering the foregoing provisions shall be developed by the <sup>6</sup>[**Licensee**] which shall form a part of the **Grid Code**.

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1, 2, 3, 4, 5 & 6. Substituted "**Gridco**" in Rev. 1



## 14.7 DISTRIBUTION SYSTEM COMMERCIAL (TARIFF) METERING

**14.7.1** This sub-**Section** specifies provision of commercial (Tariff) metering at **Connection** points between the **Distribution System** and the **Transmission System**.

**14.7.2** Metering shall be done to measure:

- i. Active energy for export.
- ii. Reactive energy for export.
- iii. Active energy for import.
- iv. Reactive energy for import.

**14.7.3** Each metering point associated with determination of energy exported or imported shall be provided with both main and check meters.

**14.7.4** Minimum standard of accuracy of meters shall be of class 0.2 or as agreed between the <sup>1</sup>[**Licensee**] and **Distribution Company** and shall conform to relevant Indian Standard Specification or relevant **IEC**.

**14.7.5** All current transformers and voltage transformers used in conjunction with commercial (Tariff) metering shall conform to relevant Indian Standard Specification or relevant **IEC**. These shall be of class 0.2 <sup>2</sup>[or as agreed between the **Licensee** and **Distribution Company**] and of suitable ratings to cater to the meter burden and lead wire burden.

**14.7.6** Voltage supply to the metering shall be assured with necessary voltage selector schemes. Voltage failure relays shall be provided which will initiate alarm on loss of one or more phases of voltage supply to any meter.

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1. Substituted "**Gridco**" in Rev.1

2. Inserted in Rev.4

**14.7.7** Limits of overall accuracy of metering shall be as agreed between the <sup>1</sup>[Licensee] and **Distribution Company**.

**14.7.8** Meters shall be tested and calibrated at least once in a year or such period as mutually agreed between the <sup>2</sup>[Licensee] and **Distribution Company** according to guidelines provided in relevant Indian Standard Specification or relevant **IEC** if applicable. Records of meter calibration tests shall be maintained for future reference.

**14.7.9** A procedure shall be drawn between the <sup>3</sup>[Licensee] and **Distribution Company** covering summation, collection, processing of tariff meter readings at various **Connection** sites. This may be revised from time to time as necessary.

**14.7.10** The comprehensive metering code specified in clause 14.6.12 shall also cover **Distribution System** commercial(Tariff) metering.

## **14.8 COMMUNICATION**

Independent dedicated communication links for voice communication, for written communication and for data acquisition shall be installed by the <sup>4</sup>[Licensee] between all **Power Stations**, **Transmission System** sub-stations and **SLDC**. In addition, similar links between adjacent **Transmission System** sub-stations shall be established. Communication shall be available by dialling discrete numbers and also through Hot Line by lifting the telephone hand set. Hot Line links shall be established by the <sup>5</sup>[Licensee] between **Power Station**/important sub-station and **SLDC**.

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1, 2, 3, 4 & 5. Substituted "**Gridco**" in Rev. 1

## 14.9 DATA ACQUISITION

**14.9.1** For effective control of the **Transmission System**, the **SLDC** needs real time data as follows:

- i. MW generated in each **Power Station**.
- ii. MW draw from **External Interconnection**.
- iii. MVAR generated or absorbed in each **Power Station**.
- iv. MVAR imported or exported from **External Interconnection**.
- v. Voltage in all system buses.
- vi. Frequency in **Transmission System**.
- vii. MW & MVAR flow in each transmission line.

**14.9.2** **Generators** shall provide necessary transducers for the transmission of the above data to **SLDC**.

**14.9.3** The <sup>1</sup>[**Licensee**] shall similarly provide necessary transducers in their system for the transmission of the above data to **SLDC**.

**14.9.4** The <sup>2</sup>[**Licensee**] shall establish suitable a data transfer link between **SLDC** and **ERLDC** for the exchange of operational data.

## 14.10 AGREED PROCEDURE FOR COMMUNICATION AND DATA TRANSMISSION

Mutually agreed procedures shall be drawn up between the <sup>3</sup>[**Licensee**] and other **Users** outlining inter responsibility, accountability and recording of day to day communication and data transmission on operational matters.

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1, 2 & 3. Substituted "**Gridco**" in Rev. 1

#### **14.10.1 Data Requirement**

The <sup>1</sup>[Licensee] and Users shall furnish metering data to each other, as applicable and as detailed in Data Registration **Section**.

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1. Substituted "**Gridco**" in Rev. 1

## 15. DATA REGISTRATION

### 15.1 INTRODUCTION

This **Section** contains a list of all data required by the <sup>1</sup>[Licensee] which is to be provided by **Users** and data required by **Users** to be provided by the <sup>2</sup>[Licensee] at times specified in the **Grid Code**. Other **Sections** of the **Grid Code** contain the obligation to submit the data and defines the times when data is to be supplied by **Users**.

### 15.2 OBJECTIVE

The objective of the **Section** is to list all the data required to be provided by **Users** to the <sup>3</sup>[Licensee] and vice versa, in accordance with the provisions of the **Grid Code**.

### 15.3 RESPONSIBILITIES

All **Users** are responsible for submitting up-to-date data to the <sup>4</sup>[Licensee] in accordance with the provisions of the **Grid Code**.

All **Users** shall provide the <sup>5</sup>[Licensee] with the name, address and telephone number of the person responsible for sending the data.

The <sup>6</sup>[Licensee] shall inform all **Users** of the name, address and telephone number of the person responsible for receiving data.

The <sup>7</sup>[Licensee] shall provide up-to-date data to **Users** as provided in the relevant schedule of the **Grid Code**.

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1, 2, 3, 4, 5, 6 & 7 Substituted "**Gridco**" in Rev. 1

Responsibility for the correctness of data rests with the concerned **Users** providing the data.

#### **15.4 DATA CATEGORIES AND STAGES IN REGISTRATION**

Data as required to be exchanged have been listed in the **Appendices** of this **Section** under various categories with cross- reference to the concerned **Sections**.

#### **15.5 CHANGES TO USERS DATA**

Whenever any **User** becomes aware of a change to any items of data, which is registered with the <sup>1</sup>[**Licensee**], the **User** must promptly notify the <sup>2</sup>[**Licensee**] of the changes. The <sup>3</sup>[**Licensee**] on receipt of intimation of the changes shall promptly correct the database accordingly. This shall also apply to any data compiled by the <sup>4</sup>[**Licensee**] regarding to its own system.

#### **15.6 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**, the <sup>5</sup>[**Licensee**] may, acting reasonably, if and when necessary, estimate such data depending upon the urgency of the situation. Similarly in case any data is missing and not supplied by the <sup>6</sup>[**Licensee**], the concerned **User** may, acting reasonably, if and when necessary, estimates 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 the <sup>7</sup>[**Licensee**], as the case may be, deems appropriate.

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1, 2, 3, 4, 5, 6 & 7 Substituted "**Gridco**" in Rev. 1

## 15.7 SPECIAL CONSIDERATIONS

The <sup>1</sup>[Licensee] and any other **User** may at any time make reasonable request for extra data as necessary.

## 15.8 APPENDICES

<b>APPENDIX</b>	<b>SUBJECT</b>	<b>PAGE</b>
<b>A</b>	STANDARD PLANNING DATA	83
<b>B</b>	DETAILED PLANNING DATA	92
<b>C</b>	OPERATIONAL PLANNING DATA	109
<b>D</b>	PROTECTION DATA	116
<b>E</b>	METERING DATA	117

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1. Substituted "**Gridco**" in Rev. 1

**DATA REGISTRATION**

**STANDARD PLANNING DATA**

**REFERENCE TO:**

**SECTION 4 SYSTEM PLANNING**

**SECTION 5 CONNECTION CONDITION**

**A.1 STANDARD PLANNING DATA (GENERATION)**

**A.1.1 <sup>1</sup>[THERMAL ( COAL / FUEL LINKED )]**

**A.1.1.1 GENERAL**

- |  |  |
|--|--|
| i. Site  | Give location map to scale showing roads, railway lines, transmission lines, rivers and reservoirs if any.   |
| ii. <sup>2</sup> [Coal linkage/ Fuel (Like Liquid Natural Gas, Naptha etc.) linkage] | Give information on means of coal transport from coalmines in case of pit-head stations or means of coal carriage if coal is to be brought from (distance). <sup>3</sup> [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 <b>Power Station</b> .  |
| iv. Environmental  | State whether forest, lands mining clearance areas are affected.   |

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1. Substituted "COAL BASED" in Rev. 1  
2. Substituted "Coal linkage" in Rev. 1  
3. Addendum in Rev. 1





<sup>1</sup>[iii. **Generator**]

- a. Type
- b. Rating ( MVA)
- c. Terminal voltage (kV)
- d. Rated Power Factor
- e. Reactive Power Capability ( MVA<sub>r</sub>) in the range 0.95 of leading and 0.85 lagging
- f. Short Circuit Ratio
- g. Direct axis transient reactance (% on MVA rating)
- h. Direct axis sub-transient reactance ( % on MVA rating)
- i. Auxiliary Power Requirement (MW)

<sup>2</sup>[iv]. Generator Transformer

- a. Type
  - b. Rated capacity (MVA)
  - c. Voltage Ratio ( HV/LV)
  - d. Tap change Range (+ % to - %)
- Percentage Impedance (Positive Sequence at Full load)

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1. Substituted "i.**Generating Unit**" in Rev. 1  
2. Substituted "ii" in Rev. 1

## A.1.2 HYDRO ELECTRICAL

### A.1.2.1 GENERAL

- i. Site Give location map to scale showing roads, railway lines, transmission lines.
- ii. Site map ( To scale) Showing proposed dam, reservoir area, water conductor system, fore-bay, power house etc.
- iii. Submerged Area Give information on area submerged, villages submerged, submerged forest land, agricultural land etc.
- iv. 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 <sup>1</sup>[STATION CAPACITY]

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

---

1. Substituted "POWER STATION CAPACITY" in Rev. 1

#### A.1.2.4 GENERATING UNIT DATA

- i. Operating Head ( in Mtr.)
  - a. Maximum
  - b. Minimum
  - c. Average.
- ii. Turbine. State Type and capacity
- iii. <sup>1</sup>[Generator]
  - a. Type
  - b. Rating (MVA)
  - c. Terminal voltage (kV)
  - d. Rated Power Factor
  - e. Reactive Power Capability (MVA<sub>r</sub>) in the range 0.95 of leading and 0.85 of lagging
  - f. Short Circuit Ratio
  - g. Direct axis transient reactance (% on rated MVA)
  - h. Direct axis sub-transient reactance (% on rated MVA)
  - i. 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).

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1. Substituted "Generating Unit" in Rev. 1

## A.2 STANDARD PLANNING DATA (TRANSMISSION)

**Note:** The compilation of the data is the internal matter of the <sup>1</sup>[Licensee], and as such the <sup>2</sup>[Licensee] shall make arrangements for getting the required data from different Departments of the <sup>3</sup>[Licensee] to update its Standard Planning Data in the format given below:

- i. Name of line (Indicating **Power Stations** and sub-stations 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 & MVA.
- viii. Terrain of 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.

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1, 2 & 3. Substituted "Gridco" in Rev. 1

## **A.3 STANDARD PLANNING DATA DISTRIBUTION**

### **A.3.1 GENERAL**

- i. Area map (to Scale)- Marking the area in the map of Orissa for which Distribution Licence is applied for.
- 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 / 11 kV sub-stations, 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 <sup>1</sup>[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 <sup>2</sup>[EHV] line from Grid Sub-station to consumer's premises.

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1 & 2. Substituted "EHT" in Rev.7

### **A.3.5 DEMAND DATA ( FOR ALL LOADS 5 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. 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**

- i. Peak load and energy forecast for each category of loads for each of the succeeding 10 years.
- ii. Details of methodology and assumptions on which forecasts are based.
- iii. If supply is received from more than one Sub-station, the sub-station wise break up of peak load and energy projections for each category of loads for each of the succeeding 10 years along with estimated daily load curve.
- iv. Details of loads 5 MW and above.
  - a. Name of prospective consumer.
  - b. Location and nature of load/complex.

- c. Sub-station from which to be fed.
- d. Voltage of supply.
- e. Phasing of load.



**DETAILED PLANNING DATA**

**REFERENCE TO:**

**SECTION 4 SYSTEM PLANNING**

**SECTION 5 CONNECTION CONDITIONS**

**B.1 DETAILED PLANNING DATA (GENERATION)**

**PART 1. FOR ROUTINE SUBMISSION**

**B.1.1 THERMAL POWER STATIONS (COAL BASED)**

**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, **Generating 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?).
- viii. Earthing arrangements with earth resistance values.

### **B.1.1.2 PROTECTION AND METERING**

- i. Full description including settings for all relays and protection systems installed on the **Generating Unit, Generating Unit** transformer, auxiliary transformer and electrical motor of major equipment listed, but not limited to, under SI.3 (General).
- ii. Full description including settings for all relays installed on all outgoing feeders from **Power Station** switchyard, tie circuit breakers, 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.1.1.3 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).

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 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. Inertia constant (MW Sec./MVA) H.
- v. Short circuit ratio.

- vi. Direct axis synchronous reactance (% on MVA)  $X_d$
- vii. Direct axis transient reactance (% on MVA)  $X'_d$
- viii. Direct axis sub-transient reactance (% on MVA)  $X''_d$
- ix. Quadrature axis synchronous reactance (% on MVA)  $X_q$
- x. Quadrature axis transient reactance (% on MVA)  $X'_q$
- xi. Quadrature axis sub-transient reactance (% on MVA)  $X''_q$
- xii. Direct axis transient open circuit time constant (Sec)  $T'_{do}$
- xiii. Direct axis sub-transient open circuit time constant (Sec)  $T''_{do}$
- xiv. Quadrature axis transient open circuit time constant (Sec)  $T'_{qo}$
- xv. Quadrature axis sub-transient open circuit time constant (Sec)  $T''_{qo}$
- xvi. Stator resistance (Ohm)  $R_a$
- xvii. Stator leakage reactance (Ohm)  $X_l$
- xviii. Stator time constant (Sec).
- xix. Rated field current (A).
- xx. Open circuit saturation characteristic for various terminal giving the compounding current to achieve the same.

(b) 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 IEEE symbols.
- vi. Dynamic characteristics of over-excitation limiter.
- vii. Dynamic characteristics of under-excitation limiter.

(c) 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 IEEE symbols.

(d) Operational Parameters:

- 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. The minimum block load requirements on synchronising.
- iv. Time required for synchronising a **Generating Unit** for the following conditions:
  - a. Hot
  - b. Warm
  - c. Cold
- <sup>1</sup>[v. Maximum **Generating Unit** loading rates for the following conditions:
  - a. Hot
  - b. Warm
  - c. Cold]
  - <sup>2</sup>[vi. Minimum load without oil support (MW)]

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1. It was in Sl. (vi). The item in Sl. (v) "Minimum time off load" is deleted in Rev. 1  
2. Addendum in Rev. 1

## B.1.2 HYDRO-ELECTRIC STATIONS

### 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
    - <sup>1</sup>[(i)] Multipurpose
    - <sup>2</sup>[(ii)] For Power
  - <sup>3</sup>[c. Operating Table with]
    - <sup>4</sup>[(i)] Area capacity curvesand (ii) 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 <sup>5</sup>[included], but not

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1. Substituted "c" in Rev. 1  
2. Substituted "d" in Rev. 1  
3. Substituted "e. Operating Table" in Rev. 1  
4. Addendum in Rev. 1  
5. Substituted "listed" in Rev. 1

limited to <sup>1</sup>[those listed], under SI.3 (General).

- ii. Full description including settings for all relays installed on all outgoing feeders from **Power Station** switchyard, tie breakers, 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**

(a) 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).

(b) 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.

(c) Lightning Arresters:

Technical data.

(d) Communications:

Details of communications equipment installed at points of **Connections**.

(e) Basic Insulation Level (kV):

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

#### **B.1.2.4 GENERATING UNITS**

(a) Parameters of Generator

- i. Rated terminal voltage (kV).
- ii. Rated MVA.
- iii. Rated MW.
- iv. Inertia constant (MW sec/MVA) H.
- v. Short circuit ratio.
- vi. Direct axis synchronous reactance. (% on MVA)  $X_d$ .
- vii. Direct axis transient reactance (% on MVA)  $X'_d$ .
- viii. Direct axis sub-transient reactance (% on MVA)  $X''_d$ .



- ix. Quadrature axis synchronous reactance (% on MVA)  $X_q$
- x. Quadrature axis transient reactance (% on MVA)  $X'_q$
- xi. Quadrature axis sub-transient reactance (% on MVA)  $X''_q$
- xii. Direct axis transient open circuit time constant (Sec)  $T'_{do}$
- xiii. Direct axis sub-transient open circuit time constant (Sec)  $T''_{do}$
- xiv. Quadrature axis transient open circuit time constant (Sec)  $T'_{qo}$
- xv. Quadrature axis sub-transient open circuit time constant (Sec)  $T''_{qo}$
- xvi. Stator Resistance (Ohm)  $R_a$
- xvii. Stator leakage reactance (Ohm)  $X_l$
- xviii. Stator time constant (Sec).
- xix. Rated Field current (A).
- xx. Open Circuit saturation characteristics of the generator for various terminal voltages giving the compounding current to achieve this.
- xxi. Type of Turbine.
- xxii. Operating Head (Mtr.).
- xxiii. Discharge with Full Gate Opening (cumecs).
- xxiv. Speed Rise on total Load thrown off (%).

(b) Parameters of Excitation Control System:  
As applicable to thermal **Power Stations**.

(c) Parameters of Governor:  
As applicable to thermal **Power Station**.

(d) 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.

## **PART 2. FOR SUBMISSION ON REQUEST BY <sup>1</sup>[LICENSEE]**

### **B.1.3 <sup>2</sup>[THERMAL POWER STATIONS]**

#### **B.1.3.1 GENERAL**

- 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 **CEA**.
- iv. Approval of State Government/Government of India
- v. Financial Tie-up.

#### **B.1.3.2 CONNECTION**

- i. Reports of Studies for parallel operation with the **Transmission System**:
  - a. Short circuit studies.
  - b. Stability studies.
  - c. Load flow studies.
- ii. Proposed **Connection** with **Transmission System**:
  - a. Voltage.
  - b. Number of circuits.
- c. Point of **Connect**

---

1 Substituted "GRIDCO" in Rev. 1

2 Substituted "THERMAL POWER STATION (COAL BASED)" in Rev.1

## **B.1.4 HYDRO-ELECTRIC POWER STATIONS**

### **B.1.4.1 GENERAL**

- 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 **CEA**.
- iv. Approval of State Government/Government of India.
- v. Financial Tie-up.

### **B.1.4.2. CONNECTION**

- i. Reports of Studies for parallel operation with the **Transmission System**:
  - a. Short circuit studies.
  - b. Stability studies.
  - c. Load flow studies.
- ii. Proposed **Connection** with **Transmission System**:
  - a. Voltage.
  - b. Number of circuits.
  - c. Point of **Connection**.

## B.2 DETAILED SYSTEM DATA, TRANSMISSION

### B.2.1 GENERAL

- i. Single line diagram of the <sup>1</sup>[**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:
    - i) Transformers.
    - ii) Circuits.
    - iii) Circuit breakers.
    - iv) Isolating switches.

---

1. Substituted "system of Orissa Power Sector upto" in Rev. 1

### **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).

#### **B.2.4 EQUIPMENT DETAILS (For all Sub-stations)**

- 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 system.

#### **B.2.7 DEMAND DATA (For all Sub-stations)**

- 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**

### **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 sub-stations, 11/0.4 kV sub-stations, 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 System** and concerned 33/11 kV sub-station of **Supplier**).

### **B.3.2 CONNECTION**

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



### **B.3.3 LOADS**

- i. Connected load - Furnish consumer details, Numbers of consumers category wise, details of loads 1 MW and above.
- 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 and forecast).

**C. OPERATIONAL PLANNING DATA**

**C.1 OUTAGE PLANNING DATA**

**REFERENCE TO:**

**SECTION 6 OUTAGE PLANNING**

**C.1.1 DEMAND ESTIMATES**

**Item**

**To be Submitted By**

- i. <sup>1</sup>[Estimated consumption of energy in million units at each **Connection / External Interconnection** point on monthly basis and peak and lean demand in MW & MVA<sub>r</sub> at each **Connection / External Interconnection** point on weekly basis for the period from April of next calendar year to March of following calendar year.] <sup>2</sup>[31<sup>st</sup> December of current calendar year.]

- 
1. Substituted "Estimated aggregate annual sales of energy in million units and peak and lean demand in MW & MVA<sub>r</sub> at each **Connection** point for the period from July of current year to June of next year." in Rev.5.
2. Substituted "31st March of current year" in Rev.5.

- ii.<sup>1</sup>[Estimated consumption of energy in MU at each **Connection / External Interconnection** point on daily basis for month ahead and 24 hourly averaged demand estimates in MW & MVA<sub>r</sub> at each **Connection / External Interconnection** point for each day of the month ahead.(31 daily data items for MU for each connection point, 31 x 24 hourly data items for MW and 31 x 24 hourly data items for MVA<sub>r</sub> for each connection point).] 15th of current month
- iii.<sup>2</sup><sup>3</sup>[Fifteen minutes block] averaged demand estimates in MW & MVA<sub>r</sub> at each **Connection / External Interconnection** point for the dayahead. (4<sup>4</sup>[96] data items for MW and 5<sup>5</sup>[96] data items for MVA<sub>r</sub> at each **Connection / External Interconnection** point.)] 10.00 Hours every day

### C.1.2 ESTIMATES OF LOAD SHEDDING

<b>Item</b>	<b>To be Submitted By</b>
i. Details of discrete load blocks that may be shed to comply with instructions issued by SLDC when required, from each <b>Connection</b> point.	Soon after connection is made.

- 
- 1. Substituted "Estimated aggregate monthly sales of energy in million units and peak and lean demand in MW & MVA<sub>r</sub> at each **Connection** point for the next month." in Rev.5
  - 2. Substituted "Hourly demand estimates for the dayahead." in Rev.5.
  - 3. Substituted "Hourly" in Rev. 11
  - 4 & 5 Substituted "24" in Rev. 11

### C.1.3 YEAR AHEAD OUTAGE PROGRAMME

(For the period <sup>1</sup>[April to March])

#### C.1.3.1 GENERATORS OUTAGE PROGRAMME

<b>Item</b>	<b>To be Submitted By</b>
i. Identification of <b>Generating Unit</b> .	1st August each year
ii. MW which will not be available as a result of <b>Outage</b> .	1st August each year
iii. Preferred start date and start time or range of start dates and start times and period of <b>Outage</b> .	1st August each year
iv. If outages are required to meet statutory requirements, then the latest date by which <b>Outage</b> must be taken.	1st August each year

#### C.1.3.2 YEAR AHEAD ERLDC'S OUTAGE PROGRAMME

(affecting **Transmission System** )

<b>Item</b>	<b>To be Submitted By</b>
i. MW which will not be available as a result of <b>Outage</b> from Imports through external <b>Connections</b> .	<sup>2</sup> [31st December each year]
ii. Start date and start time and period of <b>Outage</b> .	<sup>3</sup> [31st December each year]

---

1. Substituted "July to June" in Rev. 7

2. Substituted "1st November each year" in Rev. 7

3. Substituted "1st November each year" in Rev. 7

### C.1.3.3 YEAR AHEAD CPP'S OUTAGE PROGRAMME

<b>Item</b>	<b>To be Submitted By</b>
i. MW which will not be available as a result of <b>Outage</b> .	1st August each year
ii. Start date and start time and period of <b>Outage</b> .	1st August each year

### C.1.3.4 YEAR AHEAD DISTRIBUTION COMPANY'S OUTAGE PROGRAMME

<b>Item</b>	<b>To be Submitted By</b>
i. Loads in MW not available from any <b>Connection</b> point.	1st August each year
ii. Identification of <b>Connection</b> point.	1st August each year
iii. Period of suspension of drawal with start date and start time.	1st August each year

### C.1.3.5 THE <sup>1</sup>[LICENSEE'S] OVERALL OUTAGE PROGRAMME

<b>Item</b>	<b>To be Submitted By</b>
i. Report on proposed <b>Outage</b> programme to ERLDC.	<sup>2</sup> [30 <sup>th</sup> ] November each year
ii. Release of finally agreed <b>Outage</b> plan.	1st March each year

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1. Substituted "GRIDCO'S" in Rev. 1  
2. Substituted "1<sup>st</sup>" in Rev. 7

## C.2 GENERATION SCHEDULING DATA

### REFERENCE TO:

### SECTION 7 SCHEDULE AND DESPATCH

<b>Item</b>	<b>To be Submitted By</b>
i. Dayahead <sup>1</sup> [fifteen minutes block] MW & MVar availability (00.00 - 24.00 Hours) of all Generator Units.	10.00 Hours every day.
ii. Dayahead <sup>2</sup> [fifteen minutes block] MW import/export from <b>CPP's</b> .	10.00 Hours every day.
iii. Status of <b>Generating Unit</b> excitation <b>AVR</b> in service (Yes/No).	10.00 Hours every day.
iv. Status of <b>Generating Unit</b> speed control system. Governor in service (Yes/No).	10.00 Hours every day.
v. Spinning reserve capability (MW)	10.00 Hours every day.
vi. Backing down capability with/without oil support (MW)	10.00 Hours every day.
vii. Hydro reservoir levels and restrictions	10.00 Hours every day.
viii. <b>Generating Units</b> hourly summation outputs (MW)	10.00 Hours every day.
ix. Dayahead <sup>3</sup> [fifteen minutes block] MW entitlements from <b>Central Sector Generation</b> and Chukha Hydro <b>Power Station</b> from <b>ERLDC</b> .	11.00 Hours every day.

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1, 2 & 3 Substituted "hourly" in Rev. 11

### C.3 CAPABILITY DATA

#### REFERENCE TO:

#### SECTION 8 FREQUENCY AND VOLTAGE MANAGEMENT

<b>Item</b>	<b>To be Submitted By</b>
i. <b>Generators</b> shall submit to the <sup>1</sup> [Licensee] up-to-date capability curves for all <b>Generating Units</b> .	On receipt of request by the <b>Licensee</b>
ii. <b>CPPs</b> shall submit to the <sup>2</sup> [Licensee] net return capability that shall be available for export/import from <b>Transmission System</b> .	On receipt of request by the <b>Licensee</b>

### C.4 RESPONSE TO FREQUENCY CHANGE

#### REFERENCE TO:

#### SECTION 8 FREQUENCY AND VOLTAGE MANAGEMENT

- i. 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.
- ii. Secondary response in MW to frequency changes.

---

1 & 2. Substitutes "**Gridco**" in Rev. 1

## C.5 MONITORING OF GENERATION

### REFERENCE TO:

#### SECTION 9 <sup>1</sup>[MONITORING] OF GENERATION AND DRAWAL

<b>Item</b>	<b>To be Submitted By</b>
i. <b>Generators</b> shall provide hourly generation summation to <b>SLDC</b> .	To be submitted by real time basis
ii. <b>CPPs</b> shall provide hourly export/ import MW to <b>SLDC</b> .	To be submitted by real time basis
iii. Logged readings of <b>Generators</b> to <b>SLDC</b> .	As required
iv. Detailed report of <b>Generating Unit</b> trippings on monthly basis.	In the first week of the succeeding month

## C.6 ESSENTIAL AND NON-ESSENTIAL LOAD DATA

### REFERENCE TO:

#### SECTION 10 CONTINGENCY PLANNING

<b>Item</b>	<b>To be Submitted By</b>
i. Schedule of essential and non-essential loads on each discrete load block for purposes of load shedding.	As soon as possible after <b>Connection</b>

---

1. Substituted "METERING" in Rev. 1



**D. PROTECTION DATA**

**REFERENCE TO:  
SECTION 13 PROTECTION**

<b>Item</b>	<b>To be Submitted By</b>
i. <b>Generators/CPPs</b> shall submit details of protection requirement and schemes installed by them as referred to in B.1. <b>Detailed Planning Data</b> under sub- <b>Section "Protection And Metering"</b> .	As applicable to detailed planning data
ii. The <sup>1</sup> <b>[Licensee]</b> shall submit details of protection equipment and schemes installed by them as referred to in B.2. Detailed System Data, Transmission under sub- <b>Section "Relaying and Metering"</b> in relation to <b>Connection</b> with any <b>User</b> .	As applicable to detailed planning data

---

1. Substituted "**Gridco**" in Rev. 1

**E. METERING DATA**

**REFERENCE TO:  
SECTION 14 METERING**

<b>Item</b>	<b>To be Submitted By</b>
i. <b>Generators/CPPs</b> shall submit details of metering equipment and schemes installed by them as referred in B.1. <b>Detailed Planning Data</b> under sub- <b>Section "Protection and Metering"</b> .	As applicable to detailed planning data
ii. The <sup>1</sup> <b>[Licensee]</b> shall submit details of metering equipment and schemes installed by them as referred in B.2. Detailed System Data, Transmission under sub- <b>Section "Relaying and Metering"</b> in relation to <b>Connection</b> with any <b>User</b> .	As applicable to detailed planning data

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1. Substituted "**Gridco**" in Rev. 1

## <sup>1</sup>[16. PERIODIC REPORT

A weekly report shall be prepared and issued by **SLDC** to all the **Users**. The weekly report shall contain the following.

- (a) frequency profile
- (b) voltage profile
- (c) major outage of generating unit
- (d) major outage of transmission line
- (e) grid disturbance]