

# ANDHRA PRADESH ELECTRICITY REGULATORY COMMISSION

## TERMS AND CONDITIONS FOR DETERMINATION OF TARIFF FOR SUPPLY OF ELECTRICITY BY A GENERATING COMPANY TO A DISTRIBUTION LICENSEE AND PURCHASE OF ELECTRICITY BY DISTRIBUTION LICENSEES

### Regulation No 1 of 2008

#### INTRODUCTION

Sections 62 and Section 86 (1) (b) of the Electricity Act, 2003, require the Commission to determine the tariff for supply of electricity by a generating company to a distribution licensee and to regulate electricity purchase and procurement process of distribution licensees including the price at which electricity shall be procured, from the generating companies or licensees or from other sources through agreements for purchase of power for distribution and supply within the State. Section 61 of the Act *ibid* requires the Commission to specify the terms and conditions for such determination of tariff. Accordingly the Commission published a draft Regulation on the subject in the A.P.Gazette on 31-08-2006 seeking comments / suggestions from interested persons and also issued a press release on the same day apart from hosting the draft Regulation on its website. The Commission has considered the responses received and finalized the Regulation.

In exercise of powers conferred under Sections 61, 62, 86(1)(b) read with Section 181 of the Electricity Act, 2003, and all other powers enabling in this behalf, therefore, the Andhra Pradesh Electricity Regulatory Commission hereby makes the following Regulation, namely:

#### 1 SHORT TITLE, EXTENT AND COMMENCEMENT

- i) This Regulation may be called the Andhra Pradesh Electricity Regulatory Commission (Terms and conditions for determination of tariff for supply of electricity by a generating company to a distribution licensee and purchase of electricity by distribution licensees) Regulation, 2008.
- ii) This Regulation shall extend to the whole of the State of Andhra Pradesh.
- iii) Subject to the provisions in clause 5.2 this Regulation shall be applicable to :  
all generating companies supplying or intending to supply electricity to a Distribution Licensee, and all Distribution Licensees for purchase of electricity from generating companies, other licensees including trading licensees, captive generating plants and any other source :

Provided that determination of tariff for supply of electricity to a distribution licensee from non-conventional sources of generation shall be in accordance with such terms and conditions as stipulated in relevant separate Orders of the Commission.

- iv) This Regulation shall come into force on the date of its publication in the Andhra Pradesh Gazette and shall remain in force unless amended, varied, altered or modified by the Commission.

## 2 DEFINITIONS

- i. In this Regulation, unless the context otherwise requires:
- (a) “Act” means the Electricity Act, 2003;
  - (b) “Applicant” means a Licensee or Generating Company who has made an application for determination of tariff ;
  - (c) “Authority” means Central Electricity Authority referred to in Section 70 of the Act;
  - (d) “Auxiliary Consumption” in relation to a period, means the quantum of energy consumed by auxiliary equipment of the generating station and shall be expressed as a percentage of the sum of gross energy generated at the generator terminals of all the units of the generating station and, for the purpose of this Regulation, auxiliary consumption for a thermal generating station shall include transformer losses within the generating station;
  - (e) “Availability” in relation to a thermal generating station for any period means the average of the daily average declared capacities for all the days during that period expressed as a percentage of the installed capacity of the generating station minus the normative auxiliary consumption in MW, as specified in this Regulation, and shall be computed in accordance with the following formula:

$$\text{Availability} = 10000 \times \frac{\sum_{i=1}^N \text{DC}_i}{\{ N \times \text{IC} \times (100 - \text{AUX}_n) \}} \%$$

where –

N = number of days during the period

DC<sub>i</sub> = Average Declared Capacity for the ith day of the period in MW,

IC = Installed Capacity of the generating station in MW,

AUX<sub>n</sub> = Normative Auxiliary Consumption, expressed as a percentage of gross generation

- (f) “Beneficiary” in relation to a generating station means the person buying power generated at such a generating station on payment of Annual Fixed Charges;
- (g) “Block” in relation to a combined cycle thermal generating station includes combustion turbine – generators, associated waste heat recovery boilers, connected steam turbine – generators and auxiliaries;
- (h) “Capacity Index” in relation to a hydro power generating station means the average of the daily capacity indices over one year excluding those days

on which Maximum Available Capacity is zero due to non-availability of water;

$$\text{Capital Index} = \frac{\text{Sum of Capacity Indices for all the days of the year}}{\text{Number of days in the year when the Maximum Available Capacity is non-zero.}}$$

- (i) “Capital Cost” of a project or its unit or stage as the case may be, means the capital expenditure thereof as admitted by the Commission for determination of tariff.
- (j) “CERC” means the Central Electricity Regulatory Commission established under Section 76 of the Act;
- (k) “Commission” means the Andhra Pradesh Electricity Regulatory Commission;
- (l) “Conduct of Business Regulations” means the Andhra Pradesh Electricity Regulatory Commission (Conduct of Business) Regulations in force from time to time;
- (m) “Control Period” means a multi-year period fixed by the Commission from time to time, usually a 5-year period, the first Control Period however ending on 31<sup>st</sup> March, 2009.
- (n) “Cut-off Date” means the date of the first financial year closing after three hundred and sixty-five (365) days of the date of commissioning of a generating station;
- (o) “Daily Capacity Index” in relation to a hydro power generating station means the declared capacity subject to availability of water for the purpose of generation expressed as a percentage of the maximum available capacity for the day subject to availability of water for the purpose of generation and shall be calculated in accordance with the following formula:

Daily Capacity Index = Declared Capacity (MW) subject to availability of water for the purpose of generation x 100 / Maximum Available Capacity (MW) subject to availability of water for the purpose of generation

Note: In case the Maximum Available Capacity is zero for any day due to non-availability of water, then the Daily Capacity Index for that day shall be taken as zero for the purpose of computing Annual Capacity Index.

- (p) Date of commercial operation or COD means-  
  
in relation to a unit of a generating station means the date declared by the generator after demonstrating the Maximum Continuous Rating (MCR)

or Installed Capacity (IC) through a successful trial run after notice to the beneficiaries and in relation to the generating station means the date of commercial operation of the last unit or block of the generating station ;

(q) “Declared Capacity” means-

for a thermal generating station, the capability of the generating station to deliver ex-bus electricity in MW declared by such generating station in relation to any period of the day or whole of the day, duly taking into account the availability of fuel:

Note :

(i) In case of a gas turbine generating station or a combined cycle generating station, the generating station shall declare the capacity for units and modules on gas fuel and liquid fuel separately, and these shall be scheduled separately. Total declared capacity and total scheduled generation for the generating station shall be the sum of the declared capacity and scheduled generation for gas fuel and liquid fuel for the purpose of computation of availability and Plant Load Factor respectively;

(ii) For run-of-river hydro power generating stations with pondage and storage-type power stations the declared capacity means, the ex-bus capacity in MW expected to be available from the generating station over the peaking hours of the next day, as declared by the generating station, taking into account the availability of water for generation, optimum use of water and availability of machines and for this purpose, the peaking hours shall not be less than three (3) hours within a twenty-four (24) hour period;

(iii) For purely run-of-river hydro power generating stations the declared capacity means, the ex-bus capacity in MW expected to be available from the generating station during the next day, as declared by the generating station, taking into account the availability of water for generation, optimum use of water and availability of machines;

(r) “Deemed Generation” means the energy which a hydro-generating station was capable of generating but could not generate due to the conditions of grid or power system, beyond the control of generating station resulting in spillage of water ;

(s) “Design Energy” in relation to a hydro power generating station means the quantum of energy which could be generated in a 90 per cent dependable year with 95 per cent installed capacity of the generating station;

(t) “Existing Generating Station” means a generating station which had a date of commissioning prior to the date of notification of this Regulation;

- (u) “Generation Business” means the business of production of electricity from a generating station for the purpose of giving supply to any person or enabling a supply to be so given;
- (v) “Gross Calorific Value” in relation to a thermal generating station means the heat produced in kCal by complete combustion of one kilogram of solid fuel or one litre of liquid fuel or one standard cubic meter of gaseous fuel, as the case may be;
- (w) “Gross Station Heat Rate” means the heat energy input in kCal required to generate one kWh of electrical energy at generator terminals;
- (x) “Infirm Power” means electricity generated prior to the date of commercial operation of the unit of a generating station;
- (y) “Installed Capacity” means the summation of the name plate capacities of all the units of the generating station or the capacity of the generating station (reckoned at the generator terminals) as approved by the Commission from time to time;
- (z) “Licensee” means a person granted a licence under Section 14 of the Act;
- (aa) “Long-term procurement” means procurement of power by a Distribution Licensee for a period of over one year;
- (bb) “Maximum Available Capacity” in relation to a hydro power generating station means-
  - (i) for run-of-river hydro power generating stations with pondage and storage-type power stations, the maximum capacity in MW that the generating station can generate with all units running under prevailing conditions of water levels available for usage and flows over the peaking hours of the next day, and for this purpose, the peaking hours shall not be less than three (3) hours within a twenty-four (24) hour period;
  - (ii) for purely run-of-river hydro power generating stations, the maximum capacity in MW that the generating station can generate with all units running under prevailing conditions of water levels available for usage and flows over the peaking hours of the next day;
- (cc) “Maximum Continuous Rating” or ‘MCR’ in relation to a unit of the thermal power generating station means the maximum continuous output at the generator terminals, guaranteed by the manufacturer at rated parameters, and in relation to a unit or block of a combined cycle thermal power generating station means the maximum continuous output at the generator terminals, guaranteed by the manufacturer with water/steam injection (if applicable) and corrected to 50 Hz grid frequency and specified site conditions;

- (dd) “New Generating Station” means a generating station with a date of commissioning on or after the date of notification of this Regulation;
- (ee) “Operation and Maintenance Expenses” or ‘O&M Expenses’ means the expenditure incurred on operation and maintenance of the generating station, including part thereof, and includes the expenditure on manpower, repairs, spares, consumables, insurance and overheads;
- (ff) “Plant Load Factor”, for a given period, means the total sent-out energy corresponding to scheduled generation during such period, expressed as a percentage of sent-out energy corresponding to installed capacity in that period and shall be computed in accordance with the following formula:
- $$\text{Plant Load Factor} = 10000 \times \frac{\sum_{i=1}^N SG_i}{N \times IC \times (100 - AUX_n)} \%$$
- where –
- N = number of time blocks in the given period
  - SG<sub>i</sub> = Scheduled Generation in MW for the ith time block in such period
  - IC = Installed Capacity of the generating station in MW
  - AUX<sub>n</sub> = Normative Auxiliary Consumption in MW, expressed as a percentage of gross generation
- (gg) “Power Procurement Plan” means, the plan prepared by a Distribution Licensee in accordance with the guidelines/regulations issued in this behalf by the Commission;
- (hh) “Primary Energy” in relation to a hydro power generating station means the quantum of energy generated up to the design energy on per year basis at the generating station;
- (ii) “Project” means a generating station;
- (jj) “Run-of-river power station” means a hydro power generating station which has no upstream pondage;
- (kk) ‘ Run –of-river power station with pondage’ means a hydro electric power generating station with sufficient pondage for meeting the diurnal variation of power demand;
- (ll) “Scheduled Generation” at any time or for any given period or time block means the schedule of generation in MW ex-bus given by the State Load Despatch Centre;

Note : For the gas turbine generating station or a combined cycle generating station if the average frequency for any time block, is below 49.52 Hz but not below 49.02 Hz and the scheduled generation is more than 98.5% of the declared capacity, the scheduled generation shall be deemed to have been reduced to 98.5% of the declared capacity, and if the average frequency for

any time block is below 49.02 Hz and the scheduled generation is more than 96.5% of the declared capacity, the scheduled generation shall be deemed to have been reduced to 96.5% of the declared capacity.

- (mm) “Secondary Energy” in relation to a hydro power generating station means the quantum of energy generated in excess of the design energy on per year basis at the generating station;
  - (nn) “Short-term procurement” means procurement of power by a Distribution Licensee for a period not exceeding one year;
  - (oo) “Small Gas Turbine Power Generating Station” means and includes gas turbine/combined cycle generating stations with gas turbines in the capacity range of 50 MW or below;
  - (pp) “State” means the state of Andhra Pradesh.
  - (qq) “Storage type power station” means a hydro power generating station associated with large storage capacity to enable variation in generation of electricity according to demand;
  - (rr) “Unit” in relation to a thermal generating station means steam generator, steam turbine, generator and auxiliaries and in relation to a combined cycle thermal generating station, means gas turbine, generator and auxiliaries.
  - (ss) “Year” means a financial year.
- ii. Words and expressions used and not defined in this Regulation but defined in the Act shall have the same meanings as assigned to them in the Act.
  - iii. All proceedings under this Regulation shall be governed by the Conduct of Business Regulations.

## **PART- I**

### **APPROACH, FRAMEWORK, PROCEDURE AND FILINGS**

#### **3 POWER PROCUREMENT PLAN**

- 3.1 The Distribution Licensee shall prepare a Power Procurement Plan as per the Commission’s Guidelines on Load Forecasts, Resource Plans and Power Procurement and shall submit the same for Commission’s approval as specified in clause 9 of the APERC (Terms and Conditions for determination of tariff for wheeling and retail sale of electricity) Regulation, 2005 (Regulation No.4 of 2005), as amended from time to time.
- 3.2 The Licensee shall make explicit the steps it intends to take that will enable the acquisition of the resources required in the Power Procurement Plan.

- 3.3 The Distribution Licensee shall procure power, under this Regulation, in conformity with the Power Procurement Plan as approved by the Commission.
- 3.4 Each application for power procurement or the proposals referred to in clause 5 of this Regulation shall contain an explanation as to how the proposed procurement conforms to the Power Procurement Plan, or the reasons for deviations, if any :

Provided that a distribution licensee may undertake short-term purchases of electricity without the prior approval of the Commission, in terms of the Guidelines issued by the Commission in that behalf in force, as referred to in clause 4.

#### **4 SHORT-TERM PROCUREMENT**

For short-term procurement of electricity, the Distribution Licensees shall follow the procedure as laid down by the Commission from time to time, the latest instructions are as per the directive of the Commission in Tariff Order 2008-09 at paragraph 231.

#### **5 APPROACH TO DETERMINATION OF TARIFF**

- 5.1 Where tariff has been determined through transparent process of bidding in accordance with the guidelines issued by the Central Government, the Commission shall adopt such tariff in accordance with the provisions of the Act.
- 5.2 The provisions specified in Part – II of this Regulation shall apply in determining tariff based on Capital Cost for supply to a Distribution Licensee by :
- a. State-controlled/owned companies till such time as the Commission is satisfied that the situation is ripe to introduce competition; and
  - b. one-time expansion of generating capacity of existing projects of private developers, not exceeding 50% of the capacity as on 06.01.2006 except in the following cases:
    - (i) Where the PPA (power purchase agreement between the generating company and the distribution licensee) had been signed and approved by the Commission prior to 06.01.2006 or the PPA had been signed and was pending before the Commission on 06.01.2006;
    - (ii) Where the appraisal of the project had started before 6-1-2006 by the relevant financial institutions for lending funds to the project on the basis of appropriate evidence of process of procurement of power by any distribution licensee. Provided that in all such cases final PPA is filed before the Commission by 30<sup>th</sup> September 2006.
    - (iii) In case of hydro projects where detailed project report (DPR) has been submitted to the Central Electricity Authority/Central



Water Commission before 01.04.2006 for concurrence (except for projects where concurrence of DPR is not mandatory) and appropriate evidence of process of procurement of power by any distribution licensee existed before 6-1-2006. Provided that in all such cases final PPA is filed before the Commission by 30<sup>th</sup> September 2006.

- c. Own generating stations: Where the Distribution Licensee also undertakes the business of generation of electricity, the transfer price at which electricity is to be supplied by the Generation Business of the Distribution Licensee to his Retail Supply Business shall be determined by the Commission:

Provided that the Commission shall have regard to the terms and conditions specified in this Regulation in determining the transfer price for such supply. The Distribution Licensee shall maintain separate records for the Generation Business and shall maintain an Allocation Statement so as to enable the Commission to clearly identify the direct and indirect costs relating to such business and the return accruing to such business.

- d. The Distribution Licensee shall submit, along with the application for determination of tariff for retail sale of electricity, the information required under this Regulation relating to the Generation Business, so as to enable the Commission to determine the transfer price for supply of electricity to the Retail Supply Business in accordance with the terms and conditions contained in the Part III:

Provided that the Commission may deviate from the norms contained in this Part or specify alternative norms for particular cases, where it so deems appropriate having regard to the circumstances of the case:

Provided also that the reasons for such deviation shall be recorded in writing:

Provided further that in case of an existing generating station, the Commission shall determine the tariffs having regard to the historical performance of such generating station and reasonable opportunities for improvement in performance, if any.

- 5.3 The Commission shall determine tariff under section 62 read with section 64 of the Act on receipt of an application to that effect from a generating company for supply of electricity to a distribution licensee(s), or from the distribution licensee(s).
- 5.4 The tariffs shall unless reviewed earlier or extended or specified otherwise by the Commission remain in force for the duration of a control period.
- 5.5 A Generating Company or Distribution Licensee, as the case may be, may agree to any terms and conditions that may vary from the terms and conditions contained in this Regulation subject to the conditions that :
- (a) The overall per unit tariff of electricity over the entire life of the asset, calculated on the basis of the norms in deviation does not exceed the per unit tariff calculated on the basis of the norms specified in this Regulation; and
  - (b) Any such deviation shall come into effect only after approval by the Commission :

## **6 PROCEDURE FOR APPLICATION**

- 6.1 An application referred to in clause 5.3 above shall be filed in the form specified in Annexure-I, and shall be accompanied by the form of verification specified in the Conduct of Business Regulations in force, and the fees specified in APERC (Levy of Fees for various services rendered by the Commission) Regulation, 2005 (Regulation No.1 of 2005), as amended from time to time.
- 6.2 The applicant shall provide all and any further information as may be required by the Commission for processing the application.

## **7 PROCEDURE FOR PUBLICATION OF THE APPLICATION**

- 7.1 The applicant shall publish the application in at least two daily English newspapers in English and two Telugu daily newspapers in Telugu, in the form specified in Annexure-II inviting objections / suggestions from the public on the application, to be filed with the Secretary of the Commission with a copy to the applicant.
- 7.2 The applicant shall furnish replies to the written objections received pursuant to such publication within the time specified by the Commission, to the objectors concerned with a copy each to the Commission Secretary.

## **8 DISPOSAL OF APPLICATION**

- 8.1 The Commission shall, within one hundred and twenty (120) days from the receipt of a complete application and after considering all suggestions and objections received from the public:
- (a) issue a Tariff Order accepting the application with such modifications or such conditions as may be contained in such Order; or
  - (b) reject the application for reasons to be recorded in writing if such application is not in accordance with the provisions of the Act and the rules and regulations made thereunder or the provisions of any other law for the time being in force and for any other sufficient reasons
- 8.2 The Commission may conduct public hearing on the application in the manner as may be decided by the Commission in terms of the Conduct of Business Regulations, this Regulation and the Act.
- 8.3 No tariff or part of any tariff may be ordinarily amended, more frequently than once in any financial year, except in respect of any changes in fuel cost expressly permitted under the terms of fuel cost adjustment formula given in Annexure-III.

Provided that if any Licensee or Generating Company recovers a price or charge exceeding the tariff determined under Section 62 of the Act and in accordance with this Regulation, the excess amount shall be recoverable by the person who has paid such price or charge along with interest equivalent to the Bank Rate of the Reserve Bank of India without prejudice to any other liability incurred by such Licensee or Generating Company.

- 8.4 The Licensee shall submit periodic returns as may be required by the Commission, containing operational and cost data to enable the Commission to monitor the implementation of its Order and reassess the basis on which tariff was approved.

## **PART-II**

### **TARIFF DETERMINATION BASED ON CAPITAL COST**

## **9 FILING DETAILS**

- 9.1 Each application where tariff is to be determined based on capital cost shall include the following duly accompanied by supporting data and documentary and other evidence:
- (i) Fixed Costs
    - (a) Capital Cost of the project
    - (b) Capital structure (Debt-Equity Ratio)
    - (c) Depreciation
    - (d) Operation and Maintenance Expenses
    - (e) Working Capital
    - (f) Income-Tax as per actuals

- (ii) Variable Costs
  - (a) Landed cost of fuel including transit and handling charges, in case of thermal stations
  - (b) Royalty on coal and water rates, if any
  - (c) Others (to specify)
  
- (iii) Norms of operation
  - (a) Target Availability for recovery of full capacity (Fixed) charges
  - (b) Target Plant Load Factor (PLF) for incentive
  - (c) Gross Station Heat Rate – (i) during stabilisation period; (ii) subsequent period
  - (d) Secondary fuel oil consumption
  - (e) Auxiliary Energy Consumption

## **10 TARIFF DETERMINATION**

Tariffs under this Part shall be determined in accordance with the norms specified herein, guided by the principles and methodologies specified in CERC (Terms and Conditions of Tariff) Regulations 2004 as originally issued and amended by CERC (Terms and Conditions of Tariff) (First Amendment) Regulations, 2006, issued on 1<sup>st</sup> June, 2006 vide No. L-7/25/(5)/2003 –CERC; any further amendments thereto shall be applicable on their adoption by the Commission, by means of a general or special order, with or without any modifications:

Provided that the norms of operation specified in this Regulation shall not preclude the generating company and the distribution licensee from agreeing upon improved norms of operation and in such a case, such improved norms shall be applicable for determination of tariff.

- 10.1 Tariff in respect of a generating station under this Regulation shall be determined Stage-wise, Unit-wise or for the whole generating station. The terms and conditions for determination of tariff for generating stations specified in this Part shall apply in like manner to Stages or Units, as the case may be, as to generating stations.

- 10.2 Where the tariff is being determined for a Stage or a Unit of a generating station, the generating company shall adopt a reasonable basis for allocation of capital cost relating to common facilities and allocation of joint and common costs across all Stages or Units as the case may be under consideration:

Provided that the generating company shall maintain an Allocation Statement providing the basis for allocation of such costs and submit such statement to the Commission along with the application for determination of tariff under this Regulation.

- 10.3 In relation to multi-purpose hydroelectric projects, with irrigation, flood control and power generation components, the capital cost chargeable to the power generation component of the project only shall be considered for determination of tariff.

- 10.4 **Components of tariff:** Tariff for sale of electricity shall comprise of two parts a) annual fixed costs ; and b) energy charges

- i. In case of a thermal power generating station, the two parts shall consist of the recovery of annual fixed charges and energy charges.
- ii. In case of a hydro power generating station, the two parts shall consist of the recovery of annual capacity charge and energy charges :

Provided that the annual capacity charges for a hydro power generating station shall be computed in accordance with the following formula:

Annual Capacity Charges = (Annual Fixed Charge- Primary Energy Charge)

Provided further that the Primary Energy Charge shall not exceed the Annual Fixed Charge.

- 10.5 The annual fixed charges of a thermal generating station or of a hydro power generating station, as the case may be, shall consist of recovery of the following:

- (a) Return On Capital Employed (RoCE);
- (b) Depreciation ;
- (c) O&M Expenses ;
- (d) Income-tax as per actuals;

- 10.6 The energy charges, in case of thermal generating station, shall cover fuel cost and shall be computed in accordance with clause 13.1

- 10.7 The Primary energy charges, in case of hydro generating station, shall be computed as specified in clause 13.2

- 10.8 **Capital cost :-** Subject to prudence check by the Commission based on information filed by the generating company , licensees, evidence from other Commissions, generating companies, licensees and international experience etc. the Commission shall determine the Capital Cost of the project. The Capital Cost as determined

above, shall also include further capital expenditure incurred if any up to the first financial year closing one year after the date of commercial operation of the last unit of the project, its stage or the unit, as the case may be is admitted by the Commission.

It shall also include capitalized initial spares subject to the following ceiling norms as a percentage of the actual cost of the machinery and equipment. The actual (original cost) as on the cut-off date as admitted by the Commission.

- (i) Coal-based/lignite-fired generating stations - 2.5%
- (ii) Gas Turbine/Combined Cycle generating stations - 4.0%
- (iii) Hydro power generating stations - 1.5%

Provided that where the power purchase agreement entered into between the Generating Company and the Distribution Licensee provides actual expenditure, the expenditure shall not exceed such actuals for determination of tariff :

Provided further that in case of the existing generating stations, the actual original cost of project recorded in the books of account of the Generating Company, subject to prudence check by the Commission, shall be considered as the original cost of project for the purpose of this Regulation.

- 10.9 Capital cost of the project shall be inclusive of, and shown separately with supporting evidence the expenditure if any, likely to be capitalised within the original scope of work after the date of commercial operation, and no separate claim for any additional capitalisation shall be entertained.

Subject to prudence check Capital Expenditure of the following nature actually incurred after the cut-off date may be admitted by the Commission.

- i. Deferred liabilities relating towards works / services within the original scope of work.
- ii. Liabilities to meet award of arbitration or for compliance of the order or decree of the Court.
- iii. On account of change in law.
- iv. Any additional works / services that became necessary for efficient and successful operation of the generating station, but not included in the original project cost ; and
- v. Deferred works relating to ash pond or ash handling system in the original scope of work.

- 10.10 Foreign exchange variation risk shall not be allowed as a pass-through :

- 10.11 The capital expenditure as arrived at or determined above shall be considered as the capital cost of the project for the purpose of this Regulation.

- 10.12 **Sale of Infirm Power :** Any revenue (other than the recovery of fuel cost) earned by the generating company from sale of infirm power, shall be taken as reduction in capital cost and shall not be treated as revenue.

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- 10.13 **Debt-equity ratio :** In case of all generating stations, debt-equity ratio as on the date of commercial operation shall be taken as 70:30 for determination of tariff irrespective of the actual quantum of debt and equity .

The debt and equity amount so arrived at shall be used for calculating RoCE referred to in clause-12.

## **11 NORMS FOR OPERATION**

### **11.1 Thermal generating stations:**

The norms in respect of those generating stations with plant capacities other than those mentioned herein shall be determined by the Commission on a case to case basis.

#### **11.1.1 Availability**

- a. Target availability for full recovery of annual fixed charges in case of coal / gas – based plants shall be 80 percent.
- b. Target availability for full recovery of annual fixed charges in case of lignite - fired plant shall be 75 percent

#### **11.1.2 Auxiliary Energy Consumption**

- a. Coal-based generating stations

	<b>With cooling tower</b>	<b>Without cooling tower</b>
<b>(i) 200/210/250 MW</b>	<b>9.0%</b>	<b>8.5%</b>
<b>(ii) 500 MW series</b>		
<b>Steam driven boiler feed pumps</b>	<b>7.5%</b>	<b>7.0%</b>
<b>Electrically driven boiler feed pumps</b>	<b>9.0%</b>	<b>8.5%</b>

- b. Gas Turbine/Combined Cycle generating stations

- i. Combined cycle : 3.0%
- ii. Open cycle : 1.0%

- c. Lignite-fired thermal power generating stations

The auxiliary energy consumption norms shall be 0.5 percentage point more than the auxiliary energy consumption norms of coal-based generating stations specified clause 11.1.2 (a) above.

#### **11.1.3 Gross station heat rate**

- a. Gross station heat rate for coal-based generating stations shall be as indicated below:

	<b>After Stabilization Period</b>
<b>200/210/250 MW capacity plants</b>	<b>2500 kcal / kWh</b>
<b>500 MW capacity plants</b>	<b>2450 kcal / kWh</b>

Note 1:

In respect of 500 MW Units where the boiler feed pumps are electrically operated, the gross station heat rate shall be 40 kCal/kWh lower than the station heat rate indicated above.

Note 2:

For generating stations having combination of 200/210/250 MW sets and 500 MW sets, the normative gross station heat rate shall be the weighted average station heat rate.

- b. For lignite-fired generating stations, the gross station heat rates specified under clause (a) above for coal-based generating stations shall be corrected, using multiplying factors as given below:

(i) For lignite having 50% moisture: Multiplying factor of 1.10

(ii) For lignite having 40% moisture: Multiplying factor of 1.07

(iii) For lignite having 30% moisture: Multiplying factor of 1.04

(iv) For other values of moisture content, multiplying factor shall be prorated for moisture content between 30-40 and 40-50 depending upon the rated values of multiplying factor for the respective range given under sub-clauses (i) to (iii) above.

- c. Gross station heat rate for gas turbine/combined cycle generating stations

	Advanced Class Machines	E/EA/EC/E2 Class Machines
Open cycle	2685 kCal/kWh	2830 kCal/kWh
Combined cycle	1850 kCal/kWh	1950 kCal/kWh

- d. Gross station heat rate for small gas turbine generating stations

	With Natural Gas	With Liquid Fuel
Open cycle	3125 kCal/kWh	1.02x3125 kCal/kWh
Combined cycle	2030 kCal/kWh	1.02x2030 kCal/kWh

#### 11.1.4 Secondary fuel oil consumption

- a. Coal-based generating stations:

2.0 ml/kWh
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- b. Lignite-fired generating stations:

3.0 ml/kWh
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### **11.1.5 Transit losses**

- a. Transit losses for coal based generating stations, as a percentage of quantity of coal dispatched by the coal supply company during the month, shall be as given below:
  - (i) Pit head generating stations - 0.3%
  - (ii) Non-pit head generating stations - 0.8%

## **11.2 Hydro power generating stations**

### **11.2.1 Normative capacity index for recovery of annual fixed charges**

- a. During first year of commissioning of the generating station
  - (i) Purely Run-of-river power stations - 85%
  - (ii) Storage type and Run-of-river power stations with pondage - 80%
- b. After first year of commissioning of the generating station
  - (i) Purely Run-of-river power stations - 90%
  - (ii) Storage type and Run-of-river power stations with pondage - 85%

Note:

There shall be pro rata recovery of annual fixed charges in case the generating station achieves capacity index below the prescribed normative levels. At Zero capacity index, no fixed charges shall be payable to the generating station.

### **11.2.2 Auxiliary Energy Consumption**

- (a) Surface hydro electric power generating stations with rotating excitors mounted on the generator shaft - 0.2% of energy generated;
- (b) Surface hydro electric power generating stations with static excitation system - 0.5% of energy generated ;
- (c) Underground hydro electric power generating stations with rotating excitors mounted on the generator shaft - 0.4% of energy generated;
- (d) Underground hydro electric power generating stations with static excitation system - 0.7% of energy generated ;

### **11.2.3 Transformation losses**

From generation voltage to transmission voltage: 0.5% of energy generated.

## **12 CALCULATION OF ANNUAL FIXED CHARGES**

The capacity charges shall be computed on the following basis and their recovery shall be related to target availability. The Annual Fixed Charges shall cover:

- (a) Return on Capital Employed (RoCE)
- (b) Depreciation
- (c) O&M expenses
- (d) Taxes on Income as per actuals

## 12.1 a) Return on Capital Employed (RoCE)

RoCE is equal to sum of

- a. Original Capital Cost less Accumulated depreciation, and ;
- b. Working Capital approved by the Commission as per this Regulation, multiplied with the Weighted Average Cost of Capital (WACC)  
The WACC for this purpose will be determined as per the procedure given below :

$$\text{WACC} = [D/E/(1+D/E)] r_d + [1/(1+D/E)]r_e$$

D/E is the Debt to Equity Ratio and shall be determined at the beginning of the Control Period after considering Generating Company's previous years' D / E mix, market conditions and other relevant factors.

$r_d$  is the Cost of Debt and shall be determined at the beginning of the Control Period after considering Generating Company's proposals, present cost of debt, market conditions and other relevant factors.

$r_e$  is the Return on Equity and shall be determined at the beginning of the Control Period after considering CERC norms, Generating Company's proposals, previous years' D/E mix, risks associated with generating business, market conditions and other relevant factors

## 12.2 b) Depreciation

### Depreciation

For the purpose of tariff, depreciation shall be computed in the following manner, namely:

- (i) The value base for the purpose of depreciation shall be the historical cost of the asset;
- (ii) Depreciation shall be calculated annually, based on straight line method over the useful life of the asset and at the rates prescribed in Ministry of Power notification dated 21-03-1994, as amended till date.

The residual life of the asset shall be considered as 10% and depreciation shall be allowed up to a maximum of 90% of the historical capital cost of the asset. Land is not a depreciable asset and its cost shall be excluded from the capital cost while computing the historical cost of the asset.

- (iii) On repayment of entire loan, the remaining depreciable value shall be spread over the balance useful life of the asset.
- (iv) Depreciation shall be chargeable from the first year of operation. In case of operation of the asset for part of the year, depreciation shall be charged on *pro rata* basis.

## 12.3 Operation and Maintenance Expenses

### 12.3.1 Existing generating stations

- a. The operation and maintenance expenses including insurance, for the existing generating stations which have been in operation for 5 years or more in the base year of 2006-07, shall be derived on the basis of actual operation and maintenance expenses for the years 2001-02 to 2005-06 based on the audited financial statements or best estimates of the generating company as accepted by the Commission in respect of the years for which audited financial statements are not available, excluding abnormal operation and maintenance expenses, if any, after prudence check by the Commission.
- b. The average of such normalized operation and maintenance expenses after prudence check, for the years 2001-02 to 2005-06 considered as operation and maintenance expenses for the year 2005-06 shall be escalated by 4% to arrive at operation and maintenance expenses for the base year 2006-07:

Provided that in case, an existing generating station has been in operation for less than five (5) years as at April 1, 2007, the average shall be computed for such shorter period for which such generating station was in operation and such average shall be treated as the operating and maintenance expense for the base year commencing April 1, 2006.

- c. The base operation and maintenance expenses for the year 2006-07 shall be escalated further at the rate of 4% per annum to arrive at permissible operation and maintenance expenses for the relevant year of tariff control period.

### 12.3.2 New generating stations

- a. Thermal generating stations
  - (i) Coal-based generating stations
    - 200/210/250 MW sets : Rs. 11.25 lakh/MW
    - 500 MW sets : Rs. 10.12 lakh/MW
  - Note:  
For the generating stations having combination of 200/210/250 MW sets and 500 MW sets, the weighted average value for operation and maintenance expenses shall be adopted.
  - (ii) Gas Turbine/Combined Cycle generating stations other than small gas turbine power generating stations
    - With warranty spares of 10 years : Rs. 5.62 lakh/MW
    - Without warranty spares : Rs. 8.44 lak Q`Zh/MW
  - (iii) Small gas turbine power generating stations: Rs. 10.24 lakh/MW
  - (iv) Lignite-fired generating stations : Rs. 11.25 lakh/MW

The above operation and maintenance expense norms are for the base year commencing April 1, 2006, which shall be escalated at the rate of 4 per cent per annum to arrive at permissible operation and maintenance expenses for the relevant years of tariff Control period.

b. Hydro power generating stations

The base operation and maintenance expenses shall be 1.5 per cent of the approved original cost of the project, in the year of commissioning, and shall be escalated at a rate of 4 per cent per annum for the subsequent years.

12.4 **Estimation of Working Capital** - Requirements of Working Capital for inclusion in the rate base shall be:

a. In case of coal -based/ oil-based/ lignite-fired generating stations, working capital shall cover:

- (i) Cost of coal or lignite for one-and-a-half months for pit-head generating stations and two months for non-pit-head generating stations, corresponding to target availability;
- (ii) Cost of oil for two months corresponding to target availability;
- (iii) Cost of secondary fuel oil for two months corresponding to target availability;
- (iv) Operation and Maintenance expenses for one month;
- (v) Maintenance spares @ 1 per cent of the historical cost as per indexation of O&M norms ; and
- (vi) Receivables for sale of electricity equivalent to two months of the sum of annual fixed charges and energy charges calculated on target availability;

Minus

Payables for fuel (including oil and secondary fuel oil) to the extent of one month of the cost of fuel calculated on target availability.

b. In case of Gas Turbine/Combined Cycle generating stations, working capital shall cover:

- (i) Fuel cost for one month corresponding to target availability duly taking into account the mode of operation of the generating station on gas fuel and / or liquid fuel;
- (ii) Liquid fuel stock for fifteen (15) days corresponding to target availability;
- (iii) Operation and maintenance expenses for one month;
- (iv) Maintenance spares at 1 per cent of the historical cost;
- (v) and Receivables for sale of electricity equivalent to two months of the sum of annual fixed charges and energy charges calculated on target availability,

minus

Payables for fuel (including liquid fuel stock) to the extent of one month of the cost of fuel calculated on target availability.

- c. In case of hydro power generating stations, working capital shall cover:
  - (i) Operation and maintenance expenses for one month;
  - (ii) Maintenance spares at 1 per cent of the historical cost as per indexation of O&M norms ; and
  - (iii) Receivables for sale of electricity equivalent to two months of the annual fixed charges calculated on normative capacity index.
- d. In case of own generating stations, no amount shall be allowed towards receivables, to the extent of supply of power by the Generation Business to the Retail Supply Business, in the computation of working capital in accordance with this Regulation.
- e. Interest on working capital shall be on normative basis and shall be equal to the short-term Prime Lending Rate of State Bank of India as on the date on which the application for determination of tariff is made.

#### 12.5 **Taxes on Income**

Taxes on Income actually payable and paid shall be limited to Tax on Return on the Equity component of the RoCE, and exclusive of tax on profit, if any, in excess of such return, penalties, interest on delayed payment of tax etc., and duly adjusted for any refund etc. received for previous periods.

#### 12.6 **Other expenditure**

Any other expenditure incurred and not covered in the above items will be considered only on specific approval of the Commission.

### 13 **ENERGY CHARGES**

#### 13.1 **Thermal generating stations**

- a. Energy charges shall cover fuel costs and shall be worked out on the basis of ex-bus energy sent out corresponding to scheduled generation as per the following formula:

Energy Charges (Rs.) = Rate of Energy Charges in Rs/kWh X Ex-bus energy sent out corresponding to scheduled generation for the month in kWh

Where,

Rate of Energy Charges (REC) shall be the sum of the cost of normative quantities of primary and secondary fuel for one kWh of ex-bus energy sent out corresponding to scheduled generation and shall be computed as under:

$$REC = \frac{100 \{ P_p \times (Q_p)_n + P_s \times (Q_s)_n \}}{(100 - (AUX_n))} \quad (\text{Rs./kWh})$$

Where,

$P_p$  = Landed cost of primary fuel namely coal or lignite or gas or liquid fuel in Rs/Kg or Rs/cubic-metre (m<sup>3</sup>) or Rs./litre, as the case may be

$(Q_p)_n$  = Quantity of primary fuel required for generation of one kWh of electricity at generator terminals in Kg or litre or m<sup>3</sup>, as the case may be, and shall be computed on the basis of normative Gross Station Heat Rate (less heat contributed by secondary fuel oil for coal/lignite based generating stations) and gross calorific value of coal/lignite or gas or liquid fuel as fired.

$P_s$  = Landed cost of Secondary fuel oil in Rs./ml

$(Q_s)_n$  = Normative Quantity of Secondary fuel oil in ml/kWh as per clause 11.1.4, as the case may be, and

$AUX_n$  = Normative Auxiliary Energy Consumption as percentage of gross generation as per clause 11.1.2, as the case may be.

- b. Adjustment of rate of energy charge (REC) on account of variation in price or heat value of fuels. Initially, gross calorific value of coal/lignite or gas or liquid fuel shall be taken as per actuals of the preceding three months. Any variation shall be adjusted on month to month basis on the basis of gross calorific value of coal/lignite or gas or liquid fuel received and burnt and landed cost incurred by the Generating Company for procurement of coal/lignite, oil, or gas or liquid fuel, as the case may be. In case of any dispute, an appropriate application in accordance with the Conduct of Business Regulations shall be made before the Commission.

**c. Landed Cost of fuel**

The landed cost of fuel shall include price of fuel corresponding to the grade/quality of fuel inclusive of royalty, taxes and duties as applicable, transportation cost by rail/ road/ pipeline or any other means, and, for the purpose of calculation of energy charges, shall be arrived at after considering transit losses as per clause 11.1.5

**13.2 Hydro power generating stations**

- (1) Rate of primary energy for all hydro electric power generating stations, except for pumped storage generating stations, shall be equal to average of the lowest variable charges of the Central and State thermal power generating stations of the State for all months of the previous year. The primary energy charge shall be computed based on the primary energy rate and scheduled primary energy of the station :

Provided that in case the primary energy charge recoverable by applying the above primary energy rate exceeds the Annual fixed charges of a generating station, the primary energy rate of such generating station shall be calculated by the following formula :

Primary energy rate = Annual Fixed Charge

## Primary energy

- (2) Primary Energy Charge = Scheduled Primary Energy x Primary Energy Rate.

Secondary Energy Rate shall be equal to the Primary Energy Rate.

Secondary Energy Charge = Scheduled Secondary Energy x Secondary Energy Rate

## **14 CHARGES FOR UNSCHEDULED INTERCHANGE**

- 14.1 The generating station shall be entitled to receive or shall be required to bear, as the case may be, the charges for deviations between energy sent-out corresponding to scheduled generation and actual energy sent-out, in accordance with the Balancing and Settlement Code notified by the Commission:

Provided that the rate for determination of such charges shall be as notified by the Commission from time to time.

## **15 INCENTIVE**

### **15.1 Thermal generating stations**

- (a) Target Plant Load Factor for incentive shall be 80%.
- (b) Incentive shall be payable at a flat rate of 25.0 paise/kWh for ex-bus scheduled energy corresponding to scheduled generation in excess of ex-bus energy corresponding to target Plant Load Factor.

## **16 REBATE / LATE PAYMENT SURCHARGE**

- 16.1 For payment of bills through a letter of credit on presentation, the Generating Company and Distribution Licensee may mutually agree to a maximum rebate of 2 per cent of the bill amount. If the payments are made within one week of presentation of the bill, the Generating Company and Distribution Licensee may mutually agree to a maximum rebate of 1.25 per cent of the bill amount.
- 16.2 In case the payment of bills is delayed beyond a period of two (2) months from the date of billing, a late payment surcharge at the rate of 1.25 per cent per month shall be allowed to be levied by the Generating Company.

## **17 BILLING AND PAYMENT OF CHARGES**

Billing and payment of charges shall be done on a monthly basis.

## **18 DEMONSTRATION OF DECLARED CAPACITY**

- 18.1 The Generating Company may be required to demonstrate the declared capacity of its generating station as and when required by the State Load Despatch Centre. In the event the Generating Company fails to demonstrate the declared capacity, the fixed

charges due to the Generating Company shall be reduced suitably as a measure of penalty.

- 18.2 The quantum of penalty for the first mis-declaration during a Control Period for any duration/block in a day shall be the charges corresponding to two days' fixed charges. For the second misdeclaration the penalty shall be equivalent to fixed charges for four days and for subsequent mis-declarations, the penalty shall be multiplied in the same geometrical progression.
- 18.3 The operating log books of the generating station shall be available for inspection/ review by the Commission.

## **19 DEEMED GENERATION**

- 19.1 In case of reduced generation by a hydro power generating station on account of certain valid reasons or on account of non-availability of Transmission Licensee's transmission lines or on receipt of backing down instructions from the State Load Despatch Centre resulting in spillage of water, the energy charges on account of such spillage shall be payable to the Generator :

Provided that energy charges on the above account shall not be admissible if the energy generated during the year is equal to or more than the design energy.

## **PART-IV MISCELLANEOUS**

### **20 POWER TO AMEND:**

The Commission may, at any time add, vary, alter, modify or amend any provisions of this Regulation.

### **21 SAVINGS**

Nothing in this Regulation shall be deemed to limit or otherwise affect the powers of the Commission to make such orders as may be necessary to meet the ends of justice or to prevent abuse of the process of the Commission.

**(BY ORDER OF THE COMMISSION)**

**G.V. NAGESH**  
**Commission Secretary**



## Fuel Price Adjustment. (FPA) Calculations Formula

FPA = A + B where

A=Fuel Price Adjustment for Secondary Fuel Oil in Paise/KwH sent out.

B=Fuel Price Adjustment for Coal in Paise/KwH sent out.

$A = 10 \times \text{SFCn} (\text{Pom} - \text{Pos}) / (100 - \text{ACn})$  and

$B = 10 \times [(\text{SHRn} \{(\text{Pcm}/\text{Kcm}) - (\text{Pcs}/\text{Kcs})\} - (\text{SFCn}) \times \{(\text{Kom} \times \text{Pcm}/\text{Kcm}) - (\text{Kos} \times \text{Pcs}/\text{Kcs})\}) / (100 - \text{ACn})]$

where

SFCn	Normative Specific Fuel Consumption in L/kWh
SHRn	Normative Gross Station Heat Rate in KCal/kWh
ACn	Normative Auxiliary Consumption in percentage
Pom	Wtd. Average price of Fuel Oil for the month in Rs./KL
Kom	Wtd Average GCV of Oil fired for the month in KCal/Ltr.
Pos	Base Value of price of Fuel Oil as taken for determination of base energy charges adopted for the month of. .... Rs./KL
Kos	Base value of GCV of Fuel Oil as taken for determination of Base energy Charges for the month of ...KCal/Ltr.
Pcm	Wtd. Average price of landed coal for the month.... Rs/Mt
Kcm	Wtd Average GCV of coal fired at boiler front for the month.... KCal/Kg.
Pcs	Base value of price of Coal as taken for determination of Base energy Charges adopted for the month of .....Rs./Mt.
Kcs	Base value of GCV of Coal as taken for determination of Base energy charges adopted for the month of .....Kcal/Kg.

Fuel Price Adjustment(FPA) in Ps/kWh for the month = (A+B)Ps/Kwh

