

**CENTRAL ELECTRICITY REGULATORY COMMISSION  
NEW DELHI**

**Coram:**

1. Dr. Pramod Deo, Chairperson
2. Shri R.Krishnamoorthy, Member
3. Shri S.Jayaraman, Member
4. Shri V.S.Verma, Member

**Petition No. 76/2009**

**In the matter of**

Revision of transmission tariff due to de-capitalization and additional capital expenditure incurred during 2008-09 for 400 kV Ramagundam Transmission System, including ICT at Khammam and Reactor at Gazuwaka under CTP Augmentation in Southern Region for the period from 1.4.2008 to 31.3.2009.

**And in the matter of**

Power Grid Corporation of India Limited, New Delhi

... **Petitioner**

Vs

1. Karnataka Power Transmission Corporation Ltd., Bangalore
2. Transmission Corporation of Andhra Pradesh Ltd., Hyderabad
3. Kerala State Electricity Board, Thiruvananthapuram
4. Tamil Nadu Electricity Board, Chennai
5. Electricity Department, Govt. of Pondicherry, Pondicherry
6. Eastern Power Distribution Company of Andhra Pradesh Limited, Vishakhapatnam
7. Southern Power Distribution Company of Andhra Pradesh Limited, Tirupati
8. Central Power Distribution Company of Andhra Pradesh Limited, Hyderabad
9. Northern Power Distribution Company of Andhra Pradesh Limited, Warangal

...**Respondents**

**The following were present:**

1. Shri U.K.Tyagi, PGCIL
2. Shri V.V.Sharma, PGCIL
3. Shri M.M.Mondal, PGCIL
4. Shri Mohd. Mohsin, PGCIL
5. Shri J.Majumdar, PGCIL

**ORDER  
(DATE OF HEARING: 23.6.2009)**

This petition has been filed for revision of transmission tariff on account of de-capitalisation and additional capital expenditure incurred during 2008-09 in respect of 400 kV Ramagundam Transmission System (the transmission system), including ICT at Khammam and Reactor at Gazuwaka

under CTP Augmentation scheme (Collectively referred to as “ the transmission assets”) in Southern Region for the period from 1.4.2008 to 31.3.2009, based on the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2004, (hereinafter referred to as “the 2004 regulations”). The petitioner has also prayed for reimbursement of the petition filing fee and other expenditure .in connection with the filing of the petition.

2. The revised cost estimates for the transmission system were approved by the Central Government in Ministry of Power under letter dated 27.11.1990 at a total cost of Rs.198512 lakh, including Rs. 167462 lakh for Ramagundam Super Thermal Power Station and Rs. 31050 lakh for the associated transmission system. Further, the approval for additional assets under augmentation scheme of Central Transmission Project in Southern Region was accorded by the Board of Directors of the petitioner company under its delegated powers vide Memorandum No. C/CP/SQ2-00 dated 12.5.1994 for Rs. 3857 lakh which, inter alia, included implementation of one No. 315 MVA, 400/220 kV transformer at Khammam and one No. 50 MVAR Reactor at Gazuwaka. The apportioned approved cost of ICT at Khammam and Reactor at Gazuwaka was stated to be Rs. 2012 lakh. In this manner, the total approved cost of the transmission is Rs. 33062 lakh.

3. The transmission assets were declared under commercial operation during 1.10.1984 to 1.2.1997. The transmission charges for the transmission assets were approved by the Commission in its order dated 2.5.2006 in Petition No. 130/2004 for the period 1.4.2004 to 31.3.2009 based on capital cost of Rs. 38170.20 lakh as on 1.4.2004. Subsequently, the transmission charges were revised vide order dated 17.3.2008 in terms of the judgment dated 4.10.2006 of

the Appellate Tribunal in Appeal No. 135 of 2005 and other related appeals. The summary of the revised transmission charges approved by the said order dated 17.3.2008 is extracted hereunder:

	(Rs.in lakh)				
	2004-05	2005-06	2006-07	2007-08	2008-09
Depreciation	1048.35	600.48	600.48	600.48	600.48
Interest on Loan	5.63	0.00	0.00	0.00	0.00
Return on Equity	2455.77	2455.77	2455.77	2455.77	2455.77
Advance against Depreciation	0.00	0.00	0.00	0.00	0.00
Interest on Working Capital	165.73	163.46	169.43	175.63	182.28
O & M Expenses	1277.03	1328.04	1382.58	1435.59	1495.16
<b>Total</b>	<b>4952.50</b>	<b>4547.75</b>	<b>4608.26</b>	<b>4667.46</b>	<b>4733.69</b>

4. The relevant details of the completion cost etc. of the transmission asset claimed by the petitioner are as under:

(Rs. in lakh)			
Capital expenditure as on 1.4.2004	Additional capital expenditure during 2008-09		Capital expenditure as on 1.4.2009
	De-capitalisation on account of replacement of old assets during 1.4.2008 to 31.3.2009	Capitalisation of new assets	
38170.20	(-)87.86	293	38375.41

5. Based on the above additional capital expenditure, the petitioner has claimed the revised transmission charges for the year 2008-09 as under:

	(Rs. in lakh)
	2008-09
Depreciation	619.37
Interest on Loan	0.00
Return on Equity	2459.10
Advance against Depreciation	0.00
Interest on Working Capital	182.67
O & M Expenses	1495.16
<b>Total</b>	<b>4756.30</b>

6. The details submitted by the petitioner in support of its claim for interest on working capital are given hereunder:

	(Rs. in lakh)
	<b>2008-09</b>
Maintenance Spares	864.83
O & M expenses	124.60
Receivables	792.72
Total	1782.15
Rate of Interest	10.25%
Interest	<b>182.67</b>

7. None of the reply has been filed by the respondents .

### **CAPITAL COST**

8. The details submitted by the petitioner in support of its claim for additional capital expenditure are given hereunder:

Year	Amount (Rs. in lakh)	Nature and details of expenditure
2008-09	Sub-station = Rs 293.07 lakh	Circuit breakers, surge arrestors etc.
	Total = Rs. 293.07 lakh	

9. The petitioner vide auditor's certificate dated 11.3.2009 has submitted the audited additional capital expenditure up to 31.12.2008. The petitioner by its affidavit dated 29. 7.2009 has confirmed that no additional capital expenditure out of balance estimated expenditure shown as Rs. 33.91 lakh was incurred up to 31.3.2009. The petitioner has also submitted that the additional capital expenditure of Rs. 293.07 lakh has been incurred to replace the old and obsolete circuit breakers and surge arresters. The entire cost of the originally purchased equipment of Rs. 87.86 lakh has been de-capitalised. The petitioner has further submitted that the replaced equipments were of 20-24 years old and had become obsolete due to up-gradation of technology and non-availability of service support. Moreover, the replacement was necessary for enhancing the grid security and reliability.

10. During the hearing, the representative of petitioner stated that as per the recommendation of the expert agency, the equipments had to be replaced after 12 to 13 years. As such, the petitioner pleaded the Commission for allowing additional capital expenditures incurred for installing new equipments in place of old equipments. However, the petitioner was directed to submit the following information:

- (i) Detailed recommendation of the expert inspection agency which recommended replacing the Circuit Breakers and Surge Arresters after 12 to 13 years of operations.
- (ii) Details of old equipment replaced, giving their type and quantity.

11. The petitioner vide its affidavit dated 8.7.2009 has furnished reply as under:

(a) The circuit breakers had been in service for the past 20 to 24 years. During the initial period of service, the requirement of maintenance spares was met through the mandatory spares. M/s NGEF, the Indian agent of M/s AEG Germany, the agency was manufacturing 220 kV circuit breakers initially, had been supplying the required spares for 400 kV AEG CBs and 220 kV NGEF circuit breakers until its closure. In the absence of Indian agent for supplying the spares, the maintenance spares were required to be imported from Germany through its current Indian Agent M/s Areva.

(b) The circuit breakers were overhauled during the years 1998 to 2000. The operating mechanism was one of the main components which

failed frequently and required replacement of various components such as closing valve/piston, Trip valve/ piston and third stage valve/piston. Since the pneumatic mechanism operated at a pressure of 35 Kg/sq.cm. it was highly susceptible for air leakage leaving the circuit breaker inoperative at the time of actual requirement, thus posing a serious threat to the grid security.

(c) These breakers were filled with SF6 gas for insulation and are for quenching purpose. Due to the ageing of gaskets and other worn out parts, SF6 gas leakage was more than the acceptable norms. SF6 gas is green house gas and has global warming potential 23900 times that of carbon dioxide.

(d) As the circuit breakers became old, the requirement of spares had become very frequent. The original equipment manufacturer suggested for overhauling of the circuit breaker after completion of 20 years of service. Accordingly, the cost of overhauling of the circuit breakers and subsequent maintenance spares required for maintaining the overhauled CBs was about 80% of new breakers cost. Hence, the circuit breakers were replaced with reliable circuit breaker.

(e) The lightning arresters replaced were of gapped type Silicon Carbide arresters and almost all of them were more than 15 years old. Earlier, gapped type Silicon Carbide surge arresters were used in Electrical System but with technical advancement and the development of gapless Zinc Oxide arresters in late 80's, Silicon Carbide arresters were phased

out. Surge arresters normally limit the Lighting Impulse Voltages and Switching Impulse Voltages thus safeguarding the switchyard equipments. As per IEEE Transaction on power delivery, October 1996, gapped type lighting arresters (Silicon Carbide type) need to be replaced after 13 years of service as these arresters could not provide required protection margin for the switchyard equipments. Gapped type lighting arresters were in use up to late 1980 but have inherent drawbacks like reduction of spark over voltage level and problem in resealing after a surge passes due to carbonization/melted particles in the gap (provided in Silicon Carbide arresters). In Power Grid also, only gapless type arresters were in use after 1987/1988 and gapped Las are no more manufactured. There were also incidents in Power Grid in recent past that flashover in circuit breakers in reactor switching were observed where gapped lighting arresters were provided indicating the poor performance of gapped lighting arresters.

(f) The gapless Zinc Oxide type Surge Arresters improves the efficiency and performance against surges due to inherent superiority on account of fast response, high energy handling capabilities, absence of series/spark gap and superior performance under polluted environment. In view of above, the gapped lighting arresters were replaced with gapless arrestors.

12. The petitioner has also furnished the details of old equipments replaced, giving its type and quantity. The details of cost furnished by the petitioner are as under:

Cost of old equipments (proposed to be de-capitalised)	Cumulative depreciation of old equipments proposed to be de-capitalised	(Rs. in lakh)	
		Replacement cost of new equipments (additional capital expenditure)	
		Already incurred	Balance expenditure
87.86	60.97	293.07	33.91

13. It is found that the additional capital expenditure claimed is for replacement of old circuit breakers and surge arresters after more than 20 years of operations and is justified. Therefore, the additional expenditure of Rs. 293.07 lakh sought to be capitalised and de-capitalization of Rs. 87.86 lakh is allowed under clauses (1) and (2) of Regulation 53 of the 2004 regulations.

#### **TOTAL CAPITAL COST**

14. Based on the above, capital cost for the purpose of tariff for transmission line as on 31.3.2009 works out as under:

Capital expenditure as on 1.4.2008	Additional capital expenditure during 2008-09		(Rs. in lakh)
	De-capitalisation	Capitalisation	Capital expenditure as on 1.4.2009
38170.20	(-)87.86	293	38375.41

#### **DEBT- EQUITY RATIO**

15. The petitioner has considered the amount of additional capitalization and de-capitalization in the debt-equity ratio of 70:30. This has been found to be in order. Accordingly, for the purpose of tariff, equity considered for the transmission assets is as under:

(Rs. in lakh)

Equity as on 1.4.2008	Notional additional equity during 2008-09	Average equity for 2008-09	Total equity considered as on 31.3.2009
17541.21	61.56	17571.99	17602.77

### **RETURN ON EQUITY**

16. As per clause (iii) of Regulation 56 of the 2004 regulations, return on equity shall be computed on the equity base determined in accordance with regulation 54 @ 14% per annum. Equity invested in foreign currency is to be allowed a return in the same currency and the payment on this account is made in Indian Rupees based on the exchange rate prevailing on the due date of billing.

17. Equity as given the table under para 15 above has been considered. The tariff for the year 2008-09 has been allowed on average equity. Accordingly, revised return on equity of Rs. 2460.08 lakh has been allowed for the year 2008-09.

### **INTEREST ON LOAN**

18. Clause (1) of regulation 56 of the 2004 regulations *inter alia* provides that,-

(a) Interest on loan capital shall be computed loan wise on the loans arrived at in the manner indicated in regulation 54.

(b) The loan outstanding as on 1.4.2004 shall be worked out as the gross loan in accordance with Regulation 54 minus cumulative repayment as admitted by the Commission or any other authority having power to do so, up to 31.3.2004. The repayment for the period 2004-09 shall be worked out on a normative basis.

(c) The transmission licensee shall make every effort to re-finance the loan as long as it results in net benefit to the beneficiaries. The costs associated with such re-financing shall be borne by the beneficiaries.

(d) The changes to the loan terms and conditions shall be reflected from the date of such re-financing and benefit passed on to the beneficiaries.

(e) In case of dispute, any of the parties may approach the Commission with proper application. However, the beneficiaries shall not withhold any payment ordered by the Commission to the transmission licensee during pendency of any dispute relating to re-financing of loan;

(f) In case any moratorium period is availed of by the transmission licensee, depreciation provided for in the tariff during the years of moratorium shall be treated as repayment during those years and interest on loan capital shall be calculated accordingly.

(g) The transmission licensee shall not make any profit on account of re-financing of loan and interest on loan;

(h) The transmission licensee may, at its discretion, swap loans having floating rate of interest with loans having fixed rate of interest, or vice versa, at its own cost and gains or losses as a result of such swapping shall accrue to the transmission licensee:

Provided that the beneficiaries shall be liable to pay interest for the loans initially contracted, whether on floating or fixed rate of interest.”

19. The entire original loan was repaid up to 31.3.2005. The petitioner has not claimed interest on loan on account of the expenditure sought to be capitalised. Therefore, we have not considered interest on loan in tariff .

### **DEPRECIATION**

20. Sub-clause (a) of clause (ii) of Regulation 56 of the 2004 regulations provides for computation of depreciation in the following manner, namely:

(a) The value base for the purpose of depreciation shall be the historical cost of the asset.

(b) Depreciation shall be calculated annually based on straight line method over the useful life of the asset and at the rates prescribed in Appendix II to these regulations. The residual value of the asset shall be

considered as 10% and depreciation shall be allowed up to 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 90% of the historical cost of the asset. The historical capital cost of the asset shall include additional capitalisation on account of Foreign Exchange Rate Variation up to 31.3.2004 already allowed by the Central Government/Commission.

(c) On repayment of entire loan, the remaining depreciable value shall be spread over the balance useful life of the asset.

(d) 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.

21. Net of de-capitalisation and additional capitalisation has been added to the gross block as on 1.4.2008 for workout the depreciation for the year 2008-09.

22. In the present case, as noticed above, there was no outstanding loan as on 31.3.2005. As such, the remaining depreciable value was spread over from 2005-06 onwards during the tariff period. Despite the fact that 70% of additional capital expenditure has been apportioned to loan, the spread over of the remaining depreciable value in the balance useful life has not been re-set.

23. Cumulative depreciation of Rs. 60.97 lakh due to de-capitalisation of Rs. 87.86 during 2008-09 had been deducted from the cumulative depreciation recovered up to 31.3.2008 for working out the remaining depreciable value as on 1.4.2008.

24. Depreciation allowed has been worked out as below:

	(Rs. in lakh)
	<b>2008-09</b>
Gross block as on 1 <sup>st</sup> April of the year	38170.20
Addition due to Additional Capitalisation	205.21
Gross Block	38375.41
Rate of Depreciation	2.7488%
Depreciable Value	34271.75
Balance Useful life of the asset	13
Remaining Depreciable Value	8051.87
<b>Depreciation</b>	<b>619.37</b>

### **ADVANCE AGAINST DEPRECIATION**

25. As per sub-clause (b) of clause (ii) of Regulation 56 of the 2004 regulations, in addition to allowable depreciation, the transmission licensee is entitled to Advance Against Depreciation, computed in the manner given hereunder:

AAD = Loan repayment amount as per regulation 56 (i) subject to a ceiling of 1/10th of loan amount as per regulation 54 minus depreciation as per schedule

26. It is provided that Advance Against Depreciation shall be permitted only if the cumulative repayment up to a particular year exceeds the cumulative depreciation up to that year. It is further provided that Advance Against Depreciation in a year shall be restricted to the extent of difference between cumulative repayment and cumulative depreciation up to that year.

27. The petitioner has not claimed Advance Against Depreciation and, thereafter, Advance Against Depreciation has not been considered.

### **OPERATION & MAINTENANCE EXPENSES**

28. In accordance with clause (iv) of Regulation 56 the 2004 regulations, the following norms are prescribed for O & M expenses:

	Year				
	2004-05	2005-06	2006-07	2007-08	2008-09
O&M expenses (Rs in lakh per ckt-km)	0.227	0.236	0.246	0.255	0.266
O&M expenses (Rs in lakh per bay)	28.12	29.25	30.42	31.63	32.90

29. O&M expenses as taken for the tariff calculations as per order dated 17.3.2008 in Petition No. 130/2004 have been considered, since line length and number of bays remain unchanged.

### **INTEREST ON WORKING CAPITAL**

30. The components of the working capital and the interest thereon are discussed hereunder:

#### **(i) Maintenance spares**

Regulation 56(v) (1) (b) of the 2004 regulations provides for maintenance spares @ 1% of the historical cost escalated @ 6% per annum from the date of commercial operation. The petitioner has claimed maintenance spares after accounting for additional capital expenditure. For the purpose of computation of maintenance spares, the historical cost is being taken as the cost on the date of commercial operation. Maintenance spares on additional capital expenditure are not being considered for the present. Therefore, the petitioner's claim in this regard is not being allowed.

Accordingly, maintenance spares have been worked out on the historical cost Rs. 34044 lakh as on 1.4.1992 as per order dated 17. 3.2008 and providing escalation from the date of commercial operation.

**(ii) O & M expenses**

Regulation 56(v)(1)(a) of the 2004 regulations provides for operation and maintenance expenses for one month as a component of working capital. O&M expenses as considered in the order dated 17.3.2008 in Petition No. 130/2004 have been considered.

**(iii) Receivables**

As per Regulation 56(v)(1)(c) of the 2004 regulations, receivables will be equivalent to two months average billing calculated on target availability level. Accordingly, in the tariff being allowed, receivables have been worked out on the basis 2 months' transmission charges.

**(iv) Rate of interest on working capital**

As per Regulation 56(v) (2) of the 2004 regulations, rate of 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 1.4.2004 or on 1st April of the year in which the project or part thereof (as the case may be) is declared under commercial operation, whichever is later. The interest on working capital is payable on normative basis notwithstanding that the transmission licensee has not taken working capital loan from any outside agency. The petitioner has claimed interest on working capital @ 10.25% based on SBI PLR as on 1.4.2004, which is in accordance with the 2004 regulations and has been allowed.

31. The necessary computations in support of revised interest on working capital, as revised, are appended herein below:

	(Rs. in lakh)
	<b>2008-09</b>
Maintenance Spares	815.88
O & M expenses	119.63
Receivables	777.91
Total	1,713.43
Rate of Interest	10.25%
Interest	<b>175.63</b>

### **TRANSMISSION CHARGES**

32. The revised transmission charges being allowed for the transmission assets for the year 2008-09 are summarised below:

	(Rs. in lakh)
	<b>2008-09</b>
Depreciation	619.37
Interest on Loan	0.00
Return on Equity	2460.08
Advance against Depreciation	0.00
Interest on Working Capital	182.69
O & M Expenses	1495.16
<b>Total</b>	<b>4757.30</b>

33. The petitioner shall recover from the respondent the additional transmission charges in one monthly instalment and these charges shall be shared in accordance with the 2004 regulations. The petitioner has also sought reimbursement of filing fee paid. The Commission by its separate general order dated 11.9.2008 in Petition No. 129/2005 (Suo-motu) has decided that the petitioner shall not be allowed reimbursement of the petition filing fee.

34. In addition to the transmission charges, the petitioner shall be entitled to other charges like income-tax, incentive, surcharge and other cess and taxes in accordance with the 2004 regulations

35. This order disposes of Petition No.76/2009.

sd/-	sd/-	sd/-	sd/-
(V.S.VERMA)	(S.JAYARAMAN)	(R.KRISHNAMOORTHY)	(DR.PRAMOD DEO)
MEMBER	MEMBER	MEMBER	CHAIRPERSON

New Delhi dated the 7<sup>th</sup> August 2009