CENTRAL ELECTRICITY REGULATORY COMMISSION

NEW DELHI

Petition No. 323/2010

Coram:

Dr. Pramod Deo, Chairperson
Shri S. Jayaraman, Member
Shri V.S. Verma, Member
Shri M. Deena Dayalan, Member

Date of Hearing: 27.03.2012
Date of Order : 04.03.2013

In the matter of:

Approval under Regulation 86 of Central Electricity Regulatory Commission (Conduct of Business) Regulations 1999, and Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations 2009 for determination of transmission tariff of 400 kV Transmission System associated with Farakka (I & II) STPS in Eastern Region for the period from 1.4.2009 to 31.3.2014

And

In the matter of:

Power Grid Corporation of India Limited, Gurgaon ...**Petitioner**

Vs

1. Bihar State Electricity Board, Patna
2. West Bengal State Electricity Distribution Co. Ltd., Calcutta
3. Grid Corporation of Orissa Ltd., Bhubaneshwar
4. Damodar Valley Corporation, Calcutta
5. Power Department, Govt. of Sikkim, Gangtok
6. Jharkhand State Electricity Board, Ranchi

Respondents

The following were present:

1. Shri Prashant Sharma, PGCIL
2. Shri S S Raju, PGCIL
3. Shri M.M. Mondal, PGCIL
4. Shri R B Sharma, Advocate, BSEB, JSEB

ORDER

This petition has been filed by Power Grid Corporation of India Limited (PGCIL) for determination of transmission tariff of 400 kV Transmission System associated with Farakka (I & II) STPS (hereinafter referred to as "the transmission system) for tariff block 2009-2014 period in Eastern Region under Regulation 86 of the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2009 (hereinafter referred to as "the 2009 Tariff Regulations").

2. The revised cost estimate for the transmission system was approved by Ministry of Power vide letter dated 19.8.1997 at a total cost of ₹28589 lakh, including FERV component of ₹5798 lakh. The transmission lines covered under the transmission system were progressively commissioned from 1986 to 1994.

3. The final transmission tariff based on admitted capital cost of ₹32730.94 lakh for the assets covered in the instant petition for the tariff period 2004-09 was approved by the Commission vide order dated 5.1.2006 in Petition No. 126/2004. The said order was subsequently modified vide order dated 18.7.2006 and again revised by the Commission vide order dated 7.2.2008.

4. Details of the transmission charges claimed by the petitioner are as under:-

(₹ in lakh)

	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Depreciation	558.23	559.84	577.84	602.10	617.58
Interest on Loan	0.00	1.44	16.26	33.07	40.06
Return on equity	2674.68	2675.99	2688.65	2703.27	2710.26
Interest on Working Capital	138.18	142.30	147.51	153.15	158.50
O & M Expenses	1415.42	1496.01	1581.99	1672.56	1767.90
Total	**4786.51**	**4875.58**	**5012.25**	**5164.15**	**5294.30**

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

(₹ in lakh)

	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Maintenance Spares	212.31	224.40	237.30	250.88	265.18
O & M expenses	117.95	124.67	131.83	139.38	147.33
Receivables	797.75	812.60	835.38	860.69	882.38
Total	**1128.01**	**1161.67**	**1204.51**	**1250.95**	**1294.89**
Rate of Interest	12.25%	12.25%	12.25%	12.25%	12.25%
Interest	**138.18**	**142.30**	**147.55**	**153.24**	**158.62**

6. No comments or suggestions have been received from the general public in response to the notices published by the petitioner under section 64 of the Electricity Act, 2003. Bihar State Electricity Board (BSEB), Respondent No. 3, has raised the issue of additional capital expenditure, filing fee and publication expenses, licence fee, depreciation, etc. in its reply dated 25.3.2011. The petitioner has filed its rejoinder to the reply filed by BSEB, vide affidavit dated 7.6.2011. The objections raised by BSEB in its reply and the clarifications given by the petitioner in its rejoinder are addressed in the relevant paragraphs of this order.

7. Having heard the representatives of the parties and perused the material on records, we proceed to dispose of the petition.

Capital cost

8. Regulation 7(2) of the 2009 Tariff Regulations provides as under:-

> "The capital cost admitted by the Commission after prudence check shall form the basis for determination of tariff:
>
> Provided that in case of the thermal generating station and the transmission system, prudence check of capital cost may be carried out based on the benchmark norms to be specified by the Commission from time to time:
>
> Provided further that in cases where benchmark norms have not been specified, prudence check may include scrutiny of the reasonableness of the capital expenditure, financing plan, interest during construction, use of efficient technology, cost over-run and time over-run, and such other matters as may be considered appropriate by the Commission for determination of tariff:
>
> Provided also that the Commission may issue guidelines for vetting of capital cost of hydro-electric projects by independent agency or expert and in that event the capital cost as vetted by such agency or expert may be considered by the Commission while determining the tariff for the hydro generating station:
>
> Provided also that the Commission may issue guidelines for scrutiny and approval of commissioning schedule of the hydro-electric projects of a developer, not being a State controlled or owned company as envisaged in the tariff policy as amended vide Government of India Resolution No 23/2/2005-R&R (Vol.IV) dated 31st March 2008:
>
> Provided also that in case the site of a hydro generating station is awarded to a developer (not being a State controlled or owned company), by a State Government by following a two stage transparent process of bidding, any expenditure incurred or committed to be incurred by the project developer for getting the project site allotted shall not be included in the capital cost:
>
> Provided also that the capital cost in case of such hydro generating station shall include:
>
> (a) cost of approved rehabilitation and resettlement (R&R) plan of the project in conformity with National R&R Policy and R&R package as approved; and
>
> (b) cost of the developer's 10% contribution towards Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) project in the affected area;
>
> Provided also that where the power purchase agreement entered into between the generating company and the beneficiaries or the implementation

agreement and the transmission service agreement entered into between the transmission licensee and the long-term transmission customer, as the case may be, provide for ceiling of actual expenditure, the capital expenditure admitted by the Commission shall take into consideration such ceiling for determination of tariff:

Provided also that in case of the existing projects, the capital cost admitted by the Commission prior to 1.4.2009 and the additional capital expenditure projected to be incurred for the respective year of the tariff period 2009-14, as may be admitted by the Commission, shall form the basis for determination of tariff."

As per the last proviso to Regulation 7(2) of the 2009 Tariff Regulations, the admitted cost as on 31.3.2009 was ₹32730.94 lakh and the same has been considered for calculation of transmission tariff.

Additional capital expenditure

9. Regulation 9(2) of the 2009 Tariff Regulations provides as under:-

"The capital expenditure incurred on the following counts after the cut-off date may, in its discretion, be admitted by the Commission, subject to prudence check:

(i) Liabilities to meet award of arbitration or for compliance of the order or decree of a court;

(ii) Change in law;

(iii) Deferred works relating to ash pond or ash handling system in the original scope of work;

(iv) In case of hydro generating stations, any expenditure which has become necessary on account of damage caused by natural calamities (but not due to flooding of power house attributable to the negligence of the generating company) including due to geological reasons after adjusting for proceeds from any insurance scheme, and expenditure incurred due to any additional work which has become necessary for successful and efficient plant operation; and

(v) In case of transmission system any additional expenditure on items such as relays, control and instrumentation, computer system, power line carries communication, DC batteries, replacement of switchyards equipment due to increase of fault level, emergency restoration system, insulators cleaning infrastructure, replacement of damaged equipment not covered by insurance and any other expenditure which has become necessary for successful and efficient operation of transmission system."

10. The additional capital expenditure incurred/projected to be incurred during the years 2012-13 and 2013-14 are on account of replacement of transmission system equipments. The petitioner vide affidavit dated 17.8.2012 has submitted projected additional capital expenditure and decapitalization during 2009-14 as per details given hereunder:-

(₹ in lakh)

Sl. No.	Work	Claimed by the petitioner			
		Qty	**2012-13**	**2013-14**	**Total**
A	**Additional capitalisation**				
1	Circuit Breaker	6 No.	0.00	115.92	115.92
2	CT	18 No.	119.60	0.00	119.60
3	CVT	12 No.	40.50	0.00	40.50
4	Lightening Arrester	21 No.	0.00	23.69	23.69
5	PLCC Panel & EPABX	lot	67.54	0.00	67.54
6	Air Conditioning	lot	0.00	70.50	70.50
7	Civil Work of pathway along boundary wall	lot	52.98	0.00	52.98
8	DG Set	1 No.	0.00	13.88	13.88
9	Tower Strengthening	678 MT	0.00	394.05	394.05
	TOTAL Additional capitalisation		**280.60**	**618.05**	**898.65**
B	**De-capitalization**				
1	Circuit Breaker	6 No.	0.00	39.48	39.48
2	CT	18 No.	40.73	0.00	40.73
3	CVT	12 No.	13.79	0.00	13.79
4	Lightening Arrester	21 No.	0.00	8.07	8.07
5	PLCC Panel & EPABX	lot	23.00	0.00	23.00
6	Air Conditioning	lot	0.00	24.01	24.01
7	Civil Work of pathway along boundary wall	lot	0.00	0.00	0.00
8	DG Set		0.00	0.00	0.00
9	Tower Strengthening	678 MT	0.00	0.00	0.00
	Total De-Capitalisation		**77.53**	**71.57**	**149.10**
	Net additional capitalisation claimed		**203.07**	**546.48**	**749.56**

11. The petitioner has given justification for additional capital expenditure for tower strengthening and for replacement of Lightening Arrestors, PLCC panels, EPABX systems at sub-stations, circuit breakers, CTs, CVTs, new DG set at Durgapur Sub-station, old AC system at Durgapur, in its affidavits dated

20.4.2011, 27.9.2011, 25.5.2012, 17.8.2012 and 12.10.2012, and also in its rejoinder to the reply of BSEB dated 7.6.2011. In these affidavits, the petitioner has given justification for additional capital expenditure for tower strengthening. The petitioner's claim for capitalization of additional expenditure has been discussed item-wise as under:-

Additional capital expenditure for tower strengthening: The petitioner has proposed additional capital expenditure for tower Strengthening of 400 kV S/C Durgapur- Jamshedpur, 400 kV S/C Farakka- Durgapur-II, and 400 kV Farakka-Sagardighi-Subhashgram- Jeerat line during 2010-11 & 2011-12. It has been submitted that the earlier towers were designed on the basis of provisions of IS:802-1977 which was based on the deterministic approach i.e. factor of safety was being applied on working loads. Major changes were incorporated in the revised IS:802-1995, which is now based on the probabilistic approach with different reliability levels.

12. It has further been stated that wind patterns in the country have changed over the years from the earlier concept of three wind zones (light, medium and heavy) to six wind zones with enhanced wind pressure. The towers of 400 kV S/C Durgapur- Jamshedpur and 400 kV S/C Farakka-Durgapur-II lines were designed as per IS: 802-1977 in medium wind zone and as per IS:802-1995, these lines fall in wind zone-4 (47m/sec). With the revised wind zone, the wind pressure on conductor has increased to 161 kg/m2 from 90 kg/m2. It has also been submitted that 400 kV Farakka-Sagardighi-Subhashgram-Jeerat line was designed as per as per IS:802-1977 in heavy wind zone and as per IS:802-1995, this line falls in wind zone-5.

13. The petitioner has submitted that two incidents of tower collapse on 400 kV S/C Farakka- Sagardighi –Jeerat occurred in the past, resulting in collapse of 11 towers. Similarly, there were 4 incidents of tower collapse on 400 kV S/C Durgapur- Jamshedpur and 4 incidents on 400 kV S/C Farakka-Durgapur lines resulting in collapse of 16 and 10 numbers of towers respectively.

14. BSEB, in its affidavit dated 25.3.2011, has raised the issue of additional capital expenditure/ decapitalization during 2009-14. They have requested to allow expenses incurred on tower strengthening, subject to the condition that (i) the useful life of the transmission line is suitably enhanced, and (ii) the entire expense on this are met from debt. BSEB has also submitted that the additional capital expenditure under Regulation 9(2) of the 2009 Tariff Regulations can be claimed only after the capital expenditure has been incurred. Moreover, some of the assets especially the sub-station would be completing their useful life of 25 years during the tariff period 2009-14, and depreciation allowed upto maximum of 90% has already been claimed by the petitioner.

15. The sample calculation for change in wind pressure on tower for Terrain Category 2 is given hereunder:-

Design Wind Pressure, P_d is given in the IS 802:1995 for each of the six wind zones. The wind load on tower body, F_{wt}, as per the IS 802:1995, is calculated by the following formula:

Wind load on tower, $F_{wt} = P_d * C_{dt} * A_o * G_T$

Where C_{dt} is the Drag Coefficient and the value of C_{dt} ranges from 2 to 3.6 depending upon the solidity ratio of the tower.

G_T is the Gust Response Factor and value of G_T ranges from 1.7 to 3.8 depending upon the height of the panel and terrain category and A_o is the net surface area of the legs, bracings

For terrain category 2 and average height of tower 20 metre, value of G_t is 2.2, approximate value of C_{dt} for lattice type of structures is 3 and P_d for Reliability Level 1for Terrain Category 2 for Wind Zone 4 is 701 Newton per square metre. [All these figures are available in various Tables in IS 802:1995]

$F_{wt} = 2.2 * 3 * P_d * A_o = (6.6 * 701 * A_o) = 4626.6\ A_o$ Newton

[As per the IS 802:1995**]**

Similarly, For terrain category 2 and average height of tower 20 metre, value of G_t is 2.2, approximate value of C_{dt} for lattice type of structures is 3 and P_d for Reliability Level 1for Terrain Category 2 for Wind Zone 5 is 793 Newton per square metre.

$F_{wt} = 2.2 * 3 * P_d * A_o = (6.6 * 793 * A_o) = 5233.8\ A_o$ Newton

[As per the IS 802:1995**]**

Wind load on tower as per the IS 802:1977 is calculated based on the Factor of Safety.

Wind load on tower = (Factor of Safety) * Wind Pressure * A_o

= (1.5 * 1910 * A_o) N = 2865 A_o Newton

[As per the IS 802:1977**]**

Where 1910 N/m^2 is the wind pressure on towers for medium intensity of pressure upto the 30 metre above Mean Retarding Surface and Factor of Safety is 1.5.

Similarly, as per IS 802:1977 for Heavy wind zone,

Wind load on tower = (Factor of Safety) * Wind Pressure * A_o

= (1.5 * 2550 * A_o) N = 3825 A_o Newton

[As per the IS 802:1977**]**

Where 2550 N/m^2 is the wind pressure on towers for heavy intensity of pressure upto the 30 metre above Mean Retarding Surface and Factor of Safety is 1.5.

16. Thus, the wind load on towers as per IS 802:1995 is more than as per the IS 802:1977. It has been observed that the wind pressure have changed due to change in design criteria and also due to change in wind zone in the country. It is also noted that there were several tower failure in these lines and expert committee constituted by CEA has recommended for tower strengthening work in 400 kV Farakka-Durgapur–I and 400 kV Farakka–Sagardighi transmission lines by providing hip bracing cross arm level in all suspension towers. It is therefore, observed that the work of tower strengthening in the subject lines is justified and additional capital expenditure on tower strengthening is being allowed.

17. Additional capital expenditure for replacement of 21 Nos. of 400 kV Gapped Type Lightening Arrestors (LA): The petitioner has submitted vide affidavits dated 20.4.2011 and 27.9.2011, that additional capital expenditure is being sought for replacement of the Lightening Arrestors (LAs) as these LAs are more than 21 years old and will be completing 25 years during tariff block 2009-14. These LAs are gapped type Silicon Carbide, which are phased out. As per IEEE transaction on power delivery, October, 1996, gapped type LAs need to be replaced after 13 years of service, as these could not provide required protection margin for the switchyard equipment. The petitioner has further cited certain inherent drawbacks in Gapped LAs. It has also been submitted that explosion of LAs at Maithan sub-station in 2008 had damaged ICT bushings resulting in very high loss. Details of several incidents of LA failures in Eastern Region have also been submitted. It has also been submitted that in its order dated 7.8.2009 in Petition No. 76/2009, the Commission allowed additional capital expenditure for replacement of these type of Lightening Arrestors in Southern Region. In view of phasing out of Gapped LAs and earlier decision of the Commission, the replacement of Lightening Arrestors is found to be justified and expenditure is accordingly allowed.

18. Additional capital expenditure for replacement of PLCC panels and EPABX at Durgapur, Farakka, and Jeerat Sub-stations: The petitioner has submitted that these PLCC panels would complete 25 years of service in current tariff block and are giving frequent problems of mal-operation resulting in unwanted trippings of the load. These PLCC panels are ABB make ETI

Model with discrete electronic component which are obsolete and without spares and proper service support from Original Equipment Manufacturer (OEM). These type of panels have been phased out by the original manufacturer and is not giving service/ repair support for these panels. It was also submitted that PLCC units are having electronic cards/components and deterioration is fast beyond 15 years in service due to aging of semiconductor devices as these are round the clock in service. It was also mentioned that EPABX systems at these sub-stations were require to be replaced due to obsolescence, closure of OEM, non-availability of spare etc.

19. Keeping in view the importance of PLCC system for protection and communication as well as the recommendation of ABB, the replacement of PLCC Panels and EPABX is found to be justified and the expenditure on this account is allowed.

20. Additional capital expenditure for replacement of Circuit Breakers: The petitioner has submitted that 1 number 400 kV ABB make Air-Blast Circuit Breaker at Jeerat (WBSETCL) required replacement due to various operational problems. Overhauling of this Circuit Breaker (CB) cannot be done as spare supply has been discontinued by ABB, the Original Equipment Manufacturer (OEM). ABB has informed the petitioner that this type of design is obsolete and it has been phased out since 1986. It was also informed by ABB that no spares are available for this CB. It was also mentioned that this CB tripped 10 times in 2010-11 due to CB problem and there were frequent air leakage problems in pneumatic system.

21. The petitioner has submitted that 4 nos. TELK make and 1 no. NGEF make CB need to be replaced. These CBs are required to be replaced due to obsolescence and non-availability of spares and service support, as the OEMs have closed production facility of such type of CBs. The CBs are going to complete 25 years of service and there were frequent operational problems in these CBs. The petitioner has submitted, vide affidavit dated 25.5.2012, that out of 5 nos. 220 kV CBs proposed to be replaced, 2 nos. had broken down and could not be rectified due to non-availability of spares and service support by OEM. There were violations of closing and /or tripping timing limits in the test results in case of 3 CBs. Rectification is not possible due to non-availability of spare and service support by OEM.

22. Keeping in view the abnormal test results, non-availability of spares and service support as well as closure of OEM facility, the replacement of these circuit breakers is found to be justified and accordingly the expenditure on this account is allowed.

23. Additional capital expenditure for replacement of CTs: The petitioner has submitted that all the CTs are going to complete 25 years in service during current tariff block and are having tan delta/dielectric constant problem. Replacement of these CTs are proposed so that the same can be removed from service to avert blasting of CTs which otherwise may lead to greater damages and a potential safety hazards for the working personnel. It has been further submitted that CTs with Tan Delta value more than 0.007 or

values getting poorer i.e. rate of rise of Tan Delta more that 0.001 per year are not acceptable as per norms.

24. The petitioner has submitted the details of test results for the CTs proposed to be replaced vide affidavit dated 25.5.2012. From the details it is observed that out of 9 nos. of 400 kV CTs proposed to be replaced at Durgapur sub-station, for 1 no. CT violation was observed in DGA results and for other 8 nos. CTs, increase in the Tan Delta value was more than 0.001 per year. As regards the admissible values of gases in DGA test, the petitioner has submitted vide affidavit dated 3.2.2012 in Petition No. 316/2010 that these reference values are on the basis of IEC 60599. As regards the criteria for considering the yearly limit of increase in Tan Delta value it has been mentioned that this was on the basis of past experience.

25. In view of the above, replacement of 1 no. CT at Durgapur sub-station for which the DGA test results show abnormal values is found to be justified and additional capital expenditure for this is being allowed. Regarding replacement of CTs showing yearly increase in Tan Delta value>0.001, it is observed that the replacement of these CTs on the basis of yearly increase in Tan Delta value>0.001 is not based on any standard benchmark but is based on past experience of the petitioner. Moreover, increment in Tan Delta values is determined based on comparison of only two results. The concern of the petitioner regarding possible damage due to blast of CTs is appreciated and it is observed that the petitioner may replace these CTs as and when the requirement is felt, keeping in view the system requirement and safety of

equipments as well as personnel. The petitioner is at liberty to approach Commission with proper justification, after replacement of these CTs, when required for safe, efficient and reliable operation of the power system. The treatment of additional capital expenditure on this account would be in accordance with law. Regarding 400 kV CTs at Jeerat it is observed that Tan delta values were higher than the permissible limit of 0.007, and hence the additional capital expenditure on these CTs is allowed. Regarding 220 kV CTs at Durgapur it is observed that for 2 nos. of CTs violation in DGA was noted and for 1 no. CT the value of Tan Delta was more than 0.007. The additional capital expenditure for replacement of these 3 nos. CTs is allowed and in case of the remaining 3 nos. CTs, it is reported that the increase of Tan Delta > 0.001 per year. In view of observations made above, the additional capital expenditure for these 3 nos. CTs is not being allowed at this stage; however, the petitioner is at liberty to approach the Commission for additional capital expenditure for replacement of these CTs after actual replacement. Thus, out of 18 nos. CTs proposed to be replaced, additional capital expenditure for only 7 nos. of CTs is being allowed.

26. The petitioner has submitted the details of 12 CVTs proposed to be replaced, in its affidavit dated 25.5.2012**.** For 3 CVTs at Jeerat, where Tan Delta value was more than the permissible limit of 0.007, and for 2 nos. 220 kV CVTs at Durgapur also, which have already been replaced, additional capital expenditure is being allowed. However, from the documents available, it is observed that there is no standard / benchmark value of drift in secondary voltage for replacement of CVTs. It is learnt that the internal practice in the petitioner company, of replacement of CVTs with secondary voltage drift > 2.0

Volts, is based on experience. Moreover, from the test results given, it is observed that only in one equipment the drift in secondary voltage was >2.0 Volts. In view of above, it is observed that there is no sufficient justification for replacement of these 7 nos. CVTs and therefore, additional capital expenditure on this account is not being allowed at this stage. However, the petitioner is at liberty to approach the Commission in accordance with law, after replacement of these equipments when it is felt necessary for efficient and safe operation of the power system.

27. Additional capital expenditure for new DG set at Durgapur Sub-station: The petitioner submitted that the DG set at Durgapur is in operation for the last 25 years. The model is obsolete and no spare and service support is available as OEM has been closed. Due to ageing and mechanical wear and tear, frequent problems are being faced and the reliability and performance level gone down. Regarding comparison of fuel efficiency, it has been submitted that due to technological obsolescence and closure of manufacturing facility of this model, comparison of fuel efficiency of the existing DG set at Durgapur with the fuel efficiency of new DG set of the same model is not possible. However, it has been submitted that the fuel consumption rate for existing DG Set at Durgapur at NO-LOAD condition was higher than the fuel consumption of new DG set at 75% loading condition with radiator and fans. Hence, the existing DG set at Durgapur is not fuel efficient. It has been further submitted that as per the standards specified by the Central Pollution Control Board the concentration of particulate matters (PM) in the emission should not exceed 150 mg / Nm3, but the measured value as

indicated in the test report was 169.34 mg / Nm3 which was higher than the limit.

28. In view of the requirements of DG set for reliability, fuel economy and fulfillment of pollution norms, the additional capital expenditure on new DG set at Durgapur sub-station is found to be justified and it is accordingly allowed.

29. Additional capital expenditure for replacement of old AC system at Durgapur Sub-station: The petitioner has submitted that Durgapur S/S had M/s. UTILITY make AC system with very age-old technology. The machines are old and the spares of these old compressors are not available in market and no servicing facility is available. It has also been submitted that the problem is multiplied by recurring troubles of gas leakage, endangering the environment, due to age old and obsolete FIN-coupling system of compressor and motor. It has further been submitted that the power consumed by the compressor is on the higher side. Hence, it is required to replace the same at Durgapur Sub-station due to (i) closure of manufacturing facility of M/s. UTILITY, the OEM; (ii) obsolescence of the compressor technology of existing AC system; (iii) frequent refrigerant gas leak problems being faced in this AC system which is endangering the environment, and (iv) non- availability of service support/ spares from OEM.

30. Keeping in view the problems mentioned by the petitioner in the present AC system, the replacement of old AC system at Durgapur is found to be justified in order to ensure smooth operation as well as for better reliability of sub-station C&R system by ensuring suitable environment. The additional

capital expenditure/ decapitalization being allowed item-wise are given hereunder:-

(₹ in lakh)

A	**Additional Capitalization**	**Qty**	**2012-13**	**2013-14**	**Total**
1	Circuit Breaker	6 No.	0.00	115.92	115.92
2	CT	7 No.	43.91	0.00	43.91
3	CVT	5 No.	16.02	0.00	16.02
4	Lightening Arrester	21 No.	0.00	23.69	23.69
5	PLCC Panel & EPABX	lot	67.54	0.00	67.54
6	Air Conditioning	lot	0.00	70.50	70.50
7	Civil Work of pathway along boundary wall	lot	52.98	0.00	52.98
8	DG Set	1 No.	0.00	13.88	13.88
9	Tower Strengthening	678 MT	0.00	394.05	394.05
	TOTAL (Additional capital expenditure)		**180.44**	**618.05**	**798.49**
B	**De-Capitalization**				
1	Circuit Breaker	6 No.	0.00	39.48	39.48
2	CT	7 No.	14.96	0.00	14.96
3	CVT	5 No.	5.46	0.00	5.46
4	Lightening Arrester	21 No.	0.00	8.07	8.07
5	PLCC Panel & EPABX	lot	23.00	0.00	23.00
6	Air Conditioning	lot	0.00	24.01	24.01
7	Civil Work of pathway along boundary wall	lot	0.00	0.00	0.00
8	DG Set	1 No.	0.00	4.59	4.59
9	Tower Strengthening	678 MT	0.00	0.00	0.00
	TOTAL De-Cap		**43.42**	**76.16**	**119.57**
	Net Additional Capitalization allowed		**137.03**	**541.89**	**678.92**

31. The details of the capital cost as on 1.4.2009 and the net additional capital expenditure proposed during 2009-14, for the assets covered in the instant petition, considered for the purpose of calculation of tariff are as under:-

(₹ in lakh)

Admitted capital cost as on 1.4.2009	**Net additional capital expenditure proposed during 2009-14**					**Total estimated capital cost as on 31.3.2014**
	2009-10	2010-11	2011-12	2012-13	2013-14	
32730.94	0.00	0.00	0.00	137.03	541.89	33409.86

Debt- equity ratio

32. Regulation 12 (2) of the 2009 Tariff Regulations provides as under:-

> "In case of the generating station and the transmission system declared under commercial operation prior to 1.4.2009, debt-equity ratio allowed by the Commission for determination of tariff for the period ending 31.3.2009 shall be considered".

33. Details of the debt-equity in respect of the transmission assets as on 1.4.2009 are given hereunder:-

	Admitted capital cost as on 1.4.2009	
Particulars	**Amount (₹ in lakh)**	**%**
Debt	17430.44	53.25
Equity	15300.50	46.75
Total	32730.94	100.00

34. Details of debt equity ratio corresponding to the additional capital expenditure after adjusting de-cap during 2012-13 and 2013-14 period is given below:-

Normative				
Add cap for 2012-2013			**Add cap for 2013-14**	
	(₹ in lakh)	**%**	**(₹ in lakh)**	**%**
Debt	95.92	70.00	379.33	70.00
Equity	41.11	30.00	162.57	30.00
Total	137.03	**100.00**	541.89	**100.00**

35. Details of the debt-equity ratio as on 31.3.2014 are as under:

	As on 31.3.2014	
	(₹ in lakh)	**%**
Debt	17905.68	53.59
Equity	15504.18	46.41
Total	33409.86	100.00

Return on equity

36. Regulation 15 of the 2009 Tariff Regulations provides as under:-

> 15. (1) Return on equity shall be computed in rupee terms, on the equity base determined in accordance with regulation 12.
>
> (2) Return on equity shall be computed on pre-tax basis at the base rate of 15.5% for thermal generating stations, transmission system and run of the river generating station, and 16.5% for the storage type generating stations including pumped storage hydro generating stations and run of river generating station with pondage and shall be grossed up as per clause (3) of this regulation:
>
> Provided that in case of projects commissioned on or after 1st April, 2009, an additional return of 0.5% shall be allowed if such projects are completed within the timeline specified in **Appendix-II**:
>
> Provided further that the additional return of 0.5% shall not be admissible if the project is not completed within the timeline specified above for reasons whatsoever.
>
> (3) The rate of return on equity shall be computed by grossing up the base rate with the Minimum Alternate/Corporate Income Tax Rate for the year 2008-09, as per the Income Tax Act, 1961, as applicable to the concerned generating company or the transmission licensee, as the case may be:
>
> (4) Rate of return on equity shall be rounded off to three decimal points and be computed as per the formula given below:
> Rate of pre-tax return on equity = Base rate / (1-t)
>
> Where t is the applicable tax rate in accordance with clause (3) of this regulation.
>
> (5) The generating company or the transmission licensee as the case may be, shall recover the shortfall or refund the excess Annual Fixed charge on account of Return on Equity due to change in applicable Minimum Alternate/ Corporate Income Tax Rate as per the Income Tax Act, 1961 (as amended from time to time) of the respective financial year directly without making any application before the Commission.
>
> Provided further that Annual Fixed charge with respect to the tax rate applicable to the generating company or the transmission licensee, as the case may be, in line with the provisions of the relevant Finance Acts of the respective financial year during the tariff period shall be trued up in accordance with Regulation 6 of these regulations."

37. PGCIL has computed return on equity on pre-tax basis on 11.33% MAT in accordance with the tax rate applicable for 2008-09 and has claimed

return on equity @17.481%. In view of the above, the following amount of equity has been considered for calculation of return of equity:-

(₹ in lakh)

	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Opening Equity	15300.50	15300.50	15300.50	15300.50	15341.61
Addition due to Additional Capital Expenditure	0.00	0.00	0.00	41.11	162.57
Closing Equity	15300.50	15300.50	15300.50	15341.61	15504.18
Average Equity	15300.50	15300.50	15300.50	15321.05	15422.89
Return on Equity (Base Rate)	15.50%	15.50%	15.50%	15.50%	15.50%
Tax rate for the year 2008-09 (MAT)	11.330%	11.330%	11.330%	11.330%	11.330%
Rate of Return on Equity (Pre Tax)	17.481%	17.481%	17.481%	17.481%	17.481%
Return on Equity (Pre Tax)	2674.68	2674.68	2674.68	2678.27	2696.08

Interest on loan

38. Regulation 16 of the 2009 Tariff Regulations provides as under:-

> "16. (1) The loans arrived at in the manner indicated in regulation 12 shall be considered as gross normative loan for calculation of interest on loan.
>
> (2) The normative loan outstanding as on 1.4.2009 shall be worked out by deducting the cumulative repayment as admitted by the Commission up to 31.3.2009 from the gross normative loan.
>
> (3) The repayment for the year of the tariff period 2009-14 shall be deemed to be equal to the depreciation allowed for that year:
>
> (4) Notwithstanding any moratorium period availed by the generating company or the transmission licensee, as the case may be the repayment of loan shall be considered from the first year of commercial operation of the project and shall be equal to the annual depreciation allowed,.
> (5) The rate of interest shall be the weighted average rate of interest calculated on the basis of the actual loan portfolio at the beginning of each year applicable to the project:
>
> Provided that if there is no actual loan for a particular year but normative loan is still outstanding, the last available weighted average rate of interest shall be considered:
> Provided further that if the generating station or the transmission system, as the case may be, does not have actual loan, then the weighted average rate of interest of the generating company or the transmission licensee as a whole shall be considered.
>
> (6) The interest on loan shall be calculated on the normative average loan of the year by applying the weighted average rate of interest.

(7) The generating company or the transmission licensee, as the case may be, shall make every effort to re-finance the loan as long as it results in net savings on interest and in that event the costs associated with such re-financing shall be borne by the beneficiaries and the net savings shall be shared between the beneficiaries and the generating company or the transmission licensee, as the case may be, in the ratio of 2:1.

(8) The changes to the terms and conditions of the loans shall be reflected from the date of such re-financing.

(9) In case of dispute, any of the parties may make an application in accordance with the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 1999, as amended from time to time, including statutory re-enactment thereof for settlement of the dispute:

Provided that the beneficiary or the transmission customers shall not withhold any payment on account of the interest claimed by the generating company or the transmission licensee during the pendency of any dispute arising out of re-financing of loan."

39. In these calculations, interest on loan has been worked out as per details given hereunder:-

(a) Gross amount of loan, repayment of instalments and rate of interest on actual average loan have been considered as per the petition. In the main petition, additional capital expenditure was projected for the years 2010-11 to 2013-14. The petitioner, vide affidavit dated 17.8.2012 has revised the additional capital expenditure without submitting revised funding pattern for the same. The additional capital expenditure for 2012-13 and 2013-14 has been restricted, and therefore, pro-rata loan corresponding to restricted additional capital expenditure has been considered for calculating weighted average rate of interest;

(b) Tariff is worked out considering yearly depreciation as repayment for corresponding years;

(c) Weighted average rate of interest on actual loan worked out as

above is applied on the notional average loan during the year to arrive at the interest on loan;

(d) The normative loan of the transmission system has already been repaid, and in view of (b) above, interest on loan during the 2009-14 period is nil.

40. Detailed calculation of the weighted average rate of interest has been given in the Annexure to this order.

Depreciation

41. Regulation 17 (4) of the 2009 Tariff Regulations provides as under:-

> (4) Depreciation shall be calculated annually based on Straight Line Method and at rates specified in Appendix-III to these regulations for the assets of the generating station and transmission system.
> Provided that, the remaining depreciable value as on 31st March of the year closing after a period of 12 years from date of commercial operation shall be spread over the balance useful life of the assets.

42. In the instant petition, although a part-asset of the sub-station is being taken out of service, the sub-station as a whole has not depreciated fully. In order dated 13.8.2012 in Petition No. 334/2010, where similar issues were involved, proportionate cumulative depreciation corresponding to de-capitalized assets was allowed, same treatment is being applied in this petition also, by multiplying the capital cost of de-capitalized assets by the ratio of cumulative depreciation up to 31.3.2009 and Gross block for the combined asset up to 31.3.2009. The proportionate accumulated depreciation works out to ₹27.23 lakh and ₹47.76 lakh for equipments de-capitalized during 2012-13 and 2013-14 respectively. As the part assets have been taken out of service, these amounts of depreciation have been reduced from the

accumulated depreciation during the years 2012-13 and 2013-14 respectively. The decapitalization and additional capital expenditure taking place during the tariff period shall change the value of gross block, and therefore, in order to have a common reference point for depreciation, the ratio has been calculated considering the gross block as on 31.3.2009.

43. The assets of the transmission system in the instant petition were put on commercial operation in the period from 1986 to 1994. Balance useful life of the asset as on 1.4.2009 was fifteen years as per last order dated 5.1.2006 in Petition No. 126/2004. Accordingly, the remaining depreciable value in the current petition is spread over to the balance useful life of the assets. Details of the depreciation worked out are as under:-

(₹ in lakh)

	2009-10	2010-11	2011-12	2012-13	2013-14
Opening Gross Block (As on date of commercial operation)	32730.94	32730.94	32730.94	32730.94	32867.96
Addition during 2009-14 due to projected additional capital expenditure	0.00	0.00	0.00	137.03	541.89
Closing Gross Block	32730.94	32730.94	32730.94	32867.96	33409.86
Average Gross Block	32730.94	32730.94	32730.94	32799.45	33138.91
Rate of Depreciation	5.0767%	5.0767%	5.0767%	5.0763%	5.0775%
Depreciable Value	28899.98	28899.98	28899.98	28961.64	29267.15
Remaining Depreciable Value	8373.39	7815.16	7256.94	6760.37	6529.75
Depreciation	558.23	558.23	558.23	563.36	593.61
Adjusted cumulative depreciation/ Advance against Depreciation*	21084.81	21643.04	22201.27	22737.40	23283.26

***** After taking into account the pro-rata adjustment of decapitalised assets during 2009-14

Operation & maintenance expenses

44. Clause (g) of regulation 19 of the 2009 Tariff Regulations prescribes the norms for operation and maintenance expenses based on the type of sub-station and transmission line. Norms prescribed in respect of the elements covered in the instant petition are as under:-

Element	2009-10	2010-11	2011-12	2012-13	2013-14
400 kV S/C twin conductor /Line (₹ lakh/ kms)	0.358	0.378	0.400	0.423	0.447
400 kV D/C twin conductor T/Line (₹ lakh/ kms)	0.627	0.663	0.701	0.741	0.783
400 kV bays(₹ lakh/ bay)	52.40	55.40	58.57	61.92	65.46

45. Based on the above norms, the petitioner has calculated the following operation and maintenance expenses which are allowed:-

Element	2009-10	2010-11	2011-12	2012-13	2013-14
947 Kms. (238+236+150+146+177) 400 kV S/C twin conductor T/Line	339.03	357.97	378.80	400.58	423.31
296 Kms (95+201) 400 kV D/C twin conductor T/Line	185.59	196.25	207.50	219.34	231.77
17 Nos. 400 kV bays	890.80	941.80	995.69	1052.64	1112.82
Total O&M for asset	1415.42	1496.01	1581.99	1672.56	1767.90

46. The petitioner has submitted that O & M expenses for the year 2009-14 had been arrived on the basis of normalized actual O & M expenses during the period 2003-04 to 2007-08. The wage hike of 50% on account of pay revision of the employees of public sector undertaking has also been considered while calculating the O & M expenses for the tariff period 2009-14. The petitioner has further submitted that it would approach the Commission for suitable revision in the norms for O & M expenses in case the impact of wage hike with effect from 1.1.2007 is more than 50%. The respondent, BRPL has submitted that the Commission has already covered the increase in employee cost on account of pay revision of the employees of the Public Sector Undertakings in the O&M expenses for the year 2009-10 by rationalizing the O&M by allowing 50% increase. The petitioner in its

rejoinder vide affidavit dated 7.6.2011 has submitted that the petitioner shall approach the Commission for additional manpower cost on account of wage revision during the tariff block 2009-14.

47. It is clarified that, if any application for revision of norms of O&M expenditure is filed by the petitioner in future, it will be dealt with in accordance with law. It is further clarified that in the instant petition, the O&M expenses are allowed as per the existing norms.

Interest on working capital

48. As per the 2009 Tariff Regulations the components of the working capital and the interest thereon are discussed hereunder:-

(i) Receivables

As per Regulation 18(1) (c) (i) of the 2009 Tariff Regulations, receivables will be equivalent to two months of fixed cost. The petitioner has claimed the receivables on the basis of 2 months' transmission charges in the petition. In the tariff being allowed, receivables have been worked out on the basis of 2 months' transmission charges.

(ii) Maintenance spares

Regulation 18(1) (c) (ii) of the 2009 Tariff Regulations provides for maintenance spares @ 15% per annum of the O & M expenses from 1.4.2009. The value of maintenance spares has accordingly been worked out.

(iii) O & M expenses

Regulation 18(1) (c) (iii) of the 2009 Tariff Regulations provides for operation and maintenance expenses for one month as a component of working capital. The petitioner has claimed O&M expenses for 1 month of the respective year in the petition. This has been considered in the working capital.

(iv) Rate of interest on working capital

The SBI PLR as on 1.4.2009 (i.e. 12.25%) has been considered as the rate of interest on working capital.

49. Necessary computations in support of interest on working capital are given hereunder:-

(₹ in lakh)

	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Maintenance Spares	212.31	224.40	237.30	250.88	265.19
O & M expenses	117.95	124.67	131.83	139.38	147.33
Receivables	797.75	811.85	826.90	844.24	869.10
Total	1,128.02	1,160.92	1,196.03	1,234.50	1,281.61
Rate of Interest	12.25%	12.25%	12.25%	12.25%	12.25%
Interest	**138.18**	**142.21**	**146.51**	**151.23**	**157.00**

Transmission charges

50. The transmission charges being allowed for the transmission assets are summarized overleaf:-

(₹ in lakh)

	2009-10	2010-11	2011-12	2012-13	2013-14
Depreciation	558.23	558.23	558.23	563.36	593.61
Interest on Loan	0.00	0.00	0.00	0.00	0.00
Return on equity	2674.68	2674.68	2674.68	2678.27	2696.08
Interest on Working Capital	138.18	142.21	146.51	151.23	157.00
O & M Expenses	1415.42	1496.01	1581.99	1672.56	1767.90
Total	**4786.51**	**4871.13**	**4961.41**	**5065.42**	**5214.59**

Filing fee and publication expenses

51. The petitioner has sought reimbursement of fee paid by it for filing the petition and publication expenses. The respondent, BRPL has submitted that the filing fee and the expenses incurred on publication of notices for approval of tariff can be allowed at the discretion of the Commission as per Regulation 42 of the 2009 Tariff Regulations. In accordance with the Commission's order dated 11.1.2010 in Petition No. 109/2009 applicable for the tariff period 2009-14, the petitioner shall be entitled to recover the filing fee directly from the beneficiaries on *pro-rata* basis. The petitioner shall also be entitled for reimbursement of the publication expenses in connection with the present petition, directly from the beneficiaries on *pro-rata* basis.

Licence fee

52. The petitioner has submitted that in O&M expenses norms for tariff block 2009-14, the cost associated with licence fees had not been captured and the licence fee may be allowed to be recovered separately from the respondents. The respondent, BRPL has submitted that the licence fee is part of the O&M expenses, and no separate provisions are contained in the 2009 Tariff Regulations. The petitioner in its rejoinder vide affidavit dated 7.6.2011 has submitted that licence fee has been introduced w.e.f. 27.10.2008 only, and as such is not captured in O&M norms. This being extra burden during

O&M phase, needs to be reimbursed. We have considered the submissions of the petitioner. The petitioner shall be entitled for reimbursement of licence fee in accordance with Regulation 42 A (1) (b) of the 2009 Tariff Regulations.

Service tax

53. The petitioner has made a prayer to be allowed to bill and recover the service tax on transmission charges separately from the respondents, if it is subjected to such service tax in future. We consider petitioner's prayer pre-mature and accordingly this prayer is rejected.

Sharing of transmission charges

54. The petitioner has submitted that the transmission tariff for the 400 kV Transmission System associated with FARAKKA (I&II) STPS in Eastern Region shall be shared by all the respondents and the transmission tariff shall be recovered on monthly basis in accordance with Regulation 23.

55. The transmission charges for the Assets shall be borne by the beneficiaries in accordance with Regulation 33 of the 2009 regulations upto 30.6.2011. With effect from 1.7.2011, the billing, collection and disbursement of the transmission charges shall be governed by the provisions of the CERC (Sharing of Inter-State Transmission Charges and Losses) Regulations, 2010 as amended from time to time. The provisional transmission charges allowed shall be adjusted in accordance with the proviso to Regulation 5(3) of the 2009 Tariff Regulations.

56. This order disposes of Petition No. 323/2010.

(M. Deena Dayalan)	(V.S. Verma)	(S. Jayaraman)	(Dr. Pramod Deo)
Member	**Member**	**Member**	**Chairperson**

Annexure

CALCULATION OF WEIGHTED AVERAGE RATE OF INTEREST ON LOAN

(₹ in lakh)

	Details of Loan	2009-10	2010-11	2011-12	2012-13	2013-14
1	**Bond XXXIII (For Add cap)**					
	Gross loan opening	0.00	**0.00**	**0.00**	**0.00**	**126.31**
	Cumulative Repayment upto DOCO/previous year	0.00	**0.00**	**0.00**	**0.00**	**0.00**
	Net Loan-Opening	0.00	0.00	0.00	0.00	126.31
	Additions during the year	0.00	0.00	0.00	126.31	432.64
	Repayment during the year	0.00	0.00	0.00	0.00	0.00
	Net Loan-Closing	0.00	0.00	0.00	126.31	558.95
	Average Loan	0.00	0.00	0.00	63.16	342.63
	Rate of Interest	8.64%	8.64%	8.64%	8.64%	8.64%
	Interest	0.00	0.00	0.00	5.46	29.60
	Rep Schedule	12 Annual Instalments from 8.7.2014				
	Total Loan					
	Gross loan opening	0.00	0.00	0.00	0.00	126.31
	Cumulative Repayment upto DOCO/previous year	0.00	0.00	0.00	0.00	0.00
	Net Loan-Opening	0.00	0.00	0.00	0.00	126.31
	Additions during the year	0.00	0.00	0.00	126.31	432.64
	Repayment during the year	0.00	0.00	0.00	0.00	0.00
	Net Loan-Closing	0.00	0.00	0.00	126.31	558.95
	Average Loan	0.00	0.00	0.00	63.16	342.63
	Weighted Average Rate of Interest	**0.00%**	**0.00%**	**0.00%**	**8.64%**	**8.64%**
	Interest	0.00	0.00	0.00	5.46	29.60