CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

Petition No. 196/GT/2016

Coram:

Shri P.K. Pujari, Chairperson
Shri A.K.Singhal, Member
Shri A.S.Bakshi, Member
Dr. M.K.Iyer, Member

Date of Order: 30th May, 2018

In the matter of

Approval of tariff of Bokaro 'A' Thermal Power Station Unit-I (500 MW) for the period from COD of Unit-I of the generating station (23.2.2017) to 31.3.2019

And

In the matter of

Damodar Valley Corporation,
DVC Towers, VIP Road
Kolkata-700054 **…Petitioner**

Vs

Punjab State Power Corporation Ltd
Interstate Billing, Shed No. TI -A,
Patiala-147001 **…Respondent**

Parties present:

For Petitioner: Ms. Anushree Bardhan, Advocate, DVC
Shri Subrata Ghosal, DVC
Shri Pulak Bhattacharya, DVC

For Respondents: None

ORDER

The petition has been filed by the petitioner, DVC vide affidavit dated 23.9.2016 for approval of tariff of Bokaro 'A' Thermal Power Station Unit-I (500 MW) ('hereinafter called 'the generating station') for the period from anticipated COD (30.9.2016) to 31.3.2019 in terms of the provisions of the Central Electricity Regulatory Commission

(Terms and Conditions of Tariff) Regulations, 2014 ("the 2014 Tariff Regulations"). Pursuant to the actual COD of Unit-I on 23.2.2017, the petitioner vide affidavit dated 12.6.2017 has amended the petition and has prayed for approval of tariff from the actual COD of the Unit-I (23.2.2017) to 31.3.2019.

2. The Investment Approval of the Project comprising of Unit-I of 500 MW was sanctioned on 26.8.2006 by the Board of the Petitioner Corporation at a tentative cost of ₹2313.00 crore, including the cost of dismantling and disposal of old BTPS 'A' Units-I, II, and III, Construction of new substation and IDC and WCM of ₹179.00 crore.

3. The Board of Directors of the Petitioner Corporation vide Resolution dated 5.5.2011 had approved the Revised sanction cost of ₹3552.18 crore. Thereafter, the same was revised vide resolution dated 17.10.2017 and the total estimated cost of ₹4555.53 crore was approved. The petitioner has entered into Power Purchase Agreements (PPA) with Punjab State Power Corporation Limited (PSPCL) on 7.11.2016 for sale of 200 MW power from the generating station.

4. Accordingly, the capital cost and annual fixed charges claimed by the petitioner vide affidavit dated 12.6.2017 for the period from COD of Unit-I (2016-17) to 2018-19 is as under:

Capital cost

(₹in lakh)

	2016-17	**2017-18**	**2018-19**
	23.2.2017 to 31.3.2017		
Opening Capital Cost	392125.91	384006.75	422685.41
Add: Additional Capital Expenditure	0.00	33955.00	22990.00
Less: Reversal	8119.00	3396.00	2299.00
Add: Discharge of Liability	0.00	8119.00	3396.00
Closing Capital Cost	**384006.75**	**422685.41**	**446771.91**
Average Capital Cost	**388066.33**	**403346.08**	**434728.66**

Annual Fixed Charges

(₹ in lakh)

	2016-17	2017-18	2018-19
	23.2.2017 to 31.3.2017		
Depreciation	2761.79	28317.38	30520.64
Interest on Loan	2968.69	27346.57	26500.86
Return on Equity	2314.32	23729.39	25575.67
Interest on Working Capital	52.06	5204.91	5312.67
O&M Expenses	916.38	9610.00	10215.00
Additional O&M due to mega insurance, CISF Expenditure & expenditure for subsidiary activity	160.06	1803.49	1909.82
Total	**9173.30**	**96011.74**	**100034.65**

5. In compliance with the directions of the Commission, the petitioner has filed the additional information with copies to the respondents. The matter was heard on 20.2.2018 and the Commission reserved its order in the petition after directing the petitioner to file certain additional information as under:

(i) Documentary evidence in support of the claim of ROE based on effective tax rate of @ 20.961%;

(ii) The date of original schedule of award of CHP works and DM plant work as per original investment approval and date of actual completion and the reason of delay;

(iii) The actual cost incurred under the different packages till the actual COD in comparison to the actual cost awarded as per original investment approval of ₹2313 crore;

(iv) The details of the actual audited capital cost, actual additional capital expenditure incurred, earnings from infirm power from startup to synchronization and synchronization to COD, LD recovered if any, have been adjusted in the Capital cost, initial spares capitalized till actual COD and capital spares;

(v) The details of "As billed" GCV of coal for 3 months starting from November, 2016 to January, 2017.

6. In response, the Petitioner vide affidavit dated 9.3.2018 has filed the additional information as sought for by the Commission. The Respondent, PSPCL has not filed any reply in the matter. Based on the submissions and the documents available on record, we proceed to determine the tariff of Unit-I of the generating station for the period 2016-19 as stated in the subsequent paragraphs.

Commissioning schedule

7. The original investment approval of ₹2313.00 crore was accorded by the Board of the Petitioner Corporation on 26.8.2006, which included the finalization of EPC contract through negotiation with M/s. BHEL for installation of 500 MW at the generating station. Since the negotiation with M/s. BHEL did not materialize, Open Tender was initiated and only Single Tender was received from M/s RIL, which was cancelled due to high cost. Meanwhile, the Board of the Petitioner Corporation finalized negotiations with M/s. BHEL and Main Plant was awarded on 16.6.2008. The schedule date of declaration of COD of Unit-I was 16.12.2011. However, the Project cost was revised to ₹3552.18 crore and was approved by the Petitioner Corporation on 5.5.2011. The projected COD was further delayed and the Petitioner Corporation on 18.2.2015 revised the Project cost and approved an amount of ₹4138.41 crore. Thereafter, on 17.10.2017, the Petitioner Corporation had sanctioned the total estimated project cost of ₹4555.53 crore. As stated, the actual date of commercial operation of Unit-I is 23.2.2017, thereby resulting in the delay of 62 months from the schedule, as under:

	Original SCOD	Actual COD	Time overrun
Unit I	16.12.2011	23.2.2017	62 months

Admissibility of additional ROE

8. The date of original investment approval of the Project is 26.8.2006. In order to avail the additional ROE of 0.5%, the completion time line specified under the 2014 Tariff Regulations for green field projects (Coal/Lignite) with a unit size of 500 MW/600 MW from the date of investment approval is 44 months. The original scheduled COD for Unit-I of the generating station was 16.12.2011, whereas, the actual COD of Unit-I is 23.2.2017. Hence, there is time overrun of 62 months in the COD of Unit-I from the date of scheduled COD i.e. 16.12.2011. As the unit of the project has been declared under commercial operation beyond the timeline specified under the 2014 Tariff Regulations,

the generating station is not entitled to additional return on equity of 0.5% which is allowed for timely completion of the Project.

Time Overrun

9. As stated earlier, the scheduled COD of Unit-I of the generating station was 16.12.2011 and the actual COD of Unit-I is 23.2.2017. Thus, there is a time overrun of 62 months for Unit-I of the generating station. The petitioner vide affidavit dated 23.9.2016 had submitted that Unit-I of the generating station is expected to achieve COD on 30.9.2016. Accordingly, the petitioner has furnished reasons of delay from the original scheduled COD to the anticipated COD of 30.9.2016, as under:

(i) Despite carrying out necessary sub soil investigations, existence of old underground structure could not be identified correctly. During the actual construction work, underground structures like old CW duct was encountered at proposed locations of Boiler, Power house, Mill, ESP, and Natural Draft Cooling Tower and dismantling of old structure was taken up on 7.12.2009 and the schedule got delayed.

(ii) There was restriction of high capacity crane due to existence of overhead transmission line. The chimney and ESP front was handed over to M/s. BHEL on 30.11.2011 and 22.12.2011 after shifting of 132 KV old switch yard without discontinuing power supply to the valley area consumers.

(iii) Due to delay in readiness of erection front, Boiler drum was diverted to other project by M/s. BHEL. As a result, revised schedule could not be complied with.

(iv) During 2011, BHEL slowed down the construction activity on account of various project constraints.

10. However, the petitioner in its additional submissions vide affidavit dated 13.1.2017 has submitted that the COD of the generating station could not be declared during September, 2016 since during the erection and commissioning of the said systems, some major issues/ problems developed which are as under:

(i) Non-performance/ slow progress of M/s Zillion (Civil & Structural sub-vendor of BHEL) for delay in structural erection of different galleries and transfer points (TPS) in spite of repeated persuasion.

(ii) Consequently delay in release of mechanical front for equipment erection by M/s Promac.

(iii) Stabilization of coal conveying system after attending belt sway, belt assignment etc.

11. The petitioner vide affidavit dated 13.1.2017 has stated that on account of technical fault due to frequent boiler tube leakages, damage in the tube oil pump of FA fan, malfunctioning of PRDS valves etc., the anticipated COD of the unit would be 15.1.2017. However, the Unit-I could not achieve COD on 15.1.2017. Thereafter, the petitioner vide affidavit dated 12.6.2017 has submitted that due to persisting boiler tube leakage at different zones of boiler and other technical issues the COD was delayed and the said unit was finally declared under commercial operation on 23.2.2017. Thus, from the scheduled COD of 16.12.2011 to the actual COD of Unit-I of the generating station (23.2.2017), there is time overrun of 62 months in the declaration of COD of Unit-I of the generating station.

12. The petitioner was directed vide letter dated 11.1.2018 and by ROP of the hearing dated 20.2.2018 to submit, amongst others, the details regarding the Time and Cost Overrun along with copy of Investment Approval and PERT chart. In response, the petitioner vide affidavits dated 25.1.2018 and 9.3.2018 has furnished the reasons for time overrun along with delay analysis indicating the activities delayed, the reasons for the delay and the corresponding delay on account of the delay in each of the activities and the same is summarized hereunder:

(Figures in months)

Sl. No.	Activity	Base line duration (w.r.t Original Schedule)	Actual Duration	Delay in completion	Front availability	Slow progress / delay in supply by the contractor	Startup power	Readiness *of* NDCT	Coal availability at Bunker	Technical trouble
1.	Zero Date									
2.	Boiler erection Start	10	24	4	4	0	0	0	0	0
3.	Drum Lifting	15	47	32	29	3	0	0	0	0
4.	Condenser Erection start	21	50	29	29	0	0	0	0	0
5.	Turbine Erection start	22	51	29	29	0	0	0	0	0
6.	Boiler Hydro Test	26	63	37	29	8	0	0	0	0
7.	Turbine Box up	32	69	37	29	8	0	0	0	0
8.	Boiler Light up	33	72	39	29	8	2	0	0	0
9.	TG oil flushing	34	78	44	29	8	2	5	0	0

	completion									
10.	TG on Barring gear	35	78	43	29	8	2	4	0	0
11.	Steam blowing completion	35	78	43	29	8	2	4	0	0
12.	Oil synchronization	36	78	42	29	8	2	3	0	0
13.	Coal Synchronization	36	90	54	29	8	2	0	15	3
14.	COD	39	101	62	29	8	2	0	20	3

Analysis and decision

13. For prudence check of time over run and cost overrun of a project, the Appellate Tribunal for Electricity (the Tribunal) in its judgment dated 27.4.2011 in Appeal No. 72 of 2010 (MSPGCL V MERC & ors) has laid down the following principles:

> *"7.4. The delay in execution of a generating project could occur due to following reasons:*
>
> *i. Due to factors entirely attributable to the generating company, e.g., imprudence in selecting the contractors/suppliers and in executing contractual agreements including terms and conditions of the contracts, delay in award of contracts, delay in providing inputs like making land available to the contractors, delay in payments to contractors/suppliers as per the terms of contract, mismanagement of finances, slackness in project management like improper co-ordination between the various contractors, etc.*
>
> *ii. Due to factors beyond the control of the generating company e.g. delay caused due to force majeure like natural calamity or any other reasons which clearly establish, beyond any doubt, that there has been no imprudence on the part of the generating company in executing the project.*
>
> *iii. Situation not covered by (i) & (ii) above.*
>
> *In our opinion in the first case the entire cost due to time over run has to be borne by the generating company. However, the Liquidated damages (LDs) and insurance proceeds on account of delay, if any, received by the generating company could be retained by the generating company. In the second case the generating company could be given benefit of the additional cost incurred due to time over-run. However, the consumers should get full benefit of the LDs recovered from the contractors/supplied of the generating company and the insurance proceeds, if any, to reduce the capital cost. In the third case the additional cost due to time overrun including the LDs and insurance proceeds could be shared between the generating company and the consumer. It would also be prudent to consider the delay with respect to some benchmarks rather than depending on the provisions of the contract between the generating company and its contractors/suppliers. If the time schedule is taken as per the terms of the contract, this may result in imprudent time schedule not in accordance with good industry practices.*
> *7.5 In our opinion, the above principle will be in consonance with the provisions of Section 61(d) of the Act, safeguarding the consumers ' interest and at the same time, ensuring recovery of cost of electricity in a reasonable manner."*

14. In the light of the judgment of the Tribunal and based on the submissions of the petitioner, the question of time overrun has been examined in the subsequent paragraphs.

15. As stated, there is a time overrun of 62 month in the COD of Unit-I of the generating station. The petitioner was directed vide letter dated 11.1.2018 and ROP of the hearing dated 20.2.2018 to furnish a consolidated detailed note giving reasons/ justification for time and cost overrun along with supporting documents namely, the detailed project report, CPM analysis, PERT chart and BAR chart from the original schedule to the actual ÇOD. In addition, the petitioner was directed to submit the parallel activities which were simultaneously affected thereby resulting in the delay along with the detailed reasons / justification. In response, the petitioner vide affidavits dated 25.1.2018 and 9.3.2018 has furnished the details along with reasons for the delay and the number of months for which each activity was delayed for various reasons. It is however noticed on scrutiny that only selective and partial details have been furnished by the petitioner and no documentary evidence to substantiate/justify that the problems encountered during the execution of the Project were beyond the control of the petitioner have been submitted. In this background, the details of the activities as furnished by the petitioner along with the delay in different activities for BTPS "A" has been compiled and examined as stated below:

Sl. No	Activity	Original Schedule	Revised schedule	Actual	Time over run w.r.t original schedule (months)	Remarks/ Reasons for delay
1	Zero Date	16.9.2008		16.9.2008	0	LOA placed on BHEL on 24.06.2008 but the effective zero date was fixed to be reckoned from 16.09.08
2	Boiler Erection start	16.7.2009	24.11.2009	25.11.2009	4	It was decided to set up new 500 MW unit in the area of old BTPS-A plant which was constructed in the year 1952 and permanently closed in the year 2000 Although, necessary sub soil investigation was carried out in the new

						project site, existence of old underground structures could not be identified correctly However, during actual construction work, underground structures like old CW duct was encountered at proposed locations of Boiler, Power House, Mill, ESP and NDCT BHEL took up the work of dismantling of old structure on 07.12.2009 for which the schedule got delayed. There also restriction of high" capacity crane due to existing overhead transmission line which was removed in June 11. Apart from this, the front for Chimney and ESP was handed over to BHEL on 30.11.11 and 22.12.11 respectively after shifting of 132 KV old switch yard without discontinuing power supply to the consumers such as JSEB, Kargali and Kathara Collieries. Owing to such initial delay, the project schedule was revised on 15.05.2012 as reflected in column 4. BHEL during 2011 slowed down the construction activity on the issue of dalayed payment by DVC due to cash crunch.
3	Drum Lifting	16.12.2009	31.5.2012	1.8.2012	32	Due to delay in readiness of erection front, BHEL diverted the Boiler drum to other project. BHEL failed to comply with revised schedule and clear delay of 2 months.
4	Condenser Erection Start	15.6.2010	31.8.2012	15.11.2012	29	BHEL commenced the related civil work after demolition of old CW duct and the front for condenser erection was ready April 2011 but condenser erection was taken up by BHEL on 15.11.2012 resulting a delay of 2.5 months from the revised schedule.
5	Turbine Erection start	16.7.2010	30.10.2012	15.12.2012	29	BHEL commenced the related civil work after demolition of old CW duct and the front for Turbine erection was ready by April 2011 but Turbine erection was taken up by BHEL on 15 12.2012 resulting a delay of 1 5 months from the revised schedule.
6	Boiler Hydro Test	15.11.2010	31.3.2013	10.12.2013	**37**	Boiler was made ready in June'13 by BHEL but the hydro test of the Boiler was delayed and the same was carried out in Dec'13 resulting delay of more than 8 months from the revised schedule
7	Turbine Box Up	16.5.2011	30.9.2013	30.6.2014	**37**	Delayed by BHEL for 9 months form revised schedule without want of any customer input
8	Boiler Light Up	14.6.2011	31.10.2013	28.9.2014	39	Delayed by 11 months due to reason of delayed execution by BHEL and also due delay in readiness of GIS Substation for startup power Finally with the help of available construction power, startup power for Boiler Light Up was arranged.

9	TG Oil Flushing Completion	15.7.2011	30.11.2013	5.3.2015	44	Apart from slow execution by BHEL, these activities were delayed due delay in readiness of Cooling Tower (NDCT) Based on soil investigation conducted, the foundation of NDCT was designed for open foundation Location of NDCT was very close to Koner River, and during excavation for foundation, it was found that open foundation is not sustainable. Engineering had to be reviewed in details and pile (Raker pile] foundation for entire NDCT had to be adopted. The situation led to huge commercial implication and considerable time loss in re-commencement of NDCT work although the front was handed over in Nov' 2010. Since CW Basin with CW duct could be made ready, it was decided to go 'for Oil Synchronization utilizing CW Basin with CW duct.
10	TG on Barring Gear	15.8.2011	31.12.2013	19.3.2015	43	
11	Steam Blowing Completion	14.8.2011	30.12.2013	5.3.2015	43	
12	Oil Synchronization	12.9.2011	28.1.2014	31.3.2015	42	
13	Coal Synchroniz ation	15.9.2011	31.1.2014	22.3.2016	54	Delay in readiness of NDCT prevented to go for coal synchronization However, after completion of NDCT Shell and readiness of cooling system action for Coal Synchronization has been taken by manual bunkering due to non-availability of Coal Handling Plant.
14	COD	16.12.2011	31.3.2014	23.2.2017		Schedule to be achieved in Sept '2016 after readiness of CHD Interconnecting Route.

16. The petitioner vide its affidavits dated 25.1.2018 and 9.3.2018 has furnished details of time overrun with regard to the original schedule. However, it is observed that the justification/ reasons furnished for the delay relates to the period from the revised schedule to the actual schedule. Accordingly, based on the information available on record, the time overrun due to each activity has been discussed herein below:

Delay in Boiler Erection start work

17. The petitioner has submitted that there is a delay of 4 months in Boiler erection start work for Unit-I of the generating station. The 'zero date' of the generating station is 16.9.2008 and as per original schedule, the boiler erection start work was to be carried out on 16.7.2009 with baseline duration of 10 months. However, the same was carried out on 25.11.2009 with an actual duration of 14 months. In justification of the same, the petitioner has submitted that it was decided to set up a new 500 MW unit in the area of

the generating station, which was constructed in 1952 and permanently closed in the year 2000. Although, necessary subsoil investigation was carried out, the existence of old underground structures could not be identified correctly. It has also submitted that during the actual construction work underground structures like old CW duct was encountered and M/s. BHEL took up the additional work of dismantling of old structures on 7.12.2009 for which the schedule got delayed. Accordingly, the petitioner has submitted that the said delay was on account of presence of underground structure i.e. existence of underground old CW duct encountered at proposed locations of Boiler, Power house, Mill, ESP and NDCT. In our view, the unexpected existence of old structures encountered by the petitioner and the dismantling of old structures which added to the extra work causing the delay are factors which are beyond the control of the petitioner. Accordingly, we are inclined to accept the submissions of the Petitioner and condone the delay on this ground. Hence, in terms of the principles laid down by the Tribunal in the judgment dated 27.4.2011 [(situation (ii)], the total delay of 4 months is condoned and the generating company is given the benefit of the additional cost incurred due to time overrun. However, the LD recovered from the contractor and the insurance proceeds, if any, would be considered for reduction of capital cost.

Delay in Drum lifting

18. As per the original schedule, the boiler drum lifting was to be carried out on 16.12.2009 with baseline duration of 15 months from zero date of 16.9.2008. However, the same was carried out on 1.8.2012 with actual duration of 47 months. Hence, there is a delay of 32 months in boiler drum lifting work. In justification of the same, the petitioner has submitted that due to delay in the readiness of erection front, M/s BHEL diverted the boiler drum to other project and failed to comply with schedule time period. In our considered view, since there has been a delay of 4 months for the boiler

erection work, the petitioner should have taken steps to expedite the work of drum lifting. The impact due to the delay in shifting of the boiler drum to other project by the petitioner cannot be passed on to the beneficiaries. In our view, there has been slackness on the part of the petitioner towards project management and there has not been proper coordination between the various works and activities undertaken in the project. These factors in our considered view have contributed to the delay and the same is attributable to the petitioner. Hence, we are not inclined to condone the delay of 32 months in Boiler drum lifting. Accordingly, in terms of the principles laid down by the Tribunal in the judgment dated 27.4.2011 [(situation (i)], the delay of 32 months cannot be said to be beyond the control of petitioner and hence cannot be condoned. Therefore, the increase in cost on account of the said delay has to be borne by the petitioner. However, the Liquidated Damages (LD) and Insurance proceeds if any, received by the generating company, on account of the said delay, could be retained by the petitioner.

Delay in Condenser Erection Start and Turbine Erection Start

19. The petitioner has submitted that there has been delay of 29 months towards the condenser erection start work and turbine erection start work with regard to the original schedule. In justification of the same, the petitioner has submitted that M/s BHEL had commenced the related civil works after demolition of the old CW duct and the front of boiler erection was ready only in April, 2011. However, the Condenser Erection work and Turbine Erection work was taken up by BHEL on 15.11.2012 and 15.12.2012 respectively.

20. As per the original schedule submitted by the petitioner, the start of condenser erection work was from 15.6.2010 and the schedule start for turbine erection start work was from 16.7.2010 i.e. 21 months and 22 months respectively from the baseline date / zero date. However, the actual start of condenser erection and turbine erection was

carried out from 15.11.2012 and 15.12.2012 i.e. 50 months and 51 months respectively from baseline date. Hence, there is a delay of 29 months each in the Condenser erection start work and Turbine start work from the baseline date. The petitioner has submitted that the front of Condenser Erection and Turbine Erection was ready by April, 2011 after demolition of old CW ducts and accordingly, the work of condenser erection and turbine erection was taken up by BHEL on 15.11.2012 and 15.12.2012 respectively. The petitioner has however submitted that the old duct encountered by the petitioner during the boiler erection start work also, was finally completed on 25.11.2009.

21. The petitioner has submitted that the front was ready by April, 2011. However, the petitioner has not furnished the reasons for taking up the work of Condenser Erection work on 15.11.2012 (after 6 months) and Turbine Erection work on 15.11.2012 (after 7 months) respectively. Considering the fact that the delay due to existence of underground old CW duct encountered by the petitioner had been taken care of during the Boiler Erection work (which was completed on 25.11.2009) and since the schedule for Condenser Erection start work and Turbine Erection work was 15.6.2010 and 16.7.2010 respectively, the Turbine Erection work and Condenser Erection work should have been started within the original schedule. Although, the Boiler Erection was completed on 25.11.2009 after taking care of all the works of underground old CW duct, the petitioner has failed to clarify as to how the front of Condenser Erection and Turbine Erection work was made available only during April, 2011. Out of the total delay of 29 months, the delay up to 1.8.2012 has already been subsumed in the delay in drum lifting. Hence, there is an effective delay of 3.5 months for Condenser Erection work and 4.5 months to Turbine Erection work respectively, i.e. from 1.8.2012 to 15.11.2012 and 15.12.2012. Considering the fact that the Boiler Erection work and Condenser & Turbine Erection work are constructed at two different areas of the power plant, the petitioner, in our

view, should have readied the front for Condenser Erection & Turbine erection at the time when the existence of underground old CW duct was encountered during the Boiler Erection work. Moreover, the delay of 4 months on account of underground old CW duct encountered by the petitioner during the Boiler Erection work has already been condoned in para 17 above. In our considered view, the petitioner should have adhered to the contractual agreements and the time schedule in order to ensure that these works are completed within the scheduled time period. There has been lack of proper coordination between the petitioner and the contractor and the resultant delay in completion of these works cannot be passed on to the beneficiaries. In our view, the delay of 29 months (April, 2011 to 15.11.2012) in the completion of Condenser Erection and Turbine Erection works are attributable to the petitioner and the delay on this count cannot be condoned. Accordingly, in terms of the principles laid down by the Tribunal in the judgment dated 27.4.2011 [situation (i)], the delay of 29 months (towards the condenser erection start work and turbine erection start work) cannot be said to be beyond the control of the petitioner and hence not condoned. Therefore, the increase in cost on account of the said delay has to be borne by the petitioner. However, the Liquidated damages (LD) and Insurance proceeds if any, received by the generating company on account of the said delay, could be retained by the generating company.

Delay in Boiler Hydro Test

22. Though the Boiler hydro test was scheduled on 15.11.2010, the same was actually conducted on 10.12.2013. Thus, there has been a delay of 37 months from the original schedule date of the Boiler hydro test. The petitioner has submitted that the Boiler was made ready during June, 2013 by M/s BHEL but the hydro test was actually carried out during December, 2013. Except for this statement, the Petitioner has not furnished any justification in support of the long delay in the Boiler hydro test. In our view, there

appears to have been no proper coordination between the Petitioner and the Contractor in order to ensure that the said work is completed on time. Thus, in the absence of proper justification by the petitioner and considering the fact that there has been delay on the part of BHEL, we find no reason to condone the delay of 37 months. Accordingly, in terms of the principles laid down by the Tribunal in the judgment dated 27.4.2011 [(situation (i)], the delay of 37 months (towards the work of Boiler hydro test) cannot be said to be beyond the control of petitioner and hence not condoned. It is pertinent to mention that out of the total delay of 37 months upto 1.12.2013 in Boiler Hydro test, the delay upto 15.12.2012 has been subsumed in the Turbine Erection work. Hence, the effective delay in the Boiler Hydro test is 12 months *(approx)* i.e from 15.12.2012 to 10.12.2013 which has not been condoned. Therefore, the increase in cost on account of the said delay has to be borne by the petitioner. However, the Liquidated Damages (LD) and Insurance proceeds if any, received by the generating company, on account of the said delay, could be retained by the generating company.

Turbine Box up

23. As per the original schedule, Turbine box up was to be carried out on 16.5.2011 with baseline duration of 32 months. However, the same was carried out on 30.6.2014 with actual duration of 69 months. Thus, there has been a total delay of 37 months in Turbine box up of the generating station. The petitioner has not furnished any justification in support of the said delay, except for the submission that the work was delayed by M/s BHEL for 9 months for want of any customer input. This submission of the petitioner lacks clarity and cannot be a ground for condonation of delay. Hence, in the absence of proper justification by the petitioner and considering the fact that there has been delay on the part of BHEL, we find no reason to condone the delay of 37 months in respect of the work of Turbine Box up. Accordingly, in terms of the principles laid down

by the Tribunal in the judgment dated 27.4.2011 [(situation (i)], the delay of 37 months (towards Turbine box up) cannot be said to be beyond the control of petitioner and hence cannot be condoned. It is pertinent to mention that out of the total delay of 37 months in Turbine Box up, the delay upto 10.12.2013 has been subsumed towards delay in Boiler hydro test. Hence, the effective delay is $6^{1/2}$ months i.e from 10.12.2013 to 30.6.2014 which has not been condoned. Therefore, the increase in cost on account of the said delay has to be borne by the petitioner. However, the Liquidated Damages (LD) and Insurance proceeds if any, received by the generating company, on account of the said delay, could be retained by the generating company.

Boiler Light up

24. As per original schedule, Boiler light up was to be carried out on 14.6.2011 with baseline duration of 33 months. However, the same was carried out on 28.9.2014 with actual duration of 72 months. In justification of the same, the petitioner has submitted that the work was delayed by 11 months on account of delayed execution by M/s BHEL and also due to delay in readiness of GIS substation for start-up power. The petitioner has further submitted that it was decided to construct the 400 KV SW on opposite side of the Koner River for which LOA was placed on PGCIL on 18.1.2010. But due to technical constraints such as requirement of extensive filling, piling for switchyard equipment's and towers and also location of some towers falling on the mid of the Koner River, the tender was cancelled and retendered on 31.12.2012 with a completion schedule of 11 months i.e. 30.11.2013, with a decision to install 400 KV Gas insulated Switch Yard within the available space of the generating station. Finally with the help of available construction power, start-up power for boiler light up was arranged.

25. It is evident from the above submissions that the delay of 11 months is on account of relocation of 400 kV GIS, due to retendering of the contract. It is however noticed

that there has been a total delay of 39 months from the original schedule for Boiler light up of 14.6.2011 to the actual Boiler light up of 28.9.2014. However, the petitioner has not furnished any reasons for the said delay and the details of the work which were hampered. In our view, there has been slackness on the part of the petitioner like improper coordination between the various contractors, delay in award of contracts, delay in providing inputs like making land available to the contractors, etc. In view of the above, we are not inclined to condone the delay of 39 months on this count. Accordingly, in terms of the principles laid down by the Tribunal in the judgment dated 27.4.2011 [(situation (i)], the delay of 39 months (towards Boiler Light up) cannot be said to be beyond the control of the petitioner and hence not condoned. The petitioner has however submitted that the Boiler light up was carried out on 28.9.2014 and there is total delay of 39 months with regard to the original schedule. However, it is pointed out that the delay of 36 months upto 30.6.2014 has already been subsumed towards delay in Turbine Box up. Hence, the effective delay is 3 (three) months i.e from 30.6.2014 to 28.9.2014 which has not been condoned. Therefore, the increase in cost on account of the said delay has to be borne by the petitioner. However, the Liquidated Damages (LD) and Insurance proceeds if any, received by the generating company, on account of the said delay, could be retained by the generating company.

TG Oil Flushing, TG on barring gear, Steam blowing & Oil synchronization

26. It is observed that the works of TG oil flushing, TG on barring gear, Steam blowing and oil synchronization was to be carried out as per original schedule from 15.7.2011, 15.8.2011, 14.8.2011 and 12.9.2011 with baseline duration of 34 months, 35 months, 35 months and 36 months respectively. However, the Petitioner has submitted that the said works were carried out from 5.3.2014, 19.3.2015, 5.3.2015 and 31.3.2015 respectively with the actual duration of 78 months each. Thus, there has been a total delay of 44

months, 43 months, 43 months and 42 months respectively in the actual completion of the work of TG oil flushing, TG on barring gear, Steam blowing and oil synchronization. In justification of the same, the petitioner has submitted that apart from the slow execution of work by M/s BHEL, these activities were delayed due to the delay in readiness of the Cooling tower. The petitioner has further submitted that based on soil investigation conducted, the foundation of natural draft cooling tower was designed for open foundation, but later it was found that due to proximity to the Koner River, open foundation was not suitable and sustainable and finally the engineering plan had to be reviewed and pile foundation for entire Natural Draft Cooling Tower (NDCT) had to be adopted.

27. It is pertinent to mention that in the absence of cooling tower, the work like TG oil flushing, TG on barring gear, steam blowing and oil synchronization is not possible. Though the front for NDCT was handed over during November, 2010 and the original schedule of NDCT readiness was 24.5.2011, due to changes in the technical design and foundation for natural draft cooling tower, the readiness of NDCT finally commenced on 16.9.2016. Thus, the work of TG oil flushing, TG on barring gear, Steam blowing and Oil synchronization which was to be carried out from 15.7.2011, 15.8.2011, 14.8.2011 and 12.9.2011 respectively was also dependent on the readiness of Cooling tower. In the justification furnished by the petitioner, it is observed that the Petitioner has not categorized the period of delay and has also not bifurcated and submitted the reasons therein for the said delay. The submissions of the petitioner therefore lacks clarity as to why the completion of work took 6 years (approx) and the readiness of NDCT commenced only on 16.9.2016, even though the front for NDCT was ready by November, 2010. The petitioner has also not submitted the details regarding the factors responsible for the said delay and the steps taken to expedite the works. Even though change in the design

of NDCT and its foundation was a geological surprise and can be considered as factors beyond the control of the petitioner, the bifurcation of time and/or the period taken for changing the design parameters and for execution of the work has however not been furnished by the petitioner.

28. In response to Commission's directions dated 11.1.2018, the petitioner vide affidavit dated 25.1.2018 has submitted under the head NDCT (under Main Plant scope) that there is a delay of 64 months in the completion of NDCT. However, the petitioner has not furnished the scheduled start date and the actual start dates of NDCT. Moreover, the baseline duration of NDCT was 32 months, though the actual duration was 96 months. It is observed that out of the total delay of 64 months, the petitioner has attributed delay of 10 months to front availability, delay of 25 months to slow progress of work, delay of 18 months towards engineering issues on subsoil condition and 11 months to additional work. Therefore, the substantial delay in execution of works namely, TG oil flushing, TG on barring gear, Steam blowing and Oil synchronization is due to non-readiness of NDCT. The foundation of natural draft cooling tower was designed for open foundation and due to proximity to the Koner River, open foundation was not suitable and sustainable, finally the engineering issues had to be reviewed and pile foundation for entire NDCT had to be adopted. There is a change in the design of NDCT due to geographical location. In our view, the delay due to change in design of NDCT from open foundation to pile foundation is beyond the control of the petitioner and the delay on this count cannot be attributable to the petitioner. Hence, out of the total delay of 64 months, the delay of 18 months due to engineering issues on subsoil has been condoned. It is however pointed out that the delay of 18 months as above has been subsumed in the delay of 44 months in TG oil flushing, TG on barring gear, Steam blowing and Oil

synchronization. Hence, the effective delay is 6 (six) months from 28.9.2014 to 31.3.2015 and the same is condoned.

Coal Synchronization

29. The original schedule of synchronization with coal was 15.9.2011 with baseline duration of 36 months. However, the coal synchronization was done on 22.3.2016 with actual baseline duration of 90 months. Hence, there is a delay of 54 months from the original schedule to the actual synchronization. In justification of the same, the petitioner has attributed the delay to non-readiness of NDCT and non-availability of Coal Handling Plant (CHP). The petitioner has further submitted that after completion of NDCT shell and readiness of cooling system action, coal synchronization was done by manual bunkering due to non-availability of CHP.

30. It is observed from the submissions of the petitioner dated 25.1.2018 and 9.3.2018, that the CHP contract was originally scheduled on 14.7.2009 in order to match the Target Coal Availability at bunkers i.e August, 2011. However, due to the delay in readiness of permanent Ash pond, the tendering action was kept in abeyance for awarding the CHP contract and Plant Water supply package contract. The petitioner has submitted that there was acute shortage of land, as the new thermal generating station of Bokaro was planned to be installed in the available space of the retired old Bokaro plant and CHP installation i.e crusher house, stacker cum re-claimer etc., were to be constructed in the old ash pond land by constructing permanent ash pond at other location. The petitioner also submitted that the non-availability of CHP was consequent to the delay in readiness of permanent ash pond. It has stated that the LOA for construction of permanent ash pond was awarded to M/s HSCL on 17.7.2008 with the completion schedule of 18 months w.e.f.1.9.2008 (i.e completion date of 28.2.2010), but due to typical adverse site

conditions, huge additional work had to be carried out and permanent ash pond was put to operation with effect from June, 2014.

31. The petitioner has further submitted that CHP contracts were awarded in December, 2012 to M/s Tecpro (Main CHP) and M/s TRF (Stacker cum Re-claimer) with a schedule completion of January, 2015 and May, 2014 respectively, but both the contracts were terminated on 26.3.2014 and 24.1.2014 respectively due to unsatisfactory performance of the contractors. It has also stated that the orders were placed on M/s MBECL towards PT plant and M/s VA Tech Wabag Ltd for DM plant on 28.12.2012 which was originally scheduled on 15.2.2009 and 30.4.2009 respectively. The petitioner has stated that the work of DM plant suffered due to poor performance of the agency and the progress of work also got delayed on account of acute cash crunch faced by the petitioner. However, the DM plant was ready only on 6.10.2016. Meanwhile, fresh tender was awarded for the work of interconnecting coal conveyor route package and Main CHP package on 29.11.2014 and 17.12.2015 with a completion schedule of 28.1.2016 and 16.1.2018 respectively.

32. The matter has been examined. Though the petitioner has filed additional information vide affidavits dated 25.1.2018 and 9.3.2018 in terms of the directions of the Commission, the information submitted are inadequate/scarce as it neither contains any details of the additional work undertaken nor the amount of time taken to rectify the additional work due to adverse site conditions. In addition to this, in its submissions for the reason for delay of CHP, DM plant and Ash Pond, the petitioner has not furnished any justification and/or reasons for the problems which had arisen, details of the steps taken by the petitioner to mitigate the problems along with the documentary evidence to substantiate that the problems encountered by the petitioner during the execution of the project were beyond its control. In the absence of these details with documentary

evidence, it is difficult to examine/analyze the reasons for delay and the exact period of delay of these works thereby resulting in the delay of COD of the unit. From the submissions available on record, it is evident that the petitioner has not taken any coordinated efforts to avoid the cancellation of tenders and has also not taken any steps to ensure the execution of the works in time. In our considered view, it is the responsibility of the petitioner to maintain constant follow up of the award of contracts and to ensure that works awarded is completed by the contractor within the scheduled completion time. In this backdrop, the delay in completion of work within the scheduled date squarely lies with the petitioner and cannot be said to be beyond the control of the petitioner. Hence, we are not inclined to condone the delay in the work of Main plant CHP, DM plant and Ash pond on this count, which has led to the delay in Coal synchronization.

33. It is observed that out of the total delay of 54 months i.e upto Coal synchronization, the delay of 44 months from 15.7.2011 to 31.3.2015 has been subsumed in the delay of different activities namely TG oil flushing, TG on barring gear, Steam blowing and Oil synchronization. Hence, the effective delay in Coal synchronization is only $11^{1/2}$ months from 31.3.2015 to 22.3.2016. The petitioner has also attributed the said delay to non-readiness of Cooling Tower. It is however noticed that the delay of 18 months due to non-readiness of Cooling tower has already been subsumed in the delay in different activities of TG oil flushing, TG on barring gear, Steam blowing and Oil synchronization which has been condoned. Accordingly, in terms of the principles laid down by the Tribunal in the judgment dated 27.4.2011 [(situation (i)], the delay of 54 months cannot be said to be beyond the control of petitioner and hence cannot be condoned. Therefore, the increase in cost on account of the said delay has to be borne by the petitioner. However, the Liquidated Damages (LD) and Insurance proceeds if any, received by the

generating company, on account of the said delay, could be retained by the generating company.

Delay in Commercial Operation

34. As per original schedule, the date of commercial operation of the generating station was 16.12.2011 with baseline duration of 36 months. The coal synchronization was completed on 22.3.2016 and Unit-I/generating station was declared under commercial operation on 23.2.2017. It appears that the delay of 11 months from Coal synchronization to the actual COD of the unit was due to non-completion of CHP work and some technical issues caused by forced tripping due to Boiler leakage, malfunctioning of PRDS valves, Main steam temperature low, thrust bearing damage etc. In our considered view, the delay in CHP work was due to non-performance and unsatisfactory work of the contractor leading to delay in Coal synchronization, as above, and cannot be said to be beyond the control of the petitioner. As stated, the petitioner has taken 11 months for declaration of COD of Unit –I (23.2.2017) from the date of synchronization (22.3.2016). Since the petitioner was already running out of schedule prior to synchronization, the petitioner should have taken necessary steps for declaration of COD of the said unit, within 3 to 6 months after synchronization. However, due to technical problems in machines and also due to delay in CHP work, the petitioner was able to declare the COD of the said unit only after 11 months from synchronization. Considering these factors and keeping in view that it would normally take about 3 to 6 months for the declaration of COD after synchronization, we are inclined to condone a reasonable period of time from the synchronization of the unit till the declaration of COD. Accordingly, out of the total delay of 11 months from the date of synchronization to declaration of COD, a delay of 6 months which is normally taken from synchronization to COD to stabilize the unit, has been condoned. Accordingly, in terms of the principles laid down by the Tribunal in the

judgment dated 27.4.2011 [(situation (ii)], the total delay of 6 months is condoned and the generating company is given the benefit of the additional cost incurred due to time overrun. However, the LD recovered from the contractor and the insurance proceeds, if any, would be considered for reduction of capital cost. The balance period of delay of 5 months has however not been condoned. Therefore, the increase in cost on account of the said delay of 5 months has to be borne by the petitioner. However, the Liquidated Damages (LD) and Insurance proceeds if any, received by the generating company, on account of the said delay, could be retained by the generating company.

35. Based on the above discussions and in the light of the judgment of the Tribunal, we conclude that the delay of 28 months (delay of 4 months during the period of Boiler erection), 18 Months (due to delay in completion of Natural draft cooling tower) and 6 months (from synchronization to COD till stabilization of the unit), out of the total delay of 64 months is found to be not attributable to the petitioner and has accordingly been condoned. However, the balance period of delay of 34 months (62-28) (which includes delay in drum lifting, condenser and turbine erection, boiler hydro test, turbine box up, boiler light up and coal synchronization) are factors which are attributable to the petitioner for which the delay has not been condoned. Accordingly, in terms of the principles laid down by the Tribunal in the judgment dated 27.4.2011 [(situation (i)], the delay of 34 months cannot be said to be beyond the control of petitioner and hence cannot be condoned. Therefore, the increase in cost on account of the said delay has to be borne by the petitioner. However, the Liquidated Damages (LD) and Insurance proceeds if any, received by the generating company, on account of the said delay, could be retained by the generating company.

36. Accordingly, the time overrun allowed (against the actual time overrun) for the unit and the schedule COD (reset) for the purpose of computation IDC due to time overrun is summarized as under:

Unit	Schedule COD as per Investment Approval	Actual COD	Time Overrun considering SCOD (months)	Time overrun allowed *(in months)*	SCOD (reset) for IDC computation
I	16.12.2011	23.2.2017	62	28	16.4.2014

Capital Cost

37. Regulation 9 (2) of the 2014 Tariff Regulations provides as under:-

> *"The Capital cost of a new project shall include the following:*
>
> *(a) The expenditure incurred or projected to be incurred up to the date of commercial operation of the project;*
>
> *(b) Interest during construction and financing charges, on the loans*
>
> *(i) being equal to 70% of the funds deployed, in the event of the actual equity in excess of 30% of the funds deployed, by treating the excess equity as normative loan, or (ii) being equal to the actual amount of loan in the event of the actual equity less than 30% of the funds deployed;*
>
> *(c) Increase in cost in contract packages as approved by the Commission;*
>
> *(d) Interest during construction and incidental expenditure during construction as computed in accordance with Regulation 11 of these regulations;*
>
> *(e) Capitalised Initial spares subject to the ceiling rates specified in Regulation 13 of these regulations;*
>
> *(f) Expenditure on account of additional capitalization and de-capitalization determined in accordance with Regulation 14 of these regulations;*
>
> *(g) Adjustment of revenue due to sale of infirm power in excess of fuel cost prior to the COD as specified under Regulation 18 of these regulations; and*
>
> *(h) Adjustment of any revenue earned by the transmission licensee by using the assets before COD.*

Approved Capital Cost

38. The Board of the Petitioner Corporation vide resolution dated 26.8.2006 approved the Project cost of ₹2313.00 crore including the dismantling & disposal of 4 nos. of old units of BTPS and IDC construction of BTPS new substation with financing pattern of debt equity as 70:30. The Board of the Petitioner Corporation in its resolution dated 5.5.2011, had approved the Revised cost of ₹3552.18 crore, after considering the COD of March,

2013. Further, the Board of the Petitioner Company vide resolution dated 18.2.2015 had revised the project Cost due to retendering of the work of CHP & Stacker reclaimer, labour problems etc. and had approved the cost of ₹4138.41 crore. Further, the Board of the Petitioner Corporation vide resolution dated 17.10.2017 had revised the Project cost and approved the total estimated cost of ₹4555.53 crore. Accordingly, the approved project cost as per original investment approval to subsequent revisions is as under:

(₹ in crore)

Sanctioned cost as per original approval dated 26.8.2006	Revised cost dated 5.5.2011	Revised cost dated 18.2.2015	Revised cost dated 17.10.2017
2313.00	3552.18	4138.41	4555.53

39. The capital cost claimed by the petitioner as on date of commercial operation of Unit-I (23.2.2017) vide affidavit dated 12.6.2017 is as under:

(₹ in lakh)

	2016-17 (23.2.2017 to 31.3.2017)	2017-18	2018-19
Opening Capital Cost including Notional IDC, IDC, FC, FERV & Hedging cost.	392125.91	384006.75	422685.41
Add : Addition during the year/ period	0.00	33955.00	22990.00
Less : Reversal during the year/ period	8119.00	3396.00	2299.00
Add : Discharges during the year/ period	0.00	8119.00	3396.00
Closing Capital Cost	384006.75	422685.41	446771.91

Impact of time overrun on contract price, IDC and IEDC

40. As stated above, out of 62 months delay in the COD of the generating station, time overrun of 34 months has been disallowed. Hence, there is requirement of reduction in the increase in contract price, IDC and IEDC from the scheduled COD to actual COD. The petitioner was directed by the Commission to furnish the details of increase in IDC, IEDC and price escalation in the different packages of contracts from the date of scheduled COD to the actual COD. In response, the petitioner vide affidavit dated 9.3.2018 has

submitted that the original investment approval of ₹2313 crore was on tentative basis, without any details under different packages. However, the sanctioned order was revised at a project cost of ₹3512.18 crore issued in the month of May, 2011 was further revised to ₹4138.41 crore in March, 2015 with details under different packages. The petitioner has also submitted the breakup of Revised cost dated 13.5.2011 (Form-5E) and has stated that there is no cost overrun as on COD of Unit-I.

41. It is observed from Form-5B and Form-5E submitted by the petitioner vide affidavit dated 9.3.2018, that there is an increase in 'Establishment expenses' under the head 'Overhead expenses'. This requires a pro rata disallowance of the establishment expenses for the period of 34 months as on COD of the generating station. The total establishment expenses as submitted by the petitioner is ₹95.48 crore as on COD (23.2.2017). Thus, a pro rata deduction in the establishment expenses due to the delay of 34 months in the COD of Unit-I is worked out as under:

(₹ in lakh)

	Total period taken from zero date to actual COD (months)	**Time overrun disallowed (Months)**	**Overhead (Establishment) Expenses under IEDC**	**Pro-rata reduction = (col.4xcol.3) / col.2**
(1)	(2)	(3)	(4)	(5)
Unit-I/ Generating station	101	34	9548.00	3214.18

IDC & FC

42. Interest During Construction including notional IDC claimed by the petitioner as on the COD of Unit-I (23.2.2017) is ₹116528.24 lakh. Since the claim of the petitioner for Notional IDC has been disallowed, the total IDC & FC is worked out as ₹35151.17 lakh as on 23.2.2017 and allowed.

43. In the absence of the details of the amounts drawn against bonds, the same has not been considered in IDC. The petitioner is however granted liberty to furnish the

complete details of IDC on bonds and notional IDC at the time of truing-up of tariff of the generating station.

Initial Spares

44. Regulation 13 of the 2014 Tariff Regulations provides as under:

> *"13. Initial Spares: Initial spares shall be capitalized as a percentage of the Plant and Machinery cost up to cut-off date, subject to following ceiling norms:*
>
> *(a) Coal-based/lignite-fired thermal generating stations - 4.0%*
>
> *(b) Gas Turbine/Combined Cycle thermal generating stations - 4.0%*
>
> *Provided that:*
>
> *i. where the benchmark norms for initial spares have been published as part of the benchmark norms for capital cost by the Commission, such norms shall apply to the exclusion of the norms specified above:*
>
> *iv. for the purpose of computing of initial the cost spares, plant and machinery cost shall be considered as project cost as on cut-off date excluding IDC, IEDC, Land Cost and cost of civil works. The transmission licensee shall submit the break-up of head wise IDC & IEDC in its tariff application."*

45. The COD of Unit-I/generating station is 23.2.2017 and accordingly the cut-off date of the generating station is 31.3.2020. The petitioner in Form-5B of the petition has claimed initial spares for ₹4128.00 lakh as on the COD of Unit-I of the generating station. Further, the petitioner has claimed projected initial spares of ₹1000 lakh in 2017-18 and ₹3272 lakh as on 31.3.2019 (spillover beyond 2017-18). Thus, the total initial spares up to 31.3.2019 work out to ₹8400 lakh (4128+1000+3272).

46. The petitioner vide affidavit dated 9.3.2018 in Form 5E has submitted that the total Plant and Machinery cost of ₹226016.00 lakh till COD (23.2.2017). Therefore, considering the total cost of Plant & Machinery amounting to ₹226016.00 lakh as on 23.2.2017, the projected initial spares of ₹8400 lakh claimed by the petitioner up to 31.3.2019 of the generating station works out to 3.72 % of the Plant & Machinery cost which is within the limit specified under the said regulations. Accordingly, the claim of the petitioner is

allowed. However, the petitioner is directed to furnish the details of initial spares capitalized up to the cut-off date, at the time of truing-up of tariff of the generating station.

Infirm power

47. The Commission vide ROP dated 20.2.2018 had directed the petitioner to furnish the details of infirm power injected in the grid by Unit-I of the generating station till COD and the revenue earned from sale of infirm power, excluding fuel cost, and the details of the fuel used from synchronization till COD. In response, the petitioner vide affidavit dated 9.3.2018 has submitted that the revenue earned from infirm power amounting to ₹15.00 crore from start up to synchronization and from synchronization to COD has been adjusted in the capital cost against the start-up fuel and a net amount of ₹35.19 crore has been claimed in the capital cost for start-up fuel.

48. It is observed from Form 5B that the petitioner has claimed ₹35.19 crore as start-up fuel in the capital cost as on COD, after adjustment of ₹15.00 crore earned from the sale of infirm power. Since no details have been furnished by the petitioner, no adjustment has been considered in this order. Hence, the petitioner is directed to furnish the details of infirm power injected in the grid by Unit-I of the generating station till COD and the revenue earned from sale of infirm power, excluding fuel cost and the details of fuel used from synchronization to COD along with expenditure on fuel for pre-commissioning activities, at the time of truing-up of tariff of the generating station.

Liquidated Damages

49. The Commission vide ROP of the hearing dated 20.2.2018 had directed the petitioner to submit, amongst others, the details of LD, if any, recovered, till COD. In response, the petitioner has filed affidavit dated 9.3.2018, but has not furnished any information/details regarding the Liquidated damages recovered. Accordingly, no

adjustment on account of LD has been considered in this order. The petitioner is however granted liberty to file details of the LD, if any, recovered, at the time of truing-up of tariff.

Projected Additional Capital Expenditure

50. Regulations 14 (1) of the 2014 Tariff Regulations, provides as under:

> *"14.(1) The capital expenditure in respect of the new project or an existing project incurred or projected to be incurred, on the following counts within the original scope of work, after the date of commercial operation and up to the cut-off date may be admitted by the Commission, subject to prudence check:*
>
> *(i) Un-discharged liabilities recognized to be payable at a future date;*
>
> *(ii) Works deferred for execution;*
>
> *(iii) Procurement of initial capital spares within the original scope of work, in accordance with the provisions of Regulation 13;*
>
> *(iv) Liabilities to meet award of arbitration or for compliance of the order or decree of a court of law; and*
>
> *(v) Change in law or compliance of any existing law:*
>
> *Provided that the details of works asset wise/work wise included in the original scope of work along with estimates of expenditure, liabilities recognized to be payable at a future date and the works deferred for execution shall be submitted along with the application for determination of tariff.*

51. The petitioner in Form-9A has claimed projected additional capital expenditure of ₹339.55 crore in 2017-18, ₹229.55 crore in 2018-19 and ₹48.08 crore beyond 2018-19 under Regulation 14(1)(ii) & (iii) of the 2014 Tariff Regulations. The details of the projected additional capital expenditure claimed is tabulated as under:-

(Rs.in crore)

	Head of Work/Equipment	**2017-18**	**2018-19**	**Beyond 2018-19**
1.	Main Plant incl. ERV, PVC, Taxes & duties – EPC Package	119.21	33.88	
2.	Coal Handling Plant i) Inter-connecting route & ii) Balance part with Stacker-reclaimer incl. taxes & duties – EPC Package	77.44	81.00	7.00
3.	Water System Package – EPC Package	11.35	2.18	
4.	Switch Yard Package (400 KV GIS SW Yard and associated works) – EPC Package	15.91	5.01	2.00
5.	Mandatory Spares (for Main plant package)	10.00	32.72	
6(i)	Combined Ash slurry disposal system & Electrical works for LAN & Weigh bridge for Ash pond and High Mast Light	7.48	2.10	

6(ii)	Construction of Bridge on Konar River along with Approach Road	60.00	49.49	22.08
7.	Railway-infrastructure	20.00	5.40	7.00
8.	Shifting of HT lines (220/132 KV lines) for Rail-infrastructure plus Barhi line diversion for ROB & OPGW diversion in the links 220 KV BTPS'B'-Ramgarh 220 KV, BTP-CTPS B and 132 KV BTPS'B'- Barhi-Konar.	3.36	1.00	
9.	Colony Augmentation	3.49	4.00	10.00
10.	Overheads	3.00	3.00	
11.	Social Economic programme (SIP / CSR)	0.60	-	
12.	Green-belt development, rain water harvesting	1.00	-	
13.	Contingency Works (in-built project requirement viz. Construction of Retaining wall at River side of Old Ash dyke, Installation of CAAQMS for Pollution norms)	5.00	9.38	
14.	Computerization/Networking and Procurement of furniture, A/C machine, Xerox m/c etc.	0.58	0.74	
15.	Others for Dismantling of existing underground CW channel, Operator's Training, Preliminary Investigation, Shifting of existing Switch yard and Misc. work	1.13	-	
Total Additional Capital Expenditure		**339.55**	**229.90**	**48.08**
Un-discharged Liability included		33.95	22.99	

52. We now examine the claim of the petitioner for projected additional capital expenditure (year wise), on prudence check, as stated below:

2017-18 and 2018-19

53. The COD of the generating station is 23.2.2017 and hence the cut-off date of the generating station in terms of Regulation 3(13) of the 2014 Tariff Regulations is 31.3.2020. The petitioner has claimed projected additional capital expenditure of ₹ 339.55 lakh in the year 2017-18 and ₹229.90 lakh in the year 2018-19 against balance/deferred works towards Plant and Machinery, CHP, Water system package, Switch yard package, Ash slurry disposal system, Construction of bridge, Railway infrastructure, Shifting of HT lines, Colony augmentation, Overheads, Social economy program (SIP/CSR), Rain water harvesting, Contingency works, Computerization, dismantling of existing underground CW channel under Regulation 14(1)(ii) and Mandatory spares under Regulation 14(1)(iii) of the 2014 Tariff Regulations. The

petitioner has further submitted that the un-discharged liability of ₹33.95 crore in 2017-18 and ₹22.99 crore in 2018-19 has been included in the said projected additional capital expenditure claimed. Considering the fact that the projected additional capital expenditure claimed are within the original scope of work and is within the cut-off date, we are inclined to allow the expenditure of ₹339.55 crore and ₹229.90 crore for the years 2017-18 and 2018-19 respectively towards deferred works under Regulation 14(1)(ii) & (iii) of the 2014 Tariff Regulations, on projected basis. However, the petitioner is directed to certify and furnish at the time of truing-up of tariff that the projected additional capital expenditure claimed during the years 2017-18 and 2018-19 are within the original scope of work of the project.

Beyond 2018-19

54. The petitioner has claimed projected additional capital expenditure of ₹48.08 lakh beyond the year 2018-19 (i.e the next tariff period) in respect of deferred works towards CHP, Switch yard package, Construction of bridge, Railway infrastructure, and Colony augmentation under Regulation 14(1)(ii) of the 2014 Tariff Regulations. Since the claim of the petitioner is beyond the tariff period 2014-19, the same has not been allowed in this order. However, in case the expenditure is claimed by the petitioner during the next tariff period (2019-24) the same will be considered in terms of the applicable tariff regulations.

55. Accordingly, the projected additional capital expenditure of ₹33955.00 lakh in 2017-18 and ₹22990.00 lakh in 2018-19 has been allowed.

Reasonableness of Capital Cost as on COD

56. The capital cost excluding notional IDC, IDC, FC , FERV & Hedging cost is ₹275597.67 lakh and the *pro rata* reduction on overhead expenses IEDC is ₹3214.18 lakh. Accordingly,

the hard cost as on 23.2.2017 (COD of the Unit/generating station) is ₹272383.73 lakh (275597.67-3214.18) and the same works out to ₹5.44 cr/MW. In order to assess the reasonableness of the capital cost of the generating station, the capital cost (hard cost) of this generating station has been compared with other generating stations of similar capacity viz., 500 MW, which have been commissioned recently within a span of 4-5 years as under:

Station	Capacity (MW)	Station COD	Capital Cost	Hard Cost (₹ in crore/ MW)
Mauda STPS	2 x 500	30.3.2014	5521.37	5.52
Koderma TPS of DVC	2 x 500	14.6.2014	4482.94	4.48
Vallur Thermal Power Station	3X500	26.02.2015	7532.64	5.02
NLC Tamil Nadu Power Limited	2X500	29.08.2015	4677.81	4.68

57. The benchmark hard cost as specified by the Commission in its Order dated 4.6.2012 in respect of thermal power stations with coal as fuel at December, 2011 price level with is ₹5.08 crore/MW for one unit of 500 MW. Based on the information submitted by the petitioner, the hard cost of the generating station as on 23.2.2017 is ₹272383.73 lakh (₹5.44 crore/MW) and the same is on higher side. The reason for such a higher hard cost is on account of the fact that the petitioner has incurred additional expenditure of ₹13.80 crore towards the dismantling of underground CW channel, ₹22.83 crore towards the shifting of existing switchyard and ₹18.43 crore in respect of the work of construction of bridge on Konar River along with approach road as on COD of the generating station and these were not included in the benchmark capital cost. Further, due to various technical and space constraint (such as requirement of extensive filling, piling for switchyard equipment and towers, some towers locations were falling on the mid of Koner river) it was decided by the petitioner to install 400 KV Gas Insulated Switch Yard at a cost of ₹132 crore within the available space of the generating station, which is higher than the switchyard cost of other similar capacity generating stations. It

is however observed that in respect of Vindhyanchal Stage-V (1000 MW) generating station of NTPC, which was commissioned during the year 2013-14, the cost of switchyard is ₹50-60 crore (approx) for one unit of 500 MW. However, in the present case, total additional cost incurred is ₹135 crore (13.80 + 22.83 + 18.43 + 80). Hence, after deduction of ₹135 crore, the hard cost of this generating station works out to ₹5.17 crore. It is therefore evident that the hard cost in respect of Unit-I of the generating station, appears to be reasonable on the basis of benchmark hard cost. In view of above, the capital cost claimed as on COD of Unit-I of the generating station has been considered for the purpose of determination of tariff. However, the reasonableness of hard cost of the generating station up to the cut-off date (31.3.2020) can only be assessed when capitalization based on actuals up to 31.3.2020 has been undertaken by the generating station.

58. The petitioner has claimed capital cost of ₹392125.91 lakh as on COD of Unit-I/ generating station (23.2.2017) which includes Interest during Construction (IDC), Financial Charges (FC) and Notional IDC. Accordingly, the opening capital cost as on 23.2.2017 (COD of Unit-I/ generating station) after considering the allowable IDC & FC and liability adjustments is worked out and allowed as under:

(₹ in lakh)

	As on COD of Unit-I 23.2.2017
Capital Cost excluding IDC&FC	275597.67
Less: Pro-rata reduction on Overhead expenses IEDC	3214.18
Add: IDC & FC	35151.17
Capital cost on accrual basis	**307534.67**
Less: Un-discharged liabilities included above	8119.16
Capital cost on cash basis	**299415.51**

The petitioner is directed to provide details of IEDC at the time of truing up of tariff of the generating station.

59. Based on the above discussions, the capital cost considered for the purpose of tariff is as under:

(₹ in lakh)

	2016-17	2017-18	2018-19
	23.2.2017 to 31.3.2017		
Opening Capital Cost	299415.51	299415.51	338094.17
Add: Additional Capital Expenditure	0.00	33955.00	22990.00
Less: Reversal	0.00	3396.00	2299.00
Add: Discharge of Liability	0.00	8119.00	3396.00
Closing Capital Cost	**299415.51**	**338094.17**	**362180.67**
Average Capital Cost	299415.51	318754.84	350137.42

Debt-Equity Ratio

60. Regulation 19 of the 2014 Tariff Regulations provides as under:

"19. Debt-Equity Ratio

(1) For a project declared under commercial operation on or after 1.4.2014, the debt-equity ratio would be considered as 70:30 as on COD. If the equity actually deployed is more than 30% of the capital cost, equity in excess of 30% shall be treated as normative loan:

Provided that:

i. Where equity actually deployed is less than 30% of the capital cost, actual equity shall be considered for determination of tariff:

ii. The equity invested in foreign currency shall be designated in Indian rupees on the date of each investment:

iii. Any grant obtained for the execution of the project shall not be considered as a part of capital structure for the purpose of debt : equity ratio.

Explanation.-The premium, if any, raised by the generating company or the transmission licensee, as the case may be, while issuing share capital and investment of internal resources created out of its free reserve, for the funding of the project, shall be reckoned as paid up capital for the purpose of computing return on equity, only if such premium amount and internal resources are actually utilised for meeting the capital expenditure of the generating station or the transmission system.

(2) The generating company or the transmission licensee shall submit the resolution of the Board of the company or approval from Cabinet Committee on Economic Affairs (CCEA) regarding infusion of fund from internal resources in support of the utilization made or proposed to be made to meet the capital expenditure of the generating station or the transmission system including communication system, as the case may be.

(3) In case of the generating station and the transmission system including communication system declared under commercial operation prior to 1.4.2014, debt equity ratio allowed by the Commission for determination of tariff for the period ending 31.3.2014 shall be considered.

(4) In case of the generating station and the transmission system including communication system declared under commercial operation prior to 1.4.2014, butwhere debt: equity ratio has not been determined by the Commission for determination of

tariff for the period ending 31.3.2014, the Commission shall approve the debt: equity ratio based on actual information provided by the generating company or the transmission licensee as the case may be.

(5) Any expenditure incurred or projected to be incurred on or after 1.4.2014 as may be admitted by the Commission as additional capital expenditure for determination of tariff, and renovation and modernisation expenditure for life extension shall be serviced in the manner specified in clause (1) of this regulation."

61. The petitioner has considered the debt equity ratio 70:30 for calculation of normative loan and equity. It is notice from Form-14A and Form-13, the actual cash expenditure and loan as on actual COD (23.2.2017) is as under:

(₹ in lakh)

Actual Cash Expenditure	399523.73
Loan	238000.00
Debt	59.57%
Equity	40.43%

62. It is noticed that the equity as on 23.2.2017 is more than 30%. However in terms of Regulations 19 of the 2014 Tariff Regulations, the debt-equity ratio for the purpose of calculation tariff has been considered as 70:30. Accordingly, the gross loan and equity amounting to ₹209590.86 lakh and ₹89824.65 lakh respectively has been considered as gross normative loan and equity as on 23.2.2017. Hence, the normative debt equity ratio of 70:30 has been considered in the case of admitted additional capital expenditure and the same is subject to revision based on truing-up exercise.

Return on Equity

63. Regulation 24 of the 2014 Tariff Regulations provides as under:

*"**24. Return on Equity**: (1) Return on equity shall be computed in rupee terms, on the equity base determined in accordance with regulation 19.*

(2) Return on equity shall be computed at the base rate of 15.50% for thermal generating stations, transmission system including communication system and run of the river hydro generating station, and at the base rate of 16.50% for the storage type hydro generating stations including pumped storage hydro generating stations and run of river generating station with pondage:

Provided that:

i) in case of projects commissioned on or after 1st April, 2014, an additional return of 0.50 % shall be allowed, if such projects are completed within the timeline specified in Appendix-I:

ii) the additional return of 0.5% shall not be admissible if the project is not completed within the timeline specified above for reasons whatsoever:

iii) additional RoE of 0.50% has been allowed if any element of the transmission project is completed within the specified timeline and it is certified by the Regional Power Committee/National Power Committee that commissioning of the particular element will benefit the system operation in the regional/national grid:

iv) the rate of return of a new project shall be reduced by 1% for such period as may be decided by the Commission, if the generating station or transmission system is found to be declared under commercial operation without commissioning of any of the Restricted Governor Mode Operation (RGMO)/ Free Governor Mode Operation (FGMO), data telemetry, communication system up to load dispatch centre or protection system:

v) as and when any of the above requirements are found lacking in a generating station based on the report submitted by the respective RLDC, RoE shall be reduced by 1% for the period for which the deficiency continues:

vi) additional RoE shall not be admissible for transmission line having length of less than 50 kilometers.

64. Regulation 25 of the 2014 Tariff Regulations provides as under:

Tax on Return on Equity:

(1) The base rate of return on equity as allowed by the Commission under Regulation 24 shall be grossed up with the effective tax rate of the respective financial year. For this purpose, the effective tax rate shall be considered on the basis of actual tax paid in the respect of the financial year in line with the provisions of the relevant Finance Acts by the concerned generating company or the transmission licensee, as the case may be. The actual tax income on other income stream (i.e., income of non generation or non transmission business, as the case may be) shall not be considered for the calculation of "effective tax rate".

(2) Rate of return on equity shall be rounded off to three decimal places and shall be computed as per the formula given below:

Rate of pre-tax return on equity = Base rate / (1-t)

Where "t" is the effective tax rate in accordance with Clause (1) of this regulation and shall be calculated at the beginning of every financial year based on the estimated profit and tax to be paid estimated in line with the provisions of the relevant Finance Act applicable for that financial year to the company on pro-rata basis by excluding the income of non-generation or non-transmission business, as the case may be, and the corresponding tax thereon. In case of generating company or transmission licensee paying Minimum Alternate Tax (MAT), "t" shall be considered as MAT rate including surcharge and cess.

(3) The generating company or the transmission licensee, as the case may be, shall true up the grossed up rate of return on equity at the end of every financial year based on actual tax paid together with any additional tax demand including interest thereon, duly adjusted for any refund of tax including interest received from the income tax authorities pertaining to the tariff period 2014-15 to 2018-19 on actual gross income of any financial year. However, penalty, if any, arising on account of delay in deposit or short deposit of tax amount shall not be claimed by the generating company or the transmission licensee as the case may be. Any under-recovery or over-recovery of grossed

up rate on return on equity after truing up, shall be recovered or refunded to beneficiaries or the long term transmission customers/DICs as the case may be on year to year basis.

65. The petitioner has claimed return on equity considering the base rate of 15.5% and effective tax rate of 19.61%. Since, no tax has been paid by the petitioner for the years 2014-15, 2015-16 and 2016-17, the effective tax rate of 0.00% has been considered for the years from 2016-17 to 2018-19.This is subject to truing up. Accordingly, Return on Equity has been computed as under:

(₹ in lakh)

	2016-17	**2017-18**	**2018-19**
Notional Equity- Opening	89824.65	89824.65	101428.25
Addition of equity due to additional capital expenditure	0.00	11603.60	7225.95
Normative Equity-Closing	89824.65	101428.25	108654.20
Average Normative Equity	89824.65	95626.45	105041.22
Return on Equity (Base Rate)	15.500%	15.500%	15.500%
Tax Rate for respective years	0.000%	0.000%	0.000%
Rate of Return on Equity (Pre Tax)	15.500%	15.500%	15.500%
Return on Equity(Pre Tax)-Annualised	**13922.82**	**14822.10**	**16281.39**

Interest on loan

66. Regulation 26 of the 2014 Tariff Regulations provides as under:

"26. Interest on loan capital: (1) The loans arrived at in the manner indicated in regulation 19 shall be considered as gross normative loan for calculation of interest on loan.

(2) The normative loan outstanding as on 1.4.2014 shall be worked out by deducting the cumulative repayment as admitted by the Commission up to 31.3.2014 from the gross normative loan.

(3) The repayment for each of the year of the tariff period 2014-19 shall be deemed to be equal to the depreciation allowed for the corresponding year/period. In case of de-capitalization of assets, the repayment shall be adjusted by taking into account cumulative repayment on a pro rata basis and the adjustment should not exceed cumulative depreciation recovered up to the date of de-capitalization of such asset.

(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 depreciation allowed for the year or part of the year.

(5) The rate of interest shall be the weighted average rate of interest calculated on the basis of the actual loan portfolio after providing appropriate accounting adjustment for interest capitalized:

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 beneficiaries or the long term transmission customers /DICs 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.

67. Interest on loan has been worked out as mentioned below:

(a) The gross normative loan amounting to ₹209590.86 lakh has been considered as on 23.2.2017.

(b) Addition to normative loan on account of approved additional capital expenditure has been considered.

(c) Depreciation allowed for the period has been considered as repayment of normative loan during the respective years.

(d) In line with the provisions of the regulations, the weighted average rate of interest has been calculated applying the actual loan portfolio existing as on 1.4.2014 along with subsequent additions during the period 2014-19, if any, for the generating station. In case of loans carrying floating rate of interest the rate of interest as submitted by the petitioner has been considered for the purpose of tariff.

68. The necessary calculations for the interest on loan are as under:

(₹ in lakh)

	2016-17	2017-18	2018-19
Gross opening loan	209590.86	209590.86	236665.92
Cumulative repayment of loan up to previous year	0.00	21020.34	43398.40
Net Loan Opening	209590.86	188570.51	193267.52
Addition due to Additional capitalisation	-	27075.06	16860.55
Repayment of loan during the year	21020.34	22378.05	24581.25
Net Loan Closing	188570.51	193267.52	185546.82
Average Loan	199080.68	190919.02	189407.17
Weighted Average Rate of Interest on Loan	11.3500%	11.3500%	11.3500%
Interest on Loan	**22595.66**	**21669.31**	**21497.71**

Depreciation

69. Regulation 27 of the 2014 Tariff Regulations provides as under:

> ***"27. Depreciation:***
>
> *(1) Depreciation shall be computed from the date of commercial operation of a generating station or unit thereof or a transmission system including communication system or element thereof. In case of the tariff of all the units of a generating station or all elements of a transmission system including communication system for which a single tariff needs to be determined, the depreciation shall be computed from the effective date of commercial operation of the generating station or the transmission system taking into consideration the depreciation of individual units or elements thereof.*
>
> *Provided that effective date of commercial operation shall be worked out by considering the actual date of commercial operation and installed capacity of all the units of the generating station or capital cost of all elements of the transmission system, for which single tariff needs to be determined.*
>
> *(2) The value base for the purpose of depreciation shall be the capital cost of the asset admitted by the Commission. In case of multiple units of a generating station or multiple elements of transmission system, weighted average life for the generating station of the transmission system shall be applied. Depreciation shall be chargeable from the first year of commercial operation. In case of commercial operation of the asset for part of the year, depreciation shall be charged on pro rata basis.*
>
> *(3) The salvage value of the asset shall be considered as 10% and depreciation shall be allowed up to maximum of 90% of the capital cost of the asset: Provided that in case of hydro generating station, the salvage value shall be as provided in the agreement signed by the developers with the State Government for development of the Plant:*
>
> *Provided further that the capital cost of the assets of the hydro generating station for the purpose of computation of depreciated value shall correspond to the percentage of sale of electricity under long-term power purchase agreement at regulated tariff: Provided also that any depreciation disallowed on account of lower availability of the generating station or generating unit or transmission system as the case may be, shall not be allowed to be recovered at a later stage during the useful life and the extended life.*

(4) Land other than the land held under lease and the land for reservoir in case of hydro generating station shall not be a depreciable asset and its cost shall be excluded from the capital cost while computing depreciable value of the asset.

(5) Depreciation shall be calculated annually based on Straight Line Method and at rates specified in Appendix-II 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 the effective date of commercial operation of the station shall be spread over the balance useful life of the assets.

(6) In case of the existing projects, the balance depreciable value as on1.4.2014 shall be worked out by deducting the cumulative depreciation as admitted by the Commission up to 31.3.2014 from the gross depreciable value of the assets.

(7) The generating company or the transmission license, as the case may be, shall submit the details of proposed capital expenditure during the fag end of the project (five years before the useful life) along with justification and proposed life extension. The Commission based on prudence check of such submissions shall approve the depreciation on capital expenditure during the fag end of the project.

(8) In case of de-capitalization of assets in respect of generating station or unit thereof or transmission system or element thereof, the cumulative depreciation shall be adjusted by taking into account the depreciation recovered in tariff by the de-capitalized asset during its useful services."

70. Depreciation has been calculated considering the weighted average rate of depreciation computed on the gross value of asset as per rates approved by C&AG. The weighted average rate of depreciation @7.0205% for 2016-17 to 2018-19 has been considered for calculation of depreciation. The necessary calculations in support of depreciation are as under:

(₹ in lakh)

	2016-17	**2017-18**	**2018-19**
Average Capital Cost	299415.51	318754.84	350137.42
Value of free hold land	0.00	0.00	0.00
Depreciable value @ 90%	269473.96	286879.35	315123.67
Balance depreciable value	269473.96	286879.35	290614.79
Rate of Depreciation	7.0205%	7.0205%	7.0205%
Depreciation	2130.83	22378.05	24581.25
Depreciation (annualized)	**21020.34**	**22378.05**	**24581.25**
Cumulative depreciation at the end	2130.83	24508.88	49090.14

O&M Expenses

71. Regulation 29 (1) (a) of the 2014 Tariff Regulations provides the following O & M expense norms for coal based generating stations of 500 MW capacity:

(₹ in lakh/ MW)

2016-17 (23.2.2017 to 31.3.2017)	2017-18	2018-19
18.08	19.22	20.43

72. Accordingly, the petitioner has claimed O&M expenses for the period 2014-19 as under:

(₹ in lakh)

2016-17 (23.2.2017 to 31.3.2017)	2017-18	2018-19
916.38	9610.00	10215.00

73. The normative O&M expenses claimed by the petitioner are in terms of the 2014 Tariff Regulations and hence allowed.

Water Charges

74. Regulation 29(2) of the 2014 Tariff Regulations provide as under:

> *"29.(2) The Water Charges and capital spares for thermal generating stations shall be allowed separately:*
>
> *Provided that water charges shall be allowed based on water consumption depending upon type of plant, type of cooling water system etc., subject to prudence check. The details regarding the same shall be furnished along with the petition:*
>
> *Provided that the generating station shall submit the details of year wise actual capital spares consumed at the time of truing up with appropriate justification for incurring the same and substantiating that the same is not funded through compensatory allowance or special allowance or claimed as a part of additional capitalization or consumption of stores and spares and renovation and modernization*

75. In terms of the above regulations, water charges are to be allowed based on water consumption depending upon type of plant, type of cooling water system etc., subject to prudence check of the details furnished by the petitioner.

76. The petitioner vide affidavit dated 25.1.2018 has submitted a bill dated 2.11.2016 for the period of 92 days from 1.6.2016 to 31.8.2016. The petitioner has submitted the sanctioned allocation of 46.97 Million Gallons per Day (MGD). However, the petitioner has not claimed water charges on projection basis, during the period from 2016-19 but

has submitted that the details of actual water charges for the relevant years shall be furnished at the time of truing up. In view of this, the same has not been considered for the purpose of tariff.

Additional O&M expenses

77. The petitioner has sought liberty to claim additional O&M expenses towards Common Office expenditure, Pension & Gratuity Contribution, Ash Evacuation, Mega Insurance, CISF Security, pay revision etc. at the time of truing-up exercise. Hence, the same has not been considered in this order. The claim of the petitioner, if any, at the time of truing-up of tariff, shall be considered on merits, after prudence check.

Operational Norms

78. The operational norms in respect of the generating station considered by the petitioner as per affidavit dated 14.3.2017 are as under:

Target Availability (%)	83%
Heat Rate (kcal/kWh)	2365.54
Auxiliary Power Consumption (%)	5.25 %
Specific Oil Consumption (ml/kWh)	0.50

79. The operational norms claimed by the petitioner are discussed as under.

Normative Annual Plant Availability Factor

80. Regulation 36 of the 2014 Tariff Regulations provides as under:

> *"(a) All Thermal generating stations, except those covered under clauses (b) (c) (d) &(e)- 85%.*
>
> *Provided that in view of the shortage of coal and uncertainty of assured coal supply on sustained basis experienced by the generating stations, the NAPAF for recovery of fixed charges shall be 83% till the same is reviewed.*
>
> *The above provision shall be reviewed based on actual feedback after 3 years from 01.04.2014."*

81. The petitioner has considered the Target Availability of 83% for the period 2016-19. Due to shortage of domestic coal supply, the Commission has relaxed the Target

Availability norm to 83% for first 3 years from 1.4.2014 with a provision to review the same after a period of 3 years. Accordingly, in terms of the Regulation 36(a) of the 2014 Tariff Regulations, the Target Availability of 83% is considered for the period 2016-17 and 85% for the period 2017-19.

Gross Station Heat Rate (kcal/kwh)

82. Regulation 36(C)(b) (i) of the 2014 Tariff Regulations provides for the Gross Station Heat Rate as under:

> *"C) Gross Station Heat Rate*
>
> *(b) New Thermal Generating Station achieving COD on or after 1.4.2014*
>
> *(i) Coal-based and lignite-fired Thermal Generating Stations*
>
> *= 1.045 X Design Heat Rate (kCal/kWh)*
>
> *Where the Design Heat Rate of a generating unit means the unit heat rate guaranteed by the supplier at conditions of 100% MCR, zero percent make up, design coal and design cooling water temperature/back pressure.*
>
> *Provided that the design heat rate shall not exceed the following maximum design unit heat rates depending upon the pressure and temperature ratings of the units:*

Pressure Rating (Kg/cm2)	*150*	*170*	*170*	*247*
SHT/RHT (0C)	*535/535*	*537/537*	*537/565*	*565/593*
Type of BFP	*Electrical Driven*	*Turbine Driven*	*Turbine Driven*	*Turbine Driven*
Max Turbine Heat Rate (kCal/kWh)	*1955*	*1950*	*1935*	*1850*
Min.Boiler Efficiency				
Sub-Bituminous Indian Coal	*0.86*	*0.86*	*0.86*	*0.86*
Bituminous Imported Coal	*0.89*	*0.89*	*0.89*	*0.89*
Max Design Unit Heat Rate (kCal/kWh)				
Sub-Bituminous Indian Coal	*2273*	*2267*	*2250*	*2151*
Bituminous Imported Coal	*2197*	*2191*	*2174*	*2078*

> *Provided further that in case pressure and temperature parameters of a unit are different from above ratings, the maximum design unit heat rate of the nearest class shall be taken:*

Provided also that where unit heat rate has not been guaranteed but turbine cycle heat rate and boiler efficiency are guaranteed separately by the same supplier or different suppliers, the unit design heat rate shall be arrived at by using guaranteed turbine cycle heat rate and boiler efficiency:

Provided also that where the boiler efficiency is below 86% for Sub-bituminous Indian coal and 89% for bituminous imported coal, the same shall be considered as 86% and 89% respectively for Sub-bituminous Indian coal and bituminous imported coal for computation of station heat rate:

Provided also that maximum turbine cycle heat rate shall be adjusted for type of dry cooling system:

Provided also that if one or more generating units were declared under commercial operation prior to 1.4.2014, the heat rate norms for those generating units as well as generating units declared under commercial operation on or after 1.4.2014 shall be lower of the heat rate norms arrived at by above methodology and the norms as per the Regulation 36(C)(a)(i):

83. The petitioner has furnished the design turbine cycle heat rate and boiler efficiency of the generating station as 1944.5 kcal/kWh and 85.90% respectively. Accordingly, the unit design heat rate is worked out as 2263.68 kcal/kWh (1944.5/0.8590). However, Regulation 36(C)(b)(i) of the 2014 Tariff Regulations provides that for new thermal generating stations achieving COD on or after 1.4.2014, the Gross Station Heat Rate is = 1.045 x Design Heat Rate (kcal/kWh) (1.045x 2263.68 =2365.54), provided that the design heat rate shall not exceed the maximum design unit heat rate depending upon the pressure and temperature ratings of the units as specified under the Tariff Regulations. The design heat rate of the generating station of 2263.68 kCal/kWh is lower than the ceiling design heat rate of 2267 kcal/kwh. However, the regulation also provides that where the boiler efficiency is below 86% for Sub-bituminous Indian coal, the same shall be considered as 86%. The boiler efficiency furnished by the petitioner is 85.90% and therefore boiler efficiency has been considered as 86% for computation of design heat rate. Hence, the GSHR is worked out as 2362.79 kcal/kWh = (1944.5/.86*1.045) and the same has been considered for the purpose of tariff.

Auxiliary Power Consumption

84. Regulation 36(E)(a)(ii) of the 2014 Tariff Regulations provides for Auxiliary Power Consumption of 5.25% for coal based generating stations of 500 MW sets and above with Natural Draft cooling tower or without cooling tower with steam driven BFP. Accordingly, the Auxiliary Energy Consumption considered by the petitioner is in order and is allowed.

Specific Oil Consumption

85. Regulation 36(D)(a) of the 2014 Tariff Regulations provides for secondary fuel oil consumption of 0.50 ml/kWh for coal-based generating station. Hence, the secondary fuel oil consumption considered by the petitioner is as per norms and is allowed.

Interest on Working Capital

86. Sub-section (a) of clause (1) of Regulation 28 of the 2014 Tariff Regulations provides as under:

> *"28. Interest on Working Capital:*
>
> *(1) The working capital shall cover*
>
> *(a) Coal based/lignite fired thermal generating stations*
>
> *i) Cost of coal towards stock for 15 days for pit-head generating stations and 30 days for non-pit-head generating station for generation corresponding to the normative annual plant availability factor or the maximum coal stock storage capacity whichever is lower.*
>
> *ii) Cost of coal for 30 days for generating corresponding to the normative annual plant availability factor.*
>
> *iii) Cost of secondary fuel oil for two month for generating corresponding to the normative annual plant availability factor, and in case of use of more than one secondary fuel oil, cost of fuel oil stock for the main secondary fuel oil.*
>
> *iii) Maintenance spares @ 20% of operation and maintenance expenses specified in regulation 29.*
>
> *iv) Receivables equivalent to two months of capacity charge and energy charge for sale of electricity calculated on normative plant availability factor; and*
>
> *vi) Operation and maintenance expenses for one month."*

Fuel Cost and Energy Charges in working capital

87. The petitioner in Form 13 B has claimed Cost for fuel component for working capital for the period 23.2.2017 to 31.3.2019 based on price and "as received" GCV of coal procured and burnt for the preceding three months of November, 2016, December, 2016 and January, 2017 and for secondary fuel oil for the preceding three months of October, 2016, November, 2016 and December, 2016 as under:

(₹ in lakh)

	2016-17 (23.2.2017 to 31.3.2017)	**2017-18**	**2018-19**
Cost of Coal towards stock	1100.21	10853.44	10853.44
Cost of Coal towards Generation	1100.21	10853.44	10853.44
Cost of Secondary fuel oil 2 months	11.74	115.85	115.85

88. As per directions of the Hon'ble High Court dated 7.9.2015 in W.P.No. 1641 of 2014, the Commission vide order dated 25.1.2016 in Petition No. 283/GT/2014 has decided as under:

> *"58. In view of the above discussion, the issues referred by the Hon'ble High Court of Delhi are decided as under:*
>
> *(a) There is no basis in the Indian Standards and other documents relied upon by NTPC etc. to support their claim that GCV of coal on as received basis should be measured by taking samples after the crusher set up inside the generating station, in terms of Regulation 30(6) of the 2014 Tariff regulations.*
>
> *(b) The samples for the purpose of measurement of coal on as received basis should be collected from the loaded wagons at the generating stations either manually or through the Hydraulic Auger in accordance with provisions of IS 436(Part1/Section1)-1964 before the coal is unloaded. While collecting the samples, the safety of personnel and equipment as discussed in this order should be ensured. After collection of samples, the sample preparation and testing shall be carried out in the laboratory in accordance with the procedure prescribed in IS 436(Part1/Section1)-1964 which has been elaborated in the CPRI Report to PSERC."*

89. The petitioner in Form-15 has furnished "as received" GCV of Coal but has not furnished "as billed" GCV of coal. Accordingly, the Commission had directed the petitioner to clarify, amongst others, the following:

(i) Confirmation as to whether coal samples for measuring 'as received' GCV of coal in the months October, 2016, November, 2016 and December, 2016 were taken from the wagons at the unloading point in the site or from any other point. Also, details of 'as billed' GCV of coal for the above said months shall be furnished.

(ii) To clarify whether the infrastructure for taking coal samples from wagon at the unloading point for measuring 'as received' GCV of coal in terms of the order dated 25.1.2016 in Petition No. 283/GT/2014 was incorporated by the petitioner as per the said order. If so, details of infrastructure installed along with videography of taking coal samples from wagons.

90. In response, the petitioner vide affidavit dated 25.1.2018 has submitted that no hydraulic augur has been installed at the generating station to take coal samples for "as received" GCV and that the collection of samples is done on manual basis. It has also confirmed that the coal samples were taken from the wagons at the unloading point. The petitioner further submitted that the generating station mostly received coking/ washery coal, the GCV of which has not been determined by Coal Company at the time of billing. Accordingly, the petitioner has submitted that the weighted average of GCV of coal on "as billed" basis cannot be computed.

91. The Commission vide ROP of the hearing dated 20.2.2018 directed the petitioner to furnish the details of "as billed" GCV of coal for 3 months starting from November, 2016 to January, 2017. In response, the petitioner vide affidavit dated 9.3.2018 has submitted that the details of weighted average GCV of samples collected by third party sampler, M/s CIMFR at loading point during November, 2016, December, 2016 and January 2017 are 4414 Kcal/Kg, 4178 Kcal/Kg & 3926 Kcal/Kg respectively.

92. The petitioner has claimed Energy Charge Rate (ECR) of 193.70 paise/kWh based on the weighted average price, GCV of coal (as received basis) procured and burnt for the preceding three months i.e. November, 2016, December, 2016 & January, 2017 and for oil procured and burnt for the preceding three months i.e. October, 2016, November, 2016 and December, 2016. It is observed that the petitioner has placed on record the GCV of coal for preceding 3 months on "as received" basis. In compliance with the

direction of the Hon'ble High Court of Delhi, the Commission in its order dated 25.1.2016 in Petition No. 283/GT/2014 has clarified that the measurement of GCV of coal on as received basis shall be taken from the loaded wagons at the unloading point either manually or through the Hydraulic Augur. However, the petitioner has not installed hydraulic auger at DVC unloading point and sample is being taken manually. Further, the petitioner vide affidavit dated 9.3.2018 has submitted that the details of third party sampler at loading point for the month of November, 2016, December, 2016 and January, 2016 is 4414 Kcal/kWh, 4178 Kcal/kWh and 3926 Kcal/kWh respectively. In absence of " as received GCV of coal as per the direction of the Commission in the order dated 25.1.2016 in Petition No. 283/GT/2014, the "as billed" GCV as per the 3rd party sampler at loading point has been considered for allowing coal costs, and allowing on adjustment for total moisture as per the formula given as under:

$$\frac{GCV \times (1-TM)}{(1 - IM)}$$

Where: GCV=Gross Calorific value of coal
TM=Total moisture
IM= Inherent moisture

93. In view of the above, the cost for fuel components in working capital have been computed at 83% NAPAF for the year 2016-17 and at 85% NAPAF for the years 2017-18 and 2018-19 and based on "as billed" (3rd party sampler at loading point) GCV of coal and price of coal procured for the preceding three months from November, 2016, December, 2016 and January, 2017 and for secondary fuel oil for the preceding three months i.e. October, 2016, November, 2016 and December, 2016 and allowed as under:

(₹in lakh)

	2016-17 (23.2.2017 to 31.3.2017)	**2017-18**	**2018-19**
Cost of Coal towards stock	492.68	4977.30	4977.30
Cost of Coal towards generation	492.68	4977.30	4977.30
Cost of Coal for 2 months	999.04	10092.86	10092.86
Cost of Secondary fuel oil 2 months	11.65	117.70	117.70

94. Similarly, the Energy Charge Rate (ECR) based on operational norms specified in 2014 Tariff Regulations and on "as billed" GCV of coal for preceding 3 months i.e., from November, 2016, December, 2016 and January, 2017, is worked out as under:

Sl.No.	Description	Unit	2016-19
1	Capacity	MW	500
2	Weighted average Gross Station Heat Rate	Kcal/kWh	2362.79
3	Weighted average Aux. Energy Consumption	%	5.25
4	Weighted average GCV of oil	Kcal/lit	9800.59
5	Weighted average GCV of Coal (as per third party sampling at loading point)	Kcal/kg	4155.958
6	Adjustment on account of coal received at the generating station for equilibrated basis (Air dried) in the billed GCV of Coal India		*
7	Weighted average price of oil	Rs/KL	37937.33
8	Weighted average price of Coal	Rs/MT	2866.95
9	Rate of Energy Charge ex-bus	Paise/kWh	173.672**

**to be calculated by the petitioner based on the adjustment formulae*
***to be revised as per the figures at Sr. No. 6*

95. The GCV of coal as computed above shall be adjusted in the light of the GCV of coal on 'as received basis' to be computed by the petitioner as per our directions in order dated 25.1.2016 in Petition No. 283/GT/2014.

96. Energy charges for 2 months on the basis of as billed GCV for the purpose of interest in working capital has been worked out as under:

(₹ in lakh)

2016-17 (23.2.2017 to 31.3.2017)	2017-18	2018-19
1009.67	10200.26	10200.26

Receivables

97. Receivables equivalent to two months of capacity charge and energy charges (based on primary fuel only) has been worked out and allowed as under:

(₹ in lakh)

	2016-17	2017-18	2018-19
Variable Charges -2 months	9971.95	10212.24	10212.24
Fixed Charges – 2 months	11825.95	12163.56	12864.82
Total	**21797.90**	**22375.79**	**23077.06**

Maintenance Spares

98. The petitioner has claimed maintenance spares in the working capital as under:

(₹ in lakh)

2016-17 (23.2.2017 to 31.3.2017)	2017-18	2018-19
183.28	1922.00	2043.00

99. Regulation 28(1)(a)(iv) of the 2014 Tariff Regulations provide for maintenance spares @ 20% of the operation & maintenance expenses as specified in Regulation 29. As specified in Regulation 29 (2) of the 2014 Tariff Regulations, the maintenance spares @ 20% of the operation & maintenance expenses is allowed are as under:

(₹in lakh)

2016-17 (23.2.2017 to 31.3.2017)	2017-18	2018-19
183.28	1922.00	2043.00

O & M Expenses (one month)

100. O & M expenses for one month claimed by the petitioner for the purpose of working capital are as under:

(₹ in lakh)

2016-17 (23.2.2017 to 31.3.2017)	2017-18	2018-19
76.37	800.83	851.25

101. Regulation 28(a)(vi) of the 2014 Tariff Regulations provides for Operation and maintenance expenses for one month for coal-based generating station. The one month O&M expenses allowed is as under:

(₹ *in lakh)*

2016-17 (23.2.2017 to 31.3.2017)	2017-18	2018-19
76.37	800.83	851.25

Since the petitioner has not claimed water charges as part of the O&M expenses in terms of Regulation 29(2) of the 2014 Tariff Regulations, the same has not been considered in this order for computation of one month O&M expenses and 20% of O&M expenses as maintenance spares in working capital.

Rate of interest on working capital

102. Regulation 28 (3) of the 2014 Tariff Regulations provides as under:

> *"Interest on working Capital: (3) Rate of interest on working capital shall be on normative basis and shall be considered as the bank rate as on 1.4.2014 or as on 1st April of the year during the tariff period 2014-15 to 2018-19 in which the generating station or a unit thereof or the transmission system including communication system or element thereof, as the case may be, is declared under commercial operation, whichever is later."*

103. In terms of the above regulations, SBI PLR of 12.80% (Bank rate 9.30 + 350 bps) has been considered for the purpose of calculating interest on working capital. Interest on working capital has been computed as under:

(₹ *in lakh)*

	2016-17 (23.2.2017 to 31.3.2017)	2017-18	2018-19
Cost of coal – 60 days	9720.38	9954.60	9954.60
Cost of secondary fuel oil – 2 months	114.93	117.70	117.70
O&M expenses – 1 month	753.33	800.83	851.25
Maintenance Spares	1808.00	1922.00	2043.00
Receivables – 2 months	21797.90	22375.79	23077.06
Total working capital	**34194.54**	**35170.93**	**36043.61**
Rate of interest	12.8000%	12.8000%	12.8000%
Interest on working capital	**4376.90**	**4501.88**	**4613.58**

104. Accordingly, the annual fixed charges approved for the generating station for the period from 23.2.2017 to 31.3.2019 is summarized as under:

(₹ in lakh)

	2016-17 (23.2.2017 to 31.3.2017)	2017-18	2018-19
Depreciation	21020.34	22378.05	24581.25
Interest on Loan	22595.66	21669.31	21497.71
Return on Equity	13922.82	14822.10	16281.39
Interest on Working Capital	4376.90	4501.88	4613.58
O&M Expenses	9040.00	9610.00	10215.00
Total	**70955.72**	**72981.34**	**77188.94**

Note: All figures are on annualized basis. All figures under each head have been rounded. The figure in total column in each year is also rounded. As such, the sum of individual items may not be equal to the arithmetic total of the column.

Month to Month Energy Charges

105. Regulation 30 (6)(a) of the 2014 Tariff Regulations provides for computation and payment of Capacity Charge and Energy Charge for thermal generating stations:

"6. Energy charge rate (ECR) in Rupees per kWh on ex-power plant basis shall be determined to three decimal place in accordance with the following formula:

(a) For coal based and lignite fired stations

ECR = {(GHR – SFC x CVSF) x LPPF / CVPF+SFC x LPSFi + LC x LPL} x 100 / (100 – AUX)

Where,

AUX = Normative auxiliary energy consumption in percentage.
CVPF = Gross calorific value of primary fuel as received, in kCal per kg, per litre or per standard cubic metre, as applicable.
CVSF = Calorific value of secondary fuel, in kCal per ml.
ECR = Energy charge rate, in Rupees per kWh sent out.
GHR = Gross station heat rate, in kCal per kWh.
LC = Normative limestone consumption in kg per kWh.
LPL = Weighted average landed price of limestone in Rupees per kg.
LPPF = Weighted average landed price of primary fuel, in Rupees per kg, per litre or per standard cubic metre, as applicable during the month.
SFC= Normative specific fuel oil consumption, in ml/ kWh
LPSFi= Weighted average landed price of secondary fuel in Rs/ ml during the month

106. The petitioner shall compute and claim the Energy Charges on month to month basis from the beneficiaries based on the formulae given under Regulation 30(6)(a) of the 2014 Tariff Regulations read with Commission's order dated 25.1.2016 in Petition No. 283/GT/2014 in respect of tariff of Kahalgaon STPS (NTPC) for the period 2014-19.

107. The Commission vide order dated 19.2.2016 in Petition No. 33/MP/2014 (TPDDL V NTPC & ors) had directed NTPC to introduce helpdesk to attend to the queries of the beneficiaries with regard to the Energy Charges. Accordingly, contentious issues if any,

which arise regarding the Energy Charges, should be sorted out by the petitioner with the beneficiaries at the Senior Management level.

Application Fee and Publication Expenses

108. The petitioner has sought reimbursement of filing fee and also the expenses incurred towards publication of notices for application of tariff for the period 2016-19. The petitioner has deposited the total filing fees of ₹1097000/- for the year 2016-17 and ₹1026000/- for the year 2017-18 in respect of Unit-I in terms of the provisions of the Central Electricity Regulatory Commission (Payment of Fees) Regulations, 2012. Accordingly, in terms of Regulation 52 of the 2014 Tariff Regulations and in line with the decision in Commission's order dated 5.1.2016 in Petition No. 232/GT/2014, we direct that the petitioner shall be entitled to recover *pro rata*, the filing fees and the expenses incurred on publication of notices for the period 2016-18 directly from the respondents on submission of documentary proof. The filing fees for the year 2018-19 shall be recovered *pro rata* after deposit of the same and production of documentary proof.

109. The annual fixed charges approved for the period 2016-19 as above are subject to truing-up in terms of Regulation 8 of the 2014 Tariff Regulations.

110. Petition No. 196/GT/2016 is disposed of in terms of the above.

Sd/-	***Sd/-***	***Sd/-***	***Sd/-***
(Dr. M.K.Iyer)	**(A. S. Bakshi)**	**(A. K. Singhal)**	**(P.K. Pujari)**
Member	**Member**	**Member**	**Chairperson**