

**CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI**

Petition No. 248/MP/2018

Coram:

**Shri P.K. Pujari, Chairperson
Dr. M. K. Iyer, Member
Shri I.S.Jha, Member**

Date of Order: 24th July, 2019

In the matter of

Petition for approval of Renovation and Modernization of 105 MW Loktak Power Station in the State of Manipur

And

In the matter of

NHPC Limited
NHPC Office Complex, Sector-33,
Faridabad-121003, Haryana

.....Petitioner

Vs

1. Assam power Distribution Company Limited
4th Floor, Bijulee Bhawan, Paltan Bazar,
Guwahati- 781001

2. Department of Power,
Govt. of Arunachal Pradesh,
Vidyut Bhawan,
Itanagar- 799111

3. Department of Power,
Govt. of Mizoram,
Aizawal- 796001

4. Tripura State Electricity Corporation Ltd.
Bidyut Bhawan, North Banamalipur,
Agartala- 799001

5. Meghalaya Energy Corporation Ltd.
Lum Jinshai, Short round Road,
Shillong- 597001

6. Department of Power,
Government of Manipur,
Keishampat, Imphal- 795001



7. Department of Power,
Government of Nagaland, Kohima-797001

8. Central Electricity Authority
Sewa Bhawan, R.K.Puram,
New Delhi-110066

.....Respondents

Parties present:

Shri Piyush Kumar, NHPC
Shri A.K.Pandey, NHPC
Shri Dhanush C.K, NHPC
Shri V.N.Tripathi, NHPC
Shri K.Goswami, APDCL
Shri I.Tahbildar, APDCL

ORDER

The Petitioner, NHPC Limited has filed the present petition seeking the following reliefs:

- (a) *In-principle approval for Renovation and Modernization (R&M) and life extension proposal of Loktak Power Station at the total cost of ₹273.59 crore (September, 2017 PL);*
- (b) *Allow application of composite tariff of ₹3.85/unit during R&M period of the project;*
- (c) *To allow increased design energy of 562.73 MU against the existing design energy of 448 MU; and*
- (d) *Pass such other and further order/ orders as are deemed fit and proper in the facts and circumstances of the case.”*

Background

2. The Petitioner has set up a 105 MW (3 x 35 MW) Loktak Hydro Power Station (the generating station) in the State of Manipur, which was declared under commercial operation on 1.6.1983. The power generated from the project is being supplied to the various beneficiaries i.e. the Respondents herein in North Eastern Region in terms of the Power Purchase Agreement entered into between the Petitioner and the beneficiaries.



3. The tariff of the generating station for the period from 1.4.2014 to 31.3.2019 was approved by the Commission vide order dated 18.9.2015 in Petition No. 228/GT/2014.

4. Petition No. 99/MP/2016 was filed by the Petitioner seeking approval of R & M proposal in respect of the generating station and the Commission vide its order dated 2.5.2017 disposed of the same as under:

“8. We have considered the submissions of the Petitioner and CEA. Since petition is pending for last one year, and DPR and capital cost are still to be vetted by CEA, no purpose will be served to keep the petition pending. Accordingly, the Petitioner is granted liberty to approach the Commission after vetting of DPR and capital cost by CEA, in accordance with law.”

5. CEA in coordination with Central Water Commission (CWC) had examined the various chapters of DPR and has concurred the Power Potential Study chapter of DPR and vetted the revised annual design energy of the generating station as 562.73 MU and had intimated the same to the Petitioner vide its letter dated 24.11.2016. Thereafter, CEA had assessed the cost of E&M works, HM & civil works and submitted its final report on DPR examination to the Petitioner vide its letter dated 6.4.2018. The final cost (excluding IDC & FC) assessed by CEA for R&M of the generating station is ₹236.07 crore at September, 2017 price level. In this background and based on the liberty granted by the Commission in order dated 2.5.2017, the Petitioner has filed this petition with the prayers as in para 1 above.

6. Regulation 15(1) of the 2014 Tariff Regulations provides as under:

“15 Renovation and Modernisation: (1) The generating company or the transmission licensee, as the case may be, for meeting the expenditure on renovation and modernization (R&M) for the purpose of extension of life beyond the originally recognised useful life for the purpose of tariff of the generating station or a unit thereof or the transmission system or an element thereof, shall make an application before the Commission for approval of the proposal with a Detailed Project Report giving complete scope, justification, cost-benefit analysis, estimated life extension from a reference date, financial package, phasing of expenditure, schedule of completion, reference price level, estimated completion cost including foreign exchange component, if any, and any other information considered to be relevant by the generating company or the transmission licensee.”



Submissions by the Petitioner

7. The Petitioner has submitted that since the useful life of the generating station (35 years) is being completed on 31.5.2018, the proposal for R&M is submitted to the Commission in terms of the above regulations.

8. The highlights of the R&M proposal as submitted by the Petitioner are as under:

(A) Need for Renovation and Modernization: There is a need to undertake R&M of the generating station for the following reasons:

- (i) Life extension of power plant for further useful life;
- (ii) The Loktak Power plant equipment is going to complete its useful life in June 2018 as per the norms defined in the Regulations notified by the Commission;
- (iii) Ageing and fatigue and also the de-rating of the components due to continuous running;
- (iv) Improvement of generator and Step-Up Transformers efficiency through reduction in iron/ copper/ auxiliary losses by adopting latest technological advancements in design and material;
- (v) Technological obsolescence of major components specially so about Stator which use class “F” insulation instead of Class “B” insulation used in erstwhile generators existing in Loktak Power station;
- (vi) Generator improvement in mechanical properties of materials due to advancement of material technology;
- (vii) Integrated Control, Monitoring & Protection system needed for running modern power plant; and
- (viii) Compliance with norms like CEA Technical Standard 2010, CERC Regulation 2014, Fire protection system etc.

(B) Some major problems/ damages of civil structure encountered during the operation of the generating station are as under:

- (i) Erosion in Barrage & scoring in downstream area.
- (ii) Linking of Loktak & Imphal River through channels.
- (iii) Deterioration of Intake structure at Cut & cover section.
- (iv) Slope stability problems in bypass tunnel area & penstock area.
- (v) Deterioration of various floors of Power House.



(C) Detailed Project Report for carrying out R&M of the project for its life extension: The highlights of proposal are as under:

- (i) The focus of R&M proposal is towards activities which are essential for efficient and sustained performance of the generating station and have direct impact on generation and machine availability including State of the art equipment being used in the latest power stations.
- (ii) The total work at project site would be executed in a phased manner covering four financial years and would be completed during the year 2024. The R&M of power station and generation of power will be concurrent activities, except for a small period of six months when the entire power station will be under complete shutdown (December, 2021 to May, 2022).
- (iii) The expected life extension of the power station has been considered as 25 years after completion of R&M works i.e. from financial year 2024-25 onwards.
- (iv) The Design Energy of the Power station after completion of R&M works would be 562.73 MU against the existing Design Energy of 448 MU as vetted by CEA.
- (v) As per DPR, the estimated cost of R&M works including IDC & FC of ₹31.80 crore is ₹267.87 crore. However, in the instant petition the IDC & FC charges has been revised from ₹31.80 crore (at Sep 2017 price level) to ₹37.52 crore due to revision in interest rate from 8 % to 9.5 %.

(D) Scope of R&M and justification: The complete scope of R&M works along with justification for replacement/refurbishment of each work has been deliberated under various sections of DPR (Volume-I) and the same has been summarized as under:

- (i) Repair/reconditioning of civil structures at Ithai Barrage (Erosion damage on the surface of piers, abutments, gate grooves & other locations), replacement of bamboo trash racks, renovation/ strengthening of off take-intake structure, Repairs at Head Race Tunnel (Zero Gate Shaft and Bypass area), Minor repairs at Power House Complex (Surge Shaft, pipe tunnel and valve house, penstocks, draft tube and PRV piers etc.) & other Infrastructure works.
- (ii) R&M of Hydro-mechanical equipment at Ithai-Barrage complex (Spillway Crest vertical gates & rope drum hoists and barrage spillway stoplogs & gantry crane), Power channel/ Bye-pass area (Trash rack panels, emergency gate and rope drum hoist, intake Service gate & rope drum Hoist), Adit Inspection Gate, Penstocks and Power House Complex (Draft tube gates, PRV gates, pressure relief valve gates etc.)
- (iii) R&M of power plant for electro-mechanical equipment includes replacement and refurbishment of all the major equipment i.e., turbine & accessories, digital governing system & accessories, main inlet valve & accessories, butterfly valves & accessories, generator & its components, static excitation system, Bus duct &



cabling, GSU Transformer, Switchyard, DC system, control and monitoring system, protection system, cabling system, switchgear, DG set, auxiliary transformer, illumination, Public address and Communication system, PLCC, EOT crane, cooling water system, drainage & dewatering system, HVAC, Grounding System, Compressed Air System, fire protection system, Security and Surveillance system etc.

(E) The estimated Completion cost of R&M works is ₹300.32 crore (including IDC and FC amounting to ₹37.52 crore) at September, 2017 price level as detailed under:

(₹ in crore)		
Sl.No	Particulars	Cost (September, 2017 PL)
1.	Cost of E&M works vetted by CEA	124.38
2.	Cost of HM & Civil works vetted by CEA	111.69
3.	Total Hard Cost approved by CEA (1+2)	236.07
4.	IDC & FC	37.52*
5.	Cost of R&M works including IDC & FC (3+4)	273.59
6.	Residual value of Loktak Power Station (i.e. admitted capital cost - accumulated depreciation as on 31.5.2018) as per Commission's order dated 18.9.2015	26.73
7.	Capital cost for post R&M tariff (5+6)	300.32

*As per DPR, IDC & FC charge is Rs. 31.80 crore. However, in the instant petition the IDC & FC charges has been revised from Rs. 31.80 crore (at Sep 2017 price level) to Rs. 37.52 crore due to revision in interest rate from 8 % to 9.5 %.

(F) Cost Benefit Analysis

(i) As per Chapter 7 (Renovation and Modernisation and Uprating of Hydro Power Stations) of "Best practices in HE Power Generation" published by CEA, the R&M of hydro power plants is a cost effective way for capacity addition. It is comparatively easier than constructing new projects and can yield results in about three to four years. Clause 7.1 is as follows:

"7.1 - Renovation & Modernization (R&M) of old plants is considered to be the best option to bridge the wide gap between demand and supply of power as R&M programmes are cost effective having much lower gestation period compared to setting up of new plants."

Renovation, modernization and uprating of hydro generating units (RM&U) which have outlived their normative operating life and the relatively new machines with generic problems are recognised to yield considerable additional benefits of energy at minimum cost. RM&U programmes can be expected to yield benefits of energy at minimum cost. RM&U programmes can be expected to yield benefits in about 3 to 4 years as against installation period for new hydro generating capacity of 6 to 7 years.

RM&U programmes may be taken up timely to prevent deterioration in operation of generating units which may lead to their premature retiring. By undertaking timely RM&U & Life extension programme, the generating plant can be made to operate for another extended period of 20 to 25 years with improved reliability and availability.



(ii) The per MW cost of R&M works of Loktak Power Station is about ₹2.60 crore only against ₹10 crore/MW for a new hydroelectric power plant of a similar size. The cost benefit analysis for conducting R&M of the Loktak Power Station is attached in detail with Chapter-8 of the enclosed DPR (Volume-II).

(iii) For a new hydro project of similar capacity, if we consider the capital cost of ₹10 crore/MW & design energy of 562.73 MUs, the levelled tariff works out to ₹4.66/unit against the first year tariff of ₹3.38/unit of Loktak Power Station after completion of R&M works. Further, ₹10 crore/MW taken for new Hydro power station in the State of Manipur for the purpose of comparison is on lower side as compared to a proposed 66 MW Loktak Downstream HE Project in the vicinity of Loktak Power Station which has a similar degree of difficulties and logistics. The estimated project cost of Loktak Downstream HE Project as per TEC is ₹1352.77 crore at Feb 2015 PL, which comes out to ₹20.50 crore/MW (approx).

(G) Estimated life extension from a reference date: The life of the generating station is estimated to be extended by another 25 years after completion of R&M works i.e. from 1st June, 2024 as per Section 1.5.3 of the DPR. This is also in line with the guidelines of CEA.

(H) Schedule of completion: The schedule for completion of R&M works as per DPR submitted earlier to CEA by the Petitioner is as follows:

(i) Considering the Engineering & Manufacturing cycle, the erection work at site is proposed to commence in 2019-20 coinciding with lean discharge season, and likely to be completed during the year 2022.

(ii) The unit-wise dismantling/ installation is being proposed keeping other two units remaining in operation, except for a period of 6 months for which complete shutdown of the power house is required for undertaking the work of common auxiliary systems of power house as well as other works related to water conductor systems of power house and HM works.

(iii) The major milestones of the R&M activity is as follows:-

Award of Works: January, 2017

Dismantling, Erection & Synchronisation:

Unit-I: 01 July, 2020 to 30th April, 2021

Unit-II: 01 May, 2021 to 30th November, 2021

Unit-III: 01 December, 2021 to 30th June, 2022

(iv) However, the above timeline has undergone change as the start year of R&M has been indicated as 2020 and the end year has been indicated as 2024 in the petition.



(v) Accordingly, the major milestones as per revised DPR is as follows:

Dismantling, Erection & Synchronisation:

Unit-I: June, 2022 to March, 2023

Unit-II: April, 2023 to October, 2023

Unit-III: November, 2023 to May, 2024

(I) Review of Design Energy on account of hydrology

(i) The existing Design Energy for the generating station is 448 MU. Loktak Power Station utilizes the water from Loktak Lake, the level of which is maintained by Ithai Barrage on Manipur river.

(ii) The average 10-daily water availability series is developed on the basis of water utilized by the machine for power generation and the water released from the spillway of Ithai Barrage for the period from January, 1991 to December, 2014.

(iii) The power potential study in the 90% dependable year (2006-07) is enclosed in Chapter 2 of DPR, Vol. 1. For an installed capacity of 105 MW, with 95% machine availability, the Design Energy works out to 562.73 MU at net head of 277.60 m, considering overall efficiency of 92% (Turbine efficiency 94% and Generator efficiency 98%).

(J) Consideration during R&M period

(i) As per the revised DPR, the generating station would be under Renovation from June, 2020 to May, 2024 in a phased manner. During this period, the generating station would be under complete or partial shutdown for repair of civil structure and water conductor system and to carry out all HM and E&M works related to R&M.

(ii) The Petitioner proposes to implement R&M activity concurrently with generation to the extent possible as per schedule of R&M activities, except for a small period of six months when the entire power station will be under complete shutdown.

(iii) Based on the annual fixed charges approved by the Commission for 2018-19, the composite tariff of generating station works out to ₹3.85/unit. As the plant availability & generation beyond the period 2014-19 cannot be guaranteed due to R&M works, the Petitioner intends to raise energy bills to the existing beneficiaries based on the approved composite tariff of the year 2018-19 during the tariff period 2019-24.

(iv) The Petitioner will submit tariff petition after completion of R&M works for the period 2024-29. In view of this, Petitioner has requested the Commission to allow composite tariff of ₹3.85/ unit during the R&M period.

(v) **O&M expenses for post R&M tariff:** The tariff proposal in DPR for projections for first year tariff is ₹3.38/unit and the levelised tariff is ₹4.78/unit. The above calculation is based on O&M expenses for 2015-16 as approved by the Commission with the escalation rate of 6.64% for deriving first year O&M expenses post R&M period. This methodology has been adopted as Loktak Power Station is an existing project and the Petitioner is doing R&M works only. Therefore the R&M cost of ₹2.60 crore/MW will not reflect the actual capital cost of the project and calculation of O&M as per Regulation 29(3)(d) of the 2014 Tariff Regulations (i.e. 4% of Capital cost excluding cost of R&R works) will be highly unreasonable and hence this method has not been adopted in the tariff calculations.



(vi) Thus, the Petitioner has requested the Commission to consider the renovated power station as an existing power station for the purpose of allowing O&M expenses post R&M period.

(vii) The Commission vide its order dated 30.11.2016 in Petition No. 99/MP/2016, the earlier submitted petition for approval R&M of Loktak Power Station had directed to submit certificate stating that additional capitalization claimed during the periods 2009-14 & 2014-19 are not included under the scope of R&M works to be carried during the period 2020-24. This requirement of the Commission has been fulfilled by the Petitioner vide additional submissions dated 16.12.2016.

(viii) The Board of Directors of NHPC in its meeting No. 391 dated 10.2.2016 had approved DPR for carrying out R&M of the generating station for its life extension.

9. After examining the DPR, the CEA, in consultation with the CWC has vetted the cost of R&M in its report dated 6.4.2018 as under:

a) The cost of E&M works for R&M at September 2017 price level is as under:

Description	Submitted by Petitioner	Vetted by CEA
Generating Plant and equipment	94.61	94.61
Substation Equipment and Auxiliary Equipment and Services of Switchyard	5.64	5.64
Taxes and duties	18.31	18.69
Overheads	12.21	7.24
Total (E&M works)	130.77	124.38

b) The cost of Civil & HM works for R&M at September 2017 price level is as under:

Description	Submitted by Petitioner	Vetted by CEA
Total Direct Charges	111.32	111.20
Total Indirect Charges	0.50	0.49
Total (HM & Civil Works)	111.82	111.69

10. Accordingly, the total cost of R&M works at September 2017 price level as vetted by CEA is as under:

Description	Vetted by CEA
E&M Works	124.38
HM & Civil Works	111.69
Total	236.07



11. The Petition was admitted on 11.12.2018 and the Commission issued notice to the Respondents with direction to complete pleadings. Reply has been filed by the Respondent No. 1 APDCL and the Petitioner has filed its rejoinder to the said reply.

Reply of Respondent, APDCL

12. The Respondent APDCL vide its affidavit dated 27.12.2018 has submitted that though the CEA is stated to have assessed the cost of E&M works, HM & civil works amounting to ₹236.07 crore (excluding IDC & FC) and submitted its final report on DPR vide letter dated 6.4.2018, CEA in another letter dated 12.7.2016 had opined that the Petitioner has proposed replacement of majority of E&M equipment like Turbine Runners, Excitation system, Governors, SF₆ Circular breakers, Flood dewatering pumps etc. under this proposal which were replaced earlier during 2008-13. The Respondent has further submitted that CEA has opined that useful life of hydro power plant of 35 years is only on commercial aspect particularly on tariff components and therefore the Commission may examine the claims of the Petitioner with prudence check so that items necessary for proposed R&M works are ensured and no double claim made. The respondent has stated that CEA has suggested that the extend life of the plant may be considered as 35 years instead of the proposed 20-25 years and hence the Commission may look into the suggestion of CEA and decide the same. As regards Design Energy, the Respondent has stated that the revised design energy vetted by the CEA is yet to be demonstrated and availed practically.

Additional submissions of the Petitioner

13. The Petitioner vide its affidavit dated 29.1.2019 has clarified that during the process of approval of DPR, CEA had raised certain queries vide letter dated 12.7.2016 which were suitably replied by the Petitioner vide its letter dated



1.9.2018 and while approving DPR, the life and depreciated value of such equipment have been suitably taken care of in the DPR cost. The Petitioner has submitted that as per Regulation 3(67)(d) of the 2014 tariff Regulations, the useful life of hydro projects is 35 years only, whereas the estimated life of the generating station after completion of R&M as per CEA guidelines is 25 years. The Petitioner has added that in spite of minor renovation of the Project, it needs major R&M activity including repair works in its civil structure and power tunnel for extension of life of the Project by another 25 years. As regards Design Energy, the Petitioner has clarified that based on discharge in last 35 years, the design energy has been reviewed as 562.73 MU on the basis of water availability series for the period January, 1991 to December, 2014. The Petitioner has stated that considering the generated energy in the generating station during the period 2013-18, the increased design energy stands demonstrated and the same is based on 90% dependable year with 95% machine availability. Accordingly, the Petitioner has submitted that in-principle approval of R&M and life extension of the generating station may be allowed as prayed for in the Petition.

14. During the hearing on 27.2.2019, the representative of the Petitioner reiterated that the R&M work of the power station and generation will be concurrent activities, except for a period of six months (December 2021 to May, 2022) when the whole station will be under shut down. The representative also submitted that the expected life extension of the generating station has been considered as 25 years from 2024-25 after completion of R&M works. The representative of the Respondent APDCL while stating that it has no objection to the R&M works being allowed on prudence check has prayed that the Commission may consider the life extension of the Project as 35 years instead of 25 years.



Issues for consideration

15. Based on the submissions of the parties and the documents available on record, the issues which emerge for consideration are examined hereunder:

Issue No. (A): Capital cost and Increase in IDC & FC Charges

16. The Petitioner has submitted that CEA has approved the hard cost of ₹236.07 crore at September 2017 price level. The Petitioner has further submitted that IDC & FC amounting to ₹31.80 crore in the DPR and submitted to the CEA & CWC, is at an interest rate of 8% which was prevalent in September 2017. It has stated that the rate of interest has been revised from 8% to 9.5% and hence the revised IDC & FC for R&M works out to be ₹37.52 crore. Accordingly, the Petitioner has submitted that the revised estimated cost of R&M works is ₹273.59 crore (236.07 +37.52) including IDC & FC.

Analysis & decision

17. The submissions have been considered. It is observed that the requirement for R&M of generating plants have been stressed by the CEA, the Ministry of Power, GOI and in the Tariff Policy prescribed by the Central Government from time to time. CEA has considered the "Renovation and Modernization of Old Power Plants" as one of the best options to bridge the gap between demand and supply of power. It has also been stressed that the hydro plants which have completed their useful life shall undertake R&M for extending the life of the hydro plants, specially in view of the fact that newer capacity additions in hydro sector has slowed down in spite of various measures taken by MOP, GOI and this Commission to incentivize the hydro power plants. The Petitioner has also placed on record the DPR which provide the complete scope, justification, cost-benefit analysis, estimated life extension from a reference date, financial package, phasing of expenditure, schedule of completion and reference price level etc. In this background and



considering the fact that CEA, after detailed analysis of the DPR has approved the hard cost of ₹236.07 crore at September, 2017 price level for R&M of the generating station, we are inclined to approve the same, subject to revision based on prudence check of the actual expenditure incurred by the Petitioner. The Petitioner is directed to file petition for determination of tariff of the generating station post R&M based on the actual expenses incurred. The IDC and FC charges incurred by the Petitioner shall be governed by the provisions of the regulations applicable during the relevant period. The Petitioner is also directed to submit bank documents in respect of interest rates in support of the said claim.

Issue No. (B): Design Energy (DE)

18. As regards DE, the Respondent has pointed out that the revised DE of 562.73 MU as vetted by CEA against the existing DE of 448 MU has not been demonstrated and availed practically. Per contra, the Petitioner has clarified that based on the discharge in last 35 years, the DE of the station has been revised to 562.73 MU on the basis of water availability for the period from January, 1991 to December, 2014 which has been vetted by CEA. In this regard, the Petitioner has furnished the generated energy of the station during the period 2013-18 as under:

Years	Generated energy (in MU)
2013-14	640
2014-15	372 (less generation due to less inflow)
2015-16	537
2016-17	741
2017-18	838

Accordingly, the Petitioner has stated that the increased DE stands demonstrated in the project and the same is based on 90% dependable year with 95% machine availability.



Analysis & decision

19. The matter has been considered. It is noticed that CEA in consultation with CWC has revised the DE of the generating station to 562.73 MU from 448 MU. The relevant portion of the CEA report dated 24.11.2016 is extracted below:

“Examination of DPR Proposal”

2.2 Installed Capacity and Design Energy

2.2.1 With regard to the Installed Capacity and Design Energy of project, the studies have been carried out by NHPC taking into account the following:

(i) The observed 10-daily Hydrological flow data for Power House release and Ithai Barrage spill data for the period 1991 to 2014 duly vetted & approved by CWC vide their letter no. 4/424/2015-HYD (NE)/460 dated 02.12.2015.

(ii) Net Head of 277.6m based on Head Loss of 31.34m is vetted & approved by CWC vide their letter no. 22/1/2016-HCD (NW&S)/1581-82 dated 28.10.2016.

(iii) Efficiency of the generating units has been considered as 94% for Turbine & 98% for Generator in post R&M scenario.

2.2.2 In view of above, design energy benefits for the above mentioned installed capacity of 105 MW have been worked out by NHPC as 562.73 MU, which are considered to be in order.

2.2.3 Further, NHPC is advised to conduct a model study in respect of the losses in water conductor system in the post renovation scenario to take into account any improvement in the lining etc. of the water conductor system and the design energy from the project would be firmed up based on the same as well as the efficiency of the TG units in the post renovation scenario.”

20. Considering the fact that the DE of the generating station has been revised by CEA to 562.73 MUs, in consultation with CWC, we approve the same. This is however subject to model study post R&M as suggested by CEA in its report dated 24.11.2016.

Issue No. (C): Recovery of Annual Fixed Charges beyond the period 2014-19

21. The Petitioner in this Petition has prayed that a composite tariff of ₹3.85/unit may be allowed for the generating station during the period of R&M, based on the annual fixed charges approved for the period 2018-19 in Commission's order dated 18.9.2015 in Petition No. 228/GT/2014. The Petitioner has submitted that it has proposed to implement R&M activity concurrently with generation to the extent possible as per schedule of R&M works. It has further submitted that during the



R&M period, the station would be under partial/complete shutdown for repair of civil structure and water conductor system and to carry out all HM and E&M works related to R&M. The Petitioner has stated that the power station will be under complete shutdown for a period of six months from December, 2021 to May, 2022. The Petitioner has further stated that since the plant availability & generation beyond the period 2014-19 cannot be guaranteed due to R&M works, it intends to raise energy bills during the period 2019-24 on the existing beneficiaries based on the tariff approved for the year 2018-19 in terms of the Commission's order dated 18.9.2015. The Petitioner has stated that petition for determination of tariff shall be filed for the period 2024-29 after completion of R&M. Accordingly the Petitioner has prayed that the Commission may allow the composite tariff of ₹3.85/unit during the R&M period.

Analysis & decision

22. The matter has been considered. The Commission vide order dated 18.09.2015 in Petition No. 228/GT/2014 had approved annual fixed charges of the generating station for the period 2014-19 as under:

	(₹ in lakh)				
	2014-15	2015-16	2016-17	2017-18	2018-19
Return on Equity	1581.42	1611.02	1622.94	1627.30	1627.30
Interest on Loan	0.00	0.00	0.00	0.00	0.00
Depreciation	918.85	945.86	956.21	952.23	156.45
Interest on Working Capital	591.95	628.76	667.14	707.53	732.27
O & M Expenses	9673.64	10316.36	11001.78	11732.74	12512.26
Annual Fixed Charges	12765.86	13502.00	14248.06	15019.81	15028.29

23. The Petitioner has prayed that the tariff for the period 2018-19 as approved above may be permitted to be recovered from the beneficiaries during the R&M period.

24. It is observed that the Commission vide order dated 3.6.2016 in Petition No. 76/MP/2015 while approving the R&M proposal in respect of Bairasiul Power



Station of the Petitioner had allowed the recovery of only two components of tariff namely, the O&M expenses and Interest on Loan during the period when the unit/station was under shut down, as provided to thermal generating stations executing R&M/LE programme. Though the above proviso relates to thermal generating stations, the same is applicable to all generating stations /units thereof or the transmission system. In terms of the said proviso, during the period of shutdown of the generating station or transmission system, as the case may be, due to R&M, the generating company or transmission licensee shall be allowed to recover part tariff which shall include only O&M expenses and interest on loan. Accordingly, we direct that the Petitioner is entitled to recover tariff comprising only of O&M and interest on loan during the R&M period. However, in line with the above decision and for the purpose of billing for the period 2019-24, the principles laid down in the para below would be applicable based on the annual fixed charges for the year 2018-19. We however direct that (i) the units shall be taken out for R&M during low inflow periods so as to minimize the loss of energy and (ii) the existing procedure of declaring capacity and energy generation based on water availability and number of units not in R&M shall be followed.

25. As regards the prayer of the Petitioner for composite tariff of ₹3.85/unit based on annual fixed charges of 2018-19 during R&M period, we are of the view that recovery of composite tariff as above during the R&M period would not be prudent as the same would disturb the procedure for recovery of annual fixed charges, based on Plant Availability Factor and energy generation achieved by the generating station. Considering the fact that R&M activity is implemented concurrently with generation, the recovery of annual fixed charges by the Petitioner shall be governed by the following principles:



(i) The annual fixed charges of 2018-19 is permitted to be provisionally recovered for the period 2019-24 for the number of units in operation and the number of units in shutdown due to R&M as under:

(a) When one unit out of three units is under R&M, $2/3^{\text{rd}}$ of the annual fixed charges for the year 2018-19 i.e. ₹10018.86 lakh ($2/3 \times 15028.29$) is allowed to be recovered along with $1/3^{\text{rd}}$ of O&M component and Interest on loan i.e. ₹4170.75 lakh [$1/3 \times (12512.26 + 0)$]. Similarly, when two units are under R&M, $1/3^{\text{rd}}$ of the annual fixed charges for the year 2018-19 i.e. ₹5009.43 lakh ($1/3 \times 15028.29$) is allowed to be recovered along with $2/3^{\text{rd}}$ of O&M expenses and Interest on loan i.e. ₹8341.51 lakh [$2/3 \times (12512.26 + 0)$].

(b) When the generating station is under complete shutdown, only O&M and Interest on loan i.e. ₹12512.26 lakh would be allowed to be recovered.

(ii) During the R&M period, no incentive on capacity declaration of available units above NAPAF as well as secondary energy benefits shall be allowed to the generator.

(iii) The provisional tariff as stated in serial no. (i) above is subject to revision, based on the actual expenditure incurred by the Petitioner, on year to year basis, during the period 2019-24, after completion of R&M.

Issue No. (D): O&M expenses post R&M period

26. The Petitioner has submitted tariff proposal in DPR for projection of first year tariff (₹3.38/unit) and levelled tariff (₹4.78/unit). The Petitioner has stated that the calculation for tariff is based on O&M expenses for the year 2015-16 as approved by the Commission with escalation rate of 6.64% for computing O&M expenses post R&M period. The Petitioner has clarified that this methodology has been used as Loktak is an existing project and is undertaking R&M works only. The Petitioner has further stated that since the R&M cost of ₹2.60 crore/MW does not reflect the actual cost of the project and the O&M expenses permitted as per Regulation 29(3)(d) of the 2014 Tariff Regulations is highly unreasonable. Accordingly, the Petitioner has prayed that the Commission may consider the renovated power station as an existing station for the period post R&M.



Analysis & decision

27. The expected date of completion of R&M works of the generating station is May, 2024 and the Petitioner has been directed to file petition for determination of tariff after completion of R&M work. Accordingly, the O&M expenses to be allowed post R&M shall be based on the provisions of the tariff regulations applicable during the relevant period (i.e. tariff period 2024-29).

Issue No. 5: Prudence check of Assets/works for R&M

28. The Respondent APDCL has submitted that CEA has assessed the cost of E&M works, HM & civil works as ₹236.07 crore (excluding IDC & FC) and submitted its final report on DPR vide letter dated 6.4.2018. However, it has submitted that CEA vide letter dated 12.7.2016 has opined that the Petitioner has proposed replacement of majority of E&M equipment's like Turbine Runners, Excitation system, Governors, SF₆ Circuit Breakers, Flood dewatering Pumps etc. under this proposal which were replaced earlier during 2008-13. It has further submitted that CEA had specifically mentioned that the Petitioner has said proposed replacements of these E&M equipment under R&M citing useful life of the project being 35 years as per regulations of the Commission, for undertaking such works. The Respondent has also submitted that CEA had opined that the useful life of hydro power plant of 35 years is only on commercial aspect particularly on tariff components. It has submitted that the actual remaining technically useful life may be more than that which varies on case to case basis depending on operating conditions of generating unit, actual running period, design margin & practices considered by the manufacturer of the unit, quality assurance/ practice followed at manufacturing and erection site, O&M practices followed by the project authority etc. Moreover, the mechanical component of hydro plants are designed with high factor of safety ensuring enhanced life cycle of hydro plants.



29. The Respondent has stated that based on the submissions of the Petitioner, the Commission had allowed vide its order dated 14.6.2011 in Petition No. 108/2010 inter alia certain expenditure on R&M needed to increase efficiency of the plant and the same is submitted below for the purpose of reference and prudence check:

(₹ in lakh)				
2009-10	2010-11	2011-12	2012-13	2013-14
867.13	963.96	924.76	237.50	5.50

30. The Respondent has further submitted that CEA had pointed out that the planned and forced outages of the generating station are comparatively less with respect to all India average. It has stated that the physical or actual life of the plant may go well beyond 35 years, depending on the quality of operation and timely maintenance of the plant & equipment. The Respondent has added that such generating plant becomes capable of operating beyond the economic life of 35 years as the hydro generating plants continuously get capital infusion under the additional capitalization year after year. Accordingly, the Respondent has submitted that the R&M claim of the Petitioner may be examined and allowed on prudence check.

Analysis and Decision

31. The Commission in Petition No. 99/MP/2016 pertaining to approval of R&M of this generating station had directed the Petitioner to furnish certificate confirming that the additional capitalization claimed during the periods 2009-14 & 2014-19 have not been included under R&M works. In response to this, the Petitioner vide affidavit dated 16.12.2016 had certified that the additional capital expenditure claimed in respect of works/assets executed during 2009-14 and those which have been projected to be taken up during the period 2014-19 (in Petition Nos. 155/GT/2013 & 228/GT/2014) have not been included under the proposed R&M works of this generating station. We therefore direct the Petitioner to furnish complete details of



the assets/works including expenditure claimed and allowed during the periods 2009-14 & 2014-19 with proper justifications/reasons for the R&M expenditure, if any, on the same assets in the petition to be filed for claiming R&M expenditure for the period 2019-24.

Issue No. 6: Extension of life beyond 25 years post R&M

32. The Respondent APDCL has highlighted Para 4 of CEA letter dated 12.07.2018 regarding extension of life of hydro plants beyond 25 years after R&M. It has pointed out to clauses 1.2 & 8.1 of DPR citing CEA guidelines on the “Best Practices and Benchmarking for Hydro” under Chapter 7 as under:

“by undertaking RMU&LE timely, the generating plant can be made to operate for another extended period of 20-25 years with improved reliability and availability.”

33. The Respondent has referred to the letter of CEA dated 12.7.2016 which states as under:

“The above cited guideline is a general guideline for R&M works without distinguishing the type of works undertaken under it. However, as observed from DPR, NHPC has proposed replacement of majority of E&M equipments along with some civil works (i.e. all necessary repair works on major civil infrastructure and substantial new building works for the housing colony) and have stated that it is comparable to a new power plant.

In view of above and the CEA regulations providing useful life for civil works & E&M works as 100 years and 35 years respectively, the extended life of plant may be considered as 35 years instead of currently proposed 20-25 years”

34. Per contra, the Petitioner has stated that it has replied to the observations raised by CEA in its letter dated 12.7.2016 and subsequently CEA has cleared the DPR for useful life of 25 years of the generating station.

Analysis and Decision

35. Keeping in view that CEA had cleared the DPR for useful life of 25 years of the generating station, we are inclined to allow the life extension of the generating station by 25 years.



Recommendations

36. Based on the above discussions, the prayer of the Petitioner for in-principle approval of R&M of the generating station based on the hard cost of ₹236.07 crore with IDC & FC of ₹37.52 crore is allowed along with life extension of the generating station by 25 years. The DE of the generating station post R&M shall be 562.73 MUs as against DE of 448 MUs. Pursuant to the completion of R&M, the Petitioner shall file tariff petition based on the actual expenditure incurred for the same. During the period of unit/ station shut down for the purpose of carrying out R&M activities, the Petitioner shall maintain two separate records as under and shall submit the same along with the tariff petition for approval of cost post R&M of the generating station:

(i) IEDC including man power cost, Construction power cost, Water charges etc. booked under R&M expenses; and

(ii) Normal O&M expenses of the generating station (not booked under R&M expenses) which were unavoidable even when the unit/s/station is under shut down.

37. Petition No. 248/MP/2018 is disposed of in terms of above.

Sd/-
(I.S.Jha)
Member

Sd/-
(Dr.M.K.Iyer)
Member

Sd/-
(P.K.Pujari)
Chairperson

