

**CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI**

Petition No. 76/MP/2015

Coram:

Shri Gireesh B.Pradhan, Chairperson

Shri A.K.Singhal, Member

Shri A.S.Bakshi, Member

Dr. M.K.Iyer, Member

Date of Hearing: 23.2.2016

Date of order: 03.6.2016

In the matter of

Petition under Regulation 15 (1) of the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2014 for approval of Renovation and Modernization proposal in respect of Bairasiul Power Station.

And

In the matter of

NHPC Limited
NHPC Office Complex,
Sector-33,
Faridabad-121 003 , Haryana

....Petitioner

Vs

1. The Chairman, Punjab State Power Corporation Limited
The Mall, Near Kali Badi Mandir,
Patiala-147 001, Punjab

2. The Chairman, Haryana Power Purchase Center
Shakti Bhawan, Sector-6,
Panchkula-134 109, Haryana.

3. CEO, BSES Rajdhani Power Limited
BSES, Bhawan, Nehru Place,
New Delhi-110 019.

4. CEO, BSES Yamuna Power Limited
Shakti Kiran Building,
Karkardooma, Delhi-110 072.

5. Chief Operating Officer
Tata Power Delhi Distribution Limited
33 kV Sub-station Building
Hudson Lane, Kingsway Camp,



New Delhi 110 009.
6. The Chairman
Himachal Pradesh State Electricity Board,
Vidyut Bhawan, Kumar House,
Shimla-171 004 , Himachal Pradesh.

.....Respondents

The following were present:

Shri A.K. Pandey, NHPC
Ms. Shubhalakshmi Gupta, NHPC

ORDER

The petitioner, NHPC Limited, has filed the present petition seeking approval of Renovation and Modernization (R & M) proposal in respect of Bairasiul Power Station under Regulation 15 (1) of the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2014.

2. The petitioner has set up a 180 MW (3X60 MW) Bairasiul Hydro Power Station (generating station) in the State of Himachal Pradesh. The generating station had been declared under commercial operation on 1.4.1982. The power generated from the generating station is being supplied to the various beneficiaries in Northern 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 17.6.2015 in Petition No. 235/GT/2014 with the following annual fixed charges:

	(Rs. in lakh)				
	2014-15	2015-16	2016-17	2017-18	2018-19
Return on Equity	1731.76	1790.25	1816.34	1821.11	1824.87
Interest on Loan	0.00	0.00	0.00	0.00	0.00



Depreciation	947.07	982.59	1036.19	80.28	86.68
Interest on Working Capital	542.07	576.15	612.02	626.43	665.38
O & M Expenses	8696.25	9274.03	9890.19	10547.30	11248.06
Annual Fixed Charges	11917.15	12623.01	13354.74	13075.12	13824.98

4. The petitioner has submitted that since the useful life of the generating station, namely 35 years is being completed on 31.3.2017, the proposal for Renovation and Modernization has been submitted to the Commission for approval as per Regulation 15 (1) of the 2014 Tariff Regulations for the purpose of further life extension of the generating station. The petitioner has highlighted its proposal with regard to R&M as under:

(a) Need for Renovation and Modernization: Although components such as dam toe repairs, spillway repair, repairs of HRT AND Diversion cum desilting tunnel, repair/modification of Bhaledh feeder tunnel, repair in Siul complex, repair/replacement of intake gates, spillway gates, draft tube gates, various hoists, etc. shall also be taken up during R&M. However, predominantly electro-mechanical equipments of the generating station are proposed to be replaced (although certain components like spiral casing, etc. is to be retained and refurbishment is envisaged in no. of components) in “Renovation & Modernization” program of the generating station. The following certain major problems/damages encountered during operation of civil and hydro-mechanical structure:

- Frequent erosion at Dam Toe
- Silting of Baira Reservoir
- Frequent Stuck up of Service Gate of Diversion Tunnel & Intake Gate of HRT
- Damages in Diversion Tunnel



- Frequent Silting of Bhaledh Trench Weir

(b) The following certain major problems/ damages encountered during operation of Electro-mechanical equipment:

- Outage of U # 2 from 6.3.1993 to 10.3.1993 for rectification of stator earth fault and one no. stator bar replaced in slot-2
- Outage of U # 2 from 14.3.1995 to 21.3.1995 for rectification of stator earth fault and one no. stator bar replaced in slot-2.
- Oozing out of bituminous compound in U # 3 in year 2000, 2004 & 2006 and in U # 2 in year 2004.
- Replacement of rotor pole coils of pole no. 10 & 11 of U # 2 during October'2012
- Replacement of pole no. 14 of U # 1 during January 2014.
- Outage of U # 2 from 12.4.2014 to 23.4.2014 for rectification of rotor earth fault and pole coils for pole no. 16 & 1 replaced.
- Outage of Unit# 2 from 23.4.2014 to 4.5.2014 for rectification of Stator earth fault and one no. stator bar replaced in slot no. 1
- Insulation failure of winding of R-phase of U#1 was observed during June 2008.
- Frequent outage (Approx 1373 Hrs since 2008-09 till Sept 2014) of machines due to high vibration and high bearing temperature

(c) Detailed Project Report (DPR) for carrying out R&M of the generating station for its life extension highlights of proposal 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 equipments being used in latest power stations.



- (ii) The total work at site would be executed in a phased manner covering four financial years and would be completed by 2020-21.
- (iii) The expected life extension of 25 years has been considered after completion of R&M works i.e. from financial year 2021-22 onwards.
- (iv) Design energy would be 740 MU against existing design energy of 779 MU due to revised hydrology data.
- (v) The estimated cost of R&M works is Rs. 360.79 crore (including IDC and FC amounting to Rs. 79.43 crore) at October 2014 price level.
- (d) Scope of R&M and justification: The complete scope of R&M works with justification for replacement/refurbishment of each work has been deliberated under various sections of DPR (volume-I) which is summarized as under:
- (i) Repair/reconditioning of civil structures at Dam complex (Dam & Plunge Pool, Spillway & drainage gallery, HRT & Diversion cum desilting tunnel), Siul complex (Siul diversion weir and desilting basin and vortex chamber), surge shaft, Bhaledh complex (weir and feeder tunnel), Power House complex (Powerhouse, butterfly valve house, switchyard and tailrace channel) and Infrastructure works.
- (ii) R&M of Hydro-mechanical equipments at Baira Dam complex (Diversion cum Desilting tunnel gate hoist, emergency gate hoist, HRT intake gate and hoist, trash rack, trash rack cleaning machine, spillway radial gates, remote control panel, spillway stoplog, lifting beam and gantry crane, etc.), Siul complex (weir



gates and hoist, weir stoplog and monorail hoist, intake gate and hoist, intake stoplog and monorail hoist, Needle stoplog in desilting basin, Silt flushing outlet valve in HRT), Power House complex (Draft tube gate, pressure relief valve gates, tailrace channel outlet gates, penstock) and Bhaledh Weir complex (intake gate & hoist, trench weir trash rack, silt removal gallery).

(iii) R&M of power plant electro-mechanical equipments (i.e. turbine and accessories, digital governing system and accessories, main inlet valve and accessories, butterfly valves & accessories, generator and its components, generator step up transformer, UAT, SST, static excitation system, Bus duct and cabling, switchyard, DC system, control, monitoring & protection system, switchgear, DG set, illumination, PLCC, EOT crane, cooling water system, drainage & dewatering system, HVAC, fire protection system, etc.

(iv) The reports with regard to In-Situ testing of structures at the generating station and thickness testing of Radial gates and penstock were studied by Department of Civil Engg., IIT Roorkee. Based on recommendations of these reports, various civil works are proposed to be carried out at the generating station.

(e) The estimated completion cost of R&M works is Rs. 360.79 crore (including IDC and FC amounting to Rs. 79.43 crore) at October 2014 price level which details are given as under:

SI. No.	Description	Amount (Rs. crore)
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A	Civil works	
1	Direct charge, I- works	
	C-works & J-power plant civil works	52.32*
	K- Buildings	16.76*
	O-Misc.	2.14
	Establishment, T&P & losses on stock	9.31
	Total Direct charges	80.53
2	Indirect charges	0.36
	Total civil works	80.89
B	Electrical works	200.47 @
	Total cost (Civil + Electrical)	281.36
	IDC & FC	79.43
	Total cost	360.79

Since, there is no foreign financing proposed for R&M activity, FERV is not applicable.

*- Includes civil works of Baira dam, Bhaledh nalla & Siul complex, PH civil works, HRT works & infra-structure works

@- Includes cost in respect of generators, turbine (with enhanced capacity of 61.22 MW with 10% overload capacity) and accessories of 3 generating units, auxiliary equipment for power station, S/S equipment & auxiliary equipment for switchyard, Hard coating of under-water parts, establishment, transportation, taxes, etc.

(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 Renovation and Modernization (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.

(ii) The cost/MW of R&M works of the generating station is about Rs. 2 crore only as against Rs. 10 crore/MW for new hydroelectric power plant of similar size. The cost benefit analysis of the generating station after the



proposed R&M work is attached in detailed with Chapter-8 of the DPR (Volume-II).

(iii) For a new hydro Project of similar capacity, if we consider the capital cost of Rs. 10 crore/MW and design energy of 740 MUs, the levellised tariff of new project comes out to Rs. 6.37/unit against the levellised tariff of **Rs. 3.96/unit** of the generating station after completion of R&M works. Therefore, R&M of the generating station is overall a cost effective proposal. The approved tariff of the generating station for the year 2013-14 is Rs.1.54 /kWh, post R&M tariff is expected to be Rs. 3.96 /kWh.

(g) Estimated life extension from a reference date: The life of the generating station is estimated to be increased by 25 years after completion of R&M works i.e. from 1.4.2021.

(h) Schedule of completion: The Schedule of completion of R&M works Units, I, II and III would be December 2017 to December 2018, January 2019 to January 2020 and February 2020 to February 2021 respectively. The dismantling/erection work of one unit is proposed to be started from December, 2017 coinciding with lean discharge season and is planned up to December, 2018.

(i) Review of Design Energy on account of hydrology:

(i) Present design energy for the generating station is 779 MUs. However, over the years, the generating station is not able to generate this energy due to hydrology restrictions as explained in Chapter 3 of the enclosed DPR (vol.-I).



- (ii) The generating station has achieved the Design Energy of 779 MUs only 9 times since 1982.
- (iii) From the year 2006-07, the generating station has never achieved the Design Energy (DE) resulting into consistent under recovery of energy charges and thereby causing short fall in recovery of Annual Fixed Cost (AFC) on account of change in hydrology in the catchment area.
- (iv) Due to revised hydrological pattern in the catchment area of the generating station, the energy generation in a 90% dependable year with 95% machine availability works out to 739.96 MUs. Accordingly, the revised Design Energy (DE) of 739.96 MUs has been considered in the proposal for Renovation & Modernization which shall be considered after completion of all R&M works i.e. from 2021-22 onwards.
- (j) Consideration during Renovation and Modernization Period:
- (i) As per DPR, the generating station would be under Renovation from 2017-18 to 2020-21 in phased manners. During this period, the generating station would 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.



(iii) During R&M period, O&M expenditure (e.g. employee cost, administrative expenses, other routine maintenance expenses etc.) shall be required to be incurred by the generating station.

(iv) In this situation i.e. during complete / partial shutdown, the generating station would not be able to recover total AFC during the year on account of reduced generation and reduced availability. This would result in under recovery of legitimate expenses which would be otherwise recovered if no R&M is undertaken.

(v) O&M expenses, as approved by the Commission should be allowed to be recovered from the beneficiaries in the corresponding year so that such essential expenses during R&M activities are not required to be capitalised in R&M cost.

(vi) In case, above (v) is not accepted by the Commission, capitalisation of such expenditure (establishment, security, administrative expenses, etc.) during R&M activities, shall be required.

(vii) The Board of Directors of NHPC in its meeting No. 379 dated 17.1.2014 approved DPR for carrying out R&M of the generating station for its life extension.

5. The matter was heard on 9.4.2015 and notices were issued to the respondents to file their replies. The petitioner was directed to implead Central Electricity Authority



as party to the petition. The petitioner during the course of hearing was directed to take the following actions and submit the documents and clarification in this regard:

(a) The cost of R&M works of Baira Siul hydro electric generating station may be got vetted from the Central Electricity Authority.

(b) The revised design energy of the generating station may be got approved from the Central Electricity Authority.

(c) Certify that additional capital expenditure claimed in respect of works/ assets executed during 2009-14 and those projected to be taken up during 2014- 19 are not included under the proposed R&M works of Baira Siul generating station.

6. The petitioner, vide its affidavit dated 21.4.2015, has submitted the information called for. CEA vide its letter no. 13/2(NHPC)/2015/HE&RM/82 dated 8.2.2016 has submitted report on DPR examination. CEA has vetted the cost of R&M works and has also approved the revised design energy.

7. The respondent, BSES Rajdhani Power Limited (BRPL) vide its affidavit dated 21.7.2015, has filed reply to the petition and the petitioner has filed its rejoinder to the reply of BRPL which have been dealt with in succeeding paragraphs.

8. We have considered the submissions of the petitioner and BRPL. The need for R&M of the generating plants has been stressed by CEA/MOP/Tariff Policy from time to time. CEA considers "Renovation and Modernization of Old Power Plants" as one of the best option to bridge the gap between demand and supply of power. The hydro plants which have completed their useful life shall go in for R&M for extending the life



of the hydro plants especially in view of the fact that newer capacity addition in hydro sector has slowed down in spite of various measures taken by Government of India, Ministry of Power and the Commission to incentivize the hydro power plants. The petitioner has placed on record the 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.

9. After examining DPR, CEA in its report dated 8.2.2016, in consultation with CWC, has observed as under:

(a)The cost of R&M works at October 2014 Price Level has been assessed as Rs. 273.06 crore as per details given below:

Description	Cost (excluding IDC and Financing Charges)at Oct'2014 Price Level (Rs. in crore)
E&M works	201.00
HM & Civil Works	72.06
Total	273.06

(b) After taking into consideration the revised hydrology of the site, CEA has approved design energy of 708.59 MU. However, CEA has advised the petitioner 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.

(c) The petitioner, after the approval of hard cost and design energy by CEA, has revised the R&M cost as under:

(Rs. in crore)

Description	Cost as per DPR	Based on hard cost vetted by CEA at October, 2014 PL
E&M works	200.47	201.00
HM & Civil Works	80.89	72.06
IDC&FC	79.43	68.35*
Total	360.79	341.41

- Proposed by the petitioner

10. The following issues are for our consideration:

Issue No. 1 : (i) Cost Benefit analysis : BRPL has submitted that the cost benefit analysis on Renovation and Modernization proposals should be carried out on the basis of the capital infused on Renovation and Modernization proposal vis-a-vis no capitalization. Therefore, the petitioner is required to furnish the benefits accrued to the beneficiaries by infusion of Rs. 360.79 crore under the Renovation and Modernization proposal vis-a-vis when no Renovation and Modernization is undertaken. The benefits accrued on account of infusion of Rs. 360.79 crore capital should be clearly brought out by the petitioner besides the increase in the economic life of the generating station by 25 years.

(ii) The petitioner is contemplating head loss in the water conducting system, decrease in the pondage availability and the restriction of total flows to 88 cumec which are likely to be disadvantageous to the electricity generation. Therefore, how the petitioner is expected to garner benefits from such capital



infusion of Rs. 360.79 crore? The petitioner has stated that the design energy on completion of R&M proposal would be 740 MUs as against the existing design energy of 779 MUs owing to the revised hydrology data. All this information creates apprehension that the capital infusion amounting Rs. 360.79 crore would ultimately result disadvantage to the beneficiaries except in-the increase of useful life of the generating station that too is academic as there is clear distinction between the economic life of the plant and the physical or actual life of the plant which is discussed in the succeeding paragraphs.

11. The petitioner has submitted that the cost benefit analysis shall be carried out on the basis of the capital infused on Renovation and Modernization proposal vis-a vis no capital expenditure. The petitioner has submitted that CEA in its report on "Best Practices in HE Power generation" has also compared the cost benefit analysis on the basis of capital infusion on R&M vis-a vis constructing a new hydroelectric project of same size. The petitioner has submitted that India being a power deficient country having peak deficit of 3.3% (Executive Summary of Power Sector for June'2015 by CEA), R&M programs of old hydro projects are essentially required for achieving ideal hydro-thermal mix in the country. By exercising one time capital investment (within a time span of 4 years) for doing major R&M works of the generating station, the beneficiaries are indirectly benefitted by way of reduced add-cap requirement during succeeding years upto the completion of its extended life. The petitioner has stated that the beneficiaries would be entitled for cheaper power throughout the extended life of the generating station. According to the petitioner, it is in the interest of both the petitioner and the beneficiaries that the R&M activities be taken up at this stage and there is no merit/logic in analyzing the cost benefit analysis of capital infusion on R&M



proposal vis-à-vis no capitalization. Accordingly, BRPL's contention that capital infusion on R&M works would result into disadvantages to the beneficiaries is absolutely wrong.

Analysis and decision:

12. We have considered the submissions of the petitioner and BRPL. In our view, the projects which have outlived their useful life should go in for R&M activities to ensure improved reliability and availability. Allowing operation of the old generating station after achieving its useful life, may hamper reliability and availability of the generating station which in turn may require the beneficiaries to arrange costly power during the prolonged outages and the old generating station may have to face in absence of timely corrective action in terms of R&M activities. In the instant case, the beneficiaries shall be availing the benefit of reliable power with peaking capability for 25 years at expected levelled tariff of around Rs 3.96/kWh which is much less than the tariff of new hydro generating stations commissioned during recent times at capital cost ranging from 6 crore/MW to 12 crore/MW. On one hand, the beneficiaries want to surrender their shares from newly commissioned generating stations and on the other hand, they are objecting to the R&M of the hydro plants which would yield reliable benefits at much lower cost with lower gestation period.

13. BRPL has contended that head losses and restriction on water flow has been considered by CEA in its report. CEA in this regard has advised NHPC 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. Therefore, the benefits corresponding to the R&M expenditure in terms of improved design energy (based on latest flow series and reduction in head losses) shall be passed on to the beneficiaries based on the model study as advised by the CEA.

Issue No. 2: Economical Life versus physical life and balance capital cost to be considered post R&M and clarity on Regulation 15 (4) of the 2014 Tariff Regulations:

14. BRPL has submitted that the life of a hydro plant is 35 years which means that it is the economic life of the plant and during the economic life, 90% of the capital invested is withdrawn by the owner in the form of depreciation. As against the economic life of the plant, there is also physical or actual life of the plant, namely (i) Economic life of the Plant-35 years-useful life, (ii) Physical or actual life of the plant can go well beyond 35 years depending on the quality of operation as well as maintenance of the plant. BRPL has submitted that the generating plant is capable of operating beyond the economic life of the generating plant as the hydro generating plants have been continuously getting capital infusion under the additional capitalization year after year. However, if the petitioner wishes to take advantage of completing the useful life of 35 years, then just after completion of the useful life, the capital base of such plant should be 10% of its capital base. Therefore, the new capital base of the generating plant on conclusion of the R&M proposal should be 10% of the original project cost base plus the capital infusion amounting Rs. 360.79 crore on account of R&M proposals as may be admitted by the Commission after prudence check.

15. BRPL has submitted that the petitioner is seeking clarification on Regulation 15(4) of the 2014 Tariff Regulations stating that the figures of depreciation recovered is



required to be deducted from the original project cost. However, the petitioner is having a figure of accumulated depreciation till date which includes depreciation on original capital cost and depreciation on additional capitalization. BRPL has stated that these two figures cannot be bifurcated. The petitioner has accordingly suggested some way out of his problems of non-bifurcation of the accumulated depreciation by re-looking and re-placing the 'original project cost' by 'admitted project cost' which is legally not acceptable. BRPL has submitted that the new capital base of the generating plant after the expiry of its useful life of 35 years should be 10% of the original project cost base plus the capital infusion amounting Rs. 360.79 crore on account of R&M proposals as may be admitted by the Commission after prudence "check year on year basis.

16. The petitioner has submitted that BRPL is trying to bifurcate the economic life and physical / actual life of the generating station without any merit. Though the petitioner is entitled for capital infusion under additional capitalization after prudence check by the Commission, R&M is a package (duration of 3-4 years) and the same cannot be implemented in a piecemeal manner due to practical difficulties. The petitioner has submitted that the burden on the beneficiaries by way of additional capitalization would be nominal after completion of R&M activities of the generating station and the cost on R&M works and subsequent additional capitalization would only be allowed after due prudence check by the Commission. With regard to BRPL contention that 90% of the capital invested is withdrawn by the owner in the form of depreciation during useful life of generating station (i.e. 35 years), the petitioner has stated that the 'capital invested' for the purpose of tariff is the total cost infused by the petitioner and admitted by the Commission including additional capitalization till the end of 35 years. The capital cost in case of Bairasiul generating station is inclusive of



cost of free hold land amounting to Rs. 148.22 lakh which is not depreciable. The petitioner has submitted that the assets capitalized during the end of the useful life of generating station cannot be depreciated fully (90%) and the depreciation during the end is being allowed by the Commission by spreading the depreciable asset over the extended life of the generating station. The Commission vide order dated 17.6.2015 in Petition No. 235/GT/2015 admitted the capital cost of the generating station as on 31.7.2017 as Rs. 20813.19 lakh. However, the cumulative depreciation allowed by the Commission as on 31.3.2017 is Rs. 17032.18 lakh only which is less than 90% of the admitted capital cost (i.e. Rs.18731.87 lakh). Therefore, the contention of BRPL that the petitioner has withdrawn 90% of capital invested during useful life by way of depreciation is not correct.

Analysis and Decision

16. We have examined the submissions of the petitioner and BRPL. The petitioner has contended that economic life of the generating station is 35 years where as actual life of the plant can go much beyond 35 years. In our view, to start with physical life of various plants are established on the basis of experience gathered worldwide with respect to supply of reliable power and thereafter, the depreciation rates are adjusted for recovery of 90% of the plant cost during the established physical life of the plant. Therefore, economical life is derived to match with the physical life of the plant. It is true that plants may operate beyond their stipulated physical life established on the basis of gathered experience. However, allowing operation of the old plant after useful life may hamper reliability and availability of the generating station which in turn may require the beneficiaries to arrange costly power during the prolonged outages for which old generating station may have to face problems in absence of timely corrective action in



terms of R&M activities. As such, carrying out the R&M after expiry of useful life is considered to be a prudent practice.

17. With regard to balance capital cost to be considered for the purpose of tariff post R&M, Regulation 15 (4) of 2014 Tariff Regulations provides as under:

“(4) Any expenditure incurred or projected to be incurred and admitted by the Commission after prudence check based on the estimates of renovation and modernization expenditure and life extension, and after deducting the accumulated depreciation already recovered from the original project cost, shall form the basis of determination of tariff.”

As per the above provisions, R&M expenditure plus original project cost reduced by accumulated depreciation recovered by the plant, shall form the basis of capital cost for the purpose of tariff post R&M. Therefore, accumulated depreciation by the end of useful life may be almost 90% of the original capital cost. However, the same may not be 90% of the admitted capital cost (which also includes ACE post cut-off date) as the assets capitalized during fag end of the useful life of generating station cannot be depreciated fully (90%) as per 2014 Tariff Regulations during the remaining period of useful life of the generating station. The petitioner has submitted that Regulation 15(4) should be amended to replace the "original project cost" with admitted capital cost (including additional capital expenditure). We find merit in the submission of the petitioner as the intent of the Regulation 15(4) is also the same i.e accumulated depreciation should be reduced from the admitted capital cost (excluding R&M expenditure) till completion of R&M. Therefore, BRPL`s view that balance part of the original capital cost should be considered as a part of capital cost post R&M gets answered suitably in terms of the 2014 Tariff Regulations. We direct the staff to process the case for amendment of the Regulations suitably.



Issue No.3 : Review of Design Energy:

18. BRPL has submitted that the petitioner has claimed revised hydrology pattern in the catchment area of Bairasiul Power Station on the basis of that the generating station has achieved the Design Energy of 779 MUs only 9 times during the last 32 years of its operation. However, it is difficult to presume that not achieving the Design Energy of 779 MU is wholly attributable to the reduction in hydrology flows and reduction could as well be owing to the frequent outages on various counts. As per CEA report on "Energywise-Performance of Central Sector (hydro)", the generating station has generated 796.67 MUs which is more than the Design Energy of 779 MUs. The actual generation available for the generating station during the first two months, namely April to May, shows the actual generation of 230.02 MU as against the last year generation for the same 219.38 MUs when the generation by the generating station was beyond the Design Energy. This clearly indicates that there is upswing in generation and there is no need for further review of Design Energy.

19. The petitioner has submitted that in DPR, the petitioner has requested for review of Design Energy (DE) based on recorded hydrology data for the period 1984-2014 and effective head loss considered in this process. The petitioner has submitted that as design energy is based on 90% dependable year, the increase in generation beyond Design Energy in few years does not negate the necessity of review of design energy on the basis of recorded discharge data. The petitioner has submitted that the matter related to review of Design Energy of the generating station has been examined by CWC/CEA and CEA vide its letter dated 25.8.2015 has approved the



revised Design Energy of 708.59 MUs against the original design energy of 779.28 MUs.

Analysis and Decision:

20. CEA in consultation with CWC has revised the design energy of the project to 708. 59 MUs. The relevant portion of the CEA `s report dated 8.2.2016 examining the installed capacity and design energy is extracted as under:

“Examination of DPR Proposal

2.2 Installed capacity and Design Energy:

2.1.1. 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 days Hydrological flow data for Baira Bhaledh and Siul rivers for the period 1984-85 to 2013 -14 duly vetting and approve by CWC vide their letter no. 1/HP/37/2009/HYD (N)/131-32 dated 9.6.2015. The discharge through Bhaledh has been restricted to 24 cumecs and the discharge through Siul has been restricted to 22.65 cumecs. Keeping in view their respective tunnel capacities.

(ii) Net head of 238.10m based on Head Loss of 41.11m (corresponding to design discharge of 83.8 cumecs) is vetted & approved by CWC vide their letter no. 06/14/2015-HCD (NW&S)/2036 dated 31.7.2015.

(iii) Efficiency of the generating units has been considered as 92% for turbine and 98% for generator in post R&M scenario.

2.2.2 It is observed that the water conductor system for Bairasiul has been designed for a discharge of 88 cumecs. Considering the revised TG efficiency of 92%, it would have been possible to uprate the existing installed capacity of 180 MW to around 196 MW. However, no uprating has been envisaged by NHPC and NHPC, vide their letter no. NHPC/O&M/BSP/01/1181 dated 2.7.2015 have proposed to retain the Installed Capacity of the project as 180 MW for which the project was originally designed mainly due to comparative reduction in flows as well as negligible incremental energy benefits even beyond 150 MW.”



Since the design energy of the project has been revised by CEA to 708.59 MUs, in consultation with CWC, we are in agreement with the same subject to model study as suggested by CEA in its report dated 2.8.2016.

Issue No.4 : Consideration during R&M Period:

21. BRPL has submitted that the petitioner has requested to allow total O&M expenses during the R&M period from 2017-18 to 2021, as approved by the Commission, to be recovered from the beneficiaries in the corresponding year during the complete or partial shutdown during R&M works. BRPL has submitted that in such an event, essential expenses during R&M activities are not required to be capitalized in the R&M cost. However, as per the DPR, the expenses on account of establishment have been incorporated in the R&M works. BRPL has submitted that the petitioner is already getting the benefit of the capital infusion amounting Rs. 360.79 crore to Bairasiul generating station and any other benefits in any kind, if allowed would amount to double benefits to the petitioner which would be unreasonable.

22. *Per contra*, the petitioner in the present petition has requested to allow recovery of full normative O&M expenses already allowed by the Commission from the beneficiaries during complete / partial shutdown of generating station for R&M works. In this regard, certain essential expenses during R&M activities can be met out of the same and need not be capitalized in the R&M cost. However, BRPL has raised objection to the same on the ground that the petitioner is getting double benefits in the form of capital infusion for R&M works and additional recovery of O&M expenses. The petitioner has submitted that it has approached the Commission for in-principle approval for capital infusion on Renovation & Modernization of Bairasiul generating



station and after approval of the Commission, the petitioner will carry out R&M activities and approach the Commission with actual cost of capitalization on completion of R&M works for determination of post R&M tariff. The petitioner has submitted that in the event of complete/ partial shutdown of generating station during R&M period, if the petitioner is allowed to recover the full normative O&M expenses already fixed by the Commission, then the establishment expenditure covered in DPR shall not be considered in the post R&M cost for the purpose of determination of tariff and the same would ultimately reduce the burden on the beneficiaries including BRPL. The petitioner has requested that mechanism for recovery of AFC during shutdown due to R & M of thermal generating station provided in Regulation 30(2) of 2014 Tariff Regulations should be extended in case of Hydro generating stations also.

Analysis and Decision:

23. We have considered the request of the petitioner for allowing O&M expenses and interest on loan during the period of unit/station shut down as provided to thermal stations executing R&M/LE programme. The proviso under Regulation 30 (2) of the 2014 Tariff Regulations reads as under:

“Provided that in case of generating station or unit thereof or transmission system or an element thereof, as the case may be, under shutdown due to Renovation and Modernisation, the generating company or the transmission licensee shall be allowed to recover part of AFC which shall include O&M expenses and interest on loan only.”

Though the proviso is shown under clause (2) of Regulation 30 which pertains to thermal generating station, it is an independent stand alone proviso applicable to generating station or unit thereof or transmission system. This proviso provides that during the period of shutdown of the generating station or transmission system due to



Renovation and Modernization, the generating company or transmission licensee shall be allowed to recover part of AFC which shall include O&M expenses and interest on loan only. Therefore, the O&M expenses of the generating station shall be regulated in terms of the above proviso.

24. CEA in its report dated 8.2.2016 has vetted R&M proposal. Accordingly, we accord in-principle approval to the R&M proposal for life extension of the Bairasiul generating station by 25 years w.e.f 1.4.2021 at capital cost of Rs. **341.41crore including IDC of Rs.68.35 crore** subject to the following conditions:

(a) The petitioner shall engage one of the Independent Agencies designated by the Commission, during execution of the R&M which shall be vetting completion capital expenditure on R&M of the project.

(b) During the period of unit shut down/station shut down for the purpose of carrying out R&M activities, the petitioner shall keep the following two separate records and shall submit the same to the Commission along with the tariff petition for approval of capital cost after R&M of the generating station:

(i) IEDC including man power cost, construction power cost, water charges etc. booked to R&M activities;

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

(c) As per CEA`s report dated 8.2.2016, the petitioner shall 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.

(d) The petitioner shall obtain the investment approval of the Competent Authority. Based on the investment approval and actual expenditure, tariff will be determined in line with provisions of extant Regulations.

(e) The petitioner shall initiate the following action points as suggested by CEA in its report dated 8.2.2016:

(i) Carry out necessary dam break analysis and necessary Emergency Action Plan should be prepared for mitigation of flood hazards in downstream side of the project in consultation with State Disaster management Authority.

(ii) Establishment of necessary hydro-mechanical network to collect the flood discharge and concurrent short interval rain data for revising the studies at later date.

25. Petition No. 76/MP/2015 is disposed of in terms of the above.

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

Sd/-
(A.S. Bakshi)
Member

Sd/-
(A. K. Singhal)
Member

Sd/-
(Gireesh B. Pradhan)
Chairperson

