CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

Petition No.172/MP/2023

Coram:
Shri Jishnu Barua, Chairperson
Shri Arun Goyal, Member
Shri Pravas Kumar Singh, Member

Date of Order: 08.04.2024

In the matter of

Petition under Section 79 of the Electricity Act, 2003 read with Regulations 9(2) and 27 of the Central Electricity Regulatory Commission (Terms and Condition of Tariff) Regulations, 2019 seeking in-principle approval of additional expenditure on account of Renovation and Modernization and up-rating in respect of Units 1 & 3 (2x20 MW) of existing Maithon Hydel Power Station.

And

In the matter of
Damodar Valley Corporation
DVC Headquarters DVC Towers,
VIP Road Kolkata-700054 **…Petitioner**

Vs

1. West Bengal State Electricity Distribution Company Limited
   Vidyut Bhavan, Block- DJ
   Sector-II,Bidhannagar, Kolkata-700091

2. Jharkhand Bijli Vitran Nigam Limited
   Registered Office: Engineering Building,
   H.E.C., Dhurwa, Ranchi, Jharkhand-834004 **…Respondents**

Parties Present:
Shri Venkatesh, Advocate, DVC
Shri Shivam Kumar, Advocate, DVC

ORDER

The Petitioner, Damodar Valley Corporation (DVC), has filed the present petition seeking in-principle approval of additional expenditure on account of Renovation and

Modernization and up-rating in respect of Units 1 & 3 (2x20 MW) of existing Maithon Hydel Power Station and accordingly has claimed the following reliefs:

a) *Allow the present Petition;*
b) *Grant in-principle approval for R&M and life extension proposal of Units No.1 & 3 of MHS at the total cost of Rs. 10732.59 Lakhs may be accorded;*
c) *Allow to recover expenses from the beneficiaries during R&M activities concurrently with generation in terms of O&M expenses and interest on loan as per proviso under Regulation 42(2) of Tariff Regulation 2019;*
d) *Consider the Units 1 & 3 of MHS to be deemed available for the purpose of computation of availability and grant the capacity charges for the duration of shut down and award compensation for loss of revenue; AND*
e) *Pass such further Order/Orders as this Hon'ble Commission may deem just and proper in the facts and circumstances of the case.*

Background

2. In October 1957, May 1958 and December 1958, Petitioner's Maithon Hydel Power Station (MHS) consisting of three Units having an installed capacity of 60 MW (3x20 MW) were put on commercial operation (COD) i.e., Units No.1, 2 and 3 respectively. The usual life of a hydroelectric power plant is 40 years. Units 1, 2 & 3 of the MHS had already completed its useful life in October 1997, May 1998 and December 1998, respectively, which is 40 years from COD in terms of Regulations 3(73) of the Tariff Regulations, 2019. In the year 2006, Unit 2 of MHS was renovated and up-rated from 20 MW to 23.3 MW. However, Unit-1 and 3 were not renovated.

3. Commission, vide its order, determined the tariff for MHS Unit Nos. 1, 2 & 3 (63.2 MW) for the tariff period 2014-19 in Petition No. 354/GT/2014. Subsequent thereto, Petitioner filed Petition No. 578/GT/2020 for Truing-up of annual fixed charges for the period of 2014-19 and for the determination of Tariff for the period 2019-24 in respect of MHS Unit Nos. 1, 2 & 3. On 16.2.2023, this Commission vide Order determined the True-up of annual fixed charges for the period of 2014-19 as well as the tariff for 2019-24 for MHS Unit Nos. 1, 2 & 3.

4. On 11.4.2019, the Petitioner issued a Letter of Award (LoA) to MECON Limited to

carry out the necessary Residual Life Assessment (RLA) study, uprating study, Preparation of Detailed Project Report (DPR), Preparation of tender documents and assisting in finalization of vendor for executing Renovation and Modernisation (R&M)/Renovation Modernization and Up-rating &Life Extension (RM&LE) of Units 1 & 3.

5. On 17.4.2019 and 18.4.2019, a team of MECON Limited engineers visited Unit No.1 of MHS to run various tests, conducted in-site examinations, and on-the-spot study of the various plant systems, hydrology, etc. Furthermore, a run test of said Unit was conducted, and subsequent to which the Unit was dismantled, and Non-Destructive Tests (NDT) were carried out for the study.

6. On 3.12.2019, Unit 3 of MHS was handed over to MECON Limited for carrying out the civil and mechanical testing and electrical & dynamic testing, pursuant to which said Unit was finally handed back to the Petitioner on 4.1.2020.

7. In the month of October 2022, based on NDT, run a test of equipment and after a discussion of the same with the Operation and Management personnel of the Petitioner, MECON Limited submitted its RLA & Uprating study report, and basis the outcome of said reports DPR was prepared, which proposed for carrying out the R&M work.

8. On 2.11.2022, the above said DPR proposing for carrying out the R&M for Units 1 & 3 of MHS for its life extension, was approved by the Petitioner's Board of Directors **(**BOD). Thereafter, on 13.9.2022, the Central Electricity Authority (CEA) approved the proposals of the DPR for the R&M of Units 1 & 3 of the MHS.

Submission by the Petitioner

A. Units 1 & 3 of MHS require urgent renovation & modernization

a) With more than 60 years, the Units have already outlived their technical life, causing substantial deterioration in their performance. Pertinently, on account of the above, the said Units have suffered major damages, which have been encountered during operation and during inspection by MECON engineers.

b) As a consequence of the above, said Units have been kept in service at low load capacity with regular maintenance, despite which their availability has shown a declining trend.

c) It is submitted that the availability of water and water-head for generation of power at MHS has been assessed. The water flow through Powerhouse and spillway from the financial year 1992-93 to 2018-19 (i.e., 27 years), has been considered for Power Potential Studies.

d) Pertinently, based on the power potential study, considering the monthly reservoir level and the monthly energy generation of Petitioner's powerhouse, the weighted average of reservoir level has been estimated as 475.073 ft (144.80 m) for the entire 27 years from FY 1992-93 to FY 2018-19. Further, the Tail Water Level (TWL) and Head Loss are also considered while computing the design Head.

e) Based on the above data, the Design Head has been calculated as 35.3m. In addition, the max head has been calculated on the basis of the maximum reservoir level and minimum TWL, which comes to 45 m. Further, the minimum head has been calculated on the basis of minimum reservoir level, maximum TWL and head loss, which comes to 23.16m.

f) With the above available data for design head, maximum and minimum reservoir level and head variation with respect to design head, the R&M study has been conducted. Based on this it appears that the pieces of equipment of Units 1 & 3 of MHS have various shortcomings/defects and have become obsolete. In said circumstances, Units 1 & 3 of MHS warrant immediate RM & U for restoring the reliability and availability of the MHS.

g) Furthermore, from a bare perusal of data for power generation from Units 1 & 3 for the last five (5) financial years, it is seen that the average annual energy generation for the period 2013-14 is 30.774 MUs & 36.42 MUs respectively, against

the average annual energy generation for the period of 1992-93 to 2018-19 years, i.e., 48.70 and 39.66 respectively. Hence, there has been a substantial decrease in energy generation of Units 1 and 3 in recent years. It is not out of place to mention that the power generation is further on a declining trend due to the deteriorating condition of the said Units, and in such circumstances, the Petitioner is finding it difficult to run the said Units to generate even the average power, and as such, the generation loss is causing huge revenue loss to the Petitioner.

B. SCHEDULE OF R&M

a) The overall time for the R&M project is estimated to be 24 and 40 months for Units 1 and 3, respectively, from the 'Zero-Date' of the Project. Pertinently, the 'Zero-Date' of the project is reckoned as the date of award of contract on EPC Contractor.

b) In terms of DPR, the overall duration of R&M activities of Units 1 and 3 is estimated to be 40 months from the 'Zero-Date'. There will be a complete shutdown of the powerhouse for Unit 1; however, no such shutdown is envisaged for the powerhouse of Unit 3. Furthermore, the shutdown of Units 1 and 3 of MHS is estimated to be around the 9^{th} month and 25^{th} month from the 'Zero Date', respectively.

c) Pertinently, the commissioning of Unit 1 shall be taken up on the 22^{nd} & 23^{rd} months from 'Zero-Date' followed by a trial run in the 24^{th} month, where after Unit 3 will be handed over to the contractor for carrying out the R&M in 25^{th} month from the 'Zero Date', during which the said Unit will be under shut down. With such a scheme, it is evident that there will be no complete shutdown of the generation process and R&M activities, and the generation process will be concurrent with the renovation activities.

d) Without prejudice to the above, it is submitted that in case of any revision in the Schedule of completion of R&M works for said Units, as proposed in the DPR, the same will be submitted before this Commission on a timely basis.

e) Moreover, from the above scheme, it is evident that time is of the essence for the R&M contract and restoration of said Units in a time-bound manner will be of paramount importance, which cannot be in any manner departed away from . It bears mentioning that after the R&M of said Units, i.e., 1 and 3, they are likely to retain their original capacity of 20 MW each. Notably, the designed energy generation with 95% machine availability of MHS is expected to be 116.59 MUs for all three units and 73.79 MUs for Units 1 and 3 collectively.

f) Further, the energy generation from MHS, as approved by CEA *vide* letter dated 26.10.2021, corresponding to 75% dependability year (i.e., 2013-2014) is 116.59 MUs and for Units 1 & 3 is 73.79 MUs. Additionally, after R&MU both turbine and generators are expected to get better efficiency, wherein the efficiency of Turbine and Generator will be enhanced to 93% and 98.5%, thereby having an overall efficiency of 91.60%.

C. SCOPE OF R&M

9. The complete scope of R&M, as envisaged under the DPR, has been summarised below for kind convenience of this Commission:

(a) **Water Conductor System (penstock, spiral casing and draft tube)**

i. **Penstock**- Inner surface of penstock to be cleaned from mud, rusting, scaling, corrosion, fungus, etc. Further, weld filling, machining and matching with the original profile and painting with water resistant epoxy paint will be carried out.

ii. **Spiral Casing**- The Surface of the spiral casing shall be cleaned of mud and rust, corroded surface or damaged weld surface to be

repaired with weld filling and painted with water resistant epoxy paint after surface preparation. In addition, all drain valves, pressure gauges and other instruments, manhole seals, etc and vacuum relief of spiral case are to be replaced.

iii. **Draft Tube**- Civil repair will be conducted and manholes will also be refurbished. Additionally, all cavities/pitting shall be filled up by welding & grinding and matching with the original profile, painted with water resistant epoxy after suitable surface preparation. Further, the rung ladder shall be replaced with an 'SS' rung ladder.

(b) **Turbine and Associated Equipment**

i. **Wicket Gate**- Wicket gates are to be replaced with new ones along with lubricating type bush. Further, there shall be a replacement of connecting levers, linkages and regulating ring, i.e., total assembly.

ii. **Stay Vanes**- Refurbishment of stay vanes.

iii. **Runner & Cone**- Runner along with the runner cone, are to be replaced.

iv. **Turbine Shaft**- Turbine shaft along with shaft sleeves to be replaced.

v. **Wicket Gate Servomotors**- Servomotors along with connecting pipes, valves, fittings, etc, are to be replaced with State-of-Art technology servomotors.

vi. **Turbine Bearing & Thrust Bearing**- Turbine guide & thrust bearings to be replaced with new babbitt lining.

(c) **Generators and Associated Equipment**

i. **General**- Existing generator to be replaced with new generator. New generator shall have stator winding with class 'F' insulation, rotor poles with pole wheels, rotor spider, generator shaft, etc. Further, the new

generator shall be accommodated with existing civil works.

ii. **Stator**- New stator for capacity of 20 MW consisting of stator core and stator winding of class 'F' insulation shall be provided for both Units. Lamination of stator core shall be of high grade non ageing cold rolled steel coated with suitable insulation. Insulation class of stator winding shall be of class 'F', however temperature rise limits shall be limited to class 'B'. A new set of RTDs/ETDs shall be provided for the monitoring of the temperature of the stator core and windings.

iii. **Rotor**- New generator shall be provided according to the new turbine. The rotor will consist of a shaft, spider, pole wheels and poles with field winding of class 'F' Insulation. However, the temperature rise limit shall be limited to class "B" for both Units. New Slip rings, brush gear assembly and down shaft leads shall be provided.

iv. **Generator Bearings**- A new set of guide bearings to be replaced.

v. **Excitation System & AVR**- Replacement of present excitation system with static excitation system with digital automatic voltage regulator including excitation transformer for both Units. All cables and termination kits shall be provided. Instrumentation and metering shall be provided.

(d) **Control & Instrumentation System**

i. To Provide DCS/PLC based control system for complete monitoring and control of the Units. DCS/PLC system will ensure safe, efficient and smooth operation of the plant & equipment and its auxiliaries with minimum interference of the operating personnel during normal working of the plant. A Dedicated DCS/PLC based system with dual redundant data highway, CPU, Communication module, Power supply

& Critical I/Os to meet the functional requirements for Turbine control and their auxiliaries along with the computing device is envisaged. The DCS/PLC based automation is planned to be executed through a dedicated automation vendor. Monitoring and control of all Units will be suitably interfaced with the DCS/PLC based automation system.

ii. Reservoir water level and TWL measurement system with hook up with DCS/PLC for display of level at the control room.

iii. Turbine supervisory instrumentation system shall be envisaged in the R&M job. The turbine supervisory equipment shall be complete, including sensors, transmitters, converters, limit value monitors, measuring and amplifying modules, power supplies, etc. with the required accessories, including shielded instrumentation, special cables, etc.

iv. All the vibration parameters, as well as Turbine supervisory parameters shall also be fed to the DCS/PLC system so that all these parameters are suitably displayed on the DCS/PLC system. All required I/O cards and other processing modules, etc. shall be provided for this purpose.

v. All the field mounted instruments (for temperatures, pressures, differential pressure, level & flow) for measurement & control, thermocouples, RTDs, switches, transmitters, local gauges, etc. will be replaced using up to date microprocessor-based field instruments.

vi. Annunciation system will be replaced by microprocessor-based annunciation system with window facia, alarm hooters, etc.

vii. New UPS system, including a Battery, Battery charger, Distribution board etc., shall be included to meet the requirement of the total control and Instrumentation system.

viii. Electronic earthing system has been envisaged for the DCS/PLC based automation system and for the instrumentation system.

ix. LED display screen (big size) for display of major data of all the Units has been envisaged and is to be located in the Control room, MHS office and powerhouse.

x. Replacement of all old instrument cables, signal & control cables and cable trays.

(e) **Transformers and Electrics**

(i) **Generator Transformer**- The Generator transformer has been operating since 1957. Considering the elapsed life and due to advancements in technology of material and insulation, it is proposed to replace the existing generator transformer with new transformer of the same rating.

(ii) **Generator bus duct**- Generator bus duct to be replaced with new segregated type bus duct with breather.

(iii) **Generator Disconnecting** - Pneumatic Generator disconnecting switch is proposed to replace with a motorized operated off load isolator having a manual override facility.

(iv) **11 kV Panel**- Replacement of the 11kV panels with new current transformers, potential transformers, lightning arrestors & surge arrestor. Replacement of neutral grounding inductor by neutral grounding transformer with secondary resistance. Replacement of the 11kV generator Isolator (disconnecting switch) panel along with the motorized isolator is also proposed. Also, a new 11kV UAT isolator panel along with a motorized isolator shall be provided. Also, 2 sets of

Current transformers and associated bus bars with bus ducts for connection with the 11kV side UAT bus bar shall be provided.

(f) **Common Facilities**

(i) **Cooling Water System**- Cooling water pipelines, water equalizing system for initial filling of draft tube and scroll vase along with the pipe, valves, and water filters of the turbine is recommended for Replacement with new pipelines, valves, pipe fitting, etc., as per requirement.

(ii) **Ventilation System**- All ventilation fans will be replaced with ones having capacity 25% higher than the existing fan capacity.

(g) **Civil Works**:

(i) General Treatment works at various locations such as Spiral Casing Wall, Near the Man door Basement, RHS Wall, and Roof in between the top of the maintenance office Beam and near the Spiral Staircase Beam, etc.

(ii) Non-shrink polymeric water-proof grouting compound admixed with cement slurry through the nozzles at various sites such as Draft Tubes of RHS, Foundations, Access Tunnels, emergency exits, etc.

(iii) Civil works at Open channels such as:

a) Tailrace Channel need to be dredged off to maintain its designed bottom level and cross-section.
b) Foreign hindrances, such as loose boulder chunks, bushes, etc, need to be removed from the channel.
c) Vegetations and tree branches need to be cut and removed from the channels.
d) To maintain a smooth flow, it is recommended that both side stretch of the channel shall be lined with 250 thick RCC approx 12 ft from the top level of the channel.
e) Sharp stone edges at the entry locations of the tunnel in the surge

chamber area shall be cut to achieve a smooth bell mouth (smoothening of the surface at the entry of water into a tunnel of each unit).

10. Based on the above analysis of the provisions of the DPR, it is evident that the focus of the R&M proposal is towards activities which are essential for the efficient and sustained performance of Units 1 & 3 and have a direct impact on generation and machine availability, including state of the art equipment being used in latest power stations.

D. The life extension of Units 1 & 3 of MHS after the completion of R&M works

11. In terms of the DPR, the useful Life of the power station is estimated to be 25 years after the completion of R&M works.

E. Expenditure to be incurred for the proposed R&M works

12. The estimated impact because of R&M of Unit 1 of MHS is as follows:

(a) **Estimated completion cost**: The estimated completion cost of the proposed R&M of Units 1 & 3 is Rs. 10732.59 Lakhs, including IDC of Rs. 441.37 Lakhs. Furthermore, the Debt - Equity ratio for the capital expenditure is considered 80:20 and interest on loan capital has been considered at the rate of 7.20% p.a. Further, in case of any deviation from DPR proposed cost along with necessary details will be submitted before this Commission in due course of time.

(b) **Reference Price Level**: The capital cost has been worked out on the basis of prices prevailing during the Price level: July-September 2021.

(c) **Cost Benefit Analysis**: R&M is the most cost-effective way of capacity addition in a short span of time. It is comparatively easier than constructing new projects and can yield results in about three to four years. The levelized cost of generation for the proposed project over the 25 years of operations works out to Rs 4.05/KWh, and on the other hand, the Levelized Tariff for the

25 years of life works out to be Rs. 4.94/KWh. However, the cost-benefit analysis is subjected to revision and the revised cost-benefit analysis, if any, along with necessary details, will be submitted before this Commission on a timely basis.

(d) **Financial Package and Phasing of Expenditure**: The details of the Financial Package & Phasing of expenditure have been furnished in Chapter-13 (Cost Estimates and Techno-Economic Analysis) of DPR (Volume- I). The entire project has been envisaged to be commissioned in two phases for Units 1 & 3, i.e., 24 and 40 months, respectively, from the 'Zero Date', i.e., from the date of award of contract to the EPC contractor. Interest on long-term loan capital has been considered at the rate of 7.20% p.a. While drawing the funds based on the phasing of expenditure, it has been envisaged that equity and debt will be drawn simultaneously. IDC has been worked out based on the construction schedule, the interest rate on long-term loans and the withdrawal pattern of funds.

13. The Petitioner has further submitted that as per provisions of Regulation 27 of the Tariff Regulations, 2019, the following emerges for consideration by the Commission:

(a) Any approval for expenditure projected to be incurred by the Petitioner would be considered by the Commission based on the complete scope of DPR, which *inter alia* includes justification, cost-benefit analysis, phasing of expenditure, schedule of completion, reference price level and estimated completion cost.

(b) Approval for proposal to R&M is to be granted by the Commission after considering the veracity of reasonableness of the proposed cost estimate, financing plan, schedule of completion, IDC, use of efficient technology, cost-

benefit analysis and expected duration of life extension.

(c) Any additional capital expenditure towards renovation of turbines, and necessary due to obsolescence or non-availability of spares for efficient operation of the station shall be allowed.

14. Units 1 & 3 of MHS have already outlived their useful life, and there is a dire need for carrying out such R&M work for the safety and longevity of Units 1 & 3 for the generation of power in an optimum manner and in order to ensure continued reliability and availability. Needless to state such R&M work is also necessary as many parts thereof have become obsolete and spares are not available for replacing such equipments, and therefore merits for in-principle approval of the additional capital expenditure by this Commission.

15. Furthermore, the claim of the Petitioner is duly supported by a detailed and comprehensive DPR which provides all the requisite details which *inter alia* includes justification for carrying out R&M work, cost-benefit analysis, phasing of expenditure, schedule of completion, reference price level and estimated completion cost. Notably, the said DPR has been considered by the CEA and an approval has been granted by CEA on 13.09.2022.

16. Further, reliance is placed on the Order dated 03.06.2016 in Petition No.76/MP/2015 wherein this Commission has already granted in-principle approval to the R&M proposal for the life extension of the generating station. The relevant portion of said Order is extracted hereunder:

> *"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:"*
>
> ***[Emphasis Supplied]***

17. It is submitted that the R&M and generation of energy (to the extent) possible will be concurrent activities, and therefore, the Petitioner prays before this Commission to allow recovery of full normative Operation & Maintenance (O&M) expenses to be allowed for

2019-24 period by this Commission from the beneficiaries during complete/partial shutdown of generating station for R&M works. Pertinently, the mechanism for recovery of AFC during shutdown due to R&M of thermal generating station provided in Regulation 42(2) of Tariff Regulations, 2019 ought to be extended in the present case also. The relevant portion of the said Regulation is extracted hereunder:

> *"(2) The Capacity Charge payable to a thermal generating station for a calendar month shall be calculated in accordance with the following formulae:*
> *…*
> *Provided that in case of generating station or unit thereof under shutdown due to Renovation and Modernisation, the generating company shall be allowed to recover O&M expenses and interest on loan only."*
>
> ***[Emphasis Supplied]***

18. From bare perusal of the above provision, it is evident that a generating station or Unit being under shutdown due to R&M would be entitled to the O&M expenses and interest on the loan. Pertinently, in another similar instance, this Commission *vide* Order dated 03.06.2016(supra) has allowed the recovery of AFC component *qua* O&M expenses and interest on the loan. The relevant extract of the said order has been reproduced hereinbelow:

> *"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."***
>
> ***[Emphasis Supplied]***

19. Additionally, from the above-narrated facts of the case, it is evident that substantial

investment is required to be carried out for the R&M work, and thus, regulatory certainty *qua* in-principle approval would be critical for arranging funds from the lenders. Otherwise, Petitioner is not in a position to meet the expenditure projected to be incurred towards the R&M works in the absence of regulatory certainty over the tariff.

20. It is submitted that the aforesaid orders/judgments' reasoning is squarely applicable to the present case, and therefore, regulatory certainty *qua* in-principle approval of such costs to be incurred by Petitioner for carrying out R&M work and AFC for shut down period i.e., O&M expenditure is the need of the hour, failing which the Petitioner is not in the position to secure external financel.

21. It is further submitted that Units 1 & 3 of MHS will undergo a shutdown during the process of R&M, and therefore, the supply of power to the beneficiaries would be affected, and the Petitioner would lose the capacity charges for the duration of shut down. Additionally, there may be a liability of penalty payment on the Petitioner due to reduced availability. Therefore, the Petitioner prays before this Commission to consider its Project as deemed available for the purpose of computation of availability and grant the capacity charges for the duration of shut down.

Hearing dated 13.09.2023

22. The matter was heard on 13.09.2023, and notice was issued to the Respondent to file the reply. During the hearing, the learned counsel for the Petitioner submitted that the present petition has been filed for in-principle approval for Renovation and Modernization and up-rating in respect of Units 1 & 3 of the existing Maithon Hydel Power Station, having an installed capacity of 40MW. Commission vide ROP of hearing dated 13.09.2023 directed the Petitioner to file the additional information including Certificate to the effect that works/assets allowed in Petition No. 578/GT/2020 (Tariff petition for instant generating station for the period 2014-19 and 2019-24), consent of the beneficiaries, status of R&MU works, details of the revised cost-benefit analysis, reason for design energy approved

based on 75% dependability year and calculation of Levelized tariff.

23. In compliance with the said ROP, the Petitioner, vide affidavit dated 16.10.2023, submitted the following additional information:

A. Certificate to the effect that works/assets allowed in Petition No. 578/GT/2020 (Tariff Petition for true-up for the period of 2014-19 and determination of tariff for the period of 2019-24) vide order dated 16.2.2023 do not form part of the claimed R&MU cost

i. The additional capitalization allowed by this Commission in Petition No. 578/GT/2020 does not form part of the present claim proposed for R&M of Units 1 & 3.

ii. In fact, this Commission, in the said Petition, has specifically directed the Petitioner to file a separate Petition in terms of relevant provisions of the Tariff Regulations 2019 for any such claim.

B. Consent of the beneficiaries or long-term customers for the proposed R&MU

i. With regard to the above query, it is submitted that the Petitioner has issued an email to its beneficiaries WBSEDCL and JBVNL, thereby intimating about the present petition and sought consent from both the beneficiaries stating therein to provide the requisite consent within 10 days. However, the Petitioner has yet to receive the required objection/consent to the said request.

ii. Furthermore, the Petitioner has also published notices in various newspapers circulated in the States of West Bengal and Jharkhand to seek consent /objections for the proposed R&M works. However, no objection/comment has been received, and it is clear that the same shall be construed as deemed consent.

iii. It is pertinent to note that there is no specific Power Purchase Agreement between the Petitioner and beneficiaries for the supply of power from MHS. Thus, MHS does

not have any identified beneficiaries and its generation is considered as part of pooled generation for the Distribution System.

iv. Therefore, in the absence of any identified beneficiaries, the Petitioner ought not to be required to seek consent as the generation from MHS is considered as a part of pooled generation while determining the weighted average cost of supply by the appropriate State Commission.

C. Status of R&MU works i.e. proposed start date and completion date

i. As per the Detailed Project Report (DPR), the overall time for the R&M of the Project is estimated to be 24 and 40 months for Units 1 & 3, respectively, from the 'Zero-Date' of the Project. Pertinently, the 'Zero-Date' of the project is reckoned as the date of award of contract on EPC Contractor. It is further submitted that total work at the site will be executed in a phased manner for continued generation of power from the plant

ii. The overall R&M activities of Units 1 and 3 are estimated to be 40 months from 'Zero-Date' and so there will be a complete shutdown of the powerhouse for Unit 1. However no such shutdown is envisaged for the powerhouse of Unit 3.

iii. Furthermore, the shutdown of Units 1 & 3 of MHS is estimated to be around the 9th month and 25th month from the 'Zero Date', respectively. Pertinently, the commissioning of Unit 1 shall be taken up on the 22nd & 23rd months from 'Zero-Date' followed by a trial run in the 24th month thereafter. Unit 3 will be handed over to the contractor for carrying out the R&M in the 25th month from the 'Zero Date', during which the said Unit will be under shut down.

iv. With such a scheme, it is evident that there will be no complete shutdown of the generation process and R&M activities, and the generation process will be concurrent with the renovation activities.

v. The execution of work for R&M will commence as soon as 'in-principle' approval is obtained from this Commission. Notably, for the said purpose the tendering process has already commenced.

D. Details of the revised cost-benefit analysis as submitted

i. As per DPR, R&M is the most cost-effective way of capacity addition in a short span of time. It is comparatively easier than constructing new projects and can yield results in about three to four years.

ii. The cost-benefit analysis of Units 1 & 3 of MHS after the proposed R&M work of the present Petition, based on vetting by CEA.

iii. Notably, the levelized cost of generation for the proposed project over the 25 years of operations works out is Rs 4.05/KWh, and on the other hand, the Levelized Tariff for the 25 years of life works out to be Rs. 4.94/KWh.

iv. However, the cost-benefit analysis is subject to revision, and the revised cost-benefit analysis, if any, along with necessary details, will be submitted before this Commission on a timely basis.

E. Reason for design energy approved based on 75% dependability year

i. Initially, CEA had recommended the Petitioner to scale down/de-rate the installed capacity of Units 1 & 3 of MHS to 13 MW in place of 20 MW. However, the Petitioner, in response to the CEA's proposal *vide* its letter dated 06.10.2021, made the following submissions:

(a) The reduction of installed capacity of Units 1 and 3 from 20 MW to 13 MW will result in a loss of 16.55 Mus in annual power generation.

(b) The peak power generation is only during the monsoon months (July-October), and therefore, lowering the unit rating will be cost-intensive in nature.

(c) The cost for replacement of existing two Units having an installed capacity of 20 MW with two Units of 13 MW will be higher as all the major components will be required to be replaced with new ones.

ii. Thus, in terms of the above, it is evident that there will be a reduction in energy generation, also at the cost of enhanced capital expenditure and additional burden on the beneficiaries.

iii. Accordingly, considering the above submissions, CEA, *vide* its letter dated 26.10.2021, recommended the Petitioner carry out the R&M of two Units with the existing capacity of 20 MW.

iv. Pertinently, from the above, it is evident that the CEA took a considerate view while approving the R&M of the two Units having an installed capacity of 20 MW, both on a commercial as well as technical aspects in synchronization..

v. Therefore, on account of aforesaid reasons, the Petitioner has submitted for considering the 75% dependability year in place of 90% dependability, while calculating the design energy, which has been duly approved by CEA *vide* its letter dated 26.10.2021.

F. **Calculation of Levelized tariff**: Petitioner has submitted the levelized Tariff (based on CERC guidelines) works out to be Rs. 4.94/KWh and has submitted a calculation for the same.

Hearing dated 13.12.2023

24. The matter was heard on 13.12.2023. During the hearing, the learned counsel for the Petitioner submitted that the Petitioner had undertaken the newspaper publication of the R&M proposal, and letters have also been addressed to the Respondent discoms in this regard. The learned counsel added that no objections/replies have been received from any of the parties/Respondents. None was present on behalf of the Respondents. The

Commission, after hearing the learned counsel for the Petitioner, reserved its order in the matter.

Analysis & Decision

25. The submissions have been considered. With regard to renovation and modernization (R&M), Regulation 27 of 2019 Tariff Regulations provides as under:

> *27. Additional Capitalization on account of Renovation and Modernization*
> *(1) The generating company or the transmission licensee, as the case may be intending to undertake renovation and modernization (R&M) of the generating station or unit thereof or transmission system or element thereof for the purpose of extension of life beyond the originally recognized useful life for the purpose of tariff, shall file a petition 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:*
>
> *Provided that the generating company making the applications for renovation and modernization (R&M) shall not be eligible for Special Allowance un*der Regulation28 of these regulations;
>
> *Provided further that the generating company or the transmission licensee intending to undertake renovation and modernization (R&M) shall be required to obtain the* ***consent of the beneficiaries*** *or the long-term customers, as the case may be, for such renovation and modernization (R&M) and submit the same along with the petition.*
>
> *(2) Where the generating company or the transmission licensee, as the case may be, makes an application for approval of its proposal for renovation and modernization (R&M), approval may be granted after due consideration of* ***reasonableness of the proposed cost estimates, financing plan, schedule of completion, interest during construction, use of efficient technology, cost-benefit analysis, expected duration of life extension, consent of the beneficiaries or long term customers****, if obtained, and such other factors as may be considered relevant by the Commission.*
> *(3) In case of gas/ liquid fuel based open/ combined cycle thermal generating station after 25 years of operation from date of commercial operation, any additional capital expenditure which has become necessary for renovation of gas turbines/steam turbine or additional capital expenditure necessary due to obsolescence or non-availability of spares for efficient operation of the stations shall be allowed:*
>
> *Provided that any expenditure included in the renovation and modernization (R&M) on consumables and cost of components and spares which is generally covered in the O&M expenses during the major overhaul of gas turbine shall be suitably deducted from the expenditure to be allowed after prudence check.*

(4) After completion of the renovation and modernization (R&M), the generating company or the transmission licensee, as the case may be, shall file a petition for determination of tariff. Expenditure incurred or projected to be incurred and admitted by the Commission after prudence check, and after deducting the accumulated depreciation already recovered from the admitted project cost, shall form the basis for determination of tariff

26. It is observed that the requirement for R&M of generating plants has 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 to extend their life , especially in view of the fact that new capacity addition in the hydro sector has slowed down in spite of various measures taken by MOP, GOI and this Commission to incentivize the hydropower plants. As per the requirement of Regulation 27(1) of the 2019 Tariff Regulations, the Petitioner has placed on record the DPR (which has been duly vetted by CEA), which provides the complete scope of RM&U works, justification, cost-benefit analysis, estimated life extension from a reference date, financial package, phasing of expenditure, schedule of completion and reference price level etc.

Issues for consideration

27. Based on the submissions in the petition and the documents available on record, the issues which emerge for consideration as per Regulation 27(2) of the 2019 Tariff Regulations are examined hereunder:

Issue No. (A): Reasonableness of the proposed cost estimates, IDC and Cost Benefit

28. The Petitioner has submitted that as per Chapter 7 (Renovation and Modernization and Up-rating of Hydro Power Stations) of "'Best practices in HE Power Generation" published by CEA, the RM&U of hydropower plants is a cost-effective way for capacity addition. The anticipated total expenditure for the proposed RM&U of MHS stands at Rs.

10,732.59 Lakhs, inclusive of Interest during Construction (IDC), amounting to Rs. 441.37 Lakhs. These figures were calculated based on price indices prevalent during the July-September 2021 period. It is comparatively easier than constructing new projects and can yield results in about three to four years. The levelized cost of generation for the proposed project over the 25 years of operations works out to Rs 4.05/KWh (based on CERC guidelines). The levelized Tariff (based on CERC guidelines) works out to be Rs. 4.94/KWh. The useful Life of the power station is estimated to be 25 years after the completion of R&M works. However, the cost-benefit analysis is subjected to revision and the revised cost-benefit analysis, along with necessary details, will be submitted before this Commission in due course of time.

29. Having thoroughly reviewed the Petitioner's submissions, we are of the opinion that projects that have surpassed their useful lifespan should undergo Repair and Maintenance (R&M) activities to enhance reliability and availability. Continuing operation of an aging generating station with diminished capacity can compromise its reliability and availability, potentially leading to prolonged outages. Such circumstances may necessitate beneficiaries to procure costly power from other alternatives. In the present case, we are in agreement with the Central Electricity Authority's (CEA) observations outlined in its communication dated 13.09.2022, which emphasize that the proposed initiative primarily focuses on the Renovation, Modernization, and Life Extension (RM&LE) of electro-mechanical components, without altering or repairing the dam or its associated structures, with only minor civil works anticipated. The electricity generated from the unit would contribute significantly to meeting peak demand requirements during its extended operational lifespan.

Issue No. (B): Extension of Life Post RM&LE:

30. The Petitioner has stated that it has replied to the observations/comments raised by CEA in its letter dated 13.09.2022, and subsequently, CEA has cleared the DPR for the useful life of 25 years of the Unit No.1 and 3 of the MHS.

31. Keeping in view that CEA had cleared the DPR for useful life of 25 years of Units No.1 and 3 of the MHS, we are inclined to allow the life extension of Unit No.1 and 3 of the Maithon Hydel Power station (MHS)by 25 years.

Issue No. (C): Review of Design Energy (DE)

32. As regards DE, the Petitioner has submitted that CEA, vide its letter No. 13.09.2022, approved the design energy of 73.79 MUs for Unit No.1&3 of the MHS.

33. The matter has been considered. It is noticed that CEA considering the hydrology, the installed capacity of Units -1 and 3 was initially worked out 13 MW each. However, subsequent analysis by the CEA revealed that the projected cost for replacing the existing 2x20 MW units with 2x13 MW units appears to exceed the expenses associated with conducting Repair and Maintenance (R&M) on the existing 2x20 MW units. Additionally, replacing all major components with new ones would result in higher capital expenditure and reduced energy generation efficiency. In light of these findings, it has been recommended by the CEA that the existing unit size of 20 MW each be retained for the R&M of Units 1 and 3 of the MHS, with a revised Design Energy (DE) equivalent to 73.79 MUs for Units 1 and 3 of the MHS. Consequently, we concur with this recommendation and approve the same.

Issue No. (D): Consent of the beneficiaries or long-term customers

34. With regard to obtaining the consent of the beneficiaries, the Commission, vide ROP of the hearing dated 13.9.2023, had directed the Petitioner to obtain the consent of the beneficiaries. In response to the above, the Petitioner has submitted that it had published a

notice in various newspapers circulated in the States of West Bengal and Jharkhand to seek consent /objections for the proposed R&M works. However, no response was received from the stakeholders. The Petitioner has also stated that it had issued an email dated 4.10.2023 to its beneficiaries WBSEDCL and JBVNL, thereby intimating about the present petition and seeking consent from both the beneficiaries stating therein to provide the requisite consent within 10 days. Petitioner also submitted that there is no specific PPA between the Petitioner and beneficiaries for the supply of power from MHS. Thus, MHS does not have any identified beneficiaries and its generation is considered as part of pooled generation for the Distribution System. In the absence of any identified beneficiaries, the Petitioner ought not be required to seek consent as the generation from MHS is considered as a part of pooled generation while determining the weighted average cost of supply by the appropriate State Commission.

Analysis & Decision

35. The matter has been examined. The second proviso to Regulation 27(1) and Regulation 27(2) of the 2019 Tariff Regulations provides as under:

> *27(1) xxx*
> *xxx*
> *Provided further that the generating company or the transmission licensee intending to undertake renovation and modernization (R&M) shall be required to obtain the consent of the beneficiaries or the long-term customers, as the case may be, for such renovation and modernization (R&M) and submit the same along with the petition.*
> *(2) Where the generating company or the transmission licensee, as the case may be, makes an application for approval of its proposal for renovation and modernization (R&M), approval may be granted after due consideration of reasonableness of the proposed cost estimates, financing plan, schedule of completion, interest during construction, use of efficient technology, cost benefit analysis, expected duration of life extension, consent of the beneficiaries or long term customers, if obtained, and such other factors as may be considered relevant by the Commission"*

36. It is noticed from the submissions that, in terms of the second proviso, as quoted above, the Petitioner had sought the consent of the Respondents herein, vide email dated 4.10.2023 addressed to these Respondents with regard to the proposed RM&U works of

the generating station. However, the Petitioner has yet to receive the required objection/consent to the said request. It is pertinent to note that there is no specific PPA between the Petitioner and beneficiaries for the supply of power from MHS. Thus, MHS does not have any identified beneficiaries and its generation is considered as part of pooled generation for the Distribution System. It is further noticed that the Petitioner had published notice in the various newspapers (including vernacular newspaper) within the States of West Bengal and Jharkhand on 8.10.2023, inviting comments/ suggestions and requesting consent on the RM&U proposal. It was also made clear by the Petitioner that if nothing was heard within 7 days of the said publication, the same would be considered as 'deemed consent'. Admittedly, in the present case, none of the parties including the Respondents herein, had submitted their response to the said letters/newspaper publications. In this background, the Petitioner cannot be faulted for not taking steps to obtain the consent of the beneficiaries or long-term customers. In our considered view, the absence/non-receipt of consent from beneficiaries/long-term customers, in the present case, cannot stand in the way of granting the reliefs prayed for by the Petitioner. Accordingly, the prayer (b) of the Petitioner, as in para 1 above, are allowed in terms of Regulation 27(2) of the 2019 Tariff Regulations. We, therefore, grant in-principle approval of the RM&U of Units No.1 and 3 of MHS at the total cost of Rs. 10732.59 lakhs, including IDC of Rs. 441.37 lakh (as vetted by CEA), along with a life extension of Units No.1 and 3 of MHS by 25 years. Also, the revised Design Energy of Units No.1 and 3 of MHS, after completion of RM&U, shall be 73.79 MUs, as approved by the CEA. After completion of the said RM&U, the Petitioner shall file a petition for the determination of the tariff of the generating station, in terms of Regulation 27(4) of the 2019 Tariff Regulations for the tariff period 2019-24.

37. As regards the prayers (c) & (d) of the Petitioner, 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 shutdown, as provided to thermal generating stations executing R&M/LE program. 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 the 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.

38. For the purpose of billing for the period 2019-24, we 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 for the 2nd unit, which is not in R&M, shall be followed as per Regulation 44 (2) and (3) of 2019 Tariff Regulations. i.e., the Plant Availability for the month has to be considered as 23.20 MW for calculation of capacity charge for unit-2 and design energy corresponding to this unit has to be considered for calculating energy charges for Unit-2.

39. Accordingly, Petition No. 172/MP/2023 is disposed of in terms of the above above discussions and findings.

Sd/	sd/-	sd/-
(Pravas Kumar Singh) **Member**	**(Arun Goyal)** **Member**	**(Shri Jishnu Barua)** **Chairperson**