Before

UTTARAKHAND ELECTRICITY REGULATORY COMMISSION

Petition No. 76 of 2026

In the Matter of:

Petition for seeking prior approval of Capital Investment for Various Works and Procurement of spares for 76 MW Turbine at Dharasu Powerhouse, MB-II, Uttarkashi under Section 61 and 86 of the Electricity Act, 2003 read with the relevant regulations and guidelines of the Commission.

And

In the Matter of:

UJVN Limited,
"UJJWAL", Maharani Bagh, GMS Road,
Dehradun. **...Petitioner**

Coram

Shri M. L. Prasad **Chairman**
Shri Anurag Sharma **Member (Law)**
Shri Prabhat Kishor Dimri **Member (Technical)**

Date of Order: October 08, 2026

ORDER

This Order relates to the Petition filed by UJVN Ltd. (hereinafter referred as 'the Generator' or 'the Petitioner') seeking approval of the Commission under Section 61 and 86 of the Electricity Act, 2003 read with Regulation 22 (4) of Uttarakhand Electricity Regulatory Commission (Terms & Conditions for Determination of Multi Year Tariff) Regulations, 2024 (UERC Tariff Regulations, 2024) for seeking prior approval of Capital Investment for Various Works and Procurement of spares for 76 MW Turbine at Dharasu Powerhouse, MB-II, Uttarkashi.

Background

2. The Petitioner vide its letter No. M-1332/UJVNL/02/D(O)/B8 dated 08.12.2025 submitted its Petition under Section 61 and 86 of the Electricity Act, 2003 read with Regulation 22 (4) of Uttarakhand Electricity Regulatory Commission (Terms & Conditions for Determination of Multi Year Tariff) Regulations, 2024 (UERC Tariff Regulations, 2024) for seeking prior approval of Capital Investment for Various

Works and Procurement of spares for 76 MW Turbine at Dharasu Powerhouse, MB-II, Uttarkashi.

3. The Petitioner under the 'Facts of the case' has submitted that:

"

…

3.4 ManeriBhali –II project is a run of the river hydroelectric scheme in the Bhagirathi River with the capacity of 4x76 MW. Reservoir at Joshiyara Barrage feeds the water to run the hydro turbines at Dharasu Power House. All the four machines (each with 76 MW capacity) of the power house were commissioned in the year 2008 (Unit-1 on 17-02-2008, Unit- 2 on 10-03-2008, Unit-3 on 20-02-2008 & Unit-4 on 16-02-2008) and machines have started generation of electricity since March 2008.

…

3.20 ***RECOMMENDED MEASURES:-***

A:-PROCUREMENT

- *The above time for repair of top cover and Lower ring can be reduced by the replacement of spare top cover and Lower ring.*
- *Presently, in* ***MB-II there is only one top cover and one lower ring as spare which can be replaced in only one machine during annual maintenance.*** *If top cover/lower ring needs to be replaced in more machines during annual/capital maintenance,* ***there is no spare available hence the same top cover/lower ring needs to be repaired in-situ/workshop which requires more time and results in delay in annual maintenance.***
- *Further, the old two no.* ***Lower rings have got deformed & ovality has been observed.*** *Due to lack of spares these two deformed lower rings are being used by repairing which may have to be scrapped in near future/availability of spares. Also, during monsoon, hole have been observed in top covers which resulted in heavy leakage of water, the same was attended by shutting down the machine and only application of putty (when repairing by welding/grinding is not possible in peak season).*
- ***Guide Vanes****:- In Dharasu Power House* ***there is provision for dismantling of Lower cylinder, Runner and Lower ring along with guide vanes from the draft tube area without dismantling of complete machine from machine hall. This special feature was provided to facilitate removal of all above parts and replacement of the repaired one.*** *Considering the damages in guide vanes every year, each set of damaged guide vanes was sent for workshop repair at contractor works.*
- *Presently three spares and four installed Guide vanes set are available in plant.*
- ***Five Guide vane sets out of Seven Guide vane sets have been repaired more than 11 times and completed their expected lifespan (in term of repairing, not in age)*** *and undergo repeated repairing by welding, grinding and machining year by year which year by year alters the metallurgy and physical properties of the original material changing the basic characteristic of the parent material & original profile of the Guide vane resulting to*

significant negative impact on the overall performance and efficiency of the turbine.

- ***Lower Cylinder (upper Part of draft tube cone)*** *faces erosion and damages due to high silted Bhagirathi River water. The same is required to be dismantled, repaired and assembled during annual maintenance of individual machine every year. Each lower cylinder is dismantled and removed from draft tube area and sent for workshop repair at contractor works.* ***The process of workshop repair takes 30 to 35 days or more depending on the availability of spare capacity at workshop (including to & fro transportation time).*** *As per extent of damages in the lower cylinder, repairing time may be more which results in delay in annual maintenance of the said machine due to non-availability of spare Lower Cylinder.*

- *The non-availability of the spare lower cylinder has resulted in a restriction on reducing the downtime during the machine's annual maintenance period, as it takes* ***30 to 35*** *days for repairs and the cylinder also needs to be assembled in the same machine.*

- ***Runner:-*** *In Dharasu Power house there is provision for dismantling of Runner from the draft tube area without dismantling of complete machine from machine hall. This special feature was provided to facilitate removal of runner and replacement of the repaired one. Considering the damages in Runners every year, each damaged runner is sent for workshop repair at contractor works.* ***Repairing of runner takes 3-4-months time depending upon the quantum of erosion / damages.***

- *Several times due to excessive damages the runner becomes irreparable and extraordinary measures need to be taken in the interest of the generation such as Runner Profile needs to be developed on SS Plate (13 Cr 4 Ni) for each individual runner blade.* ***The SS Plate needs to welded/Fixed to the runner segments and the runner blades are built up by Welding. This may take approximately 4 to 5 months repairing time.***

- ***At present four spares and four installed runners are available in plant. Five out of Eight runners have been repaired more than 12 times and completed their expected lifespan (in term of repairing, not in age) and undergone repeated repairing by welding, grinding, machining and stress relieving year by year.*** *The process of repair when carried out year by year alters the metallurgy and physical properties of the original material, changing the basic characteristic of the parent material. Also, with every repair the original profile of the runner blades is altered because it is not practically possible to retain the original profile in the repaired runner resulting in decreased efficiency of the runner leading to problems like high vibration and reduced load capacity of the machine.*

Requirement of Spares: -

- *To address the challenges faced by Dharasu Power House, particularly due to erosion and damage to underwater components caused by the high silt content in the Bhagirathi River, along with repeated repairs, component life*

span completion, ovality in the two numbers Lower rings, and unavailability of spares, it is essential to procure sufficient number of Spares.

- *Consultant appointed by Hon'ble UERC also recommended that better inventory should be maintained to reduce the maintenance time.*
- *Considering the above it is proposed that following underwater components shall be procured: -*

S. No.	Parts	Unit	Spare Available	Spare to be procured	Remark
1	Top Cover	No	1	2	To avoid in-situ repair
2	Lower Ring	No	1	3	To avoid in-situ repair (Ovality in Two number Lower ring observed which may be scrapped in near future)
3	Guide Vanes	Set	3	2	5 Sets out of 7 completed their lifespan. (more than 11 times get repaired)
4	Lower Cylinder	No	0	2	No Spare is available
5	Runner	No	4	2	5 out of 8 runner completed their lifespan (more than 12 times get repaired)

- *By procuring the above parts the performance of plant in terms of Generation and PAFY shall be improved.*

B:- WORKS

1. *Up Gradation, Design, Engineering, Supply, Erection Testing and Commissioning of SCADA, Unit Cum Governor Panels along with VTA and Excitation System for four Units including AMC For Five Years After Guarantee Period.*

- *To increase availability of the machines and to increase the PAFY it shall be essential to run the Dharasu power House as peaking plant during lean discharge period. To maximize PAFM, optimum utilization of the storages at Joshiyara barrage is essential to provide peaking of 3Hrs in two parts for 1.5 Hrs in the morning and 1.5 Hrs in the evening, particularly in the month of March, April and May. In this way Dharasu Power House shall run at peak load for 1.5 Hrs in the morning then Machines stopped to increase the barrage level and again started in the evening for 1.5 Hrs in the evening then stopped/run at optimum load to increase the barrage level for next day morning peaking.*

  However, ***operation of Dharasu Power House for only morning and evening peaking shall increase the start-stops of the Machines. The increased start/stops of the machines shall require higher level of reliability and better performance of control systems, to increase the energy generation and maximize PAFY.***

- *To ensure the same and to maintain the higher level of performance of plant and* ***to improve the safety and reliability of control systems, it is necessary to provide the better control system and upgraded version of various essential equipment having latest state of the art technologies.***

The main control systems during starting and stopping of Machines are as below:

1. ***Turbine Governor Controller:-*** *The BHEL make Electro Hydraulic governor has been installed for each machine at Dharasu Power House. These systems were manufactured in 2004 and conceptualized before 2004. This system is based on BHEL proprietary Electro Hydraulic Transducer which is old technology. Also,* ***these governors are facing problems like their software getting erased on its own, which results in delay in Unit Startup.***

   The presently available Governors in the market are based on servo valves (e.g. MOOG valves) which are having precise control and processors with fast microprocessor as there has been marked development in technology in last 20 Years. Also, the feedback system for guide vanes servomotor is based on feedback rope and potentiometer while the latest guide vane feedback systems are directly mounted on the servomotor.

   Governor based on latest technology is essential for smooth and efficient startup and achieving rated speed in the shortest time, automatically attaining load on synchronization, load variation and smooth stopping of machine. Presently the governor is operating in manual mode and all operations e.g. start/stop/speed control/load variation is done manually.

   In view of more start/stop of machines it is essential to replace the old technology based governors with latest state of the art technology for increasing the safety of plant, reliability of control equipment and avoid mis-declaration in view of applicability of DSM.

2. ***Excitation system :-*** *The excitation system provided at Dharasu Power House is BHEL make manufactured in the year 2004 and commissioned in 2008.* ***This system is based on old discrete technology (IC based) and has individual cards for each function of the Excitation System.*** *Having more components leads to more chances of failure and thus decreased reliability.* ***The presently available systems are microprocessor based and provide better reliability and control and fault finding. In view of the above it is essential to replace the same with latest technology based Excitation System to improve the overall reliability and safety of the plant.***

3. ***Auto Synchronizer :-*** *The auto-synchronizer has the task of synchronizing the incoming machine with the grid by varying the speed and voltage of incoming machine and automatically closing the breaker. Presently the auto-synchronizer is not working.* ***It is essential to replace the auto-synchronizer to eliminate mal-operation due to human errors.***

4. ***Plant SCADA :-*** *the SCADA system at Dharasu Power House was installed and commissioned by BHEL in the year 2008. The system has three operators work stations, one historian and one engineering station. This system has maxDNA SCADA software which requires Windows 2000 operating system. Windows 2000 OS was released in year 2000 and the support for the same has already ended in year 2010. The workstation was originally provided by BHEL have become defective. To ensure proper monitoring of the*

machines, old workstation compatible with windows2000 were purchased from market and max-DNA software was installed on the same.

Keeping in view the obsolescence of the Windows2000 based systems and non-availability of driver software for Windows2000 it is essential to replace the plant SCADA with latest technology and Operating systems based SCADA for efficient operation of the plant from the central control room.

To maintain the higher level of performance of MB-II project for long period above mentioned all the control system need to be upgraded. This will ensure smooth and safe operation of plant with maximum energy generation and PAFY.

In view of above, following works are essential at Dharasu Power House:-

S. No	***Description of work***
1	*Digital Control cum* ***Governor System*** *along with it's associated accessories for Unit-1, Unit-2, Unit-3 & Unit-4 along with Control Room SCADA equipment's*
2	*Valve Table Assembly (VTA) broadly includes-Actuators, Main Distributing Valves- Feedback Transducers for Guide vane - Speed Sensors- Mechanical Over speed device- VTA Associated piping*
3	*Digital Excitation Panel along with (Without Excitation X-mer & Cables)- Excitation Rated Current 1250 A- Main & Backup Excitation Controller- Dual Thyristor Bridge*
4	*Dismantling of existing UCB Panels, Governor panels and Excitation Panels and Erection, Testing & Commissioning of New Unit cum Governor Panel, Control Room SCADA System, & VTA and Excitation Panel.*
5	*Annual Maintenance Contract for Digital Control cum Governor System, Valve Table Assembly and Digital Excitation Panel (After one year guaranty period)*
6	*Mandatory Spares for Control and Governor(VTA)*
7	*Mandatory Spares for Excitation System*

2. Supply, Installation, Testing and Commissioning of 90 kW Xylem Make Flygt Pumps for Cooling Water System.

- *In Dharasu Power House,* ***cooling water for turbine bearings, generator bearings, stator cooling, shaft seal cooling, and cooling of generator transformers for all four machines is provided through the cooling water*** *system. Sixteen no. water pumps have been installed at the TRC to lift water from the tailwater channel and supply cooling water to the turbine bearings, generator bearings, stator cooling, shaft seal cooling, and cooling of generator transformers for all four machines, after filtration through strainers.*
- *This is a specific feature of Dharasu Power House, where cooling water for various equipment is provided by lifting water from the tailrace, rather than tapping it from the penstock. This approach may have been implemented to protect various components from the direct use of silt-laden water from the Bhagirathi River, which could affect cooling efficiency by clogging the cooling lines and also cause damage to the system.*
- *This system is crucial, as a sufficient supply of cooling water for the aforementioned bearings, stator, and transformers is essential to operate the unit under safe conditions. Insufficient cooling water supply may result in*

increased temperatures in the bearings, leading to machine shutdowns and generation losses.

- *It is also worth mentioning that at the time of plant commissioning, 20 numbers, 90 kW Xylem Make Flygt pumps were provided, with 16 installed in the cooling system and 4 kept as spares or for use in the drainage system. Later, 4 additional pumps were procured in 2015-16, and 1 more pump was procured in 2022-23 to strengthen the system. However, two pumps were scrapped due to being in irreparable condition. As a result, a total of 23 pumps are available at Dharasu Power House, with 16 installed in the cooling system at the Power House TRC, 3 installed in the drainage system, and 4 pumps available as spares for replacement whenever any installed pump becomes defective*
- *These pumps have been installed in the TRC, where there is a continuous flow of water during machine operation due to the discharge of approximately 142 cumecs of water from the draft tubes of all the machines, which flows into the river. The pumps were installed just before the gate of the TRC. The Flygt make pumps have proven their performance in this high-velocity water environment, particularly in the turbulent and silt-laden water of the TRC.*
- *As mentioned above,* ***out of the 23 pumps, 18 have been in continuous use for*** *the last 17 years, undergoing multiple repairs, and are currently operating with reduced efficiency and also completed their life span.*
- *The water from the Bhagirathi River contains a high PPM of silt, which leads to the rapid erosion of pump components. During the monsoon season, these pumps operate continuously in high-velocity water environment, turbulent and silt-laden water, causing damage to their seals, impellers, casings, windings, and other parts.*
- *As per the previous record during monsoon seasons eight to ten pump's winding or other parts get damaged due to continuous running of pump in high silted river water. The repairing and rewinding process takes at least two to three month's time.*
- *Considering the two to three months of repairing time, it is critical to operate the cooling system with 18 pumps that have been in operation since commissioning and have outlived their lifespan. These pumps may become unrepairable in the near future.*
- *In view of the above, and considering* ***the importance of the cooling system for Dharasu Power House in terms of generation and safe operation of the machines, it is necessary to procure at least seven pumps to strengthen the system. The procurement of these seven pumps, along with the pumps previously purchased in 2015-16 and 2022-23, will enable the installation of three efficient pumps for each machine, totalling 12 pumps across all the*** *machines.*

…

3.21 The total cost of Various Works and Procurement of spares for 76 MW turbine at Dharasu Powerhouse M.B-II, Uttarkashi is as per details mentioned hereunder:

S. N	Description	Unit	Qty	Rate	Freight	Total Price	Amount (Rs.)	GST	TCS @1%	Total (Rs)
A	**Procurement of Top Cover for 76 MW Turbine at Dharasu power House.**									
1	Top Cover of 76 MW Francis Turbine	Nos	2	24900000		24900000	49800000	8964000	49800	58813800
B	**Procurement of Lower Ring for 76 MW Turbine at Dharasu power House.**									
2	Lower Ring of 76 MW Francis Turbine	Nos	3	15850180		15850180	47550540	8559097.2	47550.54	56157187.74
C	**Procurement of Guide Vane Set for 76 MW Turbine at Dharasu power House**									
3	Guide Vane Set for 76 MW Turbine	Set	2	29738000	892140	30630140	61260280	11026850	61260.28	72348390.68
D	**Procurement of Lower Cylinder for 76 MW Turbine at Dharasu power House**									
4	Lower Cylinder for 76 MW Turbine	Nos	2	9710660	291319.8	10001980	20003960	3600712.7	20003.96	23624676.29
E	**Procurement of Runner for 76 MW Turbine at Dharasu power House**									
5	Francis Runner for 76 MW Turbine	Nos	2	78613500	2358405	80971905	161943810	29149886	161943.8	191255639.6
F	**Up Gradation, Design, Engineering, Supply, Erection Testing and Commissioning of SCADA, Unit Cum Governor Panels along with VTA and Excitation System for four Units of 4 X 76 MW MB-II Dharasu Power House Including AMC For Five Years After Guarantee Period**									
6	Scada, Unit Cum Governor Panels along with VTA and Excitation System for four Units of 4 X 76 MW	Job	1	127000000		127000000	127000000	22860000		149860000
	Supply Installation Testing and Commissioning of 90 kW Xylem Make Flygt Pumps for Cooling Water System at Dharasu Power House.									
7	Supply Installation Testing and Commissioning of 90 kW Xylem Make Flygt Pumps	Nos	7	6486750	67023.03	6553773	45876411	8257754		54134165.23
									Total	**606193859.5**
									Say	**606193860**

…

3.22 ***Financing Plan and Phasing of Expenditure:***
That the Petitioner shall arrange Rs. 18.186 Crores as Equity (30%) and Rs. 42.434 Crores (70%) from financial institution/ banks. The total expenditure of Rs. 60.62 Crore including tax will be incurred during the period FY 2025-26 to FY 2027-28 as proposed in the DPR.

3.23 *Based on all the above, the Petitioner humbly prays before the Hon'ble Commission to kindly approve the total capital investment of ₹ 60.62 Crore including tax for* ***Various Works and Procurement of spares for 76 MW Turbine at Dharasu Powerhouse, MB-II, Uttarkashi.***

4. Further, the Petitioner under the section 'Relief sought' has mentioned that:

"*In view of submissions contained in the Petition, it is respectfully prayed that the Hon'ble Commission may kindly:*

…

ii. *Approve the total capital investment of ₹60.62 Crore including GST for Various Works and Procurement of spares for 76 MW Turbine at Dharasu Powerhouse, MB-II , Uttarkashi.*

iii. *The cost of proposed works has been developed on the basis of estimates as detailed in this filing. There may be difference between the present estimates and the cost of actual implementation. The Hon'ble Commission is therefore requested to kindly consider and approve the actual expenditure that may be claimed during the true-up of the expenditure.*
..."

5. The Petitioner alongwith its Petition has enclosed certified true copy of 128th Board of Directors meeting dated 04.09.2025. The resolution passed by BoD states that: -

"ITEM NO. 128.05: Various works and procurement Of Spares for 76 MW Turbine at Dharasu Power House, MB-II, Uttarkashi.

The Board was informed that several critical turbine components of the Dharasu Powerhouse, MB-II, are of obsolete design and are planned to be upgraded to enhance efficiency, safety, and reliability.

The Board noted that a consolidated DPR has been prepared for these works, at an estimated cost of Rs. 60.62 crore (inclusive of GST), and the same will be shared with UERC, post approval of the Board.

The Board discussed and noted that due to the conclusion of the term of Shri. Raj Kumar, as Independent Director, the Board does not have any requisite technical expert to review and evaluate such proposals.

After deliberation, the Board advised that the proposal may be referred to the technical expert for Due Diligence for examining/evaluation and the recommendation be placed before the Audit Committee for review. prior to submission to the Board.

In this regard, the Commission observes that the BoD of the Petitioner, in its 128th meeting, had advised that the proposal be examined by a technical expert and the recommendations be placed before the Audit Committee prior to its submission to the Board. The "Findings of the Technical Committee" are reproduced hereunder:-

"

(1) Dharasu Power House (4x76 MW) is a high-head hydroelectric plant (Head: 247 meters), which operates under challenging silt-laden conditions due to excessive sediment content in the Bhagirathi River. The combination of high water velocity and abrasive sediments (particularly quartz particles) causes severe erosion of underwater components such as runners, Top cover, Lower ring and guide vanes.

(2) A Petrographic study has confirmed that the river water contains more than 56% quartz, 7% feldspar and approximately 6% other hard particles, having sub angular shape with sharp edges, significantly contributing to the erosion and accelerated wear of underwater parts.

(3) *The hardness of quartz on the Mohs scale is 7, which exceeds the hardness of turbine steel. Even feldspar and other particles have the Hardness around 6 on the Mohs scale.*

(4) *This persistent erosion necessitates extensive annual maintenance, involving the complete removal of underwater parts and their offsite repair at the contractor's workshop. These maintenance activities often result in prolonged downtime due to the limited availability of spare components, which in turn adversely impacts the Plant Availability Factor (PAFM).*

(5) *Considering the high silt content and the damage occurring to the components, underwater parts of the machines should be replaced during maintenance and in-situ repairs should be minimized to save/optimize the maintenance time of each machine. Hence, sufficient spares for all machines should be made available in advance.*

(6) *Sh. Ratish Kumar, Former Director (Projects), NHPC Limited informed that other silt-prone hydro plants such as Salal (NHPC) and SJVN have adopted a replacement-only maintenance strategy, which allows them to complete underwater part replacement in minimal time, significantly improving availability and performance.*

(7) *The existing SCADA system at the plant is obsolete, and there is a pressing need to upgrade the SCADA, Unit-cum-Governor (UCG) panels along with VTA and Excitation Systems for all four units. This upgrade is essential to enhance the safety, reliability, and operational efficiency of the power system. Additionally, the Central Electricity Authority (CEA) has issued guidelines pertaining to cybersecurity and operational security in the power sector, which further necessitate the modernization of outdated control and monitoring infrastructure.*

(8) *The existing system fails to meet current operational demands, leading to inefficiencies in monitoring, control, and decision-making processes.*

(9) *Inconsistent data acquisition and storage have resulted in data gaps and potential compromise of data integrity, affecting system reliability and analysis.*

(10) *Obsolescence of hardware and software components has led to discontinued vendor support, making maintenance and troubleshooting increasingly difficult.*

(11) *The current system lacks the flexibility to integrate with modern technologies or accommodate future expansion, limiting its long-term viability.*

(12) *The cooling water for the machines is supplied from an external source; therefore, all associated pumps must operate at full efficiency to avoid machine shutdowns and generation loss caused by the unavailability of effective pumps.*

(13) *The proposal indicates that sufficient spares are not available at the plant. The existing components have been in use since 2008 and have undergone repairs more than ten times. As a result, the metallurgy and physical properties of the original material have deteriorated, altering the basic characteristics of the parent material. Repeated repairs are no longer sustainable and are unlikely to ensure long-term reliability.*

(14) *The operation and maintenance of the power house are currently in a compromised state, affecting overall performance, reliability, and long-term asset integrity.*

(15) The proposal estimates a cost of ₹60.62 crore, with a payback period of approximate 4 years."

Subsequently, the BoD, in its 130th meeting held on 16.10.2025, held that: -

"…

(1) A replacement-only maintenance strategy for underwater components – similar to that adopted in other silt-prone hydro power stations – should be implemented to minimize downtime and improve plant availability and performance.

(2) The existing SCADA system is obsolete, and its upgradation, along with that of the UCG Panels, VTA, and Excitation Systems, is urgently required to enhance safety, reliability, and operational efficiency.

…

The Board discussed and noted the same and based on the recommendation of the Audit Committee and thereby approved/passed the below resolution(s)."

…

***"RESOLVED FURTHER THAT** approval of the board be and is hereby accorded for Submission of the investment petition for "Various Works and Procurement of spares for 76 MW turbine at Dharasu Powerhouse M.B -II, Uttarkashi amounting to Rs. 60.62 crore including GST to the Hon'ble UERC for seeking prior approval."*

6. On preliminary examination of the Petition, the Commission vide its letter No. 88 dated 16.04.2026 issued following deficiencies/infirmities to UJVN Ltd. and directed it to submit point-wise reply before the Commission latest by **08.05.2026**:

"

1. UJVN Ltd. has cited Regulation 22 of the UERC (MYT) Regulations, 2024 as the specific legal provision under which the instant Petition has been filed. In this context, UJVN Ltd. is required to clearly specify the relevant sub-clause of Regulation 22 under which the individual items proposed in the instant Petition has been filed along with detailed justification in support of the same.

2. UJVN Ltd., in the instant Petition, has also sought investment approval for spares amounting to Rs. 40.23 Cr. In this regard, UJVN Ltd. is required to furnish detailed justification as to how such investment in spares is permissible under the provisions of the UERC (MYT) Regulations, 2024. Further, UJVN Ltd. is required to specify the relevant Regulation(s) along with the applicable sub-clause which provides for seeking prior approval for such expenditure on spares.

3. Regulation 21(11)(ii) of UERC (MYT) Regulations, 2024 categorically provides that the ceiling norm as a percentage of Plant & Machinery cost as per actual upto Cut off date for hydro generating stations would be 4%. In this regard, UJVN Ltd. is required to submit the details of spares in the following prescribed Format…

4. UJVN Ltd. is required to furnish details of procurements of each no. of spares in the format prescribed below …

5. UJVN Ltd. is required to submit soft copy (in excel format) for cost benefit analysis and break even analysis. Further, with regard to CBA, UJVN Ltd. is required to clarify following: -

(i) *UJVN Ltd. under its cost benefit analysis has anticipated an increase of 20 MW while computing the generation during Monsoon period. In this regard, UJVN Ltd. is required to substantiate the logic for 20 MW increased in generation considering the fact that the Petitioner has envisaged to procure 02 new runners i.e. from 04 running machines, 02 runners would be old one. Therefore, UJVN Ltd. is envisaging 10 MW enhancement by 02 machines operating by 02 new runners. UJVN Ltd. is required to clarify in this regard.*

(ii) *UJVN Ltd. has considered total PAFY of 86.41% whereas, the approved NAPAF for 5th control period is 85%. Further, UJVN Ltd. has not considered the impact of sharing of gains/losses. Thus, UJVN Ltd. is required to revise its CBA computation.*

6. *UJVN Ltd. is required to furnish Work Break Down Structure of Annual Maintenance (AM) & Capital Maintenance (CM) covering all activities depicting their linkages viz. start-start, start-finish, finish-finish & finish-start.*

7. *UJVN Ltd. is required to furnish details of duration of repair in case of in-situ and repair at vendor work place for last 5 years in the below mentioned format …*

8. *UJVN Ltd. is required to submit daily discharge data of last five years and corresponding generation of MB-II HEP in hard as well in excel copy for the month of May & June.*

9. *UJVN Ltd. is required to submit Unit-wise actual maintenance schedule (indicating activities of maintenance) for last five years along with Unit-wise expenditure on the same.*

10. *It has been observed that the BoD of the UJVN Ltd. in its 128th meeting held on 04.09.2025 advised to examine/evaluate the work proposed in the instant Petition through the technical expert. In this regard, UJVN Ltd. is required to submit the report of the technical expert.*

11. *The Commission vide its letter dated 04.12.2025 had categorically directed UJVN Ltd. to furnish certain information in standardized template in each BoD approval. However, the said information has not been furnished in the instant matter.*

    UJVN Ltd. is required to furnish the information in the standardized template issued alongwith the aforesaid letter.

12. *As the proposed items in the instant Petition result in downtime of the maintenance. In this regard, UJVN Ltd. is required to submit the rationale that why the instant work/items have not been proposed under R&M expenses.*

13. *UJVN Ltd. is required to furnish the details of Spares available in all its 11 LHPs in the format prescribed below …*

<u>Top covers</u>

14. *UJVN Ltd. in its instant Petition has proposed for procurement of 2 Nos. extra top covers as spare, while 1 no. top cover is already available in spare. In this regard, UJVN Ltd. is required to submit the justification for procurement of 2 nos. top covers as spare when 1 no. is already available as spare. Further, UJVN Ltd. is required to submit rationale that why the annual maintenance of each Unit with IN-SITU repairs cannot be completed within 40 to 50 days.*

15. *UJVN Ltd. is required to submit justification for not exploring the option i.e. 'the top cover taken out from 1st unit (under CM) may be got repaired outside at works within 60 to 80 days and the same may be used in last 4th machine (under CM) to be taken in maintenance i.e. 4th machine. The removed top cover can be easily repaired during the period of maintenance of 1st, 2nd & 3rd units and would be available to be replaced in 4th Unit. By adopting this methodology 2 machines will be with new/repaired top covers and 2 machines will be with INSITU repair top covers (under AM).'*

Lower Ring

16. *UJVN Ltd. in its instant Petition has proposed for procurement of 3 Nos. extra Lower Ring as spare, while 1 no. Lower Ring is already available in spare. In this regard, UJVN Ltd. is required to submit justification for not exploring the option i.e. 'the lower ring taken out from 1st unit (under CM) may be got repaired outside within 60 to 80 days and the same may be used in last machine to be taken in maintenance i.e. 4th machine. The removed lower ring can be easily repaired during the period of maintenance of 1st, 2nd & 3rd units and would be available to be replaced in 4th Unit. By adopting this methodology 2 machines will be with new/repaired lower ring, and 2 machines will be with INSITU repair lower ring (under AM).*

17. *UJVN Ltd. has also submitted that two rings would be scrapped due to ovality. In this regard, UJVN Ltd. is required to clarify if two rings are scrapable due to ovality then it would have 5-2=3 lower rings only which would be usable. This way only 1 extra lower ring may be procured as spare. However, it is not understood that when 4 out of 5 lower rings are in use then how 2 out of 5 nos. lower rings have been assessed to be declared as scrape. Further, it is observed that minimum 1 no. Lower ring with ovality must be fitted in the machine.*

    UJVN Ltd. is required to clarify how the deformed lower ring with ovality is functioning in the running machine and confirm Unit numbers in which two deformed lower rings have been installed.

Guide vanes

18. *UJVN Ltd. in its instant Petition has proposed for procurement of 2 Nos. extra Guide Vanes as spare, while 3 no. guide vanes are already available as Spare. In this regard, UJVN Ltd. is required to submit justification for not exploring the following option:-*

    'UJVN Ltd. submitted that there are 4 original sets of guide vanes & 3 set have been purchased subsequently. Further, UJVN Ltd. has submitted that 5 sets out of total 7 have become unrepairable. This imply that out of 5 unrepairable sets, 2 sets are being used in machines as on today (7-5=2). So only 3 sets out of 7 may be declared as scrap and not 5. Thus, leaving 4 sets repairable/usable. In these 4 sets, which are in use, 3 sets might be from the lot procured after commissioning and 1 might be from the original lot. So, procurement of two more sets of guide vanes prima-facie found to be not justified.'

Lower Cylinder (Runner Chamber)

19. *UJVN Ltd. in its instant Petition has proposed for procurement of 2 Nos. extra lower cylinder as spare. In this regard, UJVN Ltd. is required to submit the quantum of damages/erosion in lower cylinders of all the machines along with the color photographs of existing chambers of all the units.*

In this regard, UJVN Ltd. is required to specifically submit Unit no. where condition of lower cylinders is beyond repair. Further, UJVN Ltd. is required to submit the specific Unit-wise report in this regard.

Runner

20. *UJVN Ltd. in its instant Petition has proposed for procurement of 2 Nos. extra Runners as spare, while 4 no. Runners are already available as spare. In this regard, UJVN Ltd. is required to submit the rationale for proposing 2 more runners when 3 runners are in healthy condition as it has submitted that 5 out of 8 are beyond repairable.*

21. *UJVN Ltd. has submitted that physical and metallurgical properties of the repaired blades have been changed. In this regard, UJVN Ltd. is required to submit detailed analysis alongwith metallurgical test reports of the damaged portion of the runner blades.*

22. *UJVN Ltd. is also required to submit the Unit-wise load capacity (in MW) and Guide Vanes opening (%age)/discharge required (in cumecs) with the existing runners.*

23. *UJVN Ltd. is required to submit the details of total runners (working and spare) available in MB-I at present, which has been running for the last 40 years.*

Cooling Water Pumps:

24. *UJVN Ltd. is required to furnish Piping & Instrumentation Diagram (P&ID) for the cooling system depicting all working & standby cooling water pumps, source and equipment connected to the cooling water system.*

25. *UJVN Ltd. has submitted that initially total 20 pumps comprising of 16 cooling and 4 drainage pumps were installed in the plant. Further, it has procured 5 additional pumps. Out of aforesaid total 25 pumps, 2 pumps have been declared as unusable/scrap. Therefore, as on today, total 23 pumps are in working condition against required 20 pumps in the plant. In this regard, UJVN Ltd. is required to submit the following …*

…

Governor Controller

26. *With regard to the procurement of the new turbine governor controller, UJVN Ltd. is required to submit the following …*

…

Excitation System

27. *With regard to the procurement of the new Excitation System, UJVN Ltd. is required to submit the following …*

…

7. In response to the above observations/deficiencies, Petitioner vide its letter No. M-485/UJVNL/02/D(O)/B8 dated 11.05.2026 submitted its reply and furnished the following:

"

(1) The present Petition has been filed under the provisions of Regulation 22 of the Uttarakhand Electricity Regulatory Commission (Terms and Conditions for Determination of Multi Year Tariff) Regulations, 2024, specifically under the following sub-clauses:

1. Regulation 22(4) – Prior Approval of Capital Expenditure

Regulation 22(4) provides that:

"Any addition/modification to the existing assets exceeding Rs. 5 Crore in case of generating companies shall be undertaken only after obtaining prior approval of the Commission."

In the present case: Each individual item (except Lower Cylinder) exceeds the prescribed threshold of Rs. 5 Crore; and/or The proposed works form part of a combined capitalisation project amounting to approximately Rs. 60.62 Crore.

Accordingly, prior approval of the Hon'ble Commission is required and is being sought through the present Petition.

2.Regulation 22(2)(e) – Additional Capital Expenditure for Efficient Operation Regulation 22(2)(e) provides that:

"Any additional capital expenditure which has become necessary for efficient operation of the generating station shall be admissible, subject to technical justification and supporting documentary evidence."

The proposed capitalisation is justified on the following grounds:

(a) Reduction in Annual Maintenance Time …
(b) Increase in Machine Availability …
(c) Enhanced Generation Capacity…
(d) Evidence of Accelerated Asset Deterioration …

(2) ***Justification for Investment in Spares***

The Petitioner, UJVN Ltd., respectfully submits the following:

1. ***Applicability of Regulation 22(2)(e)***

…

The proposed investment in spares amounting to Rs. 40.23 Crore is permissible under Regulation 22(2)(e) of the Uttarakhand Electricity Regulatory Commission (MYT) Regulations, 2024, which allows additional capital expenditure necessary for efficient operation of the generating station.

"Any additional capital expenditure which has become necessary for efficient operation of the generating station or transmission system, as the case may be, shall be admissible, subject to technical justification and supporting documentary evidence."

The proposed investment in spares amounting to ***Rs. 40.23 Crore*** *is covered under the above provision.*

Justification:

- *As per DPR, high silt content (greater than 3000 PPM) has resulted in severe erosion of underwater components.*

- *Critical components have undergone **11–16 repairs**, compared to approximately **7.5 repairs** in (non silted plant)*
- *Due to such excessive deterioration, further repairs are not technically viable, and replacement through new spares is necessary for efficient operation of the generating station.*

2. Requirement of Prior Approval under Regulation 22(4)

Regulation 22(4) provides that:

"Any addition/modification to the existing assets exceeding Rs. 2.50 Crore in case of distribution licensees, Rs. 5 Crore in case of generating companies and Rs. 10 Crore in case of transmission licensees shall be taken up only after prior approval of the Commission."

Justification:

- *The total cost of proposed spares is **Rs. 40.23 Crore**, which exceeds the threshold limit of **Rs. 5 Crore** applicable to generating companies.*
- *Therefore, prior approval of the Hon'ble Commission is required and is being sought through the present Petition.*

3. Operational Requirement and Efficiency Improvement

In line with Regulation 22(2)(e), the expenditure is necessary for efficient operation.

Justification:

- *Availability of critical spares will reduce Annual Maintenance duration from **60 days to 40 days per unit**.*
- *This will improve machine availability and Plant Availability Factor (PAF), thereby supporting reliable operation and avoiding loss of generation.*

4. Supporting Evidence of Deterioration

As required under Regulation 22(2)(e) of the UERC (MYT) Regulations, 2024, the instant claim regarding deterioration/erosion of the equipment is duly supported with documentary evidence. In this regard, the relevant photographs depicting deterioration condition and the consultant's assessment/report substantiating the extent of damage and necessity of the proposed works are already available and enclosed in the DPR submitted along with the Petition.

Justification:

- *Key components such as runners and guide vanes have reached the end of their service life due to repeated repairs.*
- *Repeated welding has adversely affected the base material properties, leading to increased vibration levels and reduced hydraulic efficiency.*
- *Replacement of damaged blades using welded plates makes it difficult to maintain the original hydraulic profile and geometry of the runner.*

- *Welded joints between the repair plates and base metal are prone to early failure during operation, particularly under high silt load conditions, resulting in damage during the monsoon season.*
- *Such failures adversely impact full-load operation and lead to loss of generation during peak (monsoon) periods.*

Accordingly, further repairs are neither technically reliable nor economically viable, and replacement of components through new spares is necessary.

5. Position with respect to Regulation 21(11)

Regulation 21(11) provides a ceiling limit for capitalisation of spares.

Submission: *It is respectfully submitted that the proposed investment is in major capital spares, and previously capital spares was amounting to 2.15% of Plant & Machinery cost as on COD, is within the ceiling limit specified under Regulation 21(11) of the UERC (MYT) Regulations, 2024.*

The proposed investment is essential to ensure reliable, economical and efficient operation of the generating station considering the severe silt erosion and accelerated wear and tear of underwater components at Dharasu Power House. The proposed procurement of capital spares would help in reducing maintenance downtime, avoiding forced outages and ensuring higher generation availability, particularly during the monsoon season.

In view of the above, it is respectfully submitted that:

- *The proposed expenditure is admissible under Regulation 22(2)(e) of the UERC (MYT) Regulations, 2024.*
- *Prior approval is required under Regulation 22(4).*
- *The proposal is within the limits specified under Regulation 21(11).*

Accordingly, approval of the Hon'ble Commission is respectfully prayed for investment in spares amounting to Rs. 40.23 Crore.

(3) Copy attached as…

(4) Copy attached as…

(5) In reference to the above observation, it is respectfully submitted that:

Copy of Cost Benefit Analysis and Break-Even Analysis in Excel format is attached…

In the Cost Benefit Analysis, an increase of 20 MW has been anticipated while computing the generation during monsoon period. In this regard, Petitioner respectfully submits the following:

It is submitted that two new runners have already been procured and installed during FY 2024–25 and two additional runners are proposed to be procured under the instant Petition. After procurement of the proposed runners, a total of four new runners shall be available for phased replacement in machines and operation of all generating units.

At present, the generating units are operating with old and severely eroded runners. Due to continuous silt erosion and deterioration of runner blade profile, the machines

are unable to operate at rated capacity during the full monsoon season. In this regard, it is observed that:

(a) During monsoon season, one or more units are required to operate at reduced load due to excessive erosion and runner blade damage caused by high silt content;

(b) This results in reduction in machine efficiency, operational instability and reduction in machine output.

(c) The station presently operates at an average output of about 288 MW (approximately 72 MW per unit), though some units may operate at around 75–76 MW while comparatively deteriorated units operate at reduced load of around 70–72 MW.

With installation of new runners, the following operational improvements are expected:

Operation of units with new runners at near rated/above present operating capacity of approximately 79–80 MW per unit due to improved design, better hydraulic efficiency, and improved runner material having comparatively higher resistance against silt erosion and blade damage.

Accordingly, with a combination of 02 new runners and 02 comparatively better-condition existing runners, the station load is expected to increase from the present average level of about 288 MW to approximately 308 MW, thereby resulting in an increase of about 20 MW. The expected loading pattern is broadly as under:

- *02 units with new runners ≈ 80 MW each*
- *02 units with comparatively better old runners ≈ 74 MW each*

Total expected station load:(80 + 80 + 74 + 74) MW = 308 MW

It is respectfully submitted that the above assessment has been made considering practical operating conditions of the machines during monsoon period. The present operating condition and performance of existing runners are enclosed as …

Further, the newly installed runners are expected to operate with comparatively higher hydraulic efficiency, whereas old eroded runners require comparatively higher discharge due to efficiency loss caused by repeated repair/welding and runner damages during prolonged operation under severe silt conditions.

It is further submitted that the most deteriorated runners shall be de-capitalised, whereas comparatively better-condition runners shall continue in operation after necessary repair/refurbishment. Hence, with the combination as mentioned above, a 20 MW increase in load is achievable.

In view of the above, the estimated increase of approximately 20 MW in station generation during monsoon period is reasonable, technically justified, and based on practical operational assessment after scraping of most deteriorated runners.

Revised Cost Benefit Analysis considering approved NAPAF of 85% and impact of sharing of gains/losses as per applicable Tariff Regulations is attached …

(6) Copy attached as…

(7) Copy attached as…

(8) Copy attached as…

(9) Copy attached as…

(10) Copy attached as…

(11) Copy attached as…

(12) The Petitioner, UJVN Ltd., respectfully submits the rationale for proposing the subject items under Additional Capitalisation (Regulation 22) instead of R&M expenses as follows:

1. *Nature of Expenditure:- The proposed items, such as runners, top covers, lower rings, guide vanes, cooling pumps, and control systems, are high-value capital spares with long service life. As per applicable accounting principles and the Uttarakhand Electricity Regulatory Commission (MYT) Regulations, 2024:*
    1. *These assets provide enduring benefits beyond one financial year;*
    2. *They are not routine consumables used in day-to-day maintenance; and*
    3. *Under Regulation 22(2)(e), expenditure necessary for improving efficiency and addressing deterioration/obsolescence is admissible for capitalisation.*

    These items will reduce maintenance time and improve performance, resulting in multiple benefits:

    1. *UJVN Ltd. by increasing NAPAF and generation;*
    2. *State utility by providing higher in-house generation, especially during peak/monsoon period, thereby reducing purchase of higher-cost power; and*
    3. *Consumers by reducing overall expenditure of the utility through availability of cheaper generation instead of costly peak power procurement.*
2. *Routine Maintenance (R&M):-Routine R&M expenditure is generally intended for maintaining the existing assets in working condition, and the annual maintenance expenditure for these assets is already being booked under R&M head. However, the present case involves conditions beyond normal routine maintenance due to the following reasons …*

(13) Copy attached as…

(14) Justification for Procurement of 2 Nos. Top Covers (Additional Spare)

It is submitted that although 1 no. top cover is presently available as spare, the requirement of 2 additional top covers has been proposed, justification for the same as detailed below:

…

(15) Justification for Adopting Rotational Repair Strategy of Top Covers

…

(16) Justification for Rotational Repair Strategy of Lower Rings

…

Ovality Issue and Repairing (Lower Ring)

- *Ovality in the lower ring is corrected through mechanical pressing from the opposite side along with controlled heating. This process has been repeated multiple times to restore the ring to its required geometry;*
- *However, the deformed circular parts has a natural tendency to revert to its deformed (oval) shape even after repair. To maintain dimensional stability, temporary cross arms are welded across the ring to hold the corrected shape until installation …*

Justification for Proposed Procurement

The proposed procurement is justified on the following grounds:

- *For a 4-unit station, availability of one dedicated serviceable lower ring per unit is essential for reliable and independent maintenance;*
- *Existing lower rings are already deteriorated due to severe silt erosion, repeated repairs, and ovality, making rotational reuse technically unreliable …*

(17) It is respectfully submitted that the clarification sought by the Hon'ble Commission is addressed as under:

Present Availability and Utilization of Lower Rings

- *Presently, a total of 5 lower rings are available at the power station;*
- *Out of these, 4 lower rings are installed in the machines, and 1 lower ring is being maintained/prepared as spare (after repair) for replacement during the next maintenance cycle;*
- *Due to severe silt conditions prevailing at Dharasu Power House, all installed lower rings are subjected to heavy erosion and require extensive repair, either in-situ or at workshop, before reuse.*

Present Condition of Lower Rings

- *All installed lower rings are facing acute erosion and require repeated repair by welding and grinding for restoration of profile and dimensional accuracy;*

…

- *Technically, these two lower rings have reached a condition where they are liable to be scrapped due to excessive deformation and repeated repair cycles;*

However, if these two lower rings are scrapped immediately, only 3 lower rings would remain available (5 – 2 = 3), which would be insufficient for installation in all 4 units;

…

Clarification on Scrap Assessment vs. Usage

Although 2 lower rings are technically assessed as scrapable due to excessive ovality and repeated deformation, they are still being used in operation due to non-availability of adequate spare lower rings;

Accordingly, all available 5 lower rings are presently being used in rotation, as each lower ring requires repair and refurbishment before reuse under severe silt erosion conditions;

Hence, continued use of the deformed lower rings should not be construed as indication of healthy condition of the component, but only as an operational necessity arising due to shortage of spares.

…

Clarification on Installation of Ovality-Affected Lower Rings

…

Justification for Proposed Procurement

- *The proposed procurement of 3 additional lower rings, along with 1 existing spare lower ring, will ensure availability of 4 serviceable lower rings for installation in 4 generating units;*
- *However, since 2 of the existing lower rings are already in highly deteriorated condition and may require scrapping in future, further procurement may become necessary in phased manner;*

…

(18) In response to the observation, it is submitted that as per DPR, at present seven (7) guide vane sets are available at Dharasu Power House, comprising four (4) installed sets and *three (3) spare sets. The details of the available guide vanes are provided below …*

…

(19) Lower Cylinder (Runner Chamber)

1. Functional Importance:

The Lower Cylinder (Foundation Ring) is installed below the lower ring of the guide apparatus to facilitate the flow of water from the runner to the draft tube. The stationary labyrinth is mounted on this component, and the draft tube cone is connected at its lower end. Although it is a stationary component, it is essential for machine assembly and must be installed prior to alignment to ensure proper clearance between rotating and stationary labyrinths.

2. Non-Availability of Spare and Operational Constraint:

At present, no spare lower cylinder is available at Dharasu Power House. Therefore, immediately after dismantling, the component is required to be sent to the vendor's workshop for repair and coating and must be received back before the start of alignment. Any delay in receipt directly affects the maintenance schedule and impacts project performance in terms of generation, NAPAF, and supply to the State Utility and consumers.

…

(20) In response to the observation, it is submitted that as per DPR, at present eight (8) runners are available at Dharasu Power House, comprising four (4) installed and four (4) spare . The details of the available runners are provided below …

…

(21) Change in Physical and Metallurgical Properties of Runner Blades

…

It is a well-established in hydro turbine engineering and welding metallurgy that repeated welding and thermal cycling cause alteration in microstructure, including grain growth, residual stress accumulation, and variation in hardness and toughness. Literature and technical papers on hydro turbine maintenance indicate that multiple repair welds on stainless steel runners result in degradation of mechanical properties such as reduced fatigue strength, increased brittleness in localized zones, and susceptibility to cracking. The heat-affected zones formed during successive weld repairs experience thermal distortion and metallurgical transformations, which adversely affect the original properties of the material.

Further, in silt-prone hydro power stations, erosion-resistant materials are repeatedly overlaid through welding, which leads to dilution of base metal composition and changes in metallurgical characteristics over time. It is also to mention that beyond a certain number of repair cycles, the integrity and reliability of runner blades cannot be assured due to these cumulative metallurgical effects.

…

(22) Copy attached as…

(23) Copy attached as…

(24) Cooling Water System of Dharasu Power House

At Dharasu Power House, cooling water required for turbine bearings, generator bearings, stator cooling, shaft seal cooling, and generator transformer cooling for all four units is supplied through a dedicated cooling water system.

A total of sixteen (16) water pumps have been installed at the Tailrace Channel (TRC) to lift water from the tailwater channel. The pumped water is passed through strainers for filtration before being supplied to various cooling points, ensuring reliable and clean cooling water availability for all critical components.

This arrangement is a distinctive feature of Dharasu Power House, where cooling water is sourced from the tailrace instead of tapping it from the penstock. This design has been adopted considering the ***high head of the project****, as direct tapping from the penstock would involve very high pressure, making the cooling system complex, unsafe, and difficult to control. Additionally, the water from the Bhagirathi River carries significant silt load, which could lead to choking of cooling passages, reduced heat transfer efficiency, and damage to cooling circuits and associated equipment.*

The Piping & Instrumentation Diagram (P&ID) along with photographs is enclosed

…

(25) It is submitted that a total of 23 pumps are presently available at Dharasu Power House. Out of these:

16 pumps are installed in the cooling water system at the Power House TRC

3 pumps are installed in the drainage/dewatering system

4 pumps are available as standby spares for replacement whenever any installed pump becomes defective

It is further submitted that due to high silt content in the river, excessive leakage from shaft seals, lower bush housing, and upper bush housing is observed, particularly during the monsoon season when all machines operate at full load.

To counter this heavy leakage load, avoid flooding-like situations, and maintain safe machine operation under such critical conditions, 3 pumps have been deployed in the dewatering system along with some small-capacity pumps.

Thus, 20 pumps pertain to the cooling water system, out of which 18 pumps have been in continuous operation since commissioning, though subjected to repeated repairs.

…

(26) With regard to the procurement of the new Turbine Governor Controller, UJVN Ltd. respectfully submits the following:

1. Types of Problems Being Faced in Existing System

The following major challenges have been identified in the present Governor System …

Other faults/problems observed in the system are as follows:

1. Hunting is frequently observed in the Governor system, due to which smooth load regulation is not possible as desired. At times, load variation between 73 MW and 75 MW cannot be maintained smoothly, and the machine directly jumps from 73 MW to 75 MW. Similar problems are observed at other loading conditions also.

Further, synchronization of the machine takes more time due to hunting and unstable speed control response.

2. On a few occasions, automatic load throw-off and generation loss have occurred despite full availability of water. Gradual reduction in load is observed, followed by tripping of the machine.

…

(27) With regard to the procurement of the new Excitation System, UJVN Ltd. respectfully submits the following:

*1. **Type** of Existing System*

The existing excitation system installed in the plant is a Fully Static Excitation System.

2. Types of Problems Being Faced in Existing Excitation System

The following major challenges have been identified in the present excitation system …

…

8. Further, a meeting was held with the Petitioner at the Commission office on 21.05.2026 with Commission's officers & Expert Consultant. Subsequently, the Petitioner, vide its letter dated 03.06.2026, has submitted additional point-wise information on its earlier submission dated 11.05.2026 as detailed below: -

*(1) It is submitted that the average load of 288 MW, as stated in the petition, was derived based on the actual operating load data of the Power House over the last three years. The details are enclosed as**…**. It is further submitted that during the year 2024, one new runner was installed in Unit No. 2. The operating load range of this unit was observed to be between 77 MW and 79 MW. However, since the remaining units*

were still operating with old and deteriorated runners, the overall load had to be restricted to avoid excessive cavitation and adverse hydraulic conditions in the other units.

The operating details for the years 2024 and 2025 are enclosed as ***...***

(2) It is respectfully submitted that the observation of the Hon'ble Commission regarding the average maintenance period of less than 45 days per unit has been derived by considering the total period from shutdown of the first generating unit to synchronization of the last generating unit during a financial year and dividing the same by four units.

However, such methodology does not represent the actual maintenance duration of individual generating units, as it does not account for overlapping periods during which two units remain under simultaneous shutdown. At MB-II HEP, annual maintenance activities are planned in such a manner that maintenance of two units is carried out simultaneously, wherever feasible, to minimize the overall outage period of the Power House and maximize generation availability.

The detailed unit-wise maintenance records for the period FY 2020-21 to FY 2024-25 are enclosed as ***...****.*

(3) It is respectfully submitted that the Annual Maintenance Contract (AMC) for hydro-mechanical repairs is awarded through a single tender covering all four generating units of MB-II HEP. Under this contract, bidders quote item-wise rates based on their past experience, assessment of the likely extent of repairs, anticipated quantities of workshop repairing and in-situ repairing and the expected damage level of components during the contract period. Therefore, variation in quoted rates year to year basis for top covers is natural and depends upon the extent of erosion, cavitation damage, welding requirements, machining requirements, and HVOF coating area involved…

(4) It is respectfully submitted that the statement made in … regarding "more than 13 repair cycles" of Top Covers does not imply that the service life of underwater turbine components is only 13 years. The observation refers to the number of repair and refurbishment cycles undergone by the components and not their design life…

(5) Lower Cylinder (Runner Chamber)

…

At present, the ***Lower Cylinder of Unit No. 4 is in the most deteriorated condition****, where extensive erosion has been observed and the fixing holes have become enlarged and distorted due to repeated repairs and matching with ovality developed in the Lower Ring. Although the component is still repairable, but the reduction in maintenance time without spares is not possible due to limited time period.*

Accordingly, the proposal for procurement of spare Lower Cylinders has been made to reduce maintenance duration, avoid delays associated with workshop repairs during shutdown and improve machine availability and generation.

(6) In this regard, it is respectfully submitted that the metallurgical test report pertaining to the damaged runner blade is enclosed as …

The existing governor system is frequently operated in manual mode due to reliability concerns. In manual operation, start/stop sequences, speed regulation and

load control depend significantly on operator intervention, thereby increasing operational risks. Any sluggish response, hunting, synchronization delay or governor malfunction under such conditions may adversely affect machine safety, availability and grid operation.

Further, MB-II HEP is required to undertake frequent start-stop operations and peaking operation to meet grid requirements and NAPAF targets. Such operating conditions demand a fast, accurate and reliable governor system. Modern servo-valve-based digital governors provide significantly improved speed control, automatic synchronization, event logging, diagnostics, reliability and response characteristics compared to the existing G-40 system.

…

(7) In this regard, it is respectfully submitted that the Excitation System is one of the most critical components of a generating unit, as it is responsible for voltage regulation, reactive power control, and stable synchronization of the generator with the grid. Any malfunction in the excitation system directly affects the reliability, availability, and safe operation of the generating units.

During operation of the generating units, several recurring problems have been observed in the Excitation System:

(1) Failure or loss of Thyristors Bridges.
(2) Improper functioning of MVAR control from the Control Room.
(3) Tripping of Units during Synchronization after application of Excitation.
(4) Restricted Voltage build-up up to only 6–7 kV instead of rated voltage.
(5) Auto/Manual channel changeover failures.
(6) Malfunctioning of electronic modules/cards during machine starting and stopping.
(7) Intermittent faults in excitation control circuits.

…"

Commission's Observations, Views & Directions: -

9. Based on the examination and analysis of the Petition and the subsequent submissions made by the Petitioner, the observations, views and directions of the Commission are as follows: -

(1) The Petitioner, in the instant Petition, has sought prior approval of the Commission for capital investment for 'Various Works and Procurement of Spares for 76 MW Turbine at Dharasu Powerhouse, MB-II, Uttarkashi' (4x76 MW). The total estimated cost of the project, as submitted by the Petitioner, is Rs. 60.62 Crore (including GST), which has been duly approved by its Board of Directors in its 130th meeting held on 16.10.2025, with no provision for any variation in the approved cost.

(2) The Commission observes that the Petitioner, pursuant to the advice of its Board of Directors (BoD), got the proposal evaluated by the 'Technical

Committee'. Based on the findings and recommendations of the Committee as detailed at Para 5 of this Order, the BoD approved the proposal. The Commission has examined the aforesaid findings and observes that the 'Technical Committee', which included an independent technical expert, has carried out a detailed technical assessment of the proposed works. Considering the silt-prone operating conditions, repeated damage and repair of the underwater components and obsolescence of the existing control systems, the Committee recommended procurement of adequate Underwater Spares, Upgradation of SCADA, Unit Cum Governor (UCG) Panels, Valve Table Assembly (VTA) & Excitation Systems and strengthening of the Cooling Water System to minimise downtime and improve the reliability and availability of the plant. Accordingly, the Commission is of the view that the technical justification submitted by the Petitioner has been duly examined by the 'Technical Committee', and the requirement of technical evaluation raised by its BoD stands adequately addressed.

(3) With regard to the 'Scope of Work', the Commission observes that the Petitioner has proposed procurement of Underwater Spares, i.e. Top Cover, Lower Ring, Guide Vanes, Lower Cylinder and Runner, Upgradation, Design, Engineering, Supply, Erection, Testing & Commissioning of SCADA, Unit Cum Governor Panels along with VTA & Excitation System, and procurement of pumps for the Cooling Water System for the four generating units of Maneri Bhali-II HEP (Dharasu Powerhouse), as detailed below: -

Sl. No.	**Parts**	**Spare Available (in no.)**	**Spare to be procured (in no.)**	**Total Cost of Proposed Procurement (Rs. in Cr.)**
1.	Top Cover of 76 MW Francis Turbine	1	2	5.88
2.	Lower Ring of 76 MW Francis Turbine	1	3	5.62
3.	Guide Vanes of 76 MW Francis Turbine	3	2	7.23
4.	Lower Cylinder of 76 MW Francis Turbine	0	2	2.36
5.	Runner of 76 MW Francis Turbine	4	2	19.13
6.	SITC of 90 kW Xylem make Flygt pumps	4	7	5.41
Sub Total (Sl. No. 1 to 6)				**45.63**
7.	Upgradation, Design, Engineering, Supply, Erection, Testing & Commissioning of SCADA, Unit Cum Governor Panels along with VTA and Excitation System for four units of MB-II HEP including AMC for 5 years after guarantee period.			14.99
Sub Total (Sl. No. 1 to 7)				**60.62 (including GST)**

The Petitioner has sought approval of the aforesaid works under Regulation 22(4) read with Regulation 22(2)(e) of the UERC Tariff Regulations, 2024. Regulation 22(4) mandates prior approval of the Commission for any addition/modification to the existing assets of a generating company exceeding Rs. 5 Crore, whereas Regulation 22(2)(e), on which the Petitioner has primarily relied for the admissibility of the proposed expenditure, provides as under: -

> ***"Any additional capital expenditure which has become necessary for efficient operation of generating station*** *or transmission system as the case may be. The* claim *shall be substantiated with the technical justification duly supported by the documentary evidence like test results carried out by an independent agency in case of deterioration of assets, report of an independent agency in case of damage caused by natural calamities, obsolescence of technology, up-gradation of capacity for the technical reason such as increase in fault level." **[Emphasis Added]***

The aforesaid provision makes it clear that additional capital expenditure for efficient operation of a generating station is admissible only when the claim is substantiated with technical justification, duly supported by documentary evidence such as test results of an independent agency in case of deterioration of assets, or in case of obsolescence of technology. In the instant case, the Commission observes that the Petitioner has substantiated its claim with (i) the condition and repair history of the underwater components, which have undergone 11 to 16 repair cycles within about 17 years of operation; (ii) the metallurgical test report of the damaged runner blade; (iii) the petrographic study confirming more than 56% quartz content in the suspended sediments of the Bhagirathi River; (iv) the obsolescence of the existing Windows 2000 based SCADA, the IC based excitation system and the electro-hydraulic governors, for which OEM support is no longer available; and (v) the recommendations of the 'Technical Committee', including an independent technical expert, which have been accepted by its BoD.

With regard to the procurement of spares, the Commission observes that the UERC Tariff Regulations, 2024 do not contain any specific provision for the capitalisation of capital spares after the cut-off date. The ceiling norm

specified under Regulation 21(11) pertains to the initial spares capitalised as a part of the capital cost of the generating station up to the cut-off date and, therefore, the instant proposal, which pertains to additional capitalisation after the cut-off date, has been examined on its own merits under Regulation 22(2)(e) of the aforesaid Regulations. In this regard, the Commission has taken note of the fact that MB-II HEP is a high-head (247 m) run-of-the-river station operating under severe silt conditions, wherein the abrasive sediments of the Bhagirathi River, predominantly hard and sharp-edged quartz particles, cause accelerated erosion of the underwater parts and result in prolonged annual maintenance in the absence of adequate spares. These site-specific conditions distinguish MB-II HEP from the other generating stations of the Petitioner.

Accordingly, the Commission is of the view that the proposed works qualify for consideration under Regulation 22(2)(e) of the UERC Tariff Regulations, 2024. However, the necessity and quantum of each item have been examined separately in the succeeding paragraphs. The investment approved by the Commission shall be considered as additional capitalisation of Maneri Bhali-II HEP and shall be treated in the same manner as other investments approved by the Commission, subject to prudence check at the time of truing up and the applicable provisions of the aforesaid Regulations.

(4) With regard to the funding of the instant project, the Petitioner has submitted that the project is proposed to be funded in a debt-equity ratio of 70:30, wherein 70% of the project cost amounting to Rs. 42.434 Cr. is proposed to be met through debt from financial institutions/banks, while the remaining 30% amounting to Rs. 18.186 Cr. is proposed to be met through equity. In this regard, the Commission is of the view that the Petitioner should explore the possibility of availing grant/cheaper debt, if any, available under the schemes of MoP/GoI/GoU, so as to reduce the burden on the beneficiaries.

(5) With regard to the Cost Benefit Analysis (CBA), the Petitioner has submitted that the proposed procurement of spares and replacement of critical components would improve the availability and generation of the generating

station, reduce the maintenance downtime and enhance its operational reliability. The CBA submitted along with the Petition had certain infirmities, viz. consideration of PAFY of 86.41% against the approved NAPAF of 85% and non-consideration of sharing of gains/losses, which were rectified by the Petitioner in its revised CBA submitted vide letter dated 11.05.2026. On examination of the revised CBA, the Commission observes that the Petitioner has assessed the benefits under three scenarios, namely benefit **'For UPCL', 'For UJVN Ltd.'** and **'For Consumers of the State'**, considering various factors as detailed below: -

(Rs. in Cr.)

Sl. No.	Description	Net benefit for UPCL	Net benefit for UJVN Ltd.	Net benefit for Consumers of the State
(I)	Considering enhanced generation of 20 MW during monsoon period (16th June to 30th September, considering 97 days of actual generation & 10 days for forced outage)	4.92	3.27	16.2
(II)	PAF gain considering enhanced generation of 20 MW for 92 days (1st July to 30th September)	2.67		4.96
(III)	PAF gain due to reduction in Maintenance days by 80 days (20 days per machine)	8.71		16.4
(IV)	Total Gain in 1 Year *(Sum of the applicable benefits under Sl. Nos. (I) to (III), as applicable)*	16.30	3.27	37.68
(V)	Total Gain/Benefit in 15 Years (*considering 15 Year Life Span of Proposed Equipment*)	244.85	49.08	565.20
(VI)	Total Expenditure/ Investment in Rs. Crore	**60.62**		
(VII)	Benefit to Cost Ratio	4.03	0.81	9.32
(VIII)	Pay Back Period in Year	3.71	18.52	1.60

From the aforesaid table, it is observed that out of 3 scenarios of benefits to be accrued 'for UJVN Ltd.', for UPCL' and 'for Consumers of State', the maximum benefit appears with context to 'Consumers of State' followed by UPCL and thereafter for UJVN Ltd. This depicts that the proposal of the Petitioner if implemented successfully, would by and large result in substantial benefit for the Consumers of State.

From the above table, it is observed that, out of the three scenarios, the benefit is the highest for the 'Consumers of the State' (Benefit to Cost Ratio of 9.32 with a payback period of 1.60 years), followed by UPCL (Benefit to Cost Ratio of 4.03 with a payback period of 3.71 years). However, the

Benefit to Cost Ratio for UJVN Ltd. itself works out to only 0.81 with a payback period of 18.52 years, which exceeds the assumed life of 15 years of the proposed equipment. This indicates that the proposal, on a standalone basis, is not remunerative for the Petitioner, and its justification primarily rests on the benefits likely to accrue to UPCL and the consumers of the State on account of higher availability of comparatively cheaper hydro generation in lieu of costlier power purchase. Thus, the proposal of the Petitioner, if implemented successfully, would by and large result in substantial benefit to the consumers of the State.

The Commission further observes that the benefit to UPCL has been assessed by applying the Marginal Cost of Supply to the additional generation from MB-II HEP based on the assumption that every unit of additional generation from the station would replace an equivalent quantum of power that UPCL would otherwise procure from alternative sources at the margin. The Commission is of the view that the benefits so assessed are only indicative, as the actual benefit would depend upon the hydrology, the actual reduction in the maintenance period and the actual enhancement in the loading of the generating units achieved after implementation of the proposal. Accordingly, the Commission has linked a part of the approved investment with the actual performance of the generating station, as discussed in Para 9(14) of this Order.

The Commission further observes that the Petitioner has envisaged that the proposed procurement of spares and replacement of critical components would reduce the annual maintenance period from about 60 days to 40 days per unit, i.e. a reduction of 20 days per unit and 80 machine-days for the four units, thereby improving the availability of the generating units, and would enable additional loading of about 20 MW (from 288 MW to 308 MW) during the monsoon period, resulting in additional generation. The entire CBA of the Petitioner is based on these commitments. In this regard, the Commission is of the view that the Petitioner should adhere to the commitments made in its submissions with respect to the maintenance period/downtime, availability of the generating units, higher loading of 20

MW during the monsoon period and peaking operation during the lean period.

Further, the Commission observes that the instant proposal of the Petitioner is based on a 'replacement-only maintenance strategy', as recommended by the 'Technical Committee' and approved by its BoD, wherein, the worn-out underwater components are replaced with serviceable spares during the annual maintenance and the removed components are repaired at the vendor's works instead of being repaired *in-situ*. Although, such a strategy would reduce the outage period of the units, the Commission is of the view that total dependence on repairs at the vendor's works/factory would not be a conducive, as the same would increase the repair and transportation cost as well as the inventory requirement. Therefore, the Petitioner is advised to assess the extent of damage of each component, viz. Top Cover, Guide Vanes, Lower Ring, Lower Cylinder and Runner, after dismantling of the machine and, thereafter, take a prudent decision whether the component is to be replaced with a spare or is to be repaired *in-situ*, keeping in view the time and cost involved.

(6) With regard to the proposed procurement of Underwater Spares, Upgradation, Design, Engineering, Supply, Erection, Testing & Commissioning of SCADA, Unit Cum Governor Panels along with VTA & Excitation System and pumps for the Cooling Water System, the item-wise observations and views of the Commission are as follows: -

A. <u>Underwater Components</u>

(a) <u>Top Cover</u> - The Commission observes that the Petitioner has submitted that *in-situ* repair of the Top Cover is difficult due to space constraints and the requirement of overhead welding & grinding works. The liner plates provided on the Top Cover also get eroded at various locations during operation, which may expose the base metal. However, the Top Cover is comparatively less exposed to the main water flow through the turbine and is, therefore, less prone to erosion than the

components directly exposed to high-velocity water flow. Its lower/inner surface, however, remains subjected to water pressure and some water exposure during operation. The Top Cover also forms an important structural part of the turbine and provides support and enclosure to the guide vane and associated components of the distributor assembly.

The Commission further observes that one spare Top Cover is already available. The said spare can be repaired through an outside agency during the annual maintenance period and thereafter used for replacement, as and when required.

The Commission is of the view that, considering the difficulties involved in carrying out major repairs at site, maintaining one extra spare Top Cover is a suitable maintenance arrangement. Availability of a repaired spare Top Cover would facilitate timely replacement, as and when required, and reduce the time required for *in-situ* repair. The Top Cover removed from a unit can thereafter be repaired and made available for use in another unit.

Here it is prudent to highlight that if the Petitioner effectively executes and mobilizes its manpower and vendor so that the top cover removed from 1st unit is recovered back for replacement for the 3rd unit under annual maintenance i.e. effectively the Petitioner has to get the repaired top cover from vendor works within 90-95 days from the date of being dismantled for enabling it to be placed in 3rd unit. The Commission opines that top cover is not a moving part and thus damages on the same would be limited in comparison to the rotating part of the Hydro machine. Not necessarily every top cover needs to be sent to the vendor works and the same depends on the extent of damage, the top cover with less

damages can be repaired *in-situ* as well. Thus, Commission finds it prudent to allow procurement of 01 Top cover as spare instead of 02 top covers desired by the Petitioner as spares.

(b) **<u>Lower Ring</u> -** The Commission observes that the Petitioner has submitted that the liner plates of the Lower Ring are subjected to significant erosion, as the guide vanes are directly exposed to water flow during operation. The guide vanes are supported at their lower side by the Lower Ring and at their upper side by the Top Cover. Thus, the Lower Ring forms an important part of the guide vane supporting arrangement and is located within the water passage. Due to the water flow in the area below the guide vanes, the liner plates of the Lower Ring are subjected to significant wear. As per the Petitioner submission, at several locations the liner plates have been completely eroded/washed away, exposing the base metal. Replacement of the liner plates through *in-situ* repair is difficult due to space constraints and increased erosion. The damage in lower ring are predominantly on liner plates as water strikes the bottom area of guide vanes.

The Commission further observes that the Lower Ring is relatively lighter in weight and larger in diameter, due to which it may become oval during handling. Such deformation can create difficulties during assembly and may increase the time required for maintenance. The Petitioner has further submitted that out of the existing 07 Lower Rings (4 running + 3 spares), two have become oval and are to be scrapped.

The Petitioner has proposed procurement of 03 additional Lower Rings, which would increase the total availability to eight rings, comprising four rings for service and four rings for one-to-one replacement. The proposed

arrangement is intended to facilitate quicker replacement and reduce the maintenance period of the units.

The Commission is of the view that the condition of the existing Lower Rings and the difficulties associated with their repair at site justify the availability of additional rings for replacement. The proposed arrangement would enable a damaged ring to be replaced directly, while the removed ring can subsequently repaired for future use.

(c) **Guide Vanes -** The Commission observes that the Petitioner has submitted that 07 sets of Guide Vanes are presently available. Out of these 07 sets, 04 sets belong to the original lot and have undergone extensive use and repeated repairs, while the remaining 03 sets are in comparatively better condition. The Petitioner has proposed procurement of two additional sets to ensure adequate availability for maintenance and replacement requirements.

The Commission further observes that the Guide Vanes are an important part of the turbine and are directly exposed to water flow during operation. They regulate the quantity of water entering the Runner and direct the water towards the Runner at the required angle. The opening and closing of the Guide Vanes are controlled through the governor and operating mechanism, including the servomotor, regulating ring and linkages. The Guide Vanes are arranged between the Top Cover and Lower Ring and their proper condition and movement are necessary for maintaining the required water flow towards the Runner. Any problem in the Guide Vanes or their operating mechanism may affect water flow, turbine performance and generation. However, the water thrust acting on the Guide Vanes is comparatively lower than that acting on the Runner. Further, unlike the Runner, the Guide Vanes do

not undergo continuous rotation and are primarily subjected to opening and closing movements during operation. The 07 sets of Guide Vanes are already available. The said Guide Vane sets can be restored through an outside agency during the annual maintenance period and thereafter used for replacement, as and when required.

The Commission is of the view that, considering the existing availability of 07 sets, including 03 sets in comparatively better condition, maintaining one additional spare set would be adequate to facilitate timely replacement and future maintenance requirements. The Guide Vane set removed from one unit can thereafter be restored and made available for use in another unit.

Accordingly, the Commission considers it prudent that the Petitioner effectively plans and mobilizes its manpower and vendor works so that the Guide Vane set removed from the 1st unit is restored and made available for replacement in the 3rd unit during the annual maintenance period. The Petitioner shall ensure that, wherever, the extent of damage necessitates sending the set to the vendor, the restored Guide Vane set is received back within 90-95 days from the date of dismantling, so that it can be placed in the subsequent unit during the scheduled annual maintenance.

Depending upon the extent of damage, not every Guide Vane set needs to be necessarily sent to the vendor's works and may also be restored *in-situ*, wherever technically feasible. Although the Guide Vanes are movable components, they do not undergo continuous rotation like the Runner and are primarily subjected to opening and closing movements along with hydraulic thrust during operation. Accordingly, the extent of wear and damage would generally be lower than that

of the continuously rotating parts of the hydro machine. Thus, the Commission finds it prudent to allow one additional set of Guide Vanes instead of two sets proposed by the Petitioner.

(d) **Lower Cylinder** - The Commission observes that the Petitioner has submitted that no spare Lower Cylinder is presently available. The Lower Cylinder is installed at the bottom portion of the machine and remains exposed to silt-laden water during operation. Consequently, it is susceptible to erosion and damage. The component forms an important part of the lower portion of the turbine assembly and provides the required boundary and support in the lower water passage.

The Commission further observes that the Lower Cylinder is required to be dismantled from the draft tube area during annual maintenance and transported to the contractor's workshop for repair. Such repair generally takes about 30–35 days or more, depending upon the extent of damage and the availability of manpower, machinery and other resources. Extensive damage may further increase the turnaround time and affect the timely completion of maintenance. In the absence of a spare, the machine remains down till the repaired Lower Cylinder is made available during the maintenance period. Accordingly, the Petitioner has proposed procurement of 02 nos. spare Lower Cylinders to facilitate replacement during annual maintenance and minimise unit outages.

The Commission is of the view that the Lower Cylinder is an important component of the turbine assembly, as its proper condition is necessary to maintain the required configuration of the lower water passage and support reliable operation of the machine. Considering its continuous exposure to silt erosion, the absence of a spare and the considerable workshop turnaround time, availability of 02 spare Lower

Cylinders would enable immediate replacement of damaged components, while the removed cylinder can be repaired separately for subsequent use.

Thus, the Commission allows 02 nos. Lower Cylinders which would reduce dependence on workshop repair schedules, facilitate timely completion of annual maintenance and minimize the possibility of extended unit outages and associated generation loss.

(e) **Runner -** The Commission observes that the Petition has requested for procurement of 02 Nos. additional spare runners. Further, it is observed that the Petitioner has submitted that 05 runners have undergone more than 12 repairs during about 17 years of service. The repairs have involved repeated welding, grinding, machining and stress relieving. The repeated repair interventions may affect the original geometry and designed profile of the runner blades. Any significant change in the blade profile may disturb the designed flow of water through the runner, resulting in increased hydraulic losses, reduction in turbine output and higher vibration.

The Commission further observes that the runner is the primary energy-converting and one of the most critical components of the hydro generating unit, as the hydraulic energy of water is transferred through the runner blades to produce mechanical rotation of the turbine shaft. The runner blades are continuously subjected to high-velocity water flow and hydraulic forces.

In addition, the presence of silt in the Bhagirathi river water causes erosion and surface damage, while low-pressure conditions at the runner may lead to cavitation and associated pitting. These effects may progressively deteriorate the blade surface and hydraulic profile.

The repair of a runner requires about 3–4 months, depending upon the extent of damage. In cases of excessive damage, the runner may become irreparable through normal repair methods and may require additional restoration measures, including development of the required profile using 13Cr-4Ni stainless steel plates. Such extensive repair may further increase the period of non-availability of the runner and may affect the availability of the generating unit.

The Commission is of the view that, considering the repeated repair history, deterioration of the runner profile, exposure to high-velocity and silt-laden water, possibility of erosion/cavitation damage and the long repair period, continued dependence only on repair of the existing runners may result in prolonged outage in case of major damage. Availability of 01 spare runner for one-to-one replacement would enable the damaged runner to be replaced promptly, while the removed runner can be taken up separately for repair. This would reduce the dependence on the repair turnaround time, facilitate early restoration of the generating unit and minimize the possibility of extended outage and associated generation loss.

The Commission directs the Petitioner that, prior to procurement and installation of 01 spare runner, the Petitioner shall undertake due technical assessment to establish its compatibility with the existing turbine and hydraulic system. The Petitioner should also ensure that the blade profile, dimensions, material, clearances, design head, discharge, rotational speed and other relevant hydraulic and mechanical parameters of the proposed runner are duly examined and compared with the existing runner. The Petitioner shall also ensure that the proposed runner, upon

installation, does not adversely affect the turbine output, efficiency, vibration levels or other operating parameters.

B. <u>Upgradation, Design, Engineering, Supply, Erection Testing and Commissioning of SCADA, Unit Cum Governor Panels along with VTA and Excitation System</u>

(a) <u>Supervisory Control and Data Acquisition (SCADA) System–</u> The Commission observes that the Petitioner has submitted that, in order to improve the availability of the generating units and PAFY, Dharasu Powerhouse is required to operate as a peaking plant, including during the lean discharge period (winter season). This requires a reliable and responsive control system for safe and quick operation of the generating units and to meet the system requirements. The existing SCADA system is very old and does not have maintenance support from the original supplier, M/s BHEL and which is based on MAXDNA SCADA software requiring Windows 2000 operating system. The said operating system was introduced in the year 2000 and its support has already been discontinued. Accordingly, the existing SCADA system has become obsolete and requires upgradation.

Further, the Commission has observed that the SCADA system forms an important part of the plant control and automation infrastructure, as it enables real-time acquisition and display of operating parameters, alarm & event monitoring, system status indication and supervisory control of the generating units and associated equipment. The existing system is based on Windows 2000 operating system and MAXDNA SCADA software, and that OEM maintenance support is no longer available. The obsolescence of the underlying software platform may affect the availability of technical support, system maintenance and replacement of hardware/software components.

The Commission is of the view that the existing SCADA and associated control system needs to be upgraded considering its obsolete software platform and non-availability of OEM maintenance support. The upgraded system shall provide reliable real-time monitoring, data acquisition, alarm/event handling, supervisory control and communication with the plant control systems, thereby facilitating safe and responsive operation of the generating units.

The Commission directs the Petitioner to ensure that the upgraded SCADA system is compatible with the turbine-governor, Unit Control System, excitation system and other relevant plant equipment, with **proper integration, redundancy and necessary communication interfaces and complies with the cyber security requirements specified by the CEA from time to time.**

(b) **Excitation System –** The Commission observes that the Petitioner has submitted that the existing excitation system installed at Dharasu Powerhouse is of BHEL make, manufactured in 2004 and commissioned in 2008. The system is based on old discrete, IC-based technology, wherein individual components are provided for different functions of the excitation system. The large number of individual components increases the probability of component failure and makes fault identification and maintenance comparatively difficult.

The Petitioner has further submitted that the presently available excitation systems are based on microprocessor technology, which provides improved reliability, faster response and better fault diagnosis. Considering the importance of the excitation system and non-availability of

spares for the existing obsolete technology, the proposed replacement may be considered as a one-time investment.

Further, the Commission has observed that the excitation system is a critical part of the generating unit, as it controls the field excitation of the generator and plays an important role in maintaining generator terminal voltage and reactive power under varying operating and grid conditions.

The Commission allows the proposed replacement of the existing excitation system with a modern microprocessor-based system shall be considered in terms of improved reliability, faster excitation response, voltage regulation, fault diagnosis and response to variations in grid conditions.

The Commission directs the Petitioner to ensure that the proposed excitation system is technically compatible with the existing generator and associated control systems and complies with the applicable grid requirements. The proposed system shall also have adequate protection and monitoring features & availability of technical support and spares during its service life.

(c) **Auto Synchronizer -** The Commission observes that the Petitioner has submitted that the existing Auto Synchroniser System installed at Dharasu Powerhouse is not functional and the generating units are presently being synchronised with the grid through manual control. The Petitioner has further submitted that manual synchronization may result in out-of-step synchronisation, which may cause electrical and mechanical jerks in the generating units. Accordingly, the Petitioner has proposed procurement of a new Auto Synchroniser System to avoid such instances and ensure safe and reliable synchronisation of the generating units with the grid.

Further, the Commission has observed that the Auto Synchroniser is an important control function for safe synchronization of the generating unit with the grid. The Auto Synchronizer regulates the speed and voltage of the incoming generating unit and provides the closing command to the main circuit breaker when the required synchronising conditions are achieved. The manual synchronization may result in mismatch of voltage, frequency and phase angle, leading to electrical and mechanical stresses in the generating unit.

The Commission is of the view that a functional Auto Synchroniser is essential to ensure safe and reliable synchronisation of the generating units and to minimise the risk of improper or out-of-step synchronisation and hence the same is allowed.

(d) **Turbine Governor -** The Commission observes that the Petitioner has submitted that the existing turbine governor system at Dharasu Powerhouse is based on an older technology and has been in service for a considerable period. The existing system has limitations with regard to SCADA integration, remote operation, fault diagnosis, speed & load regulation, and synchronization, which may affect the operational responsiveness and reliability of the generating units.

The existing governor is presently operated manually through the HMC cabinet at the machine floor and does not provide adequate provision for operation from the central control room. The reported issues relating to sluggish response, hunting, load fluctuations and delayed synchronization, particularly during frequent start/stop operations and changing grid conditions, indicate limitations in the operational capability of the existing system.

Further, the Commission has observed that the existing system has become difficult to maintain due to obsolescence, limited availability of spares and non-availability of OEM support. Further, adequate control of speed rise during load throw-off is an important requirement for safe operation of the generating units.

The Commission is of the view that, considering the obsolescence of the existing governing system, non-availability of support from the original manufacturer/supplier, M/s BHEL, and difficulties in synchronization, speed variation, start/stop and load regulation, including control during load throw-off, replacement of the existing system with a modern servo-based governor system is essential to improve the reliability and operational performance of the generating units. The proposed system is also expected to reduce troubleshooting time and associated generation losses and improve the operational response during peak demand. Hence, the Commission allows the same.

C. <u>Cooling Water System –</u>

The Commission observes that the Petitioner has submitted that the cooling water pumps are critical for cooling of turbine bearings, generator bearings, generator stator, shaft seals and generator transformers. The cooling water is lifted from the Tail Race Channel (TRC), which is a specific feature of Dharasu Powerhouse. At the time of commissioning, 20 Nos. Xylem Make Flygt pumps of 90 kW capacity were installed, out of which 16 pumps were installed in the cooling system, with 4 pumps for each machine, while 4 pumps were kept as spares or for use in the drainage system. Subsequently, 4 additional pumps were procured during 2015-16 and 1 pump during 2022-23 to strengthen the system. However, out of the 25 pumps, 2 pumps were scrapped, leaving 23 pumps presently

available at Dharasu Powerhouse, of which 16 are installed in the cooling system, 3 in the drainage system and 4 are kept as spares for replacement of defective pumps.

The Petitioner has further submitted that 18 pumps have been in use for about 17 years and have undergone multiple repairs. During the monsoon, when the machines operate at full load, the high silt content in the cooling water causes rapid erosion of pump components such as impellers, seals and bushings. The repair/rewinding process takes about 2–3 months. Accordingly, the Petitioner has proposed procurement of 07 additional pumps to strengthen the cooling system.

Further, the Commission has observed that the cooling water system is essential for reliable operation of the generating units and any failure of the cooling water pumps may lead to increased temperature of bearings and generator stator, resulting in unit shutdown and generation loss. High wear and tear of the existing pumps, repeated repairs & ageing together with the larger repair period, necessitate adequate availability of pumps particularly during the monsoon period.

Thus, the Commission is of the view that procurement of 07 additional cooling water pumps is justified considering the criticality of the cooling system, condition of the existing pumps and the longer repair period.

(7) **Execution Schedule of the above works:**

With regard to the execution period, the Commission observes that the Petitioner has submitted the following activity-wise implementation schedule:-

Sl. No	Activity	Proposed period
1.	Top Cover of 76 MW Francis Turbine	12 Months
2.	Lower Ring of 76 MW Francis Turbine	12 Months
3.	Guide Vanes of 76 MW Francis Turbine	12 Months

Sl. No	Activity	Proposed period
4.	Lower Cylinder of 76 MW Francis Turbine	10 Months
5.	Runner of 76 MW Francis Turbine	18 Months
6.	SITC of 90 kW Xylem make Flygt pumps	06 Months
7.	Upgradation, Design, Engineering, Supply, Erection, Testing & Commissioning of SCADA, Unit Cum Governor Panels along with VTA and Excitation System for four units of MB-II HEP including AMC for 5 years after guarantee period.	36 Months

The Commission is of the view that, considering the criticality of the proposed spares and systems for reliable operation of the generating station, the Petitioner should ensure timely placement of orders and completion of procurement and associated works within the proposed timelines.

The Commission further directs the Petitioner to ensure that the procurement of critical spares is adequately planned in advance so as to synchronize their availability with the planned maintenance/outage schedule of the generating units, thereby avoiding any additional outage or loss of generation on account of non-availability of spares.

(8) With regard to the proposed procurement of Runners, the Commission observes that the Petitioner, in its submission dated 11.05.2026 at point No. 3, has submitted that a Runner was procured in 2024 at a total cost of approx. Rs. 4.85 Cr.

In this context, the Commission observes that the unit cost of Rs. 9.56 Crore per Runner proposed by the Petitioner in the instant Petition is substantially higher vis-à-vis the cost of approx. Rs. 4.85 Crore per Runner procured in 2024.

The Commission is of the view that, considering the substantial variation in the proposed cost vis-à-vis the earlier procurement, the Petitioner shall adopt a transparent and competitive bidding process with wider participation of bidders so as to obtain the most competitive prices.

(9) The Commission observes from the repair history furnished by the Petitioner for the period FY 2020-21 to FY 2024-25 that the repair duration varies substantially depending upon the component and the mode of repair. While the Top Covers and Lower Rings, wherever repaired *in-situ*, generally required about 15-28 days, their repair at the vendor's works took about 64-

203 days for Top Covers and 81-203 days for Lower Rings in the reported cases. Further, the Guide Vanes, Lower Cylinders and Runners, which were repaired at the vendor's works, required about 57-349 days, 14-54 days and 60-376 days, respectively.

The Commission is of the view that such prolonged repair durations, in the absence of adequate spares, result in substantial maintenance downtime and consequential loss of generation. Timely availability of the approved spares would facilitate replacement of the defective components, wherever technically feasible, and is likely to substantially reduce the maintenance downtime. At the same time, the Petitioner should strengthen its contract management with the repair vendors, including stipulation of time-bound delivery with appropriate penalty clauses, so that the repaired components are received back within a reasonable period and remain available for subsequent use

(10) With regard to the existing inventory of spares, the Commission has observed that certain components shown as available have deteriorated and reached scrap/unserviceable condition. However, due to non-availability of adequate serviceable spares, such components are required to be repaired/restored, wherever technically feasible, for continued operation & maintenance of the generating units.

Further, the Commission opines that non-availability of adequate spares is directly/indirectly resulting in prolonged maintenance period of the generating units, extended outage, loss of generation, frequent damage to underwater components, difficulty in *in-situ* repairs due to space constraint and limited shutdown availability. Availability of adequate spares would facilitate quick replacement of damaged components, reduce the maintenance period and improve the availability and reliability of the generating units.

Thus, the Commission is of the considered view that, after procurement of the proposed spares, the Petitioner should reconcile and verify the existing inventory. The spares which are technically repairable

may be restored and reused at their generating station or any other suitable generating station of the Petitioner, subject to technical compatibility and requirement. Spares which are obsolete, unserviceable or beyond economical repair should be appropriately decapitalised from the books of account and dealt accordingly.

(11) The Commission observes that Maneri Bhali-II HEP (4x76 MW) is the largest generating station of UJVN Ltd. in terms of installed capacity among its operational large hydro generating stations. Considering its substantial installed capacity, any prolonged outage or deterioration in the performance of its generating units has a significant impact on the overall generation from the station and, consequently, on the power purchase cost of UPCL. Accordingly, the Commission is of the view that timely condition assessment, maintenance and replacement of the critical and deteriorated components of the station is of utmost importance to ensure its reliable operation and to sustain its generation capability.

(12) In light of the above-mentioned observation, the Commission finds it prudent to allow below mentioned items for additional capital investment.

Sl. No.	Parts	Required for all the 4 machines	Unit	Spares				
				Available	Proposed to be procured	Cost (In Rs. Cr.)	Approved	
							Qty.	Cost (In Rs. Cr.)
Underwater Parts								
1	Top Cover	4	No.	1	2	5.88	1	2.94
2	Lower Ring	4	No.	1	3	5.62	3	5.61
3	Guide Vane Sets	4	Set	3	2	7.23	1	3.62
4	Lower Cylinder	4	No.	0	2	2.36	2	2.36
5	Runner	4	No.	4	2	19.13	2	19.13
Scada, Governor & Excitation								
6	Scada, Governor & Excitation	4	Sets	-	4	14.99	4	14.99
Cooling Pumps								
7	Cooling Pumps	16	Nos.	-	7	5.41	7	5.41
Total						**60.62**		**54.06**

Besides above, the Commission is of the view that considering the operational condition of MB-II HEP, the Petitioner shall maintain adequate inventory of the spares approved by the Commission to ensure their availability as and when required, so that any last-minute requirement does not adversely affect the generation of the plant. Moreover, mobilization of manpower and vendors is essential for the time-bound completion of the

capital maintenance of all four units, with a total maintenance period of 160 days, i.e., 40 days per unit.

(13) With regard to the 5-year Annual Maintenance Contract (AMC), the Commission observes that the Petitioner has included a 5-year AMC beyond the guarantee period for the SCADA, Unit Cum Governor Panels along with VTA and Excitation System, and the cost thereof has been included in the total proposed cost of Rs. 14.99 Crore for the said works.

In this context, the Commission is of the view that the expenditure towards the AMC is recurring in nature and pertains to the operation and maintenance of the system and, hence, does not qualify for capitalisation. Accordingly, the cost of the AMC included in the aforesaid amount shall not form part of the capital cost and shall be excluded at the time of capitalisation. The expenditure towards the AMC shall be claimed under the R&M expenses of the respective financial year, subject to prudence check.

(14) As discussed in Para 9(3) above, the instant proposal has been considered by the Commission under Regulation 22(2)(e) of the UERC Tariff Regulations, 2024, keeping in view the site-specific conditions of MB-II HEP and the performance improvement projected by the Petitioner. Since the entire justification of the proposal, including the Cost Benefit Analysis, is based on the improvement in the performance of the generating station, the Commission considers it necessary to ensure that the benefits projected by the Petitioner accrue to the beneficiaries.

The Commission observes that the Petitioner has projected the following improvement in performance in order to substantiate its proposal:-

Sl. No.	Performance Parameter	Existing Position	Projected Performance
1.	Higher generation capability during monsoon of 20 MW	Average loading of about 288 MW during the monsoon season	Additional generation of about 20 MW, resulting in about **308 MW**
2.	Higher generation during monsoon period	Design Energy for recovery of Energy Charges: 1291 MU	Considering the period from 16 June to 30 September (97 days) and 10 days of forced shutdown, the Petitioner has projected additional generation of about **46 MU** during the relevant period.

Sl. No.	Performance Parameter	Existing Position	Projected Performance
3.	Reduction in maintenance period	About 60 days per generating unit i.e. 60x4 = 240 days	The maintenance period is projected to reduce to about 40 days per generating unit i.e. 40x4 = **160 days** for four units.

The total proposed expenditure is Rs. 60.62 Cr., out of which Rs. 54.06 Cr. has been approved as detailed at para 9 (12) above. Out of the approved amount of Rs. 54.06 Cr., Rs. 39.07 Cr. pertains to spare for turbine and cooling water system.

Accordingly, the Commission considers it appropriate to link the said amount of Rs. 39.07 Cr. with the actual performance of the generating station. The financial implication of the performance-linked mechanism, considering a 15-year period (as per CBA of the Petitioner), is represented below:

(Rs. in Cr.)

Sl. No.	Performance Parameter	Amount Linked to performance Parameter (per year)	Period	Maximum cumulative amount of 15 years, subject to Adjustment/ Recovery
1.	Higher generation achivement i.e. **308 MW during the monsoon period for at least 75 days**.	0.867	15 years	13.02
2.	Higher generation during the monsoon period, with the plant achieving a minimum additional generation of **46 MU**s over & above the Revised Design Energy (RDE) of 1,291 MU.	0.867		13.02
3.	Total maintenance period for 4 units.(40x4 = **160 days**)	0.867		13.02
Total		**2.60**	**15 years**	**39.07**

Thus, failure to achieve aforesaid each parameter would attract adjustment/recovery of the corresponding **Rs. 0.867 Crore per year**, subject to the assessment and prudence check during True-up.

The Commission further observes that the achievement of the first two parameters, relating to the higher loading and higher generation during the monsoon period, is dependent, inter alia, upon the hydrological conditions and, therefore, is not entirely within the control of the Petitioner. Accordingly, non-achievement of these parameters shall be assessed with due regard to the actual hydrological conditions and any duly established

Force Majeure event, which shall be substantiated by the Petitioner with documentary evidence.

On the other hand, the reduction in the maintenance period is substantially within the control of the Petitioner and shall be assessed with reference to the actual maintenance period/downtime of the generating units after implementation of the proposal.

The Petitioner shall maintain and submit unit-wise and station-wise records of generation, hydrological conditions, maintenance period/downtime and other relevant operational parameters along with the ARR/True-up Petition, to enable the Commission to undertake the necessary prudence check and determine the applicable adjustment/recovery.

Accordingly, the approval of the proposed procurement is **performance-linked**, and the Petitioner shall be responsible for demonstrating the achievement of each specified parameters in accordance with the mechanism as detailed above.

(15) Thus, as detailed in the Table above at Para 9(12), the Commission, against the total cost of Rs. 60.62 Crore proposed by the Petitioner, **approves an investment of Rs. 54.06 Crore**. However, as discussed in Para 9(13) of this Order, the cost of the 5-year AMC included in the cost of SCADA, Unit Cum Governor Panels along with VTA and Excitation System shall not be part of the capital cost.

(16) Based on the submissions made in the Petition and subsequent submissions, the Commission grant in-principle approval for 'Various Works and Procurement of spares for 76 MW Turbine at Dharasu Powerhouse, MB-II, Uttarkashi,' as detailed at para 9 (12) and as per observations/views mentioned in this Order, subject to the following conditions: -

(i) The Petitioner is directed to adopt the competitive bidding keeping the technical specification and qualifying criteria and by larger circulation of tender inviting notices in the pan India newspapers so as to promote larger participation for obtaining most competitive prices from the bidders under prevailing Rules & Regulations.

(ii) The Commission may verify/check the proposed works to be executed by the Petitioner at any point of time during/post execution of the works from the perspective of not only substantiating that the assertions & commitments made by the Petitioner have been fully complied and correct, but also to assess Quality, Optimum utilization of resources, Benefits accrued from the proposed investments etc. as has been projected by the Petitioner.

(iii) The Petitioner is directed to ensure that the upgraded SCADA system is compatible with the turbine-governor, Unit Control System, excitation system and other relevant plant equipment, with proper integration, redundancy and necessary communication interfaces and complies with the cyber security requirements specified by the CEA from time to time.

(iv) The Petitioner shall adhere to the performance parameters specified at Para 9(14) of this order and shall submit the requisite information and supporting document during the truing-up of the respective financial year for verification of compliance with the stipulated performance parameters.

(v) The Petitioner is directed to undertake detailed engineering and technical assessment prior to procurement and installation of the spare runner to ensure its compatibility with the existing turbine and hydraulic system. The assessment shall cover the blade profile, dimensions, material, clearances, design head, discharge, rotational speed and other relevant hydraulic and mechanical parameters, and ensure that the proposed runner does not adversely affect turbine output, efficiency, vibration levels or other operating parameters.

(vi) The BoD, in its meeting held on 16.10.2025, had accorded approval to the estimated cost of the project with no provision for any variation. Therefore, the Petitioner is directed to make all efforts for executing the works within the approved cost i.e. **Rs. 54.06 Cr.** Any variation

beyond the approved cost shall require prior approval of the BoD and shall be subject to approval during prudence check

(vii) Post execution of the project, the Petitioner shall submit the Project Completion Report including photographs, expenditure incurred/completed cost, financing of the Project, detailed analysis & benefits etc. to the Commission.

(viii) The Petitioner shall ensure that all the work carried out by the vendors/contractors shall be duly executed as per the procedures laid down for ensuring the quality & quantity of the work and drawings approved by the competent authority.

(ix) The Petitioner is directed to incorporate adequate defect liability provisions in its contract so that the concerned contractors may be bound to execute their works within time and with quality & efficiency.

(x) The Petitioner is directed to claim the AMC charges for SCADA, Unit Cum Governor Panels, along with VTA and Excitation System, beyond the guarantee period, under the R&M expenses of the respective financial year.

(xi) The Petitioner is directed to ensure that the procurement of critical spares is adequately planned in advance so as to synchronize their availability with the planned maintenance/outage schedule of the generating units, thereby avoiding any additional outage or loss of generation on account of non-availability of spares and ensure capital maintenance of all 04 units of MB-II HEP.

(xii) The Petitioner must submit the detailed sanctioned letter from the Financial Institution, if any, to the Commission as soon as they get approval for the same. All the loan conditions that may be laid down by the funding agency, if any, in their detailed sanction letter should be strictly complied with. However, the Petitioner is directed to explore the possibility of swapping the loan with grant/cheaper debt option, if any, available from MoP/GoI/GoU.

(xiii) The Petitioner shall comply with the applicable Acts and Regulations, and shall, especially, ensure compliance with the following CEA Regulations, including amendments thereof:

(a) Central Electricity Authority (Safety requirements for construction, operation and maintenance of electrical plants and electric lines) Regulations, 2011.

(b) Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022.

(c) Central Electricity Authority (Measures relating to Safety and Electricity Supply) Regulations, 2023.

(xiv) The cost of servicing the project cost shall be allowed in the Annual Revenue Requirement of the Petitioner after the assets are capitalized and subject to prudence check of cost incurred.

The approval is given subject to the above conditions and on the basis of submissions and statement of facts made by the Petitioner in the Petition under affidavit. In case of violations of any of the condition mentioned above or in case any information provided, if at any time, later, found to be incorrect, incomplete or in case relevant information was not disclosed, that materially affects the basis for granting the approvals, in such cases, the Commission may cancel the approval or refuse to allow all, or part of the expenses incurred in the ARR/True-up apart from initiating plenary action.

Ordered accordingly.

(Prabhat Kishor Dimri)	**(Anurag Sharma)**	**(M. L. Prasad)**
Member (Technical)	**Member (Law)**	**Chairman**