



**JSW HYDRO ENERGY LIMITED
BASPA-II HE PLANT**

027

November 15, 2018

APPROVAL NOTE

Sub: Request for approval of Additional Capital Expenditure during FY 2018-19 and Multi Year Tariff (MYT) Control Period 2019-24 - Baspa-II HEP

In compliance of Himachal Pradesh Electricity Regulatory Commission, Shimla for tariff filling procedure, a Committee was constituted vide Office Order dated 25.09.2018 regarding additional capital expenditure which is to be incurred during FY 2018-19 and Multi Year Tariff (MYT) Control Period 2019-24. The Committee has studied requirement of such expenditures and detailed business plan has been prepared along with its technical report and the same has been submitted to the undersigned.

Based on the Committee report, it is recommended that additional capital expenditure may kindly be approved from Board of Directors, JSW Hydro Energy Limited.

- Submitted for kind approval please,

[Perveen Puri]
Vice President & Head of Plant





JSW Hydro Energy Limited,
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District Kinnaur (Himachal Pradesh)

Date: 25-10-2018

Technical Review Committee Report

For Identification of Additional Capitalization Assets / works at 3x100 MW Baspa-II HEP

Committee Members

Mr. Ravindra Rana - Head O&M, Baspa-II HEP

Mr. Ajay Nath - Head O&M, KW HEP

Mr. Himanshu Puri - Head Operations, Baspa-II HEP

Background

At Baspa-II HEP, Operation and Maintenance of power station is aimed at reducing failure rate by ensuring smooth operational levels of the power utility. This is done by adopting timely preventive maintenance schedule regarding all vital areas of the power project.

Since, the plant was commissioned in 2003 and equipment were installed, erected & commissioned during the period from 2000 to 2003, it is evident that the design & technology used was that prevailing during 1995 to 2000. Now, due to ageing of plant equipment, we are facing challenges in business continuation on account of reasons, which may be, grouped under following heads:

- (i) **Obsolescence** of then technology on which equipment was manufactured and hence unavailability of essential spares & services for the same in the market or with OEM (Original Equipment Manufacturer).
- (ii) **Upgradation in Technology:** Availability of new, higher and user-friendly versions of software & equipment in market, which cannot be integrated with old equipment / system as such, but needs complete replacement / up gradation.
- (iii) System Modification
- (iv) Change in Law
- (v) Prudent Utility Practices compliance

For business continuation as per terms of PPA and maintaining Baspa-II HEP as "State of Art" project, we intend to combat obsolescence of various key system installed at Baspa-II HEP by upgrading them with latest available versions, in a phased manner over next six years including this year.

In view of above, detailed report of Technical Review Committee for each individual system is given as below:-

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Himanshu





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1) Up-gradation of Excitation System

The Excitation system (Symadyn-D) of Baspa-II HEP supplied & commissioned by M/S Siemens currently Known as Voith Hydro Pvt. Ltd., is in continuous operation since its commissioning in 2003. This system, in each unit, has two Simadyn-D AVR controllers. However, only one is operational at a time and other acts as back-up in case of failure of other.

In April 2016, it was observed that AVR channel 1 of unit 2 excitation system has started malfunctioning causing intermittent tripping of the unit. In spite of various attempts to set this right, this behavior is still persisting. As if now, we are running the unit with only other available channel. (i.e. Channel No.-2).

It is pertinent to mention here that the same make & model of Excitation system is also commissioned in 1500 MW Nathpa Jhakri HEP, in all of its six units during 2003. In order to learn about trouble shooting methods and performance of NJHPS similar excitation system, we also visited their Power House at Nathpa Jhakri HEP.

Following was the take away from the visit of NJHPS Power Station:-

- i. Baspa-II and NJHPS units were commissioned with same version of Excitation systems. The supplier for both stations is M/S Siemens. The controller version supplied is SIMADYN-D.
- ii. NJHPS started facing challenge of availability of spares and exorbitant prices of repair / spares (as new version was launched by Siemens) and interface issues with old controller version which was Windows 95 based.
- iii. They replaced the Controller part of the excitation system with new PLC S7-300 based version having advanced features and user friendly interface. This was compatible with latest software enabling easy changes in software inputs and helpful in generating various reports.
- iv. The lead time for supply of material was approximately five months from the date of firm supply order. This included expert site visits, engineering, manufacturing, factory testing, supply and transportation period.
- v. It took about 4 days to replace and commission the panel at site.

As such, market survey, visit to NJHPS Power House and discussions with OEM (M/S Voith) revealed that the existing Excitation system (SymadynD) is now obsolete and is currently replaced by new PLC based version having latest features and user friendly interface. Hence,





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OEM is unable to provide spares for this system. However, after up-gradation of Unit-2 Excitation System, we can have this system operational on redundant topology, as before, and also will have operational support for spares and technical services from OEM.

The healthy cards and components of replaced controller panel will be kept as spares for use in other units. Once performance is adjudged satisfactory, the existing excitation systems of other two units can then be upgraded as well, in phased manner.

2) Implementation of RGMO / FGMO Enabled Electronic Governors

Three numbers Electronic governors of Baspa units were commissioned during 2003 by its OEM M/s Andritz Hydro Private Limited (Formerly known as M/S Hydro Vevey) and are operational since then.

Electronic governor system is the main controller of the hydraulic turbine. Governor system varies the water flow through the nozzles to control its Speed, Frequency and Power Output, load rejections and starting / stopping processes.

Governing system includes following: Speed sensing elements

- i. Governor control actuators
- ii. Hydraulic Oil pressure unit (OPU)
- iii. Turbine control servomotors

The primary functions of the hydraulic turbine governor are as follows: -

- i. To start, maintain and adjust unit speed for synchronizing with the running units/grid.
- ii. To maintain system frequency after synchronization by adjusting turbine output to load changes.
- iii. To share load changes with the other units in a planned manner in response to system frequency error.
- iv. To adjust output of the unit in response to operator or other supervisory automation commands.
- v. To perform normal and emergency shutdown of units safely.

As per 5th Amendment (issued on 12th April, 2017) of Indian electricity grid code (IEGC), Regulation 2010, Clause 5.2 (f), "All hydro units of 25 MW and above which are synchronized

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with the grid, irrespective of their ownership, needs to have their governors in operation at all time in accordance with these provisions". Also, Central Electricity Regulatory Commission (CERC) have further declared these provisions as **MANDATORY** in its order dated 31st July, 2017.

As such, up gradation to FGMO / RGMO has now become a statutory & mandatory requirement as per Fifth Amendment mentioned above. FGMO / RGMO compliance is meant to enhance the Grid stability as Generating Units of Power Station then respond to frequency variations very quickly and varies the power output according to grid requirements, without any human intervention.

To fulfill the mandatory compliance, OEM of these electronic governors (M/S Andritz Hydro Pvt. Ltd.) was approached for upgrading our existing governors for RGMO / FGMO, according to the IEGC and CERC requirements.

Later, OEM (M/S Andritz Hydro Pvt. Ltd.) offered their expert advice on our existing Governors as below. OEM's email reply is reproduced as verbatim below:-

"We would like to inform you that changes in technologies & design are a continuous process. Therefore, for the betterment and improvement of our existing product and to serve our customers with efficient and robust products, in this regards, we would like to inform you that we are no more manufacturing our earlier supplied Governor model MIPREG DGC and spares support are not available now.

In place of this we have, started offering our new more advanced and specialized "State of Art Microprocessor Based Digital Governing system". The new system is compatible to the earlier supplied hydraulic Systems & other plant auxiliaries with key features like: Windows based interface

- Remote Access feature*
- Self-fault detection feature*
- More users friendly.*

Therefore, we strongly recommend replacing the existing model with new age Digital Governor to increase the reliability and availability of machines with minimum efforts."

Keeping in view the Change in Law regarding implementation of FGMO / RGMO and based on OEM's recommendation, installation of new governor is recommended.





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Changing of one governor unit with new governor (along with recommended mandatory spares) having inbuilt feature of RGMO / FGMO will ensure compliance to the mandatory IEGC regulations and CERC orders. Performance of Governor and FGMO/RGMO compatibility will get tested and we may plan to upgrade another two governors in future based on performance of this replacement. Moreover, the spared governor & its components will give the comfort of spares availability for balance two units where old governors will still be functioning. This will also ensure Governor Redundancy, looking at Obsolescence PART.

3) Up-gradation to Carbon Dust Collector System

Carbon Brush Dust Collection system is provided to avoid drop in insulation resistance over time due to carbon dust accumulation in the generator area (Core, Windings & pole), thus decreasing the risk of short circuits & equipment failures. The MDC system (Mersen Carbon Dust Collection System) is designed to collect carbon dust near to its source of generation (i.e. near the carbon brushes), which is the best possible way to extract the Carbon Dust being generated and avoiding dust to float and accumulate inside the Slip ring chamber and generator winding. The dust collector is designed to work continuously 24 hours a day in conjugation to machine operation.

The Carbon Dust Collection system primarily serves following purpose:-

- i. Collects dust from the source, near the brushes.
- ii. Provide protection against carbon dust and short circuit between active coils and ground.
- iii. Low noise operation.

Therefore, this system will facilitate the successful and efficient operation of the generating station as well increase the efficiency of the generators, hence is recommended to be added to existing Generator System Package.

4) Procurement of High Pressure Compressors

Unit High Pressure Compressors are used to feed compressed air into OPU (Oil Pressure Unit) of unit Governor System, which serves as a heart of any running Power Station. Additionally, these compressors also provide compressed air into mechanical air braking system of generating unit and to cooling water auto flushing system.

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In Baspa-II Power House, two Compressors (One main and one standby) are being used which are common to all three units. Cirrus (French Company) Make Compressor System of Baspa II HEP was supplied and installed by M/s VA Tech (Now known as Andritz Hydro Pvt. Ltd). This system is in continuous operation since its commissioning in 2003.

It is pertinent to mention that these compressors are completing their useful life and are getting obsolete year by year and ageing effects of compressor parts may cause failure of entire compressor unit which will led to failure of unit governing system. As such we do not have any spare compressor in such exigencies.

To run the power plant smoothly and to maintain system healthiness, it is planned to procure two sets of new indigenous Air compressors which have good number of service providers and more vendor's availability in India.

5) Procurement of Articulated Boom Lift

Articulating booms are aerial work platforms with multiple boom sections that hinge or "articulate" allowing the operator to gain access to work areas over obstacles and barriers. Also referred to as "knuckle booms" or "up-and-over booms," these versatile products are perfect for tight access and hard-to-reach areas. Articulating booms provide greater versatility to reach up, over and out to access work areas.

The Self Propelled Articulating Boom is versatile multi-utility equipment for ceiling lights maintenance, overhead electrical maintenance inside plant campus, window glass panels cleaning and many other applications. It can be used to access any position of height up to 15m above ground level. This system is mounted on its own 4 wheel two axel chassis, driven by Battery with necessary controls for traversing / lifting / lowering operations.

This asset will enhance the safety (in particular for work at height areas) of the O&M staff and installed machineries and will help for efficient work execution during maintenance activities in underground Power House.

6) Procurement of Bearing Oil Filtration System

Bearing Lubrication & Filtration Systems are used to reduce overall operational and maintenance cost associated with contaminated bearings and other rotational equipment's. The

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end-user is able to purify a system's lube oil while on-line. This process removes harmful contaminants before they can accumulate and cause problems. This system will facilitate to enhance the life of bearings and other rotating parts of machines and hence is recommended to be procured.

7) Procurement of Cooling Water AC Pump

Rovatti Make (Made in Italy) Cooling water AC Pump sets are in operation since commissioning of plant in 2003. The ageing and wear & tear of mechanical components over the years are causing intermittent operational failures. We have contacted many of the Indian vendors for procurement of Rovatti make pumps spare parts, however they denied to supply as these parts are obsolete now.

Difficulties during repair and maintenance of Rovatti make pumps are being faced due to non-availability of spares. We approached many of the Indian vendors for procurement of Rovatti pumps maintenance but they have denied for the maintenance as it involves huge lead time and high cost. As such we have planned to replace this pump sets with Indigenous pump sets. This will ensure smooth and uninterrupted operation of CW System, also this will enhance reliability of the system and efficient plant operation.

8) Up-gradation of Positions Sensors for Pelton Turbine Nozzle & Deflectors

Four numbers of deflectors and nozzles are installed in each unit to control the water input to the runner. The position of these deflectors and needles is controlled through the feedback received from Temposonic sensors installed in servo motor assembly. These sensors are coupled with connectors, cables and analog cards. In this context, analog cards provides 4-20 mA signals as output to the Electronic Governor for position feedback.

These systems are in continuous operation since its commissioning in 2003. As per the OEM, M/s MTS Udambag, Belgaum, Karnataka the originally commissioned analog cards are now Obsolete and hence its maintenance is very difficult due to non-availability of spare cards. OEM, MTS has recommended to use its upgraded version of having integrated cable and inbuilt analog card. These new integrated cable sensors have IP68 protection which avoids moisture ingress at connector. However, a minor modification in the hardware is required to infuse the upgraded sensors with our existing system.

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We have already upgraded Unit-2 Sensors, in adherence to the OEM,s recommendation in the month of Feb'18. Further, based on their satisfactorily operational performance we are proposing to change old obsolete sensors for Unit-1 & 3 as well.

9) Up-gradation of Existing 400 KV Line Protection Relay -EPAC 3000

Distance Protection Relay is used to protect the outgoing 400 kV Power Evacuation Feeders from external line faults by tripping / safe guarding the Transmission Line under abnormal conditions / operations.

We have two-line protection relays installed for one feeder (Four protection relays for two feeders). In existing scenario P442 (Make-Alstom) is Main-I protection and EPAC-3000 (Make-Alstom) is used as Main-2 protection. Line Protection relays are commissioned in 2003 by its OEM, M/s GE T&D India Ltd. (Formerly Known as ALSTOM) and are in continuous operation since them. It's pertinent to mention here, that at present we do not have any operational spare for exiting EPAC-3000 Relay (Feeder Main-2 Protection). Hence, OEM M/s GE T&D India limited was approached to supply EPAC-3000 protection relay as operational spare / backup for installed system.

To our query OEM replied that, installed protection relay (i.e. EPAC-3000) is OBSOLETE and the same cannot be supplied any more. Our email conversation and OEM's reply verbatim is as below:-

Our Query dated: - 7th April' 18.

"It was a pleasure talking to you over call.

Further, as discussed we require (02 No.) of distance protection relays as spare for our existing Epac -3000 protection relays (please refer detailed specifications below) or else in case of unavailability of the required relay, please suggest a compatible substitute for up gradation / replacement of the existing relays (2 No.).

Case-I (For supply of Epac-3000 Relay) - Please submit your budgetary quote (Inclusive of GST) for supply of relays.

Case-II (In case you suggest compatible substitute for replacing existing Epac- 3000 Relay) - Please submit your budgetary quote (Inclusive of GST) for supply and service (testing at site) of relays.

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DETAILED TECHNICAL SPECIFICATION:

Relay: Distance Protection, Type: Numerical

Application: Switchyard / Line Protection, Auxiliary Voltage: 220 Vdc

C.T Sec. Rating : 1Amp, P.T Sec. Rating : 110 V, Reset Type: Auto, Mounting: Flush, Terminal Type: Screw

Service: Laptop Connectivity

Make: Alstom

Model: Epac 3000 Series.

Digital Input - 08 No.

Digital Output - 08 No.

Photographs of existing Epac-3000 relay along with its technical literature is also attached herein for your ready reference. An early reply from your end will be highly Appreciated."

OEM, s reply dated: - 9th April'18.

"We thank you for the enquiry, please find our offer as follows:

Since EPAC-3000 is obsoleted, the upgraded version with same dimensions is Micom Agile P444 (catalogue attached)

Unit Price: INR 255,000/-

GST Extra

F&I Extra

P&F Inclusive

Delivery: 10 weeks

Payment: 100% against PI before dispatch.

Erection, testing and commissioning including wires, ferrules, aux relays to complete the scheme: 58,000 per relay.

GST Extra

Test kit shall be provided by you.

Lodging and boarding shall be provided by you"

Our reply dated: - 26th April'18

"As discussed, we have two protection relays working in our 400 KV line "distance protection" scheme.

- 1) Micom P442- Used as Main-1, Make - Alstom.
- 2) EPAC- 3000- Used as Main-2, Make - Alstom.

Taking this into consideration, please provide alternate compatible solution and Budgetary quote for substituting existing EPAC - 3000 relay (with new upgraded relay) having operational philosophy similar to EPAC 3000 relay."

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OEM, s reply dated: - 26th April'18.

"Thanks for informing more details.

If the MAIN 1 relay is P442 then we can provide two options for MAIN 2 relay for better accuracy.

- 1.D60
- 2.P443

Both have different characteristics and hardware platform as compared to P442.

We are attaching the catalogue for your reference, please check and confirm which relay you would like to procure."

Based on OEM,s recommendation and because of having different Working principle to existing P-442 Relay (Main-1 Feeder Protection), D60 Protection Relay is proposed for substituting existing EPAC-3000 Relay as Main-2 Protection.

10) Procurement of Dewatering pumps (Submersible Type)

Dewatering Pumps are being used in various identified location of power house (MIV pit of Unit-1, Unit-2, Unit-3, DG Room Cable Gallery and at GIB Tunnel) to evacuate. Presently, Dewatering pumps installed at GIB and DG Area are not in working condition, these pumps have been repaired several times and not reliable during monsoon period. Hence additional pumps are required to strengthen the dewatering capacity to avoid any flooding condition.

As per "CEA Regulation-2010 (Technical Standard for Construction of Electrical Plants and Electric Lines), Notification No. CEA/TETD/MP/R/01/2010, Chapter III, Section 3(b) " *All the drainage water within the power house shall be collected inside drainage sump constructed near the dewatering sump. The drainage water shall be allowed to flow out to the tail race above the maximum tail water level using sump", if required"*.

Hence in view of above, it is planned to procure two Nos. of Dewatering Pumps that will serve the purpose of dewatering excess water from respective locations. That will help to maintain adequate safety of men and machinery.



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11) Installation of Safety Signage's

A Safety Audit was carried out and on the recommendation of safety Auditors to fulfill the statutory compliance to Factory Act, 1948 In continuation of this installation of mandatory safety signage's in Power house complex are required for strengthening safety aspects to meet all statutory compliance as well as "ZERO ACCIDENT" Target.

Safety Signs are crucial in any work environment. The primary importance of displaying Safety Signs is to prevent injury and ensure staff and visitors are well aware of the possible dangers and hazards ahead in certain situations and/or environments. Without signs, many employees would lack the necessary direction in times of crisis, and employers might find themselves in significant legal difficulties if any accidents were to arise as a result. On review of statutory compliance to Factory Act, 1948 following non-compliances were noted by Auditors and were recommended to be corrected:

- I. Glow signage on edge of stairs, passages were not fixed
- II. Stairs at plant premises were not carrying rubber strips to avoid accidents

In view of above recommendations, in last year (i.e. 2017-18) auto Glow signage on edge of stairs, passages and anti-skid tape were fixed in steps to avoid accident in powerhouse premises. Further, in continuation to last year's work, safety Signage's installation based on Audit team recommendation is proposed to be carried in a phased manner for current and coming years.

12) Procurement of Welding fume extractor system

At Power house there are various welding repair works held throughout the year (some places are confined space), Welding work produces various kinds of dusts and fumes, most of which are toxic or harmful for human health when not removed before coming into contact with workers in order to avoid direct exposure.

A welding fume extractor intervenes on the greater risks of the welding process, eliminating harmful gases and harmful elements at their source, therefore improving the quality and favorable conditions of the work environment. A healthy work environment results in much higher productivity.

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Using this method, the risk of the welder or operator being subject to hazardous fumes is minimized. The necessary components to achieve proper source capture of welding fumes are an easily positioned fume extractor with a well-designed hood. With proper airflow through the fume extractor and a conscientious welder who will position the hood in a correct manner, a clean and safe work environment can be achieved.

Hence, with addition of this system health & safety of workmen is ensured, also this system helps in expediting the welding process, which eventually results in improvement of plant efficiency during downtimes / maintenance works.

13) Procurement of Uninterrupted Power Supply (UPS) system

UPS provide power supply to a load in the case of a power outage or when the power input fails. It differs from an auxiliary or emergency power system or standby generator in that a UPS device provides instantaneous protection from power outages. This UPS provide power supply to GIS (for monitoring important parameters), Power House Emergency Lighting and to Centralized Control Room Computers.

The existing 15 kVA UPS of Baspa-II Power House, was supplied and commissioned by M/s Uniline (OEM). This system was in continuous operation since its commissioning in 2003. It is pertinent to mention that this system is completing its useful life and is getting obsolete year by year. Further, ageing effects of UPS is causing malfunctioning of electronic cards, which eventually is leading to intermittent trips of common DC Supply. As per OEM, M/s Uniline the originally commissioned UPS cards are now Obsolete and no further operational support of spares and technical services can be provided from there end.

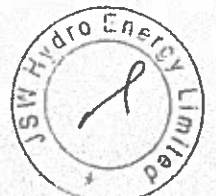
In view of above, existing obsolete UPS system was upgraded to the available prevalent UPS in Fy 2018-19.

14) Up-gradation of Generator Protection System

Siemens Make SIPROTEC Series Generator and Transformer Protection Relays were installed, erected & commissioned during the period from 2000 to 2003, it is evident that the design & technology used for the same, was that prevailing during the year 1995 to 2000. Now, due to ageing of the equipment and availability of new, higher and user-friendly versions of software &

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equipment in market, which cannot be integrated with old equipment / system as such, but needs, complete replacement / up-gradation.

Further with these relays Windows 2000 based interface / PG station were provided which are not functional anymore because of which we can't extract Disturbance Records (DR Report) from the relay in event of any faulty condition / tripping. As of which we are not able to reproduce DR reports to OEM experts, regulatory bodies (i.e. NRLDC, NRPC, SLDC etc.) if / when required by them for further fault analysis. Moreover, change in technology of existing relays is also a challenge which we face in our day to day operational activity.

As per IEGC Regulations, 2010 and its 1st Amendment w.e.f. 02.04.2012 Section 5.2(r):- System Security Aspects is reproduced verbatim as" *All the Users, STU/SLDC and CTU shall send information/data including disturbance recorder / sequential event recorder output to RLDC within 24 hours for purpose of analysis of any grid disturbance/event. No Users, SLSC/STU or CTU shall block any data/information required by the RLDC and RPC for maintaining reliability and security of the grid and for analysis of an event*".

Hence, it's recommended to upgrade Unit Protection System for Baspa-II Power House in a phased manner.

15) Up-gradation of CCTV Surveillance System

A standout amongst the most well-known and financially savvy methods for giving security in the work environment is with CCTV cameras. CCTV cameras can go about as an extremely useful for monitoring plant functions and also serves purpose of countering robberies & sabotage.

Surveillance is not just to keep an eye on O&M staff, it is also meant to keep them safe from any potential threat. We can ensure that no unauthorized person enters office premises hence create a Safe environment for them. It also helps our staff against any false accusations by giving them evidence on their side.

At Baspa-II HEP Samsung Make CCTV Surveillance System are in continuous operation since its installation in 2003. Most of the Cameras and its controls are not working properly. Further, we are also facing shortage of spares because of Obsolescence.





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During Condition monitoring visit of OEM,s Channel Partner, it was recommended that "Existing Samsung make CCTV Cameras are analog-low resolution type and the same technology is obsolete now". In view of this, OEM service Partner has recommended to install latest technology CCTV Camera with high resolution i.e. IP based system which will enhance the safety of the plant.

16) Absolute Vibration Detection System for Generating Unit

Baspa-II H.E.P was commissioned in the year 2003 and since then the plant is in continuous operation. As on date, units are having more than 2,40,000 running hours cumulatively since their commissioning.

While doing general inspection of Turbine & Generator, some CRACKS were observed in stator sole plate foundations, Lower Guide bearing sole plate foundation & inside stator generator barrel. A probable cause of cracks developed in generator system foundation concrete could be resultant of possible abnormal Vibrations in the units.

Further, to track the root cause of this event, it becomes an utmost requirement to carry out vibration condition monitoring of all three units through its OEM. It's pertinent to mention herein that, we here at Baspa-II HPS have only Relative Radial Vibration measurement system installed in the units. For effective vibration monitoring, Absolute and Axial vibration of the Generating units are also required to be measured. In view of above relative, absolute and axial vibration measurement is essentially required to be measured for condition monitoring of generating units through external Equipment / system. Secondly by doing so we can also cross refer the accuracy of our existing radial vibration system installed at Baspa-II HPS.

Vibration in machines may arise due to either electrical or mechanical factors. Some of these factors are explained below as:

- I. Electrical Factors include Non uniform air gap between rotor and stator, Unequal loading of generator, High partial discharge and Loose windings.
- II. Mechanical Factors include Rotor imbalances, Bearing Wear, Foundation Bolts looseness of sole plates & support brackets, Misalignment, Coupling looseness, Shaft fatigue etc.





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For better condition monitoring of generating unit and civil support structures, absolute vibration monitoring of bearing and housing is also required. With the new system, balancing of the unit and other vibration related troubleshooting can be done internally, which will result into cost saving and development of in-house expertise in the long run. Ultimately it would result in better monitoring, safety of the units and efficiency of plant. Also it is a major step toward implementation of Condition based maintenance.

17) Up-gradation of Distributed Control System (DCS)

Data acquisition systems measures, stores, displays and analyze information collected from a variety of measuring devices. Most measurements require a transducer, sensor, a device that converts a measurable physical quantity into an electrical signal. Sensors connect between the measured physical device and the signal conditioner's input. Signal conditioners accept sensor output signals and convert them into a form that the data acquisition system can incorporate into sequence Logic.

An optocoupler (which is a vital component of Data Acquisition System), is an electronic component that transfers electrical signals between two isolated circuits by using light. These optocouplers receives soft signals from field instrument and transmit theme to respective PLC for further signal processing.

At Baspa-II HEP approx. 1000 numbers of "Murr" make optocouplers (Module-536126) are installed in Unit Control Boards, Local Control Board, GIS Control Board and Station Service Control Board. These optocouplers are supplied and installed by Siemens and are in continuous service since commissioning of the plant, since 2003.

At current scenario many of the optocouplers are malfunctioning, due to their ageing and completion of expected service life. As such we are facing shortage of spare optocouplers due to discontinuation of production from OEM. In view to this obsolescence, it's recommended to upgrade / replace the old op to couplers of one unit control board & local control board with upgraded din rail mounting optocouplers. It is pertinent to mention here that, the replaced old optocouplers will be kept as spares for other units control boards for future requirements.





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18) Up-gradation of Emulsifier system

The Emulsifier system of Baspa-II HEP was designed, manufactured, supplied and commissioned by M/s Technico (India) Private Limited (OEM) in 2003, since then this system is in continuous operation. The emulsifier fire protection system is meant for protecting 10 Nos. of 13.84 / 400 KV, 41 MVA, oil direct water force (ODWF), cooled single phase step up Transformers. This high velocity water spray system (HVWS) consists of following components: Quartzoid Bulb Heat detectors, High velocity water spray nozzles (Projectors), Deluge Valve etc. The Deluge Valve is provided to act as main control valve which automatically operates on operation of any detector.

Presently, leakage from various sections of Deluge valves is being observed. The main cause for these leakages is excessive erosion of valve body, probably because of ageing and completion of its useful life. Continuous leakage from deluge valves of common hydrant system intermittently initiates high severity alarms and can also result in tripping of generating unit.

To resolve this issue we approached OEM (M/s Technico India Pvt. Ltd.) for procurement of new sets of Deluge Valves. On our requirement OEM informed that these Deluge valves are now obsolete and cannot be reinstated.

In view of above and in agreement to OEM recommendations, up-gradation of existing emulsifier system is proposed for ensuring efficient and successful plant operation.

19) Up-gradation of HVAC System

At Baspa-II HEP proper Ventilation system has been provided, to ensure required air changes as per industrial norms and standards in order to cater essential requirements of man and machinery. Baspa-II is sub divided in three areas namely Power House Cavern, GIS/Transformer Hall Cavern and Surge Shaft Gate chamber. The entire ventilation system including three sets of packaged Air Conditioning system were supplied and commissioned by M/s S K System Private Limited in the year 2003, since then these systems are in continuous operation.

Over past few years, unceasingly breakdown has been experienced due to excessive wear-tear and non-availability of relevant spare parts for Power House Ventilation System. Moreover, frequent breakdowns in Blue Star Make Air Conditioning Units have been experienced due to failure of their electronic controller parts, which are causing temperature raise in Control Room





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District Kinnaur (Himachal Pradesh)

block and is leading to tripping of sensitive electronic devices (such as video wall screen, server panel etc.). To resolve this technical issue we approached M/s Blue Star (OEM). In reply of our query they, recommended us to upgrade the existing Air Conditioning Units with latest technology as their Electronic controls have been obsoleted. As ventilation system is the lifeline of any underground Power House, therefore up gradation of ventilation system is very much essentially required to keep the existing plant systems healthy.

20) Up-gradation of Smoke & Fire Detection System

Baspa II HEP has Honeywell Notifier Make AFP Series Fire Detection System with 120 Nos. of Smoke detectors for detection of fire inside Power House cavern. This system was supplied and installed by M/S Technico India Pvt. Ltd., in the year 2003. Recently a problem has been observed in Smoke detectors viz. D-104,105,142,116,136 which are not functioning properly and are generating intermittent false alarm annunciations.

To resolve this discrepancy, OEM service provider M/s DQAP Systems representatives were approached to visit the Plant. Consequent to the visit, M/s DQAP recommended for Up gradation of Fire Detection System with NFS Series or latest available upgraded versions as existing system is now obsolete.

Based on the above operational discrepancy & in adherence to OEM service provider's recommendation, existing system is proposed to be upgraded to latest prevailing system.

21) Up-gradation of Public Address (PA) System

PA (Public Address) system is an important component for any industrial setup. Its main purpose is for public announcement and the most important is for emergency evacuation system. Security systems can also be enhanced through the use of PA systems. Automated PA systems will help to inform people if they need to evacuate or deliver other important information.

Emergency PA systems paired with other safety and security systems provide us with the tools we need to inform employees and visitors from potential dangers and direct them to safety.





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At Baspa-II HEP, Ahuja Make PA System was installed in 2003 and is in continuous operation since its commissioning. On Dated 29/03/2018, representative of M/s Bosch Limited visited the Baspa Power House site to study the existing PA system and offering the latest and upgraded system for its betterment.

Following was observed and shared by M/s Bosch Ltd.

- I. The existing PA system speakers are not industrial grade and SPL (Sound Pressure Level) value of the speakers are very less in comparison to the field requirement.
- II. Zone wise announcement is not present.
- III. Integration with Fire alarm system is not present.
- IV. Extension of existing PA system is not available inside Power House Lift.

To overcome from above operational issues with our existing PA system, it's recommended to upgrade it with latest technology for efficient and successful operation of plant.

22) Up-gradation of Power House Lift

One Passenger lift supplied and Installed by M/s OTIS Elevator Company India Pvt. Ltd. is in operation at Baspa Power House, since it's commissioning in 2003. OTIS Make Lift was installed, erected & commissioned during the period from 2000 to 2003, it is evident that the design & technology used was that prevailing during the year 1997 to 2000.

Installed Lift at Bapsa Power house is being maintained by its original supplier M/s OTIS Elevator company Limited on AMC basis, since 2003. It is pertinent to mention here that frequent breakdown of lift has been observed since last two year due to failure of electronic drive for the controller. To resolve this technical issue we approached our Service provider M/s OTIS Elevator Company, to our query OEM replied that *"Your Elevator is equipped with Traditional "G5" Variable voltage - Variable frequency (VVVF) Drive for the controller, since the G5 Drive is now obsolete, therefore we strongly recommend you to get upgraded to latest available L-1000VVVF Drive"*.

Due to obsolescence of certain spares parts of OTIS Lift we are unable to maintain its healthiness. In view of this, it's proposed to upgrade the power house lift for successful and efficient operation.

In line to the above recommendations made by Technical Review Committee, a business plan for Fy 2018-19 & MYT 2019-24 having detailed execution plan and estimated costs has been compiled and is attached as Annexure- B.

Jay

Anil



JSW HYDRO ENERGY LIMITED
300 MW BASPA-II HEP

Details of Additional Facilities and Modification Required for Baspa-II HEP During MYT Control Period 2019-24
PPA Reference Clauses: Article 2 Section 2.2.100, Article 7 Section 7.1, Article 3 Section 13.1(h), (i), (j), (p) and Article 20 Section 20.21(a), (b), (e) & (h) and Additional Capitalization Provision in HPERC Hydro Generation
Tariff Regulation 2007 & CERC Tariff Regulation 2014

Annexure-B

SL. NO.	DESCRIPTION OF ASSETS / WORKS	JUSTIFICATION	TENTATIVE COST (In Lacs)							TENTATIVE YEAR OF REPLACEMENT							
			2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24			
1	Upgradation of Excitation System for Unit-1, Unit-2, Unit-3	Obsolescence	92.00	-	-	119.60	131.56	-	-	-	-	Unit-2	-	-	Unit-1	Unit-3	-
2	Implementation of FGMO / RGMO Enabled Electronic Governors for Unit-1, Unit-2 and Unit-3	Change In Law	52.70	57.97	63.77	-	-	-	-	-	-	Unit-3	Unit-2	Unit-1	-	-	-
3	Installation of Carbon Dust Collection System (CDCS) for Unit-1, Unit-2, Unit-3	Prudent Utility Practices / Upgradation in Technology	39.10	43.01	47.31	-	-	-	-	-	-	-	Unit-1	Unit-2	Unit-3	-	-
4	Procurement of High Pressure Unit Compressor (Two sets of High Compressor (Main and Standby) are common for Unit-1, Unit-2 and Unit-3)	Obsolescence	20.18	22.20	-	-	-	-	-	-	-	Compressor-1	Compressor-2	-	-	-	-
5	Procurement of Articulating Boom Lift, (Upto Height-13 Meter)	Prudent Utility Practices (New Asset)	15.74	-	-	-	-	-	-	-	-	√	-	-	-	-	-
6	Procurement of Bearing (Generator and Turbine Bearing) Oil Filtration Plant	Prudent Utility Practices	14.00	-	-	-	-	-	-	-	-	√	-	-	-	-	-
7	Procurement of Cooling Water AC pump (Vertical Turbine Pump)	Obsolescence	13.46	-	15.00	-	-	-	-	-	-	√	-	√	-	-	-
8	(a) Upgradation of Position Sensors for Pelton Turbine Nozzles (Temposonic Sensors) for Unit-1 and Unit-3	Obsolescence	7.87	-	-	-	-	-	-	-	-	-	Unit-1 & Unit-3	-	-	-	-
	(b) Upgradation of Position Sensors for Pelton Turbine Defectors (Temposonic Sensors) for Unit-1, and Unit-3	Obsolescence	7.87	-	-	-	-	-	-	-	-	-	Unit-1 & Unit-3	-	-	-	-
9	Upgradation of Alstom Make EPAC 3000 Series, Distance Protection Relays for 400 kV Outgoing Feeders	Obsolescence	4.78	5.28	-	-	-	-	-	-	-	Feeder-1	Feeder-2	-	-	-	-
10	Procurement of Dewatering Pumps (Submersible Type)	Prudent Utility Practices	2.12	-	-	-	-	-	-	-	-	√	-	-	-	-	-
11	Design, Supply, Installation and Commissioning of Night Glow Signage & Stainless Steel hand rail Inside Power House Complex	Prudent Utility Practices / Upgradation in Technology	2.00	8.00	3.00	-	-	-	-	-	-	First Lot	Second Lot	Third Lot	-	-	-
12	Procurement of Welding Fume Extractor System	Prudent Utility Practices / Upgradation in Technology	1.45	-	-	-	-	-	-	-	-	√	-	-	-	-	-
13	Procurement of Uninterrupted Power Supply for Plant Auxiliaries	Obsolescence	1.24	-	-	-	-	-	-	-	-	√	-	-	-	-	-
14	Upgradation of Generator Protection System for Unit-1, Unit-2 & Unit-3	Obsolescence	-	42.00	-	51.00	56.00	-	-	-	-	-	Unit-2	Unit-1	Unit-3	-	-
15	Upgradation of CCTV Surveillance System	Obsolescence	-	24.00	-	-	-	-	-	-	-	-	√	-	-	-	-
16	Absolute Vibration Detection System for Turbine & Generator, Bearing & Housing	Prudent Utility Practices / Upgradation in Technology	-	20.00	-	20.00	20.00	-	-	-	-	-	Unit-1	Unit-2	Unit-3	-	-
17	Upgradation of DCS System	Obsolescence	-	18.00	-	-	-	-	-	-	-	-	Unit-2	-	-	-	-
18	Upgradation of Emulsifier System	Obsolescence	-	15.00	-	-	-	-	-	-	-	-	√	-	-	-	-
19	Upgradation of HVAC System	Obsolescence	-	12.00	-	-	12.00	-	-	-	-	-	√	-	-	-	-
20	Upgradation of Smoke and Fire Detection System	Obsolescence	-	10.00	-	-	10.00	-	-	-	-	-	√	-	-	-	-
21	Upgradation of Public Address System	Obsolescence	-	8.00	-	-	-	-	-	-	-	-	√	-	-	-	-
22	Upgradation of Power House Lift	Obsolescence	-	6.00	-	-	-	-	-	-	-	-	√	-	-	-	-
Grand Total (Lacs)			274.51	291.46	141.08	190.60	207.56	-	-	-	-	-	-	-	-	-	-



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**JSW HYDRO ENERGY LIMITED
BASPA-II HE PLANT**

September 25, 2018

OFFICE ORDER

Sub: Baspa-II HEP – Additional Capital Expenditure during FY 2018-19 and Multi Year Tariff (MYT) Control Period 2019-24

With regard to the above subject, Additional Capital Expenditure of Baspa-II HE Plant during FY 2018-19 and Multi Year Tariff (MYT) Control Period 2019-24, a Committee consisting of the following members is hereby constituted for comprehensive study and review:-

1. Mr. Ravindra Rana, Dy. General Manager – Head (O&M - Baspa HEP)
2. Mr. Ajay Nath, Dy. General Manager – Head (O&M - KW HEP)
3. Mr. Himanshu Puri, Manager

The Committee will thoroughly study for additional capital expenditure which is to be incurred during FY 2018-19 & Multi Year Tariff (MYT) period 2019-24 and submit their report for perusal and approval of Board of Directors of JSW Hydro Energy Limited.

[Perveen Puri]
Vice President & HOP

Distribution :-

1. Mr. Ravindra Rana, Dy. General Manager, Baspa Power House.
2. Mr. Ajay Nath, Dy. General Manager, Wangtoo Power House
3. Mr. Himanshu Puri, Manager, Baspa Power House



JSW Hydro Energy Limited (Baspa II HEP)

ANNEXI
A

Justification towards expenditure on account of Additional Capitalisation due to Change In Law

SI No. (As Per Annexure -B to MYT application)	Name of Assets	Justification along with information sought by the Hon'ble Commission	Relevant PPA Clause	Reli HP: Cl:
2	Implementation of FGMO / RGMO Enabled Electronic Governor for Unit-1, Unit-2 & Unit-3	<p>Three numbers Electronic governors of Baspa units were commissioned during 2003 by M/s Andritz Hydro Private Limited (Formerly known as M/s Hydro Vevey) and are operational since then. Electronic governor system is the main controller of the hydraulic turbine. Governor system regulates the water flow through the nozzles to control its Speed, Frequency, Power Output, load rejections and starting / stopping processes.</p> <p>As per 5th Amendment (issued on 12th April, 2017) to Principal Regulation of Indian electricity grid code (IEGC), Regulation 2010, Clause 5.2 (f), "All coal/lignite based thermal generating units of 200 MW and above, open cycle gas turbine / combined cycle generating stations having gas turbines of capacity more than 50 MW and all hydro units of 25 MW and above, which are synchronized with the grid, irrespective of their ownership, shall have their governors in operation at all time in accordance with following provisions:</p> <p>Governor Action</p> <p>i) Following thermal and hydro (except those with upto 3 hours pondage) generating units shall be operated under restricted governor mode of operation (RGMO) with effect from the date given below:</p> <p>ii)</p> <p>iii)"</p> <p>Also, Hon'ble CERC has declared these provisions as MANDATORY in its order dated 31st July, 2017 under the petition no. 84/MP/2015.</p> <p>As such, upgradation to FGMO / RGMO enabled governor functionality has now become a statutory & mandatory requirement as per fifth amendment to IEGC Regulation 2010. FGMO / RGMO compliance is meant to enhance the Grid stability as Generating Units of Power Station need to respond to frequency variations very quickly and varies the power output according to grid requirements, without any human intervention.</p> <p>Our present electronic governors are not FGMO/RGMO enabled and human intervention is required to respond to grid stability.</p> <p>To fulfil the mandatory compliance, OEM of these electronic governors (M/s Andritz Hydro Pvt. Ltd.) was approached for upgrading our existing governors for RGMO / FGMO, according to the IEGC and CERC requirements.</p> <p>Service Order for implementation of FGMO / RGMO Enabled Electronic Governor for one unit has been placed to M/s Andritz Hydro Pvt. Ltd. on dated 30.08.2018.</p> <p>The similar expenditure for Khandong HEP of M/s NEEPCO was allowed by Hon'ble CERC vide its Order dated 13.1.2016 in Petition No. 42/GT/2015 at Sl. no. 5 of page 14.</p> <p>In support to above submission, following annexures are enclosed:</p> <p>Annexure-1.1: Work approval Note for Implementation of FGMO / RGMO Enabled Electronic Governor</p> <p>Annexure-1.2: Commercial offer having tentative price received from OEM (M/s Andritz) for Implementation of FGMO / RGMO Enabled Electronic Governor of one unit</p> <p>Annexure-1.3: 5th amendment to IEGC Regulation 2010</p> <p>Annexure-1.4: CERC order dated 31.7.2017</p> <p>Annexure-1.5: CERC order dated 13.1.2016 for Khandong HEP of M/s NEEPCO.</p>	Change In Law: Article 20, Section 20.21((a), (b), (e) & (h))	HPERC & cont fo determi of hy gener: tari Regul: 201 Regul: 13 (2)



JSW Hydro Energy Limited (Baspa II HEP)

ANNEXURE
A 5

Justification towards expenditure on account of Additional Capitalisation due to Upgradation in Technology and efficient plant operations


SI No. (As Per Annexure -B to MYT application)	Name of Assets	Justification along with information sought by the Hon'ble Commission	Relevant HPEI Clause
3	Installation of Carbon Dust Collection System (CDCS) for Unit-1, Unit-2, Unit-3	<p>Carbon Brush Dust Collection system is provided to avoid drop in insulation resistance over time due to carbon dust accumulation in the generator area , thus decreasing the risk of short circuits. The MDC system (Mersen Carbon Dust Collection System) is designed to collect carbon dust near to its source of generation , near the carbon brushes, which is the best possible way to extract the Carbon Dust being generated and avoiding dust to float and accumulate inside the Slip ring chamber and generator winding. The dust collector is designed to work continuously 24 hours a day with the machine . The Carbon Dust Collection Systems</p> <ul style="list-style-type: none"> - Collects dust from the source, near the brushes. - Provide protection against carbon dust and short circuit between active coils and ground. - Low noise operation. <p>Therefore, this system will facilitate the successful and efficient operation of the generating station as well increase the efficiency of the generators.</p> <p>The similar expenditure for Khandong HEP of M/s NEEPCO was allowed by Hon'ble CERC vide its Order dated 13.1.2016 in Petition No. 42/GT/2015 at Sl. no. 8 of page 10 (enclosed as Sub annexure 1.5 to Annexure A4)</p> <p>In support to above submission, following annexures are enclosed: Annexure-2.1: Copy of E-mail correspondence held with supplier Annexure-2.2: Commercial offer having tentative price received from supplier for Installation of CDCS System</p>	<p>HPERC (terms conditions for determination c hydro generatio tariff) Regulatio 2011- Regulation 13 (c)</p>



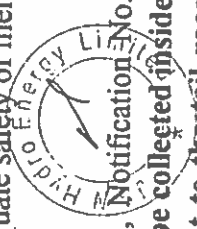
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Sl No. (As Per Annexure -B to MYT application)	Name of Assets	Justification along with information sought by the Hon'ble Commission	Relevant HPEI Clause
4	<p>Procurement of High Pressure Unit Compressor</p> <p>(Two sets of High Compressors (Main and Standby) are common for Unit-1, Unit-2 and Unit-3)</p>	<p>Unit Compressor are used to feed compressed air into OPU (Oil Pressure Unit) of unit Governor system which is a heart of any running Power Station. Additionally, these compressors also provide compressed air into mechanical air brake and cooling water auto flushing system.</p> <p>In Baspa-II Power House, two Compressors (One main and one standby) are being used which are common to all three units. Cirrus Make (French Company) Unit Compressor System of Baspa II HEP was supplied and installed by M/s VA Tech (Now known as Andritz Hydro Pvt. Ltd). This is continuously in operation since its commissioning in 2003. It is pertinent to mention that these compressors are getting obsolete year by year and ageing effects of compressor parts may cause failure of entire compressor unit which will led to failure of unit governing system. Further we do not have any spare compressor for such exigencies.</p> <p>Maintenance of these compressors is now becoming very difficult and costly as well, for maintaining system healthiness, as no vendor/dealer is available in India for existing Cirrus Make Compressors. To run the power plant smoothly and to maintain system healthiness, it is suggested to procure two sets of high pressure unit compressors from India.</p> <p>The similar expenditure for Dulhasti HEP of M/s NHPC was allowed by Hon'ble CERC vide its Order dated 30.8.2016 in Petition No. 231/GT/2014 at Sl. no. 8 page 49</p> <p>In support to above submission, following annexures are enclosed:</p> <p>Annexure-3.1: Copy of E-Mail correspondence held with supplier</p> <p>Annexure-3.2: Commercial offers (having tentative price) received from different vendors for old Cirrus make compressor spare parts</p> <p>Annexure-3.3: Commercial offer (having tentative price) for new Compressor to be purchased</p> <p>Annexure-3.4: CERC order dated 30.8.2016 for Dulhasti HEP of M/s NHPC</p>	<p>HPERC (terms conditions for determination of hydro generative tariff) Regulatory 2011-2012</p> <p>Regulation 13 (c) & Regulation</p>



SI No. (As Per Annexure -B to MYT application)	Name of Assets	Justification along with information sought by the Hon'ble Commission	Relevant HPERC Clause
5	<p>Procurement of Articulating Boom Lift, (Upto Height- 15 Meter)</p>	<p>Articulating booms are aerial work platforms with multiple boom sections that hinge or "articulate" allowing the operator to gain access to work areas over obstacles and barriers. Also referred to as "knuckle booms" or "up-and-over booms," these versatile products are perfect for tight access and hard-to-reach areas. We need access in confined work areas. Articulating booms provide greater versatility to reach up, over and out to access work areas.</p> <p>The VANJAX Make VXAPF-SPV15X-BO- SELF PROPELLED Model Articulating Boom is a versatile multi-utility equipment for ceiling lights maintenance, overhead electrical maintenance inside plant campus, window glass panes cleaning and may other application. It can be used to access any position of height up to 15m above ground level. This system is mounted on its own 4 wheel two axel chassis, driven by Battery with necessary controls for traversing / lifting / lowering operations.</p> <p>This asset will enhance the safety of the O&M staff and installed machineries and will help for efficient work execution during maintenance activities in under ground Power House.</p> <p>The similar expenditure for Dulhasti HEP of M/s NHPC was allowed by Hon'ble CERC vide its Order dated 30.8.2016 in Petition No. 231/GT/2014 at Sl. no. 9 page 49 (enclosed as Sub annexure 3.4 to Annexure A5)</p> <p>In support to above submission, following annexures are enclosed: Annexure-4.1: Product Catalogue</p>	<p>HPERC (terms conditions for determination of hydro generative tariff) Regulation 2011- Regulation 13 (c)</p>
6	<p>Procurement of Bearing (Generator and Turbine Bearing) Oil Filtration Plant</p>	<p>Bearing Lubrication & Filtration Systems are used to reduce overall operational and maintenance cost associated with contaminated bearings and other rotational equipment. The end-user is able to purify a system's lube oil while on-line. This process removes harmful contaminants before they can accumulate and cause problems. This system will facilitate to enhance the life of bearings and other rotating parts of machines.</p> <p>The similar expenditure for Dulhasti HEP of M/s NHPC was allowed by Hon'ble CERC vide its Order dated 30.8.2016 in Petition No. 231/GT/2014 at Sl. no. 30 page 21 (enclosed as Sub annexure 3.4 to Annexure A5)</p> <p>In support to above submission, following annexures are enclosed: Annexure-5.1: Commercial offer having tentative price received from supplier for procurement of Bearing Oil Filtration Plant Annexure-5.2: Product Catalogue</p> 	<p>HPERC (terms conditions for determination of hydro generative tariff) Regulation 2011- Regulation 13 (2) (c)</p>

Sl No. (As Per Annexure -B to MYT application)	Name of Assets	Justification along with information sought by the Hon'ble Commission	Relevant HPE Clause
7	Procurement of Cooling Water Pump Sets (Vertical Turbine Pump)	<p>Rovatti Make (Italian Company) Cooling water Pump sets are in continuous operation since commissioning of plant in 2003. These Pumps circulate cooling water in four major sections (Stator Cooler, Generator & Turbine Bearings, Governor Oil Sump Tank and Generator Transformer) during running of Unit. These pumps are completing its useful life and are causing frequent failures / intermittent tripping. We approached many of the Indian vendors for procurement of Rovatti pumps maintenance but they have denied for the maintenance as it involves huge lead time and high cost.</p> <p>Therefore, CW Pump set are required to be replaced with indigenous make to ensure smooth and uninterrupted operation of CW System. This will enhance the reliability of the system and efficient plant operation.</p> <p>Reliance in this regards is placed on the Hon'ble CERC Order dated 30.8.2016 in Petition No. 231/GT/2014 for Dulhasti HEP of M/s NHPC (enclosed as Sub annexure 3.4 to Annexure A5).</p> <p>In support to above submission, following annexures are enclosed: Annexure-6.1: Copy of E-Mail correspondence held with supplier Annexure-6.2: Commercial offers having tentative price received from supplier for old Rovatti make Cooling Water Pump spare parts Annexure-6.3: Commercial offer having tentative price received from supplier for new Cooling Water Pump set to be purchased</p>	<p>HPERC (terms conditions fo determination hydro generati tariff) Regulation 2011- Regulation 13 (c) & Regulation</p>
10	Procurement of Dewatering Pumps (Submersible Type)	<p>Dewatering Pumps are being used in various identified location of power house (MIV pit of Unit-1, Unit-2, Unit-3, DG Room Cable Gallery and GIB Tunnel) to evacuate. Presently, Dewatering pumps installed at GIB and DG Area are not in working condition, these pumps have been repaired several times and not reliable during monsoon period. Hence additional pumps are require to strengthen the dewatering capacity to avoid any flooding. Hence it is planned to procure two Nos. of Dewatering Pumps that will serve the purpose of dewatering excess water from respective locations. That will help to maintain adequate safety of men and machineries.</p> <p>As per "CEA Regulation-2010 (Technical Standard for Construction of Electrical Plants and Electric Lines), Notification No. CEA/TETD/MP/R/01/2010, Chapter III, Section 3(b) " All the drainage water within the power house shall be collected inside drainage sump constructed near the dewatering sump. The drainage water shall be allowed to flow out to the tail race above the maximum tail water level using sump", if required".</p> <p>The similar expenditure for Dulhasti HEP of M/s NHPC was allowed by Hon'ble CERC vide its Order dated 30.8.2016 in Petition No. 231/GT/2014 at Sl. no. 7 page 48 (enclosed as Sub annexure 3.4 to Annexure A5)</p>	<p>HPERC (terms conditions for determination o hydro generator tariff) Regulation 2011- Regulation 13 (2 (c) & Regulation</p>



SI No. (As Per Annexure -B to MYT application)	Name of Assets	Justification along with information sought by the Hon'ble Commission	Relevant HPER Clause
11	Design, Supply, Installation and Commissioning of Night Glow Safety Signage & Stainless Steel Hand Rail Inside Power House Complex	<p>Safety Signs are crucial in any work environment. The primary importance of displaying Safety Signs is to prevent injury and ensure staff and visitors are well aware of the possible dangers and hazards ahead in certain situations and/or environments. Without signs, many employees would lack the necessary direction in times of crisis, and employers might find themselves in significant legal difficulties if any accidents were to arise as a result. On review of statutory compliance to Factory Act, 1948 following non-compliances were noted by Auditors and were recommended to be corrected:</p> <ul style="list-style-type: none"> -Glow signage on edge of stairs, passages were not fixed -Stairs at plant premises were not carrying rubber strips to avoid accidents <p>As per Notification 29 CFR 1910.145, Occupational Health & safety Assessment Series (OSHA's) guideline for signs and tags that identify hazards, outlines design requirements and specifies when safety signs must be used.</p> <p>Recently, a lot of thrust has been given on improving safety at our locations. One of the 'QUICK WINS' initiative under Du Pont Safety Practices implementation is providing Standard barricading for all floor openings.</p> <p>At Baspa, the hatch covers are provided on pits, which are kept for runner, MIV or similar heavy components removal during maintenance. When these are removed, there is potential risk of fall from height, as the shifting works require constant supervision from machine hall around these big openings to ensure the safety of equipment being handled. Since, there is no fix barricading, potential risk of fall from height exists. To eliminate the risk, it is recommended that these hatch covers are barricaded permanently with fixed railings which will result into better efficiency.</p> <p>Reliance in this regards is placed on the Hon'ble CERC Order dated 30.8.2016 in Petition No. 231/GT/2014 for Dulhasti HEP of M/s NHPC (enclosed as Sub annexure 3.4 to Annexure A5).</p> <p>In support to above submission, following annexures are enclosed: Annexure-7.1: Work Approval note for Installation of Stainless Steel Hand Rail Inside Power House Complex Annexure-7.2: Commercial offer having tentative price received from supplier for installation of Safety Signage's, Annexure-7.3: Commercial offer having tentative price received from supplier for installation of Stainless Steel Hand Rail Inside Power House Complex</p>	<p>HPERC (terms, conditions for determination of hydro generation tariff) Regulation 2011- Regulation 13 (2) (c)</p>



SI No. (As Per Annexure -B to MYT application)	Name of Assets	Justification along with information sought by the Hon'ble Commission	Relevant HPERC Clause
12	Procurement of Welding Fume Extractor System	<p>Wherever it is a viable solution, it has been proven that extraction at source is the most effective and efficient method of capturing and removing welding fumes. Using this method, the risk of the welder or operator being subject to hazardous fumes is minimized.</p> <p>The necessary components to achieve proper source capture of welding fumes are an easily positioned fume extractor with a well-designed hood. With proper airflow through the fume extractor and a conscientious welder who will position the hood in a correct manner, a clean and safe work environment can be achieved.</p> <p>Reliance in this regards is placed on the Hon'ble CERC Order dated 17.6.2016 in Petition No. 233/GT/2014 for Chamara-II HEP of M/s NHPC.</p> <p>In support to above submission, following annexures are enclosed:</p>	<p>HPERC (terms & conditions for determination of hydro generation tariff) Regulation 2011- Regulation 13 (2) (c)</p>



Sl No. (As Per Annexure -B to MYT application)	Name of Assets	Justification along with information sought by the Hon'ble Commission	Relevant HPEI Clause
14	<p>Upgradation of Generator and Transformer Protection System for Unit-1, Unit-2 & Unit-3</p>	<p>Siemens Make SIPROTEC Series Generator and Transformer Protection Relays were installed, erected & commissioned during the period from 2000 to 2003, it is evident that the design & technology used was that prevailing during 1995 to 2000. Now, due to ageing of the equipment and availability of new, higher and user-friendly versions of software & equipment in market, which cannot be integrated with old equipment / system as such, but needs complete replacement / upgradation. Further with these relays Windows 2000 based interface / PG station were provided which are not functional any more because of which we can't extract Disturbance Records (DR Report) from the relay in event of any faulty condition / tripping. As of which we are not able to produce DR reports to OEM experts, regulatory bodies (i.e. NRLDC, NRPC, SLDC etc.) if / when required by them for further fault analysis. Moreover, change in technology of existing relays is also a challenge which we face in our day to day operational activity.</p> <p>As per 1st Amendment to IEGC Regulations, 2010 dated 5.3.2012, Section 5.2(r) System Security Aspects is reproduced as verbatim: "All the Users, STU/SLDC and CTU shall send information/data including disturbance recorder / sequential event recorder output to RLDC within 24 hours for purpose of analysis of any grid disturbance/event. No Users, SLSC/STU or CTU shall block any data/information required by the RLDC and RPC for maintaining reliability and security of the grid and for analysis of an event"</p> <p>The similar expenditure for Dulhasti HEP of M/s NHPC was allowed by Hon'ble CERC vide its Order dated 30.8.2016 in Petition No. 231/GT/2014 at Sl. no. 4 of page 46 (enclosed as Sub annexure 3.4 to Annexure A5)</p> <p>In support to above submission, following annexures are enclosed: Annexure-9.1: Copy of E-mail correspondence held with M/s GE T&D India Limited Annexure-9.2: Commercial offer having tentative price received from supplier Annexure-9.3: 1st amendment to IEGC Regulation, 2010</p>	<p>HPERC (terms conditions for determination of hydro generation tariff) Regulation 13 (c) & Regulation</p>



SI No. (As Per Annexure -B to MYT application)	Name of Assets	Justification along with information sought by the Hon'ble Commission	Relevant HPERC Clause
16	Installation of Absolute Vibration Detection System for Turbine & Generator, Bearing & Housing	<p>At present we have only relative vibration monitoring system for generating unit. For better condition monitoring of generating unit and civil support structures, absolute vibration monitoring of bearing and housing is also required. With the new system, balancing of the unit and other vibration related troubleshooting can be done internally, which will result into cost saving and development of in-house expertise in the long run. Ultimately it would result in better monitoring, safety of the units and efficiency of plant. Also it is a major step toward implementation of Condition based maintenance.</p> <p>The similar expenditure for Khandong HEP of M/s NEEPCO was allowed by Hon'ble CERC vide its Order dated 13.1.2016 in Petition No. 42/GT/2015 (enclosed as Sub annexure 1.5 to Annexure A4) at sl. no. 8 of page 10</p> <p>In support to above submission, following annexures are enclosed: Annexure-10.1: Copy of E-mail correspondence held with supplier M/s Voith Hydro Pvt. Ltd. & M/s Andritz Hydro</p>	<p>HPERC (terms & conditions for determination of hydro generation tariff) Regulation 2011- Regulation 13 (2) (c) & Regulation 14</p>

SI No. (As Per Annexure -B to MYT application)	Name of Assets	Justification along with information sought by the Hon'ble Commission	Relevant HPE Clause
21	Upgradation of Public Address System	<p>PA (Public Address) system is an important component for any buildings, schools and office. Its main purpose is for public announcement and the most important is for emergency evacuation system.</p> <p>Security systems can also be enhanced through the use of PA systems. Automated PA systems will help to inform people if they need to evacuate or deliver other important information. Emergency PA systems paired with other safety and security systems provide us with the tools we need to inform employees and visitors from potential dangers and direct them to safety.</p> <p>At Baspa-II HEP, AHUJA make PA System was installed in 2003 and this is in continuous operation since its commissioning. On Dated 29/03/2018, representative of M/s Bosch Limited visited the Baspa Power House site to study the existing PA system and offering the latest and upgraded system for its betterment.</p> <p>Following was observed and shared by M/s Bosch Ltd.</p> <ul style="list-style-type: none"> - The existing PA system speakers are not industrial grade, and SPL (Sound Pressure Level) value of the speakers are very less in comparison to the field requirement. - Zone wise announcement is not present. - Integration with Fire alarm system is not present. - Extension of existing PA system is not available inside Power House Lift. <p>To overcome from above operational issues with our existing PA system this is now mandatory to upgrade it with latest technology</p> <p>Reliance in this regards is placed on the Hon'ble CERC Order dated 16.8.2016 in Petition No. 234/GT/2014 for Teesta-V HEP of M/s NHPC.</p> <p>In support to above submission, following annexures are enclosed:</p> <p>Annexure-11.1: Copy of Minutes of Meeting held between M/s Bosch Limited and M/s JSW Hydro Energy Limited which recommends upgradation of Public Address System</p> <p>Annexure-11.2: Commercial offer having tentative price received from supplier for upgradation of Public Address System</p> <p>Annexure-11.3: CERC order dated 16.8.2016 for Teesta-V HEP of M/s NHPC.</p>	<p>HPERC (terms conditions for determination of hydro generatio tariff) Regulation 2011- Regulation 13 (c) & Regulation</p>

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