

Petition for
In- principle approval of Additional Capitalization
at
Kota Super Thermal Power Station (Unit -1to 7)
(Total Capacity-1240 MW)

Submitted to
Rajasthan Electricity Regulatory Commission
Jaipur
by
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JANUARY -2019

Sr.No	Table of Content	Page No.
1.	Background	3
2.	Salient Feature of Petition	3-5
3.	Respondents & Prayer	24
6.	Annexure-A (Copy of Proposal & Estimation Cost)	25-27
7.	Annexure-B(Copy of Proposal & Estimation Cost)	28-30
8.	Annexure-C(Copy of Proposal & Estimation Cost)	31-32
9.	Annexure-D(Copy of Proposal & Estimation Cost)	33-34
10.	Annexure-E(Copy of Proposal & Estimation Cost)	35-37
11.	Annexure-F(Copy of Proposal & Estimation Cost)	38-39
12.	Annexure-G(Copy of Proposal & Estimation Cost)	40-41
13.	Annexure-H(Copy of Proposal & Estimation Cost)	42-44
14.	Annexure-I(Copy of Proposal & Estimation Cost)	45-47
15.	Annexure-J(Copy of Proposal & Estimation Cost)	48-49
16.	Annexure-K(Copy of Proposal & Estimation Cost)	50-51
17.	Annexure-L(Copy of Proposal & Estimation Cost)	52-54
18.	Annexure-M(Copy of IDC Calculation)	55
19.	Annexure-N (Copy of WTD Approval)	56

A1: BACKGROUND

- 1) Rajasthan Rajya Vidyut Utpadan Nigam Ltd (RVUN) was incorporated under the Companies Act 1956, as one of the five successor companies of erstwhile Rajasthan State Electricity Board (RSEB) to take over the electricity generation business in the state of Rajasthan. The existing power stations and those under commissioning in the state sector were transferred to RVUN as per the Rajasthan Power Sector Reforms Transfer Scheme, 2000 notified by State Government provisionally on 19th July 2000 and finally on 18th January 2002.
- 2) RVUN has entered into Long Term Power supply-Purchase Agreements (PPA) in respect of existing and future power projects for 25 Years with the three Discoms on 28.09.06 and subsequently various supplementary PPA's with Discoms.
- 3) The Commissioning and Commercial Operation dates of KSTPS, Kota Unit-1 to 7 (1240 MW) as under:

Table-1

S.No.	Unit	Date of Commissioning	Date of COD
1.	Unit#1	17.01.1983	01.04.1983
2.	Unit#2	13.07.1983	01.04.1984
3.	Unit#3	25.09.1988	11.03.1989
4.	Unit#4	01.05.1989	16.01.1990
5.	Unit#5	26.03.1994	18.07.1995
6.	Unit#6	30.07.2003	01.08.2004
7.	Unit#7	30.05.2009	31.12.2009

A2: SALIENT FEATURE OF PETITION

- 1) In the instant petition, RVUN seeks In-Principle approval of the Hon'ble Commission towards additional capitalization proposals to be carried out at Kota Super Thermal Power Station (KSTPS) Unit -1 to 7 under Regulation 17(2) (iv) of RERC Tariff Regulations, 2014.
- 2) The Regulation 17(2)(iv) of RERC Tariff Regulations, 2014 provides that:

"17. Additional Capitalisation

2. The capital expenditure incurred on the following counts after the cut-off date may at its discretion, be admitted by the Commission, subject to prudence check:

(iv) Any additional works/ services, which have become necessary for efficient and successful operation of a generating station or transmission system but not included in the original capital cost.”

- 3) It is submitted that proposed additional works are essentially required for efficient and successful operation of a generating station, as detailed in subsequent paras, which were not included in the original capital cost of the project.
- 4) The Wholetime Directors (WTD), RVUN have approved the estimated cost of **Rs. 56.47 cr approx. (including IDC)** towards Additional Capitalization proposals on dated 30.01.2019. Copy of WTD approval is enclosed as **Annexure-N**.
- 5) Twelve different works have been identified for additional capitalization under regulation 17(2)(iv) of RERC Tariff Regulations 2014 likely to be taken up during FY 2018-19 and onwards. Details of the proposals are provided as below.

Table-2: Summary of Additional capitalization proposal

Sr. No.	Description of Proposal	Estimated Cost (Rs. in cr.)	Expected/Tentative time schedule for implementation	Salvage value of old items
A	Replacement of BHEL makes Pro Control P-13 SG-TG system of KSTPS Unit-5 (210 MW).	12.97	12 months	0.135
B	Renovation of static excitation and AVR system of 210 MW Unit-3&4, KSTPS, Kota by digital AVR system.	6.04	16 months	0.064
C	Replacement of 95 Nos. existing CTMM motor protection relays of HT and LT motor Stage-II (KSTPS Unit-3&4).	0.65	10 months	0.007
D	Supply and ETC of variable frequency drive of ID fan motor (4 Nos.) of Unit-6&7.	8.75	20 months	Not applicable (new case)

E	Replacement of existing Fuji Make 2x75 KVA UPS system installed in Unit-5 of KSTPS, Kota.	0.81	12 months	0.009
F	Strengthening and repair of RCC & steel structure of crusher house, RCC structure of DM plant, RCC structure of acid alkali tank, RCC structure of SDG tank and RCC structure of plow feeder at KSTPS , Kota.	3.90	12 months	Not applicable (repairing case)
G	Strengthening and repair of RCC framed structure of IDCT Cooling Tower of Unit-6 at KSTPS, Kota.	2.74	12 months	Not applicable (repairing case)
H	Renovation /Retrofitting of rotary discharge machine No. 1&2 at KSTPS, Kota.	2.05	12 months	0.021
I	Conversion of Relay logic control system of CHP into PLC based system.	3.85	8 months	0.04
J	Purchase of three (3) Nos. New bull dozers (BEML Make-Model BD-155).	8.66	12 months	Not applicable (new case)
K	Purchase, Erection and commissioning of 14 Nos. Belt weigher at KSTPS, Kota.	1.12	12 months	0.012
L	Supply, Design, installation, Testing and commissioning of online energy accounting and management system of KSTPS, Kota.	2.24	16 months	Not applicable (new case)
M	Total IDC	2.68		
Grand Total (Rs.in cr) =		56.47 (including IDC)		

A3: ITEM WISE WORK DETAILS TO BE CARRIED OUT FOR KSTPS, KOTA

- 1) The work details of twelve proposals for Additional Capitalisation at KSTPS, Kota are following as under:

A. Replacement of existing BHEL make Pro Control P-13 SG-TG system of KTPS Unit#5:

KTPS Unit-5 (210 MW)

- 1) The details of existing control system of KTPS Unit-5 are under:

Table-3

S. No.	Name of Machine	Unit Capacity	Date of COD	Control system	Designed/ Make
1.	KTPS Unit#5	210 MW	18.07.1995	HMI system	MaxDNA & BHEL

- 2) The existing HMI system of KSTPS Unit-5 is very old, aged and obsolete. The manufacturer has phased out its production. The system for control, operation and monitoring of boiler (SG-TG) of KSTPS Kota Unit-5 was supplied and commissioned by M/s BHEL in the year 1993. The unit # 5 is catering to the need of continuous generation for the State of Rajasthan. The system is in service since commissioning of unit and has outlived its useful service life and requires Renovation and Modernization for sustainable performance of KSTPS Unit-5.
- 3) In the present system, problems are being faced during start up and running as well as major threats to unit/equipment due to old/obsolete hardware and scarcity of spares. The KSTPS Unit-5 has suffered generation loss many times due to malfunctioning of old cards. The problems faced during past tripping in unit-5 are analysed. The fault diagnosis of KSTPS Unit-5 tripping is very difficult and repeated problems of processor faults are being faced causing sometimes even tripping of unit. Presently, these are being by replacing some old repaired cards or by means of removing cards from old processors in a hit & trial method which is not reliable and cause system failure, resulting in generation loss and undesired oil consumption. Sometimes, delay in proving oil guns and milling operation further attract more oil consumption. The renovation will lead to safe, smooth and efficient operation of Unit-5 with reduced tripping.

The Major problems being faced in the system are:

- HPBP processor is not communicating with I/O cards.
- Mill and Unit panel processor intermittently issuing false O/P resulting in frequent mill tripping /unit tripping.

- Soot blower panel processor is not communicating with I/O cards.
- Non-availability of spares.
- Diagnosis of faults and unit tripping is very difficult.

Major threats to unit/equipments due to unreliable old system are:

- Due to unreliable system there may be delay in guns proving.
 - Difficulties are being faced in operation of mills resulting in higher oil consumption and generation loss.
 - Due to unreliability of system the safety of turbine and its auxiliaries cannot be ensured.
 - The push button modules are also old and precise command cannot be given in case of emergencies.
- 4) In the matter, M/s BHEL was requested for providing processors and service support for healthiness of system besides several telephonic requests regarding the same. M/s BHEL have informed to RVUN that the cards have been phased out from their manufacturing range and have suggested to switch to MAXDNA system by replacing the present running system.
- 5) After refusal from M/s BHEL to repair the old system, further efforts were made to get the issue resolved through original manufacture of system (OEM) i.e. M/s ABB India. Some of the problems were resolved by ABB experts but yet the major problem of old and faulty hardware have not been resolved.
- 6) Major advantages of upgrading PRO CONTROL system with MAXDNA system are under:
- Minimize outage of unit of Pro Control system hardware malfunctioning.
 - Delay in unit light up due to unreliable system and false signals.
 - Minimize the oil consumption due to problems faced in Mill operation.
 - Reduce the time of oil guns proving and safety of turbine and its auxiliaries of the generating units.
 - The cost incurred on above replacement shall be recovered by smooth and uninterrupted operation of the unit.

- 7) In view of the above, it has become more essential and advisable to renovate the Human Machine Interface (HMI) make BHEL Pro Control P-13 system for control of boiler and turbine (SG-TG) of KSTPS U#5 (210 MW), Kota with latest technology microprocessor based MAXDNA system. Moreover, it is similar to the system installed in KSTPS Unit-6 & 7, so spares will be common. Further, MAXDNA system of Unit-6&7 is running smoothly since commissioning of units. The renovation will enhance the stability of the running unit.
- 8) The aforesaid Additional Capitalization is essential for efficient and successful operation of a generating station. It is, therefore, requested to the Commission for Approval of Additional Capitalization towards up - gradation of existing control & HMI system of Rs. 12.97 cr at KSTPS Unit-5, under Regulation 17 (2) (iv) of RERC Regulation 2014. Copy of proposal & estimation cost are enclosed as **Annexure-A**.

B. Renovation of static excitation and AVR system of KSTPS Unit-3 & 4 by digital AVR system

KTPS Unit-3&4 (210 MW)

- 1) The details of existing static excitation and AVR system of KSTPS Units-3 & 4 are under:

Table-4

S.No.	Name of Machine	Control system	Unit Capacity	Make / Year of Purchase	CoD
1.	KSTPS Unit #3	Static excitation & AVR system	210 MW	BHEL/ 1985	11.3.1989
2.	KSTPS Unit #4	Static excitation & AVR system	210 MW	BHEL/1986	06.03.1990

- 2) The existing static excitation system and AVR of 210 MW KTPS Unit-3 & 4 are very old and aged. These equipments were purchased during the year 1985-86 for 210 MW Unit-3&4 and these units were commissioned during the year 1988 & 1990. The units are catering to the need of continuous generation of electricity for the Rajasthan. The various parts of equipments are obsolete and now out of manufacturing range of M/s BHEL, the original equipment manufacturer (OEM). M/s BHEL has refused to repair various important electronic module used in existing static excitation system & AVR of above units. Due to scarcity of spares, healthy modules & denial by OEM for their repair, it is becoming increasingly difficult to maintain the existing static AVR of 210 MW Unit-3&4.

- 3) To overcome this problem of AVR system of KSTPS Unit-3&4 and future compatibility of the system with change in advance technologies, it is required to renovate existing AVR system of above machines for smooth control, monitoring and operation at single platform. The renovation will lead to safe, smooth and efficient operation of Unit-5 with reduced tripping.
- 4) Therefore, it is proposed to renovate existing AVR by new digital AVR system (DAVR) of latest technology along with its remote operation and control from main control room and replacing existing air flow /cooling system by new compatible system for thyristor, field flashing & field breaker panels room. The above renovation will minimize the tripping of units and enhance the stability of running units which will facilitate smooth generation of electricity through these old 210 MW Unit-3&4.
- 5) The cost benefit analysis is submitted as under:
 - Massive generation loss due to outage of units on AVR fault/Delay in normalization of AVR due to scarcity of AVR spares can be saved.
 - Minimum estimated time for revival of unit after AVR fault is 4 hrs. i.e. 0.84 million units (estimated sale of power cost Rs. 2.10 crore approx.), in addition to above expenditure incurred on resynchronization of units & replacement of AVR damaged parts.
 - The cost incurred on above renovation can be recovered within two years and stability of the unit can be as fairly enlarge & span of the new DAVR.
- 6) The aforesaid Additional Capitalization is essential for efficient and successful operation of a generating station. It is, therefore, requested to the Commission for approval of Additional Capitalization for Digital AVR system of Rs. 6.04 cr at KSTPS Unit-3&4 under Regulation 17 (2) (iv) of RERC Regulations, 2014 Copy of proposal & estimation cost are enclosed as **Annexure-B.**

C. Replacement of 95 Nos. existing CTMM motor protection relays of HT and LT Motors of Stage-II (KSTPS Unit-3&4)

KSTPS Unit-3&4 (210 MW)

- 1) The details of existing CTMM motor protection relays of HT and LT motors are under:

Table-5

Sr. No.	Name of Machine	Type of Relay	Unit Capacity	Make / Year of Purchase	CoD
1.	KSTPS Unit #3	CTMM	210 MW	AREVA/ 1988	11.3.1989
2.	KSTPS Unit #4	CTMM	210 MW	AREVA/1989	06.03.1990

- 2) Presently, 95 Nos. CTMM/CTMF relays were installed at various feeders in the year 1988 & 1989 for LT & HT motor's protection of stage-II (Unit-3&4). These relays are around 28-29 years old and require for Renovation & Modernisation. Now the manufacturing of these relays have been stopped. Every year, around 10-15 relay are being repaired through OEM and a very high cost is being incurred on repairing. This relay does not provide any monitoring/ analysis of parameters during running as well as during failure of equipment. Moreover, these relays malfunction and cause of tripping of main equipment which in turn, trip the unit. Under such circumstances, it has become necessary to renovate and modernize the relays for sustainable performance of KSTPS Unit-3&4.
- 3) Given below are few incidents happened due to malfunctioning/ failure of above relays:
- **KSTPS Unit-1 (110 MW)**
 - a) PA Fan-2A tripped on high set protection on dated 11.01.2017 but it was found that motor was healthy. On testing, the relay was found defective. Relay was replaced and motor was put in service. Due to tripping of PA Fan, Unit also tripped causing huge financial loss to RVUN.
 - **KSTPS Unit-2 (110 MW)**
 - b) While taking second FD Fan, it tripped on high set protection on dated 12.04.2017 but motor was found healthy. On testing, the relay was found defective and replaced. As a result, Unit -6 had to run on part load after synchronization, till checking of motor and relay. This caused a huge loss of oil and generation.

- 4) The CTMM/ CTMF relays are electro mechanical relays and protect the equipment. The accuracy of these relay are affected by ageing. Many times, the failure of relay, in service, cannot be anticipated until the equipment fails during faults. This causes disturbance on the system as well as huge financial loss. The renovation will minimize the tripping of units and enhance the stability of running units which will facilitate smooth generation of electricity through old 210 MW Unit-3&4.
- 5) Therefore, it is proposed to renovate the existing system under Regulation 17(2) (iv) of RERC Tariff Regulations'2014 as additional capitalization. New relays have better features like online monitoring of equipment health, energy consumption recording, running hour recording, past tripping record. Its data will help in analysis of faults and reduce generation loss on account of failure of HT/LT motors. New relay will protect equipments, reduce disturbance of system and consequently system reliability will be improved.
- 6) The aforesaid Additional Capitalization is essential for efficient and successful operation of a generating station. It is, therefore, requested to the Commission for approval of Additional Capitalization for new purchase relay of 0.65 cr at KSTPS Unit-3&4 under Regulation 17 (2) (iv) of RERC Regulations, 2014. Copy of proposal & estimation cost are enclosed as **Annexure-C**.

D. Supply and ETC of variable frequency drive of ID fan motor (4 Nos.) of KSTPS Unit-6&7

KSTPS Unit-6&7 (195 MW)

- 1) The details of existing ID fans installed in KSTPS, Unit-6&7 (195 MW) are under:

Table-6

Sr. No.	Name of Machine	Equipment	Unit Capacity	Specification	CoD
1.	KSTPS Unit #6	ID FAN MOTOR (2 Nos.)	195 MW	1700 KW/130 Amp. & 142 Amp.	01.08.2004
2.	KSTPS Unit #7	ID FAN MOTOR (2 Nos.)	195 MW	1700 KW/146 Amp. & 147 Amp.	31.12.2009

- 2) The matter is for supply, erection, testing and commissioning of Variable Frequency Drive (VFD) system on HT motors of ID fan of Unit-7 of KSTPS. There are 04 Nos. of ID Fans installed in KSTPS Unit-6-7. The installation of VFD on ID fan will serve the purpose of reducing the power consumption of ID fans in Unit-6&7 and consequently help to reduce the auxiliary power consumption (APC) of the unit. The renovation cost of the system is estimated to be 8.36 cr. approx. The cost will be recovered in approx 3.2 years considering 20% reduction in energy consumption on ID fans . Under such circumstances, it has become necessary to install VFD system on HT motors for reducing auxiliary energy consumption and sustainable performance of KSTPS Unit-6&7.
- 3) The requirement for installation of 04 Nos. Variable frequency Drive (VFD) system on ID Fan HT Motor of Unit-6 & 7 for reducing the auxiliary power consumption was suggested by accredited energy auditors M/S Siri Energy & Carbon Advisory Services, Hyderabad after conducting the energy audit for KSTPS Units. The VFD drives have already been installed at 600 KW CEP HT Motor and 120 KW LT Seal Air Fan Motor of Unit-5 which is running smoothly for last five years.
- 4) **Major benefits using VFD system are under:**
- Reduction in auxiliary power consumption
 - Improvement in machine efficiency
 - Expected energy saving of 20% by installation of VFD
- 5) **The Cost benefit details and submitted has shown in table-6 as under :**

Table-7

Plant	Units	Value
No. of Boilers	Nos	2
No. of FD fans	Nos	2
Rating of ID fans	KW	1700
Power Consumption by ID fan Unit-6	KW	2720
Power Consumption by ID fan Unit-7	KW	1911
Total Load	KW	4631
Avg. Running hours	Hrs.	24
Avg. Operating days /yr.	days	330
Expected Savings	%	20.00
Annual Savings	KWH	7335504
Electricity Cost	Rs/kwh	3.6
Annual Cost Savings	Rs. Lacs	264.08
Investment	Rs.Lacs	340
Simple Payback period	Years	1.29

- 6) Therefore, it is evident that the renovation will improve the efficiency of units and enhance the stability of running Unit-6&7 each of 195 MW under prevailing RERC norms.
- 7) The aforesaid Additional Capitalization is essential for efficient and successful operation of a generating station. It is, therefore, requested to the Commission for approval of Additional Capitalization for new purchase equipment of Rs. 8.75 cr at KSTPS Unit-6&7 under Regulation 17 (2) (iv) of RERC Regulations, 2014. Copy of proposal & estimation cost are enclosed as **Annexure-D**.

E. Replacement of existing Fuji make 2x75 KVA UPS system installed in Unit-5 of KSTPS, Kota

KSTPS Unit-5 (210 MW)

- 1) The details of existing Fuji make 2x75 KVA UPS system of KSTPS Unit-5 (210 MW) are under:

Table-8

S. No.	Name of Machine	Equipment	Unit Capacity	Specification	CoD
1.	KSTPS Unit #5	Fuji make UPS system	210 MW	CVCF-500	18.07.1995

- 2) The existing Fuji make 2x75 KVA UPS system of Unit-5 KSTPS, Kota is in service since commissioning of the unit in the year 1993 and has outlived its useful life. It urgently requires for Renovation & Modernization. The system has now become obsolete and its Original Equipment Manufacturer M/s Fuji Electric has denied future service/spares. Previously, M/s Instrumentation Limited, Kota was providing service/ spare support for these installed UPS through an AMC. M/s IL, Kota has been closed by Government of India. Therefore, now onwards there is no possibility of spares and service support system and no alternative is left other than to replace it by new UPS system. If any emergency arises in the form of failure of UPS, it will disrupt the complete process of Unit. Under such circumstances, it has become necessary to renovate and modernize the existing UPS system for sustainable performance of KSTPS Unit-5.

- 3) It is submitted that the UPS system is installed for providing uninterrupted power supply to most critical systems like DCS systems (of BOP/SG/TG), Generators systems and other mission critical systems of Unit dealing with most important control and protection of KSTPS Unit-5. Failure of DCS due to failure of UPS system may cause serious hazards to unit. There are examples of seizure of turbines due to failure of DCS due to UPS. Further failure of UPS may cause failure of various sub systems causing tripping of unit, consequently generation loss. Therefore, to maintain the smooth and safe operation of the unit, proper functioning of UPS system is the utmost requirement.
- 4) **Major benefits on performance of Fuji make UPS system are under :**
- Minimizing outages of various critical services like DCS system, pro control system, BFP Scoop etc. on account of power supply failure to the systems due to failure to the systems due to failure of existing UPS system.
 - Safe guarding of various auxiliaries & DCS system which are being fed by this UPS system by providing uninterrupted power supply to them.
 - Preventing trippings of the unit on account of power supply to various critical services and DCS system.
 - Preventing hazards to unit due to failure of DCS and other subsystems on account of failure of UPS supply.
- 5) **The cost benefits are submitted as under:**
- Outage of Unit on account of power supply failure of critical services due to malfunctioning or failure of UPS needs to massive generation loss.
 - Frequent tripping of unit due to UPS failures leads to increased oil consumption and generation loss
 - The cost incurred on above replacement shall be recovered by smooth and uninterrupted operation of the Unit.
- 6) The aforesaid Additional Capitalization is essential for efficient and successful operation of a generating station. It is, therefore, requested to the Commission for approval of Additional Capitalization for new purchase equipment of Rs. 0.81 cr at KSTPS Unit-5 under Regulation 17 (2) (iv) of RERC Regulations, 2014. Copy of proposal & estimation cost are enclosed as **Annexure-E**.

**F. Strengthening and repair of RCC & steel structure of crusher house ,
RCC structure of DM plant , RCC structure of alkali tank , RCC of plow
feeder at KSTPS , Kota**

- 1) The crusher house building CHP control room is about 35 years old. In the building, major cracks have been developed in cement concrete and reinforcement bars have also exposed on surface of concrete structure at many places. Similar to CHP control room, major cracks have also been observed in the RCC structure of DM plant building stage- II, Acid alkali tank foundation and S.D.G tank foundation. The condition of RCC structure of Plow feeder is also not good. Under such circumstances, it becomes necessary to renovate and modernize the RCC & steel structure of crusher house, RCC structure of DM plant, RCC structure of alkali tank, RCC of plow feeder at KSTPS, Kota.
- 2) The conditions of above structures, assessment of concrete and steel structures of old crusher house, Plow feeder RCC structure, RCC structure of DM plant, RCC structure of acid alkali tank, RCC structure of DM plant was got done by Central Power Research Institute (Govt. of undertaking) Nagpur. M/s CPRI submitted their final report in which they have suggested sealing of cracks and honey comb patches, injection grouting using non-shrink free flow low viscosity epoxy, providing and fixing shear connectors, RCC jacketing with high strength micro concrete at various locations as per the condition of structure based on their tests to avoid further damage of the structures. M/s NTPC engineers have also pointed out about deteriorated condition of crusher house in their ORT report.
- 3) The scope of work mainly includes scaffolding, sealing of cracks and honey comb patches by epoxy mortar and epoxy bond coat, injection low viscosity epoxy grout, injection polymer cement (PC) grouting for slab, shear connectors/ keys, reinforcement in RCC work for jacketing with micro concrete, structural steel work, epoxy resin bond, RCC jacketing with micro concrete, formwork, chemically modified fibre, reinforced polymer mortar, brick masonry, cement plaster, MS windows with ventilators, encasing of existing peripheral structural columns, steel structure work riveted, bolted or welded in built up section, trusses and frame work including fabrication, erection, welding alignment, cutting and applying priming coat of approved steel primer in complete, finishing with epoxy paint.
- 4) It is submitted that renovation & modernisation will strengthen the above RCC and steel structures and avoid any further damage & mishappening due to deteriorated condition of structures.

- 5) The aforesaid Additional Capitalization is essential for efficient and successful operation of a generating station. It is, therefore, requested to the Commission for approval of Additional Capitalization of Rs. 3.90 cr at KSTPS under Regulation 17 (2) (iv) of RERC Regulations, 2014. Copy of proposal & estimation cost are enclosed as **Annexure-F**.

G. Work of strengthening and repair of RCC framed structure of IDCT cooling tower of Unit # 6 at KSTPS, Kota.

KSTPS Unit-6 (195 MW)

- 1) The IDCT cooling tower of Unit # 6 is very old and was constructed by M/s Gammon India Ltd. In the cooling tower, major cracks have been developed in the main RCC columns and RCC beams of framed concrete structure of cooling tower, reinforcement bars have also exposed on surface of concrete structure at many places. Under such circumstances, it has become necessary to renovate and modernize the IDCT cooling tower of KSTPS requiring huge maintenance and strengthening.
- 2) Looking to the severity of cracks, exposed reinforcement bars and deteriorated condition of the RCC framed structure of IDCT Cooling tower of Unit # 6, an order was placed to M/s. Central Power Research Institute (a Govt. of India undertaking), Nagpur to carry out the condition assessment of concrete structure of Cooling tower of Unit#6 at KSTPS , Kota. M/s CPRI submitted their final report for repairing and strengthening/ restoration of RCC framed structure of IDCT Cooling Tower of Unit # 6. In this report they have mainly suggested remedial measures like sealing of cracks & honey comb patches by epoxy mortar, injecting low viscosity epoxy grouting, providing of shear connectors, RCC jacketing with high strength micro concrete and cement plastering to avoid further damage/deterioration. M/s NTPC engineers have also pointed in ORT about deteriorated condition of crusher house.
- 3) The scope of work mainly includes sealing of cracks and honey comb patches by epoxy mortar, injecting low viscosity epoxy grouting, providing of shear connectors, reinforcement in RCC structure for jacketing with micro concrete, cement plaster, scaffolding, chipping, formwork, applying epoxy resin bond, providing of chemically modified fiber reinforced polymer mortar, crack bridging waterproof coating and other misc works suggested by M/s CPRI, Nagpur or as per requirement of site.

- 4) The renovation and modernisation will strengthen the above RCC columns & RCC beam of framed concrete structures and avoid any further damage and mishappening due to deteriorated condition of above structures.
- 5) The aforesaid Additional Capitalization is essential for efficient and successful operation of a generating station. It is, therefore, requested to the Commission for approval of Additional Capitalization of Rs. 2.74 cr at KSTPS Unit#6 under Regulation 17 (2) (iv) of RERC Regulations, 2014. Copy of proposal & estimation cost are enclosed as **Annexure-G**.

H. Renovation/ Retrofitting of Louise make Rotary Discharge Wheel machine No. 1 & 2 installed at KSTPS, Kota

- 1) The details of existing Louise make Rotary Discharge Wheel machine No. 1&2 are under:

Table -9

Sr. No.	Description	Existing Machine
1	Type of Machine	Louise make D-5000 KOLN-90 Hydraulic
2	Max. Conveying Capacity	750 T/ Hr
3	Bulk Material	Coal
4	Geometry Dimensions	
	Diameter (Discharge Arm)	3000 mm
5	Drive	Hydraulic Motor
	Electric Motor (Capacity)	30 kW
	Travel Drive	
	Electric Motor (Capacity)	2.2 kW

- 2) In the present system, Rotary Discharge Wheel machine (Plough feeder) No. 1&2 are used to feed the coal to unit No. 1 to 4. These machines were commissioned in the year 1983 by the M/s Louise Fardertechnik GMBH & Co., Germany. Since then these are in continuous operation and are kept in service by carrying out periodically overhauling and replacing worn out spares during overhauling. Presently, spares of above Rotary Discharge wheel machines are not available in market. These two machines have outlived its useful life and urgently require Renovation & Modernization.
- 3) Presently, Rotary Discharge Wheel machine No. 1 has following deficiencies :
 - Electronic Cards are out of order (running on relay logic)
 - Closed Loop for speed control is not working.

- Output Hub connecting to discharge arms is damaged and due to this it cannot run on rated RPM.
 - Machine run on only 100 TPH coal feeding against 750 TPH capacity.
- 4) Therefore, M/s Aumund Engineering Pvt. Ltd. was requested for budgetary offer for spares/ retrofitting the same vide letter dated 29.09.16. After continuous pursuance, the firm M/s Aumund submitted the budgetary offer for retrofitting the Louise Rotary Discharge Machine in place of spares.
- The spares of existing Louise make machine ty D-5000 KOLN, 90 has discontinued.
 - M/s Louise Germany has merged in M/s Aumund Germany on dated 05.01.2004.
 - 90% payment of the materials along with full taxes & duties shall be made against pro-forma invoice and balance 10% payment shall be made within 20 days from the date of receipt of materials.
 - The dismantling and removing of old machine shall be in the scope of RVUN and the firm will provide supervisory services for assembling and commissioning of new machine on payment basis.
 - The Coal Dust Suppression system of the machine shall not be the part of offer.
- 5) The scope of work mainly includes:
- Dismantling of old machines in phased manner.
 - Supply and fixing of guide rail & plate as per system requirement with proper alignment work.
 - Erection & commissioning of Rotary Discharge machine in phased manner.
 - Supply & erection of Festoon system with alignment work.
 - Supply, laying & termination of power & control cables in junction boxes and Rotary Discharge machines.
 - Supply and fixing of platforms, ladders and stairways as per system requirement.
- 6) The aforesaid machines are only reliable and controlled means of feeding of stockyard coal to Unit No. 1 to 2 in the absent of coal rakes. Therefore, it is proposed to renovate/ retrofit the both Louise make Discharge Wheel machine for smooth coal feeding to bunkers of unit 1 to 4 as these machines have lived their useful life and OEM has also discontinued the spares of aforesaid machines.

- 7) The aforesaid additional capitalization is essential for efficient and successful operation of a generating station. It is, therefore, requested to the Commission for approval of Additional Capitalization of Rs. 2.05 cr at KSTPS under Regulation 17 (2) (iv) of RERC Regulations, 2014. Copy of proposal & estimation cost are enclosed as **Annexure-H**.

I. Conversion of Relay Logic Control System of CHP into PLC based system.

- 1) Presently, the entire CHP electrical system is running on old relay logic system and consists of five control desks and these control desks are distributed in two control rooms which are almost 200 metre away from each other. Due to aforesaid system KSTPS faces problems in troubleshooting of any fault as this system contains many relays and take more time for rectify the fault. Data monitoring and analysis cannot be done for operational point of view as presently CHP electrical system is running on old relay logic system. Erection & Commissioning process of new Wagon Tipplers No. 6, 7 and Stacker Reclaimer are going of under new CHP package. The new CHP package shall work on new technology of PLC & SCADA. As present CHP system is running on old Relay logic so hooking up problem shall occur with existing CHP system. Under such circumstances, it becomes necessity for required Renovation and Modernization of CHP electrical system.
- 2) The major benefits of Renovation & Modernisation are under:
- CHP electrical system can be operated at one control room instead of two control room due to this monitoring of the CHP system can be done in effectly manner
 - PLC & SCADA make it easier to troubleshoot the systems with minimum breakdown time.
 - Data monitoring and analysis can be done on daily/ monthly/ annually basis.
- 3) The scope of work mainly includes :
- In first phase of up-gradation, system shall operate in two modes:
 - Relay Mode: the system will run from old control desks
 - PLC Mode: The system will run from SCADA station.
 - In second phase of up-gradation, old relay panels shall be dismantled and whole system will run on PLC.
 - Study of existing relay base system.
 - Engineering & designing new automation control system.

- Preparation of new engineering drawing for new system.
 - Fixing & mounting of new supplied panels at control room.
 - Cable laying between new & old panels.
 - Termination of control cables in both new & old panels.
 - Ethernet cable laying between processor panels & processor panel.
 - Termination of Ethernet cables.
 - Establishing communication between IO panels & processor panel.
 - Application Logic development in processor.
 - SCADA screen development in personal computer.
 - Testing of the system.
 - Commissioning of the system.
 - Observation for 72 hours & handing over the system.
- 4) The aforesaid Additional Capitalization is essential for efficient and successful operation of a generating station. It is, therefore, requested to the Commission for approval of Additional Capitalization of Rs. 3.85 cr at KSTPS Unit#6 under Regulation 17 (2) (iv) of RERC Regulations, 2014. Copy of proposal & estimation cost are enclosed as **Annexure-I**.

J. Purchase of three (03) Nos. new bulldozers (BEML make, Model: BD-155)

- 1) The present status of bulldozers and reasons of purchasing of three (03) Nos. new Bulldozers of BEML make Model are under :
- Out of 08 available bulldozers, 02 Nos. existing bulldozers of BEML make Model: BD-155 have lived their useful life and worn out completely.
 - Further, 01 No. Bulldozer will be required for new upcoming system of stacker & reclaimer and wagon tippler.
 - Therefore, three (03) Nos. Bulldozers of BEML make Model: BD-155 will be required for smooth feeding/ stacking of coal.
- 2) The major benefits from purchase of three (03) bulldozers are under:
- Reduction of demurrage charges imposed by Railways by timely stacking of coal.
 - Feeding of coal to bunkers from plow feeder, ERH & MUH for smooth running of the units.

- 3) The aforesaid Additional Capitalization is essential for efficient and successful operation of a generating station. It is, therefore, requested to the Commission for approval of Additional Capitalization of Rs. 8.66 cr KSTPS under Regulation 17 (2) (iv) of RERC Regulations, 2014. Copy of proposal & estimation cost are enclosed as **Annexure-J**.

K. Supply, Erection & Commissioning of 14 Nos. Belt Weigher at KSTPS , Kota.

- 1) At present, 07 Nos. belt weighers are installed on various conveyer systems 7A, 7B, 14A, 14B, 7C, 7D for crushed coal in CHP area for measurement of coal flow (T/ Hr). The aforesaid Belt weighers are utilized for measurement of Coal flow.

Table -10

Sr. No.	Location	Remark
1	Conv. 7A	For crushed coal
2	Conv. 7B	
3	Conv. 14A	
4	Conv. 14B	
5	Conv. 21B	
6	Conv. 7C	
7	Conv. 7D	

- 2) These belt weighers were installed at the time of commissioning of units and are not in working condition. As a result, measurement of coal cannot be done. The above Belt weighers are old and lived their useful life. Spares have been discontinued by the Original Equipment Manufacturer (OEM). Under such circumstances, it has become necessary to renovate and modernize the CHP belt weighers.
- 3) For better coal quantity measurement, few more belt weighers have to be installed at following locations in addition to aforesaid locations:

Table -11

Sr. No.	Location	Remark
1	Conv. 2A	Un Crushed Coal
2	Conv. 2B	
3	Conv. 2C	
4	Conv. 18A	
5	Conv. 21A	Crushed Coal
6	Belt Conv. SR-1	
7	Belt Conv. SR-2	

- 4) Benefits of the installation of belt weighers at aforesaid locations are as under:
 - Coal quantity being fed to coal bunkers can be measured.
 - Coal quantity at stockpiles can be measured.
 - Unloaded Coal quantity from coal rakes can be measured.
 - Coal reclaim quantity can be measured.

- 5) The scope of work mainly includes:
 - Dismantling of old belt weigher.
 - Study of suitable location on each of the specified conveyors and submission the drawings for approval prior to dispatch of material.
 - Supply of cables, laying and termination from site to control room.
 - Erection and commissioning of beltweigher.
 - Display of coal flow and cumulative coal quantity on the screen.
 - Firm shall provide AMC after warranty period on chargeable basis.

- 6) RVUN sought the enquiry vide email dated 11.09.2017 for budgetary offer. M/s Rice Lake vide letter dated 14.09.2018 submitted budgetary offer.

- 7) The aforesaid Additional Capitalization is essential for efficient and successful operation of a generating station. It is, therefore, requested to the Commission for approval of Additional Capitalization of Rs. 1.12 cr at KSTPS under Regulation 17 (2) (iv) of RERC Regulations, 2014. Copy of proposal & estimation cost are enclosed as **Annexure-K**.

L. Supply, Design, Installation & Commissioning of Online Energy Accounting and Management System of KSTPS, Kota.

- 1) KSTPS, Kota having capacity of 1240 MW is one of the oldest thermal power station in the state of Rajasthan. At present, the auxiliary consumption of the power station is around 11 % and there is always a margin to reduce the auxiliary consumption if monitored properly. There are several factors contributing to auxiliary consumption and through proper Energy Accounting and Management, it can be reduced. Energy Accounting is an integral part of Energy Management and Conservation. It measures and accounts for energy inputs, energy consumption and energy losses. The Energy Accounting enables the qualification of losses in different segments of the system. The first and foremost reason for Energy Accounting in a power utility is to record the available energy and attribute energy consumption & losses in the system. At present, there are no means available to measure the segment wise energy consumption.

Therefore, it is proposed to install the "On Line Energy Accounting and Management System" at all the seven units of KTPS, Kota. The primary objective of energy management is to achieve and maintain optimum energy utilization, throughout the power plant which may help in minimizing auxiliary power consumption and mitigating environmental effects.

- 8) The whole Online Energy Accounting and Management system can be divided into three parts namely (i) Digital Energy Meter (ii) Software for monitoring and generation of reports and (iii) Networking Elements. One Digital Energy Meter shall also be installed at 6.6 KV Feeders/Motors/Ties, all 220 KV bays/feeders, Generator desk of all the seven units of KSTPS, Kota. Data from the energy meters of respective unit shall then be communicated through suitable interface to a central computer placed at Unit Control room.
- 9) **Major benefits of Energy Management System is under :**
 - Conditions Monitoring
 - Preventive Maintenance
 - Reduction in auxiliary power consumption (APC)
 - Helps in identification of segment wise Energy consumption
 - Generates various types of reports which are vital for Management.
- 10) The On Line Energy Accounting and Management system will definitely help in reducing the APC and further in preventive maintenance of major equipments i.e. Coal Mills, ID fans, PA fans, BFP etc. So, "On Line Energy Monitoring System" is an essential requirement for all 7 Units of KSTPS, Kota.
- 11) The aforesaid Additional Capitalization is essential for efficient and successful operation of a generating station. It is, therefore, requested to the Commission for approval of Additional Capitalization of Rs. 2.24 cr at KSTPS under Regulation 17 (2) (iv) of RERC Regulations, 2014. Copy of proposal & estimation cost are enclosed as **Annexure-L**.

M. Interest During Construction

The total IDC amount is **Rs.2.68 cr** and has been calculated as per the estimated time required for implementation of proposals. Copy of IDC Calculation sheet is enclosed as **Annexure-M**.

A4: RESPONDENTS:-

- 1) All the three Discom's (i.e. JVVNL/AVVNL/ JdVVNL) Jaipur/ Ajmer/ Jodhpur are respondents for the above petition.

A5: PRAYER

- 1) RVUN humbly requests the Hon'ble Commission to:
- 2) To grant the In-principle approval for 12 Nos additional capitalization proposals of KSTPS Kota amounting to **Rs.56.47 cr approx. (including IDC)** under Regulation, 17 (2) (iv) of RERC Tariff Regulations, 2014.
- 3) Pass such other further orders as are deemed fit and proper in the facts and circumstances of the case

(Y.K.Upadhyay)
Chief Accounts Officer (Comml)
RVUN, Jaipur.

(Ajay Kumar Saxena)
Addl. Chief Engineer (PPMC &IT)
RVUN, Jaipur.

