Annex – 4
(Immediate measures with financial implication)

Table 1: Implemented Recommendations with Financial Implications (O&M and Capital) Indicating Benefits

Sr. No.	CPRI Recommendations	Action Plan/ Present Status/Comment	Reference	Benefit
1	Rotary pneumatic or electrical hammers for crushing coal lumps	The same is realized by Grab crane	Vol-1,Page-08,Sr.No-12	Instead of crushing in situ, The lumps and stone will be separated or crushed by Grab crane.
2	Grab cranes may be used for removal of stones from the wagon tippler area. Removal of stones before entry into the wagon tippler area	Grab crane installed at on wagon tippler.	Vol-1,Page-07,Sr.No-10	Breaking time of Lumps and Stones in situ is eliminated.
3	Procurement of TGA analysis of the coal for operational optimization	One TGA is installed on Feb-2010 and in service.	Vol-1,Page-08,Sr.No-16	Proximate of all mines Received coal is useful for declaration of Day ahead OLC
4	For further refinement in the coal heat value determination, it is recommended to measure sample to sample variation in a rake (for receiving end coal) for each rake and to measure in-sample variation to select the minimum sample size.	Already started and record is maintained at WTP.	Vol-1,Page-11,Sr.No-05	Useful for ensuring healthiness of the measurement
5	For further refinement in the coal heat value determination, it is recommended to measure sample to sample variation in a shift (for bunkered coal) for each bunker and to measure in-sample variation to select the minimum sample size.	Already started and record is maintained at WTP.	Vol-1,Page-11,Sr.No-06	Useful for ensuring healthiness of the measurement

6	Ready reckoner books of 100-150 pages are already brought out by the TPS for 500 MW units and all parameters are readily available. Similar ready reckoner books may be brought out for Units 1-4 (210 MW) in sufficient copies and distributed to operation and	Proposal initiated.	Vol-1,Page-16,Sr.No-87	Useful to access the information at a glance
7	During overhaul all the gas flow guide vanes, direction vanes, diversion baffles are to be inspected. Materials of diversion baffles must use alloy steel with overlay of hard materials like silicon carbide or tungsten carbide for Unit 1,2,3,6,7	Inspection and repairs of guide vanes & baffles are already covered in regular overhaul practices. DPR for Hardened baffles and vanes is sent to HO.	Vol-2-U1, Page-07, Sr.No-13	Smooth operation during the tenure between the overhaul is obtained.
8	Cleaning of stator water cooler heat exchanger by high pressure water jet cleaning for unit 1 to 7	Presently cleaning by brushing is followed during overhaul & found effective.	Vol-2-U1, Page-09, Sr.No-30	TTD is maintained with in limit.
9	The TPS must evolve a rolling plan of action for total replacement of boiler related skin insulation as well as skin cladding of furnace, APH, air ducts and flue gas ducts.	1) Rolling plan already available with maintenance section. 2) Energy audit also covers insulation & skin temp survey which is implemented as per rolling plan.	Vol-1,Page-12,Sr.No-28	Convention loss is reduced. Skin temperature is within Ambient + 15° C.
10	Polar chem. L2K for clinkering control in Units 5 & 6 (500 MW) units	Trial taken in unit 6 for one month results are positive further feasibility exploration on mass scale is in process	Vol-1,Page-09,Sr.No-31	

11	Exercising of sliding pressure operation option of unit for Unit 1 to 7	At present Unit 7 is running on CMC on VWO condition. Unit No. 5 and 6 will be tried. Not possible in Unit 1 to 4, being Nozzle governing.	Vol-2-U1, Page-08, Sr.No-23	Unit – 7 is on sliding pressure.
12	Digitization of the ISO 9001 QMS work instructions	Completed	Vol-1,Page-12,Sr.No-21	Helps to be available to all for reference
13	Policy to go in for digital instrumentation preferably Intelligent electronic devices (IEDs) as preferred mode.	All instruments purchased hereafter will be of smart type.	Vol-1,Page-12,Sr.No-20	Accuracy and reliability is ensured.
14	Oxygen measurement must be introduced in the deaerator for Unit 1 to 7	Available in unit 5 to 7, DPR approved for 1 to 4, which is covered in in SWAS.	Vol-2-U1, Page-08, Sr.No-21	
15	MS, HRH, HRH drain valves: replace damaged valve stem by stellited seats, valve plug with Inconel 750, plug by Nitronic 60 for Unit 1 to 7	The passing valve replacement is done on Shut down/Overhaul. Passing will be detected after set is synchronized.	Vol-2-U1, Page-07, Sr.No-14	Passing of the valves are minimum.
16	The insulation of the primary and secondary air ducts may be replaced by new unbonded, felted, mineral/rock/slag wool mattresses on need basis for Unit 1 to 7	Combined with P13-14-BM-IT	Vol-2-U6,Page-06,Sr.No-07	Heat losses are reduced
17	Condenser vacuum problem needs to be attended for unit 5 & 6	1) Acid cleaning by sulfunic Acid, Bullet shot cleaning and high pressure jetting is done is performed	Vol-2-U6,Page-08,Sr.No-24	Vacuum improved, but temporarily because of Cooling temp mismatch

		during Overhaul. Material of @ 20 Tons is removed from Condenser tubes. Performance for effectiveness will be judge after unit is on load.		
18	GT secondary energy meter (from GCR) reading may also be incorporated in auxiliary power computation.	Data in CSV format is available. LAN connection with GCR is essential	Vol-3(Stn),Sr.No-14	Ex-Bus Power is available to GCR

Table 2: Deferred Recommendations with Justification.

Sr. No.	CPRI Recommendations	Action Plan/ Present Status/Comment	Reference	Recommendation Type	Reason for Differed
1	The coal handling plant is experiencing dust problems due to presence of high level of fines in receipt coal. Coal dust pelletization at the washery level or at the crusher level.	It will be realized through establishment of our own coal washery of 14 MTPA at CSTPS, with captive power plant, which will consume coal reject and fines.	Vol-1,Page-12,Sr.No-15	Immediate Term	It will be realized through establishment of our own coal washery of 14 MTPA at CSTPS, with captive power plant, which will consume coal reject and fines.
2	The principle of loading loss of coal into the heat rate of units results in errors in systems. Heat rate should strictly indicate heat consumption by the units and coal losses (if any) should be separately accounted as a weight loss.	The present truing up order of MERC considered the Coal GCV of blended (mathematical) coal of Raw, wash and Imported. Therefore the recommendation will not work.	Vol-1,Page-11,Sr.No-04	Immediate Term	The present truing up order of MERC considered the Coal GCV of blended (mathematical) coal of Raw, wash and Imported. Therefore the recommendation will not work.
3	Automatic online sampling of conveyor coal going into bunkers.	The recommendation is differed as per HO circular No. 2594 Did. 22 Feb 2010. (It is directed to collect Bunker sample from Feeder), which is followed.	Vol-1,Page-08,Sr.No-13	Immediate Term	The recommendation is deferred as per HO circular No. 2594 Dtd. 22 Feb 2010. (It is directed to collect Bunker sample from Feeder), which is followed.
4	Oil gun on-off operation data must be recorded through a time based system automatically for Unit 1 to 7	Will be realized through Data acquisition through Transmitters oil mass flow and oil level. DPR is approved by HO	Vol-1,Page-08,Sr.No-19	Immediate Term	Will be realized through Data acquisition through Transmitters oil mass flow and oil level. DPR is approved by HO and MERC. Tenderization

		and MERC. Tenderization is in process.			is in process.
5	The monthly data submitted to HO and to Regulatory Commission must also give the unit test heat rate and station test heat rate obtained by testing the unit on average coal and obtained through online heat rate monitoring software.	Will be realized after on line heat rate software to be used (Kalki) through GCR. However, submitting the data of test heat rate will not be appropriate, as it will be the snapshot of the observation and not the average conditions 0f the month, hence may	Vol-1,Page-18,Sr.No-112	Immediate Term	Will be realized after on line heat rate software to be used (Kalki) through GCR. However, submitting the data of test heat rate will not be appropriate, as it will be the snapshot of the observation and not the average conditions 0f the month, hence may led to confusion and conflict.
6	Cleaning of tube nest / Heating Surface of HP heater for unit 1 to 7	OEM do-not recommend the tube nest cleaning. Letter attached for reference.	Vol-2-U3,Page-08,Sr.No-26	Immediate Term	OEM do-not recommend the tube nest cleaning. Letter attached for reference. There is no deviation in Eco inlet temp to the boiler is observed.
7	Cleaning of LPH 1 for Unit 1 to 7	There is no deviation in Eco inlet temp to the boiler is observed.	Vol-2-U6,Page-08,Sr.No-23	Immediate Term	There is no deviation in Eco inlet temp to the boiler is observed.
8	Increasing the Hydrogen pressure in generator for Unit 1 to 4	No evidence of increase in slot temperature is observed in any unit.	Vol-2-U4,Page-08,Sr.No-19	Immediate Term	No evidence of increase in slot temperature is observed in any unit. It may lead to creation of leakages.
9	Performance control and optimization through emission monitoring feedback is a solution for quick detection of quality variations.	Recommendation is deferred for implementation. The sensors are costly and had the less life the duration between the overhaul. The same will be	Vol-1,Page-17,Sr.No-99	Immediate Term	Recommendation is deferred for implementation. The sensors are costly and had the less life the duration between the overhaul. The same will be realized

		realized through calculation of on line heat rate with deviation parameters, which will be available to concern			through calculation of on line heat rate with deviation parameters, which will be available to concern shift In-charge for optimization.
10	On-line computation of flue gas flow	Recommendation differed for implementation. However computation will be done by mass balance of air and coal.	Vol-3(Stn),Sr.No-17	Immediate Term	Recommendation deferred for implementation. However computation will be done by mass balance of air and coal.
11	Dry bottom ash disposal by conveyors to silos from where it is loaded into trucks for further disposal	Suitable vendor is not yet located. However no problems of choke up exist, because sufficient flushing is done.	Vol-1,Page-12,Sr.No-18	Immediate Term	Suitable vendor is not yet located. However no problems of choke up exist, because sufficient flushing is done.
12	Collection and characterization of sinospheres from ash pond	Matter taken up with Material Division of CPRI, however no positive response and suitable vendor is obtained.	Vol-1,Page-12,Sr.No-16	Immediate Term	Matter taken up with Material Division of CPRI, however no positive response and suitable vendor is obtained.
13	Turbo vaned fly wheeling eco ventilators for Unit 1 to 7	Budgetary offer received from M/s Sudha Ventilating System PVT Ltd, Ahamednagar. The offer indicates installation of two times than existing fans for obtaining same capacity which is not feasible with existing structure of turbine roof.	Vol-1,Page-09,Sr.No-23	Immediate Term	Budgetary offer received from M/s Sudha Ventilating System PVT Ltd, Ahamednagar. The offer indicates installation of two times than existing fans for obtaining same capacity which is not feasible with existing structure of turbine roof.

14	Replacement of major extraction & NRVs for unit 1 to 7	NRVs are checked during overhauls of respective units, found in intact condition, no evidence of passing is observed.	Vol-2-U1,Page-10,Sr.No-2	Immediate Term	NRVs are checked during overhauls of respective units, found in intact condition, no evidence of passing is observed.
15	ESP transformer management	Both Transformers remain charged for ensuring hot standby	Vol-3(Stn),Sr.No-19	Immediate Term	Both Transformers remain charged for ensuring hot standby
16	Transformer management (ODP)	Both Transformers remain charged for ensuring hot standby	Vol-3(Stn),Sr.No-26	Immediate Term	Both Transformers remain charged for ensuring hot standby
17	Reducing the pressure of service air compressors to 4.0 kg/cm^2	Air Motors of APH and Power cylinders of Bottom ash and ESP are operated by Service air, for which the required pressure is 6 Kg/Cm^2	Vol-3(Stn),Sr.No-31	Immediate Term	Air Motors of APH and Power cylinders of Bottom ash and ESP are operated by Service air, for which the required pressure is 6 Kg/Cm2
18	Pressurization of turbine area to avoid dust in turbine floor for U-1 to 4	(1) LMZ turbine houses in are not pressurized as per OEM's design nor any incidence of such practice is noticed. (2) No malfunction due to dust ingress is recorded/ noticed since commissioning (3) present Turbine house design has already taken care of dues	Vol-2-U2,Page-08,Sr.No-23	Immediate Term	(1) LMZ turbine houses in are not pressurized as per OEM's design nor any incidence of such practice is noticed. (2) No malfunction due to dust ingress is recorded/ noticed since commissioning (3) present Turbine house design has already taken care of dust ingress and modification is restricted due to structural constraints. Hence recommendation is

					deferred for implementation.