Annexure 02

Copy of the PPA Signed Dtd. 01.04.2009

(Relevant pages of LPS Provision's).

POWER PURCHASE AGREEMENT

for

Procurement of Power on Long Term Basis

from

Existing Power Stations including Parli T.P.S.Unit-6 (New Parli T.P.S.Unit -1) and Paras T.P.S.Unit-3 (Paras T.P.S. Expansion Unit- 1)

between

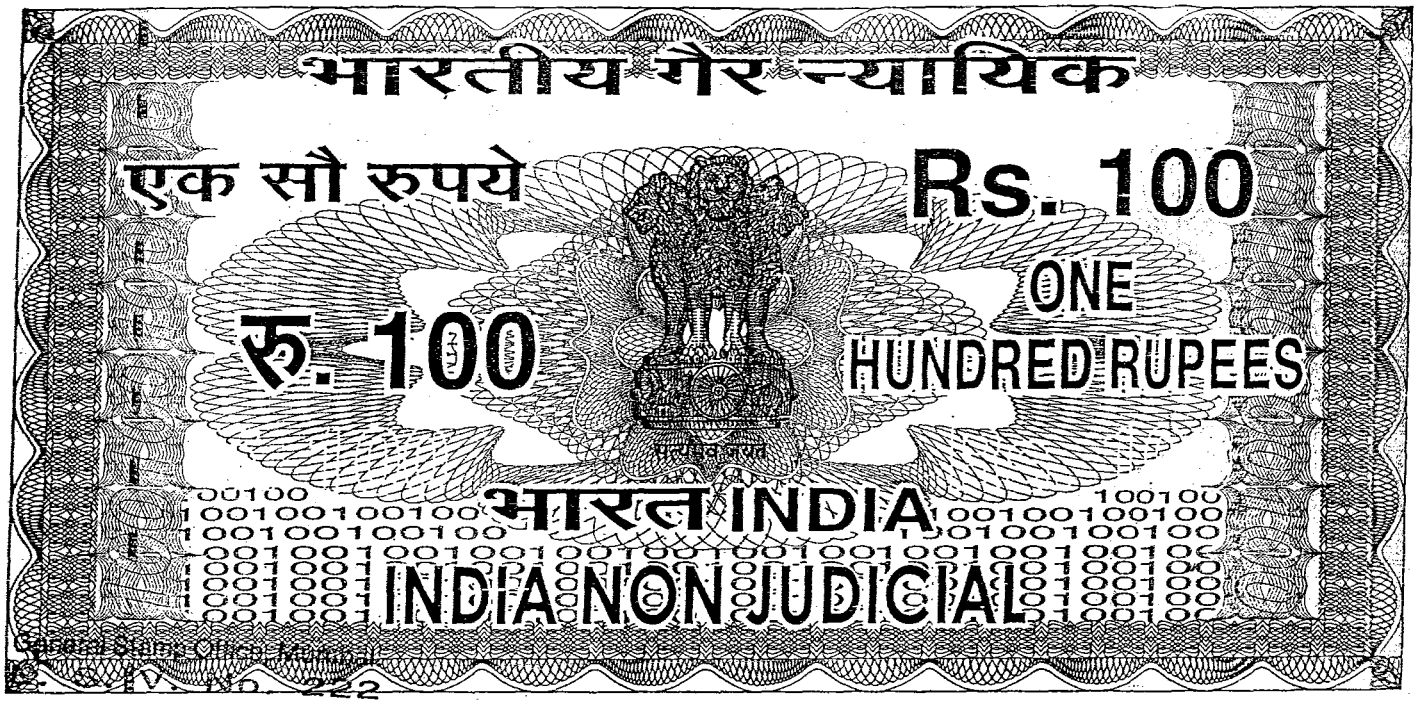
Maharashtra State Electricity Distribution Company Limited

(MSEDCL / MAHAVITARAN the "Procurer")

and

Maharashtra State Power Generation Company Limited

(MSPGCL / MAHAGENCO the "Seller")



महाराष्ट्र MAHARASHTRA

BN 351603

13 FEB 2009

श्री सौ. कांचन हर्षद बोंगाळे

21 FEB 2009

PROPER OFFICER

Mr. T. S. Sawant

परवाना धारक मुद्रांक विक्रेता

This Power Purchase Agreement (here in after referred as the Agreement") is made this First.....day of ~~February~~, Two Thousand Nine ~~(.....02-2009)~~ between April 01-04-2009

Maharashtra State Power Generation Company Limited (MSPGCL), a Company incorporated under the provisions of the Companies Act, 1956 and having its registered office at Prakashgad, G-9 , Anant Kanekar Marg , Bandra (E), off Western Express Highway, Mumbai – 400 051 (hereinafter referred to as MAHAGENCO which expression shall, unless repugnant to the context or meaning thereof include its successors and assigns) of the One Part:

And

Maharashtra State Electricity Distribution Company Limited (MSEDCL), a Company incorporated under the provisions of the Companies Act, 1956, and having its registered office at Prakashgad, G-9, Anant Kanekar Marg Bandra (E), Mumbai – 400 051 (hereinafter referred to as MAHAVITARAN, which expression shall, unless repugnant to the context or meaning thereof, include its successors and assigns) of the Other part.

M.S.P.G.C.L. PRAKASHGAD, MUMBAI

Director (Operations) MSEDCL, Mumbai-51

9 ARTICLE 9: BILLING AND PAYMENT

9.1 All payments under this Agreement shall be billed and paid in accordance with the following provisions:

(a) Monthly Bill: MAHAGENCO shall raise at monthly interval one or more bills on the basis of the joint monthly meter readings of the interface tariff meters recorded on 1st of every month for supply of electricity from the generating station and other charges payable by MAHAVITARAN. For a given Billing Month, MAHAGENCO shall issue Monthly Bill by 5th day of the subsequent month to month in which supply were effected by MAHAGENCO to MAHAVITARAN. The bills shall be raised in the name of officer designated by the MAHAVITARAN.

(b) MAHAVITARAN shall arrange payment of such bill(s) within 60 (sixty) days from the Billing Date through cheque payable at Mumbai and drawn in the name of MAHAGENCO. The date of realisation of cheque by MAHAGENCO shall be considered as the date of payment for computation of rebate or late payment surcharge payable as the case may be.

(c) MAHAVITARAN can also make a provisional payment based on the previous month's bills for which rebate will be applicable at the rate of 1.25% (one and quarter percent) of such advance payment.

(d) Supplementary Bills: Any amount due to MAHAGENCO by MAHAVITARAN under this agreement other than amounts set out in a Monthly Bill shall be payable within forty-five (45) days of presentation of the Supplementary Bill by MAHAGENCO to MAHAVITARAN.

9.2 Disputed Bill:

9.2.1 The bill(s) of MAHAGENCO shall be paid by MAHAVITARAN in full subject to the condition that:

(a) there is no apparent arithmetical error in the bill(s)

(b) the bill(s) is /are claimed as per the approved tariff

(c) they are in accordance with the joint monthly meter reading as in Article 6.4

9.2.2 If MAHAVITARAN has any disagreement with the bill(s) raised, they shall file a written objection with MAHAGENCO within 15 days of presentation of the bill(s) giving following particulars:

(a) item disputed, with full details/data and reasons of dispute, and

(b) amount disputed against each item

M.S.P.G.C.L. PRAKASHGAD, MUMBAI

Director (Operations) MSEDCL, Mumbai-51

9.2.3 MAHAGENCO shall resolve the above dispute with MAHAVITARAN as soon as possible preferably within 30 days of receipt of such objection from MAHAVITARAN. In case the dispute is not resolved, such a bill is to be treated as a "disputed bill" and the matter shall be referred to dispute resolution mechanism as provided in Article 15.

9.2.4 Notwithstanding any dispute as to all or any portion of a Bill submitted by MAHAGENCO to MAHAVITARAN, MAHAVITARAN shall pay the 95% (ninety-five percent) amount of the Bill provided that the amount of the Bill is based on a joint meter reading and that the Tariff is as determined by the Commission.

9.2.5 The amount of excess/ shortfall with respect to the said 95% payment based on the final award of arbitration shall be paid/ adjusted with interest at the rate of SBI PLR from the date on which the amount in dispute was payable.

9.3 Rebate for prompt payment and Late payment surcharge

(a) The rebate for prompt payment shall be governed as per Schedule-7 of this PPA. For payment of bills through a letter of credit on presentation a rebate of 2% (two percent) of amount paid shall be admissible. If the payments are made by MAHAVITARAN within seven days of presentation of the bill a rebate of 1.25% (one and quarter percent) of amount paid shall be admissible, and thereafter rebate shall be reduced gradually till the 59th day as per Schedule 7.

(b) In case the payment of bills is delayed by MAHAVITARAN beyond due date of payment of the bill, a late payment surcharge at the rate of 1.25% (one and quarter percent) per month calculated for number of days for which payment delayed shall be levied by MAHAGENCO.

(c) The provision for rebate and late payment surcharge shall be effective only from the date of approval of this agreement by the Commission.

M.S.P.G.C.L. ★ PRAKASHGAD, MUMBAI ★

Director (Operations) ★ MSEDCL, Mumbai-51 ★

Annexure 03

Copy of MSEDCL's Letter Dtd. 05.08.2022
Regarding LPS issue.

MSEDCL's letter dtd 05/08/22 reg. liquidation of LPS C 159

MAHAVITARAN

Maharashtra State Electricity Distribution Co. Ltd.
(CIN No. : U40109MH2005SGC153645)

Ref No. Director (F)/MSPGCL/LPS **Date : 05.08.2022**

000260

To,

The Chairman & Managing Director
Maharashtra State Power Generation Co. Ltd.
3rd Floor, Prakashgad, Bandra (E)
Mumbai – 400 051.

Sub: Liquidation of arrears of MSPGCL under Electricity Late Payment Surcharge, Rules 2022 of MoP's Notification.

Ref.: 1. Ministry of Power's Notification dtd. 03.06.2022.
2. MSEBHCL minutes of meeting dtd. 02.08.2022.
3. E Mail dtd. 03.08.2022.

With reference to above subject, a meeting is held on 02.08.2022 by Hon. Principal Secretary (Energy) for discussion of implementation of Electricity (Late Payment Surcharge & related matters) Rules, 2022 on dtd.03.06.2022 issued by Ministry of Power at Hon. Principal Secretary (Energy) cabin, Mantralaya. A brief detail of MOP rules dtd. 03.06.2022 was presented along with outstanding dues of MSPGCL and MSETCL as on 03.06.2022 alongwith amount and reasons of differences therein.

In the meeting directives are given by Hon. Principal Secretary (Energy) to all the three companies which are circulated vide minutes issued by MSEBHCL.

Accordingly, MSEDCL has conveyed the calculations and outstanding dues of MSPGCL for confirmation and reconciliation as below:

(Amt in Crs.)

Particulars	Principal	DPS	TOTAL
MSPGCL	8881	4920	13801

Maharashtra State Electricity Distribution Co. Ltd.
Prakashgad, Plot No. G-9, Bandra (E), Mumbai - 400 051. ☎ (P) 26472912 (O) 26474211
Hongkong Bank Bldg., M. G. Road, Fort, Mumbai - 400 001. ☎ (P) 22630796 (O) 22619100
E-mail : directorfmsedcl@gmail.com • Website : www.mahadiscom.in

However, reconciliation is in the process. As per LPS Rules, in order to participate in the scheme and avail the benefit, MSEDCL is required to pay first installment on 05.08.2022. Hence, it is decided to pay outstanding amount as on 03.06.2022 as per the MSEDCL's calculation and accordingly the payment of Rs. 287.52 Crs. (13801/48) has been released on 05.08.2022 as first installment against the outstanding as on 03.06.2022.

In view of above it is further requested that :

1. Difference in outstanding principal as on 03.06.2022 between MSPGCL and MSEDCL shall be freezed as on 03.06.2022 till the decision of Board of MSEBHCL.

2. DPS shall not be levied w.e.f. 04.06.2022 on the outstanding as on 03.06.2022

3. Payment made after 03.06.2022 will be appropriated against current bill issued w.e.f 04.06.2022

Director (Finance)

Copy s.w.rs.to:

1) Principal Secretary (Energy), GoM
2) The Chairman & Managing Director, MSEDCL.

Copy f.w.cs.to:

1. The Director (Finance), MSEBHCL, Mumbai.
2. The Director (Finance), MSPGCL, Mumbai.
3. The Director (Commercial), MSEDCL, Mumbai.

Dir (F)
Letter to MSEDCL reg: outstanding & Reco dtd. 26/05/23

(213

Balasaheb Thite
Director (Finance)

MAHAGENCO

Ref No: RCD23/45B/LT00595

Date: 26.05.2023

To,

The Director (Finance),

Maharashtra State Electricity Distribution Co. Ltd.

6th floor, Prakashgad, Bandra (E),

Mumbai-400 051

Sub. : Reconciliation of Outstanding amount as on 03.06.2022 including Late Payment Surcharge and immediate requirement for revision in liquidation instalment amount accordingly

Ref: 1. MoP LPS Rules, 2022
2. Letter dated 05.08.2022, from MSEDCL
3. Minutes of meeting dtd. 02.08.2022

Dear Sir,

As per MoP LPS Rules, 2022 and one time settlement for liquidation of arrears MSEDCL has taken and commenced payment of instalments towards the liquidation of arrears (principal plus LPS) as on 03.06.2022. The first instalment is received to MSPGCL on 05.08.2022. As per the intimation letter dated 05.08.2022, the outstanding amount considered for liquidation of arrears is as below.

Particulars	Principle	LPS	Total
As per MSEDCL's working	8881	4920	13801

In the said letter, following is mentioned regarding reconciliation exercise and further action

"However, reconciliation is in the process. As per LPS Rules, in order to participate in the scheme and avail the benefit, MSEDCL is required to pay first instalment on 05.08.2022. Hence. it is decided to pay outstanding amount as on 03.06.2022 as per the MSEDCLs calculation and accordingly the payment of Rs. 287.52 Crs. (13801 / 48) has been released on 05..08.2022 as first instalment against the outstanding as on 03.06.2022.

In view of above it is further requested that:

1. Difference in outstanding principal as on 03.06.2022 between MSPGCL and MSEDCL shall be freezed as on 03,06.2022 till the decision of Board of MSEBHCL.

2. DPS Shall not be levied w.e.f. 04.06.2022 on the outstanding as on 03.06.2022

3. Payment made after 03.06.2022 will be appropriated against current bill issued w.e.f. 04.06.2022".

Since then, MSEDCL's liquidation of arrears with monthly instalment is an acceptable measure, but the balance outstanding amount has not been addressed, till date.

E-mail: directorf@mahagenco.in

Prakashgad*, Plot No. G-9, Bandra (E), Mumbai - 400 051. Tel. (P) 2647 7272, (0): 2647 4211 Ext. 3574
Hongkong Bank Building, Fort - 400 001. Tel. (P). 2262 4909 (0): 2261 9100 • Fax: 2262 4909

The outstanding amount after initial stages of billing reconciliation is significantly higher. As already MSPGCL is facing severe financial crisis due to earlier delays by MSEDCL, there are still several difficulties faced by MSPGCL, especially in payment of coal dues. Thus, there is an urgent need to increase the instalment amount in line with provisions of LPS rule 2022 for complete arrears & as per methodology established in LPS Rules 2022.

- The revised LPS bills as per the methodology "Adjustment of LPS first" works out to Rs. 17784.89 Crs. Thus, as per MSPGCL, the total outstanding amount with this methodology is Rs 27163.29 Crs.
- MSEDCL has requested for revision in methodology. Accordingly, MSPGCL Board has passed following resolution.

Resolution No. 2022/3709: ***The board considered the note submitted by CE(RCD) on the above subject. After deliberation the Board directed to discuss the above issues by a committee under chairmanship of Shri. Vishwas Pathak, Independent Director and Chairman, Audit Committee, MSPGCL and Director (F), MSEBHCL, Director(F), MSPGCL, Director(F), MSEDCL, as members and submit the report for further necessary action ii this regard.***

The comparison of the three workings is as follows. Rs.Cr.

Particulars	Principal	LPS	Total
As per MSEDCL's provisional working	8881	4920	13801
As per MSPGCL's provisional working, with "Adjustment of LPS first" methodology (03.06.2022) –Audited up to March 22 and provisional from 01.04.22 to 03.06.22)	9378.40	17784.89*	27163.29
Balance claims required to be addressed	497.4	12864.89	13362.29

**LPS as billed upto 31.03.2021 + Revised LPS for FY 21-22 + Provisional LPS for 01.04.22 to 03.06.22*

Apart from the above, there is also solar outstanding amount of Rs. 285.81 Crs.

Particulars	Principal	LPS	Total
Solar PPAs	155.36	130.45	285.81

Also, MSPGCL Board has not taken any decision on your request for waiver of late payment surcharge.

Further, as per LPS rule 2022, Clause (6) operationalizing the payment security mechanism and its consequences, it is essential for MSPGCL to have unconditional, irrevocable and adequate Payment Security Mechanism (i.e. IRLC).

Yours Faithfully,

Director (Finance), MSPGCL

Letter to CMD, MSEDCL, dtd. 26/05/23

MAHARASHTRA STATE POWER GENERATION CO. LTD.
Office of Chairman & Managing Director
Prakashgad, 2nd floor, A K Marg, Bandra (East), Mumbai – 400 051
Tel: 2647 2131/4211 Ext: 3513
E-mail : md@mahagenco.in Website : www.mahagenco.in

Ref No: RCD23/45B/LT00596 **Date: 26.05.2023**

To,

Chairman and Managing Director,

Maharashtra State Electricity Distribution Co. Ltd.

6th floor, Prakashgad, Bandra (E),

Mumbai-400 051

Sub. : Reconciliation of Outstanding amount as on 03.06.2022 including Late Payment Surcharge and immediate requirement for revision in liquidation instalments amount accordingly

Ref: 1. MoP LPS Rules, 2022

2. Letter dated 05.08.2022, from MSEDCL

3. Minutes of meeting dtd. 02.08.2022

Dear Sir,

As per the provisions under MoP LPS Rules, 2022, MSEDCL has commenced payment of instalments towards the liquidation of the accumulated outstanding amount unilaterally decided by MSEDCL (principal plus LPS) as on 03.06.2022. The instalment has been received to MSPGCL as per the outstanding amount considered for liquidation of arrears is as below.

Particulars	Principle	LPS	Total
As per MSEDCL's working	8881	4920	13801

However, the said communication (vide ref .2) has further mentioned that:

"However, reconciliation is in the process. As per LPS Rules, in order to participate in the scheme and avail the benefit, MSEDCL is required to pay first instalment on 05.08.2022. Hence. it is decided to pay outstanding amount as on 03.06.2022 as per the MSEDCLs calculation and accordingly the payment of Rs. 287.52 Crs. (13801 / 48) has been released on 05.08.2022 as first instalment against the outstanding as on 03.06.2022."

The outstanding amount after initial stages of billing reconciliation is significantly higher. As already MSPGCL is facing severe financial crisis due to earlier delays by MSEDCL, there are still several difficulties faced by MSPGCL, especially in payment of coal dues. Thus, there is an urgent need to raise the instalment amount in line with the methodology as established in LPS rule 2022.

The LPS bills as per the methodology "Adjustment of LPS first" works out to Rs. 17784.89 Crs. Thus, as per MSPGCL , the total outstanding amount with this methodology is Rs. 27163.29 Crs.

The comparison of the three workings is as follows.

Rs.Cr.

Particulars	Principal	LPS	Total
As per MSEDCL's provisional working	8881	4920	13801
As per MSPGCL's provisional working , with "Adjustment of LPS first" methodology (03.06.2022) –Audited up to March 22 and provisional from 01.04.22 to 03.06.22)	9378.40	17784.89*	27163.29
Balance claims required to be addressed	497.40	12864.89	13362.29

**LPS as billed upto 31.03.2021+ Revised LPS for FY 21-22+ Provisional LPS for 01.04.22 to 03.06.22*

Apart from the above, there is also solar outstanding amount of Rs. 285.81 Crs.

Particulars	Principal	LPS	Total
Solar PPAs	155.36	130.45	285.81

The amount left out even after considering past in LPS is significantly higher after initial stages of billing reconciliation is significantly higher. As already MSPGCL is facing severe financial crisis due to earlier delays by MSEDCL, there are still several difficulties faced by MSPGCL, especially in payment of coal dues. Thus, there is an urgent need to increase the instalment amount in line with the LPS rule provision.

Further, as per LPS rule 2022, Clause (6) operationalizing the payment security mechanism and its consequences, it is essential for MSPGCL to have unconditional, irrevocable and adequate Payment Security Mechanism (i.e. IRLC).

Warm Regards!

Yours Faithfully

(Dr. P. Anbalagan, IAS)

CMD (MSPGCL)

Copy s.w.r.to

- **Hon'ble Principal Secretary (Energy), GoM, Energy Department, Mantralaya, Mumbai**
- **Hon'ble MD, MSEBHCL, 3rd & 4th floor, HSBC Bank Building, Fort, Mumbai**

Annexure 04

Minutes of Meeting Dtd. 02.08.2022 -LPS issue - Principal Secretary (Energy).

Minutes of meeting held on 02.08.2022 at the Office of Principal Secretary (Energy)

A meeting to discuss the issues involved in implementation of Late Payment Surcharge Rules, 2022 issued by MoP dtd. 03.06.2022

Issues discussed in Meeting

A brief detail of Late Payment Surcharge, Rules issued byMinistry of Power dtd. 03.06.2022 was presented along with outstanding dues of MSPGCL and MSETCL as on 03.06.2022 and difference therein in the claims as per MSPGCL/ MSETCL and MSEDCL.

Issue regarding different methodology adopted by subsidiary companies of MSEBHCL is discussed in detail regarding appropriation of payment. MSPGCL appropriate the payment towards interest 1st and balance against Principle whereas MSEDCL/MSETCL appropriate the payment towards Principle 1st and balance against interest. Therefore, there is huge difference in DPS amount as per MSPGCL & MSEDCL.

Further, it was appraised that MERC vide its order dtd. 20.03.2018 in Case No.162 of 2016 has upheld the methodology followed by MSETCL regarding appropriation of payment towards principle 1st and balance against interest and the same is in line with MYT Regulations.

Further, it was appraised that unlike MSEDCL, DPS is being calculated by MSETCL on amount of principal amount freezed by both the Companies as per MSEBHCL Board Resolution No.450 dtd. 27/08/2015. as on 31.07.2015 amounting to Rs.1351 Crs resulting into difference in the amount of DPS as per MSETCL and MSEDCL.

Directives by the Principal Secretary (Energy)

On detailed discussion about different methodology adopted by MSPGCL & MSETCL/MSEDCL, Hon'ble Principle Secretary (Energy) has directed as follows subject to decision of Hon'ble Supreme Court, Board of Directors of MSEBHCL,MERC rulings/Orders.

1. MSPGCL shall follow the methodology for calculation of LPS as per the MSETCL. Accordingly, recalculate the LPS as on 03.06.2022 and reconcile with MSEDCL within 2 days to freeze the amount of liquidation.
2. MSETCL shall calculate DPS excluding freezed amount of Rs.1351 crs and reconcile the principal and DPS amount as on 03.06.2022 with MSEDCL within 2 days and freeze the same for liquidation of arrears.
3. All the three Companies were instructed to reconcile and finalize the principal and DPS outstanding amount of MSETCL & MSPGCL within 2 days subject to final decision of MSEBHCL, Supreme Court orders,MERC rulings/orders.
4. MSEDCL shall approach to REC/PFC immediately for availment of loan for liquidation of arrears and accordingly payment of 1st instalment on 5th August 2022 based on reconciled amount of MSPGCL & MSETCL.
5. MSEDCL shall request to GOM for arrangement of Government Guarantee from the balance amount of approved Government Guarantee. Also MSEDCL should send proposal to GoM for any additional Government Guarantee if needed.
6. MSEDCL shall request REC/PFC for relaxation of condition of submission of Government Guarantee and negotiate the rate of interest with REC/PFC.

Submitted for approval pls.

SD/- (02.08.22)

Director Finance (MSEBHCL)

SD/-(02.08.22)

Hon'ble Principal Secretary (Energy),GoM

Encl:- List of officers attending meeting attached

<u>For meeting following officials were present</u>

1. **The Principal Secretary (Energy)**
2. **The Chairman & Managing Director (MSEDCL)**
3. **The Chairman & Managing Director (MSPGCL)**
4. **The Director (Finance), MSEDCL/MSPGCL/MSETCL**
5. **The Director (Commercial), MSEDCL**
6. **The Executive Director (Finance), MSEDCL**
7. **All concerned officials of MSEDCL/MSPGCL/MSETCL.**

Annexure 05

Commission's Order Dtd. 20.03.2018 in Case No. 162 of 2016.

Before the
MAHARASHTRA ELECTRICITY REGULATORY COMMISSION
World Trade Centre, Centre No.1, 13th Floor, Cuffe Parade, Mumbai 400005
Tel. 022 22163964/65/69 Fax 22163976
Email: mercindia@merc.gov.in
Website: www.mercindia.org.in / www. merc.gov.in

CASE No. 162 of 2016

In the matter of

Petition of Adani Transmission (India) Ltd. for recovery of Late Payment Surcharge and regarding non-compliance of Commission's directives by State Transmission Utility

Coram

Shri Azeez M. Khan, Member
Shri Deepak Lad, Member

Adani Transmission (India) Ltd. — Petitioner

V/s

1) State Transmission Utility.
2) Maharashtra State Electricity Distribution Co. Ltd. — Respondents

1) Maharashtra State Electricity Transmission Co. Ltd.
2) Maharashtra State Load Despatch Centre.
3) Brihanmumbai Electric Supply and Transport Undertaking.
4) Tata Power Co. Ltd. (Distribution)
5) Tata Power Co. Ltd. (Transmission)
6) Reliance Infrastructure Ltd. (Distribution)
7) Reliance Infrastructure Ltd. (Transmission)
8) Jaigad Power Transmission Co Ltd.
9) Mindspace Business Parks Pvt. Ltd.
10) Central Railways
11) Amravati Power Transmission Co. Ltd.
12) Maharashtra Eastern Grid Power Transmission Co. Ltd.
13) Vidarbha Industries Power Ltd. (Transmission) — Impleaded Parties

Appearance

For the Petitioner : 1. Shri Harinder Toor (Adv.)
2. Ms. A.A. Mujawar (Adv.)
3. Shri Bhavesh Kundalia)

For Respondents 1 and 3	: 1. Shri S.N. Bhopale 2. Shri R.D. Chavan
For Respondent No. 2	: Shri A.N. Kalekar
For Respondent No.4	: Shri Nikhil Chavan
For Respondent No.5	: Shri R.D. Waikar
For Respondent No. 6	: Shri R.M. Ranade
For Respondent No.7	: Shri Manoj Kapse
For Respondent No.8	: Shri Abaji Naralkar
For Respondent No.9	: Shri Ghansham Thakkar
For Respondent No.10	: Shri Tushar Borse
For Respondent No.13	: Shri Nilesh Thakur
For Respondent Nos 11, 12, 14 and 15	: None

ORDER

Dated: 20 March, 2018

Adani Transmission (India) Ltd. (ATIL), Adani House, Near Mithakhali Six Roads, Navarangpura, Ahmedabad has filed a Petition on 13.12.2016 under Section 86 (1) (f) read with Section 142 of the Electricity Act(EA),2003 against the State Transmission Utility (STU) seeking recovery of Late Payment Surcharge (LPS) and initiation of proceedings for non-compliance of the Commission's directives.

2. ATIL's prayers are as follows:

A. "Direct Respondents to pay delay payment charge of Rs.21.85 crore calculated upto 31st March, 2016 to the Petitioner.

B. Direct Respondent No 1 to implement Payment Security Mechanism in terms of Open Access Regulation, 2014 and BPTA.

C. Direct MSETCL to encash the PSM against the payment of outstanding LPS to reduce the financial crisis of TSPs.

D. Initiate proceedings under Section 142 of EA, 2003 against Respondent No. 1 for non-compliance of directions of this Hon'ble Commission in Order dated 26.06.2015 in Case No. 57 of 2015…"

3. The Petition states as follows:

3.1 The Petition is filed to recover outstanding LPS of Rs. 21.85 crore as on 31.3.2016 and approved by the Commission vide Order dated 28.6.2016 in Case No 7 of 2016.

3.2 Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL) entered into a Power Purchase Agreement (PPA) on 8.9.2008 with Adani Power Maharashtra Ltd. (APML) to purchase 1320 MW power from its Tiroda Thermal Power Station (TPS).

3.3 Thereafter, a Bulk Power Transmission Agreement (BPTA) was signed between MSEDCL, Maharashtra State Electricity Transmission Co. Ltd. (MSETCL) and APML wherein MSEDCL agreed to pay Transmission Charges for 1320 MW of power as per Commission's Tariff Orders. The BPTA was amended on 6.2.2014 and the quantum of the power was modified to 1851 MW instead of 1320 MW.

3.4 As per the BPTA, 1320 MW power was transmitted and supplied to MSEDCL's consumers. However, MSEDCL delayed payment of the Transmission Charges as determined by the Commission vide its Intra-State Transmission System (InSTS) Tariff Order dated 30.5.2013, which led to imposition of LPS.

3.5 Since payment of the Transmission Charges was delayed and LPS was also accruing on outstanding payment, ATIL vide letters dated 30.9.2013, 19.11.2013, 18.2.2014, 20.5.2014, 9.10.2014, 16.12.2014, 30.12.2014, 12.1.2015 and 27.3.2015 raised the issue of recovery of outstanding Transmission Charges and LPS. ATIL had arranged additional funds to maintain its cash flow by incurring additional cost because of non-recovery of LPS. ATIL also requested STU to encash the Letter of Credit (LC) of MSEDCL for recovery of LPS.

3.6 It is STU's responsibility to carry out planning and co-ordination for smooth functioning of the Transmission System. However, STU has failed to comply with the provisions of the EA, 2003, and deferred to act upon the directions of the Commission.

3.7 The Commission, vide Order dated 12.12.2014 in Case no. 151 of 2014, had rejected the plea of MSEDCL for waiver of LPS on Transmission Charges.

3.8 STU, vide letter dated 7.3.2015 addressed to Transmission System Users(TSU) including ATIL, stated that MSEDCL has to pay Rs. 477.58 crore as Monthly Transmission Charges (MTC) to the STU Pool Account for FY 2014-15. Further, it was mentioned that LCs towards the Price Security Mechanism (PSM) were not in place and requested TSUs for renewal of LCs. In reply, ATIL vide letter dated 23.4.2015 pointed out the insufficiency of LCs and requested the STU to encash and adjust valid LCs against the LPS. ATIL also requested STU to approach the Commission for appropriate Orders as the TSUs neither cleared the arrears nor renewed their LCs. However, no reply was received from STU.

3.9 The Commission, vide Order dated 8.4.2015 in Case No 217 of 2014 regarding the Annual Performance Review (APR) of ATIL for FY 2013 -14, held that timely payment of dues by the TSUs is an essential requirement to enable the Transmission Licensees to discharge their responsibilities and meet their liabilities. Hence, ATIL can approach the Commission through a separate Petition for the purpose.

3.10 In view of the above Order, ATIL vide letter dated 9.4.2015 requested STU to inform about the Commission's Order to MSEDCL and also pointed out that it is facing severe financial hardship due to delay in payment by the TSUs.

3.11 The Commission, vide Order dated 26.6.2015 in Case No. 57 of 2015 on the Mid-Term Review (MTR) of the InSTS Tariff, had observed large arrears towards LPS causing delays in payment of Transmission Charges .Hence, the STU was directed to approach the Commission within 45 days through a Petition with suggestions to deal with the past payment arrears and minimising future delays.

3.12 The Commission, vide Order dated 26.6.2015 in Case No 207 of 2014, considered the LPS as Non-Tariff Income (NTI), observing that it is payable by Distribution Licensees and recoverable by Transmission Licensees. Therefore, LPS was considered as recovery in the next financial year. The Commission had opined that STU needs to initiate necessary steps to recover these dues. ATIL, vide letters dated 14.7.2015 and 8.12.2015, requested STU to take necessary steps for recovery of the LPS in terms of the Commission's Order dated 26.6.2015.

3.13 The Commission, vide Order dated 7.7.2016 in Case No. 31 of 2016 on the Truing - up Petition of MSETCL, treated LPS as part of NTI as per the Multi Year Tariff (MYT) Regulations, 2011. Accordingly, the recovery of Aggregate Revenue Requirement (ARR) for the subsequent financial year was reduced to that extent. LPS due has been considered on an accrual basis. However, non-recovery in practice impacts MSETCL as the amount is not actually available with it. The Commission had pointed out that it was in the interest of MSETCL, both as a Transmission Licensee and as the STU, to approach the Commission to resolve this matter, but the same has not been done.

3.14 MSEDCL is not paying LPS and MSETCL is not taking any action, despite Commission's directions for recovery of LPS. Besides this, the PSM is not fully implemented in terms of the BPTA, and as such the recovery of the LPS is practically becoming impossible. Hence, ATIL is suffering severe financial hardship as NTI has been deducted from its ARR.

3.15 Despite follow-up, STU is neither making payments of LPS nor taking any steps towards its settlement. Hence, ATIL is constrained to approach the Commission for resolution of the dispute and initiation of proceedings as per Section 142 of EA, 2003 against STU on the following grounds:

A. Non-Payment of LPS

a) Article 7.5of the BPTA mandates timely payments of the Transmission Tariff by TSUs and, in case of delay, LPS at the rate of 1.25%per month or part thereof shall be applicable. The same provisions are replicated in Regulations 68.3 and 68.4 of the MYT Regulations, 2011.

b) The BPTA and the MYT Regulations, 2011 provide that:

i. STU shall raise monthly bill for Intra-State Transmission Charges (InSTC) on every TSU.

ii. All TSUs shall ensure timely payment of Transmission Tariff to STU.

iii. In case there is delay in payment by any TSU, LPS at the rate of 1.25% per month or part thereof shall be applicable.

iv. LPS in any month shall be recovered from the TSU from the next month's bill.

v. STU shall be responsible for collection of the monthly charges from the TSUs.

vi. STU shall be responsible for disbursement of the monthly InSTC collected from the TSUs to the individual Transmission Licensees and to make timely settlement of claims raised by Transmission Licensees.

vii. The PSM for Transmission Licensee(s) shall be as per Commission's Orders, issued time to time.

c) As per Clause 7.5.3 of the BPTA, MSETCL is obligated to recover the LPS on monthly basis, leaving no LPS outstanding to be recovered in the succeeding month's bills. However, this methodology of recovery of LPS is not being followed by STU. Non-payment of the complete amount of LPS on monthly basis against bill raised in the preceding month has led to accumulation of LPS.

d) ATIL has approached STU from time to time for recovery of the LPS. However, no response has been received. STU has failed to recover the LPS dues payable to ATIL.

B. Non-Implementation of PSM by STU:

a) Article 7.7 of BPTA provides the PSM and treatment of LPS to be followed by TSUs and STU.

b) The Transmission Open Access (TOA) Regulations, 2014 has the following provisions regarding PSM:

"29. Payment Security Mechanism

In case of Long-term Open Access and Medium-term Open Access, the applicant for Open Access will open an irrevocable Letter of Credit in favour of the agency responsible for collection of various charges for the estimated amount of various charges for a period of two months."

c) For recovery of LPS, ATIL suggested to STU that, on non-payment of LPS within the billing cycle, payable amounts get increased for the next billing cycle. This methodology of recovery of LPS is essential to promote TSUs to pay LPS timely. ATIL, vide various letters, had requested STU to inform it of the road-map for recovery of accumulated LPS and status of compliance with direction of the Commission for filing of a Petition.

d) ATIL suggested to STU that payment received from TSUs should be appropriated first towards LPS, with the balance payment, if any, to be adjusted towards the arrears and thereafter the current month bills. This methodology is consistent with the provisions of Transmission Service Agreement (TSA) and PPA notified by the Ministry of Power (MoP) under Competitive Bidding Guidelines.

e) STU has failed in implementation of PSM and recovery of the LPS which has violated the provisions of the MYT Regulations and the BPTA.

C. Initiation of proceedings under Section 142 of the EA, 2003 for non-compliance of directions of the Commission:

a) The Commission, vide Order dated 26.06.2015 in Case No 57 of 2015. had directed STU to approach the Commission, by way of a Petition, within 45 days with suggestions for dealing with past payment arrears and minimising future delays, with relevant details. Thereafter, ATIL has reminded STU to follow the Commission's Order. However, STU has failed to do so, which has been noted by the Commission vide Order dated 7.7.2016 in Case No 31 of 2016.This is non-compliance of Orders of the Commission and punishable under Section 142 of the EA, 2003.

4. In its Reply dated 16.3.2017, STU has stated as follows:

4.1 STU is performing billing, collection and disbursement of InSTC as per the provisions of the BPTA, and procedures and guidelines laid down by the Commission in its Tariff Orders. TSUs are billed monthly, which includes Monthly Transmission Charges (MTC), LPS and arrears. TSUs are making payment to the STU Pool Account only for the MTC determined by the Commission which unilaterally cannot be adjusted against LPS. TSUs have not paid separately towards LPS. Therefore, there is no recovery against LPS. Hence, the methodology suggested by ATIL of adjusting payments received in STU Pool Account against LPS cannot be implemented.

4.2 Inspite of rigorous follow up to implement PSM through various letters and Grid Coordination Committee (GCC) meetings, MSEDCL has not opened LC.

4.3 STU has informed the Commission regarding steps taken by it for recovery of Transmission Charges and LPS of MSEDCL. Also, Chairman and Managing Director (CMD), MSETCL has proposed an action plan for clearing LPS payable by MSEDCL to MSETCL and other Transmission Licensees.

4.4 Regarding the Commission's directives in Order dated 26.6.2015 in Case No. 57 of 2015 to approach it, the STU has submitted the following documents:

a. Communication by STU to MSEDCL regarding non-payment of the InSTC;
b. Communication by STU to MSEDCL regarding renewal of LC;
c. Details of the GCC Meetings;
d. Details of outstanding Transmission Charges of MSEDCL;
e. Details of outstanding LPS of all TSUs;
f. Problems faced by the STU in recovering InSTC and LPS.
g. Suggestions for strengthening PSM.

a) Communications by STU to TSUs for non-payment of the InSTC:

i. MSEDCL's first default in payment of MTC occurred in February, 2012. Monthly reminders after due date of payments were issued regularly to MSEDCL.

ii. The letters from the CMD, MSETCL to the CMD, MSEDCL for non-payment.

iii. Issue of non-payment by MSEDCL was also taken up with the Principal Secretary (Energy), Govt. Of Maharashtra (GoM) by CMD, MSETCL vide letter dated 24.4.2015.

b) Communication by the STU regarding renewal of LCs:

i. MSEDCL has only given one LC of Rs. 182 crore which was valid from 19.04.12 to 21.03.2013. Thereafter, MSEDCL has not renewed LC despite repeated follow-up.

ii. MSEDCL vide letter dated 9.7.2012 requested STU not to encash the LC stating precarious financial conditions.

iii. By the time STU sought to encash the LC of MSEDCL, there was no valid LC with STU, as MSEDCL had not renewed it after 2013. As there is no mechanism to enable STU to compel TSUs for renewal of LC, STU could not ensure the same.

iv. Vide letter dated 23.03.2015, MSEDCL again approached STU requesting it not to insist on LC because of its precarious financial condition and to waive the LPS.

v. STU is still awaiting response on the methodology suggested to MSEDCL vide letter dated 17.2.2016 for payment of arrears, LPS and renewal of LC. However, MSEDCL till date has not renewed it.

vi. Details of the LCs that have been revised by TSUs during last 3 years are as below :

Sr. No.	TSU	Occasions Rs. (Validity)
1	BEST	34.18 Cr (Valid upto 31-03-17) 33 Cr (25-7-15 to 25-07-16) 28.24Cr.(4-8-14 to 31-3-15) 25.95Cr.(4-8-14 to 31-3-15) 28.46Cr. (12-7-13 to 13-6-14) 17.19Cr. (10-7-12 to 13-6-13)
2	MSEDCL	182.08Cr. (19-4-12 to 31-3-13)
3	TPC-D	36.24 Cr (Valid upto 31-03-17) 36.24 Cr (01-09-15 to 31-03-2016) 74.02Cr.(29-10-14 to 31-8-15) 38.97Cr.(23-8-13 to 31-7-14) 21.61Cr. (19-6-12 to 31-7-13) 8.32Cr. (14-10-11 to 31-7-12)
4	RInfra-D	55.52 Cr (Valid upto 13-06-17) 65 Cr (13-6-15 to 13-6-16) 32.52Cr.(9-7-14 to 13-6-15) 35.68Cr.(13-5-13 to 13-6-14) 22.12Cr. (28-6-12 to 13-6-13) 14.68Cr. (8-7-11 to 30-6-12)

c) Details of GCC Meetings:

i. The GCC meetings held during the last 3 years at which the LC amount was reviewed are as below:

Sr.No	Meeting Reference	Meeting Date	Remark
1	78	21.11.2016	Implemented except MSEDCL
2	77	10.08.2016	Implemented except MSEDCL
3	76	06.04.2016	Implemented except MSEDCL
4	75	08.01.2016	Implemented except MSEDCL
5	74	18.09.2015	Implemented except MSEDCL
6	73	13.07.2015	Implemented except MSEDCL
7	72	22.05.2015	Implemented except MSEDCL
8	71	23.03.2015	Implemented except MSEDCL
9	65	18.12.2013	Implemented except MSEDCL

10	64	6.09.2013	Implemented except MSEDCL
11	63	10.07.2013	Implemented except MSEDCL
12	60	6.03.2013	Implemented except MSEDCL

ii. At the 74th GCC meeting held on 18.09.2015 regarding LC, MSEDCL stated that the issue is under consideration of its management.

iii. At 78th GCC meeting held on 11.11.2016, the issue of payment of outstanding LPS was taken up with all TSUs. STU also informed that ATIL would approach the Commission through the Petition in due course.

iv. STU has raised the issue of renewal of LCs in each GCC meeting. Accordingly, on 31.1.2017, LCs are renewed by Reliance Infrastructure Ltd. (Distribution) (RInfra-D), Brihanmumbai Electric Supply and Transport Undertaking (BEST) and Tata Power Co. Ltd. (Distribution) (TPC-D), except MSEDCL.

d) Details of the arrears of Transmission Charges of MSEDCL:

i. Due to large arrears of MSEDCL, MSETCL approached Maharashtra State Electricity Board Holding Co. Ltd. (MSEBHCL) for a solution and permission for filing the Petition as per the Commission's directives. Thereafter, according to 59th Board Meeting of MSEBHCL, vide BR No. 454, MSEDCL had transferred Rs. 1000 crore to the STU Pool Account on 31.08.2015 which was disbursed as below:

Transmission Licensee	Amount in Rs.
TPC-T	14206559/-
Rinfra-T	0
JPTL	607374665/-
APML	779489907/-
MEGPTCL	3783087889/-
MSETCL	4815840980/-
Total	10000000000/-

ii. After disbursement of Rs. 1000 crore, as on 31.08.2015 there is no outstanding towards principal Transmission Charges (excluding LPS) receivable from other TSUs, except MSEDCL.

iii. The outstanding MTC (excluding LPS) receivable from MSEDCL is payable to MSETCL only. As on 31.01.2017, the total MTC to be received from TSUs is as shown in the Table:

TSU	Net Arrears (Amount in Rupees)
MSEDCL	20,77,20,81,700/-
TPC-D	0

TSU	Net Arrears (Amount in Rupees)
RInfra-D	0
BEST	0
Total	20,77,20,81,700/-

e) Details of outstanding LPS of all TSUs:

i. As on 31.01.2017, the total outstanding of LPS from the TSUs is as shown in Table:

a) LPS to be received from TSUs to STU:

TSU	LPS receivable from Rs.
MSEDCL	11,95,12,35,960/-
TPC-D	89,19,70,952/-
RInfra-D	43,37,02,532/-
BEST	0
Total	13,27,69,09,445/-

b) LPS payable by STU to TSUs:

Transmission Licensees	LPS dues Rs
MSETCL	11,15,02,45,381/-
TPC-T	930768341/-
Rinfra-T	45,90,07,278/-
JPTL	202240080/-
ATIL	21,84,87,859/-
MEGPTCL	31,61,26,427/-
APTCL	30,790/-
VIPL	3,289/-
Total	13,27,69,09,445/-

ii. There is no recovery against LPS as TSUs have not made separate payments towards LPS. All the payments that are being received from TSUs are appropriated to clear the earliest MTC Arrears.

f) Problems faced by STU in recovering InSTS Charges and LPS:

(i) Existing PSM as per the Regulations provides for submission of Irrevocable LC in favour of STU by TSUs equivalent to the estimated amount of MTC for two months to enable STU to encash it in case of default by TSUs.

(ii) TSUs are required to renew LCs before their expiry. However, there is no mechanism to ensure that TSUs renew LCs after expiry. The Regulations merely

cast a responsibility on the TSUs to replenish the LCs, which is not followed by MSEDCL.

g) Suggestions/ Proposal for Strengthening PSM :

The existing PSM requires renewal / re-establishing of LCs within time by TSUs. Recovery of arrears involves presenting of the LCs to the Bank. Therefore, alternative PSM, i.e. recovery through an Escrow account is proposed.

4.5 Vide letter dated 14.07.2016, MSEDCL had approached to STU the deletion of the LPS Clause in the BPTA. That is being legally examined as LPS is accrued on paper. It should not be reduced from the ARR as Distribution Licensees have no means to pay this amount.

4.6 STU has followed-up with TSUs for payment of arrears towards InSTC and LPS. Also, the matter has been discussed in all recent GCC meetings. As MSETCL shares a major portion out of total LPS of Rs.1115.03 crore as on 31.01.2017, payable by all TSUs, this is also having financial impact on day to day working of MSETCL.

4.7 As per intra-Company guidelines, STU approached MSEBHCL, seeking approval for filing the Petition before the Commission regarding non-payment of Transmission Charges and LPS by MSEDCL. However, MSEBHCL has passed BR No.454, in compliance to which MSEDCL paid Rs. 1000 crore and cleared principal arrears of all Transmission Licensees except MSETCL. Other issues including LPS and MSETCL arrears are under its consideration.

4.8 Suitable directions may be passed to TSUs for :

a) Pay the InSTC timely, including arrears and LPS to STU Pool Account;
b) Resolve the issue of LPS and establish pragmatic and effective PSM;
c) To consider the suggestions of STU regarding strengthening of the PSM.

5. At the hearing held on 21.3.2017:

5.1 ATIL reiterated the submissions in its Petition, and stated that:

(i) ATIL has filed the Petition to :

a) Direct Respondents to pay LPS of Rs.21.85 crore calculated upto 31 March, 2016 to ATIL.
b) Direct STU to implement the PSM in terms of the Open Access Regulations, 2014 and BPTA.
c) Direct STU to encash the LCs against the payment of outstanding LPS.
d) Initiate proceedings under Section 142 of EA, 2003 against STU for non-compliance of directions of the Commission in Order dated 26.06.2015 in Case No. 57 of 2015.

(ii) BPTA has been signed between MSEDCL, MSETCL and ATIL for use of the InSTS network. ATIL referred to Clause 7 of the BPTA in respect of Tariff, Billing and PSM. Some TSUs have furnished only LC and not Bank Guarantee as envisaged under the BPTA. The provisions of the MYT Regulations, 2011 and 2015 regarding PSM may also be seen. It is the responsibility of the STU to issue monthly bills, collect Transmission Charges and disburse them to the Transmission Licensees.

(iii) STU is not discharging its statutory duties and functions under Section 39(2) of the EA, 2003.STU, being the Competent Authority, has not implemented the provisions of the BPTA and MYT Regulations in respect of PSM and recovery of LPS. ATIL is facing hardship due to non-receipt of LPS. ATIL has approached STU from to time for recovery of the LPS, but no response has been received.

(iv) The Commission vide its Order dated 12.12.2014 in Case No. 151 of 2014 has rejected the request of MSEDCL to waive LPS.

(v) Regarding recovery of LPS, ATIL stated that the BPTA requires that, upon non-payment of LPS within a billing cycle, the LPS payable be included in the MTC for the next billing cycle. Further, the payment received from TSUs should be appropriated first towards LPS and the balance payment, if any, should be adjusted towards the arrears first and thereafter towards the current monthly bills.

(vi) The Commission vide Order dated 26.06.2015 in Case No 57 of 2015 had directed MSETCL to approach the Commission, by way of a Petition, within 45 days with regard to payment issues, PSM and LPS. However, STU has not filed its Petition despite reminders by ATIL.STU could have made the payment of LPS to ATIL by enchasing the LCs of TPC-D and RInfra-D which are in place.

5.2 STU stated that:

(i) TSUs are making payments to the STU Pool Account towards MTC as determined by the Commission in the Tariff Order, which cannot be unilaterally adjusted against LPS. There is no recovery of LPS as TSUs have not paid towards LPS separately. Therefore, the methodology suggested by ATIL for adjusting the payments received in the STU Pool Account against LPS cannot be implemented.

(ii) MSEDCL's first default in payment of MTC bills was in February, 2012. MSEDCL had given LC of Rs. 182 crore valid from 19.04.12 to 21.03.2013. Thereafter, inspite of follow-up, MSEDCL has not renewed the LC. Hence, the LC of MSEDCL could not encashed.

(iii) The issue of non-payment of Transmission Charges and LPS by MSEDCL was also taken up with the Principal Secretary (Energy) by the CMD, MSETCL vide letter dated 24.4.2015. The CMD, MSETCL, vide letter dated 17.2.2016, has also proposed an action plan to MSEDCL for clearing the LPS payable by MSEDCL

to MSETCL and other Transmission Licensees, which is not yet considered by MSEDCL.

(iv) At the GCC meetings, STU has raised the issue of renewal of LCs. As on 31 January 2017, LCs are renewed by RInfra-D, BEST and TPC-D but not by MSEDCL.

(v) After pursuance by STU with MSEBHCL, MSEDCL has credited Rs. 1000 crore to the STU Pool Account on 31.08.2015, which was disbursed to the TSUs. As of now, there is no outstanding towards Transmission Charges (excluding LPS) receivable from TSUs except MSEDCL. After August, 2015, all TSUs are paying MTC regularly. On 17.3.2017, MSEDCL has paid Rs. 500 crore towards the arrears of Transmission Charges.

(vi) The existing PSM requires LCs to be renewed within specified time by TSUs, and recovery of arrears can be done by encashing LCs. Therefore, an alternative PSM, i.e. recovery through an Escrow account is proposed.

(vii) STU has followed-up with the concerned TSUs regarding payment of arrears and LPS. The matter has also been discussed in all recent GCC meetings. MSETCL has a major share in total LPS of Rs.1115.03 crore payable by TSUs as on 31.01.2017. Due to this, there is a financial impact on the day to day working of MSETCL.

5.3 The Commission directed ATIL and STU to submit their understanding regarding the nature of Irrevocable and Revolving Letter of Credit and the practice of Banks in this regard within two weeks.

6. BEST in its Reply dated 30.3.2017 has stated as follows:

6.1 As a TSU, BEST is promptly making payment of InSTC to STU and also made the arrangement towards PSM by providing LC. The matter of non-payment of Transmission Charges and LPS by various Distribution Licensees was raised by STU and has been discussed in the GCC meetings.

6.2 MYT Regulations / TOA Regulations stipulate that all TSUs shall ensure timely payment of InSTC to STU so as to enable STU to make timely payment to TSUs. STU in consultation with the GCC has laid down detailed procedures for settlement of InSTC, including bill collection and PSM. The LPS and operation of PSM by STU is intended to promote payment discipline among the TSUs.

6.3 Delay in payment of InSTC to STU by TSUs affects the Transmission Licensees and InSTS as a whole. By consideration of outstanding LPS payable by TSUs to STU on accrual basis as part of NTI and approval of reduced ARR during Tariff fixation, Transmission Licensees may curtail /delay planned capital investment schemes or may resort to additional borrowing to implement them, which ultimately will be passed on to TSUs through InSTS Tariff. This will increase the Tariff of a TSU like

BEST which is prompt in payment and gets penalized for issues beyond its control. Hence, timely payment of InSTC to STU and operation of PSM must be ensured.

7. In pursuance of the last Daily Order, STU, vide letter dated 31.3.2017, clarified as follows :

7.1 Irrevocable LC :

An Irrevocable LC is one which cannot be cancelled or amended without the consent of all parties concerned.

7.2 Revolving LC:

A revolving LC is one where, under its terms and conditions, the amount is renewed or reinstated without specific amendments to the credit being needed. It can revolve in relation to time and value. This type of credit is generally used in local trade and sometimes for import also. Such LCs are opened for a stated amount and the drawing under the LC is reinstated as soon as the documents are paid. The LC can be restricted to the individual amount of drawing at a time as well as aggregate amount of drawings. The issuing Bank has to confirm to the negotiating Bank about the acceptance /payment of the documents for reinstatement of the amount in the LC.

7.3 The nature of Irrevocable and Revolving LOC has been confirmed by the Bank of India, Mumbai.

7.4 Presently STU has Irrevocable and Revolving LCs of TPC-D, Rinfra-D, BEST and Mindspace Business Parks Pvt. Ltd. (MBPPL).

8. In pursuance of the Daily Order, ATIL, vide its letter dated 17.4.2017 has stated as follows:

8.1 Revolving LC: Revolving LC covers multiple shipments over a long period. Instead of arranging a new LC for each separate shipment, the buyer establishes a LC that revolves either in value (a fixed amount is available which is replenished when exhausted) or in time (an amount is available in fixed instalments over a period such as week, month, or year). LCs revolving in time are of two types: a) In the cumulative type, sum unutilized in a period is carried over to be utilized in the next period, b) In non-cumulative type, it is not carried over.

8.2 Irrevocable LC: Firm commitment by an issuing Bank to pay an accepting Bank a specified sum in a specified currency, provided conditions included in the LC document are met within a specified time frame. This LC cannot be cancelled (or its terms amended) without the seller's (beneficiary's) prior written approval, and comes usually as confirmed irrevocable LC.

8.3 Practice of Banks: Procedure is that TSU has to take sanction of credit limits from any Bank and use this limit for opening revolving LC in favour of MSETCL for security payment. In the event of non-payment of dues to the beneficiary, payment can be drawn from the Bank against the LC.

9. TPC, vide its Reply dated 9.5.2017, has stated as follows :

9.1 The issue of LPS raised by ATIL is pertaining to the past period and requires a one-time solution taking all the stakeholders into consideration. Hence, the Commission may consider settling and reconciling payment of LPS once and for all, such that all stakeholders would get their appropriate share. This issue of LPS would be resolved permanently without adversely affecting the consumers and stakeholders.

9.2 It is imperative to devise a stringent and suitable PSM with inbuilt discipline so that there will be no recurrence of the issue, such as separate Escrow account as suggested by STU.

10. MSEDCL, vide its submission dated 11.5.2017, has stated that:

10.1 No prayer in the Petition is against MSEDCL, and the Petition is regarding the dispute between ATIL and STU. Moreover, MSETCL is not only a Transmission Licensee but is also the STU. Hence, the reliefs claimed are to be answered and redressed by MSETCL.

10.2 MSEDCL entered into a PPA on 8.9.2008 with APML (now ATIL) to purchase 1320 MW power from its Tiroda TPS through the transmission networks of ATIL and MSETCL. Thereafter, a BPTA was executed between MSEDCL, MSETCL and APML on 4.1.2011, wherein it was agreed that MSEDCL shall be liable to pay Transmission Charges for 1320 MW as per the Tariff Orders issued from time to time. In terms of the BPTA, 1320 MW power was transmitted by MSEDCL to its consumers.

10.3 As per Clauses 7.3.2 and 7.6.1 of the BPTA, responsibility of collection of Transmission Charges lies with MSETCL for payments to ATIL. Hence, any relief as claimed by ATIL against MSEDCL is not maintainable.

10.4 Reliance has been placed by ATIL on several letters /communications which were never addressed to MSEDCL. Hence, MSEDCL is not replying with regard to any such letters.

10.5 In view of the above, MSEDCL may be discharged from the present proceedings.

11. At the hearing held on 18.5.2017:

11.1 ATIL stated that:-

(i) At the previous hearing, ATIL had made exhaustive arguments and all parties have accepted that the amount due from the STU towards LPS is undisputed. The Respondents were also directed to file their submissions.

(ii) In compliance of the Daily Order, ATIL has received submissions from MSEDCL, TPC and the STU

(iii) In its submission dated 16.3.2017, STU has stated that it is undertaking billing, collection and disbursement of Transmission Charges as per the applicable BPTA Clauses, and procedures and guidelines of the Commission in the Tariff Orders. Substantial arrears against LPS are due from MSEDCL, and hence STU could not pay the TSUs. If both MSEDCL and STU are distancing themselves from the proceedings, the matter would not be resolved.

(iv) In the past, MSEDCL has paid Rs. 1000 crore towards arrears of principal Transmission Charges, and likewise it may pay the LPS arrears.

(v) The LPS amount is accumulating and there is no provision for interest if it is not paid. Hence, the TSUs are not paying LPS.

(vi) ATIL is not a Distribution Licensee, and hence no dues towards Transmission Charges are payable to STU. STU could have made the payment of LPS to ATIL by enchasing LCs of TPC-D and RInfra-D, which are in place, but has not done so. MSEDCL has not provided LCs since March, 2014 to STU.

(vii) The BPTA provides that certain actions can be taken for default, but this is not practical. The Commission had asked STU long back to approach it with a Petition to deal with the LPS issue and PSM, but it has not done so.

11.2 MSEDCL stated that :

(i) It has not renewed the LC because of serious financial difficulties. MSEDCL has credited Rs. 1000 crore to the STU Pool Account on 31.08.2015, which was disbursed to the TSUs. Thereafter, MSEDCL has paid Rs. 700 crore towards arrears of Transmission Charges. It has cleared the past arrears towards Transmission Charges, except for MSETCL. MSEDCL had taken short-term loans for making the payments.

(ii) To a query of the Commission, MSEDCL stated that it recognises the LPS liability, and will sit with the other stake holders to resolve the issue of LPS.

11.3 The Commission rejected MSEDCL's submission dated 11.5.2017 seeking to be discharged from the proceedings on the ground that no prayer in the Petition is against MSEDCL. The Commission observed that MSEDCL is the main contributor to the arrears towards Transmission Charges and LPS. Hence, MSEDCL is a Respondent in this Case. The Commission directed MSEDCL to argue the matter on merits and suggest the way forward to settle the past LPS dues.

11.4 STU stated that :

(i) The major share of the LPS is due from MSEDCL. If MSEDCL makes the payment of LPS, the issue will be largely resolved. Recently, MSEDCL has paid Rs. 700

crore towards principal of Transmission Charges but not towards LPS. Hence, STU is not able to pay LPS to the TSUs.

(ii) To a query of the Commission, STU stated that the dues of TPC-D and RInfra-D are notional and are being settled by intra-Company adjustment.

11.5 TPC stated that :

(i) The issue of LPS raised by ATIL is pertaining to the past period and requires a one-time solution taking all the stakeholders into consideration. TPC-D has outstanding amount towards LPS from January, 2012 to August, 2015. Thereafter, TPC-D is making all the payments regularly.

(ii) TPC-D has Rs. 89.19 crore outstanding arrears towards LPS, and TPC-T has Rs. 93.07 crore as receivable towards LPS. TPC-D is ready to pay the LPS, but it will not resolve the issue permanently as MSEDCL is the major defaulter. STU may resolve the issue by recognizing the intra-Company adjustments.

11.6 RInfra stated that it will discuss the issue at a meeting with STU. Regarding the interest on LPS, the Commission has already taken a view in its Orders.

11.7 Jaigad Power Transmission Co. Ltd. (JPTL) stated that it has Rs. 20.24 crore receivables towards LPS and its ARR is only of Rs. 80 crore. Hence, the issue needs to be resolved.

11.8 BEST stated that it has filed its Reply, and had nothing to add.

11.9 The Commission observed that the issue is lingering since 2012 and becoming more complicated year over year. It is the responsibility of STU to issue monthly bills, collect Transmission Charges, including LPS, and disburse them to the Transmission Licensees. However, despite having the authority and under the provisions of the BPTA, MYT Regulations and directives of the Commission in its Orders, the STU did not implement the PSM. STU has also not come up with a Petition on the way forward, as directed by the Commission long back.

11.10 In view of these facts and the issues involved in, the Commission directed MD, MSETCL or his nominee to chair and convene meetings with the Transmission Licensees and TSUs to resolve the pending issue of LPS and Transmission Charges, and the future protocol. The meeting shall be attended by senior and empowered officers of the Transmission Licensees and TSUs, with their suggestions on the way forward. The following issues may be discussed at the meetings:

a) Modalities for one-time settlement of past arrears towards Transmission Charges and LPS, and methodology and implementation of PSM and renovation of LCs.

b) Modalities to ensure that non-payment of LPS and Transmission Charges does not arise in future.

c) Whether and what amendments are necessary to the existing and future BPTAs to implement PSM.

d) Provisions for non-compliance of PSM.

e) Mechanism and accounting system for intra-Company adjustment of Transmission Charges and LPS, if considered appropriate.

12. In its submission dated 14.11.2017 in pursuance of the last Daily Order, STU stated as follows:

12.1 Meetings were held on 4.7.2017, 8.8.2017 and17.10. 2017 by a Committee chaired by CMD, MSETCL in pursuance of the Commission's directives to resolve the issues regarding recovery of LPS. The Conclusions of its Report are as below:

Para "A" of Conclusion:

1. All Transmission Licensees, except MSETCL, agreed to one-time settlement by clearing LPS (without any rebate) of other Licensees except MSETCL (netting-off).

2. MSEDCL stated that one-time settlement is under consideration of its Board and efforts will be made to settle the matter at the earliest if suitable cuts are taken, in line with spirit of one-time settlement. The proposal from MSEDCL to compute LPS @ 10% instead of 15% was discussed. ATIL & JPTL did not accept the proposal. However, RInfra-T and TPC-T stated as follows (Chapter 4 of Report):

(i) RInfra-T: Based on recommendations of the Committee, RInfra-T agrees with accounting of LPS at 10% per annum (equivalent to State Bank of India (SBI) Marginal Cost of Lending-based Rate/ SBI Advance Rate (SBAR) applicable for the respective periods) subject to approval by the Commission and recovery through RInfra-T's ARR.

(ii) TPC-T: If a one-time intra-Company transfer of the LPS is recommended by STU and allowed by the Commission, outstanding LPS amount will reduce significantly. Further, as a one-time settlement arrangement, if MSEDCL pays the balance LPS after carrying out intra-Company transfer, the net receivable amounts of all the Transmission Licensees would get addressed. It agrees with request of MSEDCL to compute LPS @ 10% instead of 15% provided that this gets reflected in the ARR of Transmission Licensees and subject to approval by the Commission. Also, computation of LPS at 10% shall then be applicable to all the Distribution Licensees in Maharashtra.

3. Transmission Licensees have taken a firm stand not to give any concession in the amount due, which is not in line with the spirit of one-time settlement.

4. To move forward, the Commission may consider allowing some part of foregone LPS (5%) as a part of ARR, as the LPS amount has been already reduced from ARR by the Commission.

Para "B" of Conclusion:

1. Existing provisions of the BPTA regarding PSM are sufficient and no amendment is required.

2. Additional 0.5% rebate can be allowed on Transmission Charges to TSUs having valid LC on that date so as to promote the LC mechanism.

Para "C" of Conclusion:

LPS should be charged at 1 % above MCLR of SBI.

13. At the hearing held on 22.11.2017 :

13.1 ATIL reiterated its earlier submissions and stated that :

(i) At the previous hearing, the Commission has heard the matter extensively and issued the Daily Orders. However, STU has not acted on them till date. In the Daily Orders dated 21.3.2017 and 18.5.2017, the Commission has rejected the request of MSEDCL to waive LPS. LPS is payable as per the MYT Regulations and BPTA. Inspite of these provisions, MSEDCL is asking for rebate on LPS. ATIL referred to Chapter 6 of the Committee Report submitted by STU. ATIL does not agree to any rebate in LPS amount as the BPTA and MYT Regulations have no such provision. Already, ATIL has been deprived of the LPS amount since 2012.

(ii) Vide Order dated 28.6.2016 in Case No. 7 of 2016, the Commission has considered LPS as a NTI at prevailing interest rate, i.e. 15%, and deducted it from the ARR of ATIL. The matter is sub judice before the Appellate Tribunal for Electricity (APTEL). Hence, LPS cannot be recalculated at revised rates as proposed by MSEDCL.

(iii) To a query of the Commission regarding the way forward, ATIL stated that, if MSEDCL releases Rs. 80.10 crore, the outstanding LPS of all the Transmission Licensees would be cleared except for MSETCL.

(iv) ATIL is not agreed on 0.5 % rebate on Transmission Charges to TSUs having valid LC as suggested by STU in its Report.

13.2 STU stated that:

(i) In compliance of the Daily Order, STU has conducted meetings of Transmission Licensees and TSUs and submitted the Committee Report on 14.11.2017. One-time settlement of LPS for all Transmission Licensees except MSETCL could be done if MSEDCL pays Rs. 80.10 crore towards LPS, but this will not resolve the issue completely.

(ii) As of now, there is no outstanding towards Transmission Charges (excluding LPS) receivable from TSUs, except for MSEDCL. After August, 2015, all TSUs are paying MTC regularly. All TSUs have renewed their LCs, except MSEDCL.

13.3 MSEDCL stated that the issue of LPS was discussed in the MSEBHCL meeting held in August, 2015 wherein MSETCL was instructed to waive the LPS. However, there has been no further development on this issue. MSEDCL is ready for one-time settlement, if LPS is computed at 10 % interest rate instead of the prevailing 15 %. To a query of the Commission regarding renewal of LC, MSEDCL stated that LC is not renewed due to its poor financial condition and requested concession in providing LC to save finance charges.

13.4 TPC-T and TPC-D stated that they have filed a written submission on 3.11.2017 to STU. They agree to calculate LPS at 10 % rate instead of 15 % as requested by MSEDCL provided that the difference in LPS is reflected in the ARR of TPC-T. Further, the rate of 10 % for LPS computation should be applicable to all the Distribution Licensees. LPS in future should be at 15 % to avoid default in Transmission Charges by TSUs. To a query of the Commission, TPC-D stated that it is paying Transmission Charges to STU without any intra-Company adjustment.

13.5 RInfra-T and RInfra-D stated that their submission is the same as TPC's. To a query of the Commission, RInfra-D stated that it is paying Transmission Charges to STU since August, 2015 without any intra-Company adjustment.

13.6 The Commission expressed its displeasure that STU had not encashed the LCs of TPC-D and RInfra-D available with it, although they had defaulted on LPS payment.

13.7 JPTL stated that it agrees with the submission of ATIL and opposes one-time settlement of LPS with rebate as proposed by MSEDCL.

13.8 The Commission directed MSEDCL to file its submission on renewal of its LC and opening of Escrow account within a week.

13.9 On its request, the Commission gave ATIL a week to file its additional submission, if any.

14. In its submission dated 29.11.2017, ATIL summarized its earlier submissions along with the following points in respect of the STU Committee Report as follows:

Issue No. 1: One-time Settlement of LPS:

- ATIL Submissions:

(i) The LPS amount has been worked out by MSETCL in terms of the BPTA. MSEDCL has not disputed any monthly bills and/or supplementary bills as per the procedure prescribed in the BPTA. As such, they have become final and conclusive. Re-computation of already fructified amounts, legally due and payable

in terms of the BPTA, is not permissible in law. This view has been upheld by the Commission vide Order dated 16.11.2017 in Case No. 27 of 2016.

(ii) The Commission has also rejected the plea of MSEDCL for waiver of LPS on Transmission Charges in Case No. 151 of 2014. Therefore, under the garb of one-time settlement, MSETCL/MSEDCL cannot be permitted to seek partial waiver of the LPS, which is a crystallised amount, due and payable since 2012.

(iii) LPS amount worked out and informed by STU to the Commission has been considered as NTI and deducted from ARR in Case No. 7 of 2016. In the event, such 5%rebate,if considered, which is 1/3rd of the amount of LPS as provided in BPTA and MYT Regulations, will have additional Rs. 7.28 crore adverse financial impact on ATIL. Hence ATIL does not agree to the recommendation of STU for any rebate on LPS. The recommendation for rebate in LPS is neither supported by the provisions of BPTA nor the applicable Regulations.

(iv) The Commission may consider granting interest on LPS due, payable and outstanding since 01.04.2016 till 30.11.2017 at 1.25 % per month, as provided in the MYT Regulations and BPTA. Such interest on Rs 21.85 crore for 20 months will work out to Rs 5.46 crore. In light of the above, Rs 5.46 crore may be allowed as interest and STU directed to pay the entire outstanding LPS of Rs. 21.85 crore along with Rs 5.46 crore interest for the period from 01.04.2016 to 30.11.2017.

(v) In its presentation at the hearing on 22.11.2017, STU stated that the following amounts of LPS are required to be paid to Transmission Licensees (other than MSETCL) for one-time settlement of LPS.

Sr. No.	Transmission Licensee	Amount Rs.
1	TPC –T	3,89,89,484
2	R-Infra – T	2,55,03,784
3	JPTL	20,22,65,719
4	ATIL	21,85,23,248
5	MEGPTCL	31,64,16,873
6	VIPL –T	4,712
7	APTCL	44,766
	Total Rs.	80,17,48,586

IssueNo.2: Recommendation of allowing foregone LPS as a part of ARR

- ATIL Submissions:

ATIL is not agreeable to the proposed rebate of 5% on the LPS.

Issue No.3: Rebate on Transmission Charges to TSUs having valid LCs:

- ATIL Submissions:

(i) Submission of a valid LC by TSUs to STU is mandatory as per the BPTA. The BPTA does not provide for any rebate for maintaining LC. Hence, the recommendation of rebate on Transmission Charges which is not as per the BPTA or the Regulations ought to be rejected. Further, any rebate allowed to TSUs should be allowed to Transmission Licensees as pass-through as allowable cost.

(ii) The STU recommendation is inadequate to ensure the effective implementation of the PSM. As per the existing BPTA, it is the obligation of STU to procure and/or renew the appropriate LC and Bank Guarantees from the TSUs for implementation of the PSM. Because of inability of STU to renew LCs, LPS from 2012 to 2016 is till outstanding. Therefore, STU ought to ensure that appropriate LCs are submitted by the TSUs so that the PSM is implemented in its entirety.

(iii) STU is not precluded from approaching the Commission to seek appropriate directions against TSUs defaulting on PSM obligations as per the BPTA. Therefore, the Commission may direct STU to take prompt action against erring TSUs in order to ensure that the PSM provisions of the BPTA are implemented.

Issue No.4: Implementation of PSM by amendments to the existing and future BPTAs.

- ATIL Submission:

(i) The BPTA has provision for inclusion of LPS in the next month's bill. However, payments have been made to ATIL excluding the accumulated LPS amounts. No adjustments are being made by STU towards the same. Therefore, the Commission may direct STU to first adjust payments against unpaid LPS and then towards the principal amount.

(ii) The above approach is in line with Regulation 36.2 of the MYT Regulations, 2015 which provides that, in case payment is delayed beyond first month, 60 days and 90 days and 180 days, attracts LPS amount staggered from 1.25% to 12%, 15% and 18%. Therefore, the Commission may pass appropriate Orders on the principles of these Regulations for LPS.

(iii) From the above, it can be seen that, when TSUs have to recover their outstanding dues from their customers, they are allowed to recover a higher rate of interest for extended delay in recovery of their dues with accelerated rate of interest and interest on amount of LPS. A similar provision of accelerated rate of LPS and interest on LPS should be provided for the outstanding amount to Transmission Licensees by the TSUs.

(iv) At the hearing, STU had submitted that the existing PSM requires LCs to be renewed within a specified time by TSUs, and recovery of arrears can be done by encashing LCs. STU had, therefore, proposed an alternative PSM, i.e. recovery through an Escrow account.

(v) Further, as suggested by STU in the Report, the Commission may consider amendment to the BPTA on the lines of the Delhi Transco Limited, Clause on "Settlement of Delayed Payment Surcharge (DPS) on Transmission Charges" which reads as under:

> "*The outstanding amount received as against the Transmission Charges is first adjusted towards the DPS of the outstanding amount and the residual amount is adjusted towards the principal amount. The same methodology is followed for subsequent outstanding. This accounting policy followed by DTL is in line with Indraparastha Power Generation Power Limited payment policy.*"

(vi) In addition, appropriate Clauses securing the payment to Transmission Licensees in form of LCs/ Bank Guarantees can be considered by the Commission for adding to the BPTA.

Issue No.5: Rate of LPS linked to SBI MCLR:

- ATIL Submissions:

THE STU has recommended that LPS should be charged at 1% above MCLR of SBI. The rate at which LPS is to be charged has been fixed under the BPTA and is binding upon the parties. As such, any recommendation for change in the rate of LPS as already agreed under the BPTA ought to be rejected, being an attempt to re-write the BPTA.

15. In its further submission dated 5.12.2017, STU has stated that:

15.1 As a one-time settlement, MSEDCL on 28.11.2017 has paid Rs. 120 crore towards LPS to the STU Pool Account. The amount received has been disbursed proportionally to the Transmission Licensees. The status of LPS before and after this payment by MSEDCL is as summarised below:

Table: a: Status of LPS before payment of Rs. 120 crore by MSEDCL:

TSU	Amount (Rs)	MSETCL	TPC-T	Rinfra-T	JPTL	ATIL	MEGPTCL	VIPL-T	APTCL
MSEDCL	13,817,220,082	12,013,175,985	787,446,295	387,837,745	170,600,049	183,250,140	274,860,390	4,712	44,766
TPC-D	891,970,952	676,156,792	96,973,858	48,293,306	21,601,002	24,026,504	24,919,491	0	0
RInfra-D	433,592,835	326,138,719	46,540,283	22,965,568	10,064,668	11,246,605	16,636,992	0	0
BEST	0	0	0	0	0	0	0	0	0
MBPPL	0	0	0	0	0	0	0	0	0
IR	0	0	0	0	0	0	0	0	0
Total	15,142,783,870	13,015,471,496	930,960,436	459,096,619	202,265,719	218,523,248	316,416,873	4,712	44,766

Table b: Status of LPS after payment of Rs. 120 crore by MSEDCL:

TSU	Amount (Rs)	MSETCL	TPC-T	Rinfra-T	JPTL	ATIL	MEGPTCL	VIPL-T	APTCL
MSEDCL	12,617,220,082	12,013,175,985	263,658,902	129,858,855	57,121,637	61,357,239	92,030,897	1,578	14,989
TPC-D	298,656,662	226,396,084	32,469,543	16,169,941	7,232,616	8,044,741	8,343,738	0	0
RInfra-D	145,178,930	109,200,306	15,582,980	7,689,510	3,369,930	3,765,676	5,570,527	0	0
BEST	0	0	0	0	0	0	0	0	0
MBPPL	0	0	0	0	0	0	0	0	0
IR	0	0	0	0	0	0	0	0	0
Total	13,061,055,675	12,348,772,376	311,711,425	153,718,306	67,724,183	73,167,656	105,945,162	1,578	14,989

16. In pursuance of the Daily Order dated 22.11.2017, MSEDCL vide letter dated 28.12.2017 stated that :

16.1 On 28.11.2017, MSEDCL has paid Rs. 120 crore to the STU Pool Account towards LPS worked out at 10 % p.a. instead of 15 %, except for MSETCL.

16.2 MSEDCL has not renewed LC since April, 2014 because of its precarious financial position. However, MSEDCL is regularly paying MTC within the due date to STU since September, 2015 and there is no default.

16.3 The cost associated with LC ultimately is to be borne by the consumers. Hence, MSEDCL is in the process of renewing LC in favour of STU to the extent of the share of TSUs other than MSETCL (presently Rs. 158.92 crore). Further, MSEDCL is in discussion with MSETCL not to insist on establishment of LC to the extent of its share, being its sister concern.

Commission's Analysis and Ruling

17. **The Commission decides the Transmission Charges to be paid by TSUs in its InSTS Tariff Orders. The BPTAs, MYT Regulations and Transmission Open Access Regulations stipulate the modalities governing the payment of InSTS Charges by TSUs.**

18. **MSEDCL is the major contributor to the InSTS Pool Account. As such, any deviation by MSEDCL from its payment schedule and the amount payable by it to the Pool Account has a large adverse financial impact on all Transmission Licensees. In case of shortfall in payments due, the STU reduces the amount paid to each Transmission Licensee in proportion to the extent of under-recovery from MSEDCL (or any other defaulting TSU).**

19. **Taking advantage of this state of affairs, TPC and RInfra have until recently been netting-off the Transmission Charges payments and receipts between their respective transmission and distribution businesses in total disregard of the Regulations. This has further aggravated the situation.**

20. **MSEDCL entered into a long-term PPA with APML for power from its Tiroda TPS. A BPTA was signed on 4.1.2011 between MSEDCL, MSETCL and APML, under which MSEDCL is liable to pay the Transmission Charges as determined by the Commission. However, MSEDCL has not been paying the Transmission Charges in time, thus attracting LPS as per the provisions of the BPTA and the MYT Regulations.**

21. **While disbursing the Transmission Charges received from the TSUs among the Transmission Licensees, the STU did not include the applicable LPS against the subsequent month's bill, as envisaged in the BPTA, resulting in the accumulation of LPS as arrears. When the payments were first delayed in 2012 and the LPS began accumulating and was also not paid, there was a subsisting LC from MSEDCL, but the STU did not encash it. Thereafter, MSEDCL did not renew the LC after its expiry on 31.3.2013. The STU has also not encashed the LCs of the other TSUs available with it for recovery of the LPS due to ATIL. ATIL has pointed out that, in earlier Orders, the Commission had asked the STU to file a Petition for resolution of the general issue of delayed payments, accumulating LPS and the PSM, but the STU did not do so either. Hence this Petition.**

22. **The following issues arising from these facts have been flagged by ATIL in its Petition:**

    Issue 1: Non-payment of LPS.

    Issue 2: Non-implementation of PSM by STU.

    ATIL has also sought action against the STU under Section 142 of the EA, 2003 for non-compliance of the Commission's directions.

23. ***Issue 1 : Non-payment of LPS***

    23.1 **Article 7.5 of the BPTA, which is based on a standard document, provides for the payment of LPS for delay in payment of Transmission Charges as follows:**

    "7.5 Late Payment Surcharge

    7.5.1 All transmission system users shall ensure timely payment of Transmission Tariff to STU so as to enable STU to make timely settlement of claims raised by transmission licensees. In case there is delay in payment by any TSU, late payment surcharge at the rate of 1.25% per month or part thereof shall be applicable.

    7.5.2 The Penal charge of 1.25% per month shall be levied proportionately to the number of days of delay in making the payment after due date of monthly TTSC bill, inclusive the date of payment and same shall be computed in the following manner:

    Late Payment Surcharge = (Bill Amount ×1.25% ×No. of days of Delay)÷ No. of days in the month

    7.5.3 The charges related to the late payment surcharge in any Month shall be recovered from the TSU from the immediate next Month bill i.e. late payment

surcharge for M0 Month shall be included in the monthly bill for the M1 Month."

23.2 **The MYT Regulations, 2011 were in force when the BPTA was entered into. Regulations 68.3 and 68.4 regarding LPS read as follows:**

"*68.3 All TSUs shall ensure timely payment of Transmission Tariff to STU so as to enable STU to make timely settlement of claims raised by Transmission Licensees.*

68.4 Where there is delay in payment by any TSU, late payment surcharge at the rate of 1.25% per month or part thereof shall be applicable."

Regulation 36.1 of the subsequent MYT Regulations, 2015 has similar provisions regarding LPS.

23.3 **Article 7.5.3 of the BPTA provides that the STU recover LPS from TSUs by including it in the next month's bill, so that no LPS for that month would accumulate and be outstanding in subsequent months. While the BPTA in this Case is based on a standard document approved some years ago, prior to the MYT Regulations, 2011, it is a settled principle of law that Regulations are in the nature of subordinate legislation and prevail over contracts. The Commission had reiterated this position in its Order dated 19 August, 2016 in Case No. 94 of 2015 as follows:**

"26.9 In PTC India Ltd. vs. CERC ((2010) 4 SCC 603)), the Supreme Court has held that the Regulations made in exercise of a Commission's powers to frame subordinate legislation override existing and future contracts, which the regulated entities are required to align with such Regulations:

> ***"A regulation under Section 178, as a part of regulatory framework, intervenes and even overrides the existing contracts between the regulated entities in as much as it casts a statutory obligation on the regulated entities to align their existing and future contracts with the said regulations."***

The Appellate Tribunal for Electricity (ATE), in its Judgment dated 9 October, 2012 in Appeal No. 114/2012 (JVVNL vs. Kalpataru Power Transmission Ltd.) upholding the Order of the Rajasthan Electricity Regulatory Commission deciding the tariff as per its Tariff Regulations instead of the Power Purchase Agreement entered into between the parties, has stated that:

> ***"25. According to the Ld. Counsel for the Appellants, the State Commission has nullified the provisions of the PPA by not determining the project specific tariff. We find that the State Commission has given the findings following its Tariff Regulations. Regulations are subordinate legislation and their provision will prevail over the provisions of the PPA. When the Regulations specify the tariff in a particular manner, the same will prevail over the provisions of the PPA."***

Thus, the provisions of the applicable MYT Regulations prevail over the provisions of the BPTA. The MYT Regulations, 2011 and 2015 do not mandate inclusion of LPS in the next month's bill. Hence, to that extent, the treatment of LPS by the STU is in line with the applicable MYT Regulations.

24. ***Issue 2 : Non-implementation of PSM by STU***

24.1 **Article 7.7 of the BPTA specifies the following PSM:**

"7.7 Payment Security Mechanism

7.7.1 Letter of Credit:

7.7.1.1 The Transmission System User (TSU) shall provide an Irrevocable Revolving Letter of Credit (LC) for the full amount equivalent to one month Total Transmission System Charge (TTSC) payable by the Transmission System User (TSU), preferably an average of last three months bill paid in favour of the State Transmission Utility (STU) with a term of one year but revolving for the full term of this arrangement. The terms and conditions of LC shall be as decided by the State Transmission Utility (STU) from time to time. Later the amount of LC shall be enhanced or reduced based on the average monthly billing for the Transmission System User (TSU).

7.7.1.2 The Letter of Credit shall be generally valid for the period starting from the Effective Date to 31st March of the first year and subsequently for a period of every year starting from 1st April of the year to 31st March of next year.

7.7.1.3 In case of non-payment of monthly Transmission charges on or before due date by any Transmission System User, the letter of credit provided by him shall be encashed after 7 (seven) clear days from due date of payment….

7.7. 1.4 The late payment surcharge as per Clause No.7.5 above for the delay in payment shall be included in the next month bill.

7.7.1.5 The Transmission System User (TSU) shall ensure to renew/ re-establish the letter of credit (LC) before the date of its expiry.

7.7.1.6 In case of the encashment the letter of credit (LC) by the State Transmission Utility (STU) in instances of default by Transmission System User (TSU), it shall be the responsibility of the Transmission System User (TSU) to replenish/reinstate the letter of credit (LC) to the original level within 15 days of such encashment.

…7.7.1.8 The amount for the letter of credit (LC) shall be reviewed periodically in the monthly Grid Coordination Committee (GCC) meeting by State Transmission Utility (STU) and changed in case of revision in the charges by MERC or change in the average billing of the State Transmission Utility (STU).

7.7. 1.9 The above activity has to be completed by the Transmission System User (TSU) within seven days of intimation of the need for change in the amount of LC by the State Transmission Utility (STU).

7.7.1.10 All the costs associated with establishing, maintaining, operating and extension of validity, etc. of the LC shall be borne by the Transmission System User (TSU).

7.7.1.11 The payment security mechanism for Transmission Licensee(s) shall be as per MERC Orders, issued from time to time."

24.2 **Regulation 29 of the TOA Regulations, 2014 specified as follows:**

"29. Payment Security Mechanism

In case of Long-term Open Access and Medium-term Open Access, the applicant for Open Access will open an irrevocable Letter of Credit in favour of the agency responsible for collection of various charges for the estimated amount of various charges for a period of two months."

Regulation 24 of the subsequent TOA Regulations, 2016 has a similar provision.

24.3 **Inspite of the clear provisions of the BPTA and the TOA Regulations, the STU did not encash the LC of MSEDCL while it was neither subsisting nor the valid LCs of other TSUs available with it, leading to the accumulation of outstanding principal payments and LPS. MSEDCL has not renewed its LC since 2014.**

25. **In this context, the Commission also notes as follows:**

25.1 **In its Order dated 26.6.2015 in Case No 57 of 2015, the Commission had pointed out the large LPS arrears and opined that, had the PSM been implemented by the STU, LPS would not have accumulated. Hence, the Commission had directed the STU as follows:**

"96. In this background, the STU is directed to approach the Commission, within 45 days of this Order, with its suggestions for dealing with past payment arrears and minimising future delays, through a Petition. MSLDC and the Distribution and Transmission Licensees may be impleaded as parties. With its Petition, the STU should submit all the relevant details, including but not limited to the following:

• TSU-wise details of existing Letter of Credit (LC):

• Amount, period of validity, no. of months of Transmission charge payments to which it is equivalent;

• No. of occasions on which the LC amount has been revised in the last 3 years;

• No. of occasions in the last 3 years on which LCs of TSUs have been encashed for non-payment of dues in time;

• If LC was not encashed by STU against payment default, the reasons therefor;

• No. of GCC meetings in the last 3 years at which the LC amounts were reviewed; whether the revisions decided upon were implemented, with reasons for non-implementation, if any."

25.2 **In its InSTS Tariff Order dated 22.7.2016 in Case No 91 of 2016, the Commission observed that the non-recovery of LPS impacts MSETCL as well as the other Transmission Licensees, and stated as follows:**

"9.5 In addition to its overall responsibility in planning, coordination, execution and monitoring of the InSTS, the STU is also responsible for the settlement of Transmission Charges and operating a payment security mechanism so as to avoid the present situation of payment indiscipline by TSUs and mounting DPC of the Transmission Licensees. Vide letters dated 7 August, 9 September and 30 October, 2015 and 8 January, 2016, the STU has repeatedly sought deferment of filing its Petition as directed. Vide letter dated 28 January, 2016, the Commission had allowed time up to 29 February, 2016, but the STU has only submitted the status of ongoing discussions at various levels for resolution of the DPC issue.

9.6 MSETCL is fully aware from the MTR Order that the Commission has considered the outstanding DPC as part of Non-Tariff Income under the MYT Regulations, 2011. Accordingly, the recovery of ARR for FY 2015-16 was reduced to that extent since the DPC due has been considered on an accrual basis. Its non-recovery in practice impacts both MSETCL as well as other Transmission Licensees since the amount is not actually available with them. Accordingly, it was in the interest of MSETCL both as a Transmission Licensee and as the STU to approach the Commission for resolution of this matter, but it has not done so. However, the Commission may pursue this separately."

25.3 **The STU sought several extensions of time to file its Petition as directed by the Commission, and has still not done so. The issue of pending LPS payments was discussed in several GCC meetings, but to no avail.**

25.4 **In the course of these proceedings, the Commission had asked the CMD, MSETCL to hold meetings with the Transmission Licensees and TSUs on the issue of payment of Transmission Charges and LPS, the PSM and the future modalities. The STU has submitted its Report of these meetings. The Report is summarised earlier in this Order and states, inter alia, as follows:**

"Conclusions:

A 1. All Transmission Licensees except MSETCL agreed for one-time settlement by clearing LPS (without any rebate) of other Licensees except MSETCL (Netting-Off).

2. Director (Finance), MSEDCL stated one-time settlement is under consideration of Board Management and efforts will be made to settle at the earliest, if suitable cuts are taken, in line with spirit of one-time settlement. The proposal from MSEDCL regarding LPS i.e to compute LPS @ 10% instead of 15% was discussed. ATIL & JPTL have not accept

the said proposal, however, RInfra-T and Tata Power Co. Ltd. submitted their say subject to condition as incorporated in Chapter No. 4.

3. Transmission Licensees have taken a firm stand of not to give any concession in amount due, which is not in line with spirit of one-time settlement.

4. To move forward in the matter, Commission may consider allowing some part of fore gone DPC (5%) as a part of ARR, as DPC amount has been already reduced from ARR by MERC.

B 1. Existing Provision regarding PSM is sufficient; amendments in existing and future BPTAs are not required.

2. It is suggested that additional of 0.5% rebate can be allowed on transmission charges to TSUs, who have valid LC on that date so as to promote LC mechanism.

C. DPC should be charged at the 1 % above MCLR of SBI for consideration of MERC."

Chapter 4 of the STU Report, referred to at A 2 of the above Conclusions, reads inter alia as follows

"Chapter 4

RInfra-T: "Based on recommendations of the Committee, RInfra-T is in principle OK with accounting of DPC at the rate of 10% pa (Equivalent to SBI MCLR/SBAR applicable for respective period) subject to approval of the same by Hon'ble MERC and implementation of the same in RInfra-T ARR."

TPC-T: Tata Power-T wishes to reiterate that if a one-time intra-company transfer of the DPC is recommended by STU and allowed by the Hon'ble Commission, the outstanding DPC amount to be dealt with, reduces significantly. Further, as a one-time settlement arrangement, if MSEDCL pays the balance DPC after carrying out intra-company transfer, the net receivable amounts of all the Transmission Licensees would get addressed.

Further, with respect to the request from MSEDCL to compute DPC @ 10% instead of 15% considered by STU, as per regulations 68.4 of MERC MYT Regulations, 2011, in their computation and deducted by the Hon'ble Commission in the ARR of the Transmission Licensees, we wish to submit that Tata Power agrees to the same provided the same gets reflected in the ARR of Transmission Licensees and subject to approval by Hon'ble Commission; i.e. the Transmission Licensees are refunded the difference in DPC amount already deducted in their ARR and the new DPC computed at the rate of 10% as suggested by MSEDCL. Further, the rate of 10% for DPC computation shall be applicable to all the Distribution licensees in Maharashtra."

Thus, while the STU has made certain recommendations in its Report, there was no consensus at the meetings on the way forward for resolving the long-pending issues of payment of Transmission Charges, LPS and the PSM modalities implementation.

25.5 **The STU has stated in these proceedings that the present PSM requires LCs to be renewed within the specified time by the TSUs, and recovery of arrears can be done by encashing such LCs. However, if the LCs are not renewed, the STU has no practical recourse. In order to address such an eventuality, it has suggested that TSUs be required to open Escrow accounts (although, in its recommendations following the meetings, it had opined that the existing PSM provisions were adequate and that no changes in the BPTAs were necessary in this regard).**

25.6 **Vide its Order dated 12.12.2014 in Case no. 151 of 2014, the Commission had rejected the plea of MSEDCL for waiver of LPS on the Transmission Charges, observing that:**

> ***"7. Delayed payment of Transmission Charges to STU in turn affects the Transmission Licensees and, thus, the InSTS as a whole adversely. The surcharge for late payments specified in the MYT Regulations, 2011 is intended to promote the required payment discipline by penalising any laxity in adhering to it. For these reasons, the Commission is not inclined to waive the DPC which is payable by MSEDCL under the Regulations."***

25.7 **The Commission notes that MSEDCL has paid Rs. 120 crore on 28.11.2017 towards LPS to the STU Pool Account, which has in turn been paid to the respective Transmission Licensees proportionately to their dues.**

26. **Considering the foregoing, the Commission directs as follows:**

1) The STU shall encash the valid LCs available with it within 30 days to the extent of the current arrears of Transmission Charges as well as LPS, and make payment to the respective Transmission Licensees.

2) The STU shall strictly implement the provisions of Article 7.5 (excluding 7.5.3, as discussed at para. 23.3 above) and 7.7 of the BPTA and the applicable MYT Regulations and TOA Regulations regarding the PSM and the payment of Transmission Charges and LPS so that such a situation does not recur.

3) MSEDCL shall provide the required LC within a month, and all TSUs shall renew or revise their LCs from time to time as required under the BPTAs and the Regulations.

4) There shall be no intra-Company adjustment of Transmission Charges and LPS in future.

MSEDCL has stated that additional costs are involved in opening of LCs. MSEDCL and other TSUs are free to instead provide Escrow accounts in favour of the STU for equivalent amounts, which the STU would operate in a similar

manner and circumstances as a LC. The Commission considers that this would not constitute a material departure from the Regulations or the BPTA inasmuch as it would be an equivalent alternative to a LC which would not adversely affect the entitlements of the TSUs or the ability of the STU to perform its obligations.

27. **Considering the issues involved and the dispensation directed in this Order, the Commission is not inclined to initiate action under Section 142 of EA, 2003 against the STU.**

The Petition of M/s Adani Transmission (India) Ltd. in Case Nos. 162 of 2016 stands disposed of accordingly.

Sd/-	Sd/-
(Deepak Lad)	**(Azeez M. Khan)**
Member	**Member**

(Ashwani Kumar Sinha)
Secretary

Annexure 06

Detailed CPRI reports of the power stations.

FINAL REPORT OF

DETAILED AUXILIARY POWER CONSUMPTION AUDIT OF UNIT #3, 4, 5, 6 AND 7

Conducted at

CHANDRAPUR SUPER THERMAL POWER STATOIN

REPORT NO.: CPRI/ERED/EA/217/24

(Work order No.: CSTPS/4500124169 dated 31/07/2023)

Project code: CPRI/CS&CD/2023-24/ERED/C/04

Study conducted by

May 2024

Energy Efficiency and Renewable Energy Division

Central Power Research Institute

Prof. Sir C.V. Raman Road, P.B. No 8066,

Sadashiva Nagar, Bangalore – 560 080,

Phone: 080 2207 2033.

Work carried out by,

Energy Efficiency and Renewable Division
Central Power Research Institute
Prof. Sir C.V. Raman Road, P.B. No 8066,
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Work carried out for,

Chandrapur Super Thermal Power Station
Urjanagar, Chandrapur – 442404,
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Head of the division	N. Rajkumar	Joint Director
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Assistance provided for measurement at site by	Ajit Kumar Mohanty Vinod Kumar Ashok Kumar	Technician Gr.2 Technician Gr.1 Attendant Gr. 5
Report no.	CPRI/ERED/EA/217/24	
Date of issue of report	27 May 2024	
Signature of Energy Audit team leader		
Signature of the division head		

ACKNOWLEDGEMENT

CPRI is thankful to **Chandrapur Super Thermal Power Station** for placing the work order for 'Detailed APC audit of Unit #3,4,5,6 and 7' and making the necessary arrangements for conducting the study at Chandrapur Super Thermal Power Station, Maharashtra.

We thank the all officials of Chandrapur Super Thermal Power Station, Maharashtra for their excellent co-operation, valuable help and arrangements made during the conduct of the study.

CPRI also thank all other staff of Chandrapur Super Thermal Power Station, Maharashtra for extending excellent co-operation during the conduct of the study.

EXECUTIVE SUMMARY

The detailed auxiliary power consumption (APC) audit was conducted in ***November & December 2023.*** The work at the site consisted of measurement of input and output variables of different equipment and auxiliary loads in the plant by conducting performance tests. Optimum range of percentage APC was found based on the past performance of the units and given below. APC percentage generation above 80 % was found by extrapolating the graph.

Percentage generation		50-60 %	60-70 %	70-80 %	80-90 %	90-100 %
Unit 3	Max	12.15	11.22	10.36	9.56	8.82
	Min	11.22	10.36	9.56	8.82	8.15
Unit 4	Max	11.44	10.45	9.68	9.06	8.55
	Min	10.45	9.68	9.06	8.55	8.11
Unit 5	Max	11.00	9.74	8.78	8.03	7.42
	Min	9.74	8.78	8.03	7.42	6.91
Unit 6	Max	9.28	8.67	8.19	7.80	7.47
	Min	8.67	8.19	7.80	7.47	7.18
Unit 7	Max	11.43	10.76	10.14	9.55	8.99
	Min	10.76	10.14	9.55	8.99	8.47

- ID fans and PA fans of unit 3 are loaded to its near full load during the test load of 153.71 MW (73 %). Further increases in the generation from the unit is arrested due to non-availability of load margin for both ID fan and PA fan.
- ID fans are loaded to 80 % to 88 % and PA fans of unit 4 are loaded to 84 % to 87 % during the test load of 144.62 MW (68.87 %). Further increases in the generation from the unit is limited due to less-availability of load margin for both ID fan and PA fan.
- ID fans of unit 5 are loaded to 94 % to 98 % during the test load of 413.55 MW (82.71 %). Further increases in the generation from the unit is limited due to less-availability of load margin for ID fan.
- ID fans of unit 6 are loaded to 84 % to 97 % during the test load of 316.02 MW (63.2 %). Further increases in the generation from the unit is limited due to less-availability of load margin for ID fan.
- It is found that there are no limitations on auxiliaries' capacity for further increase in the plant load for Unit 7.

- Achievable APCs for each unit are shown below

Unit	Unit #3	Unit #4	Unit #5	Unit #6	Unit #7
Test Load, MW	153.71	144.62	413.55	316.02	313.00
Present APC, %	11.33	11.65	9.24	10.95	12.65
Possible savings, %	1.16	1.52	0.60	1.57	1.09
Achievable APC	10.17	10.13	8.64	9.38	11.56
Achievable APC at 80 % PLF	**9.63**	**9.42**	**8.82**	**8.67**	**10.51**

Nominal achievable APC for the stages is calculated by taking weighted average of the individual unit APC and given below,

Nominal achievable APC for stage II : 9.53 % at 80 % PLF
Nominal achievable APC for stage III : 9.28 % at 80 % PLF
Nominal achievable APC for station : 9.34 % at 80 % PLF

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1.0 INTRODUCTION

This section introduces the plant, equipment & process and defines the scope of the work.

1.1 Chandrapur Super Thermal Power Station

The Maharashtra State Power Generation Corporation Ltd. (MSPGCL) had established coal fired thermal power stations of 210 MW x 4 units (Unit 1-4) & 500 MW x 5 (Units 5-9) at Chandrapur. Unit 1 and unit 2 have been decommissioned and now unit 3 to 9 are operational. So, the total installed capacity is 2920 MW. The auxiliary power consumption audit study is carried out for unit 3 to unit 7.

Stage II refers to 210 MW x 2: Units 3 & 4
Stage III refers to 500 MW x 3: Units 5, 6 & 7
Stage IV refers to 500 MW x 2: Units 8 & 9

1.2 Scope of the work

The scope of the work is given below:

The scope shall include Assessment of Actual Power Consumption of all the motors/pumps at boiler side, turbine side, CHP side, and other outdoor plant auxiliaries & Suggestions for suitable energy conservation measures.

Evaluation of efficiency, specific energy consumption and suggestions for energy saving for Flue Gas & Air Cycle Path, Coal Milling Plant, ID/FD/PA Fans, Electrostatic Precipitator (ESP), Ash Handling System, Feed Water Cycle, Condenser System, Cooling Towers & CT Fans, Coal Handling System, Water treatment Plant, Compressed Air Plant, Outdoor Plant Auxiliaries

Pumps Power assessment of TDBFPs/MDBFPs/Boiler Feed Pumps, Boiler Circulating Water (BCW) Pumps, Condensate Extraction Pumps(CEP), CW/ GS or Condenser Cooling Water (CCW)/ Auxiliary Cooling Water (ACW) Pumps, Raw Water makeup pumps, DM/ Non-DM/ Soften Pumps, Raw water for ash disposal pumps.

Analysis of auxiliary consumption pattern of 2 x 210 MW + 3 x 500 MW units.

Suggesting measures to reduce auxiliary consumption & improve the reliability of electrical sub systems like motors, switchgears, transformers, cables.

2.0 WORK CARRIED OUT

The detailed auxiliary power consumption (APC) audit was conducted in ***November & December 2023.*** The work at the site consisted of measurement of input and output variables of different equipment and auxiliary loads in the plant by conducting performance tests. The performance tests were carried out at following plant loads,

Unit 3 – 153.71 MW
Unit 4 – 144.62 MW
Unit 5 – 413.55 MW
Unit 6 – 316.02 MW
Unit 7 – 313.00 MW

The data is processed at CPRI to evaluate auxiliary power consumption (APC) and possible improvement in the APC. Findings from the study are detailed in upcoming parts of the report.

3.0 OBSERVATIONS AND STUDY RESULTS

The installed generation capacity of the Chandrapur Super Thermal Power Station (CSTPS) is 2920 MW (210 MW x 2 units & 500 MW x 5 units).

At stage II of 210 MW plants, the Maximum Continuous Rating (MCR) of unit is 210 MW. The generator terminal voltage is 15.75 kV and is stepped up to 400 kV by Generator transformer of 250 MVA at Units 3 and 4. The grid voltage of 220 kV is stepped down to 6.6 kV by station transformers of 40 MVA to provide the auxiliary power to common auxiliaries and power during start up. During normal running of the plant, the auxiliary power is supplied by two numbers of Unit Auxiliary Transformers (UAT) of 25 MVA at each unit.

The secondary of UATs is fed to individual 6.6 kV Bus (i.e., UAT ‘A’ and UAT ‘B’ Bus). The HT major auxiliary equipment are fed from these two Bus. UAT bus are provided tie from station bus. During startup operation, UAT bus will be charged through tie from station boards. During normal operation the power supply will change over from station tie to UAT.

At 500 MW plants, the Maximum Continuous Rating (MCR) of unit is 500 MW. The generator terminal voltage is 21 kV and is stepped up to 400 kV by three numbers of single phase Generator Transformers of 200 MVA. The grid voltage of 400 kV is stepped down to 11 kV by station transformers of 45 MVA (ST 3 for Unit 5, ST4 for Unit 6 & ST5 for Unit 7) to provide the auxiliary power to common auxiliaries and power during start up. During normal running of the plant, the auxiliary power is supplied by two numbers of Unit Auxiliary Transformers (5UXA & 5UXB for Unit 5, 6UXA & 6UXB for Unit 6) of 12.5 MVA and 7UXA & 7UXB for Unit 7 of 10.5 MVA to step down the generator voltage from 21 kV to 3.3 kV and two more Unit Auxiliary Transformers (5UXC & 5UXD for Unit 5, 6UXC & 6UXD for Unit 6) of 22.5 MVA and 7UXC & 7UXD for Unit 7 of 35 MVA to step down the generator voltage from 21 kV to 11 kV.

The secondary of 5UXC, 5UXD, 6UXC, 6UXD, 7UXC & 7UXD is fed to individual 11 kV Bus (i.e., UAT 'A' and UAT 'B' Bus) and the secondary of 5UXA, 5UXB, 6UXA, 6UXB, 7UXA & 7UXB is fed to individual 3.3 kV Bus. The HT major auxiliary equipment are fed from these four Bus. UAT bus are provided tie from station bus. During startup operation, UAT bus will be charged through tie from station boards. During normal operation the power supply will change over from station tie to UAT.

3.1 Past Data Analysis and Observations

3.1.1 General

Figure 1 to 5 shows variation observed in monthly APC over the past 5 years along with corresponding plant load factor for Unit 3. Figure 26 shows scatter plot of PLF v/s APC characteristics and trend line plotted for each financial year for Unit 3.

Figure 6 to 10 shows variation observed in monthly APC over the past 5 years along with corresponding plant load factor for Unit 4. Figure 27 shows scatter plot of PLF v/s APC characteristics and trend line plotted for each financial year for Unit 4.

Figure 11 to 15 shows variation observed in monthly APC over the past 5 years along with corresponding plant load factor for Unit 5. Figure 28 shows scatter plot of PLF v/s APC characteristics and trend line plotted for each financial year for Unit 5.

Figure 16 to 20 shows variation observed in monthly APC over the past 5 years along with corresponding plant load factor for Unit 6. Figure 29 shows scatter plot of PLF v/s APC characteristics and trend line plotted for each financial year for Unit 6.

Figure 21 to 25 shows variation observed in monthly APC over the past 5 years along with corresponding plant load factor for Unit 7. Figure 30 shows scatter plot of PLF v/s APC characteristics and trend line plotted for each financial year for Unit 7.

With respect to the Figure 26-30 it can be observed that variation in APC at lower PLF is wide due to change in the operating condition of the unit at the particular time. APC trend is converging with rise in PLF which is evident in the APC trend for all the units. The change in the trend over a period of 3 years for Unit 3 and Unit 4 clearly shows that APC of the unit has gone up. This difference is indicated with thick dark blue and light blue trend line in the figure.

3.1.2 Unit 3

- Variation in APC is between 8.84 % to 19.95 % during 2019-20. APC of 8.84 % was observed at a PLF of 87.39 % and APC of 19.95 % was observed at a PLF of 10.82 %.
- Variation in APC is between 10.11 % to 19.23 % during 2020-21. APC of 10.11 % was observed at a PLF of 75.35 % and APC of 19.26 % was observed at a PLF of 9.20 %.
- Variation in APC is between 9.61 % to 21.64 % during 2021-22. APC of 9.61 % was observed at a PLF of 65.41 % and APC of 21.64 % was observed at a PLF of 7.62 %.
- Variation in APC is between 9.51 % to 18.85 % during 2022-23. APC of 9.51 % was observed at a PLF of 83.04 % and APC of 18.85 % was observed at a PLF of 15.52 %.
- Variation in APC is between 11.29 % to 15.42 % during 2023-24. APC of 11.29 % was observed at a PLF of 76.00 % and APC of 15.42 % was observed at a PLF of 39.90 %.

3.1.3 Unit 4

- Variation in APC is between 8.68 % to 12.56 % during 2019-20. APC of 8.68 % was observed at a PLF of 83.81 % and APC of 12.56 % was observed at a PLF of 59.96 %.
- Variation in APC is between 8.98 % to 11.01 % during 2020-21. APC of 8.98 % was observed at a PLF of 71.66 % and APC of 11.01 % was observed at a PLF

of 59.30 %.

- Variation in APC is between 8.85 % to 19.01 % during 2021-22. APC of 8.85 % was observed at a PLF of 78.87 % and APC of 19.01 % was observed at a PLF of 17.14 %.
- Variation in APC is between 8.86 % to 18.70 % during 2022-23. APC of 8.86 % was observed at a PLF of 74.87 % and APC of 18.70 % was observed at a PLF of 17.90 %.
- Variation in APC is between 10.01 % to 13.54 % during 2023-24. APC of 10.01 % was observed at a PLF of 85.80 % and APC of 13.54 % was observed at a PLF of 62.48 %.

3.1.4 Unit 5

- Variation in APC is between 7.90 % to 12.21 % during 2019-20. APC of 7.90 % was observed at a PLF of 81.65 % and APC of 12.21 % was observed at a PLF of 45.83 %.
- Variation in APC is between 7.92 % to 9.06 % during 2020-21. APC of 7.92 % was observed at a PLF of 76.14 % and APC of 9.06 % was observed at a PLF of 77.65 %.
- Variation in APC is between 7.87 % to 13.43 % during 2021-22. APC of 7.87 % was observed at a PLF of 75.01 % and APC of 13.43 % was observed at a PLF of 49.99 %.
- Variation in APC is between 9.31 % to 16.36 % during 2022-23. APC of 9.31 % was observed at a PLF of 69.08 % and APC of 16.36 % was observed at a PLF of 39.37 %.
- Variation in APC is between 7.72 % to 25.41 % during 2023-24. APC of 7.72 % was observed at a PLF of 83.41 % and APC of 25.41 % was observed at a PLF of 10.17 %.

3.1.5 Unit 6

- Variation in APC is between 6.96 % to 10.87 % during 2019-20. APC of 6.96 % was observed at a PLF of 87.09 % and APC of 10.87 % was observed at a PLF of 55.80 %.
- Variation in APC is between 7.25 % to 9.27 during 2020-21. APC of 7.25 % was

observed at a PLF of 82.68 % and APC of 9.27 % was observed at a PLF of 34.06 %.

- Variation in APC is between 7.79 % to 15.08 % during 2021-22. APC of 7.79 % was observed at a PLF of 65.97 % and APC of 15.08 % was observed at a PLF of 36.15 %.
- Variation in APC is between 7.78 % to 13.45 % during 2022-23. APC of 7.78 % was observed at a PLF of 67.99 % and APC of 13.45 % was observed at a PLF of 44.71 %.
- Variation in APC is between 7.95 % to 12.53 % during 2023-24. APC of 7.95 % was observed at a PLF of 45.54 % and APC of 12.53 % was observed at a PLF of 28.35 %.

3.1.6 Unit 7

- Variation in APC is between 7.56 % to 12.47 % during 2019-20. APC of 7.56 % was observed at a PLF of 86.30 % and APC of 12.47 % was observed at a PLF of 27.64 %.
- Variation in APC is between 8.68 % to 15.77 during 2020-21. APC of 8.68 % was observed at a PLF of 65.76 % and APC of 15.77 % was observed at a PLF of 11.97 %.
- Variation in APC is between 10.07 % to 13.53 % during 2021-22. APC of 10.07 % was observed at a PLF of 73.60 % and APC of 13.53 % was observed at a PLF of 30.12 %.
- Variation in APC is between 10.25 % to 20.12 % during 2022-23. APC of 70.81 % was observed at a PLF of 67.99 % and APC of 20.12 % was observed at a PLF of 24.80 %.
- Variation in APC is between 9.95 % to 16.02 % during 2023-24. APC of 9.95 % was observed at a PLF of 71.91 % and APC of 16.02 % was observed at a PLF of 40.38 %.

3.1.7 Present APC of units

For ascertaining present APC of each unit, APC data for past 5 years with load factor more than 30 %-40 % is considered. APC for load factor less than 30 % can be highly volatile due to change in the operational practice and due to the reason for less load factor. Variation in APC with respect to the load is shown in Figure 31 – 35.

Unit 3: -

It is found that APC for unit 3 varies in the following ranges with respect to the load factor,

- PLF of 100 % to 90 % - APC varies between 8.15 % to 8.82 %.
- PLF of 90 % to 80 % - APC varies between 8.82 % to 9.56 %.
- PLF of 80 % to 70 % - APC varies between 9.56 % to 10.36 %.
- PLF of 70 % to 60 % - APC varies between 10.36% to 11.22 %.
- PLF of 60 % to 50 % - APC varies between 11.22% to 12.15 %.

Unit 4: -

It is found that APC for unit 4 varies in the following ranges with respect to the load factor,

- PLF of 100 % to 90 % - APC varies between 8.11 % to 8.55 %
- PLF of 90 % to 80 % - APC varies between 8.55 % to 9.06 %
- PLF of 80 % to 70 % - APC varies between 9.06 % to 9.68 %
- PLF of 70 % to 60 % - APC varies between 9.68 % to 10.45 %
- PLF of 60 % to 50 % - APC varies between 10.45 % to 11.44 %

Unit 5: -

It is found that APC for unit 5 varies in the following ranges with respect to the load factor,

- PLF of 100 % to 90 % - APC varies between 6.91 % to 7.42 %
- PLF of 90 % to 80 % - APC varies between 7.42 % to 8.03 %
- PLF of 80 % to 70 % - APC varies between 8.03 % to 8.78 %
- PLF of 70 % to 60 % - APC varies between 8.78 % to 9.74 %
- PLF of 60 % to 50 % - APC varies between 9.74 % to 11.00 %

Unit 6: -

It is found that APC for unit 6 varies in the following ranges with respect to the load factor,

- PLF of 100 % to 90 % - APC varies between 7.18 % to 7.47 %

- PLF of 90 % to 80 % - APC varies between 7.47 % to 7.80 %
- PLF of 80 % to 70 % - APC varies between 7.80 % to 8.19 %
- PLF of 70 % to 60 % - APC varies between 8.19 % to 8.67 %
- PLF of 60 % to 50 % - APC varies between 8.67 % to 9.28 %

Unit 7: -

It is found that APC for unit 7 varies in the following ranges with respect to the load factor,

- PLF of 100 % to 90 % - APC varies between 8.47 % to 8.99 %
- PLF of 90 % to 80 % - APC varies between 8.99 % to 9.55 %
- PLF of 80 % to 70 % - APC varies between 9.55 % to 10.14 %
- PLF of 70 % to 60 % - APC varies between 10.14 % to 10.76 %
- PLF of 60 % to 50 % - APC varies between 10.76 % to 11.43 %

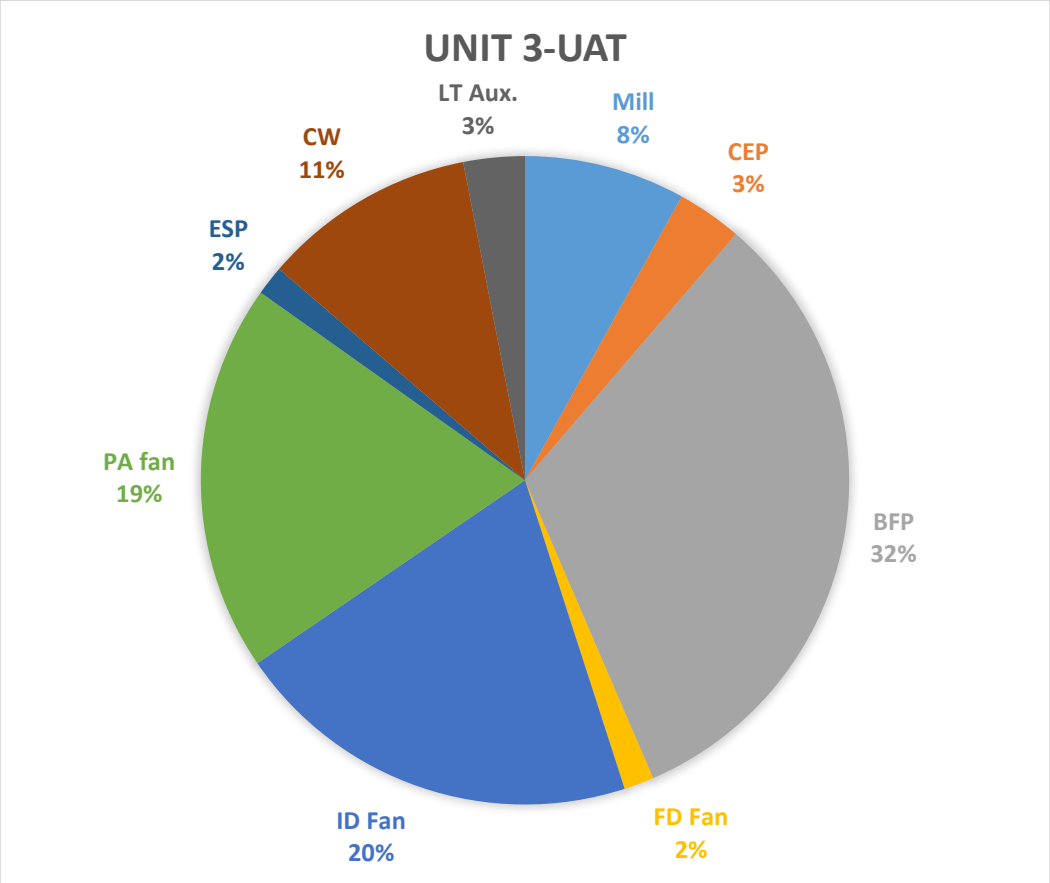
3.2 Data Analysis and Observations

3.2.1 Unit Auxiliaries power consumption

Power consumptions of plant auxiliaries connected to the Unit Auxiliary Transformer (UAT) were recorded during the unit test for each unit and bifurcation of power consumption was calculated and presented below,

Unit 3: -

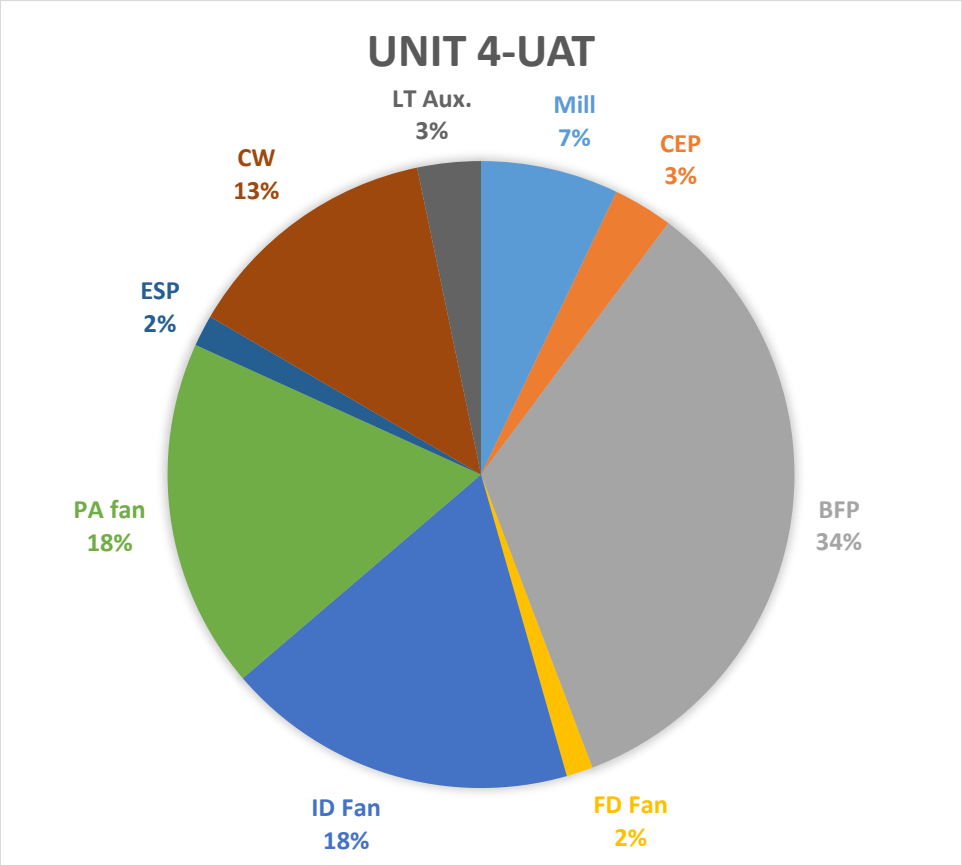
Power consumption of auxiliaries connected to UAT during the test was found to be 13.300 MW when the gross generation was 153.71 MW which account to PLF of 73.20 %. This power consumption from UAT accounts to 8.65 % of gross generation. Bifurcation of power consumption at each auxiliary as percentage of total power consumption in UAT are shown below.



Power consumption of BFP system accounts to 2.79 % of gross generation and it is 32.29 % of total UAT power consumption. Similarly, power consumption of ID fan accounts to 1.77 % of gross generation and it is 20.44 % of total UAT power consumption. In third place, power consumption of PA fan accounts to 1.68 % of gross generation and it is 19.39 % of total UAT power consumption.

Unit 4: -

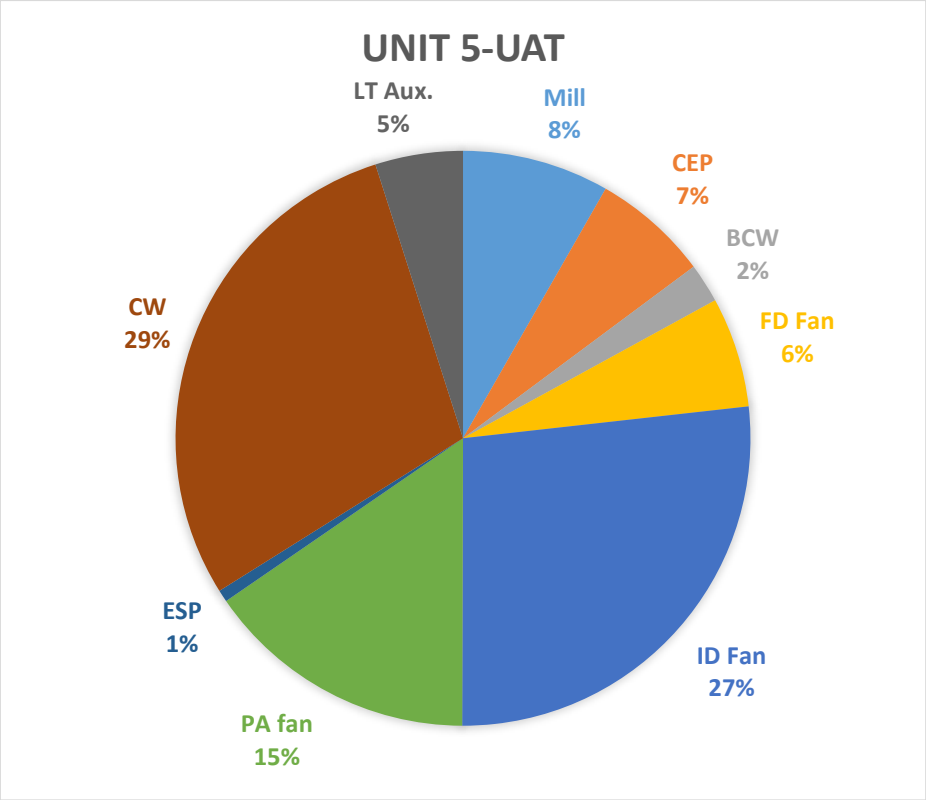
Power consumption of auxiliaries connected to UAT during the test was found to be 12.618 MW when the gross generation was 144.62 MW which account to PLF of 68.87 %. This power consumption from UAT accounts to 8.72 % of gross generation. Bifurcation of power consumption at each auxiliary as percentage of total power consumption in UAT are shown below,



Power consumption of BFP system accounts to 3.00 % of gross generation and it is 34.36 % of total UAT power consumption. Similarly, power consumption of ID fan accounts to 1.60 % of gross generation and it is 18.34 % of total UAT power consumption. In third place, power consumption of PA fan accounts to 1.59 % of gross generation and it is 18.22 % of total UAT power consumption.

Unit 5: -

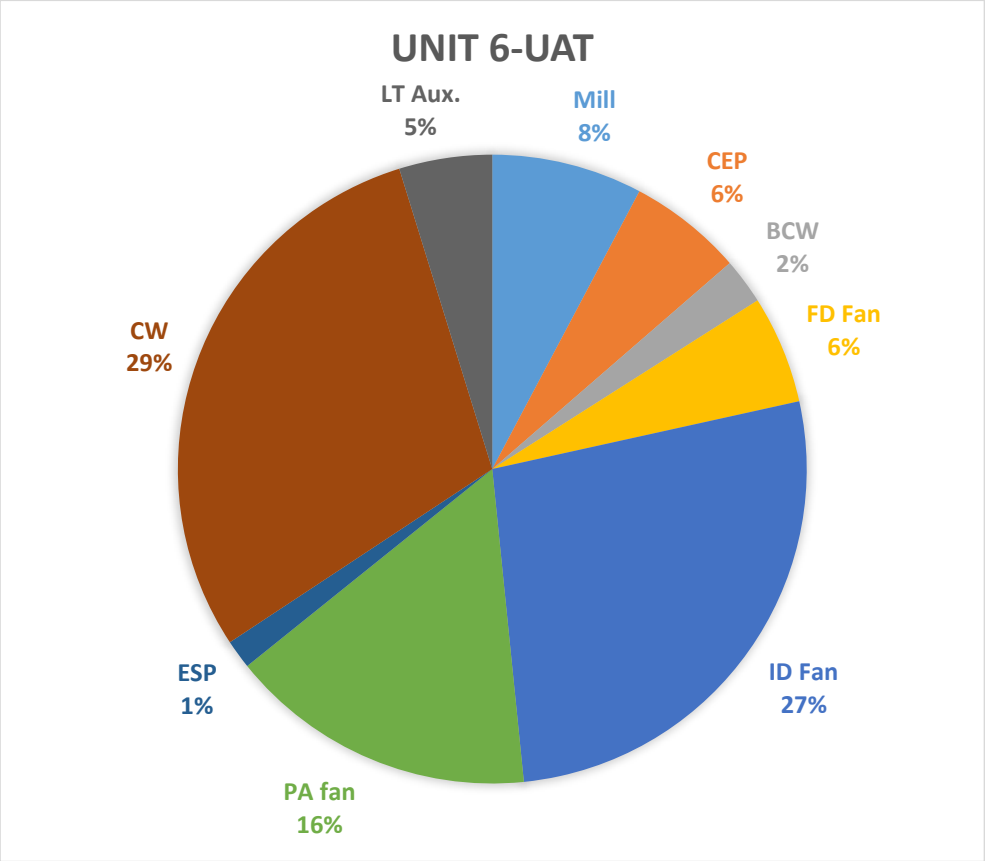
Power consumption of auxiliaries connected to UAT during the test was found to be 27.092 MW when the gross generation was 413.55 MW which account to PLF of 82.6 %. This power consumption from UAT accounts to 6.56 % of gross generation. Bifurcation of power consumption at each auxiliary as percentage of total power consumption in UAT are shown below,



Power consumption of CW system accounts to 1.90 % of gross generation and it is 28.98 % of total UAT power consumption. Similarly, power consumption of ID fan accounts to 1.76 % of gross generation and it is 26.82 % of total UAT power consumption. In third place, power consumption of PA fan accounts to 1.01 % of gross generation and it is 15.37 % of total UAT power consumption.

Unit 6: -

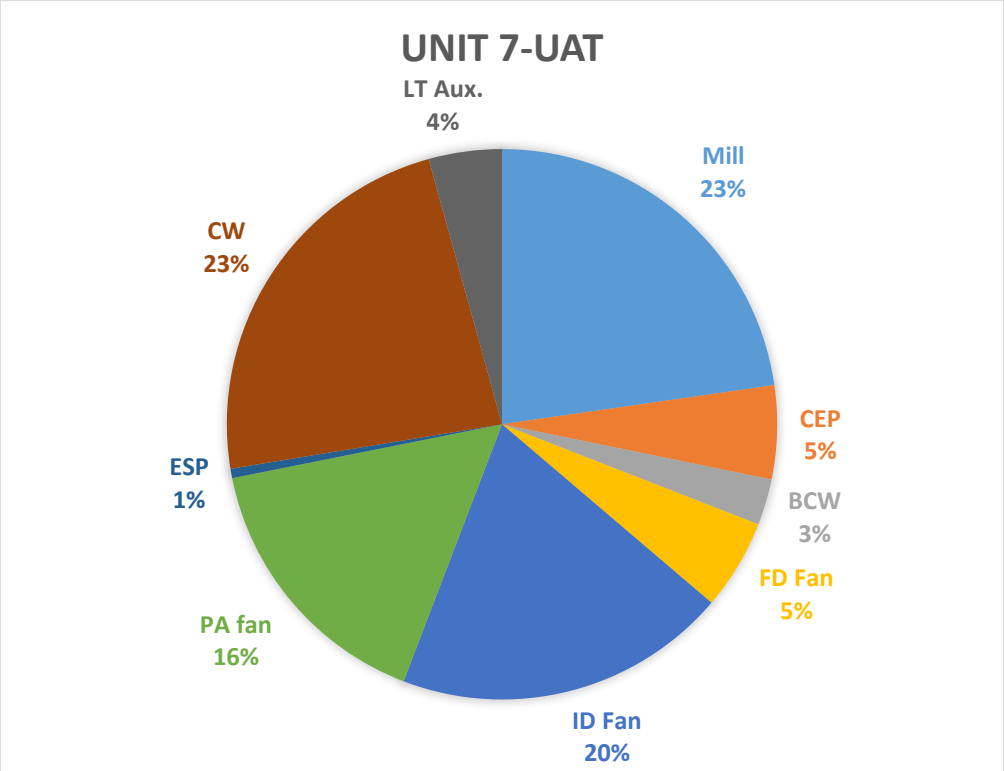
Power consumption of auxiliaries connected to UAT during the test was found to be 26.129 MW when the gross generation was 305 MW which account to PLF of 61.0 %. This power consumption from UAT accounts to 8.57 % of gross generation. Bifurcation of power consumption at each auxiliary as percentage of total power consumption in UAT are shown below,



Power consumption of CW system accounts to 2.53 % of gross generation and it is 29.50 % of total UAT power consumption. Similarly, power consumption of ID fan accounts to 2.30 % of gross generation and it is 26.86 % of total UAT power consumption. In third place, power consumption of PA fan accounts to 1.36 % of gross generation and it is 15.83 % of total UAT power consumption.

Unit 7: -

Power consumption of auxiliaries connected to UAT during the test was found to be 26.625 MW when the gross generation was 313 MW which account to PLF of 62.6 %. This power consumption from UAT accounts to 8.51 % of gross generation. Bifurcation of power consumption at each auxiliary as percentage of total power consumption in UAT are shown below,



Power consumption of CW system accounts to 1.98 % of gross generation and it is 23.29 % of total UAT power consumption. Similarly, power consumption of Mills accounts to 1.93 % of gross generation and it is 22.73 % of total UAT power consumption. In third place, power consumption of ID fan accounts to 1.67 % of gross generation and it is 19.59 % of total UAT power consumption.

3.2.2 Common auxiliaries and total APC

Power consumption in common auxiliaries such as CHP, WTP etc. which are connected to station transformer and other pump house has been attributed to different units based on the gross generation for a particular month, December 2023. Estimated power consumption for common auxiliaries for different units are as follows,

Unit 3 : 2.42 %
Unit 4 : 2.59 %
Unit 5 : 2.45 %
Unit 6 : 2.24 %
Unit 7 : 3.89 %

Total APC for each unit was found by addition of power consumption by common auxiliaries and power consumption by UAT auxiliaries. Estimated total APC for each unit is given below,

Unit 3 : 11.33 % at a load factor of 73.20 %.
Unit 4 : 11.65 % at a load factor of 68.70 %.
Unit 5 : 9.24 % at a load factor of 82.71 %.
Unit 6 : 10.95 % at a load factor of 63.2 %.
Unit 7 : 12.65 % at a load factor of 62.6 %.

Losses in the transformer has been calculated and accounted for Unit #5, #6 and #7 based on the design losses and losses are as follows,
Unit 3 : 0.25 %
Unit 4 : 0.25 %
Unit 5 : 0.24 %
Unit 6 : 0.24 %
Unit 7 : 0.25 %

3.3 Auxiliary-wise Analysis and Observations

3.3.1 In-house auxiliary power

3.3.1.1 BFP

Unit #3:

There are three Boiler Feed Pumps (BFP) of 4000 kW. Two pumps will be continuously working and other will be stand-by. There are three Booster pumps, two will be working continuously and third will be stand-by. The Booster pumps are mounted on the same shaft of main pump. The feed water flow is controlled by scoop coupling. The performance Test is conducted on BFP during the energy audit study. The

performance results of BFP are given in Table 1. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.64 to 6.70 kV and is normal. The voltage unbalance between 3-phases at motor terminals is about 0.20 – 0.35 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.69 – 1.84 % and is normal.
c) The power factor of BFP motor is varying between 0.85 – 0.88 and is normal.
d) The load factor of BFP motors is computed by taking the ratio of BFP motor output and rating of BFP. The load factor of BFP is varying in the range of 48.55 % to 50.21 % and enough margin is available for BFP motors.
a) The BFP efficiency is computed as 49.72% to 52.62 % as against to the design value of 81 %.
b) The specific energy consumption (SEC) of BFP is computed in the range of 6.77 – 7.80 kWh/t of FW flow and is lower than the design value of 8.09 kWh/t of FW.
c) The overall auxiliary power used by BFP forms 2.79 % of total plant load. **Recommendations:** It is suggested to check the passing in re-circulation by-pass valve by conducting the test. For improving the efficiency of pumps, overhauling of pump can be done and clearances between impeller and casing can be checked. This will reduce the ***energy consumption by 704.8 MWh/month*** if the efficiency can be brought to 58 %.
d) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.

Unit #4:

There are three Boiler Feed Pumps (BFP) of 4000 kW. Two pumps will be continuously working and other will be stand-by. There are three Booster pumps, two will be working continuously and third will be stand-by. The Booster pumps are mounted on the same shaft of main pump. The feed water flow is controlled by scoop coupling. The performance Test is conducted on BFP during the energy audit study. The performance results of BFP are given in Table 1. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.62 to 6.65 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.15 – 0.36 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.55 – 1.55 % and is normal.
c) The power factor of BFP motor is varying between 0.85 – 0.89 and is normal.
d) The load factor of BFP motors is computed by taking the ratio of BFP motor output and rating of BFP. The load factor of BFP is varying in the range of 49.38 % to 50.34 % and enough margin is available for BFP motors.
e) The BFP efficiency is computed as 53.67 – 55.29 % as against to the design value of 81 %. The efficiencies are on lower side.
f) The specific energy consumption (SEC) of BFP is computed in the range of 7.02 – 7.25 kWh/t of FW flow and is lower than the design value of 8.09 kWh/t of FW.
g) The overall auxiliary power used by BFP forms 3.00 % of total plant load. **Recommendations:** It is suggested to check the passing in re-circulation by-pass valve by conducting the test. For improving the efficiency of pumps, overhauling of pump can be done and clearances between impeller and casing can be checked. This will reduce the ***energy consumption by 364.62 MWh/month*** if the efficiency can be brought to 58 %.
h) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.

Unit #5:

There are two Turbine Driven Boiler Feed Pumps (TDBFP) and two numbers of Motor Driven Boiler Feed Pumps (MDBFP) of 10000 kW. TDBFPs will be continuously working and MDBFPs will be stand-by. The performance results of TDBFPs are given in Table 2. The observations and suggestions from the energy audit study are as follows:

a) The BFP discharge pressure is varying in the range of 155 – 161 kgf/cm2 and is slightly lower than the design value of 196.74 kgf/cm2.

b) The Booster pump suction pressure is 8.0 kgf/cm2 and is higher than the design value of 5.61 kgf/cm2.
c) The steam inlet pressure in the range of 4.42 – 4.44 kgf/cm^2 and is lower than the design pressure of 5.85 kgf/cm2.
d) The exit pressure is 12.3 kPa and is on par with design value of 12.27 kPa.
e) The steam flow to the TDBFPs are in the range of 27.89 – 32.29 t/h whereas the design value is 28.15 t/h.
f) The feed water flow is varying between 723.04 – 724.50 t/h and is higher than the design value of 643.93 t/h may be due to higher specific steam consumption of main turbine. Feed water flow is on higher side due to less steam inlet pressure than the design.
g) The pump overall efficiency is varying between 13.0 – 70.47 % and is lower than the design value of 78.44 % may be due to higher steam flow.
h) The specific steam consumption for TDBFP is in the range of 9.61 – 10.49 t/MWh and is higher than design value of 7.57 t/MWh. Recommendations: It is suggested to improve the performance of TDBFP by reducing internal leakages, maintaining the clearances, etc. It will reduce ***the steam consumption of about 9.34 t/h*** if the specific steam consumption can be brought to 8.5 t/MWh.

Unit #6:

There are two Turbine Driven Boiler Feed Pumps (TDBFP) and two numbers of Motor Driven Boiler Feed Pumps (MDBFP) of 10000 kW. TDBFPs will be continuously working and MDBFPs will be stand-by. The performance results of TDBFPs are given in Table 3. The observations and suggestions from the energy audit study are as follows:

a) The BFP discharge pressure is varying in the range of 108.94 – 109.10 kg$_f$/cm^2 and is lower than the design value of 196.74 kg$_f$/cm^2.
b) The Booster pump suction pressure is 6.6 kg$_f$/cm^2 and is higher than the design value of 5.61 kg$_f$/cm^2.
c) The steam inlet pressure in the range of 4.76 – 4.87 kg$_f$/cm^2 and is lower than the design pressure of 5.85 kg$_f$/cm^2.
d) The exit pressure is 13.20 kPa and is on par with design value of 12.27 kPa.

e) The steam flow to the TDBFPs are in the range of 16.95 – 17.34 t/h and is lower than the design value of 28.15 t/h.
f) The feed water flow is varying between 553.82 – 555.91 t/h and is lower than the design value of 643.93 t/h.
g) The pump overall efficiency is varying between 11.56 – 77.94 % and is lower than the design value of 78.44 % may be due to higher steam flow.
h) The specific steam consumption for TDBFP is in the range of 10.88 – 11.31 t/MWh and is higher than design value of 7.57 t/MWh. Recommendations: It is suggested to improve the performance of TDBFP by reducing internal leakages, maintaining the clearances, etc. will reduce ***the steam consumption of about 7.96 t/h*** if the specific steam consumption can be brought to 8.5 t/MWh.
i) TDBFPs and MDBFPs are not having any restrictions in raising the load and enough capacity is available.

Unit #7:

There are two Turbine Driven Boiler Feed Pumps (TDBFP) and two numbers of Motor Driven Boiler Feed Pumps (MDBFP) of 10000 kW. TDBFPs will be continuously working and MDBFPs will be stand-by. The performance results of TDBFPs are given in Table 4. The observations and suggestions from the energy audit study are as follows:

a) The BFP discharge pressure is about 121.48 kg_f/cm^2 and is lower than the design value of 157.75 kg_f/cm^2.
b) The Booster pump suction pressure is 7.5 kg_f/cm^2 and is higher than the design value of 5.47 kg_f/cm^2.
c) The steam inlet pressure in the range of 4.13 kg_f/cm^2 and is lower than the design pressure of 5.62 kg_f/cm^2.
d) The exit pressure is -0.98 kg_f/cm^2 and is on par with design value of 10.5 kPa.
e) The steam flow to the TDBFPs are about 12.87 t/h and is lower than the design value of 22.11 t/h.
f) The feed water flow is varying between 556.08 t/h and is lower than the design value of 597.33 t/h.

g) The pump overall efficiency is varying between 82.16 % and is higher than the design value of 80.02 %.
h) The specific steam consumption for TDBFP is in the range of 7.36 t/MWh and is on par with design value of 8.04 t/MWh.
i) TDBFPs and MDBFPs are not having any restrictions in raising the load and enough capacity is available.

3.3.1.2 CEP

Unit #3:

There are three Condensate Extraction Pumps (CEP) of 250 kW. Two pumps will be continuously working and third will be stand-by. The performance Test is conducted on CEPs during the study. Table 5 gives the performance results of condensate extraction pumps during the performance test. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.66 to 6.69 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.10 – 0.25 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.62 – 1.59 % and is normal.
c) The power factor of CEP motor is varying between 0.86 – 0.89 and is normal.
d) The load factor of CEP motors is computed by taking the ratio of CEP motor output and rating of CEP motor. The load factor of CEPs are in the range of 80.29 – 80.66 %.
e) The CEP pump efficiency is computed as 48.28 % and is lower than the design value of 80.0 %.
f) The specific energy consumption (SEC) of CEP is computed in the range of 1.03 kWh/t of condensate flow and is higher than the design value of 0.78 kWh/t.
g) The overall auxiliary power used by CEP forms 0.28 % of total plant load and is on par with other similar units.
h) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.

Unit #4:

There are three Condensate Extraction Pumps (CEP) of 250 kW. Two pumps will be continuously working and third will be stand-by. The performance Test is conducted on CEPs during the study. Table 5 gives the performance results of condensate extraction pumps during the performance test. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.60 to 6.67 kV and is good. The voltage unbalance between 3-phases at motor terminals is in the range of 0.06 - 0.33 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.74 – 4.39 % and is satisfactory.
c) The power factor of CEP motor is varying between 0.88 – 0.90 and is normal.
d) The load factor of CEP motors is computed by taking the ratio of CEP motor output and rating of CEP motor. The load factor of CEP is 72.98 %.
e) The CEP pump efficiency is computed as 65.96 % and is lower than the design value of 80.0 %.
f) The specific energy consumption (SEC) of CEP is computed in the range of 0.92 kWh/t of condensate flow and is on higher side compared to design value of 0.78 kWh/t of condensate flow due to lower pump efficiency.
g) The overall auxiliary power used by CEP forms 0.27 % of total plant load and is on par with other similar units.
h) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.

Unit #5:

There are three Condensate Extraction Pumps (CEP) of 1000 kW. Two pumps will be continuously working and third will be stand-by. The performance Test is conducted on CEPs during the study. Table 6 gives the performance results of condensate extraction pumps during the performance test. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 3.40 to 3.41 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.20 – 0.29 % and is normal.

b) The current unbalance between 3-phases at motor terminals is 1.02 – 1.13 % and is normal.
c) The power factor of CEP motor is varying between 0.85 – 0.87 and is normal.
d) The load factor of CEP motors is computed by taking the ratio of CEP motor output and rating of CEP motor. The load factor of CEPs are in the range of 82.16 – 83.65 %.
e) The CEP pump efficiency is computed in the range of 65.30 – 72.24 % as against to the design value of 81.0 %. The efficiency of CEP pumps efficiencies are on lower side may be due to passing in recirculation valves. The total condensate flow at CEP discharge is 1161.00 t/h and condensate flow at deaerator is 1063.56 t/h. There is difference of 97.44 t/h. The additional power of CEP is 149.5 kW. **Recommendations:** It is suggested to reduce the passing re-circulation valve and improve the CEP efficiency near to design value. This will reduce the ***energy consumption by 107.6 MWh/month***.
f) The specific energy consumption (SEC) of CEP is computed in the range of 1.46 – 1.61 kWh/t of condensate flow and is on higher side compared to design value of 1.12 kWh/t of condensate flow due to lower pump efficiency.
g) The overall auxiliary power used by CEP forms 0.43 % of total plant load and is slightly on higher side compared to other similar units.
h) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.

Unit #6:

There are three Condensate Extraction Pumps (CEP) of 1000 kW. Two pumps will be continuously working and third will be stand-by. The performance Test is conducted on CEPs during the study. Table 6 gives the performance results of condensate extraction pumps during the performance test. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 3.37 – 3.39 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.24 - 0.33 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.48 – 2.71 % and is normal.

c) The power factor of CEP motor is varying between 0.85 – 0.87 and is normal.
d) The load factor of CEP motors is computed by taking the ratio of CEP motor output and rating of CEP motor. The load factor of CEPs are in the range of 71.61 – 71.72 %.
e) The CEP pump efficiency is computed in the range of 59.96 – 61.86 % as against to the design value of 81.0 %. The efficiency of CEP pumps efficiencies are on lower side may be due to passing in recirculation valves. The total condensate flow at CEP discharge is 871.56 t/h and condensate flow at deaerator is 855.78 t/h. There is difference of 15.78 t/h. The additional power of CEP is 27.73 kW. **Recommendations:** It is suggested to reduce the passing re-circulation valve and improve the CEP efficiency near to design value. This will reduce the ***energy consumption by 19.96 MWh/month***.
f) The specific energy consumption (SEC) of CEP is computed in the range of 1.76 – 1.77 kWh/t of condensate flow and is on higher side compared to design value of 1.12 kWh/t of condensate flow due to lower pump efficiency.
g) The overall auxiliary power used by CEP forms 0.49 % of total plant load and is slightly on higher side compared to other similar units.
h) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.

Unit #7:

There are three Condensate Extraction Pumps (CEP) of 900 kW. Two pumps will be continuously working and third will be stand-by. The performance Test is conducted on CEPs during the energy audit study. Table 7 gives the performance results of condensate extraction pumps during the performance test. The observations and suggestions from the energy audit study are as follows:

b) The voltage at motor terminals is varying between 3.35 to 3.42 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.32 - 0.62 % and is normal.
c) The current unbalance between 3-phases at motor terminals is 1.63 – 4.35 % and is satisfactory.
d) The power factor of CEP motor is varying between 0.89 – 0.93 and is normal.

e) The load factor of CEP motors is computed by taking the ratio of CEP motor output and rating of CEP motor. The load factor of CEPs are in the range of 75.36 – 76.24 %.
f) The CEP pump efficiency is about 53.53 – 60.63 % as against to the design value of 81.0 %.
g) The specific energy consumption (SEC) of CEP is computed in the range of 1.50 – 1.51 kWh/t of condensate flow and is on higher side compared to design value of 1.12 kWh/t of condensate flow due to lower pump efficiency.
h) The overall auxiliary power used by CEP forms 0.47 % of total plant load and is slightly on higher side compared to other similar units.
i) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.

3.3.1.3 ID Fan

Unit #3:

There are two Induced Draft Fans (IDF) of 1300 kW and both fans will be working continuously. The ID fans are of axial fans with inlet guide vane control. The performance Test is conducted on ID fans during the study. The performance results are given in Table 8. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.66 to 6.69 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.20 – 0.25 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.08 – 0.48 % and is normal.
c) The power factor of ID fan motors is varying between 0.88 – 0.90 and is normal.
d) The load factor of ID fan motors is computed by taking the ratio of motor output and rating. The load factor of ID fan motors is varying between 98.78 - 99.14 %.
e) During the performance test the oxygen content was measured at APH inlet, APH outlet and ID fan outlet during the performance test. The average

Oxygen content at APH inlet was 5.00 %, at APH outlet was 7.5 % and ID fan outlet was 11.3 %.

f) The ID fan efficiencies are computed in the range of 20.87 % to 21.84 % whereas the design value is 81.89 % at 100 % fan capacity. The ID fan efficiencies are on lower side may be due to high air leakage through APH and air ingress in the flue gas duct.
g) It is found that ID fans are loaded to its near full load during the test load of 153.71 MW (73 %). Further increases in the generation from the unit is arrested due to non-availability of load margin for ID fan.
h) The average Oxygen content at ID fan outlet was 11.3 % and is higher.
i) The increased power in ID fans due to APH air leakage is 61.51 kW and due to ingress in flue gas duct from APH outlet to ID outlet is 650.16 kW. These increased powers form 0.46 % of generation. **Recommendation**: It is suggested to arrest the air ingress in flue gas duct and in APH.

Unit #4:

There are two Induced Draft Fans (IDF) of 1300 kW and both fans will be working continuously. The ID fans are of axial fans with inlet guide vane control. The performance Test is conducted on ID fans during the energy audit study. The performance results are given in Table 9. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.60 to 6.65 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.15 - 0.36 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.45 – 1.56 % and is normal.
c) The power factor of ID fan motors is varying between 0.87 – 0.92 and is normal.
d) The load factor of ID fan motors is computed by taking the ratio of motor output and rating. The load factor of ID fan motors is varying between 80.10 – 88.31 %.
e) During the performance test the oxygen content was measured at APH inlet, APH outlet and ID fan outlet during the performance test. The average

Oxygen content at APH inlet was 3.40 %, at APH outlet was 8.35 % and ID fan outlet was 11.70 %.

f) The ID fan efficiencies are computed in the range of 27.38 % to 32.62 % whereas the design value is 81.89 % at 100 % fan capacity. The ID fan efficiencies are on lower side may be due to high air leakage through APH and air ingress in the flue gas duct.
g) It is found that ID fans are loaded to 80 % to 88 % during the test load of 144.62 MW (68.87 %). Further increases in the generation from the unit is limited due to less-availability of load margin for ID fan.
h) The average Oxygen content at ID fan outlet was 11.70 % and is higher.
i) The increased power in ID fans due to APH air leakage is 304.96 kW and due to ingress in flue gas duct from APH outlet to ID outlet is 806.62 kW. These increased powers form 0.77 % of generation. **Recommendation**: It is suggested to arrest the air ingress in flue gas duct and in APH.

Unit #5:

There are four Induced Draft Fans (IDF) of 1800 kW and 11 kV. All the four fans will be working continuously. The ID fans are provided with inlet damper control. The ID fans are provided with 25 % reserve capacity on flow and 40 % reserve capacity on pressure. It is observed that transducers for measuring suction and discharge pressure on ID fan are not operational. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 11.12 to 11.24 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.13 – 0.21 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.23 – 1.60 % and is normal.
c) The power factor of ID fan motors is varying between 0.79 – 0.82 and is normal.
d) The load factor of ID fan motors is computed by taking the ratio of motor output and rating. The load factor of ID fan motors is varying between 94.47 – 98.69 %.

e) The pressure drop across APH on flue gas side is in the range of 131 – 164 mmWC and is higher than the design value of 113 mmWC.
f) During the performance test the oxygen content was measured at APH inlet, APH outlet and ID fan outlet by combustion analyzer during the performance test. The average Oxygen content at APH inlet was 4.65 %, at APH outlet was 7.9 % and ID fan outlet was 12.3 %. Pressure transducers have to be installed to measure suction and discharge pressure of ID fan to make performance analysis possible for the plant.
g) The average Oxygen content at ID fan outlet was 12.3 % and is higher.
h) It is found that ID fans are loaded to 94 % to 98 % during the test load of 413.55 MW (82.71 %). Further increases in the generation from the unit is limited due to less-availability of load margin for ID fan.
i) The increased power in ID fans due to APH air leakage is 342.30 kW and due to ingress in flue gas duct from APH outlet to ID outlet is 1000.88 kW. These increased powers form 0.32 % of generation. **Recommendation**: It is suggested to arrest the air ingress in flue gas duct and in APH.

Unit #6:

There are four Induced Draft Fans (IDF) of 1800 kW and 11 kV. All the four fans will be working continuously. The ID fans are provided with inlet damper control. The ID fans are provided with 25 % reserve capacity on flow and 40 % reserve capacity on pressure. The performance Test is conducted on ID fans during the energy audit study. The performance results are given in Table 10. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 11.00 – 11.16 kV and is good. The voltage unbalance between 3-phases at motor terminals is 0.06 – 0.27 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.79 – 3.47 % and is normal.
c) The power factor of ID fan motors is varying between 0.80 – 0.84 and is normal.

d) The load factor of ID fan motors is computed by taking the ratio of motor output and rating. The load factor of ID fan motors is varying between 84.30 – 97.10 %.

e) The flue gas pressure at ID inlet was recorded in the range of -374 to -516 and is higher than the design value at 100 % TMCR of -274 mmWC. The higher inlet pressure is may be due to increased hydro dynamic resistance in flue gas path.

f) The ID fan efficiencies are computed as 34.82 and 36.88 % for IDF A and IDF C, respectively. The design value of ID fan efficiency is 77.01 % at 100 % fan capacity. The ID fan efficiencies are on lower side may be due to higher air leakage through APH, air ingress in flue gas duct and higher pressure drop in flue gas duct. Efficiencies of IDF B and IDF D could not be calculated due to non-availability of discharge pressure value.

g) The specific energy consumption (SEC) of ID fans is computed as 2.99 kWh/t of Flue gas flow and is slightly higher than the design value of 2.23 kWh/t of flue gas flow.

h) The pressure drop across APH on flue gas side is in the range of 95.96 – 154.79 mmWC.

i) The flue gas pressure drop across ESP is 252 mmWC and is higher than the design value of 80 mmWC. **Recommendations:** It is suggested to reduce the pressure drop across ESP by clearing the flue gas path in ESP from debris.

j) During the performance test the oxygen content was measured at APH inlet, APH outlet and ID fan outlet by combustion analyzer during the performance test. The average Oxygen content at APH inlet was 6.85 %, at APH outlet was 10.45 % and ID fan outlet was 13.4 %.

k) It is found that ID fans are loaded to 84 % to 97 % during the test load of 316.02 MW (63.2 %). Further increases in the generation from the unit is limited due to less-availability of load margin for ID fan.

l) The increased power in ID fans due to APH air leakage is 782.67 kW and due to ingress in flue gas duct from APH outlet to ID outlet is 2422.10 kW. These increased powers form 1.01 % of generation. **Recommendation**: It is suggested to arrest the air ingress in flue gas duct and in APH.

Unit #7:

There are three Induced Draft Fans (IDF) of 3682 kW and 11 kV. All the three fans will be working continuously. These fans are provided with Variable frequency drives (VFD). The performance Test is conducted on ID fans during the energy audit study. The performance results are given in Table 11. The observations and suggestions from the energy audit study are as follows:

a) The voltage at VFD input terminal is varying between 11.17 to 11.28 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.77 – 0.81 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.30 – 16.72 % and this increased unbalance is due to frequent change in load factor.
c) The power factor of ID fan motors is varying between 0.58 – 0.90 and is normal considering the respective loading.
d) The load factor of ID fan motors is computed by taking the ratio of motor output and rating. The load factor of ID fan motors is varying between 34.93 – 54.31 %.
e) The flue gas pressure at ID inlet was recorded in the range of -10.27 mmWC to -277.82 mmWC. These reading might not be correct since it indicates wide variation.
f) The ID fan discharge pressure was in the range of 89.40 to 89.57 mmWC.
g) The ID fan efficiencies are computed in the range of 11.11 – 39.49 % as against to the design value of 80.01 % at 100 % fan capacity. The ID fan 7C efficiency is on lower side. **Recommendations:** It is suggested to improve the efficiency of ID fan 7C efficiency.
h) The specific energy consumption (SEC) of ID fans is computed as 2.08 kWh/t of Flue gas flow and is in par with the design value of 2.22 kWh/t of flue gas flow.
i) During the performance test the oxygen content was measured at APH inlet, APH outlet and ID fan outlet by combustion analyzer during the performance test. The average Oxygen content at APH inlet was 4.8 %, at APH outlet was 6.85 % and ID fan outlet was 14 %.
j) The average Oxygen content at ID fan outlet was 14 % and is higher.
j) There are no limitations from ID fans to operate plant to its 100 % MCR.

k) The increased power in ID fans due to APH air leakage is 114.52 kW and due to ingress in flue gas duct from APH outlet to ID outlet is 2524.23 kW. These increased powers form 0.84 % of generation. **Recommendation**: It is suggested to arrest the air ingress in flue gas duct and in APH.

3.3.1.4 FD Fan

Unit #3:

There are two numbers of 750 kW FD fans of axial flow fans with blade pitch control and both fans will be working continuously. The performance Test is conducted on FD fans during the energy audit study. The performance results are given in Table 12. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.66 to 6.70 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.20 – 0.25 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 2.99 – 3.19 % and is normal.
c) The power factor of FD fan motors is varying between 0.25 – 0.48 and is on lower side due to under loading of the motor.
d) The load factor of FD fan motors is computed by taking the ratio of motor output and rating. The load factor of FD fan motors is 10.36 – 14.28 %. **Recommendation**: It is suggested to install variable frequency drives (VFD) for FD fans. Since the loading on FD fans is very low and efficiencies are also low, it is suggested to operate single FD fan to provide the total secondary air.
e) The FD fan discharge pressure is in the range of 40.50 – 58.10 mmWC and is lower than the design value of 520 mmWC at 100 % MCR condition. This will reduce the furnace to windbox DP. **Recommendations:** It is suggested to increase the FD fan discharge pressure near to about 200 mmWC. Again at higher windbox DP may leads to decrease in the furnace ingress. Therefore, the windbox DP may be optimized to reduce the furnace ingress.
f) The FD fan efficiency is in the range of 15.16 – 21.75 % as against to the design value of 85.26 % at 100 % fan capacity. The FD fan efficiency is on lower side may be due to partial loading, increased air leakage through APH, higher pressure drop across air ducts.

g) The specific energy consumption (SEC) of FD fan is computed as 0.62 kWh/t of secondary air flow and is lower than the design value of 1.63 kWh/t of secondary air flow may be due to lower efficiency of fans.
h) There are no limitations from FD fans to operate plant to its 100 % MCR.
i) The increased power in FD fans due to APH air leakage is 6.91 kW. This increased power form 0.004 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

Unit #4:

There are two numbers of 750 kW FD fans of axial flow fans with blade pitch control and both fans will be working continuously. The performance Test is conducted on FD fans during the energy audit study. The performance results are given in Table 13. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.59 to 6.65 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.15 – 0.24 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 4.28 – 6.55 % and is on higher side.
c) The power factor of FD fan motors is varying between 0.30 – 0.41 and is on lower side due to under loading of motor.
d) The load factor of FD fan motors is computed by taking the ratio of motor output and rating. The load factor of FD fan motors is 10.26 – 11.81 %. **Recommendation**: It is suggested to install variable frequency drives (VFD) for FD fans. Since the loading on FD fans is very low and efficiencies are also low, it is suggested to operate single FD fan to provide the total secondary air.
e) The FD fan discharge pressure is in the range of 31.00 – 33.00 mmWC and is lower than the design value of 520 mmWC at 100 % MCR condition. This will reduce the furnace to windbox DP. **Recommendations:** It is suggested to increase the FD fan discharge pressure near to about 200 mmWC. Again at higher windbox DP may leads to decrease in the furnace ingress. Therefore, the windbox DP may be optimized to reduce the furnace ingress.
f) The FD fan efficiency is in the range of 9.52 – 10.23 % as against to the design value of 85.26 % at 100 % fan capacity. The FD fan efficiency is on

lower side may be due to partial loading, increased air leakage through APH, higher pressure drop across air ducts.

g) The specific energy consumption (SEC) of FD fan is computed as 0.76 kWh/t of secondary air flow and is lower than the design value of 1.63 kWh/t of secondary air flow may be due to lower efficiency of fans.
h) There are no limitations from FD fans to operate plant to its 100 % MCR.
i) The increased power in FD fans due to APH air leakage is 39.48 kW. This increased power form 0.03 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

Unit #5:

There are two numbers of 1750 kW FD fans of radial flow fans with inlet vane control and both fans will be working continuously. The performance Test is conducted on FD fans during the energy audit study. The performance results are given in Table 14. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 3.40 to 3.42 kV and is good. The voltage unbalance between 3-phases at motor terminals is 0.2 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.41 – 2.00 % and is normal.
c) The power factor of FD fan motors is varying between 0.70 – 0.77 and is on lower side due to oversizing of motor.
d) The load factor of FD fan motors is computed by taking the ratio of motor output and rating. The load factor of FD fan motors is 39.96 – 48.86 %. **Recommendation**: It is suggested to install variable frequency drives (VFD) for FD fans and operate both fans in parallel. Since the loading on FD fans is very low and efficiencies are also low, it is suggested to operate single FD fan to provide the total secondary air.
e) The FD fan discharge pressure is in the range of 132.52 – 135.42 mmWC and is lower than the design value of 261 mmWC at 100 % TMCR.
f) The FD fan efficiency is in the range of 15.54 – 16.02 % as against to the design value of 85.0 % at 100 % fan capacity. The FD fan efficiency is on lower side may be due to partial loading, increased air leakage through APH, higher

pressure drop across air ducts. **Recommendations:** It is suggested to improve the fan efficiency by overhauling the fans and reducing the electrical power input to fans.

g) The specific energy consumption (SEC) of FD fan is computed as 1.98 kWh/t of secondary air flow and is higher than the design value of 1.41 kWh/t of secondary air flow may be due to lower efficiency of fans.
h) There are no limitations from FD fans to operate plant to its 100 % MCR.
i) The increased power in FD fans due to APH air leakage is 123.71 kW. This increased power form 0.04 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

Unit #6:

There are two numbers of 1750 kW FD fans of radial flow fans with inlet vane control and both fans will be working continuously. The performance Test is conducted on FD fans during the energy audit study. The performance results are given in Table 15. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 3.37 to 3.39 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.24 – 0.33 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.99 – 4.58 % and is normal.
c) The power factor of FD fan motors is varying between 0.70 – 0.75 and is on lower side due to oversizing of motor.
d) The load factor of FD fan motors is computed by taking the ratio of motor output and rating. The load factor of FD fan motors is 37.34 – 39.35 %. **Recommendation**: It is suggested to install variable frequency drives (VFD) for FD fans and operate both fans in parallel. Since the loading on FD fans is very low and efficiencies are also low, it is suggested to operate single FD fan to provide the total secondary air.
e) The FD fan discharge pressure is in the range of 43 – 45 mmWC and is lower than the design value of 261 mmWC at 100 % TMCR. This pressure value is to be verified for its correctness.

f) The FD fan efficiency is in the range of 4.62 – 4.75 % as against to the design value of 85.0 % at 100 % fan capacity. The FD fan efficiency is on lower side may be due to partial loading, increased air leakage through APH, higher pressure drop across air ducts. **Recommendations:** It is suggested to improve the fan efficiency by overhauling the fans and reducing the electrical power input to fans.
g) The specific energy consumption (SEC) of FD fan is computed as 2.24 kWh/t of secondary air flow and is higher than the design value of 1.41 kWh/t of secondary air flow may be due to lower efficiency of fans.
h) There are no limitations from FD fans to operate plant to its 100 % MCR.
i) The increased power in FD fans due to APH air leakage is 121.48 kW. This increased power form 0.04 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

Unit #7:

There are two numbers of 1405 kW FD fans of radial flow fans with inlet guide vane control and both fans will be working continuously. The performance Test is conducted on FD fans during the energy audit study. The performance results are given in Table 16. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 3.35 to 3.42 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.30 – 0.68 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.39 – 2.19 % and is normal.
c) The power factor of FD fan motors is varying between 0.76 – 0.79 and is on lower side due to oversizing of motor.
d) The load factor of FD fan motors is computed by taking the ratio of motor output and rating. The load factor of FD fan motors is 43.94 – 50.19 %. **Recommendation**: It is suggested to install variable frequency drives (VFD) for FD fans and operate both fans in parallel. Since the loading on FD fans is very low and efficiencies are also low, it is suggested to operate single FD fan to provide the total secondary air.

e) The FD fan discharge pressure is in the range of 82.12 – 94.97 mmWC and is lower than design value of 253 mmWC at 100 % TMCR.
f) The FD fan efficiency is in the range of 10.22 – 11.81 % as against to the design value of 80.5 % at 100 % fan capacity. The FD fan efficiency is on lower side may be due to partial loading, increased air leakage through APH, higher pressure drop across air ducts.
g) The specific energy consumption (SEC) of FD fan is computed as 1.84 kWh/t of secondary air flow and is higher than the design value of 1.41 kWh/t of secondary air flow may be due to lower efficiency of fans.
h) There are no limitations from FD fans to operate plant to its 100 % MCR.
i) The increased power in FD fans due to APH air leakage is 39.78 kW. This increased power form 0.01 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

3.3.1.5 PA Fan

Unit #3:

There are two Primary Air fans of 1250 kW with inlet damper control to provide the primary air to mills. The performance Test is conducted on PA fans during the energy audit study. The performance results are given in Table 17. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.66 to 6.70 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.20 – 0.25 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.92 – 1.03 % and is normal.
c) The power factor of PA fan motors is varying between 0.85 – 0.92 and is normal.
d) The load factor of PA fan motors is computed by taking the ratio of motor output and rating. The load factor of PA fan motors is varying between 94.57 – 97.78 %.
e) PA fan discharge pressure was varying between 757.3 – 765.9 mmWC and is lower than the design value of 1210 mmWC (100 % fan capacity). The discharge pressure is normal.

f) The PA fan efficiencies are computed in the range of 17.74 – 17.94 % as against to the design value of 80 % at 100 % fan capacity. The PA fan efficiencies are on lower side due to higher power consumption.
g) The specific energy consumption (SEC) of PA fans is computed as 9.94 kWh/t of primary air flow and is much higher than the design value of 1.03 kWh/t of primary air flow may be due to higher power input.
h) PA fan is being operated near its full load during the test load of 160 MW. Further rise in PA fan loading is not recommended to operate plant to its 100 % MCR.
i) The increased power in PD fans due to APH air leakage is 86.16 kW. This increased power form 0.06 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

Unit #4:

There are two Primary Air fans of 1250 kW with inlet damper control to provide the primary air to mills. The performance Test is conducted on PA fans during the energy audit study. The performance results are given in Table 18. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.61 to 6.65 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.06 – 0.15 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.36 – 1.50 % and is normal.
c) The power factor of PA fan motors is varying between 0.885 – 0.898 and is normal.
d) The load factor of PA fan motors is computed by taking the ratio of motor output and rating. The load factor of PA fan motors is varying between 84.49 – 86.95 %.
e) PA fan discharge pressure was varying between 743 – 759 mmWC and is lower than the design value of 1210 mmWC (100 % fan capacity). The discharge pressure is normal.

f) The PA fan efficiencies are computed in the range of 26.87 – 27.45 % as against to the design value of 80 % at 100 % fan capacity. The PA fan efficiencies are on lower side due to higher power consumption.
g) The specific energy consumption (SEC) of PA fans is computed as 6.44 kWh/t of primary air flow and is much higher than the design value of 1.03 kWh/t of primary air flow may be due to higher power input.
h) PA fan is being operated at optimum load during the test load of 135 MW. A little margin is available with PA fan to operate plant to its 100 % MCR.
i) The increased power in FD fans due to APH air leakage is 533.70 kW. This increased power form 0.37 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

Unit #5:

There are two Primary Air fans of 2800 kW radial fans with inlet vane control to provide the primary air to mills. The performance Test is conducted on PA fans during the energy audit study. The performance results are given in Table 19. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 11.11 to 11.24 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.18 – 0.21 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.90 – 1.48 % and is normal.
c) The power factor of PA fan motors is varying between 0.83 – 0.85 and is normal.
d) The load factor of PA fan motors is computed by taking the ratio of motor output and rating. The load factor of PA fan motors is varying between 64.29 – 75.53 %.
e) PA fan discharge pressure was varying between 907.41 – 926.5 mmWC and is slightly higher than 100 % TMCR i.e., 720 mmWC and is lower than the design value of 1210 mmWC (100 % fan capacity). The discharge pressure is normal.
f) The PA fan efficiencies are computed in the range of 37.0 – 37.78 % as against to the design value of 80.99 % at 100 % fan capacity. The PA fan efficiencies are on lower side.

g) The specific energy consumption (SEC) of PA fans is computed as 5.86 kWh/t of primary air flow and is much higher than the design value of 1.12 kWh/t of primary air flow may be due to higher power input.
h) There are no limitations from PA fans to operate plant to its 100 % MCR.
i) The increased power in FD fans due to APH air leakage is 555.13 kW. This increased power form 0.13 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

Unit #6:

There are two Primary Air fans of 2800 kW radial fans with inlet vane control to provide the primary air to mills. The performance Test is conducted on PA fans during the energy audit study. The performance results are given in Table 20. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 11.00 to 11.15 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.24 – 0.33 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 2.06 – 2.75 % and is normal.
c) The power factor of PA fan motors is varying between 0.836 – 0.876 and is normal.
d) The load factor of PA fan motors is computed by taking the ratio of motor output and rating. The load factor of PA fan motors is varying between 67.98 – 70.86 %.
e) PA fan discharge pressure was varying between 907 – 926 mmWC and is higher than 100 % TMCR i.e., 720 mmWC and is lower than the design value of 1210 mmWC (100 % fan capacity). The discharge pressure is normal.
f) The PA fan efficiencies are computed in the range of 33.77 – 34.48 % as against to the design value of 80.99 % at 100 % fan capacity.
g) The specific energy consumption (SEC) of PA fans is computed as 6.25 of primary air flow and is much higher than the design value of 1.12 kWh/t of primary air flow may be due to higher power input.
h) There are no limitations from PA fans to operate plant to its 100 % MCR.

i) The increased power in FD fans due to APH air leakage is 1306.78 kW. This increased power form 0.41 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

Unit #7:

There are two Primary Air fans of 2800 kW radial fans with inlet damper control to provide the primary air to mills. The performance Test is conducted on PA fans during the energy audit study. The performance results are given in Table 21. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 11.18 to 11.28 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.24 – 0.50 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 3.13 – 5.35 % and is normal.
c) The power factor of PA fan motors is varying between 0.880 – 0.892 and is normal.
d) The load factor of PA fan motors is computed by taking the ratio of motor output and rating. The load factor of PA fan motors is varying between 67.39 – 75.46 %.
e) PA fan discharge pressure was varying between 651.15 – 744.15 mmWC and is slightly lower than 100 % TMCR i.e., 800 mmWC and the design value of 1332 mmWC (100 % fan capacity). The discharge pressure is normal.
f) The PA fan efficiencies are computed in the range of 14.16 – 16.18 % as against to the design value of 85.55 % at 100 % fan capacity. The PA fan efficiencies are on lower side.
g) The specific energy consumption (SEC) of PA fans is computed as 10.52 kWh/t of primary air flow and is much higher than the design value of 1.11 kWh/t of primary air flow may be due to higher power input.
h) There are no limitations from PA fans to operate plant to its 100 % MCR.
i) The increased power in FD fans due to APH air leakage is 355.30 kW. This increased power form 0.11 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

3.3.1.6 Mills

Unit #3:

There are six Mills of 340 kW, XRP 803 Bowl mills, five mills will be working continuously and sixth mill will be stand-by to meet 100 % MCR load. Each mill is provided with primary air from hot PA header to lift the coal from mill to burners. The coal-air mixture temperature is maintained by varying the hot air and cold air flow to mills. The air damper operation is in auto. The performance Test is conducted on Mills during the study. The observations and suggestions from the study are as follows:

a) The voltage at motor terminals is varying between 6.66 to 6.70 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.20 – 0.25 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.88 – 3.00 % and is normal.
c) The power factor of Mill motors is varying between 0.74 – 0.83 and is on lower side may be due to varying load of mills.
d) It is observed that coal flow measurement is not available for mills in Unit #3. It is recommended to install metering of coal flow for each mill.

Unit #4:

There are six Mills of 335 kW, XRP 803 Bowl mills, five mills will be working continuously and sixth mill will be stand-by to meet 100 % MCR load. Each mill is provided with primary air from hot PA header to lift the coal from mill to burners. The coal-air mixture temperature is maintained by varying the hot air and cold air flow to mills. The air damper operation is in auto. The performance Test is conducted on Mills during the energy audit study. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.59 to 6.66 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.06 – 0.24 % and is normal.

b) The current unbalance between 3-phases at motor terminals is 1.35 – 9.54 % and is normal.
c) The power factor of Mill motors is varying between 0.608 – 0.768 and is on lower side may be due to varying load of mills.
d) It is observed that coal flow measurement is not available for mills in Unit #4. It is recommended to install metering of coal flow for each mill.

Unit #5:

There are eight Mills of 600 kW, XRP 1043 Bowl mills, six mills will be working continuously and other two mills will be stand-by to meet 100 % MCR load. Each mill is provided with primary air from hot PA header to lift the coal from mill to burners. The coal-air mixture temperature is maintained by varying the hot air and cold air flow to mills. The air damper operation is in auto. The performance Test is conducted on Mills during the energy audit study. The performance results are given in Table 22. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 3.40 to 3.42 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.20 – 0.29 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.46 – 9.31 % and is on higher side.
c) The power factor of Mill motors is varying between 0.57 – 0.74 and is on lower side may be due to varying load of mills.
d) The coal flow in each mill is varying between 36.29 – 39.42 t/h (the design coal flow: 49.8 t/h). The mill loading based on coal flow is about 74 %.
e) The SEC of mills is varying between 9.27 – 10.60 kWh/t of coal.
f) The air to fuel ratio in mills is varying between 2.93 – 3.18.

Unit #6:

There are eight Mills of 600 kW, XRP 1043 Bowl mills, six mills will be working continuously and other two mills will be stand-by to meet 100 % MCR load. Each mill is provided with primary air from hot PA header to lift the coal from mill to burners. The coal-air mixture temperature is maintained by varying the hot air and cold air flow to mills. The air damper operation is in auto. The performance Test is conducted on Mills

during the energy audit study. The performance results are given in Table 23. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 3.37 to 3.39 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.24 – 0.33 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 2.33 – 4.53 % and is normal.
c) The power factor of Mill motors is varying between 0.510 – 0.919.
d) The coal flow in each mill is varying between 25 – 62 t/h (the design coal flow: 49.8 t/h). The mill loading based on coal flow is varying between 50.2 % to 124 %.
e) The SEC of mills is varying between 3.59 – 8.59 kWh/t of coal.
f) The fuel to air ratio in mills is varying between 0.23 – 0.88 and is lower compared to design value of 2.10.

Unit #7:

There are five Mills of 2400 kW, BBD 4772 Ball & Tube mills, four mills will be working continuously and fifth mill will be stand-by to meet 100 % MCR load. Each mill is provided with primary air from hot PA header to lift the coal from mill to burners. The coal-air mixture temperature is maintained by varying the hot air and cold air flow to mills. The air damper operation is in auto. The performance Test is conducted on Mills during the energy audit study. The performance results are given in Table 24. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 11.28 to 11.62 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.21 – 0.27 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 2.02 – 7.93 % and is normal.
c) The power factor of Mill motors is varying between 0.766 – 0.863 and is on lower side may be due to varying load of mills.

d) The coal flow in each mill is varying between 45 - 77 t/h (the design coal flow: 86.75 t/h). The mill loading based on coal flow is varying between 52 % to 88 %.
e) The SEC of mills is varying between 19.05 – 26.89 kWh/t of coal.
f) The fuel to air ratio in mills is varying between 0.43 – 0.72 and is lower compared to design value of 1.56.

3.3.2 Network- analysis of performance; equipment assessment for damage, restriction, de-rating and loss.

The observations from the study are as follows:

a) The cables are laid in cable trays and cable glands are used.
b) All the panels and cable glands are provided with earth.
c) It was observed that dust inside the panels. **Recommendations:** It is suggested to clean all the HT and LT panels during overhaul.
d) At few places the cable end terminations were hot due to loose connections. **Recommendations**: It is suggested to check the joint temperature by either non-contact temperature indicator or thermography camera periodically.

There are no limitations of electrical network system in increasing the load to 100 % MCR.

3.3.3 Cooling Water System

Cooling water system for Unit 3 and Unit 4 constitute 5 Condenser Cooling Water (CW Pump) and 2 General Service (GS) for each unit. Cooling water system for Unit 5, Unit 6 constitute 4 Condenser Cooling Water (CWP) and 3 Auxiliary cooling water (ACW) for each unit. Cooling water system for Unit 7 constitute 5 Condenser Cooling Water (CWP) and 3 Auxiliary cooling water (ACW). Performance of each pump set was assessed by measuring water discharge, input power and developed head across the pump during its operation

Unit 3&4: -

Performance results of CWPs and GSPs associated with Unit 3 and Unit 4 is shown in table 25. Efficiencies (motor pump) of CWPs and ACWs are listed below,

CWP – 1	:	60.90 %	,	GSP – 3	:	72.64 %
CWP – 3	:	46.00 %	,	GSP – 4	:	60.16 %

CWP – 4 : 62.84 % , GSP – 5 : 22.00 %

Efficiencies of CWP 1 and CWP 4 are in the range of 60.90 % to 62.84 % whereas efficiency of CWP 3 is 46.00 % and it is poor. GSP 3 observed highest efficiency of 72.64 % among GSPs. Efficiency of other GSP-5 is only 22.00 % and is very poor.

Unit 5: -

Performance results of CWPs and ACWs associated with Unit 5 is shown in table 26. Efficiencies (motor pump) of CWPs and ACWs are listed below,

CWP – 5A : 78.95 % , ACW – 5A : 62.32 %

CWP – 5B : 79.59 % , ACW – 5B : 74.16 %

CWP – 5C : 77.19 % , ACW – 5C : 70.28 %

CWP – 5D : 85.94 %

CWP – 5D observed highest efficiency of 85.94 % among CWPs whereas other CWPs are in similar range of 77.19 % to 79.59 %. ACW – 5B observed highest efficiency of 74.16 % among ACWs. Efficiency of ACW – 5A is found to be 62.32 and is comparatively poor.

Unit 6: -

Performance results of CWPs and ACWs associated with Unit 6 is shown in table 27. Efficiencies (motor pump) of CWPs and ACWs are listed below,

CWP – 6A : 68.28 % , ACW – 6A : 62.05 %

CWP – 6B : 72.42 % , ACW – 6C : 64.26 %

CWP – 6D : 85.48 % ,

CWP – 6D observed highest efficiency of 85.48 % among CWPs whereas other CWPs are in similar range of 68.28 % to 72.42 %. ACW – 6C observed highest efficiency of 64.05 % among ACWs. Efficiency of ACW – 6A is found to be 62.05.

Unit 7: -

Performance results of CWPs and ACWs associated with Unit 7 is shown in table 28 and 9. Efficiencies (motor pump) of CWPs and ACWs are listed below,

CWP – 7A : 82.16 % , CWP – 7E : 61.35 %

CWP – 7B : 76.19 % , ACW – 7A : 66.16 %

CWP – 7C : 71.89 % , ACW – 7B : 79.15 %

CWP – 7D : 72.02 % , ACW – 7C : 68.23 %

CWP – 7A observed highest efficiency of 82.16 % among CWPs whereas other CWPs are in range of 71.89 % to 76.19 %. ACW – 7B observed highest efficiency of 79.15 % among ACWs. Efficiency of other ACWs are in the range of 66.16 % to 68.23 %.

3.3.4 Compressed air system

Unit 3 has 3 Instrument Air Compressors (IAC) and 2 Service Air Compressors (SAC) of 90 kW each installed. 2 IACs and 1 SAC are under operation normally. Unit 4 has 3 Instrument Air Compressors (IAC) and 2 Service Air Compressors (SAC) of 90 kW each installed. 1 IAC and 1 SAC are under operation normally. Unit 5 has 3 Instrument Air Compressors (IAC) and 3 Service Air Compressors (SAC) installed. 2 IAC and 1 SAC are under operation normally. Unit 6 has 3 Instrument Air Compressors (IAC) and 3 Service Air Compressors (SAC) installed. 1 IAC and 2 SAC are under operation normally. Unit 7 has 3 Instrument Air Compressors (IAC) and 3 Service Air Compressors (SAC) installed. 1 IAC and 2 SAC are under operation normally. Contribution towards APC by compressor system for each unit are given below,

Unit 3 : 0.16 %
Unit 4 : 0.12 %
Unit 5 : 0.09 %
Unit 6 : 0.13 %
Unit 7 : 0.09 %

3.3.5 Savings in Common Auxiliaries such as CHP, AHP and WTP etc.

Common auxiliaries consisting of CHP, AHP, WTP and RWP etc. are contributing 2.42 % towards APC for unit #3, 2.59 % towards APC for unit #4, 2.45 % towards APC for unit #5, 2.44 % towards APC for unit #6 and 3.89 % towards APC for unit #7.

Water to ash ratio for ash slurry discharge pumps were inspected by collecting slurry samples. It is observed that the ratio is normal for AHP 3&4 whereas the ratio is high for AHP 5, 6 and 7 which are 10.39:1, 19:1 and 16.67:1 respectively. This ratio is to be brought down to 5:1 for efficient operation of AHPs. This will reduce power consumption in AHP 5, 6 and 7 by 220 MWh/month, 219 MWh/month and 267 MWh/month respectively.

Energy savings opportunities are limited in other common auxiliaries.

3.3.6 Loading condition of ID fan, PA fan and other unit auxiliaries.

Unit 3: - It is found that ID fans and PA fans are loaded to its near full load during the test load of 153.71 MW (73 %). Further increases in the generation from the unit is arrested due to non-availability of load margin for both ID fan and PA fan. Other unit auxiliaries have enough load margin to support increase in generation.

Unit 4: - It is found that ID fans are loaded to 80 % to 88 % and PA fans are loaded to 84 % to 87 % during the test load of 144.62 MW (68.87 %). Further increases in the generation from the unit is limited due to less-availability of load margin for both ID fan and PA fan. Other unit auxiliaries have enough load margin to support increase in generation.

Unit 5: - It is found that ID fans are loaded to 94 % to 98 % during the test load of 413.55 MW (82.71 %). Further increases in the generation from the unit is limited due to less-availability of load margin for ID fan. Other unit auxiliaries have enough load margin to support increase in generation.

Unit 6: - It is found that ID fans are loaded to 84 % to 97 % during the test load of 316.02 MW (63.2 %). Further increases in the generation from the unit is limited due to less-availability of load margin for ID fan. Other unit auxiliaries have enough load margin to support increase in generation.

Unit 7: - It is found that there are no limitations on auxiliaries' capacity for further increase in the plant load.

3.4 Flue gas analysis and observation

Unit 3: -

Details of percentage of oxygen measured at different location of flue gas path and leakage across different sections are shown in Table 30 and 31. Air ingress to the flue gas path across the APH is 17.86 % in path A and 15.77 % in path B. Air ingress to the flue gas path from APH outlet to the ESP inlet is 31.55 % in path A and 23.12 % in path B. Air ingress to the flue gas path from ESP inlet to the ID outlet is 3.87 % in path A and 9.09 % in path B. Overall air ingress is found to be 61.94 % in path A and 56.36 % in path B.

Unit 4: -

Details of percentage of oxygen measured at different location of flue gas path and leakage across different sections are shown in Table 30 and 31. Air ingress to the flue gas path across the APH is 27.74 % in path A and 44.24 % in path B. Air ingress to the flue gas path from APH outlet to the ESP inlet is 34.69 % in path A whereas 20.63 % in path B. Air ingress to the flue gas path across the ESP is 6.0 % in path A and 1.91 % in path B. Air ingress to the flue gas path from ESP outlet to ID fan outlet is less in both the path. Overall air ingress is found to be 82.09 % in path A and 76.74 % in path B.

Unit 5: -

Details of percentage of oxygen measured at different location of flue gas path and leakage across different sections are shown in Table 32 and 33. Air ingress to the flue gas path across the PAH is 38.92 % in path A and 29.75 % in path B. Air ingress to the flue gas path across the SAH is 6.88 % in path A and 20.61 % in path B. Air ingress to the flue gas path from APH common outlet to the ESP inlet is negligible in path A and 3.24 % in path B. Air ingress to the flue gas path across the ESP is 25.0 % in path A and 31.83 % in path B. Air ingress to the flue gas path from ESP outlet to ID fan outlet is less in both the path. Overall air ingress is found to be 47.50 % in path A and 62.81 % in path B.

Unit 6: -

Details of percentage of oxygen measured at different location of flue gas path and leakage across different sections are shown in Table 32 and 33. Air ingress to the flue gas path at the PAH is 62.22 % in path A and 54.22 % in path B. Air ingress to the flue gas path at the SAH is 22.31 % in path A and 5.41 % in path B. Air ingress to the flue gas path from APH common outlet to the ESP inlet is 18.66 % in path A and 12.71 % in path B. Air ingress to the flue gas path across the ESP is 7.11 % in path A and 5.63 % in path B. Air ingress to the flue gas path from ESP outlet to ID fan outlet is negligible in path A and 7.30 % in path B. Overall air ingress is found to be 88.82 % in path A and 96.08 % in path B.

Unit 7: -

Details of percentage of oxygen measured at different location of flue gas path and

leakage across different sections are shown in Table 32 and 33. Air ingress to the flue gas path at the PAH is 17.33 % in path A and 15.32 % in path B. Air ingress to the flue gas path at the SAH is 10.21 % in path A and 9.93 % in path B. Air ingress to the flue gas path from APH common outlet to the ESP inlet is 21.69 % in path B. Measurement of oxygen percentage was not possible at ESP inlet for path A because of unavailability of ports. Air ingress to the flue gas path across the ESP is 8.29 % in path B. Air ingress to the flue gas path from ESP outlet to ID fan outlet is 5.69 % in path A and 6.34 % in path B. Overall air ingress is found to be 120.44 % in path A and 129.30 % in path B.

3.5 Energy savings and achievable APC for the units

Possible energy savings in different areas of plant are tabulated in Table 34 to 38. Achievable APC under test condition was calculated considering the possible savings. This value was extrapolated to 80 % PLF and given below,

Unit	Unit #3	Unit #4	Unit #5	Unit #6	Unit #7
Test Load, MW	153.71	144.62	413.55	316.02	313.00
Present APC, %	11.33	11.65	9.24	10.95	12.65
Possible savings, %	1.16	1.52	0.60	1.57	1.09
Achievable APC	10.17	10.13	8.64	9.38	11.56
Achievable APC at 80 % PLF	**9.63**	**9.42**	**8.82**	**8.67**	**10.51**

Nominal achievable APC for the stages is calculated by taking weighted average of the individual unit APC and given below,

Nominal achievable APC for stage II : 9.53 % at 80 % PLF
Nominal achievable APC for stage III : 9.28 % at 80 % PLF
Nominal achievable APC for station : 9.34 % at 80 % PLF

Following formula was used to calculate weighted average of APC of stage/station,

$$Nominal\ APC\ = \frac{\sum_k (\mathrm{APC})_k * (Load)_k}{\sum_k (Load)_k}$$

Where k is the unit number

4.0 CONCLUSIONS

- Optimum range of percentage APC was calculated based on the performance of the units and given below. APC at percentage generation above 80 % was found by extrapolating the graph.

Percentage generation		50-60 %	60-70 %	70-80 %	80-90 %	90-100 %
Unit 3	Max	12.15	11.22	10.36	9.56	8.82
	Min	11.22	10.36	9.56	8.82	8.15
Unit 4	Max	11.44	10.45	9.68	9.06	8.55
	Min	10.45	9.68	9.06	8.55	8.11
Unit 5	Max	11.00	9.74	8.78	8.03	7.42
	Min	9.74	8.78	8.03	7.42	6.91
Unit 6	Max	9.28	8.67	8.19	7.80	7.47
	Min	8.67	8.19	7.80	7.47	7.18
Unit 7	Max	11.43	10.76	10.14	9.55	8.99
	Min	10.76	10.14	9.55	8.99	8.47

- It is found that ID fans and PA fans of unit 3 are loaded to its near full load during the test load of 153.71 MW (73 %). Further increases in the generation from the unit is arrested due to non-availability of load margin for both ID fan and PA fan. Other unit auxiliaries have enough load margin to support increase in generation.
- It is found that ID fans are loaded to 80 % to 88 % and PA fans of unit 4 are loaded to 84 % to 87 % during the test load of 144.62 MW (68.87 %). Further increases in the generation from the unit is limited due to less-availability of load margin for both ID fan and PA fan. Other unit auxiliaries have enough load margin to support increase in generation.
- It is found that ID fans of unit 5 are loaded to 94 % to 98 % during the test load of 413.55 MW (82.71 %). Further increases in the generation from the unit is limited due to less-availability of load margin for ID fan. Other unit auxiliaries have enough load margin to support increase in generation.
- It is found that ID fans of unit 6 are loaded to 84 % to 97 % during the test load of 316.02 MW (63.2 %). Further increases in the generation from the unit is limited due to less-availability of load margin for ID fan. Other unit auxiliaries have enough load margin to support increase in generation.

- It is found that there are no limitations on auxiliaries' capacity for further increase in the plant load for Unit 7.
- Overall air ingress in unit 3 flue gas path is found to be 61.94 % in path A and 56.36 % in path B.
- Overall air ingress in unit 4 flue gas path is found to be 82.09 % in path A and 76.74 % in path B.
- Overall air ingress in unit 5 flue gas path is found to be 47.50 % in path A and 62.81 % in path B.
- Overall air ingress in unit 6 flue gas path is found to be 88.82 % in path A and 96.08 % in path B.
- Overall air ingress in unit 7 flue gas path is found to be 120.44 % in path A and 129.30 % in path B.
- Achievable APC under test condition was calculated considering the possible savings. This value was extrapolated to 80 % PLF and given below,

Unit	**Unit #3**	**Unit #4**	**Unit #5**	**Unit #6**	**Unit #7**
Test Load, MW	153.71	144.62	413.55	316.02	313.00
Present APC, %	11.33	11.65	9.24	10.95	12.65
Possible savings, %	1.16	1.52	0.60	1.57	1.09
Achievable APC	10.17	10.13	8.64	9.38	11.56
Achievable APC at 80 % PLF	**9.63**	**9.42**	**8.82**	**8.67**	**10.51**

- Nominal achievable APC for stage II (Unit #3 & #4) is 9.53 % at 80 % PLF.
- Nominal achievable APC for stage III (Unit #5, #6 & #7) is 9.28 % at 80 % PLF.
- Nominal achievable APC for the station is 9.34 % at 80 % PLF.

Annexure 1 – Figures

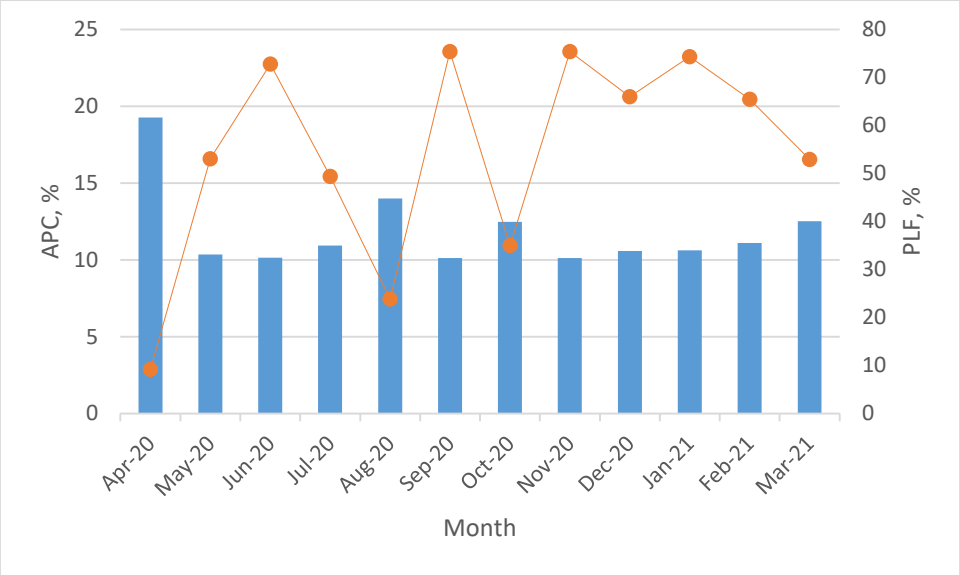


Figure 1: Variation in monthly APC for unit 3

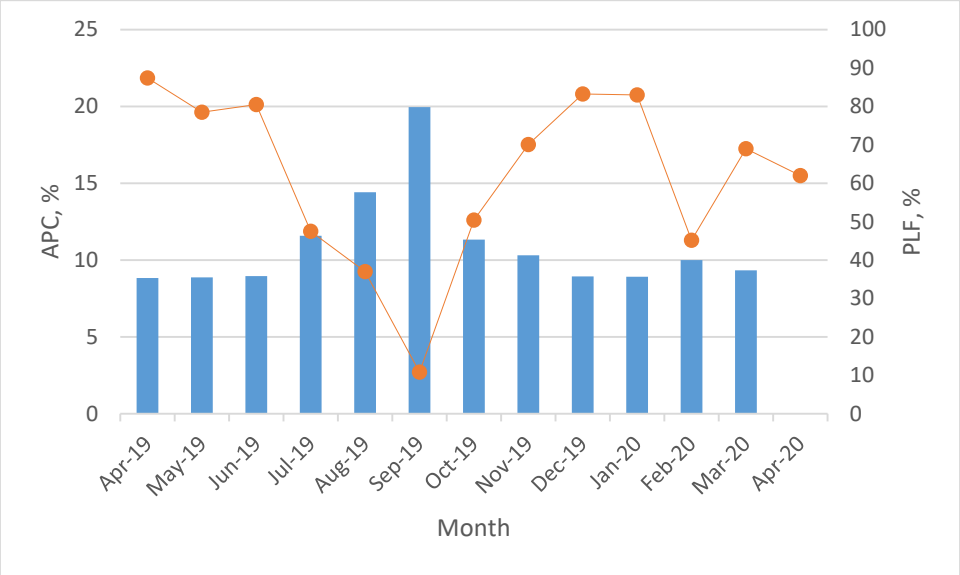


Figure 2: Variation in monthly APC for unit 3

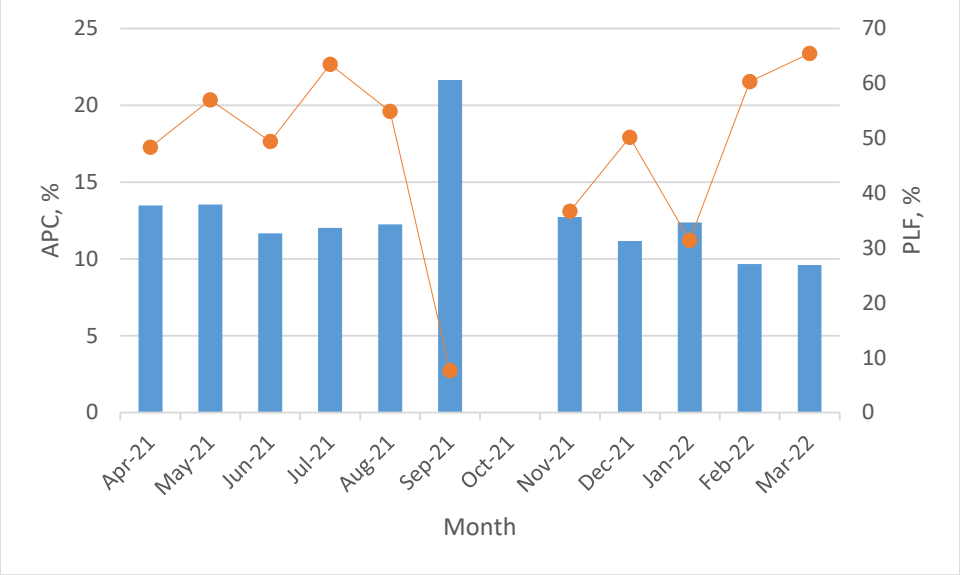


Figure 3: Variation in monthly APC for unit 3

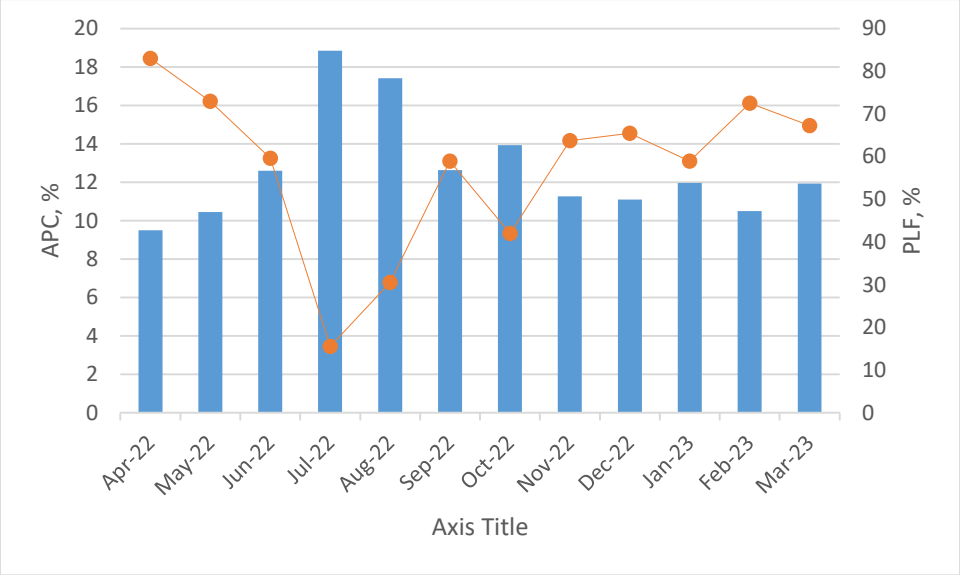


Figure 4: Variation in monthly APC for unit 3

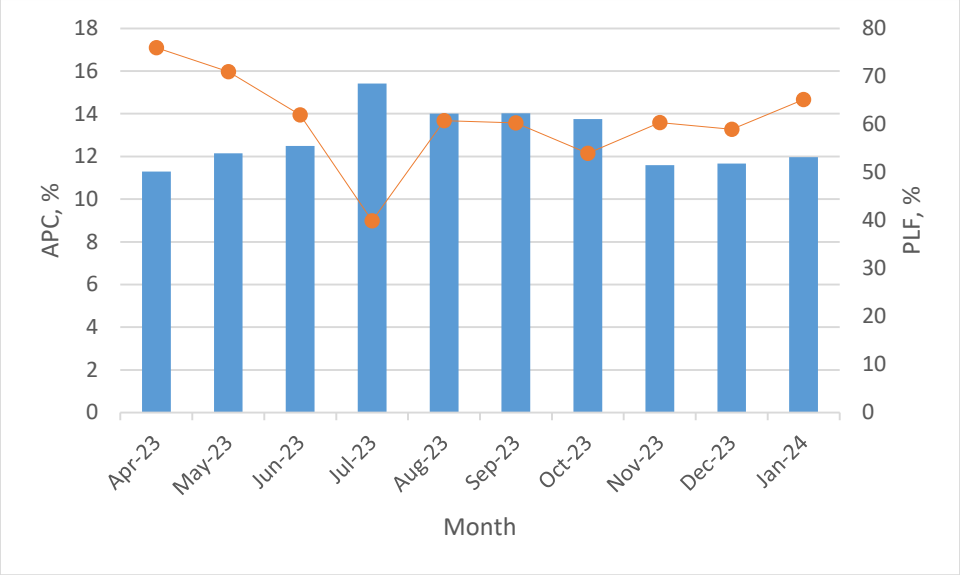


Figure 5: Variation in monthly APC for unit 3

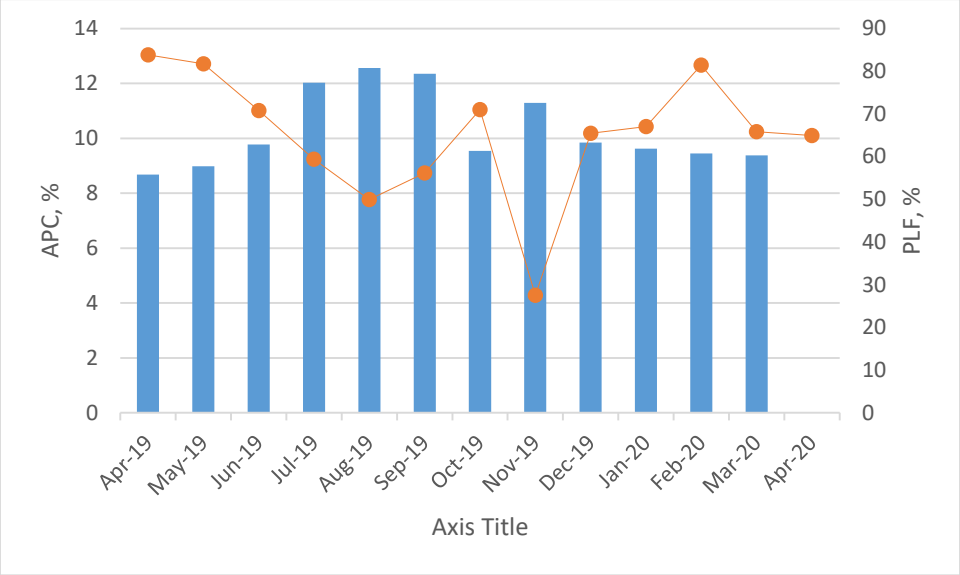


Figure 6: Variation in monthly APC for unit 4

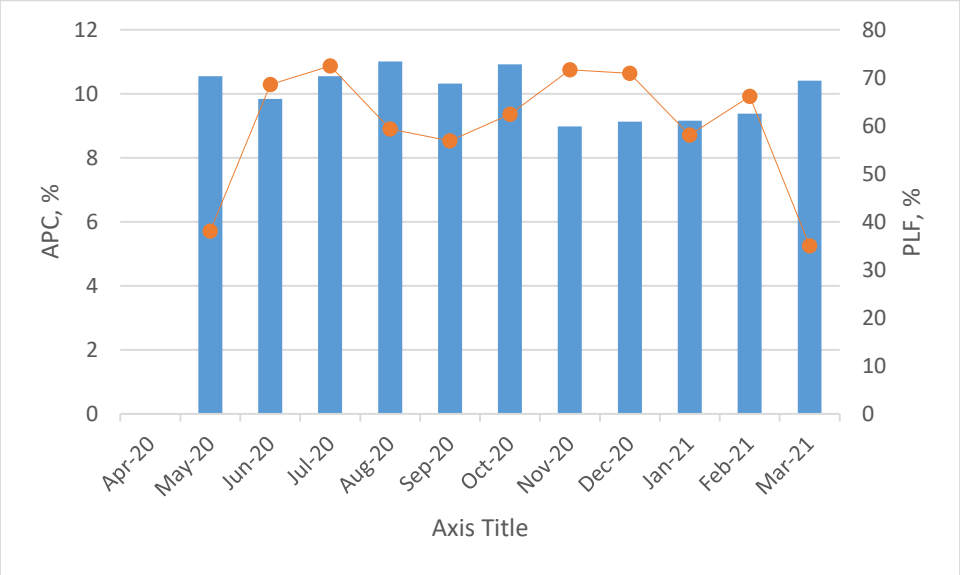


Figure 7: Variation in monthly APC for unit 4

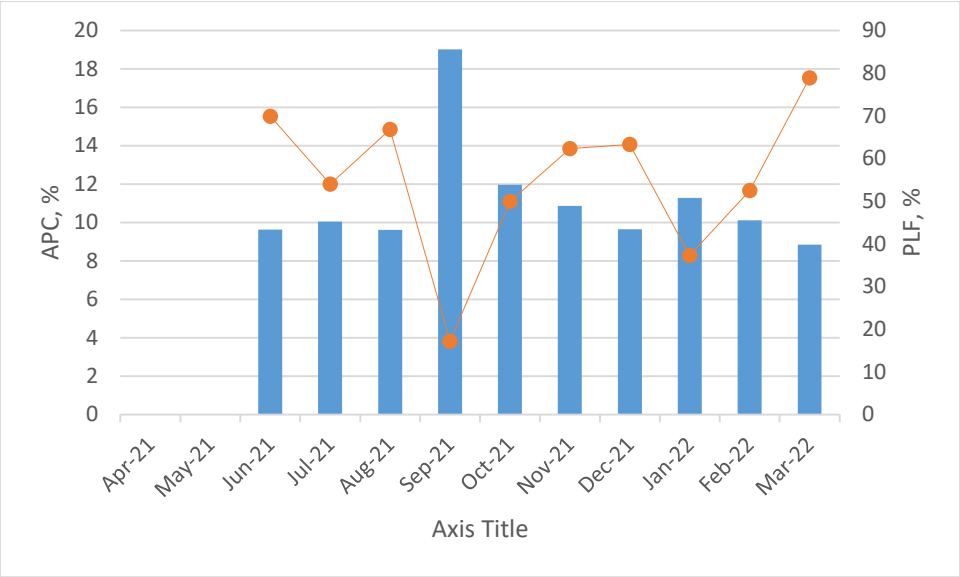


Figure 8: Variation in monthly APC for unit 4

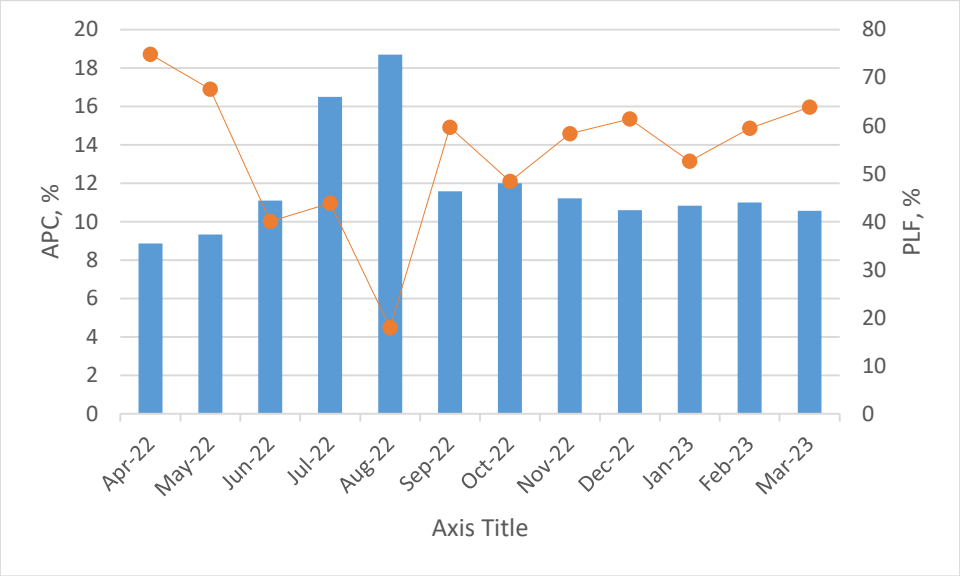


Figure 9: Variation in monthly APC for unit 4

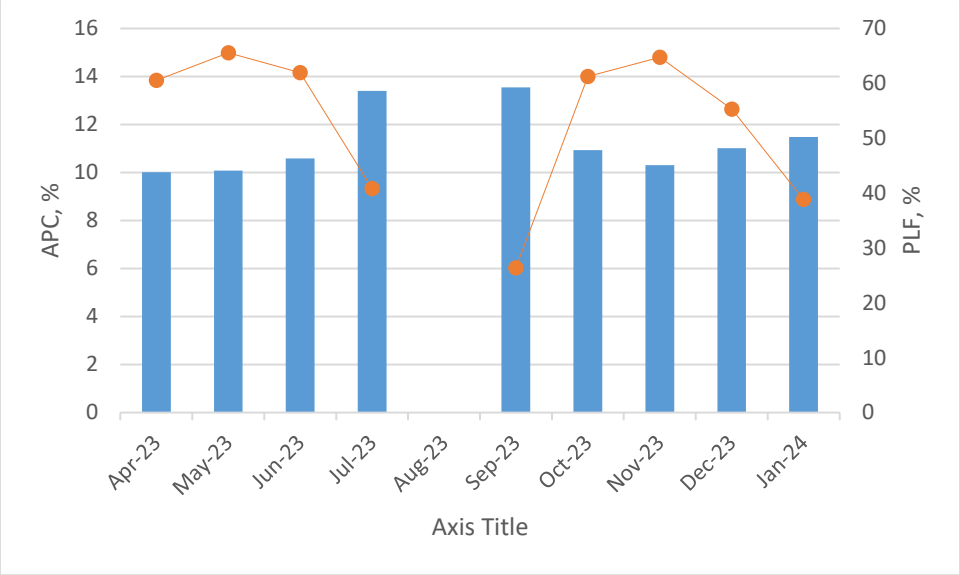


Figure 10: Variation in monthly APC for unit 4

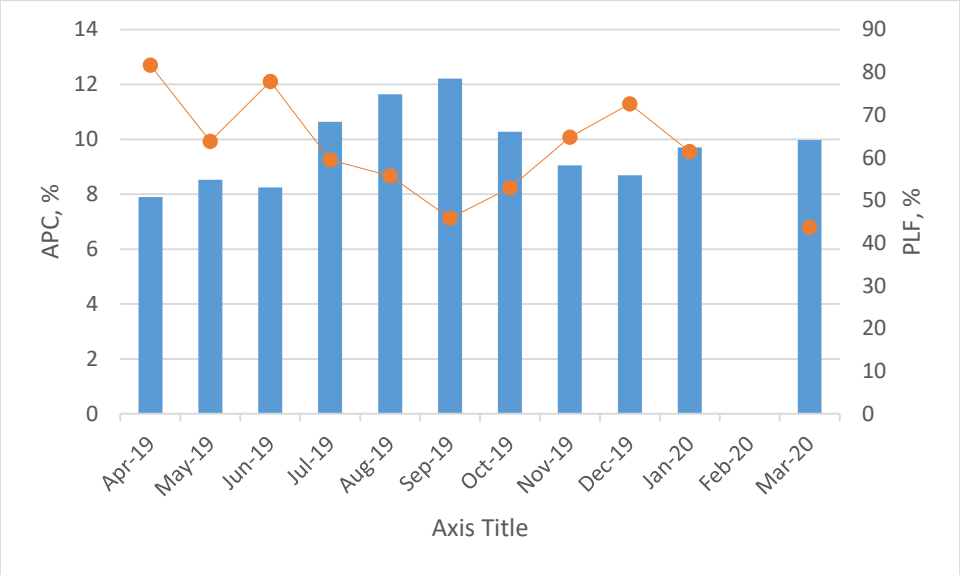


Figure 11: Variation in monthly APC for unit 5

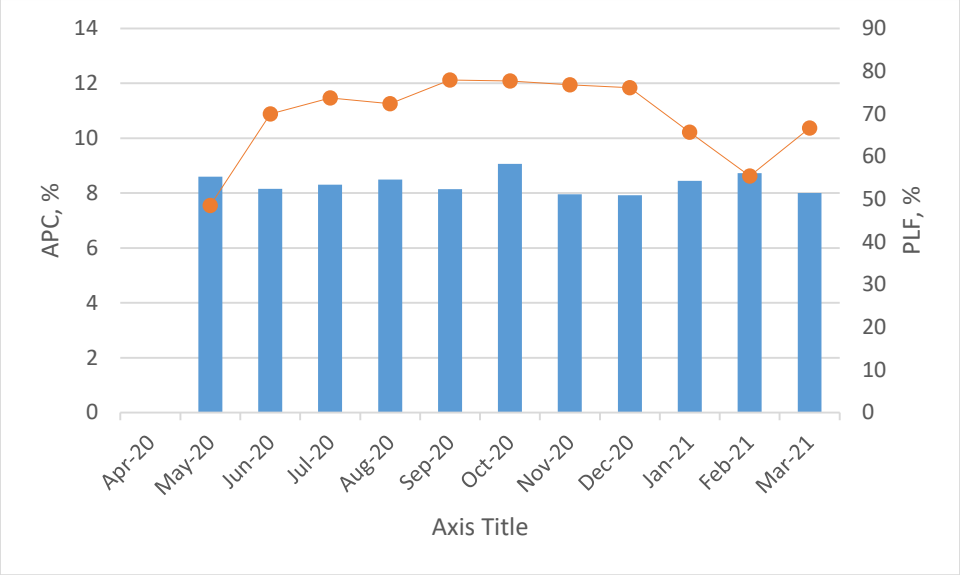


Figure 12: Variation in monthly APC for unit 5

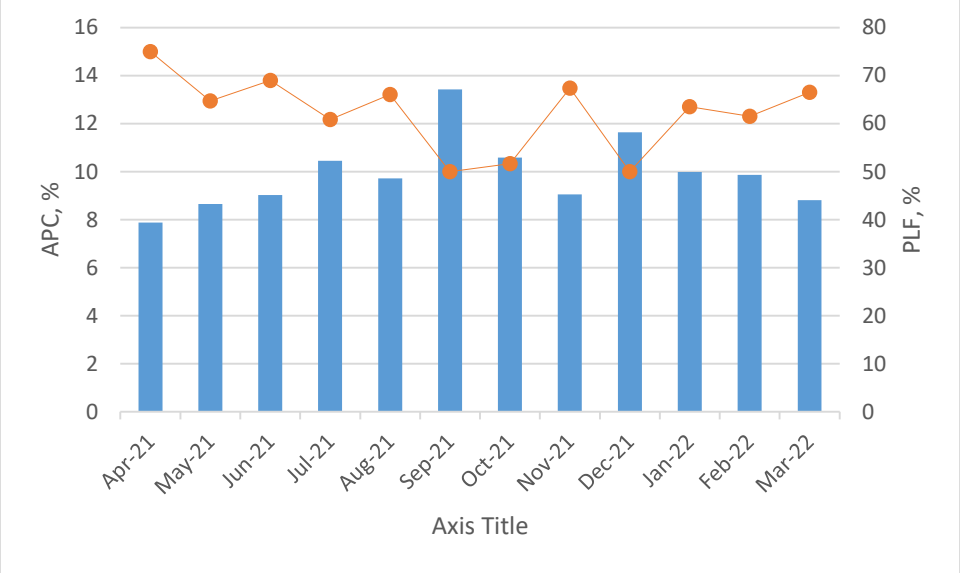


Figure 13: Variation in monthly APC for unit 5

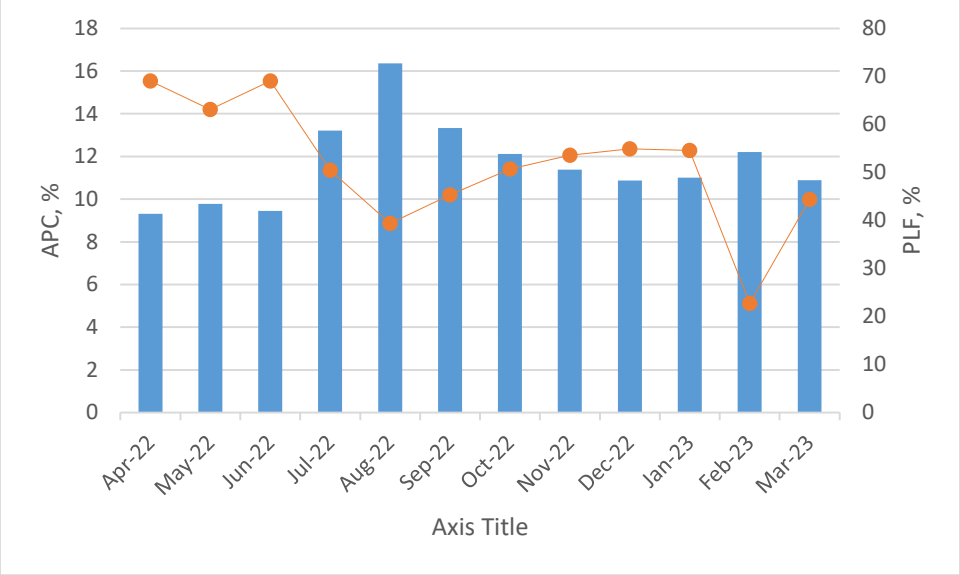


Figure 14: Variation in monthly APC for unit 5

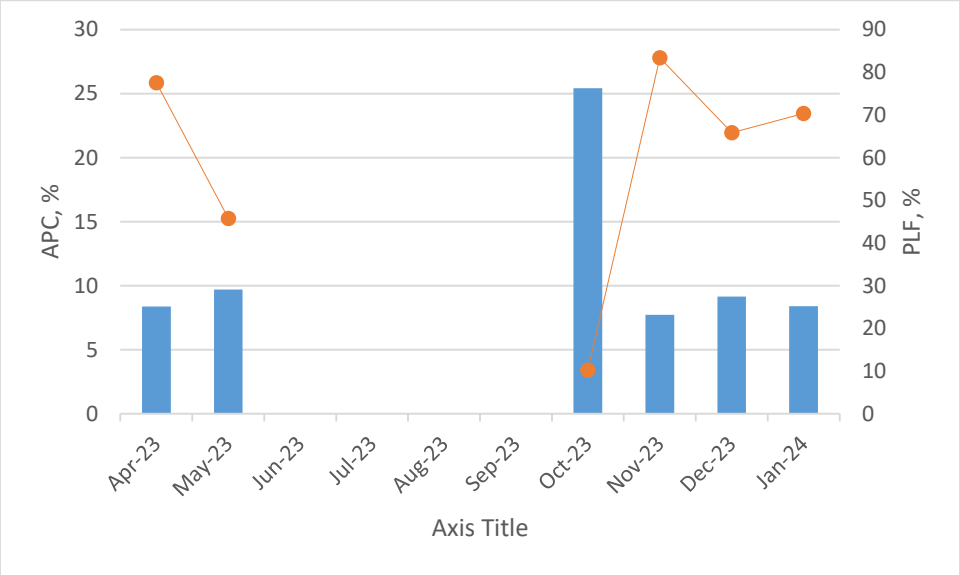


Figure 15: Variation in monthly APC for unit 5

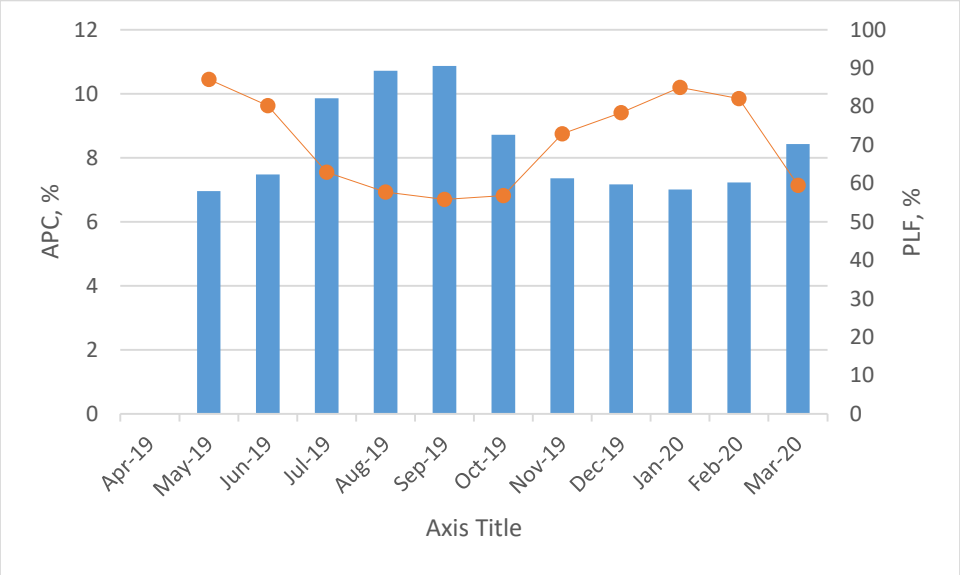


Figure 16: Variation in monthly APC for unit 6

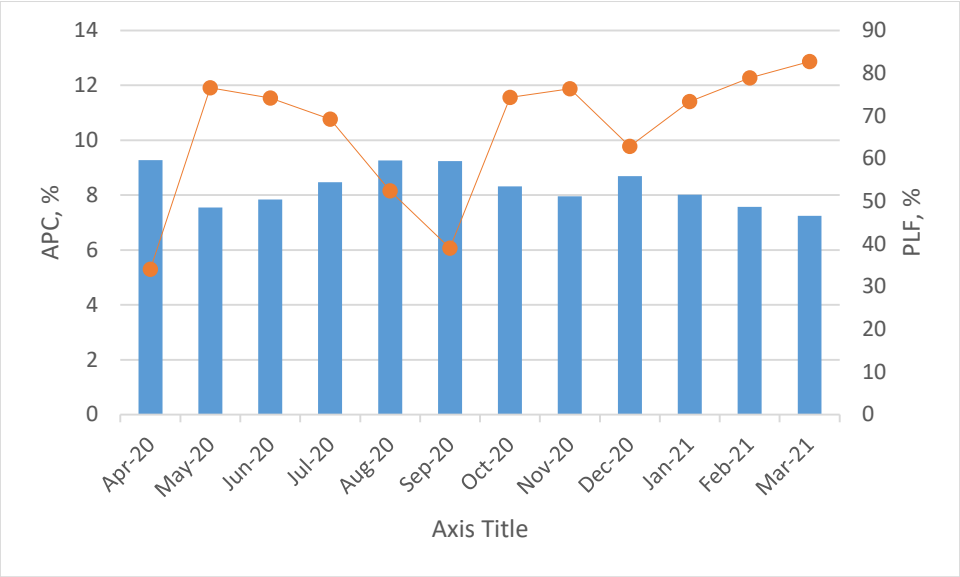


Figure 17: Variation in monthly APC for unit 6

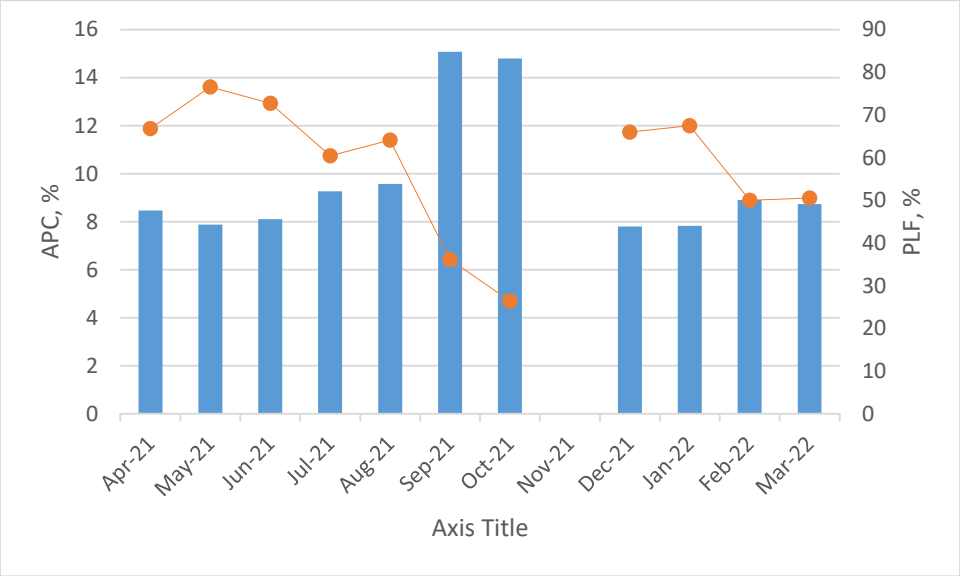


Figure 18: Variation in monthly APC for unit 6

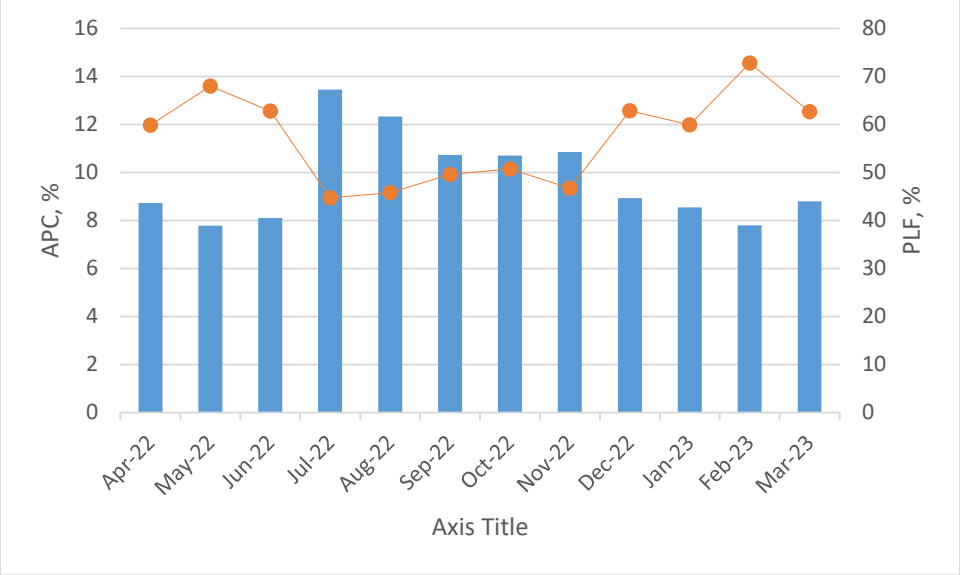


Figure 19: Variation in monthly APC for unit 6

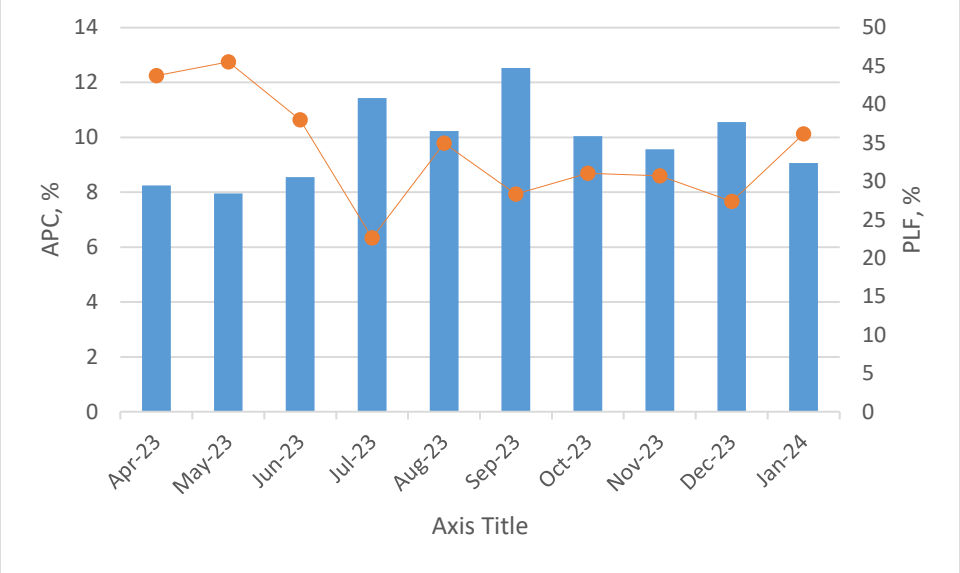


Figure 20: Variation in monthly APC for unit 6

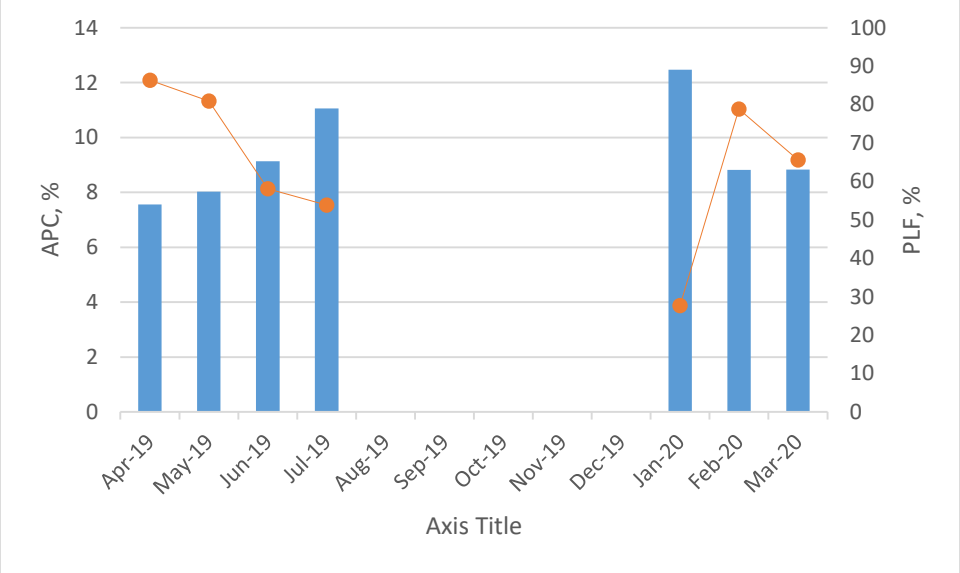


Figure 21: Variation in monthly APC for unit 7

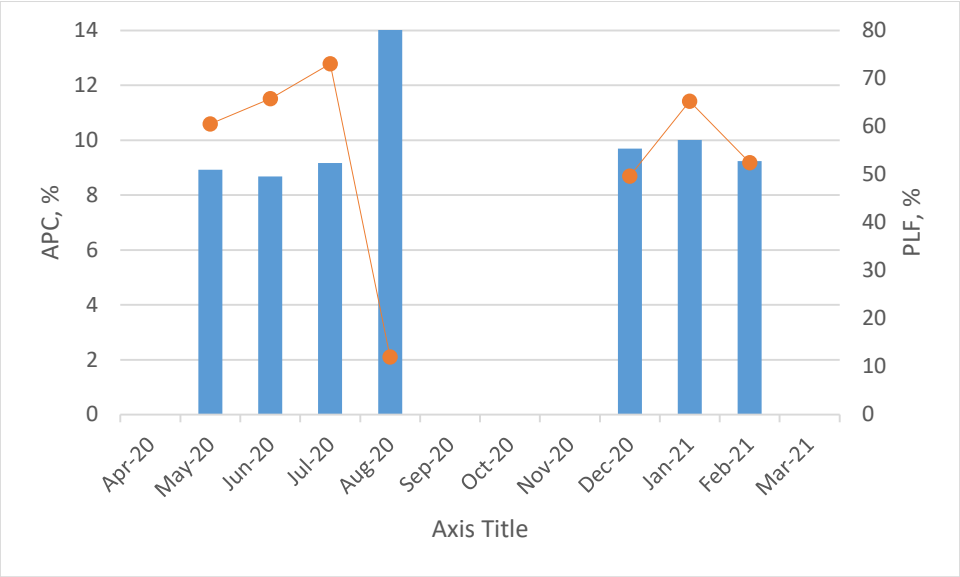


Figure 22: Variation in monthly APC for unit 7

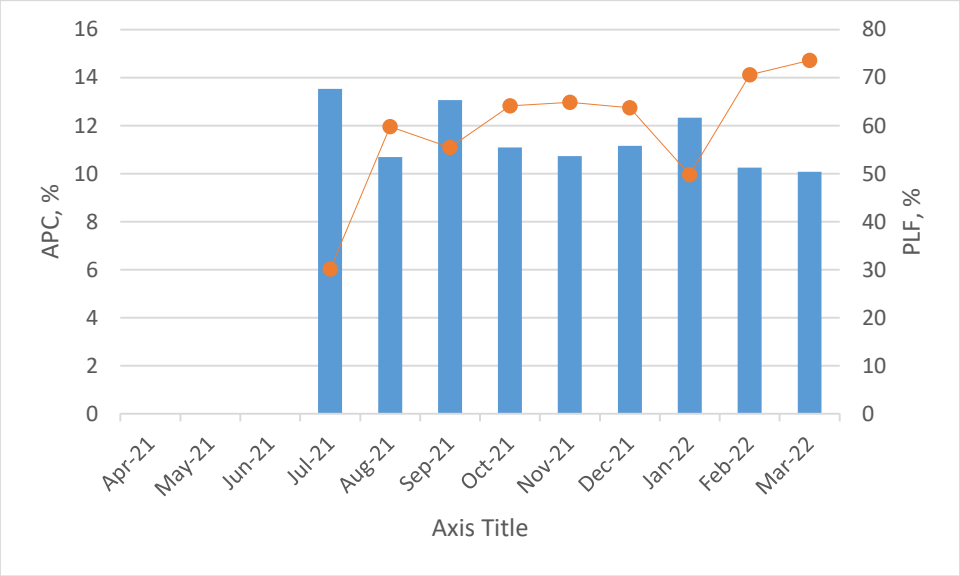


Figure 23: Variation in monthly APC for unit 7

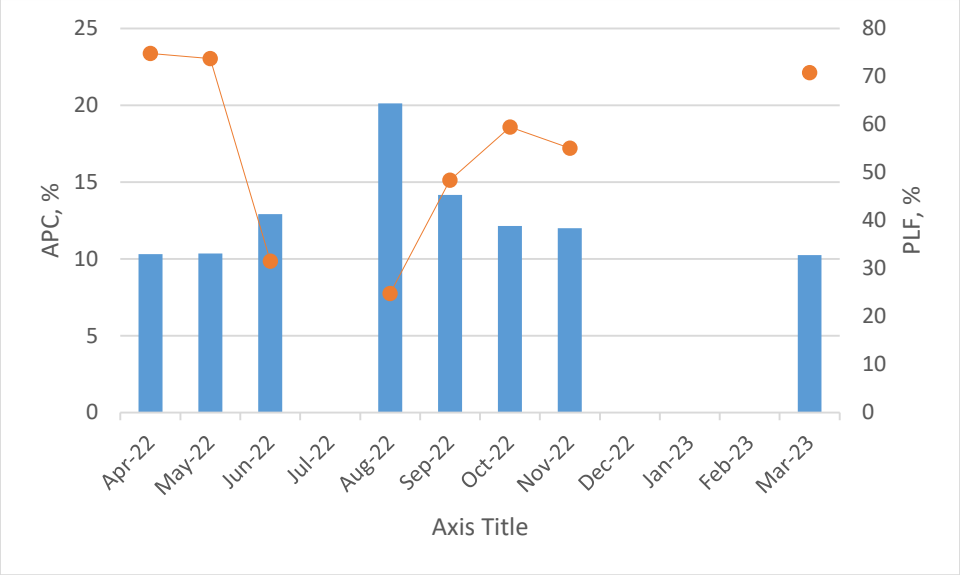


Figure 24: Variation in monthly APC for unit 7

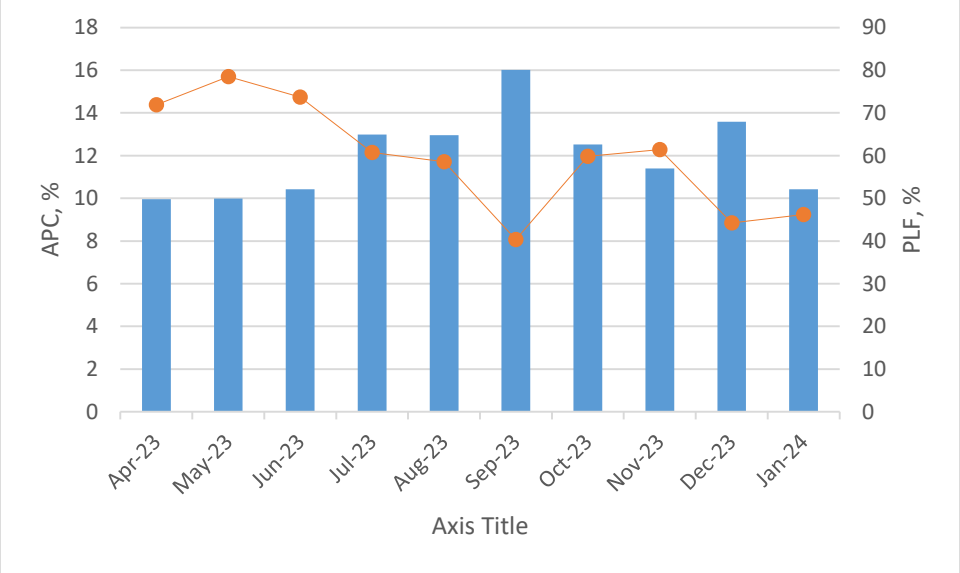


Figure 25: Variation in monthly APC for unit 7

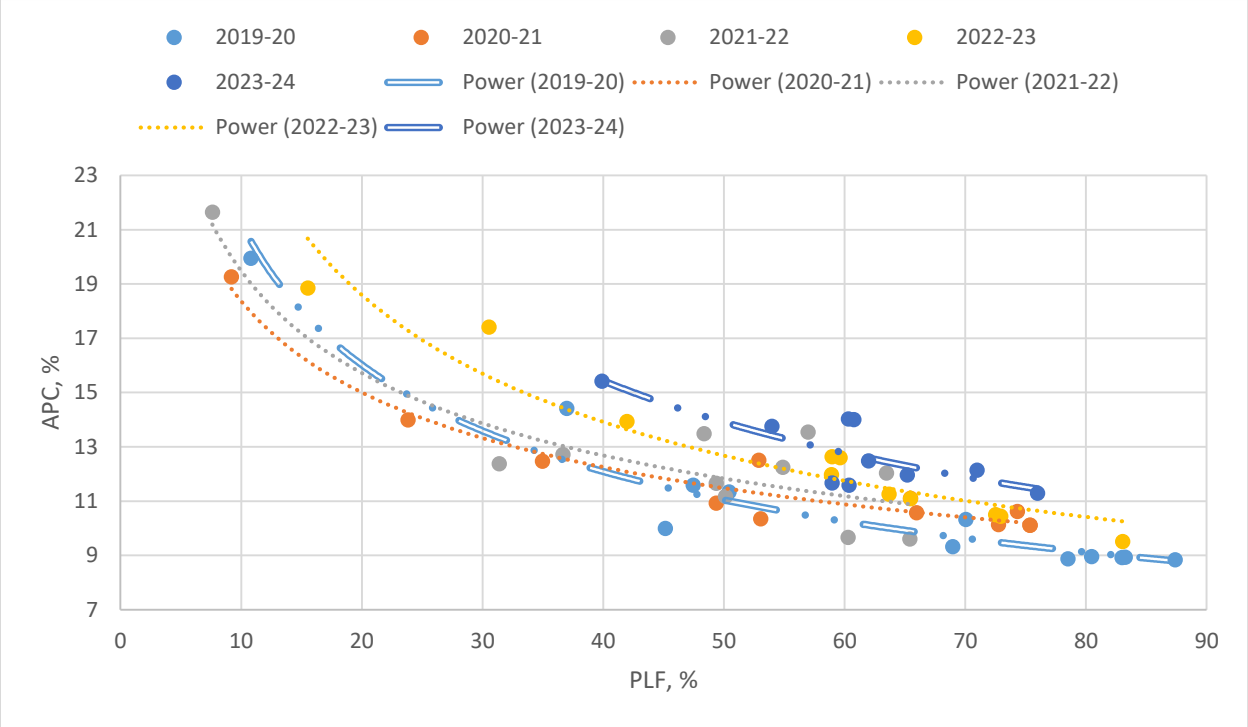


Figure 26: Variation in monthly APC with respect to PLF for Unit 3

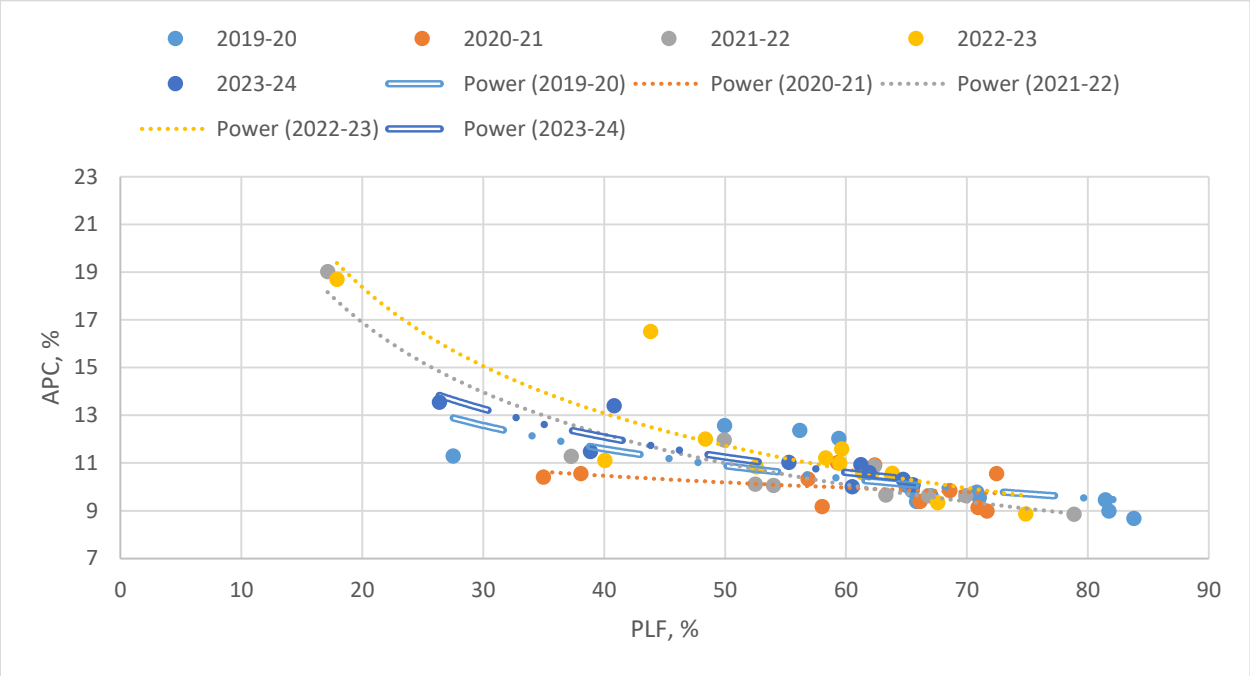


Figure 27: Variation in monthly APC with respect to PLF for Unit 4

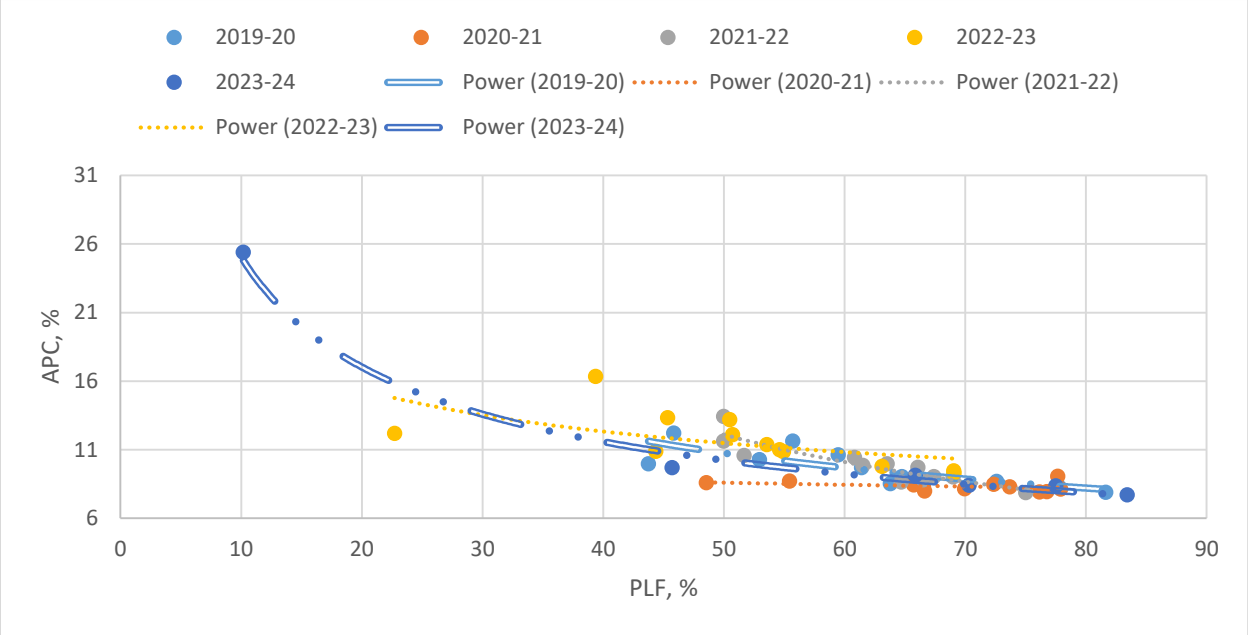


Figure 28: Variation in monthly APC with respect to PLF for Unit 5

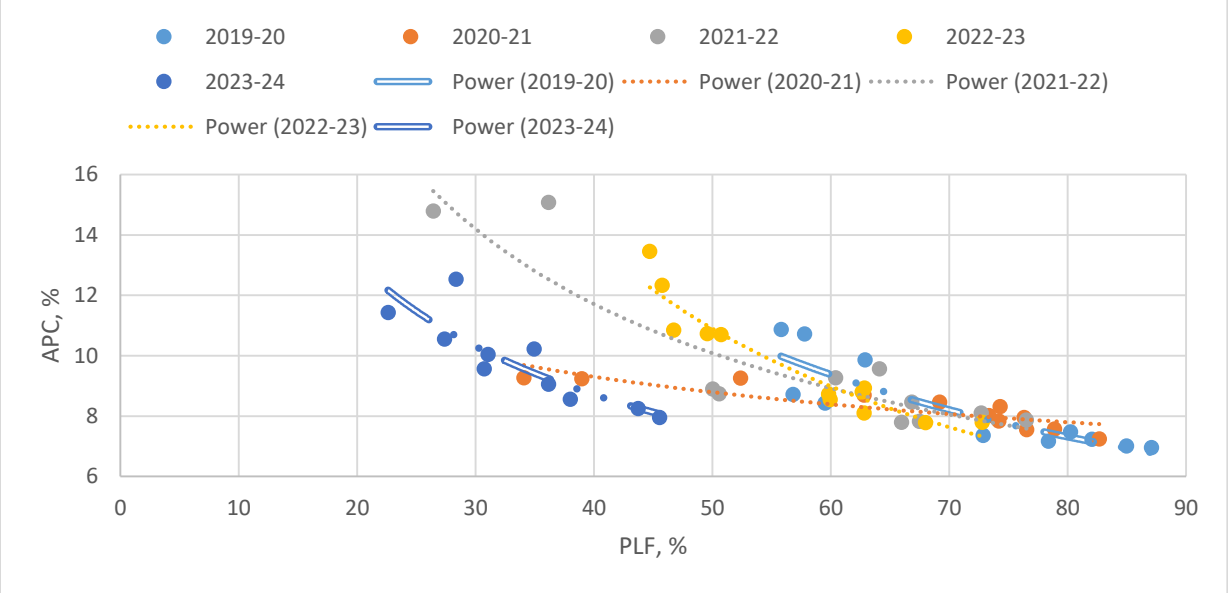


Figure 29: Variation in monthly APC with respect to PLF for Unit 6

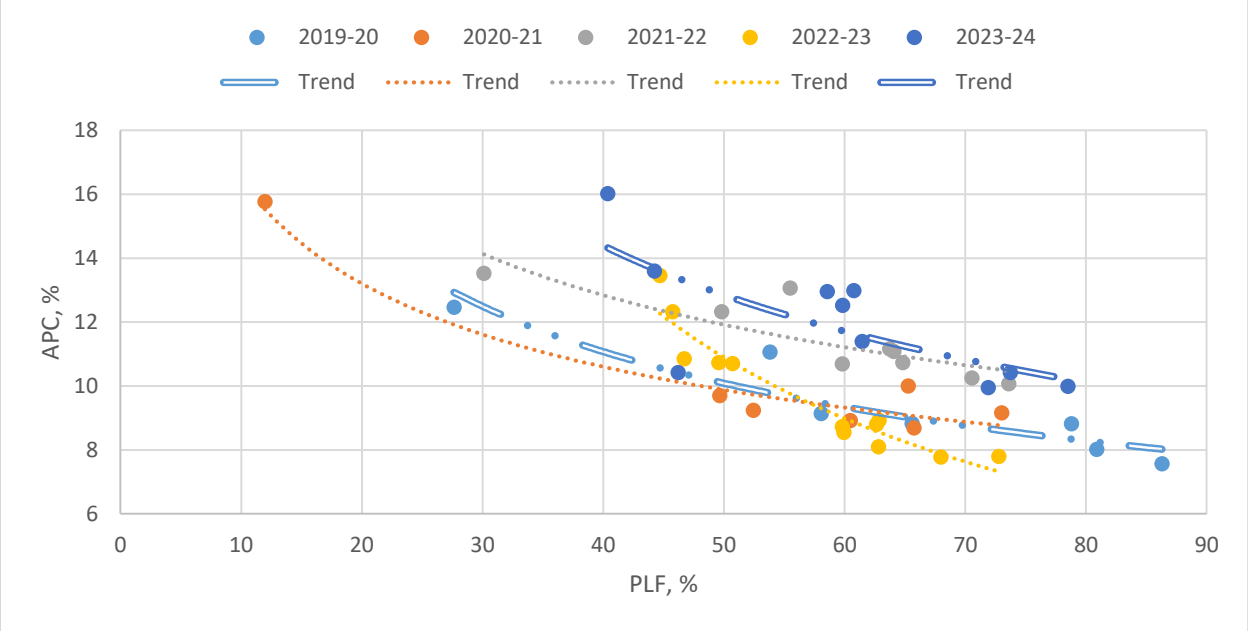


Figure 30: Variation in monthly APC with respect to PLF for Unit 7

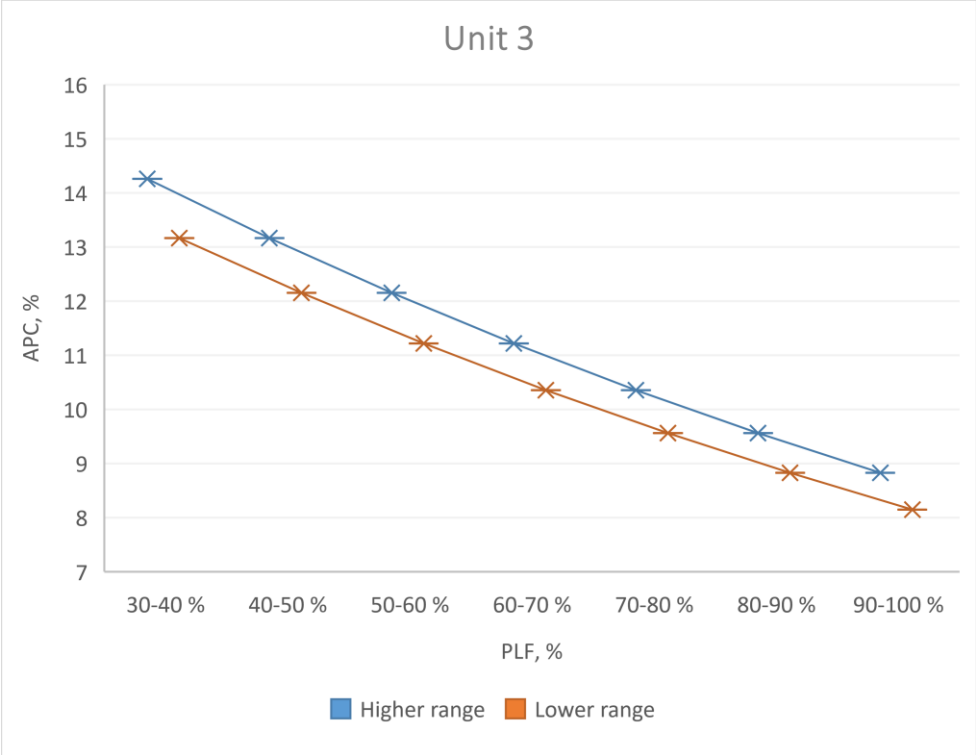


Figure 31: Variation in APC range with respect to PLF

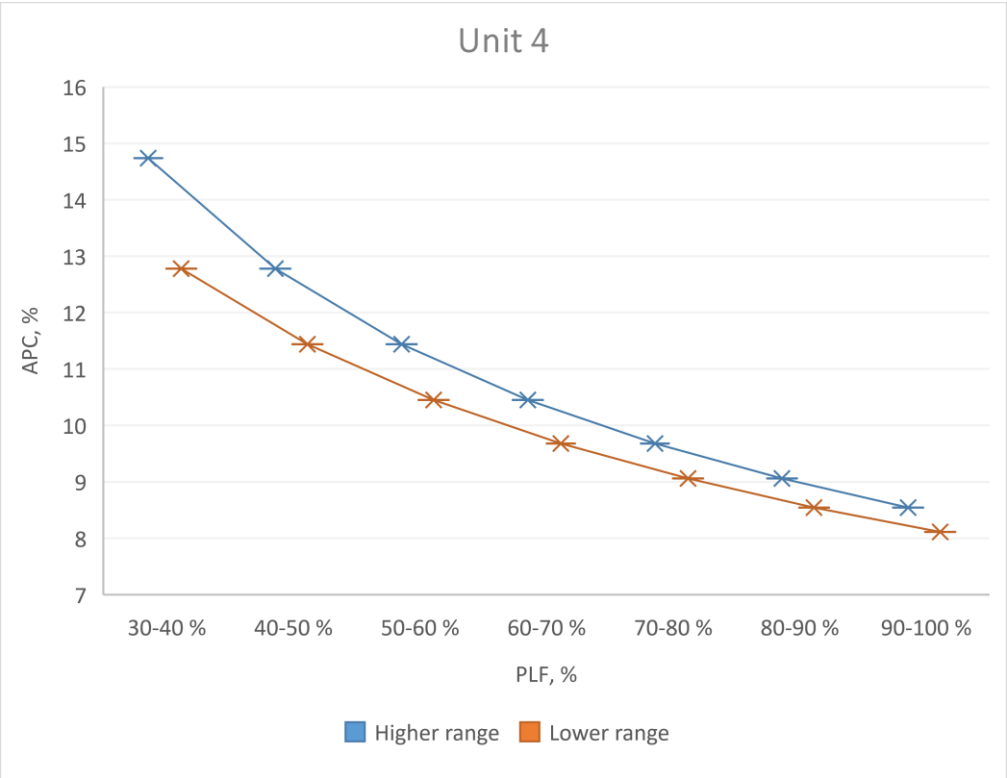


Figure 32: Variation in APC range with respect to PLF

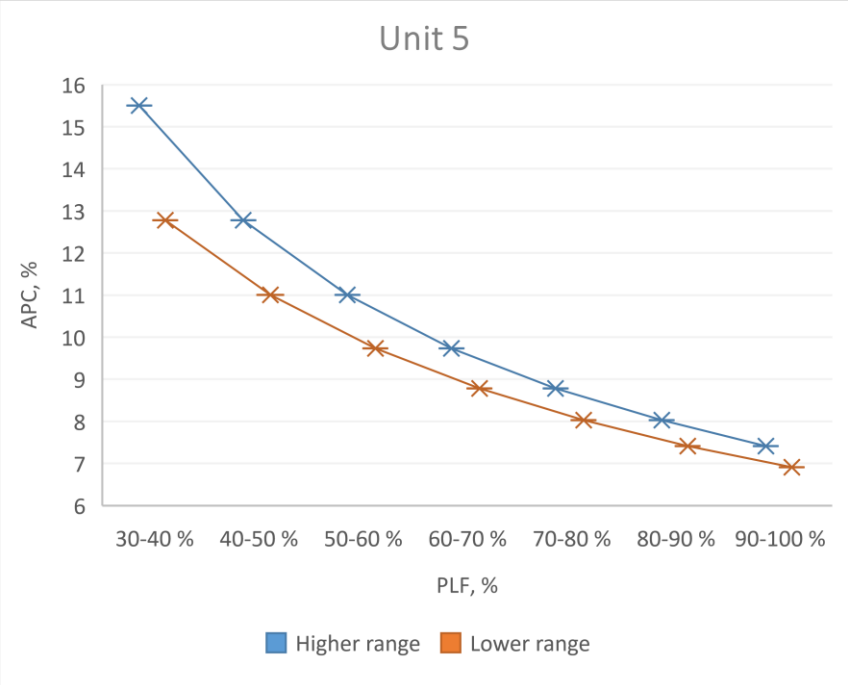


Figure 33: Variation in APC range with respect to PLF

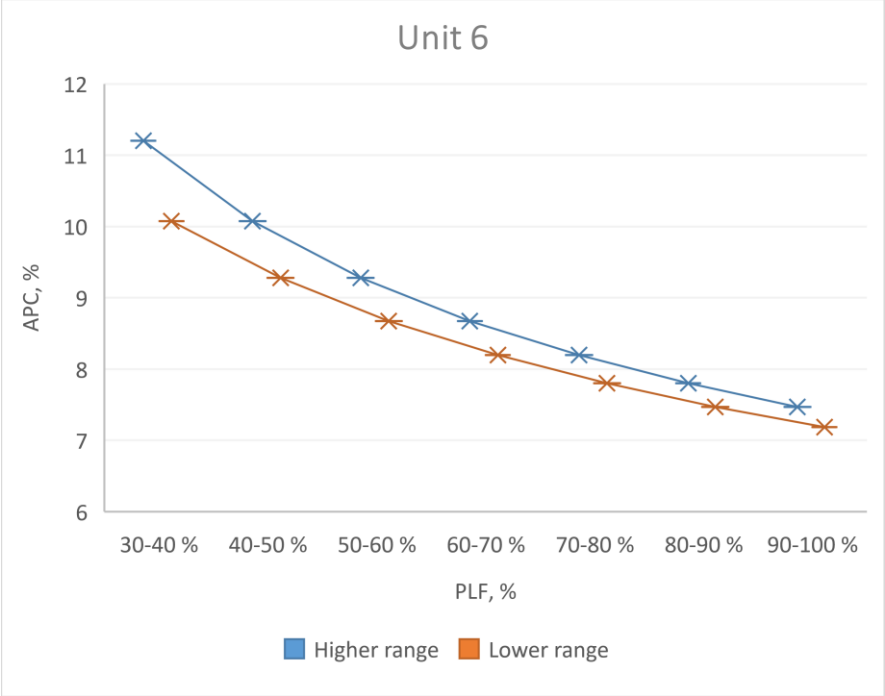


Figure 34: Variation in APC range with respect to PLF

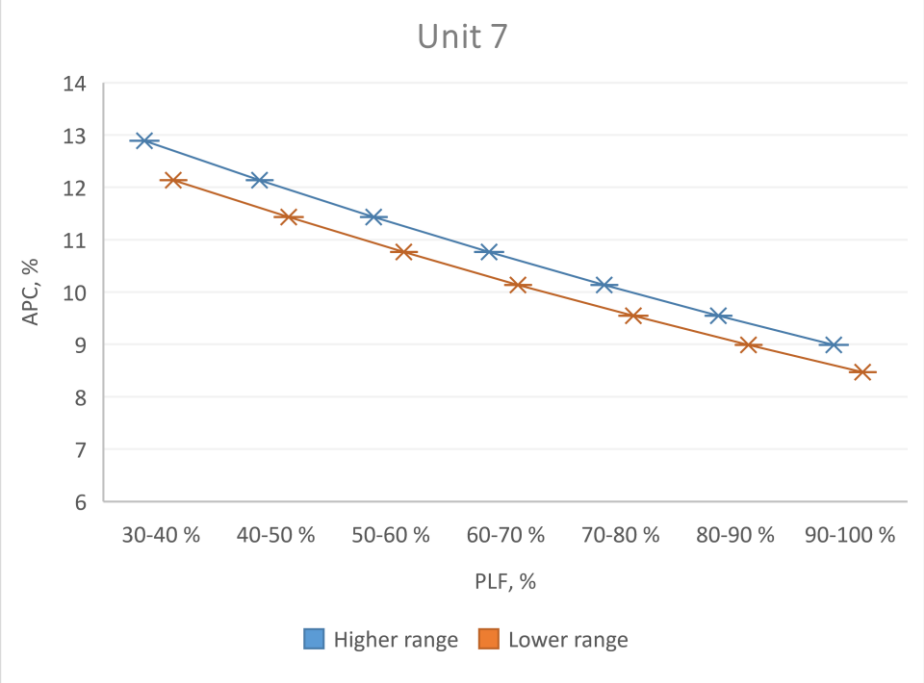


Figure 35: Variation in APC range with respect to PLF

Annexure 2 – Tables

Table 1: Performance results of BFP of Unit – 3, 4.

Sl. No.	Particulars	Unit	Design	BFP-3A	BFP-3B	BFP-4A	BFP-4C
1	Motor output rating	kW	4000	4000	4000	4000	4000
2	Measured input power	kW	2922.5	2183.0	2111.0	2146.8	2188.8
3	Total discharge flow	t/h	361.15	280	312	296	312
4	Suction pressure	kgf/cm2	12.3	10.7	11.3	11.1	11.6
5	Discharge pressure	kgf/cm2	210.6	153	142	154	154
6	Total pressure developed	kgf/cm2	198.3	142.3	130.7	142.9	142.4
7	**Motor + pump efficiency**	**%**	**66.75**	**49.72**	**52.62**	**53.67**	**55.29**
8	Motor load factor	%	67.55	50.21	48.55	49.38	50.34
9	SEC	kWh/t	8.09	7.80	6.77	7.25	7.02
10	Test load	MW	--	153.71	153.71	144.62	144.62

Table 2: Performance results of TDBFP of Unit – 5

Sl. No.	Particulars	Unit	Design	Operating	
				TDBFP A	TDBFP B
Input					
1.0	BFP discharge pressure	kg_f/cm^2	196.7	155.0	161.0
2.0	BFP suction pressure	kg_f/cm^2	--	20.7	18.4
3.0	BFP discharge FW temp	ºC	158.9	153.0	153.0
4.0	FW flow	t/h	643.9	724.5	723.0
5.0	Steam pressure @ BFP inlet	kg_f/cm^2	5.9	4.4	4.4
6.0	Steam temp @ BFP inlet	ºC	316.1	303.2	309.7
7.0	Steam pressure @ BFP exit	kg_f/cm^2	--	-0.8	-1.0
8.0	Steam temp @ BFP exit	ºC	--	44.8	51.5
9.0	Enthalpy of steam at BFP inlet	kJ/kg	3070.6	3070.2	3083.7
10.0	Enthalpy of steam at BFP exit	kJ/kg	2464.0	187.6	2596.9
11.0	Steam flow	t/h	28.15	27.9	32.3
12.0	FW density	kg/m^3	--	912.8	912.8
Output					
13.0	BFWP input power	kW	4743.3	22331.8	4366.7
14.0	Total mechanical power output	kW	3720.6	2902.9	3077.2
15.0	Operating pump efficiency	%	78.4	13.00	70.47
16.0	Specific steam consumption	kg/kWh	7.57	9.61	10.49

Table 3: Performance results of TDBFP of Unit – 6

Sl. No.	Particulars	Unit	Design	Operating	
				TDBFP A	TDBFP B
Input					
1	BFP discharge pressure	kg_f/cm^2	196.7	108.94	109.10
2	BFP suction pressure	kg_f/cm^2	--	15.93	14.92
3	BFP discharge FW temp	ºC	158.9	150.00	150.00
4	FW flow	t/h	643.9	553.82	555.91
5	Steam pressure @ BFP inlet	kg_f/cm^2	5.9	4.87	4.76
6	Steam temp @ BFP inlet	ºC	316.1	275.97	300.60
7	Steam pressure @ BFP exit	kg_f/cm^2	--	-0.87	-0.71
8	Steam temp @ BFP exit	ºC	--	57.00	48.00
9	Enthalpy of steam at BFP inlet	kJ/kg	3070.6	3012.61	3064.11
10	Enthalpy of steam at BFP exit	kJ/kg	2464.0	2604.42	201.00
11	Steam flow	t/h	28.15	17.34	16.95
12	FW density	kg/m^3	--	915.70	915.70
Output					
13	BFWP input power	kW	4743.34	1966.10	13478.12
14	Total mechanical power output	kW	3720.57	1532.38	1557.50
15	Operating pump efficiency	%	78.44	77.94	11.56
16	Specific steam consumption	kg/kWh	7.57	11.32	10.88

Table 4: Performance results of TDBFP of Unit – 7

Sl. No.	Particulars	Unit	Design	Operating
				TDBFP B
Input				
1	BFP discharge pressure	kg_f/cm^2	157.75	121.48
2	BFP suction pressure	kg_f/cm^2	--	15.77
3	BFP discharge FW temp	ºC	154.5	150
4	FW flow	t/h	597.33	556.08
5	Steam pressure @ BFP inlet	kg_f/cm^2	5.62	4.13
6	Steam temp @ BFP inlet	ºC	295.8	352
7	Steam pressure @ BFP exit	kg_f/cm^2	--	-0.98
8	Steam temp @ BFP exit	ºC	--	41.02
9	Enthalpy of steam at BFP inlet	kJ/kg	--	3172.14
10	Enthalpy of steam at BFP exit	kJ/kg	--	2576.76
11	Steam flow	t/h	21.11	12.87
12	FW density	kg/m^3	--	915.7
Output				
13	BFWP input power	kW	4743.34	2128.48
14	Total mechanical power output	kW	3720.57	1748.71
15	Operating pump efficiency	%	78.44	82.16
16	Specific steam consumption	kg/kWh	7.57	7.36

Table 5: Performance results of Condensate Extraction Pumps of Unit – 3 & 4.

Sl. No.	Particulars	Unit	Design	CEP-3A&3C	CEP-4A&4C
1	Motor output rating	kW	500	500	500
2	Measured input power	kW	436.80	432.40	392.16
3	Total discharge flow	t/h	562	419.4	424.8
4	Suction pressure	kgf/cm2	-0.88	-0.92	-0.92
5	Discharge pressure	kgf/cm2	20.1	17	21
6	Total pressure developed	kgf/cm2	20.98	17.92	21.92
7	**Motor + pump efficiency**	**%**	**74.45**	48.28	65.96
8	Motor load factor	%	81.27	80.48	72.99
9	SEC	kWh/t	0.78	1.03	0.92

Table 6: Performance results of Condensate Extraction Pumps of Unit – 5 & 6.

Sl. No.	Particulars	Unit	Design	CEP-5B	CEP-5C	CEP-6B	CEP-6C
1	Motor output rating	kW	1000	1000	1000	1000	1000
2	Measured input power	kW	906.50	880.10	896.10	768.30	767.10
3	Total discharge flow	t/h	812.14	546	615	437.76	433.8
4	Suction pressure	kgf/cm2	-0.88	-0.89	-0.89	-0.88	-0.88
5	Discharge pressure	kgf/cm2	29.72	37	37	37	38.5
6	Total pressure developed	kgf/cm2	30.60	37.89	37.89	37.88	39.38
7	**Motor + pump efficiency**	**%**	**75.61**	**65.30**	**72.24**	**59.96**	**61.86**
8	Motor load factor	%	84.61	82.16	83.65	71.72	71.61
9	SEC	kWh/t	1.12	1.61	1.46	1.76	1.77

Table 7: Performance results of Condensate Extraction Pumps of Unit – 7.

Sl. No.	Particulars	Unit	CEP-7A	CEP-7C
1	Motor output rating	kW	900	900
2	Measured input power	kW	726.60	735.00
3	Total discharge flow	t/h	484	487.2
4	Suction pressure	kgf/cm2	-0.93	-0.93
5	Discharge pressure	kgf/cm2	28	32
6	Total pressure developed	kgf/cm2	28.93	32.93
7	**Motor + pump efficiency**	**%**	**53.53**	**60.63**
8	Motor load factor	%	75.36	76.24
9	SEC	kWh/t	1.50	1.51

Table 8: Performance results of Induced draft fans of Unit 3

Sl. No.	Particular	Unit	Design	IDF-3A	IDF-3B
1	Suction Pressure	mmWc	-345.00	-238.40	-249.00
2	Discharge Pressure	mmWc	5.00	44.60	49.10
3	Pressure developed	mmWc	350.00	283.00	298.10
4	Flue gas temperature	^oC	150.00	136.00	131.00
5	Flue gas flow	t/h	664.90	327.92	299.99
6	Electrical power	kW	1016.59	1362.00	1357.00
7	Flue gas density	kg/m^3	--	0.85	0.86
8	Mechanical power	kW	787.76	297.41	283.26
9	Overall (fan+motor) efficiency	%	77.49	21.84	20.87
10	SEC	kWh/t	1.53	4.15	4.52

Table 9: Performance results of Induced draft fans of Unit 4

Sl. No.	Particular	Unit	Design	IDF-4A	IDF-4B
1	Suction Pressure	mmWc	-345.00	-263.00	-200.00
2	Discharge Pressure	mmWc	5.00	59.70	61.70
3	Pressure developed	mmWc	350.00	322.70	261.70
4	Flue gas temperature	^oC	150.00	128.00	134.00
5	Flue gas flow	t/h	664.90	351.20	391.39
6	Electrical power	kW	1016.59	1100.40	1213.20
7	Flue gas density	kg/m^3	--	0.86	0.84
8	Mechanical power	kW	787.76	358.98	332.17
9	Overall (fan+motor) efficiency	%	77.49	32.62	27.38
10	SEC	kWh/t	1.53	3.10	3.10

Table 10: Performance results of Induced draft fans of Unit 6

Sl. No.	Particular	Unit	Design	IDF-6A	IDF-6C
1	Suction Pressure	mmWc	-475.00	-435.00	-418.00
2	Discharge Pressure	mmWc	5.00	25.00	32.00
3	Pressure developed	mmWc	480.00	460.00	450.00
4	Flue gas temperature	^oC	154.00	141.80	131.00
5	Flue gas flow	t/h	730.73	390.36	449.48
6	Electrical power	kW	1633.00	1598.00	1840.00
7	Flue gas density	kg/m^3	--	0.83	0.86
8	Mechanical power	kW	1194.74	589.34	640.68
9	Overall (fan+motor) efficiency	%	73.16	36.88	34.82
10	SEC	kWh/t	2.23	4.10	4.10

Table 11: Performance results of Induced draft fans of Unit 7

Sl. No.	Particular	Unit	Design	IDF-7A	IDF-7B	IDF-7C
1	Suction Pressure	mmWc	-485	-277.82	-96.68	-10.27
2	Discharge Pressure	mmWc	5	89.40	89.41	89.57
3	Pressure developed	mmWc	490	367.22	186.09	99.84
4	Flue gas temperature	^oC	150	120.20	123.80	132.00
5	Flue gas flow	t/h	1502	739.56	617.29	475.71
6	Electrical power	kW	3340	2105.00	1757.00	1354.00
7	Flue gas density	kg/m^3	--	0.89	0.88	0.86
8	Mechanical power	kW	2538.67	831.24	355.59	150.44
9	Overall (fan+motor) efficiency	%	76.01	39.49	20.24	11.11
10	SEC	kWh/t	2.22	2.85	2.85	2.85

Table 12: Performance results of Forced draft fans of Unit 3

Sl. No.	Particular	Unit	Design	FDF-3A	FDF-3B
1	Suction Pressure	mmWc	--	0.00	0.00
2	Discharge Pressure	mmWc	520	40.50	58.10
3	Pressure developed	mmWc	--	40.50	58.10
4	secondary air temperature	^oC	--	30.40	30.40
5	secondary air flow	t/h	414.33	185.04	134.24
6	Electrical power	kW	677	115.10	83.50
7	secondary air density	kg/m^3	--	1.17	1.17
8	Mechanical power	kW	537.15	17.45	18.16
9	Overall (fan+motor) efficiency	%	79.34	15.16	21.75
10	SEC	kWh/t	1.63	0.62	0.62

Table 13: Performance results of Forced draft fans of Unit 4

Sl. No.	Particular	Unit	Design	FDF-4A	FDF-4B
1	Suction Pressure	mmWc	--	0.00	0.00
2	Discharge Pressure	mmWc	520	33.00	31.00
3	Pressure developed	mmWc	--	33.00	31.00
4	secondary air temperature	^oC	--	28.70	28.70
5	secondary air flow	t/h	414.33	123.04	106.96
6	Electrical power	kW	677	93.24	81.06
7	secondary air density	kg/m^3	--	1.16	1.17
8	Mechanical power	kW	537.15	9.53	7.72
9	Overall (fan+motor) efficiency	%	79.34	10.23	9.52
10	SEC	kWh/t	1.63	0.76	0.76

Table 14: Performance results of Forced draft fans of Unit 5

Sl. No.	Particular	Unit	Design	FDF-5A	FDF-5B
1	Suction Pressure	mmWc	--	0.00	0.00
2	Discharge Pressure	mmWc	430	135.42	132.52
3	Pressure developed	mmWc	--	135.42	132.52
4	secondary air temperature	^oC	--	32.28	28.84
5	secondary air flow	t/h	948.39	380.69	465.52
6	Electrical power	kW	1333	755.80	924.20
7	secondary air density	kg/m^3	--	1.16	1.17
8	Mechanical power	kW	1048.37	121.07	143.63
9	Overall (fan+motor) efficiency	%	78.65	16.02	15.54
10	SEC	kWh/t	1.41	1.99	1.99

Table 15: Performance results of Forced draft fans of Unit 6

Sl. No.	Particular	Unit	Design	FDF-6A	FDF-6B
1	Suction Pressure	mmWc	--	0.00	0.00
2	Discharge Pressure	mmWc	430	45.00	43.00
3	Pressure developed	mmWc	--	45.00	43.00
4	secondary air temperature	^oC	--	35.27	42.26
5	secondary air flow	t/h	948.39	331.96	314.96
6	Electrical power	kW	1333	744.30	706.20
7	secondary air density	kg/m^3	--	1.15	1.13
8	Mechanical power	kW	1048.37	35.38	32.65
9	Overall (fan+motor) efficiency	%	78.65	4.75	4.62
10	SEC	kWh/t	1.41	2.24	2.24

Table 16: Performance results of Forced draft fans of Unit 7

Sl. No.	Particular	Unit	Design	FDF-7A	FDF-7B
1	Suction Pressure	mmWc	--	0.00	0.00
2	Discharge Pressure	mmWc	413	94.97	82.12
3	Pressure developed	mmWc	--	94.97	82.12
4	secondary air temperature	^oC	--	27.10	27.10
5	secondary air flow	t/h	936.92	409.45	358.42
6	Electrical power	kW	1315	753.30	659.40
7	secondary air density	kg/m^3	--	1.19	1.19
8	Mechanical power	kW	991.01	89.02	67.38
9	Overall (fan+motor) efficiency	%	75.36	11.82	10.22
10	SEC	kWh/t	1.4	1.84	1.84

Table 17: Performance results of Primary air fans of Unit 3

Sl. No.	Particular	Unit	Design	PAF-3A	PAF-3B
1	Suction Pressure	mmWc	--	0.00	0.00
2	Discharge Pressure	mmWc	1210	757.30	765.90
3	Pressure developed	mmWc	--	757.30	765.90
4	Primary air temperature	^oC	--	30.40	30.40
5	Primary air flow	t/h	275.44	127.58	131.90
6	Electrical power	kW	1114.1	1268.00	1311.00
7	Primary air density	kg/m^3	--	1.17	1.17
8	Mechanical power	kW	830.92	224.94	235.21
9	Overall (fan+motor) efficiency	%	74.58	17.74	17.94
10	SEC	kWh/t	1.03	9.94	9.94

Table 18: Performance results of Primary air fans of Unit 4

Sl. No.	Particular	Unit	Design	PAF-4A	PAF-4B
1	Suction Pressure	mmWc	--	0.00	0.00
2	Discharge Pressure	mmWc	1210	743.00	759.00
3	Pressure developed	mmWc	--	743.00	759.00
4	Primary air temperature	^oC	--	28.70	28.70
5	Primary air flow	t/h	275.44	181.06	175.94
6	Electrical power	kW	1114.1	1165.80	1132.80
7	Primary air density	kg/m^3	--	1.17	1.17
8	Mechanical power	kW	830.92	313.22	310.91
9	Overall (fan+motor) efficiency	%	74.58	26.87	27.45
10	SEC	kWh/t	1.03	6.44	6.44

Table 19: Performance results of Primary air fans of Unit 5

Sl. No.	Particular	Unit	Design	PAF-5A	PAF-5B
1	Suction Pressure	mmWc	--	0.00	0.00
2	Discharge Pressure	mmWc	1270	907.41	926.50
3	Pressure developed	mmWc	--	907.41	926.50
4	Primary air temperature	°C	--	36.61	36.61
5	Primary air flow	t/h	643.69	326.83	384.00
6	Electrical power	kW	2750	1915.00	2250.00
7	Primary air density	kg/m^3	--	1.14	1.14
8	Mechanical power	kW	2093.7	708.66	850.14
9	Overall (fan+motor) efficiency	%	76.13	37.01	37.78
10	SEC	kWh/t	1.12	5.86	5.86

Table 20: Performance results of Primary air fans of Unit 6

Sl. No.	Particular	Unit	Design	PAF-6A	PAF-6B
1	Suction Pressure	mmWc	--	0.00	0.00
2	Discharge Pressure	mmWc	1270	907.00	926.00
3	Pressure developed	mmWc	--	907.00	926.00
4	Primary air temperature	°C	--	29.80	29.80
5	Primary air flow	t/h	643.69	337.61	323.86
6	Electrical power	kW	2750	2111.00	2025.00
7	Primary air density	kg/m^3	--	1.17	1.17
8	Mechanical power	kW	2093.7	712.95	698.23
9	Overall (fan+motor) efficiency	%	76.13	33.77	34.48
10	SEC	kWh/t	1.12	6.25	6.25

Table 21: Performance results of Primary air fans of Unit 7

Sl. No.	Particular	Unit	Design	PAF-7A	PAF-7B
1	Suction Pressure	mmWc	--	0.00	0.00
2	Discharge Pressure	mmWc	1332	651.15	744.15
3	Pressure developed	mmWc	--	651.15	744.15
4	Primary air temperature	°C	--	27.10	27.10
5	Primary air flow	t/h	491.06	214.16	191.27
6	Electrical power	kW	2089	2254.00	2013.00
7	Primary air density	kg/m^3	--	1.19	1.19
8	Mechanical power	kW	1675.2	319.23	325.81
9	Overall (fan+motor) efficiency	%	80.19	14.16	16.19
10	SEC	kWh/t	1.11	10.52	10.52

Table 22: Performance results of Mills at Unit 5

Sl. No.	Particulars	Unit	Design	Coal Mill 5B	Coal Mill 5C	Coal Mill 5D	Coal Mill 5E	Coal Mill 5F	Coal Mill 5G
1	PA flow	t/h	104.5	115.25	116.36	113.83	115.69	115.59	114.04
2	Coal flow	t/h	49.8	36.29	--	38.50	39.42	37.45	--
3	Air to Fuel ratio	-	2.1	3.18	--	2.96	2.93	3.09	--
4	Power	kW	600	365.60	406.20	404.30	417.80	347.10	298.30
5	SEC	kWh/t of coal	12.05	10.07	--	10.50	10.60	9.27	--

Table 23: Performance results of Mills at Unit 6

Sl. No.	Particulars	Unit	Design	Coal Mill 6A	Coal Mill 6B	Coal Mill 6D	Coal Mill 6E	Coal Mill 6F	Coal Mill 6G	Coal Mill 6H
1	PA flow	t/h	104.5	59.23	110.57	112.61	111.91	109.96	108.22	48.97
2	Coal flow	t/h	49.8	52.00	57.00	60.00	62.00	52.00	25.00	0.00
3	Air to Fuel ratio	-	2.1	1.14	1.94	1.88	1.80	2.11	4.33	--
4	Power	kW	600	186.90	316.50	346.20	304.80	349.50	214.80	307.50
5	SEC	kWh/t of coal	12.05	3.59	5.55	5.77	4.92	6.72	8.59	--

Table 24: Performance results of Mills at Unit 7

Sl. No.	Particulars	Unit	Design	Coal Mill 7AB	Coal Mill 7CD	Coal Mill 7EF	Coal Mill 7GH
1	PA flow	t/h	135.06	100	105	106	104
2	Coal flow	t/h	86.75	70	74	77	45
3	Air to Fuel ratio	-	1.56	1.43	1.42	1.38	2.31
4	Power	kW	1524	1356	1488	1467	1210
5	SEC	kWh/t of coal	17.57	19.37	20.11	19.05	26.89

Table 25: Performance results of Cooling Water Pumps & Auxiliary Cooling Water Pumps of Unit – 3&4.

Sl. No.	Particulars	Unit	CWP-1	CWP-3	CWP-4	GSP-3	GSP-4	GSP-5
1	Motor output rating	kW	1460	1460	1460	332	332	332
2	Measured input power	kW	1125.60	1231.20	1146.00	291.72	282.78	270.84
3	Total discharge flow	t/h	12156	10044	12772	1355.16	942.00	324
4	Suction pressure	kgf/cm2	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37
5	Discharge pressure	kgf/cm2	1.70	1.70	1.70	5.37	6.26	6.38
6	Total pressure developed	kgf/cm2	2.07	2.07	2.07	5.74	6.63	6.75
7	**Motor + pump efficiency**	**%**	**60.90**	**46.00**	**62.84**	**72.64**	**60.16**	**22.00**
8	Motor load factor	%	67.07	73.37	68.29	76.44	74.10	70.97
9	SEC	kWh/t	0.09	0.12	0.09	0.22	0.30	0.84

Table 26: Performance results of Cooling Water Pumps & Auxiliary Cooling Water Pumps of Unit – 5.

S. No.	Particulars	Unit	CCW-5A	CCW-5B	CCW-5C	CCW-5D	ACW-5A	ACW-5B	ACW-5C
1	Motor output rating	kW	1800	1800	1800	1800	570	570	570
2	Measured input power	kW	1790.00	1742.00	1778.00	1704.00	606.30	540.90	563.60
3	Total discharge flow	t/h	20039.71	18531.71	19089.89	20160.00	2529.60	2544.00	2636.04
4	Suction pressure	kgf/cm2	-0.60	-0.62	-0.62	-0.62	-0.59	-0.59	-0.59
5	Discharge pressure	kgf/cm2	1.99	2.13	2.02	2.05	4.89	5.20	4.93
6	Total pressure developed	kgf/cm2	2.59	2.75	2.64	2.67	5.48	5.79	5.52
7	**Motor + pump efficiency**	**%**	**78.95**	**79.59**	**77.19**	**85.94**	**62.32**	**74.16**	**70.28**
8	Motor load factor	%	86.52	84.20	85.94	82.36	92.54	82.56	86.02
9	SEC	kWh/t	0.09	0.09	0.09	0.08	0.24	0.21	0.21

Table 27: Performance results of Cooling Water Pumps & Auxiliary Cooling Water Pumps of Unit – 6.

Sl. No.	Particulars	Unit	CCW-6A	CCW-6B	CCW-6D	ACW-6A	ACW-6C
1	Motor output rating	kW	1800	1800	1800	570	570
2	Measured input power	kW	1721.4	1646.4	1580.4	474.3	525.9
3	Total discharge flow	t/h	18420	18684	20304	1788	1956
4	Suction pressure	kgf/cm2	-0.34	-0.34	-0.34	-0.34	-0.34
5	Discharge pressure	kgf/cm2	2	2	2.1	5.7	6
6	Total pressure developed	kgf/cm2	2.34	2.34	2.44	6.04	6.34
7	**Motor + pump efficiency**	**%**	**68.28**	**72.42**	**85.48**	**62.05**	**64.26**
8	Motor load factor	%	83.20	79.58	76.39	72.39	80.27
9	SEC	kWh/t	0.093	0.088	0.078	0.265	0.269

Table 28: Performance results of Cooling Water Pumps of Unit – 7.

Sl. No.	Particulars	Unit	CCW-7A	CCW-7B	CCW-7C	CCW-7D	CCW-7E
1	Motor output rating	kW	1800	1800	1800	1800	1800
2	Measured input power	kW	1588.8	1493.0	1759.0	1690.0	1686.9
3	Total discharge flow	t/h	23460	18456	20700	20196	18600
4	Suction pressure	kgf/cm2	-0.34	-0.34	-0.34	-0.34	-0.34
5	Discharge pressure	kgf/cm2	1.7	1.92	1.9	1.87	1.7
6	Total pressure developed	kgf/cm2	2.04	2.26	2.24	2.21	2.04
7	**Motor + pump efficiency**	**%**	**82.16**	**76.19**	**71.89**	**72.02**	**61.35**
8	Motor load factor	%	76.79	72.16	85.02	81.68	81.53
9	SEC	kWh/t	0.07	0.08	0.08	0.08	0.09

Table 29: Performance results of Auxiliary Cooling Water Pumps of Unit – 7.

Sl. No.	Particulars	Unit	ACW-7A	ACW-7B	ACW-7C
1	Motor output rating	kW	485	485	485
2	Measured input power	kW	420.2	417.9	409.6
3	Total discharge flow	t/h	1928.4	2078.4	1909.56
4	Suction pressure	kgf/cm2	-0.34	-0.34	-0.34
5	Discharge pressure	kgf/cm2	4.95	5.5	5.03
6	Total pressure developed	kgf/cm2	5.29	5.84	5.37
7	**Motor + pump efficiency**	**%**	**66.16**	**79.15**	**68.23**
8	Motor load factor	%	75.38	74.96	73.47
9	SEC	kWh/t	0.22	0.20	0.21

Table 30. Percentage of oxygen measured at different locations of flue gas path A & B in Unit 3 & 4

Location	Unit # 3		Unit # 4	
	A	B	A	B
APH Inlet	5.2	4.8	3.5	3.3
APH Outlet	7.8	7.2	7.6	9.1
ESP Inlet	11.2	10	11.3	11.3
ESP Outlet	-	-	11.9	11.5
IDF Outlet	11.6	11	11.9	11.5

Table 31. Percentage of leakage at different locations of flue gas path in Unit 3 & 4

Location	Unit # 3		Unit # 4	
	A	B	A	B
Across APH	17.86	15.77	27.74	44.24
APH Outlet to ESP Inlet	31.55	23.12	34.69	20.63
Across ESP	*	*	6.00	1.91
ESP Outlet to IDF Outlet	*	*	Nil	Nil

*O2 measurement could not be carried out due to lack of port.

Table 32. Percentage of oxygen measured at different locations of flue gas path A & B in Unit 5, 6 & 7

Location	Unit # 5		Unit # 6		Unit # 7	
	A	B	A	B	A	B
Eco. Outlet	4.4	4.6	5.8	5.6	5	3.6
PAH Inlet	5	4.8	7.2	7.6	4.8	4.4
PAH Outlet	9.8	8.8	12.8	12.6	7.4	6.8
SAH Inlet	4	4.8	5.8	6.8	5.2	4.8
SAH Outlet	5.2	7.8	8.8	7.6	6.8	6.4
Common outlet	9.4	9.4	11	11.2	12.8	10.6
ESP Inlet	9.4	9.8	12.7	12.4	-	12.6
ESP Outlet	11.9	12.7	13.3	12.9	13.7	13.3
IDF Outlet	11.9	12.7	13.3	13.5	14.1	13.8

Table 33. Percentage of leakage at different locations of flue gas path in Unit 5, 6 & 7

Location	Unit # 5		Unit # 6		Unit # 7	
	A	B	A	B	A	B
Eco Outlet to APH Inlet	0.55	1.12	4.38	10.51	Nil	5.52
Across PAH	38.92	29.75	62.22	54.22	17.33	15.32
Across SAH	6.88	20.61	22.31	5.41	10.21	9.93
Common Outlet to ESP Inlet	Nil	3.24	18.66	12.71	*	21.69
Across ESP	25.00	31.83	7.11	5.63	*	8.29
ESP Outlet to IDF Outlet	Nil	Nil	Nil	7.30	5.69	6.34

*O2 measurement could not be carried out due to lack of port.

Table 34. Energy saving opportunities and achievable APC in Unit #3

Auxiliaries	Present APC, %	Savings in APC, %	Achievable APC, %
Mill	0.70	Nil	0.70
CEP	0.28	Nil	0.28
BFP	2.79	0.64	2.16
FD Fan	0.13	0.004	0.12
ID Fan	1.77	0.46	1.31
PA fan	1.68	0.06	1.62
ESP	0.13	Nil	0.13
CW	0.92	Nil	0.92
LT Aux.	0.26	Nil	0.26
Common Aux	2.42	Nil	2.42
Tr. Losses	0.25	Nil	0.25
Total	**11.33**	**1.16**	**10.17**

Table 35. Energy saving opportunities and achievable APC in Unit #4

Auxiliaries	Present APC, %	Savings in APC, %	Achievable APC, %
Mill	0.63	Nil	0.63
CEP	0.27	Nil	0.27
BFP	3.00	0.35	2.65
FD Fan	0.12	0.03	0.09
ID Fan	1.60	0.77	0.83
PA fan	1.59	0.37	1.22
ESP	0.14	Nil	0.14
CW	1.18	Nil	1.18
LT Aux.	0.29	Nil	0.29
Common Aux	2.59	Nil	2.59
Tr. Losses	0.25	Nil	0.25
Total	**11.65**	**1.52**	**10.13**

Table 36. Energy saving opportunities and achievable APC in Unit #5

Auxiliaries	Present APC, %	Savings in APC, %	Achievable APC, %
Mill	0.54	Nil	0.54
CEP	0.43	0.04	0.39
BCWP	0.14	Nil	0.14
FD Fan	0.41	0.03	0.38
ID Fan	1.76	0.32	1.43
PA fan	1.01	0.13	0.87
ESP	0.04	Nil	0.04
CW	1.90	Nil	1.90
LT Aux.	0.32	Nil	0.32
Common Aux	2.45	0.07	2.38
Tr. Losses	0.24	Nil	0.24
Total	**9.00**	**0.60**	**8.64**

Table 37. Energy saving opportunities and achievable APC in Unit #6

Auxiliaries	Present APC, %	Savings in APC, %	Achievable APC, %
Mill	0.64	Nil	0.64
CEP	0.49	0.01	0.48
BCWP	0.19	Nil	0.19
FD Fan	0.46	0.04	0.42
ID Fan	2.22	1.01	1.21
PA fan	1.31	0.41	0.90
ESP	0.12	Nil	0.12
CW	2.44	Nil	2.44
LT Aux.	0.40	Nil	0.40
Common Aux	2.44	0.10	2.34
Tr. Losses	0.24	Nil	0.24
Total	**10.71**	**1.57**	**9.38**

Table 38. Energy saving opportunities and achievable APC in Unit #7

Auxiliaries	Present APC, %	Savings in APC, %	Achievable APC, %
Mill	1.93	Nil	1.93
CEP	0.47	Nil	0.47
BCWP	0.23	Nil	0.23
FD Fan	0.45	0.01	0.44
ID Fan	1.67	0.84	0.82
PA fan	1.36	0.11	1.25
ESP	0.05	Nil	0.05
CW	1.98	Nil	1.98
LT Aux.	0.37	Nil	0.37
Common Aux	3.89	0.12	3.77
Tr. Losses	0.25	Nil	0.25
Total	**12.40**	**1.09**	**11.56**

FINAL REPORT OF

DETAILED STUDY OF AUXILIARY POWER CONSUMPTION OF UNIT #3 AND 4

Conducted at

PARAS THERMAL POWER STATOIN

REPORT NO.: CPRI/ERED/EA/220/24

(Work order No.: PRSTPS/4500129576 dated 15/10/2023)

Project code: CPRI/CS&CD/2023-24/ERED/C/08

Study conducted by

May 2024

Energy Efficiency and Renewable Energy Division

Central Power Research Institute

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Report no.	CPRI/ERED/EA/220/24	
Date of issue of report	29 May 2024	
Signature of Energy Audit team leader		
Signature of the division head		

ACKNOWLEDGEMENT

CPRI is thankful to **Paras Thermal Power Station** for placing the work order for 'Detailed study of auxiliary power consumption of Unit #3 and 4' and making the necessary arrangements for conducting the study at Paras Thermal Power Station, Maharashtra.

We thank the all officials of Paras Thermal Power Station, Maharashtra for their excellent co-operation, valuable help and arrangements made during the conduct of the study.

CPRI also thank all other staff of Paras Thermal Power Station, Maharashtra for extending excellent co-operation during the conduct of the study.

EXECUTIVE SUMMARY

The detailed auxiliary power consumption (APC) audit was conducted in February 2024. The work at the site consisted of measurement of input and output variables of different equipment and auxiliary loads in the plant by conducting performance tests. Present APCs of different units were calculated at different PLF based on the test carried out on the units and given below,

PLF, %	**APC, %**	
	Unit #3	**Unit #4**
100	10.22	9.57
90	11.03	10.28
80	11.84	10.98
70	12.65	11.68
60	13.46	13.08

- Overall air ingress to flue gas is 83.33 % in path A and 40.34 % in path B.
- Overall air ingress to flue gas is 60.87 % in path A and 34.49 % in path B.
- Possible savings in the APC for Unit # 3 is found to be 1.02 %.
- Possible savings in the APC for Unit # 4 is found to be 0.64 %.
- Achievable values of APC for each unit at different plant load are shown below,

PLF, %	APC, %		
	Unit 3	Unit 4	**Station**
100	9.20	8.93	9.07
90	10.01	9.64	9.83
85	10.42	10.00	10.21
80	10.82	10.36	10.59
70	11.64	11.07	11.36
60	12.45	11.79	12.12

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1.0 INTRODUCTION

This section introduces the plant, equipment & process and defines the scope of the work.

1.1 Paras Thermal Power Station

The Maharashtra State Power Generation Corporation Ltd. (MSPGCL) had established coal fired thermal power stations of 30 MW (Unit 1), 62.5 MW (Unit 2) and 250 MW x 2 units (Unit 3-4) at Paras. Unit 1 and unit 2 have been decommissioned and now unit 3 & 4 are operational. So, the total installed capacity is 500 MW. The auxiliary power consumption audit study is carried out for unit 3 and unit 4.

1.2 Scope of the work

The scope of the work is given below:

- The study includes detailed analysis of power consumed by different auxiliaries such as unit related auxiliaries and common auxiliaries.
- Conducting performance testing on each unit to ascertain its performance.
- Suggesting measures to reduce auxiliary consumption & improve availability factor.
- Preparation of detailed study report based on the finding during the field study.

2.0 WORK CARRIED OUT

The detailed auxiliary power consumption (APC) audit was conducted in ***February 2024.*** The work at the site consisted of measurement of input and output variables of different equipment and auxiliary loads in the plant by conducting performance tests. The performance tests were carried out at following plant loads,

Unit 3 – 245.97 MW
Unit 4 – 253.66 MW

The data is processed at CPRI to evaluate auxiliary power consumption (APC) and possible improvement in the APC. Preliminary findings from the study are discussed in upcoming parts of the report.

3.0 OBSERVATIONS AND STUDY RESULTS

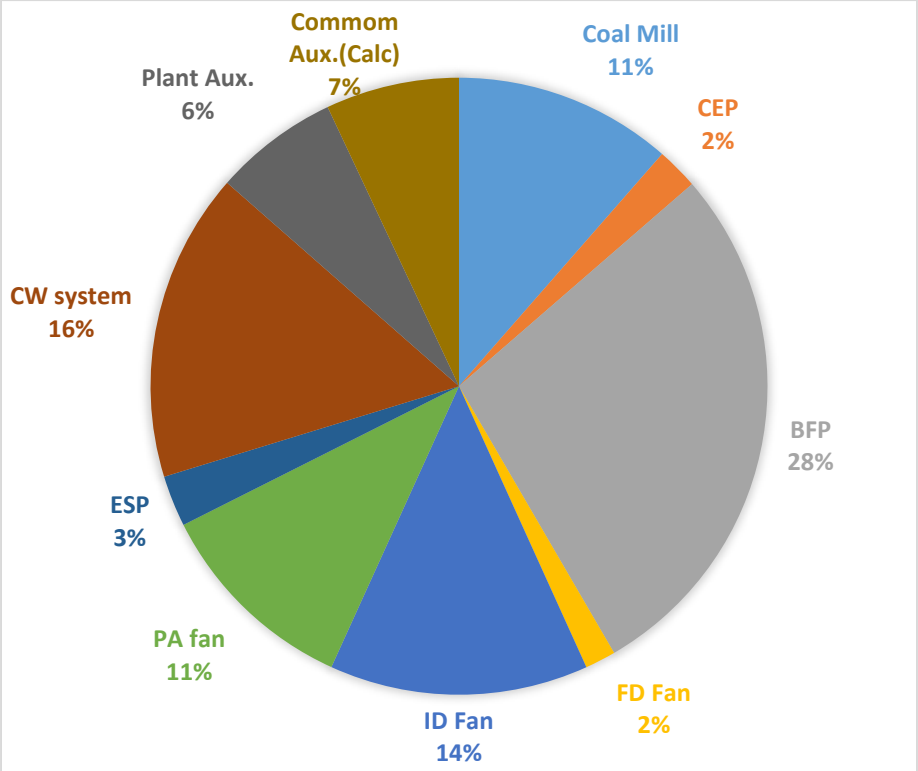
The installed generation capacity of the Paras Thermal Power Station is 500 MW (250 MW x 2 units).
The station consists of 2 x 250 MW (Unit #3 and #4) units. The generator terminal voltage is 16.5 kV and is stepped up to 220 kV by Generator transformer of 315 MVA. The grid voltage of 220 kV is stepped down to 6.6 kV by station transformers of 50 MVA to provide the auxiliary power to common auxiliaries and power during start up. During normal running of the plant, the auxiliary power is supplied by two numbers of Unit Auxiliary Transformers (UAT) of 20 MVA at each unit.
The secondary of UATs is fed to individual 6.6 kV Bus (i.e., UAT 'A' and UAT 'B' Bus). The HT major auxiliary equipment are fed from these two buses. UAT bus are provided tie from station bus. During startup operation, UAT bus will be charged through tie from station boards. During normal operation the power supply will change over from station tie to UAT.

3.1 Auxiliary power consumption

Power consumptions of plant auxiliaries connected to the Unit Auxiliary Transformer (UAT) were recorded during the unit test for each unit and bifurcation of power consumption was calculated and presented below,

Unit 3: -

Power consumption of auxiliaries during the test was found to be 24.85 MW when the gross generation was 245.97 MW which account to PLF of 98.39 %. This power consumption of auxiliaries accounts to 10.10 % of gross generation. Bifurcation of power consumption at each auxiliary as percentage of total power consumption is shown below.

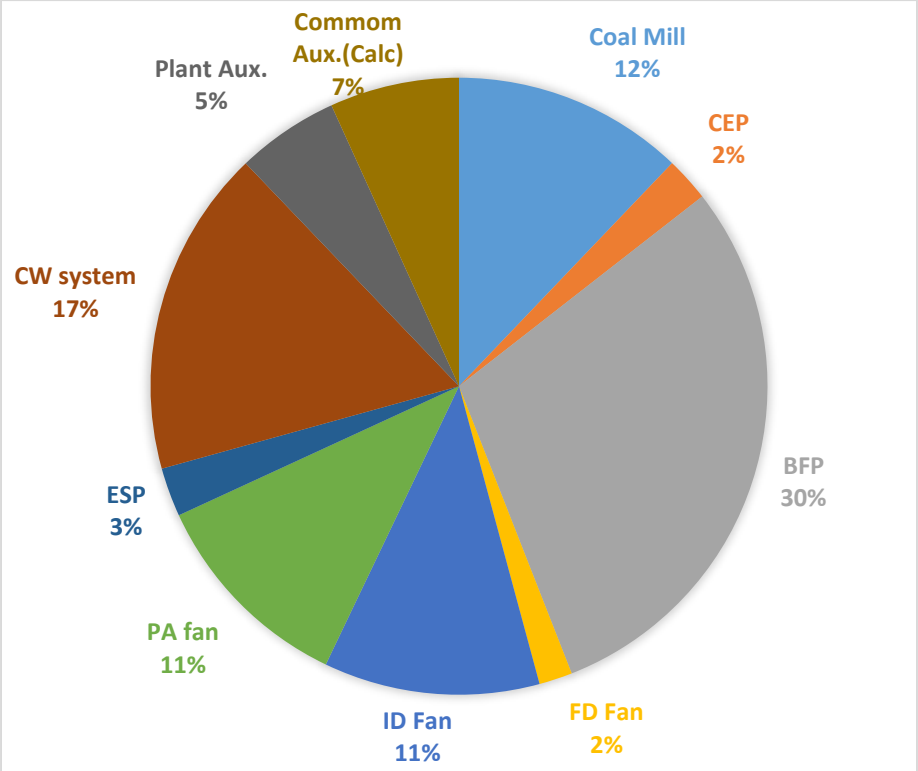


Power consumption of BFP accounts to 2.83 % of gross generation and it is 27.96 % of total auxiliary power consumption. Similarly, power consumption of CW system accounts to 1.64 % of gross generation and it is 16.19 % of total auxiliary power consumption. In third place, power consumption of ID Fan accounts to 1.37 % of gross generation and it is 13.55 % of total auxiliary power consumption.

Contribution of common auxiliaries such as CHP, AHP, WTP etc. is 0.71 % of gross generation and it is 7.07 % of total auxiliary power consumption. This is calculated by sharing the common auxiliary load based on the generation from the respective unit.

Unit 4: -

Power consumption of auxiliaries during the test was found to be 23.37 MW when the gross generation was 253.16 MW which account to PLF of 101.26 %. This power consumption of auxiliaries accounts to 9.23 % of gross generation. Bifurcation of power consumption at each auxiliary as percentage of total power consumption is shown below.



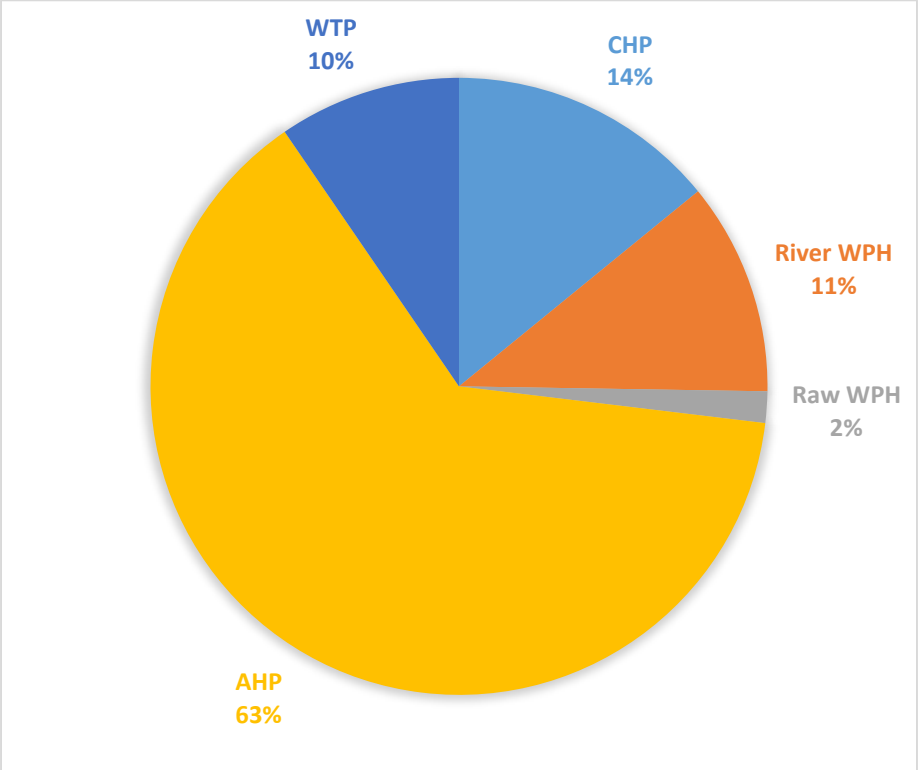
Power consumption of BFP system accounts to 2.72 % of gross generation and it is 29.50 % of total auxiliary power consumption. Similarly, power consumption of CW system accounts to 1.58 % of gross generation and it is 17.11 % of total auxiliary power consumption. In third place, power consumption of coal mills accounts to 1.12 % of gross generation and it is 12.10 % of total auxiliary power consumption.

Contribution of common auxiliaries such as CHP, AHP, WTP etc. is 0.65 % of gross generation and it is 7.05 % of total auxiliary power consumption. This is calculated by sharing the common auxiliary load based on the generation from the respective unit.

3.1.1 Common auxiliaries power consumption and total APC

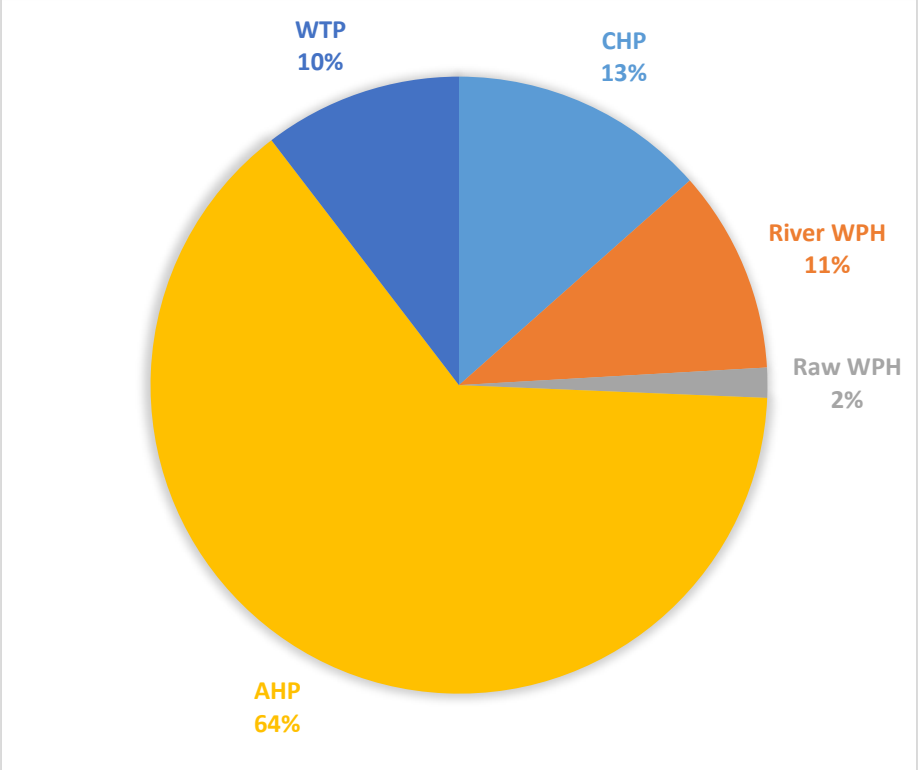
Power consumption in common auxiliaries such as CHP, WTP etc. which are connected to station transformer and other pump house has been attributed to different units based on the gross generation from the respective units. Estimated power consumption for common auxiliaries for different units are as follows,

Power consumption by common auxiliaries of Unit 3 is found to be 1500 kW (0.71 % of APC). Bifurcation of power consumption is shown below,



It is found that AHP's contribution is 63 % towards total common auxiliary's power and it is 14 % 11%, 10 % and 2 % for CHP, River WPH and RWP respectively.

Power consumption by common auxiliaries of Unit 4 is found to be 1576 kW (0.65 % of APC). Bifurcation of power consumption is shown below,



It is found that AHP's contribution is 64 % towards total common auxiliary's power and it is 13 % 11%, 10 % and 2 % for CHP, River WPH and RWP respectively.

Losses in the transformer has been calculated and accounted for Unit #3 and Unit #4 based on the design losses and losses are as follows,

Unit 3 : 0.24 %
Unit 4 : 0.25 %

Total APC for each unit was found by addition of power consumption by common auxiliaries, transformer losses and power consumption by UAT auxiliaries. Estimated total APC for each unit is given below,

Unit 3 : 10.35 % at a load factor of 98.39 %.
Unit 4 : 9.48 % at a load factor of 101.26 %.

3.1.2 APC at different PLFs

APC of each unit has been measured at partial load and APC trend with respect to PLF is obtained. Figure 1 to 3 shown the variation in APC with respect to PLF. APC of each unit at different PLF is derived from the curve and shown below,

PLF, %	APC, %	
	Unit #3	Unit #4
100	10.22	9.57
90	11.03	10.28
80	11.84	10.98
70	12.65	11.68
60	13.46	12.38

3.2 Auxiliary-wise Analysis and Observations

3.2.1 Boiler feed pumps (BFPs)- analysis of performance

Unit #3:

There are two Boiler Feed Pumps (BFP) of 9000 kW. One pumps will be continuously working and other will be stand-by. There are two Booster pumps, one will be working continuously and other will be stand-by. The Booster pumps are mounted on the same shaft of main pump. The feed water flow is controlled by scoop coupling. The performance Test is conducted on BFP during the energy audit study. The performance results of BFP are given in Table 1. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.452 to 6.485 kV and is normal. The voltage unbalance between 3-phases at motor terminals is about 0.26 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.96 % and is normal.
c) The power factor of BFP motor is varying between 0.93 – 0.94 and is normal.
d) The load factor of BFP motors is computed by taking the ratio of BFP motor output and rating of BFP. The load factor of BFP is computed as 72.00 % and enough margin is available for BFP motors.

e) The BFP efficiency is computed as 46.25 % as against to the design value of 78 % (considering an efficiency of 95.1 % for the motor).
f) The specific energy consumption (SEC) of BFP is computed in the range of 8.40 kWh/t of FW flow and is higher than the design value of 6.57 kWh/t of FW.
g) The overall auxiliary power used by BFP forms 2.83 % of total plant load. **Recommendations:** It is suggested to check the passing in re-circulation by-pass valve. For improving the efficiency of pumps, overhauling of pump can be done and clearances between impeller and casing can be checked. This will reduce the ***energy consumption by 795.73 MWh/month*** if the efficiency can be brought to 55 % or above.
h) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.

Unit #4:

There are two Boiler Feed Pumps (BFP) of 9000 kW. One pumps will be continuously working and other will be stand-by. There are two Booster pumps, one will be working continuously and other will be stand-by. The Booster pumps are mounted on the same shaft of main pump. The feed water flow is controlled by scoop coupling. The performance Test is conducted on BFP during the energy audit study. The performance results of BFP are given in Table 1. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.678 to 6.720 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.32 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 2.33 % and is normal.
c) The power factor of BFP motor is varying between 0.92 – 0.93 and is normal.
d) The load factor of BFP motors is computed by taking the ratio of BFP motor output and rating of BFP. The load factor of BFP is computed as 71.43 % and enough margin is available for BFP motors.
e) The BFP efficiency is computed as 46.42 % as against to the design value of 78 % % (considering an efficiency of 95.1 % for the motor). The efficiencies are on lower side.

f) The specific energy consumption (SEC) of BFP is computed in the range of 8.88 kWh/t of FW flow and is higher than the design value of 6.57 kWh/t of FW.

g) The overall auxiliary power used by BFP forms 2.72 % of total plant load. **Recommendations:** It is suggested to check the passing in re-circulation by-pass valve. For improving the efficiency of pumps, overhauling of pump can be done and clearances between impeller and casing can be checked. This will reduce the ***energy consumption by 774.64 MWh/month*** if the efficiency can be brought to 55 % or above.

h) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.

3.2.2 Condensate Extraction pumps (CEPs)- analysis of performance

Unit #3:

There are two Condensate Extraction Pumps (CEP) of 650 kW. One pumps will be continuously working and other will be stand-by. The performance Test is conducted on CEPs during the study. Table 2 gives the performance results of condensate extraction pumps during the performance test. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.403 to 6.760 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.28 – 0.32 % and is normal.

b) The current unbalance between 3-phases at motor terminals is 0.88 - 1.45 % and is normal.

c) The power factor of CEP motor is varying between 0.88 – 0.90 and is normal.

d) The load factor of CEP motors is computed by taking the ratio of CEP motor output and rating of CEP motor. The load factors of CEPs are in the range of 75.34 – 76.04 %.

e) The CEP pump efficiency is computed as 68.04 – 68.36 % and is lower than the design value of 76.6 % (considering an efficiency of 95.1 % for the motor).

f) The specific energy consumption (SEC) of CEP is computed in the range of 0.85 – 0.86 kWh/t of condensate flow and is higher than the design value of 0.71 kWh/t.
g) The overall auxiliary power used by CEP forms 0.22 % of total plant load and is on par with other similar units.
h) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.

Unit #4:

There are two Condensate Extraction Pumps (CEP) of 650 kW. One pumps will be continuously working and other will be stand-by. The performance Test is conducted on CEPs during the study. Table 2 gives the performance results of condensate extraction pumps during the performance test. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.801 to 6.872 kV and is good. The voltage unbalance between 3-phases at motor terminals is in the range of 0.22 - 0.51 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.34 - 2.65 % and is normal.
c) The power factor of CEP motor is varying between 0.87 – 0.89 and is normal.
d) The load factor of CEP motors is computed by taking the ratio of CEP motor output and rating of CEP motor. The load factor of CEP is 74.38 – 74.91 %.
e) The CEP pump efficiency is computed as 67.27 – 68.82% and is lower than the design value of 76.6 % (considering an efficiency of 95.1 % for the motor).
f) The specific energy consumption (SEC) of CEP is computed in the range of 0.839 – 0.844 kWh/t of condensate flow and is on higher side compared to design value of 0.71 kWh/t of condensate flow due to lower pump efficiency.
g) The overall auxiliary power used by CEP forms 0.21 % of total plant load and is on par with other similar units.
h) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.

3.2.3 ID Fan

Unit #3:

There are two Induced Draft Fans (IDF) of 2173 kW and both fans will be working continuously. The ID fans are regulated with the help of VFD and inlet damper. The performance Test is conducted on ID fans during the study. The performance results are given in Table 3. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.407 to 6.772 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.28 – 0.29 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.59 – 4.04 % and is normal.
c) The power factor of ID fan motors is varying between 0.77 – 0.89 and is normal.
d) The load factor of ID fan motors is computed by taking the ratio of motor output and rating. The load factor of ID fan motors is varying between 70.43 to 74.51 %.
e) The ID fan efficiencies are computed in the range of 24.28 % to 39.79 %. The ID fan efficiencies are on lower side may be due to high air leakage through APH and air ingress in the flue gas duct.
f) The overall auxiliary power used by ID Fans forms 1.37 % of total plant load.
g) The increased power in ID fans due to APH air leakage is 126.53 kW and due to ingress in flue gas duct from APH outlet to ID outlet is 1060.27 kW. These increased powers form 0.48 % of generation. **Recommendation**: It is suggested to arrest the air ingress in flue gas duct and in APH.

Unit #4:

There are two Induced Draft Fans (IDF) of 2173 kW and both fans will be working continuously. The ID fans are regulated with the help of VFD and inlet damper. The performance Test is conducted on ID fans during the study. The performance results are given in Table 4. The observations and suggestions from the energy audit study

are as follows:

a) The voltage at motor terminals is varying between 6.643 to 6.845 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.26 - 0.40 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.40 – 2.57 % and is normal.
c) The power factor of ID fan motors is varying between 0.83 – 0.90 and is normal.
d) The load factor of ID fan motors is computed by taking the ratio of motor output and rating. The load factor of ID fan motors is varying between 53.41 to 60.01 %.
e) The ID fan efficiencies are computed in the range of 26.39 % to 31.66 %. The ID fan efficiencies are on lower side may be due to high air leakage through APH and air ingress in the flue gas duct.
f) The overall auxiliary power used by ID Fans forms 1.04 % of total plant load.
g) The increased power in ID fans due to ingress in flue gas duct from APH outlet to ID outlet is 547.94 kW. These increased powers form 0.21 % of generation. **Recommendation**: It is suggested to arrest the air ingress in flue gas duct.

3.2.4 FD Fan

Unit #3:

There are two numbers of 825 kW FD fans of axial flow fans with blade pitch control and both fans will be working continuously. The performance Test is conducted on FD fans during the energy audit study. The performance results are given in Table 5. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.407 to 6.772 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.28 – 0.29 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.91 - 3.18 % and is normal.

c) The power factor of FD fan motors is varying between 0.55 – 0.73 and is on lower side due to under loading of the motor.
d) The load factor of FD fan motors is computed by taking the ratio of motor output and rating. The load factor of FD fan motors is 18.32 – 27.86 %. **Recommendation**: It is suggested to install variable frequency drives (VFD) for FD fans since the loading on FD fans is very low.
e) The FD fan discharge pressure is in the range of 128.18 – 133.7 mmWC and is lower than the design value of 281 mmWC at 100 % MCR condition. This will reduce the furnace to windbox DP. **Recommendations:** It is suggested to increase the FD fan discharge pressure near to its design. Also the windbox DP may be optimized to reduce the furnace ingress.
f) The FD fan efficiency is in the range of 30.44 – 31.75 %. The FD fan efficiency is on lower side may be due to partial loading, increased air leakage through APH, higher pressure drop across air ducts.
g) The specific energy consumption (SEC) of FD fan is computed as 0.98 kWh/t of secondary air flow and is lower than the design value of 2.19 kWh/t of secondary air flow may be due to lower efficiency of fans.
h) There are no limitations from FD fans to operate plant to its 100 % MCR.
i) The increased power in FD fans due to APH air leakage is 22.58 kW. This increased power form 0.01 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

Unit #4:

There are two numbers of 825 kW FD fans of axial flow fans with blade pitch control and both fans will be working continuously. The performance Test is conducted on FD fans during the energy audit study. The performance results are given in Table 6. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.643 to 6.845 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.26 - 0.40 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 2.41 – 2.50 % and is normal.

c) The power factor of FD fan motors is varying between 0.61 – 0.67 and is on lower side due to under loading of motor.
d) The load factor of FD fan motors is computed by taking the ratio of motor output and rating. The load factor of FD fan motors is 21.96 – 24.98 %. **Recommendation**: It is suggested to install variable frequency drives (VFD) for FD fans since the loading on FD fans is very low.
e) The FD fan discharge pressure is in the range of 123.08 – 136.5 mmWC and is lower than the design value of 281 mmWC at 100 % MCR condition. This will reduce the furnace to windbox DP. **Recommendations:** It is suggested to increase the FD fan discharge pressure near to its design. Also the windbox DP may be optimized to reduce the furnace ingress.
f) The FD fan efficiency is in the range of 33.00 – 36.60 %. The FD fan efficiency is on lower side may be due to partial loading, higher pressure drop across air ducts.
g) The specific energy consumption (SEC) of FD fan is computed as 0.88 kWh/t of secondary air flow and is lower than the design value of 2.19 kWh/t of secondary air flow may be due to lower efficiency of fans.
h) There are no limitations from FD fans to operate plant to its 100 % MCR.

3.2.5 PA Fan

Unit #3:

There are two Primary Air fans of 1525 kW with inlet guide vane control to provide the primary air to mills. The performance Test is conducted on PA fans during the study. The performance results are given in Table 7. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.407 to 6.772 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.28 – 0.29 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.28 – 1.80 % and is normal.

c) The power factor of PA fan motors is varying between 0.93 – 0.94 and is normal.
d) The load factor of PA fan motors is computed by taking the ratio of motor output and rating. The load factor of PA fan motors is varying between 82.75 % to 84.37 %.
e) PA fan discharge pressure was varying between 911.38 – 916.94 mmWC and is in par with the design value of 928 mmWC. The discharge pressure is normal.
f) The PA fan efficiencies are computed in the range of 20.29 – 20.42 %. The PA fan efficiencies are on lower side.
g) The specific energy consumption (SEC) of PA fans is computed as 10.46 kWh/t of primary air flow and is higher than the design value of 5.09 kWh/t of primary air flow.
h) The increased power in PA fans due to APH air leakage is 190.73 kW. This increased power form 0.08 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

Unit #4:

There are two Primary Air fans of 1525 kW with inlet guide vane control to provide the primary air to mills. The performance Test is conducted on PA fans during the energy audit study. The performance results are given in Table 8. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.643 to 6.845 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.26 - 0.40 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 2.09 % to 3.29 % and is normal.
c) The power factor of PA fan motors is varying between 0.92 – 0.94 and is normal.
d) The load factor of PA fan motors is computed by taking the ratio of motor output and rating. The load factor of PA fan motors is varying between 78.32 % to 81.88 %.
e) PA fan discharge pressure was varying between 929.78 – 936.86 mmWC and is in par with the design value of 928 mmWC. The discharge pressure is normal.

f) The PA fan efficiencies are computed in the range of 21.27 – 21.43 %. The PA fan efficiencies are on lower side.
g) The specific energy consumption (SEC) of PA fans is computed as 10.27 kWh/t of primary air flow and is higher than the design value of 5.09 kWh/t of primary air flow.

3.2.6 Mills

Unit #3:

There are three Mills of 2400 kW, BBD 4772 Ball & Tube mills, two mills will be working continuously and other mill will be stand-by to meet 100 % MCR load. The performance Test is conducted on Mills during the energy audit study. The performance results are given in Table 9. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.407 to 6.772 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.28 – 0.29 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.58 % to 1.59 % and is normal.
c) The power factor of Mill motors is varying between 0.82 – 0.85.
d) The coal flow in each mill is varying between 40.06 – 43.52 t/h (the design coal flow: 45 t/h). The mill loading based on coal flow is varying between 89.02 % to 96.71 %.
e) The SEC of mills is varying between 16.06 – 17.48 kWh/t of coal.
f) The air to fuel ratio in mills is varying between 1.50 – 1.53.

Unit #4:

There are three Mills of 2400 kW, BBD 4772 Ball & Tube mills, two mills will be working continuously and third mill will be stand-by to meet 100 % MCR load. The performance Test is conducted on Mills during the energy audit study. The performance results are given in Table 10. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.643 to 6.845 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.26 - 0.40 % and is normal.
g) The current unbalance between 3-phases at motor terminals is 2.32 % to 2.52 % and is normal.
b) The power factor of Mill motors is varying between 0.78 – 0.85.
c) The coal flow in each mill is varying between 38.47 – 44.46 t/h (the design coal flow: 45 t/h). The mill loading based on coal flow is varying between 85.50 % to 86.53 %.
d) The SEC of mills is varying between 16.65 – 17.10 kWh/t of coal.
e) The air to fuel ratio in mills is varying between 1.40 – 1.59.

3.2.7 Network- analysis of performance

The observations from the study are as follows:

a) The cables are laid in cable trays and cable glands are used.
b) All the panels and cable glands are provided with earth.
c) Dust accumulation was observed inside the panels. **Recommendations:** It is suggested to clean all the HT and LT panels during overhaul.

There are no limitations of electrical network system in increasing the load to 100 % MCR.

3.2.8 Cooling Water System

Cooling water system for Unit 3 and Unit 4 constitute 3 Condenser Cooling Water (CW Pump) and 2 Auxiliary Cooling Water Pump (ACWP) for each unit. Performance of each pump set was assessed by measuring water discharge, input power and developed head across the pump during its operation. Performance of each pump set was assessed by measuring water discharge, input power and developed head across the pump during its operation

Unit 3: -

Performance results of CWPs and ACWPs associated with Unit 3 is shown in table 11. Efficiencies (motor pump) of CWPs and ACWPs are listed below,

CWP – A	:	73.69 %	,	ACWP – A	:	68.53 %
CWP – B	:	58.33 %	,	ACWP – B	:	72.77 %
CWP – C	:	56.85 %				

Efficiencies of CWP A found to be god and it is 73.69 %. Efficiencies of CWP B and CWP C are on lower side and it is in the range of 56.88 % to 58.33 %. Efficiencies of ACW Pumps are found to be in the range of 68.53 % to 72.77 %.

Unit 4: -

Performance results of CWPs and ACWPs associated with Unit 4 is shown in table 12. Efficiencies (motor pump) of CWPs and ACWPs are listed below,

CWP – A	:	59.68 %	,	ACWP – A	:	59.79 %
CWP – B	:	58.13 %	,	ACWP – B	:	47.12 %
CWP – C	:	56.41 %				

Efficiencies of CWPs are on lower side and it is in the range of 56.41 % to 59.68 %. Efficiency of ACWP A is 59.79 %. Efficiency of ACWP B is 47.12 % and it is very poor.

3.2.9 Compressed air system

Unit 3 has 3 Instrument Air Compressors (IAC) and 3 Service Air Compressors (SAC) installed. 1 IACs and 2 SAC are under operation normally. Unit 4 has 3 Instrument Air Compressors (IAC) and 3 Service Air Compressors (SAC) installed. 2 IAC and 1 SAC are under operation normally. Contribution towards APC by compressor system for each unit are given below,

Unit 3: 0.13 %
Unit 4: 0.19 %

3.3 Loading condition of ID fan, PA fan and other unit auxiliaries.

Unit 3: - ID fans are loaded in the range of 70.43 % to 74.51 %. PA fans are loaded in the range of 82.75 % to 84.37 %. FD fans are loaded in the range of 18.32 % to 27.86 %. Coal mills are loaded in the range of 54.68 % to 57.89 %.

Unit 4: - ID fans are loaded in the range of 53.41 % to 60.01 %. PA fans are loaded in the range of 78.32 % to 81.88 %. FD fans are loaded in the range of 21.96 % to 24.98 %. Coal mills are loaded in the range of 54.72 % to 57.34 %.

There is no limitation on unit auxiliaries to run the units at 100 % PLF.

3.4 Flue gas analysis and observation

Unit 3: -

Details of percentage of oxygen measured at different location of flue gas path and leakage across different sections are shown in Table 13 and 14. Air ingress to the flue gas path across the APH is 20.30 % in path A and 7.95 % in path B. Air ingress to the flue gas path from APH outlet to the ESP inlet is 36.80 % in path A and 38.86 % in path B. Air ingress across ESP is 10.38 % in path A and 6.82 % in path B. Air ingress to the flue gas path from ESP outlet to the ID outlet is negligible. Overall ingress to flue gas is 83.33 % in path A and 40.34 % in path B.

Unit 4: -

Details of percentage of oxygen measured at different location of flue gas path and leakage across different sections are shown in Table 13 and 14. Air ingress to the flue gas path across the APH is 4.68 % in path A and 2.87 % in path B. Air ingress to the flue gas path from APH outlet to the ESP inlet is 31.50 % in path A and 30.65 % in path B. Air ingress across ESP is 1.78 % in path A and negligible in path B. Air ingress to the flue gas path from ESP outlet to the ID outlet is negligible. Overall ingress to flue gas is 60.87 % in path A and 34.49 % in path B.

3.5 Energy savings and achievable APC for the units

Possible savings has been discussed in respective sections. Consolidated values of saving in BFP, FD fan, ID fan and PA fan are given below,

Auxiliaries	Unit 3	Unit 4
BFP	0.45	0.42
FD Fan	0.01	Nil
ID Fan	0.48	0.22
PA fan	0.08	Nil

Achievable values of APC for each unit at different plant load are shown below,

PLF, %	APC, %		
	Unit 3	Unit 4	**Station**
100	9.20	8.93	9.07
90	10.01	9.64	9.83
85	10.42	10.00	10.21
80	10.82	10.36	10.59
70	11.64	11.07	11.36
60	12.45	11.79	12.12

4.0 CONCLUSIONS

- Present APCs of different units were calculated at different PLF based on the test carried out on the units and given below.

PLF, %	**APC, %**	
	Unit #3	**Unit #4**
100	10.22	9.52
90	11.03	10.24
80	11.84	10.95
70	12.65	11.67
60	13.46	12.38

- The performance tests were carried out at maximum achievable loads by the units. Following are the measured APCs of different units during the test,

Sl. No.	Unit number	Total APC	Test load (MW)
1	Unit # 3	10.35 %	245.97
2	Unit # 4	9.48 %	253.16

- It is found that all in-house auxiliaries are loaded to optimum level during the unit test and there is no limitation for the units to operate at its 100 % MCR
- Overall air ingress to flue gas is 83.33 % in path A and 40.34 % in path B.
- Overall air ingress to flue gas is 60.87 % in path A and 34.49 % in path B.
- Possible savings in the APC for Unit # 3 is found to be 1.02 %.
- Possible savings in the APC for Unit # 4 is found to be 0.64 %.
- Achievable values of APC for each unit at different plant load are shown below,

PLF, %	APC, %		
	Unit 3	Unit 4	**Station**
100	9.20	8.93	9.07
90	10.01	9.64	9.83
85	10.42	10.00	10.21
80	10.82	10.36	10.59
70	11.64	11.07	11.36
60	12.45	11.79	12.12

Annexure 1 – Figures

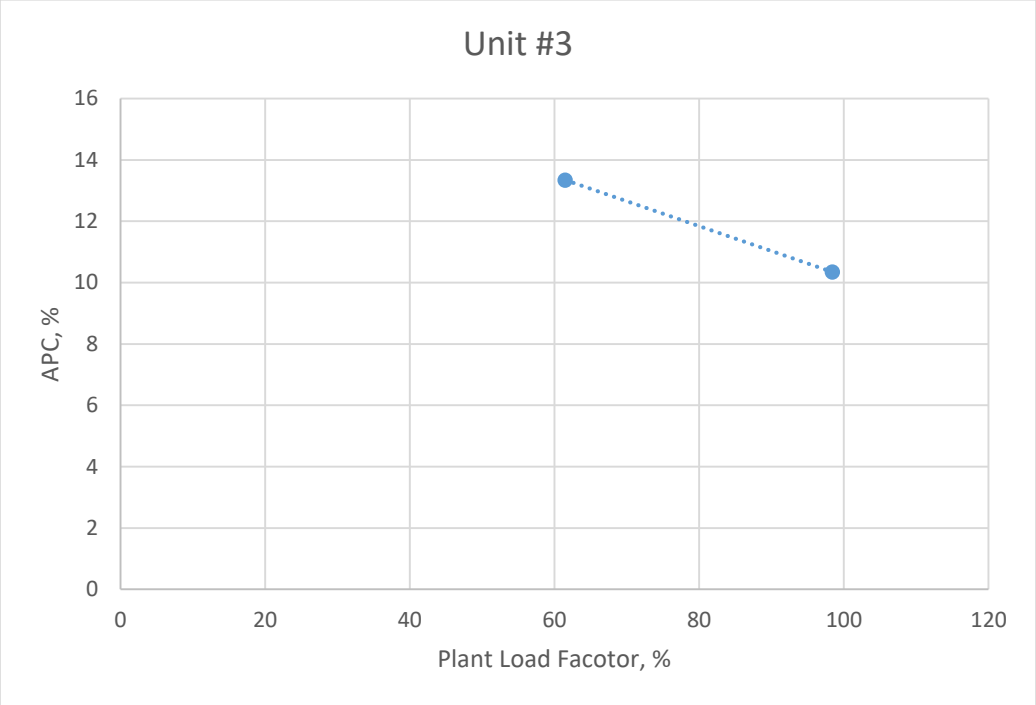


Figure 1: Variation in APC with respect to the PLF

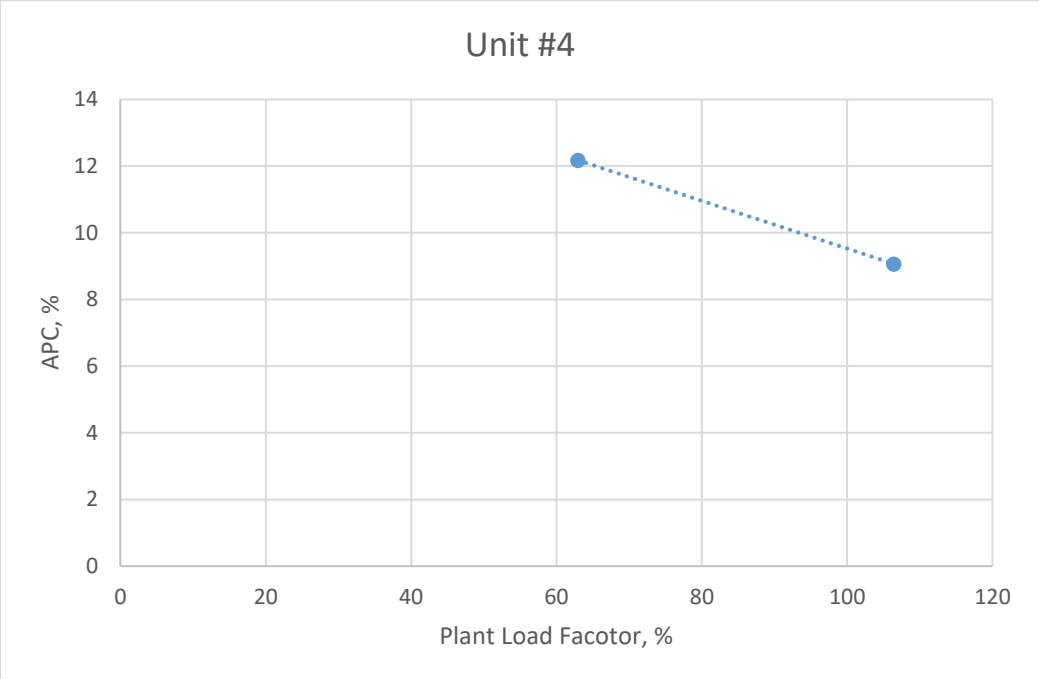


Figure 2: Variation in APC with respect to the PLF

Annexure 2 – Tables

Table 1: Performance results of Boiler feed pumps at Unit 3 & 4.

Sl. No.	Particulars	Unit	BFP-3A	BFP-4B
1	Motor output rating	kW	9000	9000
2	Measured input power	kW	6950.0	6895.0
3	Total discharge flow	t/h	827.67	776.28
4	Suction pressure	kgf/cm2	24.01	25.67
5	Discharge pressure	kgf/cm2	166.59	177.02
6	Total pressure developed	kgf/cm2	142.58	151.35
7	**Motor + pump efficiency**	**%**	**46.25**	**46.42**
8	Motor load factor	%	72.00	71.43
9	SEC	kWh/t	8.40	8.88

Table 2: Performance results of Condensate Extraction Pumps at Unit 3 & 4.

Sl. No.	Particulars	Unit	CEP-3A	CEP-3B	CEP-4A	CEP-4B
1	Motor output rating	kW	650	650	650	650
2	Measured input power	kW	544.10	549.20	541.00	537.20
3	Total discharge flow	t/h	635.42	644.40	640.86	640.03
4	Suction pressure	kgf/cm2	-0.89	-0.89	-0.93	-0.93
5	Discharge pressure	kgf/cm2	20.5	20.5	20.4	19.8
6	Total pressure developed	kgf/cm2	21.39	21.39	21.33	20.73
7	**Motor + pump efficiency**	**%**	**68.04**	**68.36**	**68.82**	**67.27**
8	Motor load factor	%	75.34	76.04	74.91	74.38
9	SEC	kWh/t	0.86	0.85	0.84	0.84

Table 3: Performance results of Induced draft fans at Unit 3

Sl. No.	Particular	Unit	IDF-3A	IDF-3B
1	Suction Pressure	mmWc	-321.33	-466.05
2	Discharge Pressure	mmWc	-1.98	103.41
3	Pressure developed	mmWc	319.35	569.46
4	Flue gas temperature	^oC	133.3	138
5	Flue gas flow	t/h	388.33	373.15
6	Electrical power	kW	1636.90	1731.70
7	Flue gas density	kg/m^3	0.85	0.84
8	Mechanical power	kW	397.43	689.11
9	**Overall (fan+motor) efficiency**	**%**	**24.28**	**39.79**
10	SEC	kWh/t	4.22	4.64

Table 4: Performance results of Induced draft fans at Unit 4

Sl. No.	Particular	Unit	IDF-4A	IDF-4B
1	Suction Pressure	mmWc	-308.51	-312.99
2	Discharge Pressure	mmWc	5.28	46.48
3	Pressure developed	mmWc	313.79	359.47
4	Flue gas temperature	^oC	123.8	147.3
5	Flue gas flow	t/h	337.24	369.75
6	Electrical power	kW	1241.30	1394.56
7	Flue gas density	kg/m^3	0.88	0.82
8	Mechanical power	kW	327.57	441.54
9	**Overall (fan+motor) efficiency**	**%**	**26.39**	**31.66**
10	SEC	kWh/t	3.68	3.77

Table 5: Performance results of Forced draft fans at Unit 3.

Sl. No.	Particular	Unit	FDF-3A	FDF-3B
1	Suction Pressure	mmWc	0	0
2	Discharge Pressure	mmWc	133.7	128.18
3	Pressure developed	mmWc	133.7	128.18
4	secondary air temperature	^oC	30.5	30.5
5	secondary air flow	t/h	162.07	246.52
6	Electrical power	kW	158.90	241.70
7	secondary air density	kg/m^3	1.17	1.17
8	Mechanical power	kW	50.45	73.57
9	**Overall (fan+motor) efficiency**	**%**	**31.75**	**30.44**
10	SEC	kWh/t	0.98	0.98

Table 6: Performance results of Forced draft fans at Unit 4.

Sl. No.	Particular	Unit	FDF-4A	FDF-4B
1	Suction Pressure	mmWc	0	0
2	Discharge Pressure	mmWc	136.50	123.08
3	Pressure developed	mmWc	136.50	123.08
4	secondary air temperature	^oC	33.2	33.2
5	secondary air flow	t/h	247.42	217.50
6	Electrical power	kW	216.70	190.50
7	secondary air density	kg/m^3	1.16	1.16
8	Mechanical power	kW	79.31	62.87
9	**Overall (fan+motor) efficiency**	**%**	**36.60**	**33.00**
10	SEC	kWh/t	0.88	0.88

Table 7: Performance results of Primary air fans at Unit 3.

Sl. No.	Particular	Unit	PAF-3A	PAF-3B
1	Suction Pressure	mmWc	0	0
2	Discharge Pressure	mmWc	911.38	916.94
3	Pressure developed	mmWc	911.38	916.94
4	Primary air temperature	^oC	30.5	30.5
5	Primary air flow	t/h	129.40	126.92
6	Electrical power	kW	1353	1327
7	Primary air density	kg/m^3	1.17	1.17
8	Mechanical power	kW	274.59	270.95
9	**Overall (fan+motor) efficiency**	**%**	**20.29**	**20.42**
10	SEC	kWh/t	10.46	10.46

Table 8: Performance results of Primary air fans at Unit 4.

Sl. No.	Particular	Unit	PAF-4A	PAF-4B
1	Suction Pressure	mmWc	0	0
2	Discharge Pressure	mmWc	936.86	929.78
3	Pressure developed	mmWc	936.86	929.78
4	Primary air temperature	^oC	33.2	33.2
5	Primary air flow	t/h	122.34	127.90
6	Electrical power	kW	1256	1313
7	Primary air density	kg/m^3	1.16	1.16
8	Mechanical power	kW	269.16	279.25
9	**Overall (fan+motor) efficiency**	**%**	**21.43**	**21.27**
10	SEC	kWh/t	10.27	10.27

Table 9: Performance results of Mills at Unit 3.

Sl. No.	Particulars	Unit	Coal Mill AB	Coal Mill EF
1	PA flow	t/h	128.65	127.69
2	Coal flow	t/h	85.91	83.58
3	Air to Fuel ratio	-	1.50	1.53
4	Coal - air mixture temp.	^oC	67.42	66.22
5	Power	kW	1380.00	1461.00
6	SEC	kWh/t of coal	16.06	17.48

Table 10: Performance results of Mills at Unit 4.

Sl. No.	Particulars	Unit	Coal Mill AB	Coal Mill EF
1	PA flow	t/h	115.97	134.3
2	Coal flow	t/h	82.93	84.64
3	Air to Fuel ratio	-	1.40	1.59
4	Coal - air mixture temp.	^{o}C	81.15	81.5
5	Power	kW	1381.00	1447.00
6	SEC	kWh/t of coal	16.65	17.10

Table 11: Performance results of Cooling Water Pumps & Auxiliary Cooling Water Pumps of Unit 3.

Sl. No.	Particulars	Unit	CWP-A	CWP-B	CWP-C	ACWP-A	ACWP-B
1	Motor output rating	kW	1650	1650	1650	630	630
2	Measured input power	kW	1724.00	1793.00	1814.00	506.10	480.00
3	Total discharge flow	t/h	18288.00	15480.00	15204.00	2169.02	2199.37
4	Suction pressure	kgf/cm2	-0.38	-0.38	-0.38	-0.34	-0.34
5	Discharge pressure	kgf/cm2	2.17	2.10	2.11	5.53	5.49
6	Total pressure developed	kgf/cm2	2.55	2.48	2.49	5.87	5.83
7	**Motor + pump efficiency**	**%**	**73.69**	**58.33**	**56.85**	**68.53**	**72.77**
8	Motor load factor	%	90.90	94.54	95.65	69.89	66.29
9	SEC	kWh/t	0.09	0.12	0.12	0.23	0.22

Table 12: Performance results of Cooling Water Pumps & Auxiliary Cooling Water Pumps of Unit 4.

Sl. No.	Particulars	Unit	CWP-A	CWP-B	CWP-C	ACWP-A	ACWP-B
1	Motor output rating	kW	1650	1650	1650	630	630
2	Measured input power	kW	1768.00	1683.00	1690.00	552.80	493.50
3	Total discharge flow	t/h	15012.00	14196.00	13944.00	1932.00	1404.00
4	Suction pressure	kgf/cm2	-0.36	-0.36	-0.36	-0.40	-0.40
5	Discharge pressure	kgf/cm2	2.22	2.17	2.15	5.88	5.68
6	Total pressure developed	kgf/cm2	2.58	2.53	2.51	6.28	6.08
7	**Motor + pump efficiency**	**%**	**59.68**	**58.13**	**56.41**	**59.79**	**47.12**
8	Motor load factor	%	93.22	88.74	89.11	76.34	68.15
9	SEC	kWh/t	0.12	0.12	0.12	0.29	0.35

Table 13. Percentage of oxygen measured at different locations of flue gas path in Unit 3 & Unit 4

Location	Unit # 3		Unit # 4	
	A	B	A	B
APH Inlet	2.7	3.65	4.1	3.9
APH Outlet	6.05	5.05	4.93	4.425
ESP Inlet	10.36	9.83	9.07	8.61
ESP Outlet	11.45	10.61	9.3	8.61
IDF Outlet	11.45	10.61	9.3	8.61

Table 14. Percentage of leakage at different locations of flue gas path in Unit 3 & Unit 4

Location	Unit # 3		Unit # 4	
	A	B	A	B
Across APH	20.30	7.95	4.68	2.87
APH Outlet to ESP Inlet	36.80	38.86	31.50	30.65
Across ESP	10.38	6.82	1.78	Nil
ESP Outlet to IDF Outlet	Nil	Nil	Nil	Nil

FINAL REPORT OF

DETAILED STUDY OF AUXILIARY POWER CONSUMPTION OF UNIT #6, 7 AND 8

Conducted at

PARLI THERMAL POWER STATOIN

REPORT NO.: CPRI/ERED/EA/221/24

(Work order No.: PRLTPS/4550021222 dated 19/1/2024)

Project code: CPRI/CS&CD/2023-24/ERED/C/10

Study conducted by

June 2024

Energy Efficiency and Renewable Energy Division

Central Power Research Institute

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Report no.	CPRI/ERED/EA/221/24	
Date of issue of report	10 June 2024	
Signature of Energy Audit team leader		
Signature of the division head		

ACKNOWLEDGEMENT

CPRI is thankful to **Parli Thermal Power Station** for placing the work order for 'Detailed study of auxiliary power consumption of Unit #6, #7 and #8' and making the necessary arrangements for conducting the study at Parli Thermal Power Station, Maharashtra.

We thank the all officials of Parli Thermal Power Station, Maharashtra for their excellent co-operation, valuable help and arrangements made during the conduct of the study.

CPRI also thank all other staff of Parli Thermal Power Station, Maharashtra for extending excellent co-operation during the conduct of the study.

EXECUTIVE SUMMARY

The detailed auxiliary power consumption (APC) audit was conducted in February 2024. The work at the site consisted of measurement of input and output variables of different equipment and auxiliary loads in the plant by conducting performance tests.

- Present APCs of different units were calculated at different PLF based on the test carried out on the units and given below,

PLF, %	**APC, %**		
	Unit #6	**Unit #7**	**Unit #8**
100	10.54	10.55	9.72
90	11.42	11.13	10.33
80	12.31	11.70	10.94
70	13.19	12.28	11.54
60	14.07	12.85	12.15

- Overall air ingress in unit 6 flue gas path is found to be 64.83 % in path A and 37.66 % in path B.
- Overall air ingress in unit 7 flue gas path is found to be 46.08 % in path B.
- Overall air ingress in unit 8 flue gas path is found to be 51.09 % in path A and 54.07 % in path B.
- Possible savings in the APC for Unit # 6 is found to be 1.13 %.
- Possible savings in the APC for Unit # 7 is found to be 0.67 %.
- Possible savings in the APC for Unit # 8 is found to be 1.02 %.
- Achievable values of APC for each unit at different plant load are shown below,

PLF, %	APC, %			
	Unit 6	Unit 7	**Stage III**	**Unit 8**
100	9.40	9.87	**9.64**	**8.52**
90	10.34	10.51	**10.43**	**9.18**
80	11.28	11.15	**11.21**	**9.85**
70	12.22	11.79	**12.00**	**10.51**
60	13.16	12.43	**12.79**	**11.17**

Nominal achievable APC for stage III (Unit # 6 & 7) at 85 % PLF: 10.82 %

Nominal achievable APC for Unit # 8 at 85 % PLF : 9.51 %

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1.0 INTRODUCTION

This section introduces the plant, equipment & process and defines the scope of the work.

1.1 Parli Thermal Power Station

The Maharashtra State Power Generation Corporation Ltd. (MSPGCL) had established coal fired thermal power stations of 30 MW x 2 units (Unit 1 & 2), 210 MW x 3 units (Unit 3 to 5) and 250 MW x 3 units (Unit 6 to 8) at Parli. Unit 1 to unit 5 have been decommissioned and now unit 6 to unit 8 are operational. So, the total installed capacity is 750 MW. The auxiliary power consumption audit study is carried out for unit 6 to unit 8.

1.2 Scope of the work

The scope of the work is given below:

- Detailed analysis of power consumed by different auxiliaries such as unit related auxiliaries and common auxiliaries.
- Conducting performance testing on each unit to ascertain its performance.
- Suggesting measures to reduce auxiliary consumption & improve availability factor.
- Preparation of detailed study report based on the finding during the field study.

2.0 WORK CARRIED OUT

The detailed auxiliary power consumption (APC) audit was conducted in ***February 2024.*** The work at the site consisted of measurement of input and output variables of different equipment and auxiliary loads in the plant by conducting performance tests. The performance tests were carried out at following plant loads,

Unit 6 – 247.58 MW
Unit 7 – 248.64 MW
Unit 8 – 250.20 MW

The data is processed at CPRI to evaluate auxiliary power consumption (APC) and possible improvement in the APC. Preliminary findings from the study are discussed in upcoming parts of the report.

3.0 OBSERVATIONS AND STUDY RESULTS

The installed generation capacity of the Parli Thermal Power Station is 750 MW (250 MW x 3 units).

At stage III consists of 2 x 250 MW (Unit #6 and #7) units and stage IV consists of 1 x 250 MW (Unit #8) unit. The generator terminal voltage is 16.5 kV and is stepped up to 220 kV by Generator transformer of 315 MVA at Units 6 and 7. The grid voltage of 220 kV is stepped down to 6.6 kV by station transformers of 50 MVA for stage III and 35 MVA for stage IV to provide the auxiliary power to common auxiliaries and power during start up. During normal running of the plant, the auxiliary power is supplied by two numbers of Unit Auxiliary Transformers (UAT) of 20 MVA at each unit.

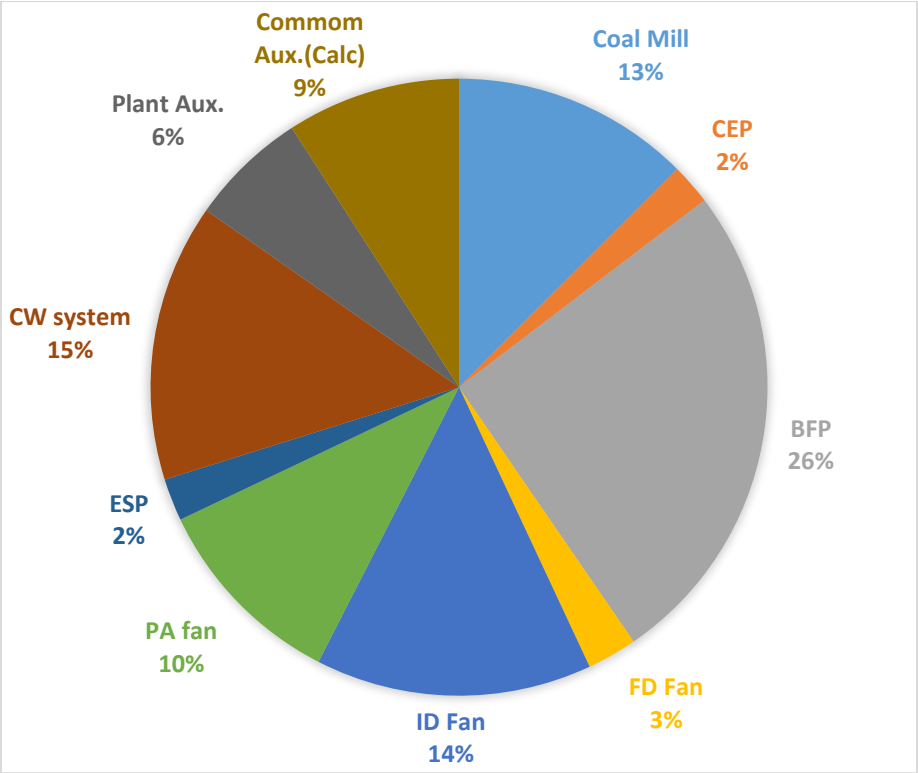
The secondary of UATs is fed to individual 6.6 kV Bus (i.e., UAT ‘A’ and UAT ‘B’ Bus). The HT major auxiliary equipment are fed from these two Bus. UAT bus are provided tie from station bus. During startup operation, UAT bus will be charged through tie from station boards. During normal operation the power supply will change over from station tie to UAT.

3.1 Auxiliary power consumption

Power consumptions of plant auxiliaries connected to the Unit Auxiliary Transformer (UAT) were recorded during the unit test for each unit and bifurcation of power consumption was calculated and presented below,

Unit 6: -

Power consumption of auxiliaries during the test was found to be 25.64 MW when the gross generation was 247.58 MW which account to PLF of 99.03 %. This power consumption of auxiliaries accounts to 10.36 % of gross generation. Bifurcation of power consumption at each auxiliary as percentage of total power consumption is shown below.



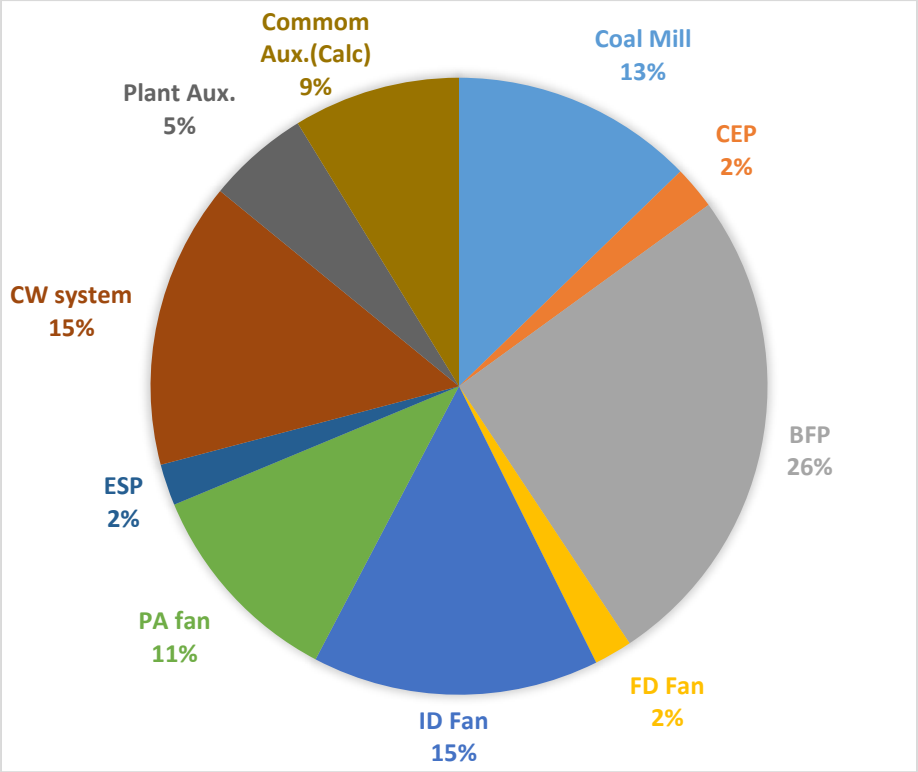
Power consumption of BFP accounts to 2.67 % of gross generation and it is 25.78 % of total auxiliary power consumption. Similarly, power consumption of CW system accounts to 1.51 % of gross generation and it is 14.56 % of total auxiliary power consumption. In third place, power consumption of ID Fan accounts to 1.50 % of gross generation and it is 14.49 % of total auxiliary power consumption.

Contribution of common auxiliaries such as CHP, AHP, WTP etc. is 0.94 % of gross generation and it is 9.12 % of total auxiliary power consumption. This is calculated by

sharing the common auxiliary load based on the generation from the respective unit.

Unit 7: -

Power consumption of auxiliaries during the test was found to be 25.65 MW when the gross generation was 248.64 MW which account to PLF of 99.46 %. This power consumption of auxiliaries accounts to 10.31 % of gross generation. Bifurcation of power consumption at each auxiliary as percentage of total power consumption is shown below.

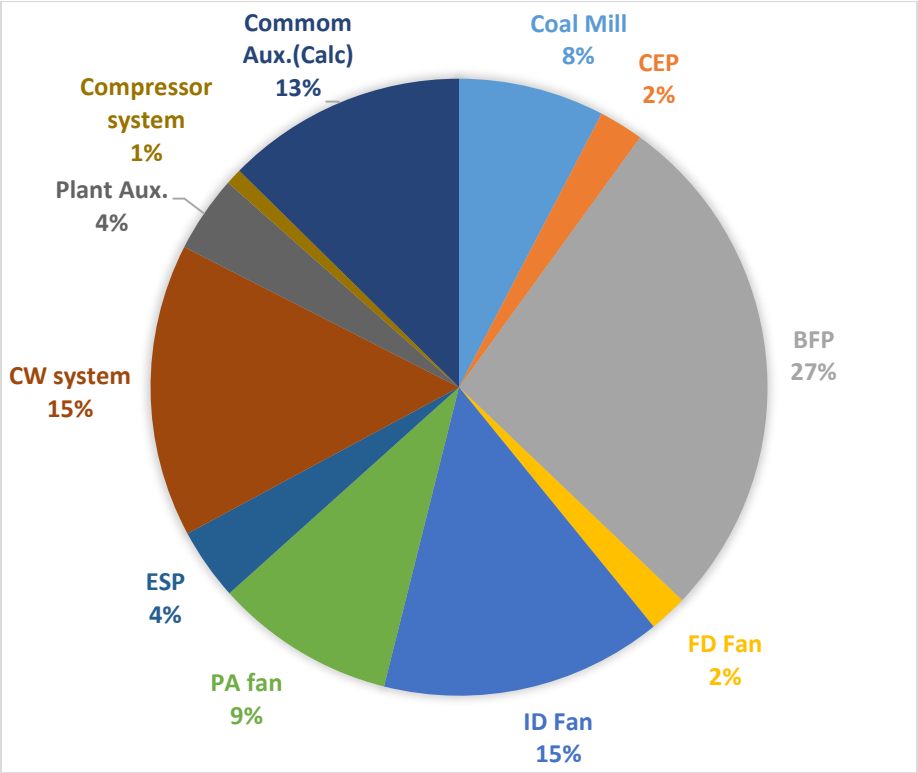


Power consumption of BFP system accounts to 2.65 % of gross generation and it is 25.67 % of total auxiliary power consumption. Similarly, power consumption of CW system and ID fan accounts to 1.55 % of gross generation each and it is 15.00 % of total auxiliary power consumption.

Contribution of common auxiliaries such as CHP, AHP, WTP etc. is 0.90 % of gross generation and it is 8.76 % of total auxiliary power consumption. This is calculated by sharing the common auxiliary load based on the generation from the respective unit.

Unit 8: -

Power consumption of auxiliaries during the test was found to be 23.43 MW when the gross generation was 250.20 MW which account to PLF of 100.08 %. This power consumption of auxiliaries accounts to 9.37 % of gross generation. Bifurcation of power consumption at each auxiliary as percentage of total power consumption is shown below.



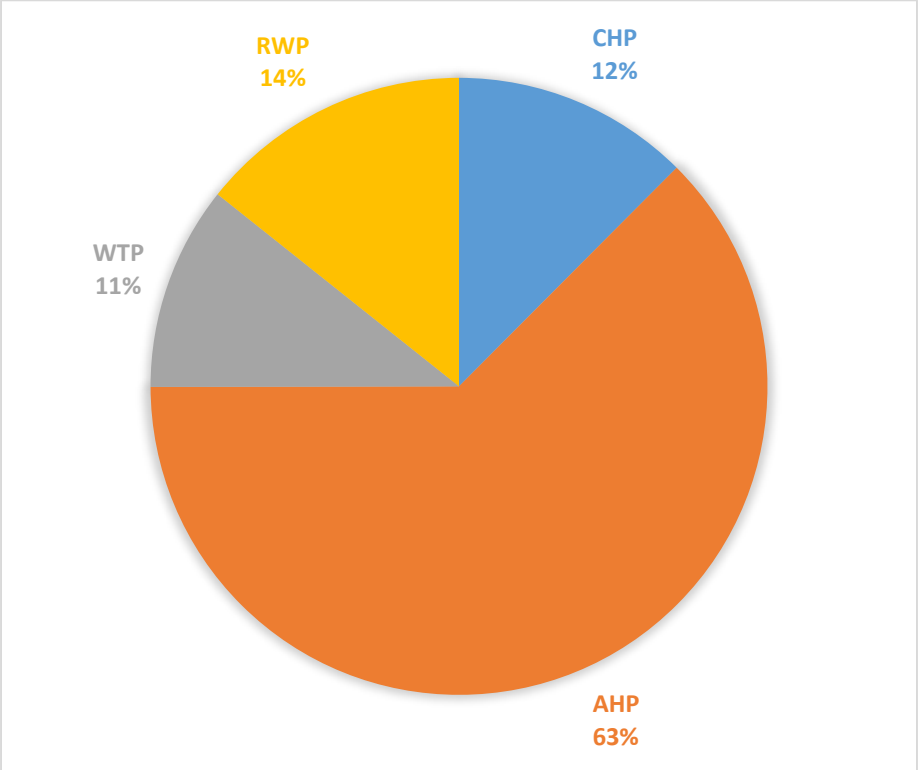
Power consumption of BFP accounts to 2.56 % of gross generation and it is 27.37 % of total auxiliary power consumption. Similarly, power consumption of CW system accounts to 1.45 % of gross generation and it is 15.51 % of total auxiliary power consumption. In third place, power consumption of ID Fan accounts to 1.40 % of gross generation and it is 14.90 % of total auxiliary power consumption.

Contribution of common auxiliaries such as CHP, AHP, WTP etc. is 1.19 % of gross generation and it is 12.73 % of total auxiliary power consumption.

3.1.1 Common auxiliaries and total APC

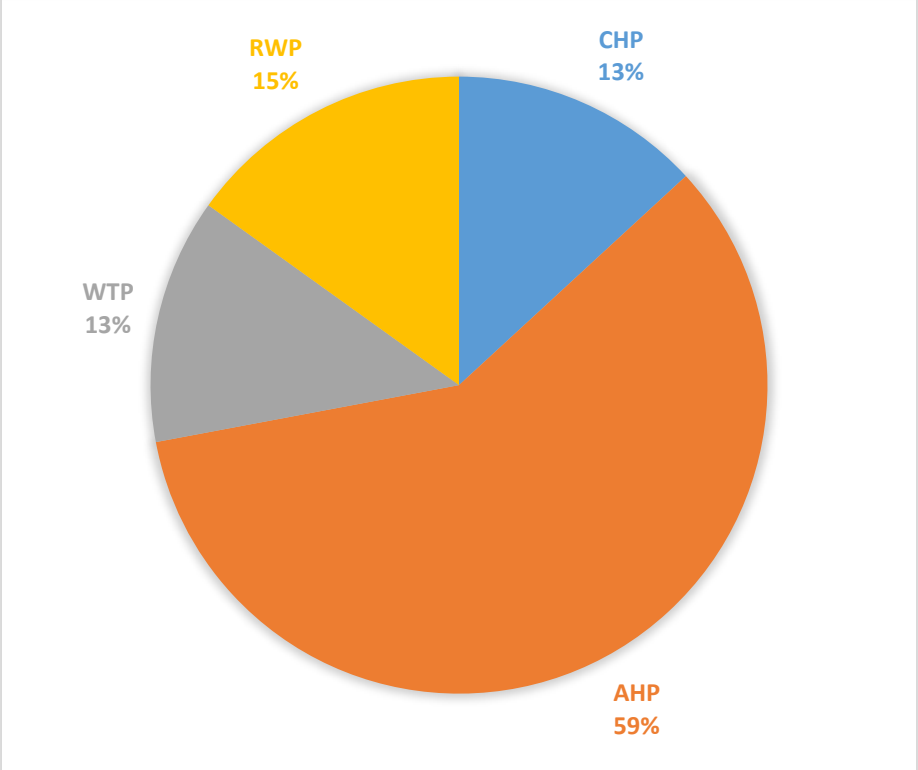
Power consumption in common auxiliaries such as CHP, WTP etc. which are connected to station transformer and other pump house has been attributed to different units based on the gross generation from the respective units. Estimated power consumption for common auxiliaries for different units are as follows,

Power consumption by common auxiliaries of Unit 6 is found to be 1778 kW (0.72 % of generation). Bifurcation of power consumption is shown below,



It is found that AHP's contribution is 63 % towards total common auxiliary's power and it is 14 % 12% and 11 % for RWP, CHP and WTP respectively.

Power consumption by common auxiliaries of Unit 7 is found to be 1645 kW (0.68 % of generation). Bifurcation of power consumption is shown below,



It is found that AHP's contribution is 59 % towards total common auxiliary's power and it is 15 % 13% and 13 % for CHP, WTP and RWP respectively.

Losses in the transformer has been calculated and accounted for Unit #6, #7 and #8 based on the design losses and losses are as follows,

Unit 6 : 0.27 %
Unit 7 : 0.27 %
Unit 8 : 0.26 %

Total APC for each unit was found by addition of power consumption by common auxiliaries, transformer losses and power consumption by UAT auxiliaries. Estimated total APC for each unit is given below,

Unit 6 : 10.62 % at a load factor of 99.03 %.
Unit 7 : 10.58 % at a load factor of 99.46 %.
Unit 8 : 9.54 % at a load factor of 100.08 %.

3.1.2 APC at different PLFs

APC of each unit has been measured at partial load and APC trend with respect to PLF is obtained. Figure 1 to 3 shown the variation in APC with respect to PLF. APC of each unit at different PLF is derived from the curve and shown below,

PLF, %	APC, %		
	Unit #6	Unit #7	Unit #8
100	10.54	10.55	9.72
90	11.42	11.13	10.33
80	12.31	11.70	10.94
70	13.19	12.28	11.54
60	14.07	12.85	12.15

3.2 Auxiliary-wise Analysis and Observations

3.2.1 Boiler feed pumps (BFPs)- analysis of performance

Unit #6:

There are two Boiler Feed Pumps (BFP) of 9000 kW. One pumps will be continuously working and other will be stand-by. There are two Booster pumps, one will be working continuously and other will be stand-by. The Booster pumps are mounted on the same shaft of main pump. The feed water flow is controlled by scoop coupling. The performance Test is conducted on BFP during the energy audit study. The performance results of BFP are given in Table 1. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.516 to 6.538 kV and is normal. The voltage unbalance between 3-phases at motor terminals is about 0.17 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.22 % and is normal.
c) The power factor of BFP motor is varying between 0.92 – 0.93 and is normal.
d) The load factor of BFP motors is computed by taking the ratio of BFP motor output and rating of BFP. The load factor of BFP is varying in the range of 67.57 and enough margin is available for BFP motors.

a) The BFP efficiency is computed as 46.14 % as against to the design value of 78 % (considering an efficiency of 95.1 % for the motor). Efficiency of BFP is poor compared to its design.
b) The specific energy consumption (SEC) of BFP is computed in the range of 8.41 kWh/t of FW flow and is lower than the design value of 6.57 kWh/t of FW.
c) The overall auxiliary power used by BFP forms 2.67 % of total plant load. **Recommendations:** For improving the efficiency of pumps, overhauling of pump can be done and clearances between impeller and casing can be checked. This will reduce the ***energy consumption by 766.36 MWh/month or more*** if the efficiency can be brought to 55 % or above.
d) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.

Unit #7:

There are two Boiler Feed Pumps (BFP) of 9000 kW. One pumps will be continuously working and other will be stand-by. There are two Booster pumps, one will be working continuously and other will be stand-by. The Booster pumps are mounted on the same shaft of main pump. The feed water flow is controlled by scoop coupling. The performance Test is conducted on BFP during the energy audit study. The performance results of BFP are given in Table 1. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.558 to 6.590 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.30 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.92 % and is normal.
c) The power factor of BFP motor is varying between 0.92 – 0.93 and is normal.
d) The load factor of BFP motors is computed by taking the ratio of BFP motor output and rating of BFP. The load factor of BFP is varying in the range of 67.30 and enough margin is available for BFP motors.
e) The BFP efficiency is computed as 48.08 % as against to the design value 78 % (considering an efficiency of 95.1 % for the motor). Efficiency of BFP is poor compared to its design.

f) The specific energy consumption (SEC) of BFP is computed in the range of 8.07 kWh/t of FW flow and is lower than the design value of 6.57 kWh/t of FW.
g) The overall auxiliary power used by BFP forms 2.65 % of total plant load. **Recommendations:** It is suggested to check the passing in re-circulation by-pass valve by conducting the test. For improving the efficiency of pumps, overhauling of pump can be done and clearances between impeller and casing can be checked. This will reduce the ***energy consumption by 596.19 MWh/month or more*** if the efficiency can be brought to 55 % or above.
h) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.

Unit #8:

There are three Boiler Feed Pumps (BFP) of 4600 kW. Two pumps will be continuously working and other will be stand-by. There are three Booster pumps, two will be working continuously and other will be stand-by. The Booster pumps are mounted on the same shaft of main pump. The feed water flow is controlled by scoop coupling. The performance Test is conducted on BFP during the energy audit study. The performance results of BFP are given in Table 1. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.76 to 6.82 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.17 – 0.39 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.96 – 2.99 % and is normal.
c) The power factor of BFP motor is varying between 0.89 – 0.92 and is normal.
d) The load factor of BFP motors is computed by taking the ratio of BFP motor output and rating of BFP. The load factor of BFP is varying in the range of 60.48 – 67.80 and enough margin is available for BFP motors.
e) The BFP efficiency is computed as 50.14 – 55.13 % as against to the design value of 78 % (considering an efficiency of 95.1 % for the motor). Efficiency of BFP is poor compared to its design.

f) The specific energy consumption (SEC) of BFP is computed in the range of 7.85 – 8.61 kWh/t of FW flow and is lower than the design value of 6.57 kWh/t of FW.

g) The overall auxiliary power used by BFP forms 2.56 % of total plant load. **Recommendations:** For improving the efficiency of pumps, overhauling of pump can be done and clearances between impeller and casing can be checked. This will reduce the ***energy consumption by 215.46 MWh/month or more*** if the efficiency can be brought to 55 % or above.

h) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.

3.2.2 Condensate Extraction pumps (CEPs)- analysis of performance

Unit #6:

There are two Condensate Extraction Pumps (CEP) of 650 kW. One pumps will be continuously working and other will be stand-by. The performance Test is conducted on CEPs during the study. Table 2 gives the performance results of condensate extraction pumps during the performance test. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.516 to 6.554 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.17 – 0.31 % and is normal.

b) The current unbalance between 3-phases at motor terminals is 0.67 % and is normal.

c) The power factor of CEP motor is varying between 0.84 – 0.89 and is normal.

d) The load factor of CEP motors is computed by taking the ratio of CEP motor output and rating of CEP motor. The load factors of CEPs are in the range of 75.81 – 76.15 %.

e) The CEP pump efficiency is computed as 70.59 – 72.36 % and is lower than the design value of 76.6 % (considering an efficiency of 95.1 % for the motor).

f) The specific energy consumption (SEC) of CEP is computed in the range of 0.80 – 0.81 kWh/t of condensate flow and is higher than the design value of 0.71 kWh/t.
g) The overall auxiliary power used by CEP forms 0.22 % of total plant.
h) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.
i) CEP is operating at good efficiency level

Unit #7:

There are two Condensate Extraction Pumps (CEP) of 650 kW. One pumps will be continuously working and other will be stand-by. The performance Test is conducted on CEPs during the study. Table 2 gives the performance results of condensate extraction pumps during the performance test. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.591 to 6.632 kV and is good. The voltage unbalance between 3-phases at motor terminals is in the range of 0.21 - 0.28 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.00 % and is satisfactory.
c) The power factor of CEP motor is varying between 0.85 – 0.90 and is normal.
d) The load factor of CEP motors is computed by taking the ratio of CEP motor output and rating of CEP motor. The load factor of CEP is 78.23 – 80.22 %.
e) The CEP pump efficiency is computed as 69.96 – 75.54% and is lower than the design value of 76.6 % (considering an efficiency of 95.1 % for the motor).
f) The specific energy consumption (SEC) of CEP is computed in the range of 0.76 – 0.79 kWh/t of condensate flow and is on higher side compared to design value of 0.71 kWh/t of condensate flow due to lower pump efficiency.
g) The overall auxiliary power used by CEP forms 0.23 % of total plant load.
j) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.
k) CEP is operating at good efficiency level.

Unit #8:

There are two Condensate Extraction Pumps (CEP) of 650 kW. One pumps will be continuously working and other will be stand-by. The performance Test is conducted on CEPs during the study. Table 2 gives the performance results of condensate extraction pumps during the performance test. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.713 to 6.924 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.16 – 0.27 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.97 – 1.40 % and is normal.
c) The power factor of CEP motor is varying between 0.87 – 0.88 and is normal.
d) The load factor of CEP motors is computed by taking the ratio of CEP motor output and rating of CEP motor. The load factors of CEPs are in the range of 76.57 – 76.78 %.
e) The CEP pump efficiency is computed in the range of 66.23 – 67.65 % as against to the design value of 76.6 % (considering an efficiency of 95.1 % for the motor).
f) The specific energy consumption (SEC) of CEP is computed in the range of 0.84 – 0.86 kWh/t of condensate flow and is on higher side compared to design value of 0.71 kWh/t of condensate flow due to lower pump efficiency.
g) The overall auxiliary power used by CEP forms 0.22 % of total plant load.
h) Pumps and motors are not having any restrictions in raising the load and enough capacity is available.

3.2.3 ID Fan - analysis of performance

Unit #6:

There are two Induced Draft Fans (IDF) of 2173 kW and both fans will be working continuously. The ID fans are regulated with the help of VFD and inlet damper. The performance Test is conducted on ID fans during the study. The performance results are given in Table 3. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.516 to 6.566 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.17 – 0.26 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.81 – 1.88 % and is normal.
c) The power factor of ID fan motors is varying between 0.92 – 0.95 and is normal.
d) The load factor of ID fan motors is computed by taking the ratio of motor output and rating. The load factor of ID fan motors is varying between 77.07 - 82.75 %. Loading is optimum on the ID fans.
e) The ID fan efficiencies are computed in the range of 25.84 % to 36.04 %. The ID fan efficiencies are on lower side may be due to high air leakage through APH and air ingress in the flue gas duct.
f) Pressure drop from APH inlet to ID fan inlet is 309 mmWC to 312 mmWC against the design value of 202 mmWC. This pressure drop is due to chocking in the path/APH/ESP. This is to be addressed to reduce pressure drop. Suction pressure of ID fan was maintained from -370.91 mmwc to -371.18 mmwc against a design value of -259 mmwc at 100 % MCR due to the above said pressure drop.
g) The overall auxiliary power used by ID Fans forms 1.50 % of total plant load.
h) The increased power in ID fans due to APH air leakage is 321.94 kW and due to ingress in flue gas duct from APH outlet to ID outlet is 951.28 kW. These increased powers form 0.51 % of generation. **Recommendation**: It is suggested to arrest the air ingress in flue gas duct and in APH.

Unit #7:

There are two Induced Draft Fans (IDF) of 2173 kW and both fans will be working continuously. The ID fans are regulated with the help of VFD and inlet damper. The performance Test is conducted on ID fans during the study. The performance results are given in Table 4. The observations and suggestions from the energy audit study are as follows:

:

a) The voltage at motor terminals is varying between 6.558 to 6.632 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.28 - 0.30 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.06 – 2.83 % and is normal.
c) The power factor of ID fan motors is varying between 0.88 – 0.95 and is normal.
d) The load factor of ID fan motors is computed by taking the ratio of motor output and rating. The load factor of ID fan motors is varying between 79.07 – 86.81 %.
e) The overall auxiliary power used by ID Fans forms 1.55 % of total plant load.
f) The ID fan efficiencies are computed in the range of 6.44 % to 10.71 %. The ID fan efficiencies are on lower side. There might be issue with the transducer also. ID Fan suction side pressure transducer is to be checked for its accuracy.
g) The increased power in ID fans due to APH air leakage is 118.86 kW and due to ingress in flue gas duct from APH outlet to ID outlet is 559.79 kW. These increased powers form 0.27 % of generation. **Recommendation**: It is suggested to arrest the air ingress in flue gas duct and in APH.

Unit #8:

There are two Induced Draft Fans (IDF) of 2173 kW and both fans will be working continuously. The ID fans are regulated with the help of VFD and inlet damper. The performance Test is conducted on ID fans during the study. The performance results are given in Table 5. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.625 to 6.823 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.16 - 0.30 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.72 – 1.33 % and is normal.
c) The power factor of ID fan motors is varying between 0.81 – 0.92 and is normal.

d) The load factor of ID fan motors is computed by taking the ratio of motor output and rating. The load factor of ID fan motors is varying between 69.86 – 80.41 %.
e) The ID fan efficiencies are computed in the range of 30.88 % to 31.65 %. The ID fan efficiencies are on lower side.
f) Pressure drop from APH inlet to ID fan inlet is 351 mmWC to 355 mmWC against the design value of 203 mmWC. This pressure drop is due to chocking in the path/APH/ESP. This is to be addressed to reduce pressure drop. Suction pressure of ID fan was maintained from -369 mmwc to -368 mmwc against a design value of -260 mmwc at 100 % MCR due to the above said pressure drop.
g) The increased power in ID fans due to APH air leakage is 658.55 kW and due to ingress in flue gas duct from APH outlet to ID outlet is 872.47 kW. These increased powers form 0.61 % of generation. **Recommendation**: It is suggested to arrest the air ingress in flue gas duct and in APH.

3.2.4 FD Fan - analysis of performance

Unit #6:

There are two numbers of 825 kW FD fans of axial flow fans with blade pitch control and both fans will be working continuously. The performance Test is conducted on FD fans during the energy audit study. The performance results are given in Table 6. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.516 to 6.566 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.17 – 0.26 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.6 - 2.59 % and is normal.
c) The power factor of FD fan motors is varying between 0.78 – 0.84.
d) The load factor of FD fan motors is computed by taking the ratio of motor output and rating. The load factor of FD fan motors is 36.08 – 41.36 %. **Recommendation**: It is suggested to install variable frequency drives (VFD) for FD fans.

e) The FD fan discharge pressure is in the range of 255.37 – 258.49 mmWC and is in par with the design value of 281 mmWC at 100 % MCR condition. The pressure drop across APH in secondary air side is 115 mmWC and is in par with the design value of 110 mmWC. Wind box pressure is found to be 87 mmWC to 106 mmWC against the design value of 100 mmWC.
f) The FD fan efficiency is in the range of 54.20 – 54.82 %.
g) The specific energy consumption (SEC) of FD fan is computed as 1.20 kWh/t of secondary air flow and is lower than the design value of 2.19 kWh/t of secondary air flow.
h) There are no limitations from FD fans to operate plant to its 100 % MCR.
i) The increased power in FD fans due to APH air leakage is 89.35 kW. This increased power form 0.04 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

Unit #7:

There are two numbers of 825 kW FD fans of axial flow fans with blade pitch control and both fans will be working continuously. The performance Test is conducted on FD fans during the energy audit study. The performance results are given in Table 7. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.558 to 6.632 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.28 - 0.30 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.06 – 2.79 % and is normal.
c) The power factor of FD fan motors is varying between 0.64 – 0.78.
d) The load factor of FD fan motors is computed by taking the ratio of motor output and rating. The load factor of FD fan motors is 24.51 – 34.43 %. **Recommendation**: It is suggested to install variable frequency drives (VFD) for FD fans.
e) The FD fan discharge pressure is in the range of 202.89 – 205.81 mmWC and is lower than the design value of 281 mmWC at 100 % MCR condition. The pressure drop across APH in secondary air side is 75 mmWC to 101 mmWC and is lower than the design value of 110 mmWC. Wind box pressure

is found to be 101 mmWC to 102 mmWC against the design value of 100 mmWC.

f) The FD fan efficiency is in the range of 50.30 – 50.96 %.
g) The specific energy consumption (SEC) of FD fan is computed as 1.01 kWh/t of secondary air flow and is lower than the design value of 2.19 kWh/t of secondary air flow.
h) There are no limitations from FD fans to operate plant to its 100 % MCR.
i) The increased power in FD fans due to APH air leakage is 21.42 kW. This increased power form 0.01 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

Unit #8:

There are two numbers of 700 kW FD fans of axial flow fans with blade pitch control and both fans will be working continuously. The performance Test is conducted on FD fans during the energy audit study. The performance results are given in Table 8. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.632 to 6.817 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.17 - 0.29 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.65 - 2.04 % and is normal.
c) The power factor of FD fan motors is varying between 0.62 – 0.71.
d) The load factor of FD fan motors is computed by taking the ratio of motor output and rating. The load factor of FD fan motors is 33.36 – 33.88 %. **Recommendation**: It is suggested to install variable frequency drives (VFD) for FD fans.
e) The FD fan discharge pressure is in the range of 173.09 – 173.43 mmWC and is lower than the design value of 288 mmWC at 100 % MCR condition. The pressure drop across APH in secondary air side is 90 mmWC to 92 mmWC and is lower than the design value of 112 mmWC. Wind box pressure is found to be 48 mmWC to 66 mmWC against the design value of 100 mmWC. FD fan discharge pressure is to be increased near to its design to keep wind box pressure in par with the design.

f) The FD fan efficiency is in the range of 33.53 – 41.95 %. The FD fan efficiency is on lower side due to partial loading.
g) The specific energy consumption (SEC) of FD fan is computed as 1.04 – 1.30 kWh/t of secondary air flow and is lower than the design value of 2.19 kWh/t of secondary air flow.
h) There are no limitations from FD fans to operate plant to its 100 % MCR.
i) The increased power in FD fans due to APH air leakage is 125.59 kW. This increased power form 0.05 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

3.2.5 PA Fan - analysis of performance

Unit #6:

There are two Primary Air fans of 1525 kW with inlet guide vane control to provide the primary air to mills. The performance Test is conducted on PA fans during the energy audit study. The performance results are given in Table 9. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.551 to 6.580 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.15 – 0.24 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.65 – 1.65 % and is normal.
c) The power factor of PA fan motors is varying between 0.92 – 0.94 and is normal.
d) The load factor of PA fan motors is computed by taking the ratio of motor output and rating. The load factor of PA fan motors is varying between 79.76 – 86.74 %.
e) PA fan discharge pressure was varying between 964.82 – 994.11 mmWC against the design value of 928 mmWC. The discharge pressure is normal. Primary air pressure at APH outlet is 803 mmWC to 806 mmWC against a design value of 819 mmWC and it is normal.
f) The PA fan efficiencies are computed in the range of 21.76 – 22.41 %. The PA fan efficiencies are on lower side.

g) The specific energy consumption (SEC) of PA fans is computed as 10.71 kWh/t of primary air flow and is higher than the design value of 5.09 kWh/t of primary air flow.
h) The increased power in PA fans due to APH air leakage is 362.15 kW. This increased power form 0.15 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

Unit #7:

There are two Primary Air fans of 1525 kW with inlet guide vane control to provide the primary air to mills. The performance Test is conducted on PA fans during the energy audit study. The performance results are given in Table 10. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.558 to 6.632 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.28 - 0.30 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.65 – 1.48 % and is normal.
c) The power factor of PA fan motors is varying between 0.93 – 0.94 and is normal.
d) The load factor of PA fan motors is computed by taking the ratio of motor output and rating. The load factor of PA fan motors is varying between 84.49 – 86.95 %.
e) PA fan discharge pressure was varying between 1018.2 – 1023.2 mmWC against the design value of 928 mmWC. The discharge pressure is higher than that of design value. Primary air pressure at APH outlet is 764 mmWC to 823 mmWC against a design value of 819 mmWC. Primary air pressure at APH outlet on LHS is lower than the design. This can be due to high pressure drop in APH.
f) The PA fan efficiencies are computed in the range of 21.03 – 21.13 %. The PA fan efficiencies are on lower side.
g) The specific energy consumption (SEC) of PA fans is computed as 11.29 kWh/t of primary air flow and is higher than the design value of 5.09 kWh/t of primary air flow.

h) The increased power in PA fans due to APH air leakage is 143.7 kW. This increased power form 0.06 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

Unit #8:

There are two Primary Air fans of 1525 kW with inlet guide vane control to provide the primary air to mills. The performance Test is conducted on PA fans during the energy audit study. The performance results are given in Table 11. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.628 to 6.817 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.17 - 0.29 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.21 – 2.01 % and is normal.
c) The power factor of PA fan motors is varying between 0.88 – 0.91 and is normal.
d) The load factor of PA fan motors is computed by taking the ratio of motor output and rating. The load factor of PA fan motors is varying between 84.49 – 86.95 %.
e) PA fan discharge pressure was varying between 971.81 – 1013.1 mmWC against the design value of 883 mmWC. The discharge pressure is higher than the design. Primary air pressure at APH outlet is 825 mmWC against a design value of 793 mmWC. Primary air pressure at APH outlet on LHS is higher than the design. PA fan discharge pressure may be reduced to its design value. Pressure value at APH out let at RHS is erroneous. Transducer is to be checked for its healthiness.
f) The PA fan efficiencies are computed in the range of 42.83 – 44.63 %. The PA fan efficiencies are on lower side.
g) The specific energy consumption (SEC) of PA fans is computed as 5.33 kWh/t of primary air flow and is in par with the design value of 5.09 kWh/t of primary air flow.
h) The increased power in PA fans due to APH air leakage is 602.66 kW. This increased power form 0.24 % of generation. **Recommendation**: It is suggested to arrest the air leakage in APH.

3.2.6 Mills - analysis of performance

Unit #6:

There are three Mills of 2400 kW, BBD 4772 Ball & Tube mills, two mills will be working continuously and other one mill will be stand-by to meet 100 % MCR load. The performance Test is conducted on Mills during the energy audit study. The performance results are given in Table 12. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.516 to 6.566 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.17 – 0.26 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 1.43 – 1.88 % and is normal.
c) The power factor of Mill motors is varying between 0.82 – 0.85.
d) The coal flow in each mill is varying between 35.31 – 36.3 t/h (the design coal flow: 45 t/h). The mill loading based on coal flow is varying between 78.46 % to 80.67 %.
e) The SEC of mills is varying between 22.28 – 22.51 kWh/t of coal.
f) The air to fuel ratio in mills is varying between 1.45 – 1.47.

Unit #7:

There are three Mills of 2400 kW, BBD 4772 Ball & Tube mills, two mills will be working continuously and third mill will be stand-by to meet 100 % MCR load. The performance Test is conducted on Mills during the energy audit study. The performance results are given in Table 13. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.558 to 6.590 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.30 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.75 – 0.88 % and is normal.

c) The power factor of Mill motors is varying between 0.81 – 0.90 and is normal.
d) The coal flow in each mill is varying between 34.92 – 42.20 t/h (the design coal flow: 45 t/h). The mill loading based on coal flow is varying between 77.6 % to 93.8 %.
e) The SEC of mills is varying between 20.23 – 20.99 kWh/t of coal.
f) The air to fuel ratio in mills is varying between 1.50 – 1.65.

Unit #8:

There are six Mills of 450 kW, Bowl mills, five mills will be working continuously and sixth mill will be stand-by to meet 100 % MCR load. The performance Test is conducted on Mills during the energy audit study. The performance results are given in Table 14. The observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals is varying between 6.625 to 6.819 kV and is good. The voltage unbalance between 3-phases at motor terminals is about 0.23 – 0.29 % and is normal.
b) The current unbalance between 3-phases at motor terminals is 0.28 – 1.55 % and is normal.
c) The power factor of Mill motors is varying between 0.65 – 0.73 and is on lower side may be due to varying load of mills.
d) The coal flow in each mill is varying between 28.43 – 37.39 t/h (the design coal flow: 41.28 t/h). The mill loading based on coal flow is varying between 68.9 % to 90.57 %.
e) The SEC of mills is varying between 9.67 – 12.90 kWh/t of coal.
f) The air to fuel ratio in mills is varying between 2.27 – 2.88 and is higher compared to the design value of 1.87.

3.2.7 Network- analysis of performance

The observations from the study are as follows:

a) The cables are laid in cable trays and cable glands are used.
b) All the panels and cable glands are provided with earth.

c) Dust accumulation was observed inside the panels. **Recommendations:** It is suggested to clean all the HT and LT panels during overhaul.

There are no limitations of electrical network system in increasing the load to 100 % MCR.

3.2.8 Cooling Water System

Cooling water system for Unit 6, Unit 7 and Unit 8 constitute 3 Condenser Cooling Water (CW Pump) and 2 Auxiliary Cooling Water Pump (ACWP) for each unit. Performance of each pump set was assessed by measuring water discharge, input power and developed head across the pump during its operation

Unit 6: -

Performance results of CWPs and ACWPs associated with Unit 6 is shown in table 15. Efficiencies (motor pump) of CWPs and ACWPs are listed below,

CWP – A : 60.90 % , ACWP – A : 80.56 %

CWP – B : 64.41 % , ACWP – B : 86.85 %

CWP – C : 63.68 % ,

Efficiencies of CWPs were found in the range of 60 to 65 % is satisfactory. Efficiencies of ACWPs are above 80 % and it is good.

Unit 7: -

Performance results of CWPs and ACWPs associated with Unit 7 is shown in table 16. Efficiencies (motor pump) of CWPs and ACWPs are listed below,

CWP – A : 58.14 % , ACWP – A : 56.05 %

CWP – B : 56.66 % , ACWP – B : 60.56 %

CWP – C : 63.39 % ,

CWP – C observed highest efficiency of 63.39 % among CWPs whereas efficiencies of other CWPs are range of 56.66 % to 58.14 %. Efficiencies of CWP A and B are on lower side. ACW – B observed highest efficiency of 60.56 % among ACWs. Efficiency of ACW – A is found to be 56.05 and is comparatively less.

Unit 8: -

Performance results of CWPs and ACWs associated with Unit 6 is shown in table 17. Efficiencies (motor pump) of CWPs and ACWs are listed below,

CWP – B : 61.70 % , ACWP – A : 73.52 %

CWP – C : 53.50 % , ACWP – B : 70.48 %

CWP – B observed highest efficiency of 61.70 % whereas efficiency of CWP C is 53.50 %. Efficiencies of CWPs are poor. Efficiencies of ACW Pumps are good.

Observations and recommendations:

- Head loss in the suction side was observed for CW pumps due to chocking of strainer installed in the water path. It should be ensured that the strainer is cleaned on a regular interval to avoid the head loss.

- Heavy leakage was observed near CW pump house of Unit #7. Since the location of leakage is not visible, quantification of the same was not possible. Location of the leakage is to be identified and corrected to avoid wastage of energy in CW pumps. Two pumps are being operated continuously to evacuate the leaked water. These pumps consume 37.3 kW.

3.2.9 Compressed air system

Unit 6 has 3 Instrument Air Compressors (IAC) and 3 Service Air Compressors (SAC) installed. 2 IACs and 1 SAC are under operation normally. Unit 7 has 3 Instrument Air Compressors (IAC) and 2 Service Air Compressors (SAC) installed. 1 IAC and 1 SAC are under operation normally. In unit 8, 1 IAC was in operation during the test. Contribution towards APC by compressor system for each unit are given below,

Unit 6 : 0.13 %

Unit 7 : 0.11 %

Unit 8 : 0.08 %

3.2.8 Other auxiliaries

There are two pumping stations situated at Khadka and at Naikota to transport river water to the plant. Results of performance assessment of pumps are tabulated in Table 18 & 19.

Efficiencies of pumps at Naikota pump house were found to be in the range of 71.28 % to 75.87 and it is normal. Efficiencies of pumps at Khadka pump house were found to be in the range of 59.89 % to 61.41 and it is on the lower side.

Analysis of pumps at other locations such as WTP, PTP, RWP are given in Table 20 to 27. It is observed that efficiencies of majority of these pumps are on lower side. Although the contribution to APC by these pumps are minimal due to intermittent operation, regular maintenance can improve the performance of the pumps.

Provision for installing pressure gauge is to be provided for ash slurry discharge pumps(ASDP) in AHPs and the reading is to be made available in the AHP control room to evaluated operating region of ASDPs.

Power measured for major auxiliaries at CHPs are given in Table 28 & 29. Load factors of all the conveyor motors and crusher were found very less considering motor efficiency not less than 90 %. Loading of CHP can be increased to improve the performance of the system.

Two booster pumps are installed to circulate cooling water to auxiliaries from CW outlet for Unit 6 and 7. One pump is in operation and other is in standby. Measured flow and power for the booster pumps are reported in table 33. Performance of the pumps could not be calculated due to non-availability of pressure measurement at suction side.

Auxiliary cooling in Unit 8 is achieved with ECW pumps. There are three numbers of Turbo-Generator side Equipment Cooling Water pump (TGECWP) and two Steam Generator side Equipment Cooling Water pump (SGECWP). One pump is kept standby for both the sides. Performance analysis of the pumps are given in table 28.

3.3 Loading condition of ID fan, PA fan and other unit auxiliaries.

Unit 6: - ID fans are loaded in the range of 76.66 % to 82.30 %. PA fans are loaded in the range of 78.00 % to 84.83 %. FD fans are loaded in the range of 35.28 % to 40.45 %. Coal mills are loaded in the range of 61.85 % to 62.43 %.

Unit 7: - ID fans are loaded in the range of 79.07 % to 86.81 %. PA fans are loaded in the range of 85.50 % to 87.02 %. FD fans are loaded in the range of 23.97 % to 33.67 %. Coal mills are loaded in the range of 60.57 % to 66.07 %.

Unit 8: - ID fans are loaded in the range of 69.86 % to 80.41 %. PA fans are loaded in the range of 58.14 % to 60.53 %. FD fans are loaded in the range of 29.69 % to 33.13 %. Coal mills are loaded in the range of 69.96 % to 77.73 %.

There is no limitation on unit auxiliaries to run the units at 100 % PLF.

3.4 Flue gas analysis and observation

Unit 6: -

Details of percentage of oxygen measured at different location of flue gas path and leakage across different sections are shown in Table 32 and 33. Air ingress to the flue gas path across the APH is 31.18 % in path A and 11.77 % in path B. Air ingress to the flue gas path from APH outlet to the ESP inlet is 20.54 % in path A and 19.55 % in path B. Air ingress across ESP is 3.62 % in path A and 2.75 % in path B. Air ingress to the flue gas path from ESP outlet to the ID outlet is negligible.

Unit 7: -

Details of percentage of oxygen measured at different location of flue gas path and leakage across different sections are shown in Table 32 and 33. Air ingress to the flue gas path across the APH is negligible in path A and 16.32 % in path B. Air ingress to the flue gas path from APH outlet to the ESP inlet is 9.98 % in path A and 24.64 % in path B. Air ingress across ESP is 2.86 % in path A and 0.43 % in path B. Air ingress to the flue gas path from ESP outlet to the ID outlet is negligible.

Unit 8: -

Details of percentage of oxygen measured at different location of flue gas path and leakage across different sections are shown in Table 32 and 33. Air ingress to the flue gas path across the APH is 29.59 % in path A and 39.40 % in path B. Air ingress to the flue gas path from APH outlet to the ESP inlet is 10.54 % in path A and 2.98 % in path B. Air ingress across ESP is 5.05 % in path A and 7.00 % in path B. Air ingress to the flue gas path from ESP outlet to the ID outlet is negligible.

3.5 Energy savings and achievable APC for the units

Possible savings has been discussed in respective sections. Consolidated values of saving in BFP, FD fan, ID fan and PA fan are given below,

Auxiliaries	Unit 6	Unit 7	Unit 8
BFP	0.43	0.33	0.12
FD Fan	0.04	0.01	0.05
ID Fan	0.51	0.27	0.61
PA fan	0.15	0.06	0.24

Achievable values of APC for each unit at different plant load are shown below,

PLF, %	APC, %			
	Unit 6	Unit 7	**Stage III**	**Unit 8**
100	9.40	9.87	**9.64**	**8.52**
90	10.34	10.51	**10.43**	**9.18**
80	11.28	11.15	**11.21**	**9.85**
70	12.22	11.79	**12.00**	**10.51**
60	13.16	12.43	**12.79**	**11.17**

Following are the nominal achievable APC of the plant at 85 % PLF,

Nominal achievable APC for stage III (Unit # 6 & 7) at 85 % PLF: 10.82 %
Nominal achievable APC for Unit # 8 at 85 % PLF : 9.51 %

Khadka raw water pump house and Naikota raw water pump house are fed from Unit # 8. The feeder power is shared between the station while calculating the APC for units.

3.6 Recommendations to improve APC and to improve performance of auxiliaries.

- FD fan discharge pressure is to be increased near to its design to keep wind box pressure in par with the design for Unit #7 and #8.
- Primary air pressure at APH outlet on LHS in Unit #7 is to be increased to its design by reducing the pressure drop in the path after PA fan discharge.
- Pressure drop from APH inlet to ID fan inlet is high due to chocking in the path/APH/ESP. This is to be addressed to reduce pressure drop.
- Pressure values in the flue gas path in Unit #7 are abnormal with reference to the design. Transducers are to be checked for its healthiness.
- Pressure value at APH out let at RHS in Unit #8 is erroneous. Transducer is to be checked for its healthiness.
- Air ingress in the flue gas path and air leakage in APH is to be arrested and brought to the design value.
- APH leakage in secondary air side is to be arrested to save 0.04 % in APC for Unit #6.
- APH leakage in secondary air side is to be arrested to save 0.01 % in APC for Unit #7.
- APH leakage in secondary air side is to be arrested to save 0.05 % in APC for Unit #8.
- APH leakage in primary air side is to be arrested to save 0.15 % in APC for Unit #6.
- APH leakage in primary air side is to be arrested to save 0.06 % in APC for Unit #7.
- APH leakage in primary air side is to be arrested to save 0.24 % in APC for Unit #8.
- Air ingress to flue gas from APH inlet to ID fan outlet to be arrested to save 0.51 % in APC for Unit #6.
- Air ingress to flue gas from APH inlet to ID fan outlet to be arrested to save 0.27 % in APC for Unit #7.
- Air ingress to flue gas from APH inlet to ID fan outlet to be arrested to save 0.61 % in APC for Unit #8.
- It is suggested to install variable frequency drives (VFD) for FD fans in all the

units since FD fans are operated at low load factor.

- It should be ensured that the strainer in the CW path after NDCT is cleaned on a regular interval to avoid the head loss.
- Location of the leakage is to be identified and corrected to avoid wastage of energy in CW pumps in Unit #7 near CW pump house.
- For improving the efficiency of BFPs, overhauling of pump is to be done and clearances between impeller and casing is to be checked.
- Provision for installing pressure gauge is to be provided for ash slurry discharge pumps (ASDP) in AHPs and the reading is to be made available in the AHP control room to evaluated operating region of ASDPs.
- Loading of CHP can be increased to improvise the system efficiency.
- Cleaning of HT and LT panel is to be done at regular intervals.

4.0 CONCLUSIONS

- Present APCs of different units were calculated at different PLF based on the test carried out on the units and given below.

PLF, %	APC, %		
	Unit #6	Unit #7	Unit #8
100	10.54	10.55	9.72
90	11.42	11.13	10.33
80	12.31	11.70	10.94
70	13.19	12.28	11.54
60	14.07	12.85	12.15

- The performance tests were carried out at maximum achievable loads by the units. Following are the measured APCs of different units during the test,

Sl. No.	Unit number	Total APC	Test load (MW)
1	Unit # 6	10.40 %	247.58
2	Unit # 7	10.36 %	248.64
3	Unit # 8	9.31 %	250.20

- It is found that all in-house auxiliaries are loaded to optimum level during the unit test and there is no limitation for the units to operate at its 100 % MCR
- Overall air ingress in unit 6 flue gas path is found to be 64.83 % in path A and 37.66 % in path B.
- Overall air ingress in unit 7 flue gas path is found to be 46.08 % in path B.
- Overall air ingress in unit 8 flue gas path is found to be 51.09 % in path A and 54.07 % in path B.
- Possible savings in the APC for Unit # 6 is found to be 1.13 %.
- Possible savings in the APC for Unit # 7 is found to be 0.67 %.
- Possible savings in the APC for Unit # 8 is found to be 1.02 %.

- Achievable values of APC for each unit at different plant load are shown below,

PLF, %	APC, %			
	Unit 6	Unit 7	**Stage III**	**Unit 8**
100	9.40	9.87	**9.64**	**8.52**
90	10.34	10.51	**10.43**	**9.18**
80	11.28	11.15	**11.21**	**9.85**
70	12.22	11.79	**12.00**	**10.51**
60	13.16	12.43	**12.79**	**11.17**

Nominal achievable APC for stage III (Unit # 6 & 7) at 85 % PLF: 10.82 %

Nominal achievable APC for Unit # 8 at 85 % PLF : 9.51 %

Annexure 1 – Figures

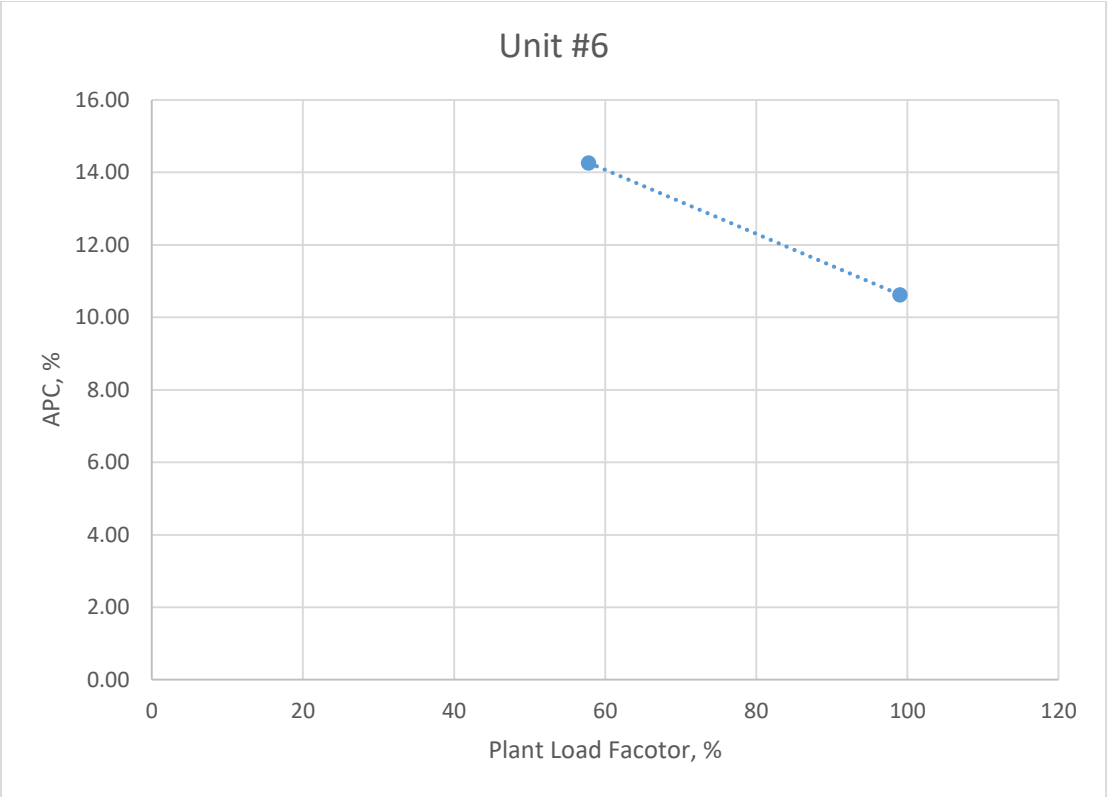


Figure 1: Variation in APC with respect to the PLF

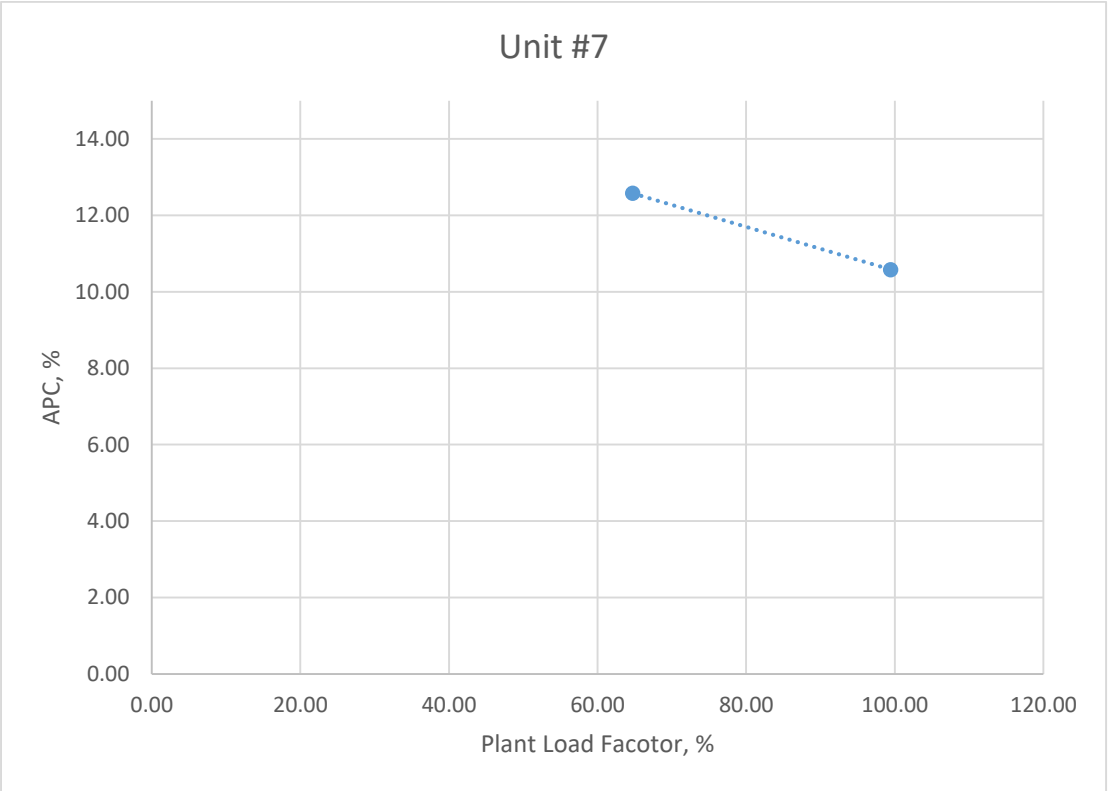


Figure 2: Variation in APC with respect to the PLF

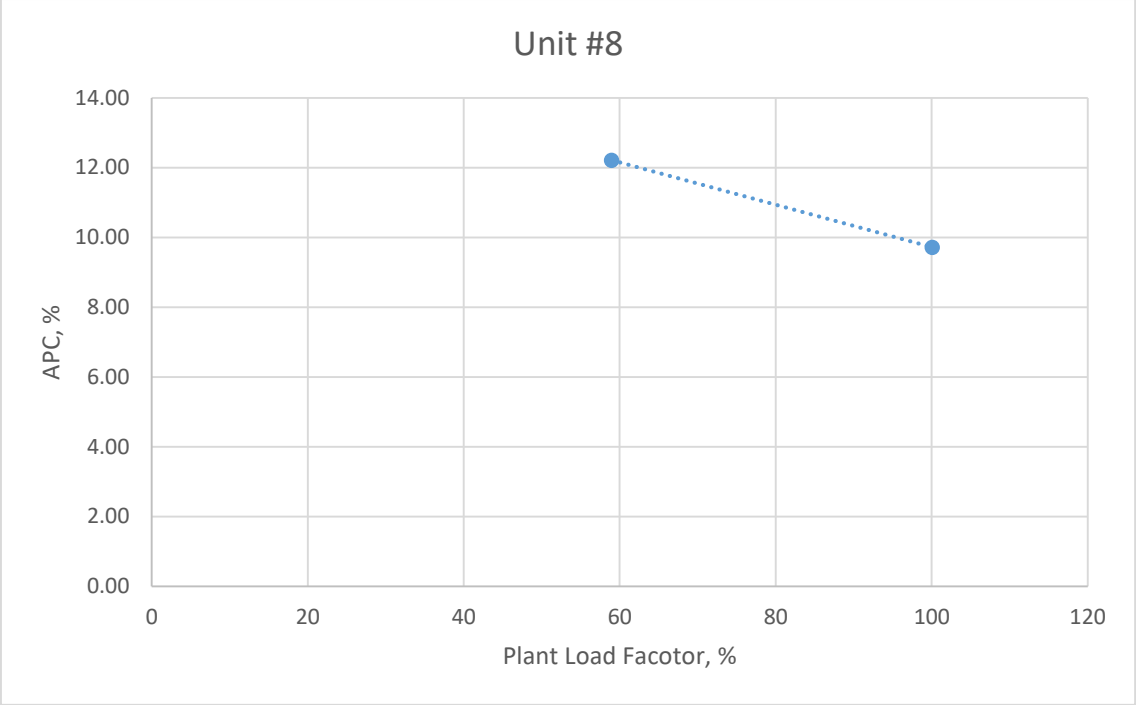


Figure 3: Variation in APC with respect to the PLF

Annexure 2 – Tables

Table 1: Performance results of Boiler feed pumps at Unit 6, 7 & 8.

Sl. No.	Particulars	Unit	BFP-6B	BFP-7B	BFP-8B	BFP-8C
1	Motor output rating	kW	9000	9000	4600	4600
2	Measured input power	kW	6610.0	6584.0	3390.0	3024.0
3	Total discharge flow	t/h	785.74	815.83	393.66	385.37
4	Suction pressure	kgf/cm2	27.18	27.39	17.7	17.52
5	Discharge pressure	kgf/cm2	169.68	169.84	176.22	176.32
6	Total pressure developed	kgf/cm2	142.5	142.45	158.52	158.8
7	**Motor + pump efficiency**	**%**	**46.14**	**48.08**	**50.14**	**55.13**
8	Motor load factor	%	67.57	67.30	67.80	60.48
9	SEC	kWh/t	8.41	8.07	8.61	7.85

Table 2: Performance results of Condensate Extraction Pumps at Unit 6, 7 & 8.

Sl. No.	Particulars	Unit	CEP-6A	CEP-6B	CEP-7A	CEP-7B	CEP-8A	CEP-8B
1	Motor output rating	kW	650	650	650	650	650	650
2	Measured input power	kW	550.00	547.50	579.40	565.00	554.50	553.00
3	Total discharge flow	t/h	678.72	687.94	729.74	746.40	644.81	656.84
4	Suction pressure	kgf/cm2	-0.90	-0.90	-0.89	-0.89	-0.91	-0.91
5	Discharge pressure	kgf/cm2	20.10	20.24	19.50	20.10	20.00	20.00
6	Total pressure developed	kgf/cm2	21.00	21.14	20.39	20.99	20.91	20.91
7	**Motor + pump efficiency**	**%**	**70.59**	**72.36**	**69.96**	**75.54**	**66.23**	**67.65**
8	Motor load factor	%	76.15	75.81	80.22	78.23	76.78	76.57
9	SEC	kWh/t	0.81	0.80	0.79	0.76	0.86	0.84

Table 3: Performance results of Induced draft fans at Unit 6

Sl. No.	Particular	Unit	IDF-6A	IDF-6B
1	Suction Pressure	mmWc	-370.91	-371.18
2	Discharge Pressure	mmWc	107.72	27.00
3	Pressure developed	mmWc	478.63	398.18
4	Flue gas temperature	°C	113.1	119.7
5	Flue gas flow	t/h	450.60	407.75
6	Electrical power	kW	1791.20	1923.20
7	Flue gas density	kg/m^3	0.91	0.89
8	Mechanical power	kW	645.60	496.94
9	Overall (fan+motor) efficiency	%	36.04	25.84
10	SEC	kWh/t	3.98	4.72

Table 4: Performance results of Induced draft fans at Unit 7

Sl. No.	Particular	Unit	IDF-7A	IDF-7B
1	Suction Pressure	mmWc	-104	-49
2	Discharge Pressure	mmWc	109	49
3	Pressure developed	mmWc	213	98
4	Flue gas temperature	°C	136.65	129.50
5	Flue gas flow	t/h	288.29	418.54
6	Electrical power	kW	1837.60	2017.50
7	Flue gas density	kg/m^3	0.85	0.86
8	Mechanical power	kW	196.79	129.92
9	Overall (fan+motor) efficiency	%	10.71	6.44
10	SEC	kWh/t	6.37	4.82

Table 5: Performance results of Induced draft fans at Unit 8

Sl. No.	Particular	Unit	IDF-8A	IDF-8B
1	Suction Pressure	mmWc	-368.55	-368.47
2	Discharge Pressure	mmWc	26.66	26.91
3	Pressure developed	mmWc	395.21	395.38
4	Flue gas temperature	^oC	130.45	134.70
5	Flue gas flow	t/h	400.48	461.25
6	Electrical power	kW	1623.60	1868.70
7	Flue gas density	kg/m^3	0.86	0.84
8	Mechanical power	kW	501.33	591.41
9	Overall (fan+motor) efficiency	%	30.88	31.65
10	SEC	kWh/t	4.05	4.05

Table 6: Performance results of Forced draft fans at Unit 6.

Sl. No.	Particular	Unit	FDF-6A	FDF-6B
1	Suction Pressure	mmWc	-19	-19
2	Discharge Pressure	mmWc	255.37	258.49
3	Pressure developed	mmWc	274.37	277.49
4	secondary air temperature	^oC	35	35
5	secondary air flow	t/h	261.046	299.244
6	Electrical power	kW	313.00	358.80
7	secondary air density	kg/m^3	1.15	1.15
8	Mechanical power	kW	169.66	196.69
9	Overall (fan+motor) efficiency	%	54.20	54.82
10	SEC	kWh/t	1.20	1.20

Table 7: Performance results of Forced draft fans at Unit 7.

Sl. No.	Particular	Unit	FDF-7A	FDF-7B
1	Suction Pressure	mmWc	-19	-19
2	Discharge Pressure	mmWc	202.89	205.81
3	Pressure developed	mmWc	221.89	224.81
4	secondary air temperature	^oC	23.74	24.62
5	secondary air flow	t/h	295.81	210.54
6	Electrical power	kW	298.70	212.60
7	secondary air density	kg/m^3	1.19	1.19
8	Mechanical power	kW	150.25	108.35
9	Overall (fan+motor) efficiency	%	50.30	50.96
10	SEC	kWh/t	1.01	1.01

Table 8: Performance results of Forced draft fans at Unit 8.

Sl. No.	Particular	Unit	FDF-8A	FDF-8B
1	Suction Pressure	mmWc	-14	-14
2	Discharge Pressure	mmWc	173.09	173.43
3	Pressure developed	mmWc	187.09	187.43
4	secondary air temperature	^oC	30	29
5	secondary air flow	t/h	191.97	214.88
6	Electrical power	kW	249.40	223.50
7	secondary air density	kg/m^3	1.17	1.17
8	Mechanical power	kW	83.62	93.77
9	Overall (fan+motor) efficiency	%	33.53	41.95
10	SEC	kWh/t	1.30	1.04

Table 9: Performance results of Primary air fans at Unit 6.

Sl. No.	Particular	Unit	PAF-6A	PAF-6B
1	Suction Pressure	mmWc	-19	-19
2	Discharge Pressure	mmWc	964.82	994.11
3	Pressure developed	mmWc	983.82	1013.11
4	Primary air temperature	^oC	34.49	34.49
5	Primary air flow	t/h	119.45	129.90
6	Electrical power	kW	1279	1391
7	Primary air density	kg/m^3	1.15	1.15
8	Mechanical power	kW	278.36	311.75
9	Overall (fan+motor) efficiency	%	21.76	22.41
10	SEC	kWh/t	10.71	10.71

Table 10: Performance results of Primary air fans at Unit 7.

Sl. No.	Particular	Unit	PAF-7A	PAF-7B
1	Suction Pressure	mmWc	-19	-19
2	Discharge Pressure	mmWc	1018.23	1023.18
3	Pressure developed	mmWc	1037.23	1042.18
4	Primary air temperature	^oC	23.74	24.62
5	Primary air flow	t/h	124.15	126.36
6	Electrical power	kW	1402	1427
7	Primary air density	kg/m^3	1.19	1.19
8	Mechanical power	kW	294.77	301.46
9	Overall (fan+motor) efficiency	%	21.03	21.13
10	SEC	kWh/t	11.29	11.29

Table 11: Performance results of Primary air fans at Unit 8.

Sl. No.	Particular	Unit	PAF-8A	PAF-8B
1	Suction Pressure	mmWc	-9	-9
2	Discharge Pressure	mmWc	1013.05	971.81
3	Pressure developed	mmWc	1022.05	980.81
4	Primary air temperature	^oC	29	30
5	Primary air flow	t/h	205.19	213.63
6	Electrical power	kW	1094	1139
7	Primary air density	kg/m^3	1.17	1.17
8	Mechanical power	kW	488.27	487.84
9	Overall (fan+motor) efficiency	%	44.63	42.83
10	SEC	kWh/t	5.33	5.33

Table 12: Performance results of Mills at Unit 6.

Sl. No.	Particulars	Unit	Coal Mill AB	Coal Mill EF
1	PA flow	t/h	104.58	104.53
2	Coal flow	t/h	70.91	72.30
3	Air to Fuel ratio	-	1.47	1.45
4	Coal - air mixture temp.	^oC	72.95	75.07
5	Power	kW	1596.00	1611.00
6	SEC	kWh/t of coal	22.51	22.28

Table 13: Performance results of Mills at Unit 7.

Sl. No.	Particulars	Unit	Coal Mill CD	Coal Mill EF
1	PA flow	t/h	126.10	122.66
2	Coal flow	t/h	84.29	74.47
3	Air to Fuel ratio	-	1.50	1.65
4	Coal - air mixture temp.	^{o}C	75.07	79.40
5	Power	kW	1705.00	1563.00
6	SEC	kWh/t of coal	20.23	20.99

Table 14: Performance results of Mills at Unit 8.

Sl. No.	Particulars	Unit	Coal Mill A	Coal Mill C	Coal Mill D	Coal Mill E	Coal Mill F
1	PA flow	t/h	81.80	91.28	81.41	79.33	84.75
2	Coal flow	t/h	28.43	33.18	35.71	35.01	37.39
3	Air to Fuel ratio	-	2.88	2.75	2.28	2.27	2.27
4	Coal - air mixture temp.	^{o}C	79.78	72.55	61.56	53.03	61.35
5	Power	kW	366.90	375.40	351.30	338.50	376.10
6	SEC	kWh/t of coal	12.91	11.31	9.84	9.67	10.06

Table 15: Performance results of Cooling Water Pumps & Auxiliary Cooling Water Pumps of Unit 6.

Sl. No.	Particulars	Unit	CWP-A	CWP-B	CWP-C	ACWP-A	ACWP-B
1	Motor output rating	kW	1650	1650	1650	630	630
2	Measured input power	kW	1572.00	1657.00	1724.00	530.70	505.40
3	Total discharge flow	t/h	1608.56	18954.07	18104.04	3333.72	3303.28
4	Suction pressure	kgf/cm2	-0.30	-0.42	-0.34	-0.35	-0.35
5	Discharge pressure	kgf/cm2	1.89	1.65	1.89	4.36	4.53
6	Total pressure developed	kgf/cm2	2.19	2.07	2.23	4.71	4.88
7	**Motor + pump efficiency**	**%**	**60.90**	**64.41**	**63.68**	**80.56**	**86.85**
8	Motor load factor	%	82.89	87.37	90.90	73.29	69.79
9	SEC	kWh/t	0.17	0.08	0.15	0.16	0.15

Table 16: Performance results of Cooling Water Pumps & Auxiliary Cooling Water Pumps of Unit 7.

Sl. No.	Particulars	Unit	CWP-A	CWP-B	CWP-C	ACWP-A	ACWP-B
1	Motor output rating	kW	1650	1650	1650	630	630
2	Measured input power	kW	1564.00	1609.00	1651.00	564.10	560.20
3	Total discharge flow	t/h	17532.00	16860.00	18252.00	2508.00	2405.11
4	Suction pressure	kgf/cm2	-0.40	-0.48	-0.48	-0.43	-0.43
5	Discharge pressure	kgf/cm2	1.50	1.51	1.63	4.20	4.75
6	Total pressure developed	kgf/cm2	1.90	1.99	2.11	4.63	5.18
7	**Motor + pump efficiency**	**%**	**58.14**	**56.66**	**63.39**	**56.05**	**60.56**
8	Motor load factor	%	82.47	84.84	87.05	77.90	77.36
9	SEC	kWh/t	0.09	0.10	0.09	0.22	0.23

Table 17: Performance results of Cooling Water Pumps & Auxiliary Cooling Water Pumps of Unit 8.

Sl. No.	Particulars	Unit	CWP-B	CWP-C	ACWP-A	ACWP-B
1	Motor output rating	kW	1650	1650	630	630
2	Measured input power	kW	1572.00	1473.00	593.20	600.70
3	Total discharge flow	t/h	16200.0	13308.0	2526.00	2355.60
4	Suction pressure	kgf/cm2	-0.39	-0.35	-0.34	-0.34
5	Discharge pressure	kgf/cm2	1.81	1.82	6.00	6.26
6	Total pressure developed	kgf/cm2	2.20	2.17	6.34	6.60
7	**Motor + pump efficiency**	**%**	**61.70**	**53.50**	**73.52**	**70.48**
8	Motor load factor	%	82.89	77.67	81.92	82.95
9	SEC	kWh/t	0.10	0.11	0.23	0.26

Table 18: Performance results of pumps of Khadka Pump House.

Sl. No.	Particulars	Unit	Pump-1	Pump-3	Pump-4	Pump-5
1	Motor output rating	kW	450	450	450	450
2	Measured input power	kW	318.10	368.60	441.50	410.90
3	Total discharge flow	t/h	1672.82	1952.99	1499.10	1382.47
4	Suction pressure	kgf/cm2	-1.08	-1.08	-1.08	-1.08
5	Discharge pressure	kgf/cm2	3.17	3.18	5.50	5.46
6	Total pressure developed	kgf/cm2	4.25	4.26	6.58	6.54
7	**Motor + pump efficiency**	**%**	**60.81**	**61.41**	**60.82**	**59.89**
8	Motor load factor	%	67.15	77.82	93.21	86.75
9	SEC	kWh/t	0.19	0.19	0.29	0.30

Table 19: Performance results of Pumps of Naikota Pump House.

Sl. No.	Particulars	Unit	Pump-1	Pump-3	Pump-4	Pump-5
1	Motor output rating	kW	450.00	450.00	450.00	450.00
2	Measured input power	kW	458.20	459.80	445.60	430.90
3	Total discharge flow	t/h	2232.82	2207.88	2032.85	1866.64
4	Suction pressure	kgf/cm2	-0.39	-0.39	-0.39	-0.39
5	Discharge pressure	kgf/cm2	5.23	5.41	5.62	5.65
6	Total pressure developed	kgf/cm2	5.62	5.80	6.01	6.04
7	**Motor + pump efficiency**	**%**	**74.60**	**75.87**	**74.69**	**71.28**
8	Motor load factor	%	96.73	97.07	94.07	90.97
9	SEC	kWh/t	0.21	0.21	0.22	0.23

Table 20: Performance results of Pumps of WTP of Unit 6 & 7

Sl. No.	Particulars	Unit	CMP 1	CMP 2	CMP 3	CMP 4	Degasser pump 1	Degasser pump 2
1	Motor output rating	kW	15	6	6	11	30	30
2	Measured input power	kW	9.69	7.45	6.34	11.85	31.34	28.97
3	Total discharge flow	t/h	40.70	43.62	33.50	79.61	132.84	133.48
4	Suction pressure	kgf/cm2	0.84	0.82	0.82	0.80	0.00	0.00
5	Discharge pressure	kgf/cm2	4.39	3.42	3.36	3.82	4.81	5.00
6	Total pressure developed	kgf/cm2	3.55	2.60	2.54	3.02	4.81	5.00
7	**Motor + pump efficiency**	**%**	**40.61**	**41.40**	**36.50**	**55.27**	**55.53**	**62.74**
8	Motor load factor	%	58.14	121.91	103.75	96.95	94.02	86.91
9	SEC	kWh/t	0.24	0.17	0.19	0.15	0.24	0.22

Table 21: Performance results of Pumps of WTP of Unit 8

Sl. No.	Particulars	Unit	CSTMP A	CSTMP B
1	Motor output rating	kW	15.00	15.00
2	Measured input power	kW	16.81	16.32
3	Total discharge flow	t/h	137.70	150.00
4	Suction pressure	kgf/cm2	0.87	0.87
5	Discharge pressure	kgf/cm2	3.38	3.17
6	Total pressure developed	kgf/cm2	2.51	2.30
7	**Motor + pump efficiency**	**%**	**56.09**	**57.68**
8	Motor load factor	%	99.74	96.83
9	SEC	kWh/t	0.12	0.11

Table 22: Performance results of Pumps of PTP of Unit 6.

Sl. No.	Particulars	Unit	SWFP 1	SWFP 2	SWFP 3
1	Motor output rating	kW	90.00	90.00	90.00
2	Measured input power	kW	72.90	72.79	82.28
3	Total discharge flow	t/h	593.76	681.00	551.28
4	Suction pressure	kgf/cm2	-0.22	-0.22	-0.22
5	Discharge pressure	kgf/cm2	1.47	1.70	1.79
6	Total pressure developed	kgf/cm2	1.69	1.92	2.01
7	**Motor + pump efficiency**	**%**	**37.50**	**48.93**	**36.69**
8	Motor load factor	%	72.90	72.79	82.28
9	SEC	kWh/t	0.12	0.11	0.15

Table 23: Performance results of Pumps of PTP of Unit 7.

Sl. No.	Particulars	Unit	SFWP D	SFWP E
1	Motor output rating	kW	75.00	75.00
2	Measured input power	kW	61.70	66.57
3	Total discharge flow	t/h	362.84	350.09
4	Suction pressure	kgf/cm2	-0.20	-0.20
5	Discharge pressure	kgf/cm2	3.52	3.52
6	Total pressure developed	kgf/cm2	3.72	3.72
7	**Motor + pump efficiency**	**%**	**59.64**	**53.33**
8	Motor load factor	%	77.17	83.26
9	SEC	kWh/t	0.17	0.19

Table 24: Performance results of Pumps of PTP of Unit 8

Sl. No.	Particulars	Unit	CWMP A	CWMP B	CWMP C	SWP B	DMFWP A	DMFWP C
1	Motor output rating	kW	75.00	75.00	75.00	90.00	11.00	11.00
2	Measured input power	kW	57.61	63.72	65.38	43.90	9.81	11.20
3	Total discharge flow	t/h	547.90	576.71	542.40	95.44	72.31	81.34
4	Suction pressure	kgf/cm 2	-0.19	-0.19	-0.19	-0.19	-0.19	-0.19
5	Discharge pressure	kgf/cm 2	1.23	1.25	1.17	9.15	1.43	1.61
6	Total pressure developed	kgf/cm 2	1.42	1.44	1.36	9.34	1.62	1.80
7	**Motor + pump efficiency**	**%**	**36.87**	**35.58**	**30.80**	**55.33**	**32.59**	**35.67**
8	Motor load factor	%	72.05	79.69	81.77	45.75	79.37	90.62
9	SEC	kWh/t	0.11	0.11	0.12	0.46	0.14	0.14

Table 25: Performance results of Pumps of Raw Water Pump House of Unit 6 & 7

Sl. No.	Particulars	Unit	RWP-I	RWP-II	RWP-III	AWP-I	AWP-II	AWP-III	AWP-IV
1	Motor output rating	kW	90	90	110	55	55	55	55
2	Measured input power	kW	100.52	92.44	62.85	49.80	50.08	45.24	47.29
3	Total discharge flow	t/h	1161.52	881.46	679.51	496.81	206.36	506.96	553.32
4	Suction pressure	kgf/cm2	-0.29	-0.26	-0.29	-0.25	-0.25	-0.25	-0.25
5	Discharge pressure	kgf/cm2	1.35	1.35	1.25	1.99	1.65	1.76	1.80
6	Total pressure developed	kgf/cm2	1.64	1.61	1.54	2.24	1.90	2.01	2.05
7	**Motor + pump efficiency**	**%**	**51.65**	**41.85**	**45.24**	**60.76**	**21.28**	**61.24**	**65.21**
8	Motor load factor	%	104.99	97.78	53.99	84.93	85.41	76.91	80.39
9	SEC	kWh/t	0.09	0.10	0.09	0.10	0.24	0.09	0.09

Table 26: Performance results of Pumps of Raw Water Pump House of Unit 8

Sl. No.	Particulars	Unit	RWP-I	AWP-II	JP-I	HP-II
1	Motor output rating	kW	125.00	90.00	37.50	160.00
2	Measured input power	kW	91.96	91.59	15.47	156.16
3	Total discharge flow	t/h	592.01	916.20	68.76	362.08
4	Suction pressure	kgf/cm2	-0.17	-0.17	0.24	0.24
5	Discharge pressure	kgf/cm2	2.98	1.38	2.80	9.25
6	Total pressure developed	kgf/cm2	3.15	1.55	2.56	9.01
7	**Motor + pump efficiency**	**%**	**55.31**	**42.26**	**31.00**	**56.91**
8	Motor load factor	%	69.89	91.59	37.54	93.50
9	SEC	kWh/t	0.16	0.10	0.22	0.43

Table 27: Performance results of ACW Booster Pump of Unit 6.

Sl. No.	Particulars	Unit	Pump B1	Pump B2
1	Motor output rating	kW	45.00	45.00
2	Measured input power	kW	39.91	36.43
3	Total discharge flow	t/h	1116.18	1127.28
4	Discharge pressure	kgf/cm2	1.87	1.84
5	Motor load factor	%	79.82	72.86
6	SEC	kWh/t	0.04	0.03

Table 28: Loading condition of major CHP auxiliaries of Unit 6 & 7

Sl. No.	Auxiliary	Rating, kW	Operating power, kW	Load factor, %
1	Crusher motor feeder	1200	170	12.75
2	Conveyor motor feeder - 1	250	77.99	28.08
3	Conveyor motor feeder - 2	180	91.13	45.57
4	Conveyor motor feeder - 5	250	71.78	25.84
5	Conveyor motor feeder - 6	224	114.4	45.96
6	RBF-2	75	21.52	25.82

Table 29: Loading condition of major CHP auxiliaries of Unit 8

Sl. No.	Auxiliary	Rating, kW	Operating power, kW	Load factor, %
1	Belt conveyor – 1A	355	150	38.03
2	Belt conveyor – 2A	280	76	24.43
3	Belt conveyor – 3A	200	95	42.75
4	Belt conveyor – 4A	200	40	18.00
5	Belt conveyor – 6A	160	71	39.94
6	Belt conveyor – 7B	500	212	38.16
7	RBF – 1A	75	8.69	10.43
8	RBF – 2A	75	10.74	12.89
9	Crusher – 1A	1250	109	7.85

Table 30: Performance results of Pumps of ECW System of Unit 8.

Sl. No.	Particulars	Unit	TGECW-A	TGECW-B	TGECW-C	SGECW-A	SGECW-B
1	Motor output rating	kW	160.00	160.00	160.00	110.00	110.00
2	Measured input power	kW	112.22	126.83	126.05	98.43	110.10
3	Total discharge flow	t/h	595.46	794.78	765.83	263.14	272.57
4	Suction pressure	kgf/cm2	2.16	2.14	2.09	2.12	2.12
5	Discharge pressure	kgf/cm2	6.71	6.17	6.80	8.47	8.22
6	Total pressure developed	kgf/cm2	4.55	4.03	4.71	6.35	6.10
7	**Motor + pump efficiency**	**%**	**65.77**	**68.79**	**77.95**	**46.24**	**41.14**
8	Motor load factor	%	66.98	75.70	75.24	80.53	90.08
9	SEC	kWh/t	0.22	0.16	0.16	0.37	0.49

Table 31: Performance results of ACW booster pumps

Sl. No.	Particulars	Unit	U # 6		U # 7
			Pump B1	Pump B2	Pump A
1	Motor output rating	kW	45	45	45
2	Measured input power	kW	39.91	36.43	36.33
3	Total discharge flow	t/h	1116.18	1127.28	996.77
4	Suction pressure	kgf/cm2	--	--	--
5	Discharge pressure	kgf/cm2	1.87	1.84	--
6	Total pressure developed	kgf/cm2	--	--	--
7	**Motor + pump efficiency**	**%**	--	--	--
8	Motor load factor	%	79.82	72.86	75.08
9	SEC	kWh/t	0.04	0.03	0.04

Table 32: Percentage of oxygen measured at different locations of flue gas path in Unit 6, 7 & 8

Location	Unit # 6		Unit # 7		Unit # 8	
	A	B	A	B	A	B
APH Inlet	3.80	4.90	--	5.10	1.50	1.85
APH Outlet	8.20	6.75	7.38	7.53	6.30	7.65
ESP Inlet	10.56	9.28	8.73	10.40	7.83	8.08
ESP Outlet	10.96	9.62	9.10	10.45	8.53	9.00
IDF Outlet	10.96	9.62	9.10	10.45	8.53	9.00

Table 33: Percentage of leakage at different locations of flue gas path in Unit 6, 7 & 8

Location	Unit # 6		Unit # 7		Unit # 8	
	A	B	A	B	A	B
Across APH	31.18	11.77	--	16.32	29.59	39.40
APH Outlet to ESP Inlet	20.54	19.55	9.98	24.64	10.54	2.98
Across ESP	3.62	2.75	2.86	0.43	5.05	7.00
ESP Outlet to IDF Outlet	Nil	Nil	Nil	Nil	Nil	Nil

FINAL REPORT OF

DETAILED STUDY OF AUXILIARY POWER CONSUMPTION AND AVAILABILITY FACTOR OF UNIT #1,2, 3 AND 4

Conducted at

KHAPERKHEDA THERMAL POWER STATOIN

REPORT NO.: CPRI/ERED/EA/219/24

(Work order No.: KPKD/4500128570 dated 05/10/2023)

Project code: CPRI/CS&CD/2023-24/ERED/C/05

Study conducted by

June 2024

Energy Efficiency and Renewable Energy Division

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Date of issue of report	20 June 2024	
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Signature of the division head		

ACKNOWLEDGEMENT

CPRI is thankful to **Khaperkheda Thermal Power Station** for placing the work order for 'Detailed study of auxiliary power consumption and availability factor of Unit #1, 2, 3 and 4' and making the necessary arrangements for conducting the study at Khaperkheda Thermal Power Station, Maharashtra.

We thank the all officials of Khaperkheda Thermal Power Station, Maharashtra for their excellent co-operation, valuable help and arrangements made during the conduct of the study.

CPRI also thank all other staff of Khaperkheda Thermal Power Station, Maharashtra for extending excellent co-operation during the conduct of the study.

EXECUTIVE SUMMARY

The detailed audit to ascertain scope of improvement in availability factor and reduction in auxiliary power consumption (APC) was conducted in **January 2024**.

- Achievable values of APC for each unit at different plant load after implementing corrective measures are shown below,

PLF	APC, %			
	Unit 1	**Unit 2**	**Unit 3**	**Unit 4**
100	8.36	7.91	9.20	8.53
90	9.15	8.55	9.55	9.02
80	10.02	9.24	9.91	9.56
70	10.98	9.99	10.30	10.13
60	12.05	10.82	10.72	10.76

- Maximum achievable AVF for stage I (Unit #1 and Unit #2) is found to be 73.75 % (GCV= 3200 kcal/kg) and the corresponding APC of the stage is 10.10 %.

- Maximum achievable AVF for stage II (Unit #3 and Unit #4) is found to be 79.75 % (GCV= 3200 kcal/kg) and the corresponding APC of the stage is 9.80 %.

- Maximum achievable AVF for the station is found to be 76.75 % (GCV= 3200 kcal/kg) and the corresponding APC of the stage is 9.95 %.

- Following major activities can be considered with respect to its financial implication for improving the AVF to the normative value of 85 %,
    - Increasing heating surface area to address low coal quality than the design.
    - Installation of modular duct to address the duct leakage due deteriorated duct system.
    - Revamping of milling system.
- During the test period 2 CWP, 2 ACWP and 9 CT fans were not operated due to improved vacuum on account of cooler ambient conditions of winter. This operation of equipment is only practiced for 2 months i.e December & January. For the remaining 10 months, all above auxiliaries are operated.

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1.0 INTRODUCTION

This section introduces the plant, equipment & process and defines the scope of the work.

1.1 Khaperkheda Thermal Power Station

The Maharashtra State Power Generation Corporation Ltd. (MSPGCL) had established coal fired thermal power stations of 210 MW x 4 units (Unit 1-4) & 500 MW (Units 5) at Khaperkheda. All the units are operational. So, the total installed capacity is 1340 MW. The auxiliary power consumption audit study is carried out for unit 1 to unit 4.

1.2 Scope of the work

The scope of the work is given below:

- Detailed analysis of auxiliary power consumption.
- Detailed analysis of availability factor of units.
- Conducting performance testing on each unit to ascertain its performance.
- Suggesting measures to reduce auxiliary consumption & improve availability factor.
- Preparation of detailed study report based on the finding during the field study.

2.0 WORK CARRIED OUT

The detailed auxiliary power consumption (APC) audit was conducted in ***January 2024.*** The work at the site consisted of measurement of input and output variables of different equipment and auxiliary loads in the plant by conducting performance tests.

The performance tests were carried out at following plant loads,

Unit 1 – 148.80 MW

Unit 2 – 123.93 MW

Unit 3 – 176.26 MW

Unit 4 – 191.95 MW

The data is processed at CPRI to evaluate auxiliary power consumption (APC) and possible improvement in the APC. Findings from the study are detailed in upcoming parts of the report.

3.0 OBSERVATIONS AND STUDY RESULTS

The generator terminal voltage is 15.75 kV and is stepped up to 220 kV by Generator Transformer of 250 MVA. The grid voltage of 220 kV is stepped down to 6.6 kV by station transformer of 40 MVA (individual station transformer for each unit) to provide the auxiliary power to common auxiliaries and power during start up. During normal running of the plant, the auxiliary power is supplied by the Unit Auxiliary Transformer (UAT) of 25 MVA.

The secondary of UAT is fed to two 6.6 kV Bus (i.e., UAT 'A' and UAT 'B' Bus). The HT major auxiliary equipment are fed from these two Bus. UAT bus are provided tie from station bus. During startup operation, UAT bus will be charged through tie from station boards. During normal operation the power supply will change over from station tie to UAT.

3.1 Past Data Analysis and Observations

For ascertaining variation in APC of each unit, APC data for past 5 years with load factor more than 40 % was considered. APC for load factor less than 40 % can be highly volatile due to change in the operational practice and due to the reason for less load factor. Variation in APC with respect to the load is shown in Figure 1 to 8.

Unit 1: -

It is found that APC for unit 1 varies in the following ranges with respect to the load factor,

- PLF of 90 % to 100 % - APC varies between 8.62 % to 7.88 %.
- PLF of 80 % to 90 % - APC varies between 9.44 % to 8.62 %.
- PLF of 70 % to 80 % - APC varies between 10.33 % to 9.44 %.
- PLF of 60 % to 70 % - APC varies between 11.30 % to 10.33 %.
- PLF of 50 % to 60 % - APC varies between 12.36% to 11.30 %.

Unit 2: -

It is found that APC for unit 2 varies in the following ranges with respect to the load factor,

- PLF of 90 % to 100 % - APC varies between 8.70 % to 8.11 %
- PLF of 80 % to 90 % - APC varies between 9.33 % to 8.70 %
- PLF of 70 % to 80 % - APC varies between 10.01 % to 9.33 %

- PLF of 60 % to 70 % - APC varies between 10.74 % to 10.01 %
- PLF of 50 % to 60 % - APC varies between 11.52 % to 10.74 %

Unit 3: -

It is found that APC for unit 3 varies in the following ranges with respect to the load factor,

- PLF of 90 % to 100 % - APC varies between 10.09 % to 9.79 %
- PLF of 80 % to 90 % - APC varies between 10.39 % to 10.09 %
- PLF of 70 % to 80 % - APC varies between 10.71 % to 10.39 %
- PLF of 60 % to 70 % - APC varies between 11.04 % to 10.71 %
- PLF of 50 % to 60 % - APC varies between 11.37 % to 11.04 %

Unit 4: -

It is found that APC for unit 4 varies in the following ranges with respect to the load factor,

- PLF of 90 % to 100 % - APC varies between 9.25 % to 8.80 %
- PLF of 80 % to 90 % - APC varies between 9.73 % to 9.25 %
- PLF of 70 % to 80 % - APC varies between 10.23 % to 9.73 %
- PLF of 60 % to 70 % - APC varies between 10.75 % to 10.23 %
- PLF of 50 % to 60 % - APC varies between 11.30 % to 10.75 %

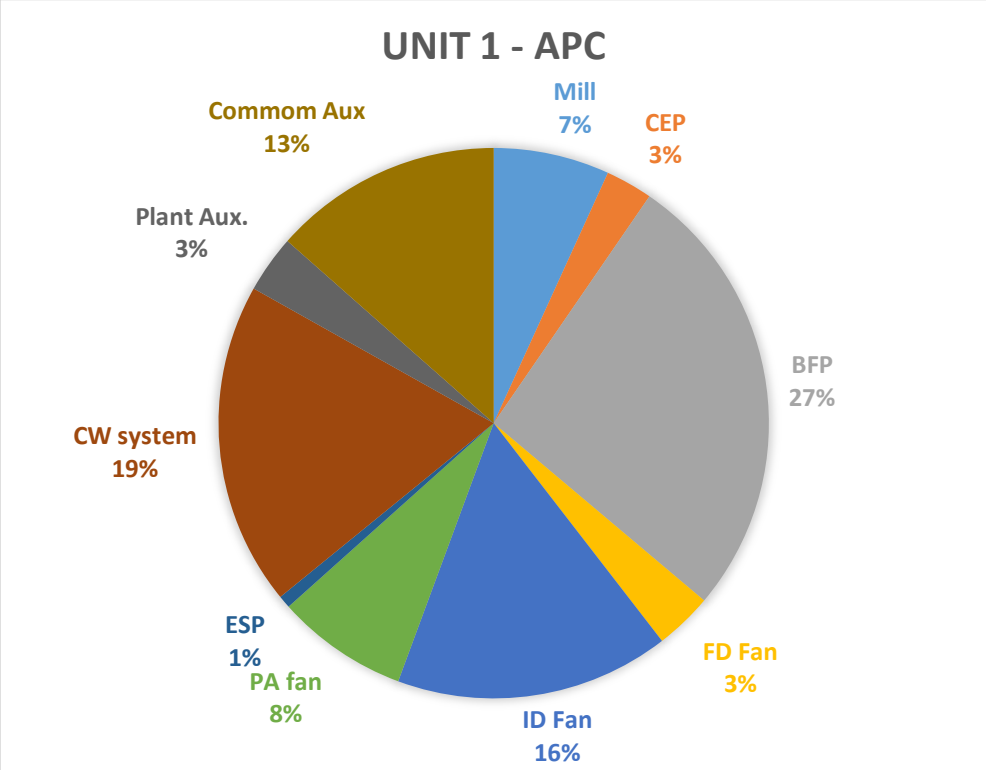
3.2 Study Data Analysis and Observations

3.2.1 Unit Auxiliaries power consumption

Power consumptions of plant auxiliaries connected to the Unit Auxiliary Transformer (UAT) and Station Transformer (ST) were recorded during the unit test for each unit and bifurcation of power consumption was calculated and presented below,

Unit 1: -

Power consumption of auxiliaries during the test was found to be 16.34 MW when the gross generation was 148.80 MW which account to PLF of 70.86 %. This power consumption of auxiliaries accounts to 10.99 % of gross generation. Bifurcation of power consumption at each auxiliary as percentage of total power consumption is shown below.

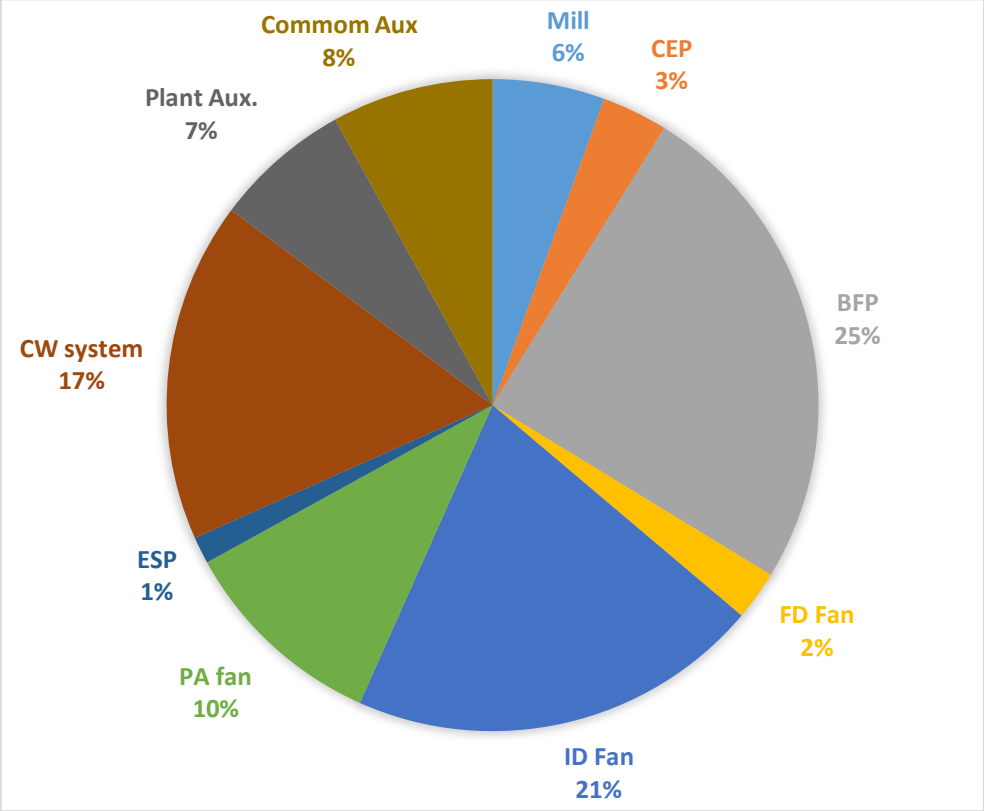


Power consumption of BFP system accounts to 3.12 % of gross generation and it is 26.56 % of total auxiliary power consumption. Similarly, power consumption of CW system accounts to 2.23 % of gross generation and it is 19.01 % of total auxiliary power consumption. In third place, power consumption of ID fan accounts to 1.89 % of gross generation and it is 16.11 % of total auxiliary power consumption.

Contribution of common auxiliaries such as CHP, AHP, WTP etc. is 0.84 % of gross generation and it is 7.16 % of total auxiliary power consumption. This is calculated by sharing the common auxiliary load based on the generation from the respective unit.

Unit 2: -

Power consumption of auxiliaries during the test was found to be 12.99 MW when the gross generation was 123.93 MW which account to PLF of 59.01 %. This power consumption of auxiliaries accounts to 10.48 % of gross generation. Bifurcation of power consumption at each auxiliary as percentage of total power consumption is shown below.

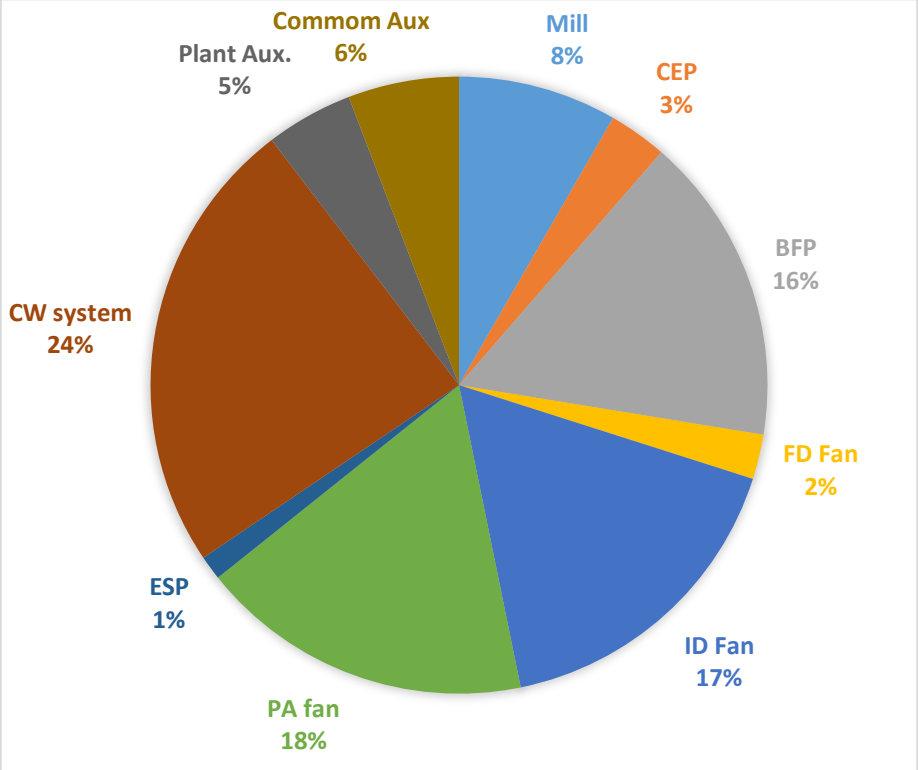


Power consumption of BFP system accounts to 2.61 % of gross generation and it is 24.88 % of total auxiliary power consumption. Similarly, power consumption of ID Fan accounts to 2.15 % of gross generation and it is 20.51 % of total auxiliary power consumption. In third place, power consumption of CW system accounts to 1.77 % of gross generation and it is 16.88 % of total auxiliary power consumption.

Contribution of common auxiliaries such as CHP, AHP, WTP etc. is 0.84 % of gross generation and it is 8.01 % of total auxiliary power consumption. This is calculated by sharing the common auxiliary load based on the generation from the respective unit.

Unit 3: -

Power consumption of auxiliaries during the test was found to be 14.84 MW when the gross generation was 176.26 MW which account to PLF of 83.93 %. This power consumption of auxiliaries accounts to 8.42 % of gross generation. Bifurcation of power consumption at each auxiliary as percentage of total power consumption is shown below.

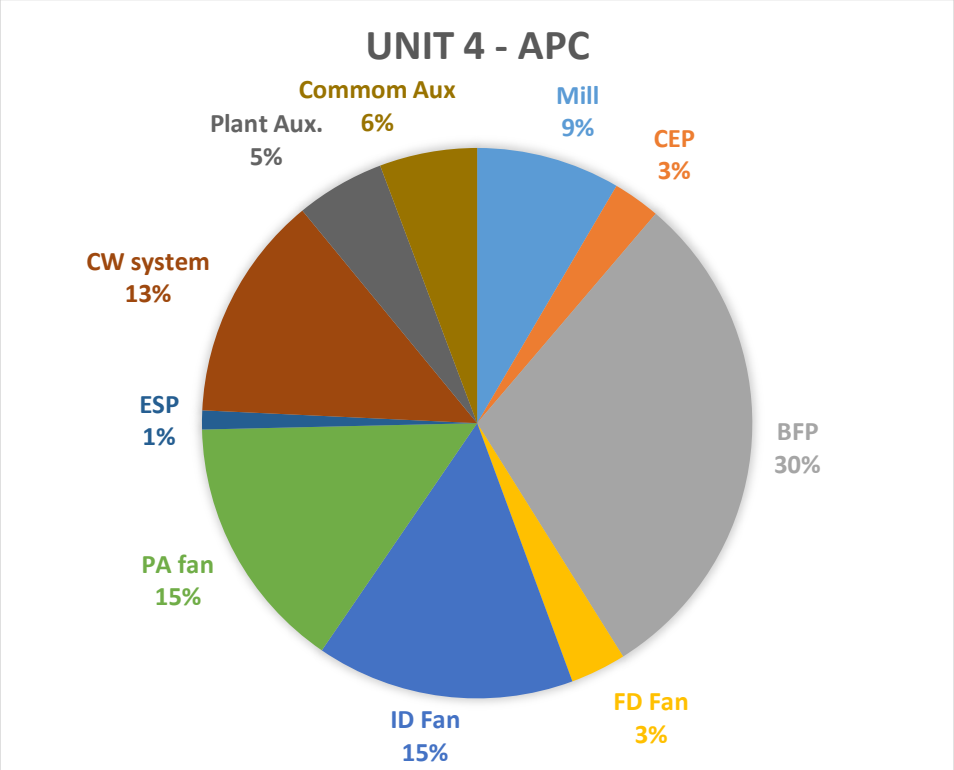


Power consumption of CW system accounts to 2.03 % of gross generation and it is 24.06 % of total auxiliary power consumption. Similarly, power consumption of PA Fan accounts to 1.47 % of gross generation and it is 17.48 % of total auxiliary power consumption. In third place, power consumption of ID Fan accounts to 1.42 % of gross generation and it is 16.88 % of total auxiliary power consumption.

Contribution of common auxiliaries such as CHP, AHP, WTP etc. is 0.49 % of gross generation and it is 5.82 % of total auxiliary power consumption. This is calculated by sharing the common auxiliary load based on the generation from the respective unit.

Unit 4: -

Power consumption of auxiliaries during the test was found to be 16.40 MW when the gross generation was 191.95 MW which account to PLF of 91.40 %. This power consumption of auxiliaries accounts to 8.55 % of gross generation. Bifurcation of power consumption at each auxiliary as percentage of total power consumption is shown below.



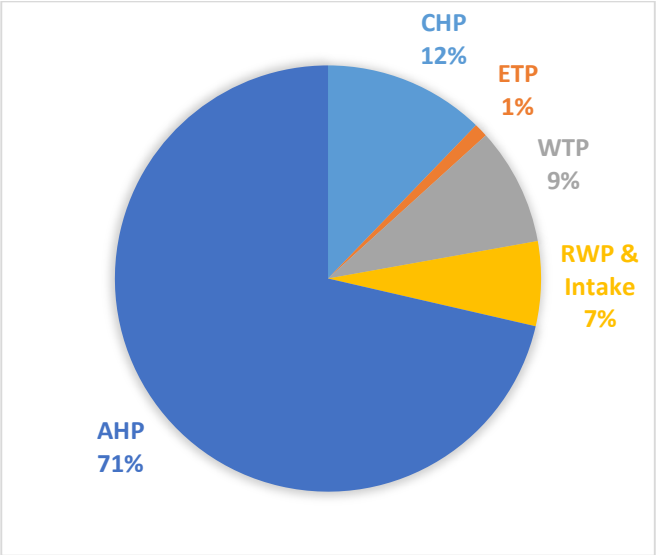
Power consumption of BFP system accounts to 2.55 % of gross generation and it is 29.86 % of total auxiliary power consumption. Similarly, power consumption of ID Fan accounts to 1.30 % of gross generation and it is 15.17 % of total auxiliary power consumption. In third place, power consumption of PA Fan accounts to 1.29 % of gross generation and it is 15.09 % of total auxiliary power consumption.

Contribution of common auxiliaries such as CHP, AHP, WTP etc. is 0.49 % of gross generation and it is 5.73 % of total auxiliary power consumption. This is calculated by sharing the common auxiliary load based on the generation from the respective unit.

3.2.2 Common auxiliaries power consumption

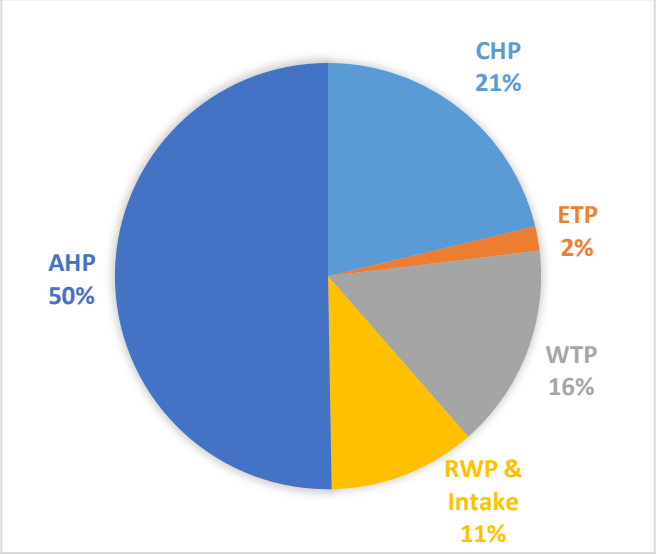
Power consumption in common auxiliaries such as CHP, WTP etc. which are connected to station transformer and other pump house has been attributed to different units based on the gross generation from the respective units. Estimated power consumption for common auxiliaries for different units are as follows,

Power consumption by common auxiliaries of Unit 1 is found to be 1250 kW (0.84 % of APC) whereas it is found to be 1041 kW (0.84 % of APC) for Unit 2. Bifurcation of power consumption is shown below,



It is found that AHP's contribution is 71 % towards total common auxiliary's power and it is 12 %. 9%, 7 % and 1 % for CHP, WTP, RWP and ETP respectively.

Power consumption by common auxiliaries of Unit 3 is found to be 864 kW (0.49 % of APC) whereas it is found to be 940.56 kW (0.49 % of APC) for Unit 2. Bifurcation of power consumption is shown below,



It is found that AHP's contribution is 50 % towards total common auxiliary's power and it is 21 %. 16%, 11 % and 2 % for CHP, WTP, RWP and ETP respectively.

Losses in the transformer has been calculated and accounted for Unit #1, #2, #3 and #4 based on the design losses and losses are as follows,

Unit 1 : 0.27 %
Unit 2 : 0.29 %
Unit 3 : 0.27 %
Unit 4 : 0.27 %

Total APC for each unit was found by addition of power consumption by common auxiliaries, transformer losses and power consumption by UAT auxiliaries. Estimated total APC for each unit is given below,

Unit No.	Test load, MW	APC, %
Unit #1	148.80	11.25
Unit #2	123.93	10.77
Unit #3	176.26	8.69
Unit #4	191.95	8.82

Weighted average APC for the station is 9.73 % at a station load factor of 76.30 %.
This APC value is applicable only for the test condition.

3.3 Auxiliary-wise Analysis and Observations

Connected auxiliaries to the units were analyzed for its performance and discussed here.

3.3.1 Boiler feed pumps (BFPs)

Tables 1 to 2 give the performance results of BFPs. The Boiler Feed pump efficiencies are in the range of:

a) Unit #1: 48.69 – 50.44 %
b) Unit #2: 35.39 – 34.38 %
c) Unit #3: 41.50 – 41.64 %
d) Unit #4: 44.45 – 45.01 %

The main observations and suggestions from the energy audit study are as follows:

a) The voltage at motor terminals are normal.
b) The voltage unbalance between 3-phases at motor terminals is also normal.
c) The current unbalance between 3-phases at motor terminals is normal.
d) The BFP efficiencies are on lower side compared to design values of 81 %.
e) The specific energy consumption (SEC) of BFP is computed in the range of 7.15 – 8.47 kWh/t of FW flow as against to the design value of 8.41 kWh/t of FW.
f) The overall auxiliary power used by BFP is on higher side compared to other similar units. **Recommendations:** It is suggested to check the passing in re-circulation by-pass valve by conducting the test. Reducing the specific steam consumption of unit. Overhauling of pump and checking the clearances between impeller and casing.
g) Load factor of BFP is varying between 40.53 % to 63.80 %. The pumps and motors are not having any restrictions in raising the load and enough capacity is available.

3.3.2 Condensate Extraction pumps (CEPs)

There are two Condensate Extraction Pumps (CEP) for each unit having a capacity of 500 kW and 560 kW for unit 1 &2 and unit 3&4, respectively. One pump will be

continuously working and other will be stand-by. The performance Test is conducted on CEPs during the energy audit study. Tables 3 to 4 give the performance results of CEPs. The observations and suggestions from the energy audit study are as follows:

Unit #1:

a) The load factor of CEP motors is computed by taking the ratio of CEP motor output and rating of CEP. The load factor of CEP is 89.74 %.
b) The CEP efficiency is computed as 72.17 % as against to the design value of 81.0 %. The efficiency is on lower side may be due to reduced discharge pressure at pump outlet. **Recommendations:** It is suggested to improve the pump efficiency by overhauling the pump, maintaining the clearance between impeller and casing, reducing the re-circulation flow, etc.
c) The specific energy consumption (SEC) of CEP is computed as 0.83 kWh/t of condensate flow and is higher than the design value of 0.75 kWh/t of condensate flow due to lower pump efficiency.
d) The overall auxiliary power used by CEP forms 0.32 % of total plant load and is slightly higher compared to other similar units.

Unit #2:

a) The load factor of CEP motors is computed by taking the ratio of CEP motor output and rating of CEP. The load factor of CEP was in the range of 79.08 % to 85.38%.
b) The CEP efficiency was in the range of 52.99 % to 64.22 % as against to the design value of 81.0 %. The efficiency is on lower side may be due to reduced discharge pressure at pump outlet. **Recommendations:** It is suggested to improve the pump efficiency by overhauling the pump, maintaining the clearance between impeller and casing, reducing the re-circulation flow, etc.
c) The specific energy consumption (SEC) of CEP is computed as 1.05 to 1.21 kWh/t of condensate flow and is higher than the design value of 0.75 kWh/t of condensate flow due to lower pump efficiency.
d) The overall auxiliary power used by CEP forms 0.34 % of total plant load and is slightly higher compared to other similar units.

Unit #3:

a) The load factor of CEP motors is computed by taking the ratio of CEP motor output and rating of CEP. The load factor of CEP is in the range of 74.17 % to 75.40 %.
b) The CEP efficiency was in the range of 52.56 % to 53.99 % as against to the design value of 81.0 %. The efficiency is on lower side may be due to reduced discharge pressure at pump outlet. **Recommendations:** It is suggested to improve the pump efficiency by overhauling the pump, maintaining the clearance between impeller and casing, reducing the re-circulation flow, etc.
c) The specific energy consumption (SEC) of CEP is computed in the range of 1.15 to 1.23 kWh/t of condensate flow and is higher than the design value of 0.75 kWh/t of condensate flow due to lower pump efficiency.
d) The overall auxiliary power used by CEP forms 0.26 % of total plant load.

Unit #4:

a) The load factor of CEP motors is computed by taking the ratio of CEP motor output and rating of CEP. The load factor of CEP is in the range of 75.93 % to 76.66 %.
b) The CEP efficiency is computed in the range of 38.88 % to 67.23 % as against to the design value of 81.0 %.
c) The specific energy consumption (SEC) of CEP is computed in the range of 0.88 to 1.23 kWh/t of condensate flow and is higher than the design value of 0.75 kWh/t of condensate flow due to lower pump efficiency.
d) The overall auxiliary power used by CEP forms 0.24 % of total plant load and is on par with other similar units.

3.3.3 ID Fans- Analysis of performance

There are two Induced Draft Fans (IDF) for each unit and both fans will be working continuously. At stage I, the ID fans are provided with hydraulic couplings and at stage II ID fans are provided with variable frequency drives. The performance Test is conducted on ID fans during the energy audit study. The performance results are given in Tables 5 to 8. The observations and suggestions from the energy audit study are as follows:

Unit #1:

a) The load factor of ID fan motors is computed by taking the ratio of motor output and rating. The load factor of ID fan motors is varying between 102.84 – 105.91 %.

b) The flue gas pressure at APH inlet was measured in the range of - 86 to - 93 mmWC and is on higher side.

c) The pressure drop across APH on flue gas side is varying between 51 – 65 mmWC and is lower than the design value of 150 mmWC.

d) The ID fan efficiencies are computed in the range of 34.92 % to 37.91 % as against to the design value of 77.5 % at 100 % fan capacity. The ID fan efficiencies are on lower side may be due to higher pressure drop in the flue gas duct and higher air leakage through APH.

e) The specific energy consumption (SEC) of ID fans is computed as 2.82 – 2.86 kWh/t of Flue gas flow and is higher than the design value of 1.96 kWh/t of flue gas flow may be due to higher power consumption by fans, higher pressure drop in flue gas ducts.

f) During the performance test the oxygen content was measured at APH inlet, APH outlet and ID fan outlet by flue gas analyzer during the performance test. The average Oxygen content at APH inlet was 2.97 % and at APH outlet it was 5.34 %. The increased power due to APH air leakage by ID fans is 107.63 kW that forms about 0.07 % of PL. **Recommendations:** APH leakage is to be arrested. This will reduce ***the energy consumption by 77.50 MWh/month***.

g) The average Oxygen content at ID fan outlet was 10.7 % and is higher. The increased power due to air ingress in flue gas duct from APH to ID outlet is 930.18 kW that forms about 0.63 % of PL. **Recommendations:** It is suggested to arrest air ingress in flue gas duct. This will reduce ***the energy consumption by 669.73 MWh/month***.

h) The loading of ID fan motors is more than its capacity. This is a bottleneck for increasing the plant load. **Recommendations**: It is suggested to arrest the leakage in the flue gas path including APH. This will improve the loading capacity of the unit.

Unit #2:

a) The load factor of ID fan motors is computed by taking the ratio of motor output and rating. The load factor of ID fan motors is varying between 98.47 – 99.28 %.

b) The flue gas pressure at APH inlet was measured in the range of -118 to -127 mmWC and is higher side compared to -267 mmWC at 100 % MCR condition.

c) The pressure drop across APH on flue gas side is varying between 29 – 36 mmWC and is lower than the design value of 150 mmWC.

d) The ID fan efficiencies are computed in the range of 34.48 – 43.63 % as against to the design value of 77.5 % at 100 % fan capacity. The ID fan efficiencies are on lower side.

e) The specific energy consumption (SEC) of ID fans is computed as 2.82 – 2.85 kWh/t of Flue gas flow and is higher than the design value of 1.96 kWh/t of flue gas flow may be due to higher power consumption by fans, higher pressure drop in flue gas ducts.

f) During the performance test the oxygen content was measured at APH inlet, APH outlet and ID fan outlet by flue gas analyzer during the performance test. The average Oxygen content at APH inlet was 2.61 % and at APH outlet it was 9.08 %. The increased power due to APH air leakage by ID fans is 537.32 kW that forms about 0.43 % of PL. **Recommendations:** It is suggested to arrest the leakage in the APH. This will reduce ***the energy consumption by 386.87 MWh/month***.

g) The average Oxygen content at ID fan outlet was 13.1 % and is higher. The increased power due to air ingress in flue gas duct from APH to ID outlet is 1328.55 kW that forms about 1.07 % of PL. **Recommendations:** It is suggested to air ingress in flue gas duct. This will reduce ***the energy consumption by 956.56 MWh/month***.

h) The load factor of ID fan motors is near to its maximum capacity. This is a bottleneck for increasing the plant load. **Recommendations**: It is suggested to arrest the leakage in the flue gas path including APH. This will improve the loading capacity of the unit.

i) The auxiliary power used by ID fans is 2.15 % and is higher compared to other similar units.

Unit #3:

a) The load factor of ID fan motors is computed by taking the ratio of motor output and rating. The load factor of ID fan motors is varying between 77.39 – 79.68 %.

b) The flue gas pressure at APH inlet was measured in the range of - 51.8 to -55.5 mmWC .

c) The pressure drop across APH on flue gas side is varying between 89.5 to 105.2 mmWC and is higher than the design value of 87 mmWC. **Recommendations:** It is suggested to reduce the pressure drop across APH near to design value.

d) The ID fan efficiencies are computed in the range of 18.34 – 22.68 % as against to the design value of 82.0 % at 100 % fan capacity. The ID fan efficiencies are on lower side may be due to higher pressure drop in flue gas duct and higher air leakage through APH.

e) The specific energy consumption (SEC) of ID fans is computed as 2.79 to 3.48 kWh/t of Flue gas flow and is higher than the design value of 2.06 kWh/t.

f) During the performance test the oxygen content was measured at APH inlet, APH outlet and ID fan outlet by flue gas analyzer method during the performance test. The average Oxygen content at APH inlet was 6.89 % and at APH outlet it was 7.86 %. The increased power due to APH air leakage by ID fans is 15.24 kW that forms about 0.1 % of PL. **Recommendations:** It is suggested to arrest the leakage in the APH. This will reduce ***the energy consumption by 10.97 MWh/month***.

g) The average Oxygen content at ID fan outlet was 10.65 % and is higher. The increased power due to air ingress in flue gas duct from APH to ID outlet is 506.66 kW that forms about 0.29 % of PL and is low. **Recommendations:** It is suggested to air ingress in flue gas duct. This will reduce ***the energy consumption by 364.80 MWh/month***.

h) The auxiliary power used by ID fans is 1.42 % and is on par with other similar units.

Unit #4:

a) The load factor of ID fan motors is computed by taking the ratio of motor output and rating. The load factor of ID fan motors is varying between 76.26 – 79.87 %.

b) The flue gas pressure at APH inlet was measured in the range of -35.4 to -75.1 mmWC and is high.

c) The pressure drop across APH on flue gas side is varying between 161.80 – 170.90 mmWC and is higher than the design value of 87 mmWC. **Recommendations:** It is suggested to reduce the pressure drop across AHP near to design value.

d) The ID fan efficiencies are computed in the range of 54.91 – 58.45 % as against to the design value of 82.0 % at 100 % fan capacity. The ID fan efficiencies are on lower side may be due to higher pressure drop in flue gas duct and higher air leakage through APH.

e) The specific energy consumption (SEC) of ID fans is computed as 1.78 – 2.31 kWh/t of Flue gas flow and is lower than the design value of 2.06 kWh/t of flue gas flow may be due to use of variable frequency drives.

f) During the performance test the oxygen content was measured at APH inlet, APH outlet and ID fan outlet by flue gas analyzer during the performance test. The average Oxygen content at APH inlet was 4.41 % and at APH outlet it was 7.46 %. The increased power due to APH air leakage by ID fans is 163.01 kW. **Recommendations:** It is suggested to arrest the leakage in the APH. This will reduce ***the energy consumption by 117.37 MWh/month***.

g) The average Oxygen content at ID fan outlet was 8.9 % and is higher. The increased power due to air ingress in flue gas duct from APH to ID outlet is 366.13 kW. **Recommendations:** It is suggested to air ingress in flue gas duct. This will reduce ***the energy consumption by 263.61 MWh/month***.

h) The auxiliary power used by ID fans is 1.30 % and is on par with other similar units.

3.3.4 FD Fans- Analysis of performance

There are two numbers of FD fans and both fans will be working continuously. The performance test is conducted on FD fans during the study. The performance results are given in Tables 9 to 11. The observations and suggestions from the energy audit study are as follows:

Unit #1:

a) The load factor of FD fan motors is computed by taking the ratio of motor output and rating. The load factor of FD fan motors is 17.56 – 48.11 %. **Recommendation**: It is suggested to install variable frequency drives (VFD) for FD fans and operate both fans in parallel.

b) The FD fan discharge pressure is in the rage of 82.47 – 93.70 mmWC and is lower than the design value of 383 mmWC. This will reduce the furnace to windbox DP. **Recommendations:** It is suggested to increase the FD fan discharge pressure near to design value (about 200 mmWC at 100 % MCR). Again higher windbox DP may leads to decrease in the furnace ingress. Therefore, the windbox DP may be optimized to reduce the furnace ingress.

c) The FD fan efficiency is in the range of 19.66 to 22.33 % as against to the design value of 84.0 % at 100 % fan capacity. The FD fan efficiency is on lower side due to partial loading, increased air leakage through APH, higher pressure drop across air ducts.

d) The specific energy consumption (SEC) of FD fan is computed as 0.98 kWh/t of total air flow and is lower than the design value of 1.32 kWh/t of total air flow. This reduced SEC occurs with reduced efficiency due to under loading of FD fans.

e) During the performance test the oxygen content was measured at APH inlet, APH outlet and ID fan outlet by flue gas analyzer during performance test. The average Oxygen content at APH inlet was 2.97 % and at APH outlet it was 5.34 %. The increased power due to APH air leakage by FD fans is 51.31 kW that forms about 0.03 % of PL. **Recommendations:** It is suggested to replace the APH full set to reduce the air leakage through APH. This will reduce ***the energy consumption by 36.94 MWh/month***.

f) There are no limitations from FD fans to operate plant to its 100 % MCR.

g) The auxiliary power used by FD fans is 0.40 % and is on higher side compared to other similar units.

Unit #2:

a) The load factor of FD fan motors is computed by taking the ratio of motor output and rating. The load factor of FD fan motors is 35.44 %. **Recommendation**: It is suggested to install variable frequency drives (VFD) for FD fans.
b) The FD fan discharge pressure is in the rage of 16.59 to 21.23 mmWC and is lower than the design value of 383 mmWC. Pressure transducer at FD fan discharge is to be checked for its accuracy.
c) The FD fan efficiency is found to be 4.57 % as against to the design value of 84.0 % at 100 % fan capacity. The FD fan efficiency is very less may be due to incorrect reading.
d) The specific energy consumption (SEC) of FD fan is computed as 0.91 kWh/t of total air flow and is lower than the design value of 1.32 kWh/t of total air flow.
e) During the performance test the oxygen content was measured at APH inlet, APH outlet and ID fan outlet by flue gas analyzer during performance test. The average Oxygen content at APH inlet was 2.61 % and at APH outlet it was 9.08 %. The increased power due to APH air leakage by FD fans is 77.12 kW that forms about 0.06 % of PL. **Recommendations:** It is suggested to replace the APH full set to reduce the air leakage through APH. This will reduce ***the energy consumption by 115.39 MWh/month***.
f) There are no limitations from FD fans to operate plant to its 100 % MCR.
a) The auxiliary power used by FD fans is 0.26 % and is on par with other similar units.

Unit #3:

b) The load factor of FD fan motors is computed by taking the ratio of motor output and rating. The load factor of FD fan motors is 18.33 – 20.22 %. **Recommendation**: It is suggested to install variable frequency drives (VFD) for FD fans.
c) The FD fan discharge pressure is in the rage of 30.27 to 35.4 mmWC and is lower than the design value of 411 mmWC. This will reduce the furnace to windbox DP. **Recommendations:** It is suggested to increase the FD fan

discharge pressure near to design value (about 200 mmWC at 100 % MCR). Again higher windbox DP may leads to decrease in the furnace ingress. Therefore, the windbox DP may be optimized to reduce the furnace ingress.

d) The FD fan efficiency is in the range of 10.24 % to 12.03 % as against to the design value of 84.0 % at 100 % fan capacity. The FD fan efficiency is on lower side may be due to partial loading, increased air leakage through APH, higher pressure drop across air ducts.
e) The specific energy consumption (SEC) of FD fan is computed as 0.65 kWh/t of total air flow and is lower than the design value of 1.36 kWh/t of total air flow may be due to lower efficiency of fans.
f) During the performance test the oxygen content was measured at APH inlet, APH outlet and ID fan outlet by flue gas analyzer during performance test. The average Oxygen content at APH inlet was 6.89 % and at APH outlet it was 7.86 %. Leakage across APH is negligible.
g) There are no limitations from FD fans to operate plant to its 100 % MCR.
h) The auxiliary power used by FD fans is 0.20 % and is on par with other similar units.

Unit #4:

a) The load factor of FD fan motors is computed by taking the ratio of motor output and rating. The load factor of FD fan motors is 29.56 – 30.11 %. **Recommendation**: It is suggested to install variable frequency drives (VFD) for FD fans.
b) The FD fan discharge pressure is in the rage of 92.43 – 98.63 mmWC and is lower than the design value of 411 mmWC. This will reduce the furnace to windbox DP. **Recommendations:** It is suggested to increase the FD fan discharge pressure near to design value (about 200 mmWC at 100 % MCR). Again higher windbox DP may leads to decrease in the furnace ingress. Therefore, the windbox DP may be optimized to reduce the furnace ingress.
c) The FD fan efficiency is in the range of 25.35 – 27.29 % as against to the design value of 84.0 % at 100 % fan capacity. The FD fan efficiency is on lower side may be due to partial loading, increased air leakage through APH, higher pressure drop across air ducts.

d) The specific energy consumption (SEC) of FD fan is computed as 0.85 kWh/t of total air flow and is lower than the design value of 1.36 kWh/t of total air flow may be due to under-loading of fans.
e) During the performance test the oxygen content was measured at APH inlet, APH outlet and ID fan outlet by flue gas analyzer during performance test. The average Oxygen content at APH inlet was 4.41 % and at APH outlet it was 7.46 %. The increased power due to APH air leakage by FD fans is 98.21 kW. **Recommendations:** It is suggested to arrest leakage in APH. This will reduce ***the energy consumption by 70.71MWh/month***.
f) There are no limitations from FD fans to operate plant to its 100 % MCR.
g) The auxiliary power used by FD fans is 0.28 % and is on par with other similar units.

3.3.5 PA Fans- analysis of performance

Primary Air fans are installed in series with FD fans. The suction for PA fans is from APH outlet. There are six numbers of PA fans in series with Mills to provide the primary air to individual mills. Five fans will be working continuously and sixth will be stand-by. The performance Test is conducted on PA fans during the energy audit study. The performance results of PA fans are given in Tables 12 to 13. The observations and suggestions from the energy audit study are as follows:

Unit #1:

a) The load factor of PA fan motors is computed by taking the ratio of motor output and rating. The load factor of PA fan motors is varying between 75.98 – 91.34 %.
b) The PA fan discharge pressures were recorded in the range of 104.60 – 748.03 mmWC during the performance test and the discharge pressure was on lower side compared to the design value of 641 mmWC. At lower pressure, the PA pressure at mill inlet will be low. PA fan 1B discharge pressure is 104.60 mmWC, which is very less compared to design value. **Recommendations**: It is suggested to increase the PA fan discharge pressure near to the design value. Also accuracy of the pressure transducer at PA fan 1B is to be checked since it is showing abnormally lower value than design.

c) The primary air fan flow is taken at mill inlet. The PA flow for individual mills is varying between 54.21 – 57.40 t/h and is slightly higher than the design value of 54.9 t/h (at 100 % MCR). **Recommendations**: It is suggested to optimize the PA fan flow near to design PA flow at mills.
d) The PA fan efficiencies are computed in the range of 36.56– 52.09 % as against to the design value of 80.5 % at 100 % fan capacity.
e) The specific energy consumption (SEC) of PA fans is computed as 4.86 kWh/t of primary air flow and is higher than the design value of 1.91 kWh/t of primary air flow.
f) There are no limitations from PA fans to operate plant to its 100 % MCR.
g) The auxiliary power used by PA fans is 0.91 % and is on par with other similar units.

Unit #2:

a) The load factor of PA fan motors is computed by taking the ratio of motor output and rating. The load factor of PA fan motors is varying between 78.96 – 87.14 %.
b) The PA fan discharge pressures were recorded in the range of 521.77 – 563.72 mmWC during the performance test and the discharge pressure was on par with design value of 641 mmWC.
c) The primary air fan flow is taken at mill inlet. The PA flow for individual mills is varying between 51.39 – 60.56 t/h and is slightly higher than the design value of 54.9 t/h (at 100 % MCR).
d) The PA fan efficiencies could not be calculated since suction pressure value was not available. It is recommended to install pressure transducer at suction side of PA fan and integrate with DCS.
e) The specific energy consumption (SEC) of PA fans is computed as 4.83 kWh/t of primary air flow and is higher than design value of 1.91 kWh/t of primary air flow.
f) There are no limitations from PA fans to operate plant to its 100 % MCR.
g) The auxiliary power used by PA fans is 1.08 % and is higher than other similar units.

Unit #3:

a) The load factor of PA fan motors is computed by taking the ratio of motor output and rating. The load factor of PA fan motors is varying between 85.77 – 94.65 %.
b) The PA fan discharge pressures were recorded in the range of 424 to 467 during the performance test and the discharge pressure was on lower side compared to the design value of 841 mmWC. At lower pressure, the PA pressure at mill inlet will be low. **Recommendations**: It is suggested to increase the PA fan discharge pressure near to the design value.
c) The primary air fan flow is taken at mill inlet. The PA flow for individual mills is varying between 68.05 – 69.31 t/h (at 83.93 PLF) and is on higher side compared to design value of 70 t/h (at 100 % MCR).
d) The PA fan efficiencies are computed in the range of 20.16 to 23.78 % as against to the design value of 75.0 % at 100 % fan capacity. The PA fan efficiencies are on lower side due to higher power consumption and reduced fan discharge pressure.
e) The specific energy consumption (SEC) of PA fans is computed as 7.58 kWh/t of primary air flow and is higher than the design value of 1.72 kWh/t of primary air flow.
f) There are no limitations from PA fans to operate plant to its 100 % MCR.
g) The auxiliary power used by PA fans is 1.47 % and is on higher side compared other similar units.

Unit #4:

a) The load factor of PA fan motors is computed by taking the ratio of motor output and rating. The load factor of PA fan motors is varying between 80.54 – 91.76 %.
b) The primary air fan flow is taken at mill inlet. The PA flow for individual mills is varying between 63.69 to 72.89 t/h and is on par with design value of 70 t/h (at 100 % MCR).
c) The PA fan efficiencies could not be calculated since discharge pressure value was not available. It is recommended to install pressure transducer at suction side of PA fan and integrate with DCS.

d) The specific energy consumption (SEC) of PA fans is computed as 7.17 – 7.88 kWh/t of primary air flow and is on par with design value of 1.72 kWh/t of primary air flow.
e) There are no limitations from PA fans to operate plant to its 100 % MCR.
f) The auxiliary power used by PA fans is 1.29 % and is on higher side compared other similar units.

3.3.6 Mills & Associated Equipment

There are six Mills, five mills will be working continuously and sixth mill will be stand-by to meet 100 % MCR load. Each mill is provided with one PA fan in series to lift the coal from mill to burners. The performance Test is conducted on Mills during the energy audit study and the results are given in Tables 14 to 17. The observations and suggestions from the energy audit study are as follows:

Unit #1:

a) The load factor of Mill motors is computed by taking the ratio of motor output and rating. The load factor of Mill motors is varying between 54 – 85 %. The mill motor load factor is normal.
b) Since there is no measurement for coal flow, the coal flow for individual mills is taken from the specific fuel consumption of the unit. The estimated coal flow during the performance test was 132.13 t/h. The coal flow in each mill is about 26.43 t/h (the design coal flow: 32.03 t/h). The mill loading based on coal flow is about 82.51 % and is normal. The SEC of mills is varying between 7.63 – 11.75 kWh/t of coal. **Recommendations:** It is suggested to calibrate the feeder speed to coal flow. Based on the individual mill coal flow, the operator can control the coal and air mixture at mills.
c) The coal air mixture temperature is varying between 59.49 – 63.94 ºC and is slightly lower than the design value of 77 ºC.
d) The measurement for mill differential pressure was not available for few mills and was varying between 379.42 – 565.68 mmWC. **Recommendations:** It is suggested to rectify the same to monitor and reduce the mill chocking problem.
a) The auxiliary power used by Mills is 0.80 % and is slightly on higher side compared other similar units.

Unit #2:

a) The load factor of Mill motors is computed by taking the ratio of motor output and rating. The load factor of Mill motors is varying between 34 – 49 %. The mill motor load factor is on lower side.
b) Since there is no measurement for coal flow, the coal flow for individual mills is taken from the specific fuel consumption of the unit. The estimated coal flow during the performance test was 108.56 t/h. The coal flow in each mill is about 21.71 t/h (the design coal flow: 32.03 t/h). The mill loading based on coal flow is about 67.78 % and is normal. The SEC of mills is varying between 6.05 – 8.32 kWh/t of coal. **Recommendations*:*** It is suggested to calibrate the feeder speed to coal flow. Based on the individual mill coal flow, the operator can control the coal and air mixture at mills.
c) The coal air mixture temperature is varying between 61.74 – 64.83 ºC and is lower than the design value of 77 ºC. **Recommendations**: It is suggested to maintain the coal-air mixture temperature near to design value by operating the hot and cold air dampers appropriately.
d) The measurement for mill differential pressure was not available for few mills and was varying between 30.13 – 417.24 mmWC. **Recommendations:** It is suggested to maintain the mill DP near to the design value.
e) The auxiliary power used by Mills is 0.58 % and is on par with other similar units.

Unit #3:

a) The load factor of Mill motors is computed by taking the ratio of motor output and rating. The load factor of Mill motors is varying between 43 – 61 %. The mill motor load factor is on lower side.
b) Since measurement for coal flow is not available, the coal flow for individual mills is taken from the specific fuel consumption of the unit. The estimated coal flow during the performance test was 153.17 t/h. The coal flow in each mill is about 30.63 t/h (the design coal flow: 36.86 t/h). The mill loading based on coal flow is about 83.10 % and is normal. The SEC of mills is varying between 6.52 – 9.26 kWh/t of coal.
c) The auxiliary power used by Mills is 0.70 % and is on par with other similar units.

Unit #4:

b) The load factor of Mill motors is computed by taking the ratio of motor output and rating. The load factor of Mill motors is varying between 38 – 69 %.
c) The coal flow at mills is varying between 24.35 – 40.85 t/h and is slightly lower than design value of 36.86 t/h (100 % MCR). The mill loading is normal.
d) The SEC of mills is varying between 6.00 – 12.19 kWh/t of coal.
e) The coal air mixture temperature is varying between 65.71 – 72.19 ºC and is lower than the design value of 77 - 90 ºC. **Recommendations**: It is suggested to maintain the coal-air mixture temperature near to design value by operating the hot and cold air dampers appropriately.
f) The auxiliary power used by Mills is 0.72 % and is slightly on higher side compared other similar units.

3.4 Electrical Network

The observations from the study are as follows:

a) The cables are laid in cable trays and cable glands are used.
b) All the panels and cable glands are provided with earth.
c) It was observed that dust inside the panels. **Recommendations:** It is suggested to clean all the HT and LT panels during overhaul.
d) At few places the cable end terminations were hot due to loose connections. **Recommendations**: It is suggested to check the joint temperature by either non-contact temperature indicator or thermography camera periodically.

There are no limitations of electrical network system in increasing the load to 100 % MCR.

3.5 Cooling Water System

At stage I, each unit is provided with two numbers of CW pumps of 1400 kW and both pumps will be working continuously. Each unit is provided with one cooling tower with 10 CT fans of 90 kW each. All the CT fans will be in service but during winter 8 – 9 fans will be in service at each unit.

At stage II, each unit is provided with two numbers of CW pumps of 1400 kW and both pumps will be working continuously. Each unit is provided with one cooling tower with

11 CT fans of 91 kW each. All the CT fans will be in service but during winter 8 – 9 fans will be in service at each unit.

During the audit, 3 CW pumps and 2 GS pumps were in operation to cater requirement of each stage.

Performance of each pump set was assessed by measuring water discharge, input power and developed head across the pump during its operation

Unit 1&2: -

Performance results of CWPs and GSPs associated with Unit 1 and Unit 2 is shown in table 18 & 19. Efficiencies (motor pump) of CWPs and GSPs are listed below,

CWP – 1	:	64.50 %	,	CWP – 2	:	78.62 %
CWP – 3	:	35.57 %	,	CWP – 4	:	77.87 %
CWP – 5	:	68.54 %				

GSP – 1	:	79.61 %	,	GSP – 2	:	82.97 %
GSP – 4	:	75.76 %				

Efficiencies of CWP 2 and CWP 4 are in the range of 77.87 % to 78.62 % and it is good. Efficiency of CWP 1 is 64.50 % and it is normal. Efficiency of CWP 3 is 35.57 % and it is very poor. GSP 2 observed highest efficiency of 82.97 % among GSPs. Efficiencies of other GSP-1 and GSP-4 are in the range of 75.76 to79.61 %.

It is recommended to carry out overhauling of CWP-3 to improve the efficiency since it is operating with poor efficiency.

Unit 3&4: -

Performance results of CWPs and GSPs associated with Unit 3 and Unit 4 are shown in table 20 & 21. Efficiencies (motor pump) of CWPs and GSPs are listed below,

CWP – 1	:	63.03 %	,	CWP – 2	:	71.21 %
CWP – 4	:	64.77 %	,	CWP – 5	:	75.66 %

GSP – 1	:	72.80 %	,	GSP – 2	:	74.80 %
GSP – 3	:	71.28 %	,	GSP – 4	:	68.60 %

CWP – 2 and CWP-5 observed good efficiencies in the range of 71.21 % to 75.66 %

whereas other CWPs are in the range of 63.03 % to 64.77 %. Efficiencies of GS Pumps found to be in the range of 68.60 % to 74.80 %.

3.6 Compressed air system

The energy used for Air compressor for both stages is 13.10 MWh/day that forms 0.079 % of total plant load.

At stage I Unit #1, for two numbers of Instrument air compressors of 110 kW and two numbers of service air compressors are installed. Both IAC and one SAC will be working continuously and others will be stand-by. The air compressor will mechanically un-load when the tank pressure reaches to 7.5 kgf/cm^2 and will mechanically load the compressor at air pressure of 6.5 kgf/cm^2.

Similarly, at stage I Unit #2, for two numbers of Instrument air compressors of 110 kW and two numbers of service air compressors are installed. One IAC and one SAC will be working continuously and others will be stand-by. The air compressor will mechanically un-load when the tank pressure reaches to 7.5 kgf/cm^2 and will mechanically load the compressor at air pressure of 6.5 kgf/cm^2.

At Stage II for Units 3 & 4, six numbers of Instrument air compressors and six numbers of service air compressors are installed. At a time, three instrument air compressors and two service air compressor will be in service. The service air compressors and instrument air compressors are mechanically unloaded as soon as the receiver tank pressure reaches to 7.8 kg$_f$/cm^2 and automatically load when the receiver tank pressure reaches to 6.8 kg$_f$/cm^2.

Contribution towards APC by compressor system for each unit are given below,
Unit 1 : 0.18 %
Unit 2 : 0.13 %
Unit 3 : 0.17 %
Unit 4 : 0.13 %

3.7 Coal Handling System & associated equipment

The design capacity of coal handling plant is 1000 t/h and is provided with two streams. The coal is received by railway wagons. The railway wagons are of two types i.e., tippling type and bottom opening type.

There are two Wagon tipplers of 90 tonne capacity each. The coal from wagon tipplers 1 & 2 goes to Conveyor 2C or 2D, Conveyor 3A or 3B and crushers. The crushed coal is stacked in the stacking yard through Conveyor 4A or 4B, Conveyor 4C or 4D, Conveyor 8A or 8B, Conveyor 9 and Conveyor 10. For direct bunkering, the coal from crusher goes to Bunkers through Conveyor 4A or 4B, Conveyor 4C or 4D, Conveyor 5A or 5B, Conveyor 6A or 6B, Conveyor 7A or 7B, Conveyor 7E or 7F, Belt Feeder 1 or 2, Conveyor 7C or 7D, Conveyor 7G or 7H and to coal bunkers.

For reclaiming the coal, the stacked coal pass through Conveyor 5A or 5B, Conveyor 6A or 6B, Conveyor 7A or 7B, Conveyor 7E or 7F, Belt Feeder 1 or 2, Conveyor 7C or 7D, Conveyor 7G or 7H and to coal bunkers.

There are four crushers of Impactor type, 1000 t/h capacity, 800 kW motor size. At a time only two crushers will be working and other two will be stand-by. All the conveyor belts are designed for coal flow of 1500 t/h capacity.

3.7.1 Crushers- analysis of performance

Table 22 gives the performance results of crusher. The observations from the study are as follows:

a) The crushers are designed with coal flow of 1000 t/h but during the study the crusher was loaded between 384 – 592 t/h. At lower loading the SEC will be higher. The present SEC of crushers is in the range of 0.21 kWh/t of coal and is higher.
b) Roller screens are provided at crusher input. About 54.98 % of the coal is below 25 mm before crusher, which is being by-passed from the crushers. After crushers, the percentage of coal with size below 25 mm is about 73.71 %.
c) The load factor of crusher motor is 6.9 % and is on lower side due to poor loading. **Recommendations:** It is suggested to operate the plant near to its full capacity. This will reduce the SEC of coal handling plant.

d) There are no restrictions of crushers in raising the load and enough capacity is available.

3.8 Ash Handling System & associated equipment

The energy used for Ash handling plant for stage I is 42.33 MWh/day and for stage II is 22.995 MWh/day. The overall energy consumption for Ash handling plant is 20.19 MWh/day that forms 0.48 % of total energy generation.

At Stage I, the ash collected from ESP is mixed with water and the slurry is disposed to Waregaon (at a distance of about 8 km from plant). The water from the slurry is recovered at Waregaon and sent back to power station.

At stage II, screw type of pumps (Geho pumps) are used to dispose the ash slurry. The slurry will be thick in the ratio of 70 % ash and 30 % water. The system is working satisfactorily. By using Geho pump the water requirement will reduce by 5.4 times compared to stage I system. Apart from Gaho pump, stage II is provided with dry ash evacuation system through Silo system. The auxiliary power for silo system is very less.

At Waregaon, the water recovery from ash slurry system is installed. At Waregaon, three numbers of 160 kW LT pumps are operational.

a. During the study the ash to water ratio is measured in the range of:
    i. AHP (Unit 1 $ 2): 1:10.82
b. The ash to water ratio can be improved to 1:5 but the erosion of equipment has to be monitored because as the ash to water ratio reduces the slurry will become thicker and lead to erosion problem.
c. The load factor of slurry discharge motors in series are in the range of 57.57 % – 63.19 %. Loading is normal for motors.
d. There are no limitations or restrictions of ash handling plant in maintaining the plant load to 100 % MCR.

3.9 Loading condition of ID fan, PA fan and other unit auxiliaries.

Unit 1: - Loading conditions of auxiliaries during the unit test is shown below,

CEP : 89.74 %

ID Fan : 102.84 % to 105.91 %

FD Fan : 17.56 % to 48.11 %

PA Fan : 75.98 % to 91.34 %

Coal Mill : 54 % to 85 %

It is found that ID fans are loaded more than 100 % of its capacity during the test load of 148.8 MW (70.86 %). Further increases in the generation from the unit is arrested due to non-availability of load margin for ID fan. For PA fan a little margin is available to increase the generation. Other unit auxiliaries have enough load margin to support increase in generation.

Unit 2: - Loading conditions of auxiliaries during the unit test is shown below,

CEP : 79.08 % to 85.38 %

ID Fan : 98.47 % to 99.28 %

FD Fan : 35.44

PA Fan : 78.96 % to 87.14 %

Coal Mill : 34 % to 49 %

It is found that ID fans are loaded near to 100 % of its capacity during the test load of 123.93 MW (59.01 %). Further increases in the generation from the unit is arrested due to non-availability of load margin for ID fan. Other unit auxiliaries have enough load margin to support increase in generation.

Unit 3: - Loading conditions of auxiliaries during the unit test is shown below,

CEP : 74.17 % to 75.40 %

ID Fan : 49.68 % to 77.39 %

FD Fan : 18.33 % to 20.22 %

PA Fan : 85.77 % to 94.65 %

Coal Mill : 43 % to 61 %

It is found that maximum loading during the test load of 176.26 (83.93 %) was observed on PA Fan and it is 94.65 %. Standby system is available to take up the

increase in plant load. Other unit auxiliaries have enough load margin to support increase in generation. Hence there is no limitation as per unit auxiliaries to increase the plant load.

Unit 4: **-** Loading conditions of auxiliaries during the unit test is shown below,

CEP	:	75.93 % to 76.66 %
ID Fan	:	76.26 % to 79.87 %
FD Fan	:	29.56 % to 30.11 %
PA Fan	:	80.54 % to 91.76 %
Coal Mill	:	38 % to 69 %

It is found that maximum loading during the test load of 191.95 (91.4 %) was observed on PA Fan and it is 91.76 %. Standby system is available to take up the increase in plant load. Other unit auxiliaries have enough load margin to support increase in generation. Hence there is no limitation as per unit auxiliaries to increase the plant load.

3.10 Flue gas analysis and observation

Details of percentage of oxygen measured at different location of flue gas path and leakage across different sections are shown in Table 23 and 24.

Unit 1: -

Air ingress from economizer outlet to APH inlet is 9.12 % in path A and negligible in path B. Air ingress to the flue gas path across the APH is 17.14 % in path A and 10.25 % in path B. Air ingress to the flue gas path from APH outlet to common outlet is 15.97 % in path A and 30.10 % in path B. Air ingress to the flue gas path from common outlet to the ESP inlet is 15.57 % in path A and 9.59 % in path B. Air ingress to the flue gas path across ESP is negligible in both the paths. Air ingress to the flue gas path from ESP inlet to the ID outlet is 0.82 % in path A and 3.53 % in path B. Overall air ingress is found to be 74.45 % in path A and 65.29 % in path B.

Unit 2: -

Air ingress from economizer outlet to APH inlet is 9.84 % in path A and 14 % in path B. Air ingress to the flue gas path across the APH is 66.49 % in path A and 35.00 % in path B. Air ingress to the flue gas path from APH outlet to common outlet is 2.87 % in path A and 28.42 % in path B. Air ingress to the flue gas path from common outlet

to the ESP inlet is 25.00 % in path A and 20.12 % in path B. Air ingress to the flue gas path across ESP is negligible in path A and 4.09 in path B. Air ingress to the flue gas path from ESP inlet to the ID outlet is 2.28 % in path A and negligible in path B. Overall air ingress is found to be 144.68 % in path A and 153.12 % in path B.

It is found that availability of O2 in the boiler for coal combustion in not sufficient. It is validated with percentage of O2 at the economizer outlet, which is only 0.3 % in path A and 0.1 % in path B. It is found that percentage of Carbon Monoxide (CO) in the flue gas at economizer exit is very high (nearly 7466 ppm). This also indicates improper combustion of coal in the boiler due to unavailability of air.

Unit 3: -

Air ingress from economizer outlet to APH inlet is negligible in path A and 15.17 % in path B. Air ingress to the flue gas path across the APH is 4.20 % in path A and 9.28 % in path B. Air ingress to the flue gas path across ESP is 1.39 % in path A and 0.95 % in path B. Air ingress to the flue gas path from ESP inlet to the ID outlet negligible in both the paths. Overall air ingress is found to be 23.73 % in path A and 66.31 % in path B.

Unit 4: -

Air ingress from economizer outlet to APH inlet is negligible in path A and 3.3 % in path B. Air ingress to the flue gas path across the APH is 16.02 % in path A and 25.35 % in path B. Air ingress to the flue gas path from APH outlet to common outlet is 1.54 % in path A and 7.02 % in path B. Air ingress to the flue gas path from common outlet to the ESP inlet is 2.99 % in path A and 1.36 % in path B. Air ingress to the flue gas path across ESP is 3.09 % in path A and 5.37 in path B. Air ingress to the flue gas path from ESP inlet to the ID outlet is negligible in both the paths. Overall air ingress is found to be 25.28 % in path A and 48.71 % in path B.

Air ingress to the flue gas path for all the units found to be very high. This has caused increased loading in ID fans and PA fans. This leakage in the APH and in the flue gas path is to be arrested for minimizing loading of ID and PA fans, hence reducing energy wastage and improving plant load.

3.11 Achievable APC and Availability factor (AVF)

It is observed that leakage in APHs and in flue gas ducts are huge and this is causing overloading of ID and pressure drop in FD outlet. Arresting the leakage can reduce power consumption of ID fan and FD fan. This will lead to improved loading of ID fan. Achievable savings has been discussed in respective sections. An additional auxiliary power consumption as calculated for CW Pumps since 3 numbers are operated in winter season (3 months) and 4 numbers are operated in rest of the seasons (9 months) which was not measured during the test. Achievable values of APC for each unit at different plant load are shown below,

PLF	APC, %			
	Unit 1	Unit 2	Unit 3	Unit 4
100	8.39	7.46	8.14	8.34
90	9.16	8.07	8.47	8.82
80	10.01	8.74	8.81	9.33
70	10.94	9.46	9.17	9.87
60	11.97	10.24	9.55	10.45

Normative AVF for the plant is 85 % and normative APC is 9.7 %. Since the AVF is derived from the declared capacity, it is directly connected with PLF at which the plant is capable of operating continuously. To meet the normative AVF, the plant has to increase the PLF by addressing the bottlenecks in continuous operation.

AVF is calculated as per the below formula,

$$AVF = \frac{\text{Declared Capacity}}{Installed\ capacity - Normative\ APC} * 100$$

Unit #1:

During the unit test, unit 1 operated at a PLF of 70.86 %. Further increase in the plant load was not possible due to non-availability of ID fan margin. Major cause of this issue is high amount of air ingress in the flue gas path through the APH and air duct. This leakage is to be arrested in next overhaul. This rectification will provide extra margin

to ID fan hence improving the plant load. However, the unit cannot run at 100 % plant load due to constraints with PA fan and mill loading.

Overall loading of PA fan is 84.09 %. As per the design, air to fuel ratio of mill is 1.71 whereas it was observed during the test that fuel to ratio of mill is 2.09. This indicate that excess air is being supplied by PA fan to the mill. Optimizing the air to fuel ratio to the design value will provide excess margin for PA to supply approximately 50.54 t/h of air.

Also it was found that the GCV of coal is 3055 kcal/kg whereas the design is 4400 kcal/kg. Following is the achievable PLF and AVF for unit #1 with optimizing the air to fuel ration in the mill and addressing the air ingress to the flue gas path in APH and in duct,

Achievable plant load = 175.21 MW (Coal GCV is 3055 kcal/kg)

Achievable AVF = 71.23 %

This estimation is valid only for stated GCV of coal. Variation in the coal GCV affects plant load and AVF.

Though additional margin is available for PA fan, increase in plant load is not possible since the mill is loaded to its full capacity at above mentioned plant load.

Unit #2:

During the unit test, unit 2 operated at a PLF of 59.01 %. Further increase in the plant load was not possible due to non-availability of ID fan margin. Major cause of this issue is high amount of air ingress in the flue gas path through the APH and air duct. This leakage is to be arrested in next overhaul. This rectification will provide extra margin to ID fan hence improving the plant load. However, the unit cannot run at 100 % plant load due to constraints with PA fan and mill loading.

Overall loading of PA fan is 83.35 %. As per the design, air to fuel ratio of mill is 1.71 whereas it was observed during the test that fuel to ratio of mill is 2.57. This indicate that excess air is being supplied by PA fan to the mill. Optimizing the air to fuel ratio to the design value will provide excess margin for PA to supply approximately 93.89 t/h of air.

Also it was found that the GCV of coal is 3272 kcal/kg whereas the design is 4400

kcal/kg. Following is the achievable PLF and AVF for unit #1 with optimizing the air to fuel ration in the mill and addressing the air ingress to the flue gas path in APH and in duct,

Achievable plant load = 168.34 MW (Coal GCV is 3272 kcal/kg)

Achievable AVF = 69.13 %

This estimation is valid only for stated GCV of coal. Variation in the coal GCV affects plant load and AVF.

Though additional margin is available for PA fan, increase in plant load is not possible since the mill is loaded to its full capacity at above mentioned plant load.

Unit #3:

During the unit test, unit 3 operated at a PLF of 83.93 %. Maximum loading observed was on PA fan and it was in the range of 86 % to 95 %. Overall loading of PA fan is 93.97 %. As per the design, air to fuel ratio of mill is 1.9 whereas it was observed during the test that fuel to ratio of mill is 2.23. This indicate that excess air is being supplied by PA fan to the mill. Optimizing the air to fuel ratio to the design value will provide excess margin for PA to supply approximately 51.21 t/h of air.

Also it was found that the GCV of coal is 3001 kcal/kg whereas the design is 3500 kcal/kg. Following is the achievable PLF and AVF for unit #3 with addressing the issue,

Achievable plant load = 204.17 MW (Coal GCV is 3001 kcal/kg)

Achievable AVF = 84.12 %

Unit #4:

During the unit test, unit 4 operated at a PLF of 91.40 %. Maximum loading observed was on PA fan and it was in the range of 81 % to 92 %. Overall loading of PA fan is 89.64 %. As per the design, air to fuel ratio of mill is 1.9 whereas it was observed during the test that fuel to ratio of mill is 2.34. This indicate that excess air is being supplied by PA fan to the mill. Optimizing the air to fuel ratio to the design value will provide excess margin for PA to supply approximately 54.61 t/h of air.

Also it was found that the GCV of coal is 3566 kcal/kg whereas the design is 3500 kcal/kg. Following is the achievable PLF and AVF for unit #4 with addressing the issue,

Achievable plant load = 203.14 MW (Coal GCV is 3566 kcal/kg)

Achievable AVF = 83.58 %

Average GCV was found to 3200 kcal/kg (rounded to nearest 100). Achievable AVF was calculated for the GCV is as shown below,

1. **Maximum achievable AVF for stage I (Unit #1 and Unit #2) is found to be 73.75 % and the corresponding APC of the stage is 10.10 %.**
2. **Maximum achievable AVF for stage II (Unit #3 and Unit #4) is found to be 79.75 % and the corresponding APC of the stage is 9.80 %.**
3. **Maximum achievable AVF for the station is found to be 76.75 % and the corresponding APC of the stage is 9.95 %.**

Maximum achievable AVF is limited to 76.75% due to the gradual deterioration of equipment & systems and considering the current characteristics of the coal.

3.11.1 Reason based suggestions for AVF improvement

The older thermal power plants tend to have lower availability factors compared to newer plants due to equipment degradation. This degradation can lead to increased frequency of breakdowns, unplanned outages, and reduced availability of the plant. Khaperkheda thermal power plant can achieve the normative availability factor through proactive maintenance, equipment upgrades, and operational optimization. However, it requires significant investments in refurbishments and replacements as given below,

Poor quality coal:

Design coal GCV for Unit 1 and 2 is 4400 kcal/kg whereas the plant receives coal with an average GCV of 3200 kcal/kg. Coal with low GCV, high ash and moisture content, can affect combustion efficiency and heat transfer in boilers, resulting in lower steam generation capacity and reduced plant load. So, to accommodate the effect of poor coal quality, heating surface area can be increased because the heating surface area is a critical parameter in boiler design and operation, as it directly affects the efficiency and performance of the boiler. A detailed study can be conducted to assess the additional heating surface area requirement. Financial feasibility is to be studied considering the remaining life of the plant as it is already more than 30 years old.

Boiler Tube Leakage:

It is observed that the units have faced recurrent boiler tube leakages. Poor quality coal often contains higher levels of ash, which can lead to accumulation of ash deposits reducing heat transfer efficiency and increasing the operating temperature of the boiler tubes, making them more susceptible to corrosion and failure lead to downtime for repairs. Design ash content for stage 1 and 2 is 29 % and 42 % respectively whereas present value is between 43.45 % to 51.45 %. Moreover, Coal with high moisture content can lead to increased formation of corrosive acidic condensate which accelerates the corrosion of boiler tube surfaces, weakening them and eventually leading to leakage.

Clinker formation is also often associated with poor quality coal or coal with high ash content. During combustion in the boiler furnace, the mineral matter in the coal reacts with oxygen and other elements in the air to form ash. This ash can melt at high temperatures and combine with other ash particles to form sticky, molten clinkers. Clinker formation reduces the efficiency of the boiler by obstructing airflow and heat transfer within the furnace. This can lead to reduced steam generation capacity and increased fuel consumption.

Milling system:

The plant utilizes XRP 803 coal mills. Issues such as malfunctioning classifiers, gear box assembly problems, mill body and duct leakages, mill choking, and shear pin failures have been observed. Due to these issues, the mills of stage 1 & 2 can currently operate at about 75 % and 70 % of their design coal flow capacity respectively. Also, poor quality coal with high moisture, ash, and volatile matter content can adversely affect the performance of the mill. It can result in reduced grinding efficiency, and increased tendency for mill choking, limiting the mill's capacity.

It is suggested to explore the feasibility for revamping the milling system to improve the performance of the units.

Duct leakages:

It is found that high duct leakage has compromised the performances of ID fan and FD fan. Duct leakages are more likely to occur in the case of older ducting systems because of wear and tear, fatigue, and exposure to environmental elements. Though

the leakage can be arrested to improve the situation, maintaining the system in good condition for long term may not be viable. Installation of modular system can address the issues effectively. Modular duct system's maintenance-friendly design features like removable panels, access doors, and inspection ports to facilitate maintenance, cleaning, and inspection activities help minimize downtime, improve reliability, and prolong the service life of the ductwork system. Modular duct system provides effective sealing and insulation to prevent leakage, minimize heat loss, and maintain desired temperature and pressure levels within the ductwork system. Financial feasibility may be explored for the same.

Following major activities can be considered with respect to its financial implication for improving the AVF to the normative value of 85 %,

- Increasing heating surface area to address low coal quality than the design.
- Installation of modular duct to address the duct leakage due deteriorated duct system.
- Revamping of milling system.

4.0 CONCLUSIONS

- Range of percentage APC based on the past performance of the units are given below. APC at percentage generation above 80 % was found by extrapolating the graph.

Percentage generation		50-60 %	60-70 %	70-80 %	80-90 %	90-100 %
Unit 1	Min	11.30	10.33	9.44	8.62	7.88
	Max	12.36	11.30	10.33	9.44	8.62
Unit 2	Min	10.74	10.01	9.33	8.70	8.11
	Max	11.52	10.74	10.01	9.33	8.70
Unit 3	Min	11.04	10.71	10.39	10.09	9.79
	Max	11.37	11.04	10.71	10.39	10.09
Unit 4	Min	10.75	10.23	9.73	9.25	8.80
	Max	11.30	10.75	10.23	9.73	9.25

- The performance tests were carried out at maximum achievable loads by the units. Following are the measured APCs of different units during the test,

Sl. No.	Unit number	Total APC, %	Plant Load, MW
1	Unit # 1	11.25	148.80
2	Unit # 2	10.77	123.93
3	Unit # 3	8.69	176.26
4	Unit # 4	8.82	191.95

- Achievable values of APC for each unit at different plant load after implementing corrective measures are shown below,

PLF	**APC, %**			
	Unit 1	**Unit 2**	**Unit 3**	**Unit 4**
100	8.36	7.91	9.20	8.53
90	9.15	8.55	9.55	9.02
80	10.02	9.24	9.91	9.56
70	10.98	9.99	10.30	10.13
60	12.05	10.82	10.72	10.76

- Maximum achievable AVF for stage I (Unit #1 and Unit #2) is found to be 73.75 % (GCV= 3200 kcal/kg) and the corresponding APC of the stage is 10.10 %.

- Maximum achievable AVF for stage II (Unit #3 and Unit #4) is found to be 79.75 % (GCV= 3200 kcal/kg) and the corresponding APC of the stage is 9.80 %.

- After implementing all the suggested actions for improvement in AVF and reduction in APC, maximum achievable AVF for the station is found to be 76.75 % (GCV= 3200 kcal/kg) and the corresponding APC of the stage is 9.95 %.

- As per the information received from the plant, it has been observed that 0.5 class PT at secondary side (GCR end) of GT for Units 1, 2, 3 & 4 had been replaced with 0.2 class PT at 9:30 hrs on 3/5/2024 (after the study period) as per the regulatory requirement and it has led to reduction in the recorded voltage level. This has in turn led to reduction in exported energy hence increase in calculated APC. As per the data shared by the plant, an increase of 0.86 % was observed in APC from April 2024 (with 0.5 class PT) to May 2024 (with 0.2 class PT) at a PLF of 77.91 % to 79.8 %. Recorded voltage before and after replacement of PT is given in Annexure 3.

Annexure 1 – Figures

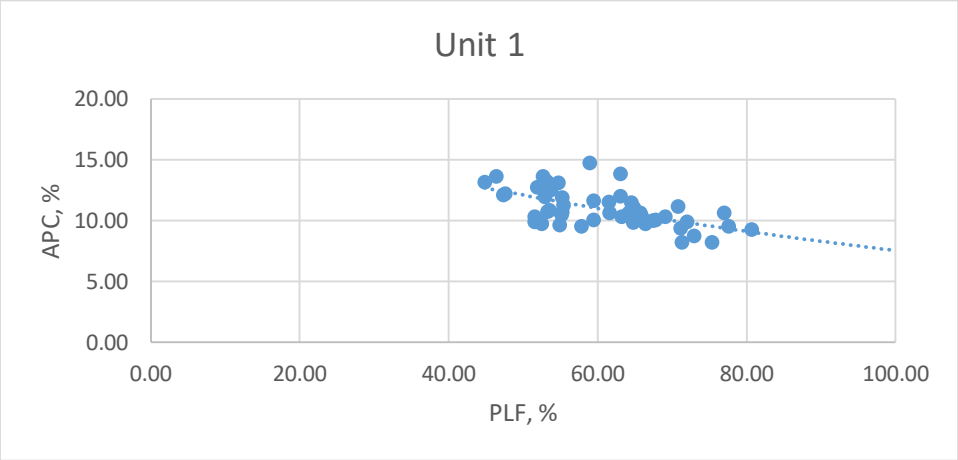


Figure 1. Variation in APC with respect to PLF in the past 5 years

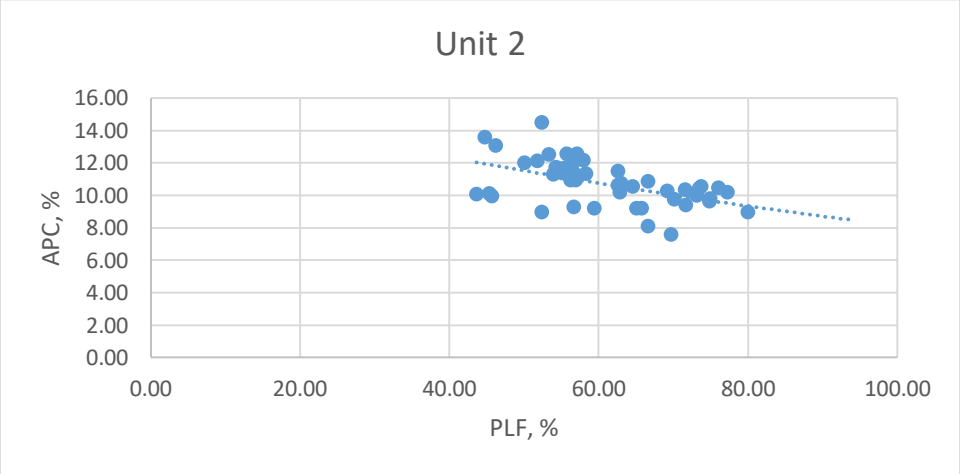


Figure 2. Variation in APC with respect to PLF in the past 5 years

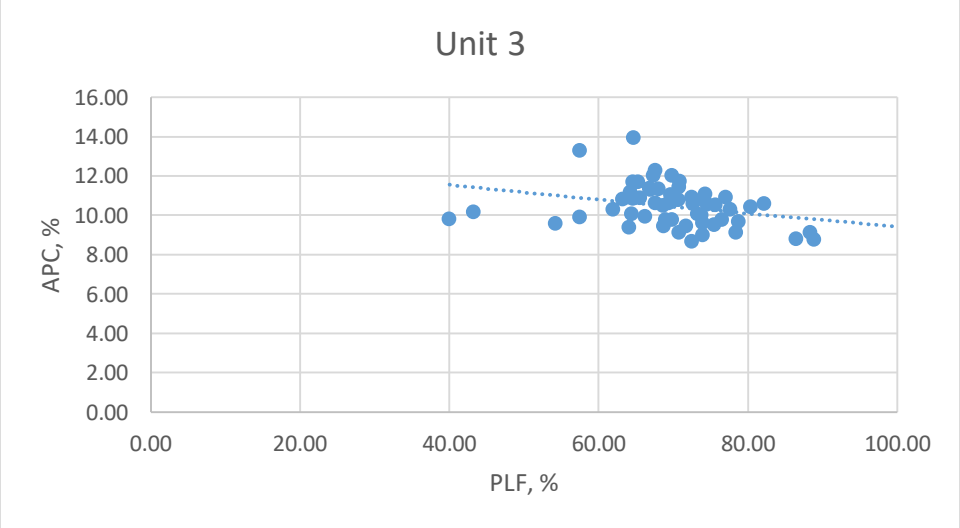


Figure 3. Variation in APC with respect to PLF in the past 5 years

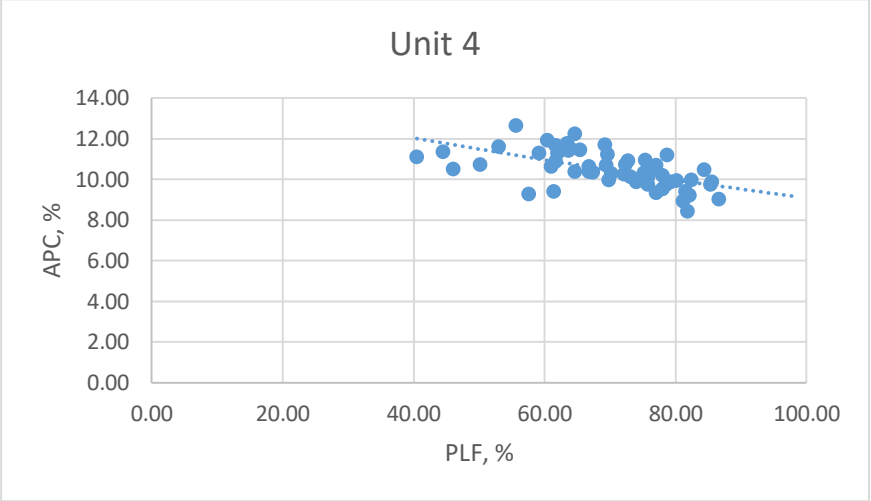


Figure 4. Variation in APC with respect to PLF in the past 5 years

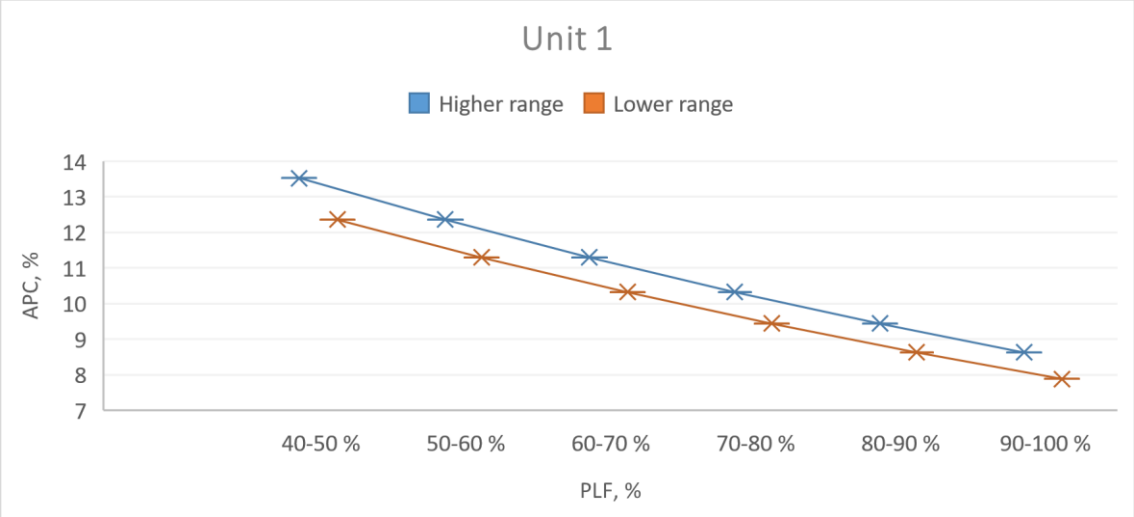


Figure 5. Variation in APC range with respect to PLF

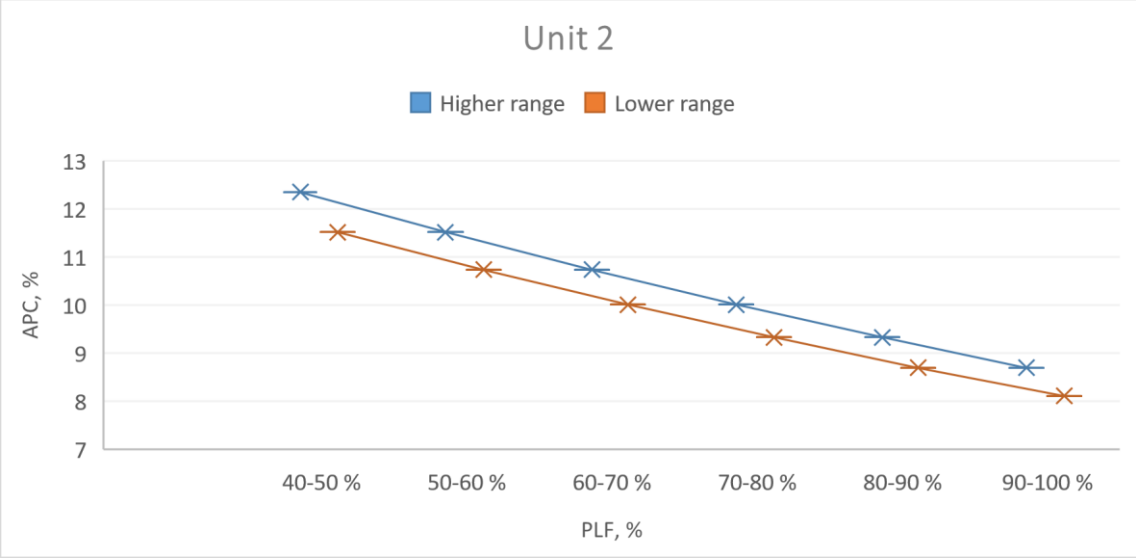


Figure 6. Variation in APC range with respect to PLF

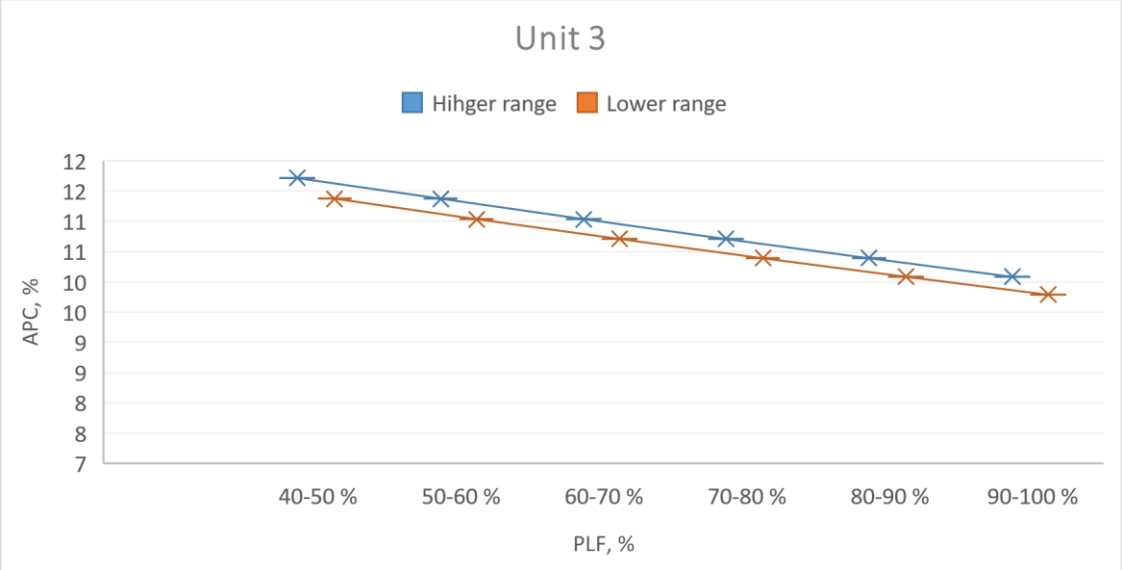


Figure 7. Variation in APC range with respect to PLF

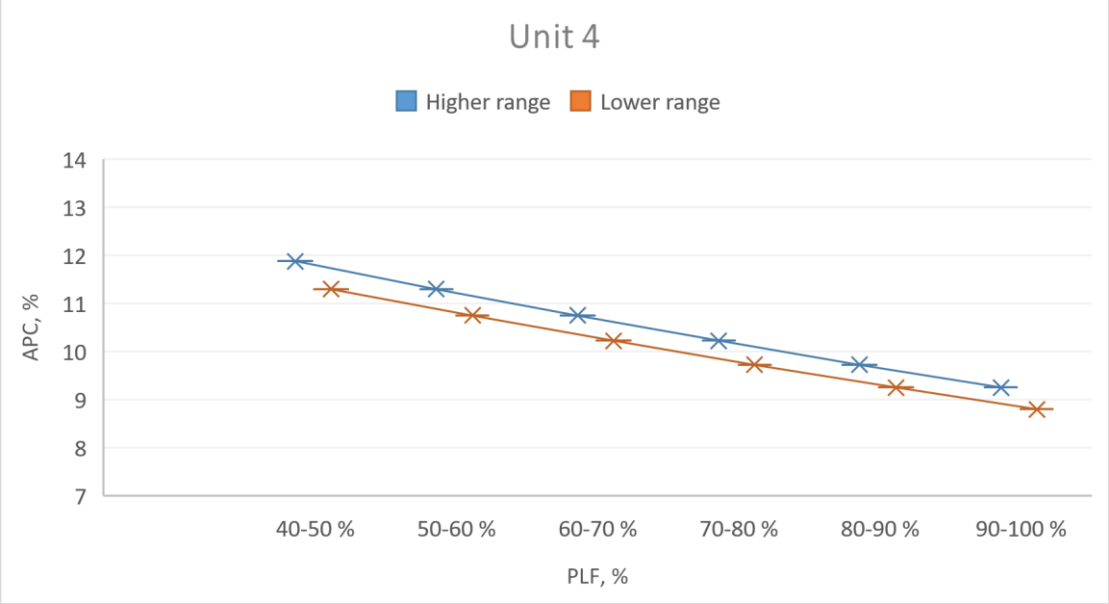


Figure 8. Variation in APC range with respect to PLF

Annexure 2: Tables

Table 1: Performance results of Boiler feed pumps at Unit 1 & 2.

Sl. No.	Particulars	Unit	BFP-1A	BFP-1B	BFP-2A	BFP-2B
1	Motor output rating	kW	3500	3500	3500	3500
2	Measured input power	kW	2410.8	2224.8	1690.2	1542.0
3	Total discharge flow	t/h	319.40	311.05	222.99	208.69
4	Suction pressure	kgf/cm2	15.02	17.13	9.73	15.54
5	Discharge pressure	kgf/cm2	149.94	149.56	108.18	108.79
6	Total pressure developed	kgf/cm2	134.92	132.43	98.46	93.25
7	**Motor + pump efficiency**	**%**	**48.69**	**50.44**	**35.39**	**34.38**
8	Motor load factor	%	63.37	58.48	44.43	40.53
9	SEC	kWh/t	7.55	7.15	7.58	7.39

Table 2: Performance results of Boiler feed pumps at Unit 3 & 4.

Sl. No.	Particulars	Unit	BFP-3A	BFP-3C	BFP-4A	BFP-4B
1	Motor output rating	kW	3550	3550	3550	3550
2	Measured input power	kW	2388.6	2389.2	2436.6	2461.8
3	Total discharge flow	t/h	291	290.5	291	290.5
4	Suction pressure	kgf/cm2	16.44	16.89	17.301	17.127
5	Discharge pressure	kgf/cm2	141.49	142.6	155.64	155.42
6	Total pressure developed	kgf/cm2	125.05	125.71	138.34	138.29
7	**Motor + pump efficiency**	**%**	**41.50**	**41.64**	**45.01**	**44.45**
8	Motor load factor	%	61.90	61.92	63.15	63.80
9	SEC	kWh/t	8.21	8.22	8.37	8.47

Table 3: Performance results of Condensate Extraction Pumps at Unit 1 & 2.

Sl. No.	Particulars	Unit	CEP-1A	CEP-2A	CEP-2B
1	Motor output rating	kW	500.00	500.00	500.00
2	Measured input power	kW	482.10	424.86	458.69
3	Total discharge flow	t/h	583.26	402.56	380.00
4	Suction pressure	kgf/cm2	-0.90	-0.88	-0.88
5	Discharge pressure	kgf/cm2	21.00	24.00	22.60
6	Total pressure developed	kgf/cm2	21.90	24.88	23.48
7	**Motor + pump efficiency**	**%**	**72.18**	**64.22**	**52.99**
8	Motor load factor	%	89.74	79.08	85.38
9	SEC	kWh/t	0.83	1.06	1.21

Table 4: Performance results of Condensate Extraction Pumps at Unit 3 & 4.

Sl. No.	Particulars	Unit	CEP-3A	CEP-3B	CEP-4A	CEP-4B
1	Motor output rating	kW	560.00	560.00	560.00	560.00
2	Measured input power	kW	446.28	453.66	456.84	461.29
3	Total discharge flow	t/h	386.40	369.49	517.20	376.18
4	Suction pressure	kgf/cm2	-0.89	-0.89	-0.90	-0.90
5	Discharge pressure	kgf/cm2	22.00	22.80	20.90	16.60
6	Total pressure developed	kgf/cm2	22.89	23.69	21.80	17.50
7	**Motor + pump efficiency**	**%**	**53.99**	**52.56**	**67.23**	**38.88**
8	Motor load factor	%	74.17	75.40	75.93	76.66
9	SEC	kWh/t	1.15	1.23	0.88	1.23

Table 5: Performance results of Induced draft fans at Unit 1

Sl. No.	Particular	Unit	Design	IDF-1A	IDF-1B
1	Suction Pressure	mmWc	-380	-322.41	-320.87
2	Discharge Pressure	mmWc	38	11.37	5.90
3	Pressure developed	mmWc	418	333.78	326.77
4	Flue gas temperature	^oC	150	138.50	119.90
5	Flue gas flow	t/h	650.81	505.62	483.78
6	Electrical power	kW	1273.5	1426.80	1385.40
7	Flue gas density	kg/m^3	--	0.85	0.89
8	Mechanical power	kW	938.36	540.85	483.86
9	Overall (fan+motor) efficiency	%	73.68	37.91	34.93
10	SEC	kWh/t	1.96	2.82	2.86

Table 6: Performance results of Induced draft fans at Unit 2

Sl. No.	Particular	Unit	Design	IDF-2A	IDF-2B
1	Suction Pressure	mmWc	-380	-276.20	-157.00
2	Discharge Pressure	mmWc	38	45.76	259.00
3	Pressure developed	mmWc	418	321.96	416.00
4	Flue gas temperature	^oC	150	115.80	109.50
5	Flue gas flow	t/h	650.81	473.26	464.80
6	Electrical power	kW	1273.5	1337.40	1326.60
7	Flue gas density	kg/m^3	--	0.90	0.91
8	Mechanical power	kW	938.36	461.18	578.81
9	Overall (fan+motor) efficiency	%	73.68	34.48	43.63
10	SEC	kWh/t	1.96	2.83	2.85

Table 7: Performance results of Induced draft fans at Unit 3

Sl. No.	Particular	Unit	Design	IDF-3A	IDF-3B
1	Suction Pressure	mmWc	-441	-228.00	-160.00
2	Discharge Pressure	mmWc	19	1.03	0.00
3	Pressure developed	mmWc	460	229.03	160.00
4	Flue gas temperature	^oC	150	154.50	137.20
5	Flue gas flow	t/h	647.5	364.77	441.35
6	Electrical power	kW	1331.4	1270.20	1233.60
7	Flue gas density	kg/m^3	--	0.79	0.85
8	Mechanical power	kW	1027.39	288.07	226.31
9	Overall (fan+motor) efficiency	%	77.17	22.68	18.35
10	SEC	kWh/t	2.06	3.48	2.80

Table 8: Performance results of Induced draft fans at Unit 4

Sl. No.	Particular	Unit	Design	IDF-4A	IDF-4B
1	Suction Pressure	mmWc	-441	-323.00	-298.00
2	Discharge Pressure	mmWc	19	40.50	0.15
3	Pressure developed	mmWc	460	363.50	298.15
4	Flue gas temperature	^oC	150	156.40	158.00
5	Flue gas flow	t/h	647.5	525.81	714.66
6	Electrical power	kW	1331.4	1215.60	1273.20
7	Flue gas density	kg/m^3	--	0.78	0.78
8	Mechanical power	kW	1027.39	667.51	744.15
9	Overall (fan+motor) efficiency	%	77.17	54.91	58.45
10	SEC	kWh/t	2.06	2.31	1.78

Table 9: Performance results of Forced draft fans at Unit 1.

Sl. No.	Particular	Unit	Design	FDF-1A	FDF-1B
1	Suction Pressure	mmWc	-25	0	0
2	Discharge Pressure	mmWc	383	82.47	93.70
3	Pressure developed	mmWc	408	82.47	93.70
4	secondary air temperature	^oC	--	28.10	28.10
5	secondary air flow	t/h	568.06	443.28	161.23
6	Electrical power	kW	752.4	433.02	157.50
7	secondary air density	kg/m^3	--	1.17	1.17
8	Mechanical power	kW	586.42	85.11	35.17
9	Overall (fan+motor) efficiency	%	77.94	19.66	22.33
10	SEC	kWh/t	1.32	0.98	0.98

Table 10: Performance results of Forced draft fans at Unit 3.

Sl. No.	Particular	Unit	Design	FDF-3A	FDF-3B
1	Suction Pressure	mmWc	-9	1	1
2	Discharge Pressure	mmWc	411	30.27	35.4
3	Pressure developed	mmWc	420	29.27	34.4
4	secondary air temperature	^oC	--	27	27
5	secondary air flow	t/h	568.06	252.74	278.87
6	Electrical power	kW	773.8	165.36	182.46
7	secondary air density	kg/m^3	--	1.19	1.19
8	Mechanical power	kW	603.66	16.93	21.96
9	Overall (fan+motor) efficiency	%	78.01	10.24	12.04
10	SEC	kWh/t	1.36	0.65	0.65

Table 11: Performance results of Forced draft fans at Unit 4.

Sl. No.	Particular	Unit	Design	FDF-4A	FDF-4B
1	Suction Pressure	mmWc	-9	0	0
2	Discharge Pressure	mmWc	411	92.44	98.63
3	Pressure developed	mmWc	420	92.44	98.63
4	secondary air temperature	^oC	--	29.77	32.01
5	secondary air flow	t/h	568.06	313.83	319.06
6	Electrical power	kW	773.8	266.40	270.84
7	secondary air density	kg/m^3	--	1.17	1.16
8	Mechanical power	kW	603.66	67.54	73.90
9	Overall (fan+motor) efficiency	%	78.01	25.35	27.29
10	SEC	kWh/t	1.36	0.85	0.85

Table12: Performance results of Primary air fans at Unit 1.

Sl. No.	Particular	Unit	Design	PAF-1A	PAF-1B	PAF-1C	PAF-1D	PAF-1E
1	Suction Pressure	mmWc	31	70.08	70.08	70.08	70.08	70.08
2	Discharge Pressure	mmWc	641	569.13	104.60	532.97	543.88	748.03
3	Pressure developed	mmWc	610	499.05	34.52	462.89	473.79	677.95
4	Primary air temperature	^oC	--	227.57	255.95	221.80	227.57	204.96
5	Primary air flow	t/h	54.9	50.72	52.13	60.98	57.38	57.13
6	Electrical power	kW	239.75	246.36	253.20	296.16	278.70	277.50
7	Primary air density	kg/m^3	--	0.69	0.66	0.71	0.69	0.73
8	Mechanical power	kW	178.59	99.93	7.43	108.29	107.33	144.54
9	Overall (fan+motor) efficiency	%	74.49	40.56	2.93	36.56	38.51	52.09
10	SEC	kWh/t	1.91	4.86	4.86	4.86	4.86	4.86

Table 13: Performance results of Primary air fans at Unit 3.

Sl. No.	Particular	Unit	Design	PAF-3A	PAF-3B	PAF-3C	PAF-3D	PAF-3E
1	Suction Pressure	mmWc	39	14.62	14.62	14.62	14.62	14.62
2	Discharge Pressure	mmWc	851	--	458.00	435.00	424.00	467.00
3	Pressure developed	mmWc	812	--	443.38	420.38	409.38	452.38
4	Primary air temperature	^oC	--	--	241.68	213.13	204.32	208.43
5	Primary air flow	t/h	84.82	68.36	71.17	69.71	64.50	68.50
6	Electrical power	kW	377.3	518.10	539.40	528.36	488.82	519.18
7	Primary air density	kg/m^3	--	--	0.67	0.72	0.73	0.73
8	Mechanical power	kW	260.67	--	128.30	110.88	98.53	115.64
9	Overall (fan+motor) efficiency	%	69.09	--	23.78	20.99	20.16	22.27
10	SEC	kWh/t	1.72	7.58	7.58	7.58	7.58	7.58

Table 14: Performance results of Mills at Unit 1.

Sl. No.	Particulars	Unit	Design	Coal Mill 1A	Coal Mill 1B	Coal Mill 1C	Coal Mill 1D	Coal Mill 1E
1	PA flow	t/h	54.9	57.40	54.21	54.45	56.04	54.40
2	Coal flow	t/h	32.03	26.43	26.43	26.43	26.43	26.43
3	Air to Fuel ratio	-	1.71	2.17	2.05	2.06	2.12	2.06
4	Coal - air mixture temp.	^{o}C	77	59.49	63.94	63.79	59.70	--
5	Power	kW	340	241.62	211.80	223.92	310.50	201.54
6	SEC	kWh/t of coal	10.61	9.14	8.01	8.47	11.75	7.63

Table 15: Performance results of Mills at Unit 2.

Sl. No.	Particulars	Unit	Design	Coal Mill 2A	Coal Mill 2B	Coal Mill 2C	Coal Mill 2D	Coal Mill 2E
1	PA flow	t/h	54.9	53.77	56.66	57.16	51.39	60.56
2	Coal flow	t/h	32.03	21.71	21.71	21.71	21.71	21.71
3	Air to Fuel ratio	-	1.71	2.48	2.61	2.63	2.37	2.79
4	Coal - air mixture temp.	^{o}C	77	63.50	64.83	62.16	61.75	--
5	Power	kW	340	131.40	138.66	140.04	132.24	180.66
6	SEC	kWh/t of coal	10.61	6.05	6.39	6.45	6.09	8.32

Table 16: Performance results of Mills at Unit 3.

Sl. No.	Particulars	Unit	Design	Coal Mill 3A	Coal Mill 3B	Coal Mill 3C	Coal Mill 3D	Coal Mill 3E
1	PA flow	t/h	70	66.75	69.26	69.31	68.05	68.87
2	Coal flow	t/h	36.83	30.63	30.63	30.63	30.63	30.63
3	Air to Fuel ratio	-	1.9	2.18	2.26	2.26	2.22	2.25
4	Coal - air mixture temp.	^{o}C	77 - 90	--	--	--	--	--
5	Power	kW	425	283.68	268.20	220.62	260.00	199.68
6	SEC	kWh/t of coal	11.54	9.26	8.75	7.20	8.49	6.52

Table 17: Performance results of Mills at Unit 4

Sl. No.	Particulars	Unit	Design	Coal Mill 4A	Coal Mill 4B	Coal Mill 4C	Coal Mill 4D	Coal Mill 4F
1	PA flow	t/h	70	65.08	65.99	63.69	72.89	67.79
2	Coal flow	t/h	36.83	40.85	25.13	27.38	24.35	30.09
3	Air to Fuel ratio	-	1.9	1.59	2.63	2.33	2.99	2.25
4	Coal - air mixture temp.	^oC	77 - 90	67.30	71.88	65.71	72.19	--
5	Power	kW	425	315.60	283.56	309.90	296.94	180.66
6	SEC	kWh/t of coal	11.54	7.73	11.28	11.32	12.19	6.00

Table 18: Performance results of Cooling Water Pumps of Unit – 1&2

Sl. No.	Particulars	Unit	CWP-1	CWP-2	CWP-3	CWP-4	CWP-5
1	Motor output rating	kW	1400	1400	1400	1400	1400
2	Measured input power	kW	1213.20	1299.60	1356.60	1368.00	1249.80
3	Total discharge flow	t/h	12418.80	16950.00	8004.00	17832.00	14673.45
4	Suction pressure	kgf/cm2	-0.61	-0.61	-0.61	-0.61	-0.61
5	Discharge pressure	kgf/cm2	1.7	1.6	1.6	1.58	1.53
6	Total pressure developed	kgf/cm2	2.31	2.21	2.21	2.19	2.14
7	**Motor + pump efficiency**	**%**	**64.50**	**78.62**	**35.57**	**77.87**	**68.54**
8	Motor load factor	%	82.93	88.84	92.73	93.51	85.43
9	SEC	kWh/t	0.10	0.08	0.17	0.08	0.09

Table 19: Performance results of Auxiliary Cooling Water Pumps of Unit – 1&2

Sl. No.	Particulars	Unit	GSP-1	GSP-2	GSP-4
1	Motor output rating	kW	370.00	370.00	370.00
2	Measured input power	kW	348.90	348.00	350.04
3	Total discharge flow	t/h	1948.56	1980.00	1808.40
4	Suction pressure	kgf/cm2	-0.61	-0.61	-0.61
5	Discharge pressure	kgf/cm2	4.62	4.74	4.77
6	Total pressure developed	kgf/cm2	5.23	5.35	5.38
7	**Motor + pump efficiency**	**%**	**79.61**	**82.97**	**75.76**
8	Motor load factor	%	82.04	81.83	82.31
9	SEC	kWh/t	0.18	0.18	0.19

Table 20: Performance results of Cooling Water Pumps of Unit – 3 & 4

Sl. No.	Particulars	Unit	CWP-1	CWP-2	CWP-4	CWP-5
1	Motor output rating	kW	1400	1400	1400	1400
2	Measured input power	kW	1327.20	1365.00	1318.20	1345.80
3	Total discharge flow	t/h	11518.52	13640.00	14606.40	12192.00
4	Suction pressure	kgf/cm2	-0.77	-0.77	-0.77	-0.77
5	Discharge pressure	kgf/cm2	1.9	1.85	1.38	2.3
6	Total pressure developed	kgf/cm2	2.67	2.62	2.15	3.07
7	**Motor + pump efficiency**	**%**	**63.03**	**71.21**	**64.78**	**75.66**
8	Motor load factor	%	90.72	93.31	90.11	92.00
9	SEC	kWh/t	0.12	0.10	0.09	0.11

Table 21: Performance results of Auxiliary Cooling Water Pumps of Unit – 3&4

Sl. No.	Particulars	Unit	GSP-1	GSP-2	GSP-3	GSP-4
1	Motor output rating	kW	450	450	450	450
2	Measured input power	kW	363.84	384.06	370.20	379.56
3	Total discharge flow	t/h	1112.60	1362.66	1071.72	1219.20
4	Suction pressure	kgf/cm2	-0.74	-0.74	-0.74	-0.74
5	Discharge pressure	kgf/cm2	8.00	7.00	8.30	7.10
6	Total pressure developed	kgf/cm2	8.74	7.74	9.04	7.84
7	**Motor + pump efficiency**	**%**	**72.80**	**74.80**	**71.28**	**68.59**
8	Motor load factor	%	70.34	74.25	71.57	73.38
9	SEC	kWh/t	0.33	0.28	0.35	0.31

Table 22: Performance results of crushers.

Sl. No.	Particulars	Unit	Before crusher	After crusher
1	Coal weight Below 25 mm size	kg	27.7	89.58
		%	54.98	73.71
2	Coal weight Above 25 mm size	kg	22.68	31.95
		%	45.02	26.29
3	Total coal weight	kg	50.38	121.53
		%	100%	100%

Table 23. Percentage of oxygen measured at different locations of flue gas path in Unit 1 to Unit 4

	Unit # 1		Unit # 2		Unit # 3		Unit # 4	
Location	A	B	A	B	A	B	A	B
Eco. Outlet	0.8	3.3	0.3	0.1	7	4.4	4.12	4.1
APH Inlet	2.65	3.3	2.33	2.9	7	6.78	4.12	4.7
APH Outlet	5.57	5.1	10.22	7.94	7.62	8.1	6.66	8.26
Common Outlet	7.88	9.06	10.55	11.05	--	--	6.9	9.17
ESP Inlet	9.8	10.2	12.8	12.85	9.73	11.3	7.35	9.35
ESP Outlet	9.8	10.3	12.8	13.2	9.9	11.4	7.8	10
IDF Outlet	9.9	10.7	13	13.2	9.9	11.4	7.8	10

Table 24. Percentage of leakage at different locations of flue gas path in Unit 1 to Unit 4

	Unit # 1		Unit # 2		Unit # 3		Unit # 4	
Location	A	B	A	B	A	B	A	B
Eco Outlet to APH Inlet	9.12	Nil	9.84	14.00	Nil	15.17	Nil	3.33
Across APH	17.14	10.25	66.49	35.00	4.20	9.28	16.02	25.35
APH Outlet to Common Outlet	15.97	30.10	2.87	28.42	-	-	1.54	7.02
Common Outlet to ESP Inlet	15.57	9.59	25.00	20.12	-	-	2.99	1.36
Across ESP	Nil	0.85	Nil	4.09	1.39	0.95	3.09	5.37
ESP Outlet to IDF Outlet	0.82	3.53	2.28	Nil	Nil	Nil	Nil	Nil

Annexure 3: Voltage profile report

MAB00357	02/05/2024	02:00	226.97	226.78	225.77	102.90
MAB00357	02/05/2024	02:15	227.06	227.03	225.98	103.00
MAB00357	02/05/2024	02:30	227.15	227.23	226.22	103.10
MAB00357	02/05/2024	02:45	226.94	227.24	226.08	103.00
MAB00357	02/05/2024	03:00	227.25	227.53	226.34	103.20
MAB00357	02/05/2024	03:15	227.52	227.54	226.49	103.20
MAB00357	02/05/2024	03:30	227.58	227.55	226.67	103.30
MAB00357	02/05/2024	03:45	227.72	227.68	226.72	103.30
MAB00357	02/05/2024	04:00	227.37	227.47	226.82	103.20
MAB00357	02/05/2024	04:15	227.93	227.83	226.78	103.40
MAB00357	02/05/2024	04:30	227.87	228.14	226.81	103.40
MAB00357	02/05/2024	04:45	227.79	228.11	227.03	103.40
MAB00357	02/05/2024	05:00	228.03	228.11	226.94	103.50
MAB00357	02/05/2024	05:15	227.78	228.18	226.93	103.40
MAB00357	02/05/2024	05:30	227.74	228.08	226.91	103.40
MAB00357	02/05/2024	05:45	227.79	228.03	227.04	103.40
MAB00357	02/05/2024	06:00	227.69	227.76	226.78	103.30
MAB00357	02/05/2024	06:15	227.56	227.79	226.53	103.30
MAB00357	02/05/2024	06:30	227.60	227.51	226.64	103.30
MAB00357	02/05/2024	06:45	227.48	227.56	226.58	103.20
MAB00357	02/05/2024	07:00	227.64	227.74	226.71	103.30
MAB00357	02/05/2024	07:15	227.70	228.13	226.90	103.40
MAB00357	02/05/2024	07:30	227.89	228.26	227.26	103.50
MAB00357	02/05/2024	07:45	228.07	228.09	227.12	103.50

E-watch

Note : Value mark to ' rows may indicates Communication fail.
Value mark to = rows may indicates Feeder fail.

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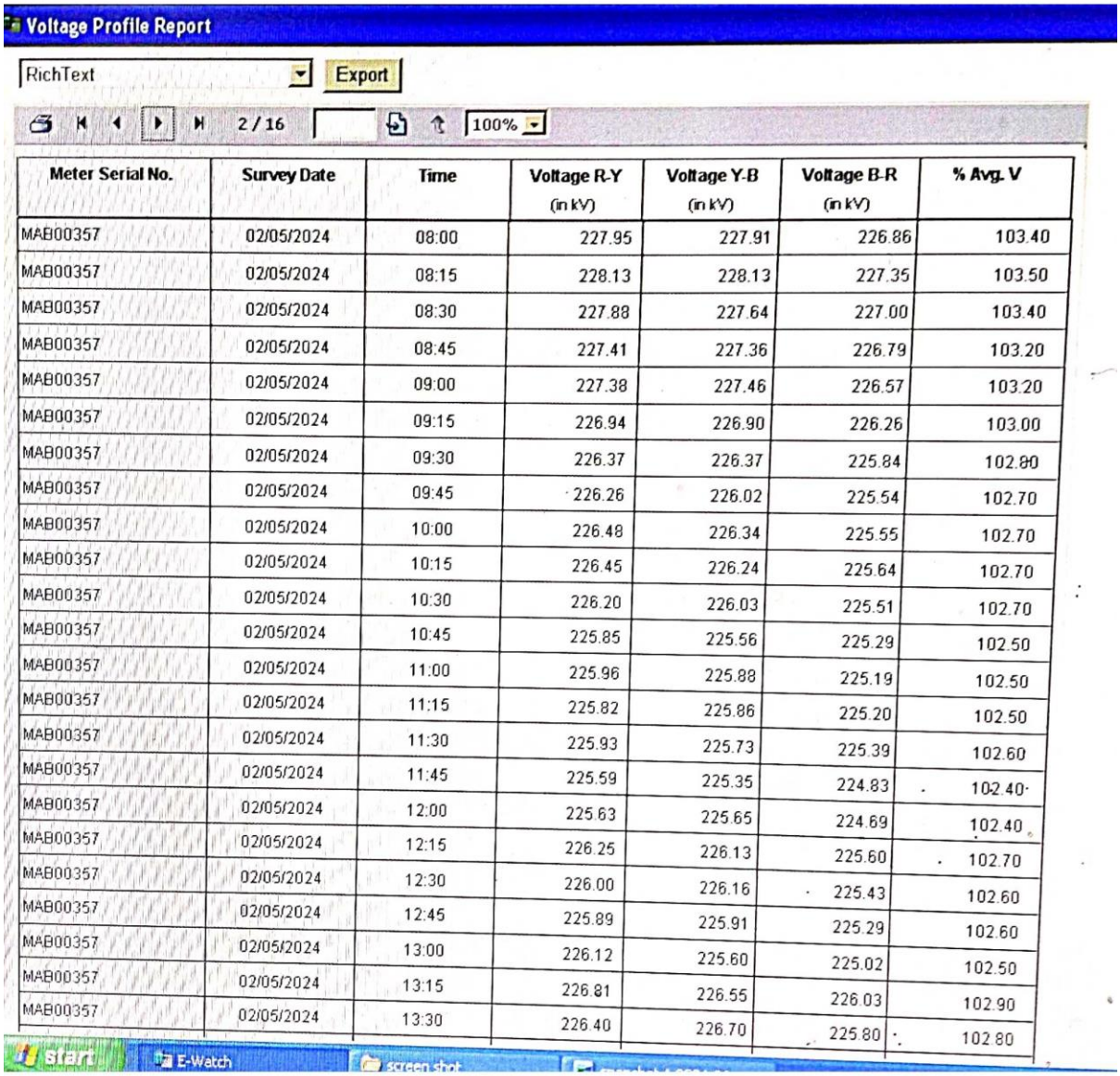

Voltage Profile Report

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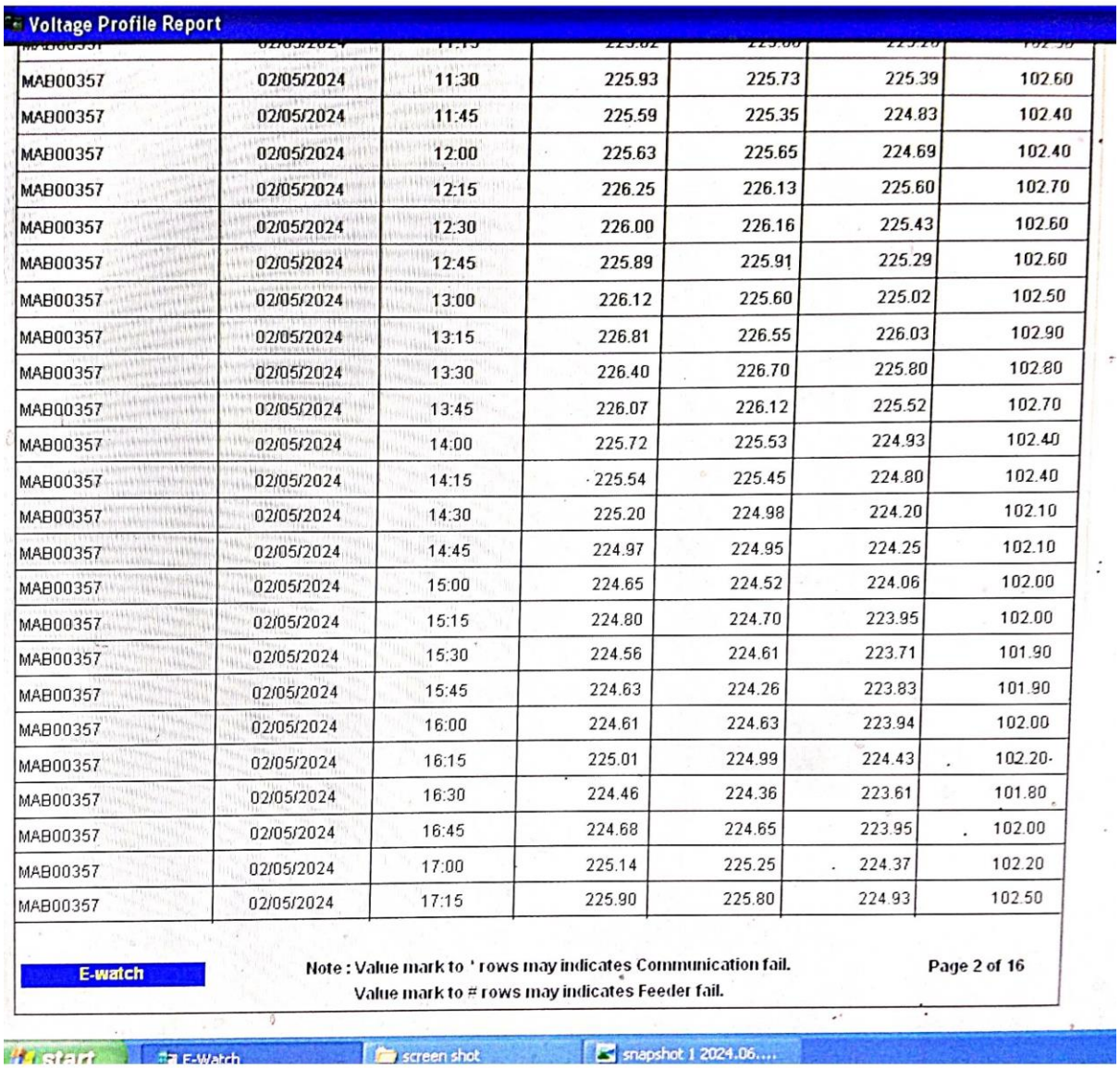
Meter Serial No.	Survey Date	Time	Voltage R-Y (in kV)	Voltage Y-B (in kV)	Voltage B-R (in kV)	% Avg. V
MAB00357	02/05/2024	08:00	227.95	227.91	226.86	103.40
MAB00357	02/05/2024	08:15	228.13	228.13	227.35	103.50
MAB00357	02/05/2024	08:30	227.88	227.64	227.00	103.40
MAB00357	02/05/2024	08:45	227.41	227.36	226.79	103.20
MAB00357	02/05/2024	09:00	227.38	227.46	226.57	103.20
MAB00357	02/05/2024	09:15	226.94	226.90	226.26	103.00
MAB00357	02/05/2024	09:30	226.37	226.37	225.84	102.80
MAB00357	02/05/2024	09:45	226.26	226.02	225.54	102.70
MAB00357	02/05/2024	10:00	226.48	226.34	225.55	102.70
MAB00357	02/05/2024	10:15	226.45	226.24	225.64	102.70
MAB00357	02/05/2024	10:30	226.20	226.03	225.51	102.70
MAB00357	02/05/2024	10:45	225.85	225.56	225.29	102.50
MAB00357	02/05/2024	11:00	225.96	225.88	225.19	102.50
MAB00357	02/05/2024	11:15	225.82	225.86	225.20	102.50
MAB00357	02/05/2024	11:30	225.93	225.73	225.39	102.60
MAB00357	02/05/2024	11:45	225.59	225.35	224.83	102.40
MAB00357	02/05/2024	12:00	225.63	225.65	224.69	102.40
MAB00357	02/05/2024	12:15	226.25	226.13	225.60	102.70
MAB00357	02/05/2024	12:30	226.00	226.16	225.43	102.60
MAB00357	02/05/2024	12:45	225.89	225.91	225.29	102.60
MAB00357	02/05/2024	13:00	226.12	225.60	225.02	102.50
MAB00357	02/05/2024	13:15	226.81	226.55	226.03	102.90
MAB00357	02/05/2024	13:30	226.40	226.70	225.80	102.80

Start | E-Watch | screen shot



Voltage Profile Report

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MAB00357	02/05/2024	12:00	225.63	225.65	224.69	102.40
MAB00357	02/05/2024	12:15	226.25	226.13	225.60	102.70
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MAB00357	02/05/2024	14:15	225.54	225.45	224.80	102.40
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MAB00357	02/05/2024	15:00	224.65	224.52	224.06	102.00
MAB00357	02/05/2024	15:15	224.80	224.70	223.95	102.00
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MAB00357	02/05/2024	15:45	224.63	224.26	223.83	101.90
MAB00357	02/05/2024	16:00	224.61	224.63	223.94	102.00
MAB00357	02/05/2024	16:15	225.01	224.99	224.43	102.20
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MAB00357	02/05/2024	16:45	224.68	224.65	223.95	102.00
MAB00357	02/05/2024	17:00	225.14	225.25	224.37	102.20
MAB00357	02/05/2024	17:15	225.90	225.80	224.93	102.50

E-watch

Note : Value mark to ' rows may indicates Communication fail.
Value mark to # rows may indicates Feeder fail.

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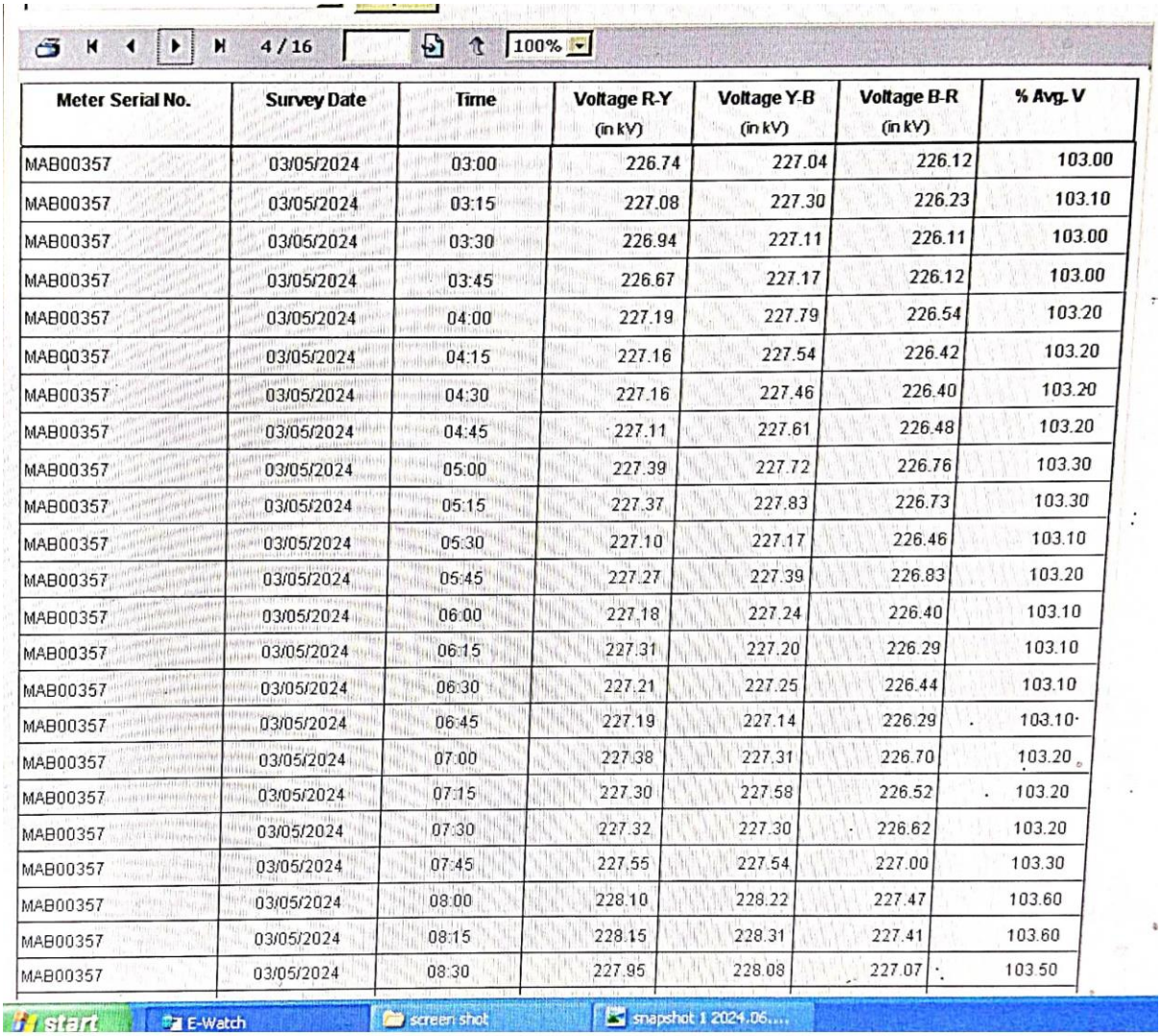
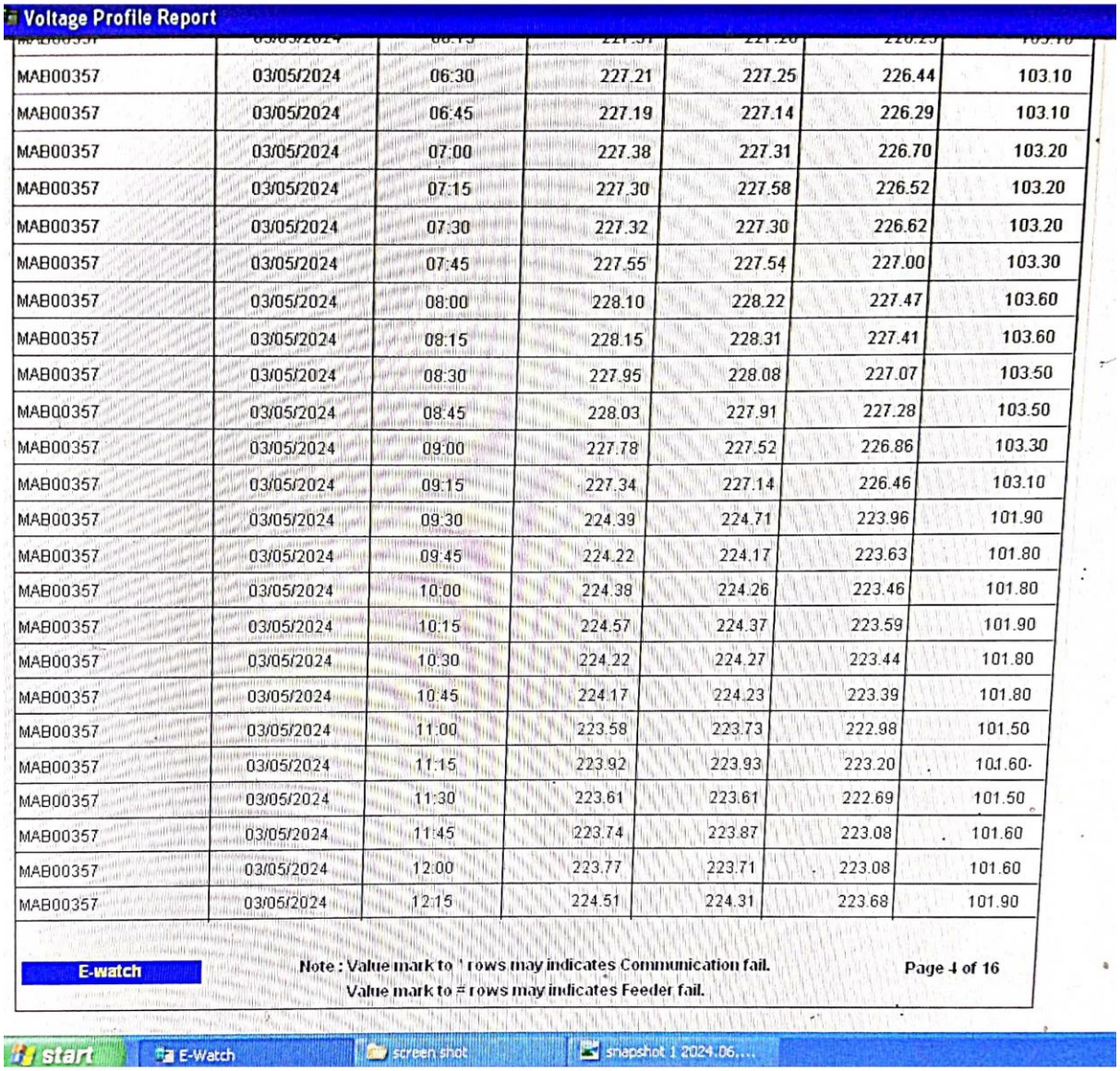


4 / 16 100%

Meter Serial No.	Survey Date	Time	Voltage R-Y (in kV)	Voltage Y-B (in kV)	Voltage B-R (in kV)	% Avg. V
MAB00357	03/05/2024	03:00	226.74	227.04	226.12	103.00
MAB00357	03/05/2024	03:15	227.08	227.30	226.23	103.10
MAB00357	03/05/2024	03:30	226.94	227.11	226.11	103.00
MAB00357	03/05/2024	03:45	226.67	227.17	226.12	103.00
MAB00357	03/05/2024	04:00	227.19	227.79	226.54	103.20
MAB00357	03/05/2024	04:15	227.16	227.54	226.42	103.20
MAB00357	03/05/2024	04:30	227.16	227.46	226.40	103.20
MAB00357	03/05/2024	04:45	227.11	227.61	226.48	103.20
MAB00357	03/05/2024	05:00	227.39	227.72	226.76	103.30
MAB00357	03/05/2024	05:15	227.37	227.83	226.73	103.30
MAB00357	03/05/2024	05:30	227.10	227.17	226.46	103.10
MAB00357	03/05/2024	05:45	227.27	227.39	226.83	103.20
MAB00357	03/05/2024	06:00	227.18	227.24	226.40	103.10
MAB00357	03/05/2024	06:15	227.31	227.20	226.29	103.10
MAB00357	03/05/2024	06:30	227.21	227.25	226.44	103.10
MAB00357	03/05/2024	06:45	227.19	227.14	226.29	103.10
MAB00357	03/05/2024	07:00	227.38	227.31	226.70	103.20
MAB00357	03/05/2024	07:15	227.30	227.58	226.52	103.20
MAB00357	03/05/2024	07:30	227.32	227.30	226.62	103.20
MAB00357	03/05/2024	07:45	227.55	227.54	227.00	103.30
MAB00357	03/05/2024	08:00	228.10	228.22	227.47	103.60
MAB00357	03/05/2024	08:15	228.15	228.31	227.41	103.60
MAB00357	03/05/2024	08:30	227.95	228.08	227.07	103.50

start E-Watch screen shot snapshot 1 2024.06....



Voltage Profile Report

MAB00357	03/05/2024	06:30	227.21	227.25	226.44	103.10
MAB00357	03/05/2024	06:45	227.19	227.14	226.29	103.10
MAB00357	03/05/2024	07:00	227.38	227.31	226.70	103.20
MAB00357	03/05/2024	07:15	227.30	227.58	226.52	103.20
MAB00357	03/05/2024	07:30	227.32	227.30	226.62	103.20
MAB00357	03/05/2024	07:45	227.55	227.54	227.00	103.30
MAB00357	03/05/2024	08:00	228.10	228.22	227.47	103.60
MAB00357	03/05/2024	08:15	228.15	228.31	227.41	103.60
MAB00357	03/05/2024	08:30	227.95	228.08	227.07	103.50
MAB00357	03/05/2024	08:45	228.03	227.91	227.28	103.50
MAB00357	03/05/2024	09:00	227.78	227.52	226.86	103.30
MAB00357	03/05/2024	09:15	227.34	227.14	226.46	103.10
MAB00357	03/05/2024	09:30	224.39	224.71	223.96	101.90
MAB00357	03/05/2024	09:45	224.22	224.17	223.63	101.80
MAB00357	03/05/2024	10:00	224.38	224.26	223.46	101.80
MAB00357	03/05/2024	10:15	224.57	224.37	223.59	101.90
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MAB00357	03/05/2024	11:00	223.58	223.73	222.98	101.50
MAB00357	03/05/2024	11:15	223.92	223.93	223.20	101.60
MAB00357	03/05/2024	11:30	223.61	223.61	222.69	101.50
MAB00357	03/05/2024	11:45	223.74	223.87	223.08	101.60
MAB00357	03/05/2024	12:00	223.77	223.71	223.08	101.60
MAB00357	03/05/2024	12:15	224.51	224.31	223.68	101.90

E-watch

Note : Value mark to * rows may indicates Communication fail.
Value mark to # rows may indicates Feeder fail.

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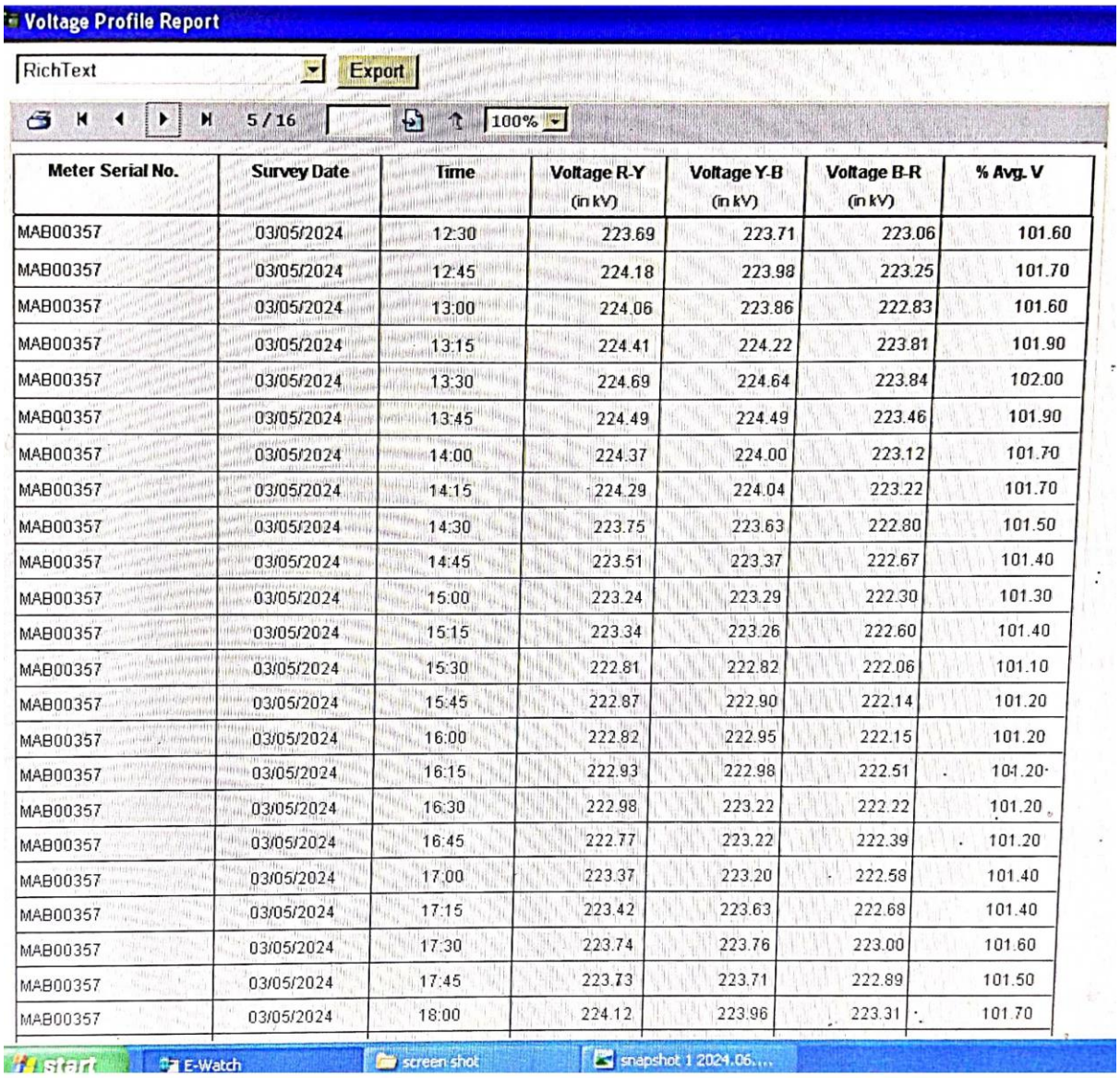

Meter Serial No.	Survey Date	Time	Voltage R-Y (in kV)	Voltage Y-B (in kV)	Voltage B-R (in kV)	% Avg. V
MAB00357	03/05/2024	12:30	223.69	223.71	223.06	101.60
MAB00357	03/05/2024	12:45	224.18	223.98	223.25	101.70
MAB00357	03/05/2024	13:00	224.06	223.86	222.83	101.60
MAB00357	03/05/2024	13:15	224.41	224.22	223.81	101.90
MAB00357	03/05/2024	13:30	224.69	224.64	223.84	102.00
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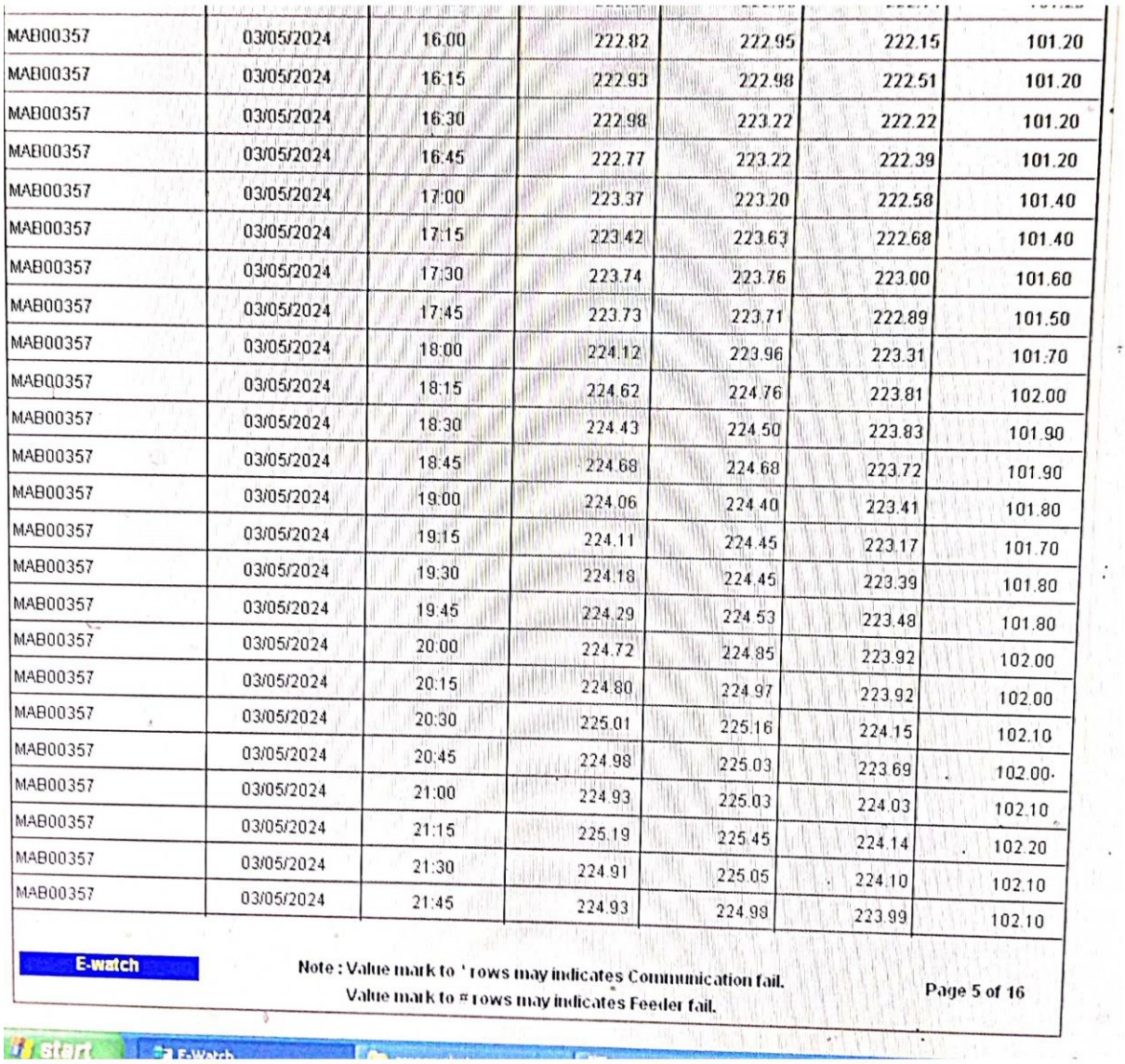
MAB00357	03/05/2024	14:15	224.29	224.04	223.22	101.70
MAB00357	03/05/2024	14:30	223.75	223.63	222.80	101.50
MAB00357	03/05/2024	14:45	223.51	223.37	222.67	101.40
MAB00357	03/05/2024	15:00	223.24	223.29	222.30	101.30
MAB00357	03/05/2024	15:15	223.34	223.26	222.60	101.40
MAB00357	03/05/2024	15:30	222.81	222.82	222.06	101.10
MAB00357	03/05/2024	15:45	222.87	222.90	222.14	101.20
MAB00357	03/05/2024	16:00	222.82	222.95	222.15	101.20
MAB00357	03/05/2024	16:15	222.93	222.98	222.51	101.20
MAB00357	03/05/2024	16:30	222.98	223.22	222.22	101.20
MAB00357	03/05/2024	16:45	222.77	223.22	222.39	101.20
MAB00357	03/05/2024	17:00	223.37	223.20	222.58	101.40
MAB00357	03/05/2024	17:15	223.42	223.63	222.68	101.40
MAB00357	03/05/2024	17:30	223.74	223.76	223.00	101.60
MAB00357	03/05/2024	17:45	223.73	223.71	222.89	101.50
MAB00357	03/05/2024	18:00	224.12	223.96	223.31	101.70



MAB00357	03/05/2024	16:00	222.82	222.95	222.15	101.20
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MAB00357	03/05/2024	16:30	222.98	223.22	222.22	101.20
MAB00357	03/05/2024	16:45	222.77	223.22	222.39	101.20
MAB00357	03/05/2024	17:00	223.37	223.20	222.58	101.40
MAB00357	03/05/2024	17:15	223.42	223.63	222.68	101.40
MAB00357	03/05/2024	17:30	223.74	223.76	223.00	101.60
MAB00357	03/05/2024	17:45	223.73	223.71	222.89	101.50
MAB00357	03/05/2024	18:00	224.12	223.96	223.31	101.70
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MAB00357	03/05/2024	18:30	224.43	224.50	223.83	101.90
MAB00357	03/05/2024	18:45	224.68	224.68	223.72	101.90
MAB00357	03/05/2024	19:00	224.06	224.40	223.41	101.80
MAB00357	03/05/2024	19:15	224.11	224.45	223.17	101.70
MAB00357	03/05/2024	19:30	224.18	224.45	223.39	101.80
MAB00357	03/05/2024	19:45	224.29	224.53	223.48	101.80
MAB00357	03/05/2024	20:00	224.72	224.85	223.92	102.00
MAB00357	03/05/2024	20:15	224.80	224.97	223.92	102.00
MAB00357	03/05/2024	20:30	225.01	225.16	224.15	102.10
MAB00357	03/05/2024	20:45	224.98	225.03	223.69	102.00
MAB00357	03/05/2024	21:00	224.93	225.03	224.03	102.10
MAB00357	03/05/2024	21:15	225.19	225.45	224.14	102.20
MAB00357	03/05/2024	21:30	224.91	225.05	224.10	102.10
MAB00357	03/05/2024	21:45	224.93	224.99	223.99	102.10

Voltage Profile Report

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Meter Serial No.	Survey Date	Time	Voltage R-Y (in kV)	Voltage Y-B (in kV)	Voltage B-R (in kV)	% Avg. V
MAB00357	03/05/2024	22:00	224.74	224.71	223.57	101.90
MAB00357	03/05/2024	22:15	224.63	224.81	223.60	101.90
MAB00357	03/05/2024	22:30	224.42	224.45	223.43	101.80
MAB00357	03/05/2024	22:45	224.47	224.31	223.21	101.80
MAB00357	03/05/2024	23:00	223.90	224.04	223.05	101.60
MAB00357	03/05/2024	23:15	223.95	224.12	223.24	101.70
MAB00357	03/05/2024	23:30	223.67	223.97	222.79	101.50
MAB00357	03/05/2024	23:45	224.46	224.73	223.71	101.90
MAB00357	04/05/2024	00:00	223.97	224.31	223.33	101.70
MAB00357	04/05/2024	00:15	223.77	224.04	222.93	101.60
MAB00357	04/05/2024	00:30	223.87	224.19	222.99	101.60
MAB00357	04/05/2024	00:45	223.77	223.90	222.81	101.60
MAB00357	04/05/2024	01:00	223.94	224.05	223.11	101.60
MAB00357	04/05/2024	01:15	223.92	224.03	222.84	101.60
MAB00357	04/05/2024	01:30	223.91	224.12	222.89	101.60
MAB00357	04/05/2024	01:45	224.30	224.47	223.39	101.80
MAB00357	04/05/2024	02:00	224.17	224.39	223.04	101.70
MAB00357	04/05/2024	02:15	224.05	224.24	223.23	101.70
MAB00357	04/05/2024	02:30	224.60	224.84	223.78	102.00
MAB00357	04/05/2024	02:45	224.54	224.85	223.42	101.90
MAB00357	04/05/2024	03:00	224.50	224.57	223.50	101.90
MAB00357	04/05/2024	03:15	224.30	224.59	223.51	101.80
MAB00357	04/05/2024	03:30	224.78	224.60	223.60	101.90

MAB00357	04/05/2024	01:30	223.91	224.12	222.89	101.60
MAB00357	04/05/2024	01:45	224.30	224.47	223.39	101.80
MAB00357	04/05/2024	02:00	224.17	224.39	223.04	101.70
MAB00357	04/05/2024	02:15	224.05	224.24	223.23	101.70
MAB00357	04/05/2024	02:30	224.60	224.84	223.78	102.00
MAB00357	04/05/2024	02:45	224.54	224.85	223.42	101.90
MAB00357	04/05/2024	03:00	224.50	224.57	223.50	101.90
MAB00357	04/05/2024	03:15	224.30	224.59	223.51	101.80
MAB00357	04/05/2024	03:30	224.78	224.60	223.60	101.90
MAB00357	04/05/2024	03:45	224.84	224.95	223.88	102.00
MAB00357	04/05/2024	04:00	225.07	225.31	224.18	102.20
MAB00357	04/05/2024	04:15	225.22	225.12	224.22	102.20
MAB00357	04/05/2024	04:30	224.97	225.15	223.91	102.10
MAB00357	04/05/2024	04:45	224.79	224.97	223.77	102.00
MAB00357	04/05/2024	05:00	224.81	225.05	223.94	102.10
MAB00357	04/05/2024	05:15	225.32	225.18	224.14	102.20
MAB00357	04/05/2024	05:30	224.82	224.83	223.82	102.00
MAB00357	04/05/2024	05:45	225.50	225.46	224.37	102.30
MAB00357	04/05/2024	06:00	225.31	225.45	224.33	102.30
MAB00357	04/05/2024	06:15	225.34	225.29	224.07	102.20
MAB00357	04/05/2024	06:30	224.93	224.99	223.97	102.10
MAB00357	04/05/2024	06:45	225.28	225.14	224.35	102.20
MAB00357	04/05/2024	07:00	225.40	225.37	224.33	102.30
MAB00357	04/05/2024	07:15	225.41	225.36	224.49	102.30

Annexure 06 (a)

The copies of correspondence in connection with efforts taken to reduce GCV gap

स्वातंत्र्याचा अमृत महोत्सव

सत्यमेव जयते

DEPUTY CHIEF MINISTER
MAHARASHTRA STATE

9th November, 2022

Sub: Issues in the sampling and analysis of coal.

Respected Sir,

Mahagenco is having Fuel Supply Agreement (FSA) with CIL for Supply of Coal from WCL, MCL, SECL and SCCL. But, Mahagenco is facing the difficulties of receipt of poor quality coal viz. lumpy, containing stones, shells and muddy coal from coal companies. There is no recourse available in Fuel Supply Agreement (FSA) to address and resolve the issues of non-representative, non-random and manual method of sampling due to which Mahagenco is continuously getting poor quality coal leading to heavy loss of generation as well as financial losses. Payment to the coal companies are made on the basis of results at loading end as per FSA. However, it is observed that there is considerable difference in loading end and unloading end results.

In view of above, I request for following actions to address coal quality related issues:

1. **Review of coal sampling method**: A more representative, random method involving augur machine/ auto mechanical sampler may be deployed for wagon/road/conveyor belt sampling.
2. **Receipt of crushed coal**-There should be at least 100 percent Standby crushing capacity at each mine end to ensure dispatches of sized coal to the power stations.
3. **Coal Regulatory Commission:** A Coal Regulatory commission may be appointed to address the critical issues and regulate coal quality, quantity and payments.
4. **Formation of Bilateral dispute resolving working committee**: There may be Bilateral dispute resolving working committee/ forum involving members from coal companies & Power utilities to resolve, settle and finalise various claims/issues
5. **Time frame to settle issues:** FSA between coal companies and power utilities may be revised to include time frame to settle outstanding dues effectively in time bound manner.
6. **Revision of FSA:** FSA may be reviewed after every five years as per the provision of FSA so that deterrent clauses observed during operation may be revised for smooth working of the agreement and the views of stakeholders to be included.

In view of above, I request for your intervention to address these issues at the earliest, as it will help in bringing down the energy rates in state of Maharashtra.

With regards,

Yours Sincerely,

(Devendra Fadnavis)

Shri. Pralhad Joshi Ji,
Hon'ble Minister of Coal, Mines & Parliamentary Affairs,
Government of India, Shastri Bhavan,
New Delhi– 110001
Email: *minister.coal@gov.in*

MAHAGENCO
Maharashtra State Power Generation Co. Ltd.

MAHARASHTRA STATE POWER GENERATION CO. LTD.
Office of Chairman & Managing Director
Prakashgad, 2nd floor, A K Marg, Bandra (East), Mumbai – 400 051
Tel: 6910 6216/6910 6214, Ext.: 3601/3602
E-mail : md@mahagenco.in Website : www.mahagenco.in

Ref.: CMD/Mahagenco/CE(FM)/No. 488 Date: 28 FEB 2024

To,
The Secretary (Coal),
Ministry of Coal,
Shastri Bhavan, A-Wing,
New Delhi – 110001.
E-mail: secy.moc@nic.in

Sub: Issues in coal sampling methodology prescribed in Fuel Supply Agreement signed amongst Mahagenco & CIL subsidiaries-regarding.

Ref: 1) Ltr to Director, CCO, MoC: Dir(Min)/CE(FM)/0323 dtd:16.02.2023.
2) Ltr to Director, CCO, MoC: Dir(Min)/CE(FM)/695/10.04.2023.
3) Ltr to CMD, CIL: CMD/MAHAGENCO/NO.1174 dtd.31 May 2023.
4) Ltr to CMD, CIL: CMD/MAHAGENCO/CE(FM)/No. 1507 dtd. 04 JUL 2023.
5) Ltr to Principal Secretary, GoM No.: CMD/MAHAGENCO/CE(FM)/No.2384 dtd.23.10. 2023.

Respected Sir,

With ref to above, Mahagenco and CIL subsidiaries have signed Fuel Supply Agreement in the year 2009 for ensuring supply of coal of prescribed quality. However, Mahagenco is facing the issue of considerable difference in analysis results between loading and unloading ends due to improper coal sampling methodology prescribed in Fuel Supply Agreement.

Although the sampling methodology issues are taken up by Mahagenco with Ministry of coal, Coal Controller Organization as well as Coal companies viz WCL, SECL & MCL time to time, no concrete steps have been initiated to rectify the issues to revise the sampling methodology.

The issues in coal sampling methodology are summarized below:

A. Sampling of Rail mode Supply:

1. **Less representation:** As per FSA, Schedule-V, clause-1.2 (c) & (d), out of 59 wagons in a rake, only 6 wagons (i.e. 10%) are selected for sampling. However, as per Indian Standard- 436 of Bureau of Standards (BIS), it should be 25% (i.e. 14 wagons), as it scientifically ensure better and representative sampling of whole lot.

2. **Top layer sampling**: As per FSA, Schedule-V, clause-1.2 (f) & (g), 50 Kg coal sample is collected manually from the top layer of each selected wagon. However, in this method only top layer of coal is collected leaving middle and bottom portion coal unsampled. In case of poor coal at middle and bottom portion, it is never captured in sample.

3. **Removal of stone/shales from sample**: As per FSA, Schedule-V, clause-1.2 (h), any

stone/shale of size more than 100 mm are required to be removed/discarded from sample. However, such discriminatory removal of stones/shales from sample makes complete sampling procedure obsolete in terms of true representativeness of coal in particular lot and is unjustified for purchaser.

B. Sampling of Road mode Supply:

1. **Non-random sampling**: As per FSA, Schedule-V, clause-1.3 (b), every eighth truck is subjected to the third party sampling once the number of first truck to be sampled is finalized. However, this method lacks randomness, which is the basis of true sampling. Since the eighth truck to be sampled is fixed, many times trucks are already topped-up with good quality coal and hence the results are always on higher side than the actual quality of the lot.

C. Sampling of Conveyor Belt mode Supply:

1. **Non-random sampling**: As per FSA, Schedule-V, clause-1.4 (a), coal sample is collected in increments of full cross section and thickness of the stream in one operation in a regular interval of time. However, this method lacks randomness. As the timing of sampling is fixed, only selected coal is captured in sample.

In view of above, the Sampling Methodology is required to be revised as below:

1. Review of coal sampling method: Current method of rail mode supply sampling to be modified by making 25% wagons selection instead of 10% wagons. Rail mode supply sampling to be modified by making random selection of truck instead of every 8th truck. Conveyor belt mode supply sampling to be modified by making it random instead of sampling at fixed timing.

2. No stones/ shales shall be discarded from the sample.

3. Sampling by Augur machine shall be incorporated in FSA for wagon and road sampling.

4. Online mechanical samplers for conveyor belt supply- Provision of Online Mechanical Samplers is to be incorporated in FSA for conveyor belt supply sampling.

In view of above, it requested to revised sampling methodology so that representative and random sampling is ensured.

Thanking you.

Chairman & Managing Director
MAHAGENCO, Mumbai.

Copy.s.w.r.to:
Additional Chief Secretary (Energy), Govt. of Maharashtra, 4th Floor, Mantralaya, Mumbai – 400032, Maharashtra.

MAHAGENCO
Maharashtra State Power Generation Co. Ltd.

MAHARASHTRA STATE POWER GENERATION CO. LTD.
Office of Chairman & Managing Director
Prakashgad, 2nd floor, A K Marg, Bandra (East), Mumbai – 400 051
Tel: 6910 6216/6910 6214, Ext.: 3601/3602
E-mail : md@mahagenco.in Website : www.mahagenco.in

Ref: CMD/ Mahagenco/FM/Sup Chem/2674 Date: 21 NOV 2024

To,
The Secretary (Coal),
Ministry of Coal,
Shastri Bhavan, A-Wing,
New Delhi- 110001
Email: secy.moc@nic.in

Sub: Issues in coal sampling methodology prescribed in Fuel Supply Agreement signed amongst Mahagenco & CIL subsidiaries - regarding.

Ref: 1. Ltr to Director CCO, MoC: Dir(Min)/CE(FM)/0323 dtd:16.02.2023.
2. Ltr to Director CCO, MoC: Dir(Min)/CE(FM)/695 dtd:10.04.2023.
3. Ltr to CMD, CIL: CMD/MAHAGENCO/CE(FM)/1174 dtd:31.05.2023
4. Ltr to CMD, CIL: CMD/MAHAGENCO/CE(FM)/1507 dtd:04.07.2023
5. Ltr to Principal Secretary, GoM: CMD/MAHAGENCO/CE(FM)/2384 dtd:23.10.2023.
6. Letter to Secretary Coal, MoC: CMD/MAHAGENCO/CE(FM)/448 dtd:28.02.2024.
7. Minutes of Meeting on coal quality issues held on dtd. 19.01.2023.
8. Compendium regd Demurrage-Wharfage-Waiver/ 2016/0 Dtd: 19.05.2016

Respected Sir,

With ref to above, Mahagenco and CIL subsidiaries have signed Fuel Supply Agreement in the year 2009 for ensuring supply of coal of prescribed quality. However, some of the clauses of the FSA related with sampling of the coal are having issues of non-representativeness due to which Mahagenco is facing the issue of considerable difference in analysis result between loading and unloading end.

Mahagenco has taken up these issues in the virtual meeting chaired by Hon. Secretary (Coal), Govt. of India on dtd 9th Jan-2023. Director (Marketing), CIL, Principal Secretary (Energy), Govt. of Maharashtra and Chairman & Managing Director, Mahagenco were present in the meeting.

A. <u>Sampling of Rail mode Supply:</u>

1. **Less representation:** As per FSA, Schedule-V, clause-1.2 (c) & (d), out of 59 wagons in a rake, only 6 wagons (i.e. 10%) are selected for sampling. However, as per Indian Standard- 436 of

2. In road mode sampling, Mahagenco representative is not allowed in the loading area i.e. in coal stock area by giving the reason of safety by mine authority. Mahagenco representatives are allowed only in sampling area near weighbridge where weighment of trucks is done. Therefore, loaded quality of coal cannot be ensured by physical verification and only surface coal is being collected in sampling which is topped up by good quality coal most of the time. As such it is requested to allow Mahagenco representative who have done VTC carried out by CIL for monitoring coal loading in trucks.

C. <u>Sampling of Conveyor Belt mode Supply:</u>

Non-random sampling: As per FSA, Schedule-V, clause-1.4 (a), coal sample from conveyor belt is collected at a regular interval of time. However, this method lacks randomness, as the timing of sampling of first sample is only random, however rest all samples are collected at fixed interval of time.

It is observed that there are empty belt running or belt is stopped by any reason at the time of sampling of interval of 45 minutes. In such conditions, most of the time sample could not be collected and not allowed by authority to collect the sample after immediate start of belt. It is required to wait for next slot of 45-minute turn. In such case less quantity of sample is being collected which is non representative sample for lot of that day's quantity. It is necessary to take sample at any time between the 45 minutes slot to maintain the randomness in sampling.

In view of the issues discussed above, it is requested to revise the sampling methodology as below:

Review of coal sampling method:

A. Rail mode supply sampling:

1. Current method of rail mode supply sampling to be modified by making 25 % wagons selection as per BIS-436 instead of 10% wagons as in FSA.
2. Sampling of coal shall be done preferably by mechanical means like Augur machine for wagon and truck sampling.
3. No stones/shales shall be discarded from the coal sample.

Bureau of Standards (BIS), it should be 25% (i.e. 15 wagons), as it scientifically ensures better and representative sampling of whole lot.

As per MoM cited under reference (7), the free time given by railways for loading of rake at the loading end is not sufficient. In this context it is to mention here that the free time for loading of rake at loading end to coal company is 5 hours as per ref (8) Clause 2.2 (a) (i) and also learnt that permissible time for some sidings of loading end is 3 hours. However, it is to inform that free time for unloading of rakes at Koradi TPS is five hours and for BOBR it is 2.5 hours and at free time Mahagenco is unloading maximum rakes at wagon tippler and track hopper respectively. As such it is to submit that, 25% sampling as per IS – 436 may be carried out at sidings of loading end.

2. **Top layer sampling**: As per FSA, Schedule-V, clause-1.2 (f) & (g), 50 Kg coal sample is collected manually from the top layer of each selected wagon. However, in this method only top layer of coal is collected leaving middle and bottom portion coal unsampled. As such coal sampling through Auger machine for all modes of dispatches shall be implemented to collect true representative sample.

3. **Removal of stone/shales from sample**: As per FSA, Schedule-V, clause-1.2 (h), any stone/shale of size more than 100 mm are required to be removed/discarded from sample. However, such discriminatory removal of stones/shales from sample makes complete sampling procedure obsolete in terms of true representativeness of coal in particular lot and is unjustified for purchaser. As such provision of removing of 100 mm stone/shale from collected gross coal sample shall be delated from FSA.

B. <u>Sampling of Road mode Supply:</u>

1. **Non-random sampling**: As per FSA, Schedule-V, clause-1.3 (b), every eighth truck is subjected to the third-party sampling once the number of first truck to be sampled is finalized. However, this method lacks randomness, which is the basis of true sampling. Since the eighth truck to be sampled is fixed, many times trucks are already topped-up with good evidence quality coal and hence the results are always on higher side than the actual quality of the lot. Hence selection of truck from every lot of every 8 trucks shall be allowed for getting random sample of truck in true sense.

B. Road mode supply sampling:

1. Road mode supply sampling to be modified by making random selection of any loaded truck in a lot of 8 loaded trucks instead of every 8th truck.
2. Thermal Power Station representatives to be allowed while loading of trucks for monitoring.

C. Conveyor Belt supply sampling:

1. Conveyor belt mode supply sampling to be modified by making it random instead of sampling at fixed timing; it should be allowed at any moment in every 45 minutes.
2. Online Coal analyser for conveyor belt supply- Provision of online coal analyser is to be incorporated in FSA for supply of coal through conveyor belt / pipe conveyor.

In view of above, it is kindly requested to look into above matter and revise sampling methodology to resolve these issues.

Thanking You.

Yours Faithfully

Chairman and Managing Director
Mahagenco, Mumbai.

Copy to:

1. Director (Fuel), Mahagenco, HO, Mumbai.
2. Executive Director (Coal), Mahagenco, HO, Mumbai.
3. Chief Engineer, FM Division, CEA, New Delhi.
4. Chief Engineer (FM), Mahagenco, HO, Mumbai.
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Respected Sir,

With ref to above, Mahagenco and CIL subsidiaries have signed Fuel Supply Agreement in the year 2009 for ensuring supply of coal of prescribed quality. However, some of the clauses of the FSA related with sampling of the coal are having issues of non-representativeness due to which Mahagenco is facing the issue of considerable difference in analysis result between loading and unloading end.

Mahagenco has taken up these issues in the virtual meeting chaired by Hon. Secretary (Coal), Govt. of India on dtd 9th Jan-2023. Director (Marketing), CIL, Principal Secretary (Energy), Govt. of Maharashtra and Chairman & Managing Director, Mahagenco were present in the meeting.

A. <u>Sampling of Rail mode Supply:</u>

1. **Less representation:** As per FSA, Schedule-V, clause-1.2 (c) & (d), out of 59 wagons in a rake, only 6 wagons (i.e. 10%) are selected for sampling. However, as per Indian Standard- 436 of

2. In road mode sampling, Mahagenco representative is not allowed in the loading area i.e. in coal stock area by giving the reason of safety by mine authority. Mahagenco representatives are allowed only in sampling area near weighbridge where weighment of trucks is done. Therefore, loaded quality of coal cannot be ensured by physical verification and only surface coal is being collected in sampling which is topped up by good quality coal most of the time. As such it is requested to allow Mahagenco representative who have done VTC carried out by CIL for monitoring coal loading in trucks.

C. <u>Sampling of Conveyor Belt mode Supply:</u>

Non-random sampling: As per FSA, Schedule-V, clause-1.4 (a), coal sample from conveyor belt is collected at a regular interval of time. However, this method lacks randomness, as the timing of sampling of first sample is only random, however rest all samples are collected at fixed interval of time.

It is observed that there are empty belt running or belt is stopped by any reason at the time of sampling of interval of 45 minutes. In such conditions, most of the time sample could not be collected and not allowed by authority to collect the sample after immediate start of belt. It is required to wait for next slot of 45-minute turn. In such case less quantity of sample is being collected which is non representative sample for lot of that day's quantity. It is necessary to take sample at any time between the 45 minutes slot to maintain the randomness in sampling.

In view of the issues discussed above, it is requested to revise the sampling methodology as below:

Review of coal sampling method:

A. Rail mode supply sampling:

1. Current method of rail mode supply sampling to be modified by making 25 % wagons selection as per BIS-436 instead of 10% wagons as in FSA.
2. Sampling of coal shall be done preferably by mechanical means like Augur machine for wagon and truck sampling.
3. No stones/shales shall be discarded from the coal sample.

Bureau of Standards (BIS), it should be 25% (i.e. 15 wagons), as it scientifically ensures better and representative sampling of whole lot.

As per MoM cited under reference (7), the free time given by railways for loading of rake at the loading end is not sufficient. In this context it is to mention here that the free time for loading of rake at loading end to coal company is 5 hours as per ref (8) Clause 2.2 (a) (i) and also learnt that permissible time for some sidings of loading end is 3 hours. However, it is to inform that free time for unloading of rakes at Koradi TPS is five hours and for BOBR it is 2.5 hours and at free time Mahagenco is unloading maximum rakes at wagon tippler and track hopper respectively. As such it is to submit that, 25% sampling as per IS – 436 may be carried out at sidings of loading end.

2. **Top layer sampling**: As per FSA, Schedule-V, clause-1.2 (f) & (g), 50 Kg coal sample is collected manually from the top layer of each selected wagon. However, in this method only top layer of coal is collected leaving middle and bottom portion coal unsampled. As such coal sampling through Auger machine for all modes of dispatches shall be implemented to collect true representative sample.

3. **Removal of stone/shales from sample**: As per FSA, Schedule-V, clause-1.2 (h), any stone/shale of size more than 100 mm are required to be removed/discarded from sample. However, such discriminatory removal of stones/shales from sample makes complete sampling procedure obsolete in terms of true representativeness of coal in particular lot and is unjustified for purchaser. As such provision of removing of 100 mm stone/shale from collected gross coal sample shall be delated from FSA.

B. <u>Sampling of Road mode Supply:</u>

1. **Non-random sampling**: As per FSA, Schedule-V, clause-1.3 (b), every eighth truck is subjected to the third-party sampling once the number of first truck to be sampled is finalized. However, this method lacks randomness, which is the basis of true sampling. Since the eighth truck to be sampled is fixed, many times trucks are already topped-up with good evidence quality coal and hence the results are always on higher side than the actual quality of the lot. Hence selection of truck from every lot of every 8 trucks shall be allowed for getting random sample of truck in true sense.

B. Road mode supply sampling:

1. Road mode supply sampling to be modified by making random selection of any loaded truck in a lot of 8 loaded trucks instead of every 8th truck.
2. Thermal Power Station representatives to be allowed while loading of trucks for monitoring.

C. Conveyor Belt supply sampling:

1. Conveyor belt mode supply sampling to be modified by making it random instead of sampling at fixed timing; it should be allowed at any moment in every 45 minutes.
2. Online Coal analyser for conveyor belt supply- Provision of online coal analyser is to be incorporated in FSA for supply of coal through conveyor belt / pipe conveyor.

In view of above, it is kindly requested to look into above matter and revise sampling methodology to resolve these issues.

Thanking You.

Yours Faithfully

Chairman and Managing Director
Mahagenco, Mumbai.

Copy to:

1. Director (Fuel), Mahagenco, HO, Mumbai.
2. Executive Director (Coal), Mahagenco, HO, Mumbai.
3. Chief Engineer, FM Division, CEA, New Delhi.
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Tel: 2647 2131/4211 Ext: 3513
E-mail : md@mahagenco.in Website : www.mahagenco.in

Ref: CMD/MSPGCL/Coal/ 2181

Date: 1 NOV 2022

To,
Hon. Principal Secretary,

Energy Department, Mantralaya,

Govt. of Maharashtra

Sub: Issues in the sampling and analysis of coal regarding.

With ref to above, currently Mahagenco is facing the problem of receipt of poor quality coal from coal companies. The coal is lumpy, contains stones and shells and is wet. Though the issues are taken up by Mahagenco with WCL, SECL & MCL time to time, however, there is no improvement on the front of coal quality. Further, no recourse is available in Fuel Supply Agreement (FSA) to address and resolve the issues of non-representative, non-random and manual method of sampling due to which Mahagenco is continue getting poor quality coal leading to heavy loss of generation as well as financial losses.

The issues in coal sampling and analysis are summarized as below:

1. **Non-representative sampling**: For correctness of the coal quality results it is essential that all the sample shall have equal opportunity to be picked up in sample to assess the realistic coal quality. However, the procedure adopted by Fuel Supply Agreement (FSA) and prescribed by coal companies for coal sampling is not truly representative as the coal sample is picked up manually from the top layer of the rakes/tippers only (around 30 cm) leaving middle and bottom portion coal unsampled. Due to topping up of the good quality coal, results are always better though the coal quality is poorer.
2. **Less representation:** As per FSA, out of 59 wagons in a rake, only 6 wagons (i.e. 10%) are selected for sampling while as per the Bureau of Standards (BIS), it should be 25%, as it scientifically ensure better and representative sampling.
3. **Fixed sampling in road mode supply**: - As per FSA, in road mode coal supply through trucks, sampling of every eighth truck is fixed. Hence, this method lacks in randomness, which is the basis of true sampling. Many times trucks are already top-up with good quality coal and hence the results are always on higher side than the actual.
4. **Manual Sampling**-FSA prescribes only manual sampling which is non-representative and can be manipulated. Hence, the better option is to deploy Mechanical Augur Machine for sampling in railway rakes.

5. **Online mechanical samplers for conveyor belt supply**- As per FSA, from the sidings, where coal is received through ropeway/conveyor belt, the timing of sampling is fixed thus lacking randomness. Only good quality coal is loaded on belt during sampling time leads to erroneous results. Therefore, online mechanical samplers are required to be deployed for representative sampling for conveyor belt supply.
6. **Receipt of uncrushed coal**-In the year 2016, CIL issued notification informing that, henceforth, all its subsidiaries shall supply only (-)100 mm coal to power utilities and it has increased crushing charges from Rs. 53/- per Metric Tonne to Rs.87/- per Metric Tonne for all dispatches. However, the continued receipt of lumpy coal at Power stations indicates the inadequate crushing capacity with coal companies.
7. **Coal Regulatory committee and Bilateral dispute resolving working committee:** It may be noted that currently, there is no Coal Regulatory Committee which can address the critical issues and regulate coal quality, quantity and payments. Further, it is also observed that, the critical issues/disputes are not settled in time bound manner by coal companies. For the resolution of disputes, presently there is no bilateral dispute working committee/forum involving members from coal companies & Power utilities.

In view of above, it is proposed that-

1. **Review of coal sampling method**: Current method of coal sampling is to be reviewed by involving all the stakeholders. A more representative, random method involving augur machine/auto mechanical sampler shall be deployed for wagon/road/conveyor belt sampling.
2. **Receipt of crushed coal**-There should be at least 100 percent Standby crushing capacity at each mine end to ensure dispatches of sized coal to the power stations.
3. **Coal Regulatory Committee:** A Coal Regulatory committee shall be appointed to address the critical issues and regulate coal quality, quantity and payments.
4. **Formation of Bilateral dispute resolving working committee**: There shall be Bilateral dispute resolving working committee /forum involving members from coal companies & Power utilities to resolve, settle and finalise various claims/issues in time bound manner so that claims does not remain pending for years together.
5. **Time frame to settle issues:** Although, FSA prescribes method for credit/debit notes for grade slippages, excess surface moisture etc, these are not settled in time bound manner by coal companies. FSA between coal companies and power utilities needs to be revised to include time frame to settle outstanding dues effectively in time bound manner.
6. **Revision of FSA:** FSA should be reviewed after every five years as per the provision of FSA so that deterrent clause observed during operation may be revised for smooth working of the

agreement and the views of stakeholders to be included. Mahagenco already informed CIL about issues like Annual Contracted Quantity (ACQ) determination, compensation for short delivery/lifting, performance incentives (PI) etc, however these are not addressed so far.

In view of above, it is proposed to write a letter addressed to Hon. Minister, Coal Ministry, Govt. of India by the signature of Hon. Minister of Energy New and Renewable Energy, Govt. of Maharashtra requesting to resolve these issues.

The draft letter is enclosed herewith.

Encl: As above

(Dr. P. Anbalagan)
Chairman & Managing Director
MAHAGENCO

DIWAKAR GOKHALE
Director (Mining)

Azadi Ka Amrit Mahotsav

MAHAGENCO
Maharashtra State Power Generation Co. LTD.

Ref.: Dir (Min)/CE(FM)/ 0323 - [redacted] Date: 16 FEB 2023

To,
The Director,
Coal Controller's Organization,
Ministry of Coal,Govt. of India,
5th Floor, Scope Minar, Laxmi Nagar,
New Delhi- 110092
Fax: 011 24699949, Email: coalcont-wb@nic.in

Sub: Issues in coal sampling methodology prescribed in Fuel Supply Agreement signed amongst Mahagenco & CIL subsidiaries - regarding.

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Mahagenco has taken up these issues in the virtual meeting chaired by Hon. Secretary (Coal), Govt. of India on dtd 9th Jan-2023. Director (Marketing), CIL, Principal Secretary (Energy), Govt. of Maharashtra and Chairman & Managing Director, Mahagenco were present in the meeting.

Since, under 'Colliery Control Rules, 2004' – Coal Controller is entrusted the role & reponsibility – 'To lay down procedure & standard for sampling of coal', following issues in coal sampling methodology are presented below for rectification :

A. <u>Sampling of Rail mode Supply:</u>

1. **Less representation:** As per FSA, Schedule-V, clause-1.2 (c) & (d), out of 59 wagons in a rake, only 6 wagons (i.e. 10%) are selected for sampling. However, as per Indian Standard- 436 of

Bureau of Standards (BIS), it should be 25% (i.e. 14 wagons), as it scientifically ensure better and representative sampling of whole lot.

2. **Top layer sampling**: As per FSA, Schedule-V, clause-1.2 (f) & (g), 50 Kg coal sample is collected manually from the top layer of each selected wagon. However, in this method only top layer of coal is collected leaving middle and bottom portion coal unsampled. In case of poor coal at middle and bottom portion, it is never captured in sample collection.

3. **Removal of stone/shales from sample**: As per FSA, Schedule-V, clause-1.2 (h), any stone/shale of size more than 100 mm are required to be removed/discarded from sample. However, such discriminatory removal of stones/shales from sample makes complete sampling procedure obsolete in terms of true representativeness of coal in particular lot and is unjustified for purchaser.

B. <u>Sampling of Road mode Supply:</u>

Non-random sampling: As per FSA, Schedule-V, clause-1.3 (b), every eighth truck is subjected to the third party sampling once the number of first truck to be sampled is finalized. However, this method lacks randomness, which is the basis of true sampling. Since the eighth truck to be sampled is fixed, many times trucks are already topped-up with good quality coal and hence the results are always on higher side than the actual quality of the lot.

C. <u>Sampling of Conveyor Belt mode Supply:</u>

Non-random sampling: As per FSA, Schedule-V, clause-1.4 (a), coal sample is collected in increments of full cross section and thickness of the stream in one operation in a regular interval of time. However, this method lacks randomness. As the timing of sampling is fixed, only selected coal is captured in sample.

In view of above, for the issues discussed above, it is requested to revise the sampling methodology as below:

Review of coal sampling method:

A. Rail mode supply sampling:

1. Current method of rail mode supply sampling to be modified by making 25% wagons selection as per BIS-436 instead of 10% wagons as in FSA.
2. Sampling of coal shall be done preferably by mechanical means like Augur machine for wagon and truck sampling.
3. No stones/ shales shall be discarded from the coal sample.

B. Road mode supply sampling:

Road mode supply sampling to be modified by making random selection of any loaded truck in a lot of 8 loaded trucks instead of every 8th truck.

C. Conveyor Belt supply sampling:

1. Conveyor belt mode supply sampling to be modified by making it random instead of sampling at fixed timing; it should be allowed at any moment in every hour.
2. Online Coal analyser for conveyor belt supply - Provision of Online Coal analyser is to be incorporated in FSA for supply of coal through conveyor belt / pipe conveyor. .

In view of above, you are kindly requested to look into above matter and revise sampling methodology to resolve these issues.

16/2/23

Director (Mining)
Mahagenco, Mumbai.

Copy to:

1. Executive Director (Coal), Mahagenco, HO, Mumbai.
2. Chief Engineer, FM Division, CEA, New Delhi.
3. Chief Engineer (FM), Mahagenco, HO, Mumbai.
4. Shri. Nitesh Kumar Gupta, Regional Head, OSD, Coal Controller's Organization,Kolkata. Email- cco.mcps-coal@gov.in/ nitesh.kumar6883@coalindia,in.
5. Shri. Sandip Paranjpee, Regional Head, OSD, Coal Controller's Organization,Nagpur. Email- cco.ngp-coal@gov.in/osdccongp14@gmail.com.
6. Dy CE-III, (FM), Coal Office, Nagpur.
7. OSD to Hon. Chairman & Managing Director, Mahagenco, Mumbai.

Annexure 07

Govt. Resolutions regarding CMAG Scheme.

"मुख्यमंत्री सौर कृषी वाहिनी योजनेची" परिणामकारक अंमलबजावणी होण्याकरीता सुधारणा.

महाराष्ट्र शासन

उद्योग, ऊर्जा व कामगार विभाग
शासन निर्णय क्रमांक: सौरप्र-२०१८/प्र.क्र.२६/ऊर्जा-७.
मादाम कामा मार्ग, हुतात्मा राजगुरु चौक,
मंत्रालय, मुंबई - ४०० ०३२.
दिनांक: १७ मार्च, २०१८.

संदर्भ:- १) शासन निर्णय, उद्योग, ऊर्जा व कामगार विभाग, क्र.सौरप्र-२०१६/प्र.क्र.४९/ ऊर्जा-७, दिनांक १४ जुन, २०१७.

२) शासन निर्णय, महसूल व वन विभाग क्र. जमीन-२०१७/प्र..क्र.१९७/ज-१, दि.२९ नोव्हेंबर, २०१७

३) अध्यक्ष तथा व्यवस्थापकीय संचालक, महानिर्मिती यांचे पत्र क्र. सीई/एसपीजीडी - पी/जी आर /कृषी फिडर/सुधारणा/००३८६, दि.१० जानेवारी, २०१८

४) अध्यक्ष तथा व्यवस्थापकीय संचालक, महावितरण यांचे पत्र क्र.एमईएसडीसीएल/ पीपी/सोलर एजी फिडर/ ००१००४ दि. १२ जानेवारी, २०१८

५) शासन निर्णय, उद्योग, ऊर्जा व कामगार विभाग, क्र.सौरप्र-२०१८/प्र.क्र.८७/ ऊर्जा-७, दिनांक २७ फेब्रुवारी, २०१८.

प्रस्तावना :-

राज्यातील ज्या ग्रामीण भागामध्ये गावठाण व कृषी वाहिनी विलगीकरण झाले आहे अशा ठिकाणच्या कृषी वाहिनी सौर ऊर्जाद्वारे विद्युतीकरण केल्यास पारंपारिक विजेची मोठ्या प्रमाणात बचत होऊ शकते. अशा बचत झालेल्या वीजेचा वापर इतर उत्पादनक्षम कामांसाठी होऊ शकत, परिणामी महावितरण कंपनीचा वीजेच्या खरेदीवर होणारा खर्च कमी होईल व पारंपारिक वीजेची बचत होईल. तसेच महावितरण कंपनीच्या महसूलात वाढ होण्यास मदत होईल आणि वाणिज्यिक व औद्योगिक ग्राहकांसाठी वीजेचा दर कमी राखण्यासही मदत होईल. या सर्व बाबी तसेच राज्यातील शेतकऱ्यांना माफक दरात व त्यांच्या सोयीनुसार वीज पुरवठा उपलब्ध व्हावा या दृष्टिकोनातून राज्यात सौर कृषी वाहिनी योजना सुरू करण्याची बाब शासनाच्या विचाराधीन होती. त्यानुसार संदर्भ क्र. १ येथील शासन निर्णयान्वये राज्यात "मुख्यमंत्री सौर कृषी वाहिनी योजना" लागू करण्यात आली. सदर योजनेअंतर्गत राळेगणसिध्दी, जि. अहमदनगर व कोळंबी, जि. यवतमाळ येथे पथदर्शी प्रकल्प मंजुर करण्यात आले आहेत. सदर प्रकल्पांची अंमलबजावणी/ कार्यन्वयन करताना काही अडचणी अंमलबजावणी यंत्रणा व त्यास सहाय्यभूत असणाऱ्या पुरक यंत्रणांच्या निदर्शनास आल्या. योजनेच्या शासन निर्णयात अनु.क्र. २३ येथे या योजनेची अंमलबजावणी योग्य रितीने होण्याच्या दृष्टीने प्रधान सचिव (ऊर्जा) यांच्या अध्यक्षतेखाली समिती गठीत करण्यात आली असून त्याबाबतचा शासन

निर्णय संदर्भाधीन अनु. क्र. ५ नुसार निर्गमित करण्यात आला आहे. योजनेचा व त्याअंतर्गत मंजुर प्रकल्पाचा वेळोवेळी विभागाव्दारे आढावा घेण्यात आला असून त्यात प्रामुख्याने काही बाबी, योजना गतिमान व परिणामकारक अंमलात आणण्याच्या दृष्टीने, आवश्यक वाटल्या आहेत. अशा अडचणींबाबत महानिर्मिती /महावितरण/महाऊर्जा यांनी योजनेत सुचविलेले बदल/सुधारणा समितीव्दारा विचारात घेण्यात येऊन योजनेची गतीने व परिणामकारक अंमलबजावणी होण्याच्या दृष्टीने संदर्भ क्र. १ येथील शासन निर्णय दि. १४ जुन, २०१७ मध्ये सुधारणा/बदल करण्याची बाब शासनाच्या विचाराधिन होती.

<u>शासन निर्णय</u> :-

"मुख्यमंत्री सौर कृषी वाहिनी योजना" या योजनेची अंमलबजावणी करताना उदभवणाऱ्या/ येणाऱ्या अडचणींबाबत महानिर्मिती /महावितरण/महाऊर्जा यांनी वेळोवेळी निदर्शनास आणलेले, सुचविलेले बदल लक्षात घेता, संदर्भाधीन क्र. ५ येथील शासन निर्णयानुसार गठीत समितीने केलेल्या शिफारशींनुसार संदर्भ क्र. १ येथील शासन निर्णय दि. १४ जुन, २०१७ मध्ये खालीलप्रमाणे सुधारणा/बदल करण्यात येत आहेत:-

१. राज्यातील ग्रामीण भागामधील सौर ऊर्जा प्रकल्पातून निर्माण होणारी वीज कृषी फिडरव्दारे शेतकऱ्यांना दिवसा उपलब्ध करून देण्यात येईल. यास महाराष्ट्र वीज नियामक आयोगाची मान्यता घेण्यात येईल.

२. सदरच्या योजनेस गतीमानता व अंमलबजावणीत लवचिकता येण्यासाठी प्रकल्पपरत्वे महानिर्मिती कंपनी या अंमलबजावणी यंत्रणेव्यतिरिक्त महावितरण कंपनीस अंमलबजावणी यंत्रणा म्हणून घोषीत करण्यात येत आहे. सदर योजनेच्या अंमलबजावणीच्या टप्प्यामध्ये त्या त्या विवक्षित ठिकाणी महाऊर्जा तसेच महानिर्मिती/महापारेषण/ महावितरण या कंपन्यांचाही सहभाग असेल.

३. अंमलबजावणी यंत्रणेव्दारे राज्यातील ११ के.व्ही. ते १३२ के.व्ही. वीज उपकेंद्राच्या २ कि.मी. ते ३ कि.मी. (अपवादात्मक परिस्थितीत ५ कि.मी.) परीघातील शासकीय जमीन उपलब्धतेचा शोध घेण्यात येईल. तसेच सदर ठिकाणी असलेल्या वीज उपकेंद्राची क्षमता आणि शासकीय जमीनीची उपलब्धता व जमिनीचा महत्तम वापर होण्याच्या दृष्टीने वीज निर्मितीची क्षमता विचारात घेऊन, सौर कृषी वाहिनी प्रकल्पाची निवड करण्यात येईल. तत्पूर्वी त्याबाबत आवश्यकतेनुसार महाऊर्जा/ महानिर्मिती/ महापारेषण/महावितरण कंपनी यांच्यासमवेत समन्वय राखून अशा प्रकल्पाच्या प्राथमिक व्यवहार्यतेबद्दल त्यांच्याकडून मान्यता अंमलबजावणी यंत्रणा घेईल. विविध टप्प्यात या कंपन्यांचे सुचविलेले अभिप्राय सम्मिलित करून घेतील.

४. सौर कृषी वाहिनी योजनेच्या प्रकल्पाकरिता निश्चित केलेली शासकीय जमीन ३० वर्षाच्या कालावधीकरिता नाममात्र रू.१/- या दराने भाडेपट्टीने त्या त्या विभागाच्या व महसूल विभागाच्या मान्यतेने उपलब्ध करण्यासाठी स्वतंत्रपणे धोरणात्मक व सविस्तर आदेश महसूल विभागाकडून संदर्भ क्र. २ येथे नमूद केल्यानुसार निर्गमित करण्यात आले आहेत. त्यात महानिर्मितीसह योजनेकरीता

अंमलबजावणी यंत्रणा म्हणून घोषीत करण्यात येणाऱ्या यंत्रणेस जमिन भाडेपटयाने उपलब्ध करण्याबाबत बदल करण्यात येतील. अशी जमिन महसूल विभाग अंमलबजावणी यंत्रणेस ३० वर्षाच्या भाडेपटयाने देईल. त्यानुसार करारनाम्यात योग्य अटी व शर्ती नमुद करण्यात येतील. सौर ऊर्जा प्रकल्पासाठी खाजगी जमिनधारकही आपली पडिक जमिन भाडेकराराने (Lease Basis) देऊ शकतील. याबाबतच्या भाडेपटयाचा दर अंमलबजावणी यंत्रणेव्दारे निश्चित करण्यात येईल.गायरान जमिनी जिल्हाधिकारी यांच्याकडून मिळविण्यात येतील.

५. सौर कृषि वाहिनीला उपलब्ध करुन देण्यात येणारी जमीन अकृषिक (NA) करण्याची गरज राहणार नाही. अंमलबजावणी यंत्रणा योजनेअंतर्गत अंतिम करण्यात येणाऱ्या प्रकल्पांची नोंदणी प्रथम महाऊर्जाकडे करतील व त्याकरिता महाऊर्जा कोणतेही शुल्क आकारणार नाही.

६. प्रकल्पाची प्राथमिक व्यवहार्यता निश्चित झाल्यावर अंमलबजावणी यंत्रणेव्दारे PPP (Public-Private Partnership) तत्वावर विहीत कार्यपध्दतीने पारदर्शक व स्पर्धात्मक निविदा प्रक्रिया वा उलट बोली (Competitive Bidding/ERA) राबवून खाजगी गुंतवणूकदाराची निवड करण्यात येईल. Bidding Cap निश्चित करताना प्रधान सचिव (ऊर्जा) यांच्या अध्यक्षतेखाली समितीची मान्यता घ्यावी. स्पर्धात्मक निविदा प्रक्रिया वा उलट बोली (Competitive Bidding Process/ERA)साठी केंद्र शासन/महाराष्ट्र शासन/महाराष्ट्र विद्युत नियामक आयोग यांचे मार्गदर्शक तत्वे विचारात घेण्यात येतील.

७. प्रस्तावित ठिकाणी खाजगी गुंतवणूकदाराकडून सौर कृषी वाहिनी प्रकल्प उभारण्यासाठी अंमजलबजावणी यंत्रणेकडून योग्य तो करार २५ वर्षाच्या अथवा विवक्षित कालावधीकरिता करण्यात येईल. त्यामध्ये वीज खरेदी करार (PPA) व त्याबाबतच्या अटी व शर्तींचा समावेश असेल. विकासकाकडून खरेदी केलेली वीज अंमलबजावणी यंत्रणा जर महानिर्मिती कंपनी असल्यास ती महावितरण कंपनीला विक्री करेल. अशी वीज महावितरण कंपनीला विक्री करताना त्यात महानिर्मिती कंपनीस अशा वीजेसाठी येणाऱ्या व्यवस्थापन खर्चाचा समावेश करून त्याप्रमाणे महानिर्मिती कंपनी व महावितरण कंपनी यांच्यात वीज विक्री करार (Power Sale Agreement) करण्यात येईल. अशा वीज खरेदी/विक्री करारास (PPA/PSA) व व्यवस्थापन खर्चास महानिर्मिती/महावितरण कंपनीकडून महाराष्ट्र विद्युत नियामक आयोगाची मान्यता घेण्यात येईल. महावितरण कंपनीव्दारा राबविण्यात येणाऱ्या प्रकल्पांमध्ये वीज विक्री करारास महावितरण कंपनी महाराष्ट्र विद्युत नियामक आयोगाची मान्यता घेईल. अंमलबजावणी यंत्रणेव्दारे करण्यात येणाऱ्या सर्व करारामध्ये शासनाचे हित जपण्याची दक्षता घेण्याची जबाबदारी अंमलबजावणी यंत्रणेची राहील.

८. प्रकल्पाची निवड करताना जागा अधिग्रहीत करण्यासाठी होणारा खर्च, विकास शुल्क, निष्कासनाचा खर्च आणि खाजगी गुंतवणूकदारांचा दर हा सगळा खर्च एकत्रितपणे विचारात घेऊन अंतिम वीजेचा दर निश्चित झाल्यानंतर अंतिम दरास महावितरणची मान्यता घेऊन प्रकल्पाची व्यवहार्यता निश्चित करण्यात यावी.

९. खाजगी गुंतवणूकदारांकडून सदर प्रकल्पाची उभारणी व त्याची देखभाल-दुरूस्ती अंमलबजावणी यंत्रणे समवेत केलेल्या करारात नमूद केल्याप्रमाणे २५ वर्षाच्या अथवा विवक्षित कालावधीसाठी करण्यात येईल.

१०. या योजने अंतर्गत निवड झालेला सौर ऊर्जा प्रकल्प उभारण्यासाठी सर्व मुलभूत/पायाभूत सुविधांचा खर्च विकासकाव्दारे करण्यात येईल. वीजेच्या निष्कासनाचा खर्च हा महाऊर्जाव्दारे हरित ऊर्जा निधीतून प्रकरणपरत्वे अंमलबजावणी यंत्रणेला अदा करण्यात येइल. अंमलबजावणी यंत्रणेस निष्कासनाचा खर्चही विकासकाकडून करण्याबाबतची अट करारात टाकण्याची मुभा असेल.

११. अशा योजने अंतर्गत आस्थापित झालेला प्रकल्प महावितरण कंपनीच्या वीज प्रणालीला (पारेषण संलग्न) जोडण्यात येईल व सदर वीज वितरण वाहिनीची देखभाल व दुरूस्ती महावितरण कंपनीकडून करण्यात येईल.

१२. सदर सौर कृषी वाहिनीमधील कृषी ग्राहकांच्याकडून वीज वितरण झालेल्या वीजेच्या पुरवठ्यापोटी बिलाची वसुली महावितरण कंपनीकडून वा महावितरण कंपनीने निश्चित/निवड केलेल्या वितरण फ्रेंचायझी कडून करण्यात येईल.

१३. अशा ठिकाणी त्या कृषी ग्राहकांना वीज मिटर जोडलेले नसल्यास ते महावितरण कंपनीकडून जोडण्यात येतील.

१४. सदर प्रकल्पामधून निर्माण होणारी संपूर्ण वीज विद्युत प्रणालीमध्ये निष्कासित करण्यात येईल. अशा संपूर्ण वीजेपोटी प्रसंगानुरूप अंमलबजावणी यंत्रणा असणाऱ्या महावितरण कंपनीकडून अथवा महानिर्मिती कंपनीकडून विकासकास बील अदा करण्यात येईल.

१५. एक किंवा अनेक शेतकरी यांनी सहकारी संस्था स्थापन करून खाजगी गुंतवणूक मिळवून अशा संस्था वा स्थानिक स्वराज्य संस्था सौर कृषी वाहिनी प्रकल्प उभारण्यासाठी अंमलबजावणी यंत्रणेकडे प्रस्ताव सादर करू शकतील. सदर संस्थांनांही स्पर्धात्मक निविदा प्रक्रिया / उलट बोली मध्ये भाग घ्यावा लागेल. निवड झाल्यास अंमलबजावणी यंत्रणाशी यथोचित करार करून योजनेत सहभागी होऊ शकतील. अशा प्रकल्पातून संबंधित संस्थेच्या लाभार्थी शेतकऱ्यांना वीज पुरवठा करता येईल.

१६. सदर सुधारणेच्या अनुषंगाने संदर्भ क्र. १ येथील नमूद शासन निर्णयातील अनुषंगिक तरतुदी/ कार्यपध्दती सुधारण्यात आल्या आहेत. याबाबत साशंकता असल्यास त्याबाबत प्रधान सचिव (ऊर्जा) यांच्या अध्यक्षतेखालील दिनांक २७ फेब्रुवारी, २०१८ च्या शासन निर्णयाव्दारे गठीत समितीव्दारे घेण्यात आलेला निर्णय अंतिम असेल.

१७. हा शासन निर्णय, महाराष्ट्र शासनाच्या www.maharashtra.gov.in या संकेतस्थळावर उपलब्ध करण्यात आला असून त्याचा संकेतांक २०१८०३१७१२२११३६४१० असा आहे. हा आदेश डिजीटल स्वाक्षरीने साक्षांकित करुन काढण्यात येत आहे.

महाराष्ट्राचे राज्यपाल यांच्या आदेशानुसार व नावाने.

(प्र.पुं.बडगेरी)

उप सचिव, महाराष्ट्र शासन

प्रत,

१) मा. राज्यपाल यांचे प्रधान सचिव, राजभवन, मुंबई,
२) मा.मुख्यमंत्री, महाराष्ट्र राज्य यांचे अपर मुख्य सचिव, मंत्रालय, मुंबई,
३) सर्व मंत्री / सर्व राज्यमंत्री यांचे खाजगी सचिव, मुंबई,
४) विरोधी पक्षनेता, विधानसभा/विधान परिषद, विधान भवन मुंबई,
५) सर्व विधानमंडळ सदस्य,विधान भवन, मुंबई,
६) मुख्य सचिव, महाराष्ट्र राज्य, मंत्रालय, मुंबई,
७) अपर मुख्य सचिव (वित्त), वित्त विभाग, मंत्रालय, मुंबई,
८) प्रधान सचिव (नियोजन), नियोजन विभाग, मंत्रालय, मुंबई,
९) प्रधान सचिव (महसूल), महसूल व वन विभाग, मंत्रालय, मुंबई,
१०) प्रधान सचिव (कृषि), कृषि व पदुम विभाग, मंत्रालय, मुंबई,
११) सर्व अपर मुख्य सचिव/प्रधान सचिव/सचिव यांचे स्वीय सहायक,सर्व मंत्रालयीन विभाग,
१२) सर्व विभागीय आयुक्त,
१३) सर्व जिल्हाधिकारी,
१४) मुख्य कार्यकारी अधिकारी, सर्व जिल्हा परिषदा,
१५) महालेखापाल, महाराष्ट्र राज्य, मुंबई / नागपूर,
१६) निवासी लेखा परीक्षा अधिकारी, मुंबई १/२
१७) निवासी लेखा परीक्षा अधिकारी, नागपूर १/२
१८) सचिव, महाराष्ट्र विद्युत नियामक आयोग, मुंबई (पत्राने),
१९) व्यवस्थापकीय संचालक, महाराष्ट्र राज्य विद्युत मंडळ, सूत्रधार कंपनी मर्या.,मुंबई,
१९) व्यवस्थापकीय संचालक, महाराष्ट्र राज्य विद्युत वितरण कंपनी मर्या.,मुंबई,
२०) व्यवस्थापकीय संचालक, महाराष्ट्र राज्य विद्युत निर्मिती कंपनी मर्या.,मुंबई,
२१) व्यवस्थापकीय संचालक, महाराष्ट्र राज्य विद्युत पारेषण कंपनी मर्या.,मुंबई,
२२) महासंचालक, महाराष्ट्र ऊर्जा विकास अभिकरण (महाऊर्जा),पुणे,
२३) उप सचिव/ ऊर्जा-३, उद्योग,ऊर्जा व कामगार विभाग, मंत्रालय, मुंबई,
२४) ऊर्जा उप विभागातील सर्व कार्यासने,उद्योग,ऊर्जा व कामगार विभाग, मंत्रालय, मुंबई,
२५ निवड नस्ती,ऊर्जा-७, उद्योग,ऊर्जा व कामगार विभाग, मंत्रालय, मुंबई.

राज्यात "मुख्यमंत्री सौर कृषी वाहिनी योजना" सुरू करण्याबाबत ....

महाराष्ट्र शासन

उद्योग, ऊर्जा व कामगार विभाग

शासन निर्णय क्रमांक: सौरप्र-२०१६/प्र.क्र.३५४/ऊर्जा-७.

मादाम कामा मार्ग, हुतात्मा राजगुरु चौक,
मंत्रालय, मुंबई -४०० ०३२.
दिनांक: १४ जून, २०१७.

संदर्भ:- १) शासन निर्णय, उद्योग, ऊर्जा व कामगार विभाग, क्र.अपाऊ-२०१५/प्र.क्र.४९/ ऊर्जा-७, दिनांक २० जुलै, २०१५.

२) शासन निर्णय, उद्योग, ऊर्जा व कामगार विभाग, क्र.अपाऊ-२०१५/प्र.क्र.४९/भाग-८/ ऊर्जा-७, दिनांक ०९ सप्टेंबर, २०१५.

३) अध्यक्ष तथा व्यवस्थापकीय संचालक, महानिर्मिती यांचे पत्र क्र.महानिर्मिती / सं.नि.सु./सौर ऊर्जा /कृषी फिडर / ०३६३०, दि.२५ मार्च , २०१७.

प्रस्तावना :-

राज्यामध्ये ऊर्जेच्या एकूण वापरापैकी कृषीक्षेत्राकरिता सुमारे ३०% ऊर्जेचा वापर होतो. प्रामुख्याने सदरच्या वीजेचा वापर कृषीपंपास वीज पुरवठा करण्यासाठी होत असून त्यामधून महावितरण कंपनीस महसूली तोटा सहन करावा लागतो. परंतु अशा परिस्थितीत देखील शेतकऱ्यांना माफक दरात वीज उपलब्ध करून देणे आवश्यक असल्याने त्याकरिता महावितरण कंपनीस शासनाकडून मोठ्या प्रमाणात दरवर्षी अनुदान देण्यात येते. तसेच महावितरण कंपनीकडून कृषी ग्राहकांचा वीज दर माफक ठेवण्यासाठी वाणिज्यिक व औद्योगिक वीज ग्राहकांकरिता क्रॉस सबसिडीच्या रूपाने अधिक वीज दर आकारण्यात येतो.

राज्यातील शेतकऱ्यांना माफक दरात व त्यांच्या सोयीनुसार वीज पुरवठा उपलब्ध व्हावा, या दृष्टिकोनातून राज्यात सौर कृषी वाहिनी योजना सुरू करण्याची बाब शासनाच्या विचाराधीन होती. त्याकरिता राज्यातील ज्या ग्रामीण भागामध्ये गावठाण व कृषी वाहिनीचे विलगीकरण झाले आहे, अशा ठिकाणच्या कृषी वाहिनीचे सौर ऊर्जाद्वारे विद्युतीकरण केल्यास पारंपारिक विजेची मोठ्या प्रमाणात बचत होऊ शकते. तसेच सदर विजेचा वापर इतर उत्पादनक्षम कामांसाठी होऊ शकतो. त्यामुळे महावितरण कंपनीचा वीजेच्या खरेदीवर होणारा खर्च कमी होईल, पारंपारिक विजेची बचत होईल, महावितरण कंपनीच्या महसूलात वाढ होण्यास मदत होईल आणि वाणिज्यिक व औद्योगिक ग्राहकांसाठी विजेचा दर कमी राखण्यास मदत होईल.

शासन निर्णय -:

राज्यातील ज्या ग्रामीण भागामध्ये गावठाण व कृषी वाहिनीचे विलगीकरण झाले, अशा ठिकाणी कृषी वाहिनीचे सौर ऊर्जाद्वारे विद्युतीकरण करण्याच्या योजनेस शासन मान्यता देण्यात येत असून सदर योजनेस "मुख्यमंत्री सौर कृषी वाहिनी योजना " असे संबोधण्यात येईल.

२. या योजनेनुसार राळेगणसिध्दी, जि.अहमदनगर व कोळंबी, जि. यवतमाळ या दोन ठिकाणी सौर कृषी वाहिनी योजना प्रायोगिक तत्वावर महानिर्मिती कंपनीमार्फत राबविण्यास शासन मान्यता देण्यात येत आहे.

३. सदरच्या योजनेची अंमलबजावणी महानिर्मिती कंपनीमार्फत करण्यात येईल. परंतु सदर योजनेच्या अंमलबजावणीच्या टप्प्यामध्ये त्या त्या विविक्षित ठिकाणी महाऊर्जा व महावितरण कंपनी यांचाही सहभाग असेल.

४. महानिर्मिती कंपनीमार्फत राज्यातील ११ के.व्ही. ते १३२ के.व्ही. वीज उपकेंद्राच्या ५ कि.मी. ते १० कि.मी. परीसरामध्ये शासकीय जमीन उपलब्धतेचा शोध घेण्यात येईल. तसेच सदर ठिकाणी असलेल्या वीज उपकेंद्रावर जोडणी व विलगीकरण केलेल्या कृषी वाहिनीचा भार व त्यावरील कृषी ग्राहकांची संख्या आणि शासकीय जमीनीची उपलब्धता विचारात घेऊन, सौर कृषी वाहिनी प्रकल्पाची निवड अंतिम करण्यात येईल. तत्पूर्वी त्याबाबत महावितरण व महापारेषण कंपनी यांच्याकडून देखील त्याचा अभ्यास करून प्रकल्पाच्या व्यवहार्यतेबद्दल त्यांच्याकडून देखील अभिप्राय महानिर्मिती कंपनी घेईल.

५. सौर कृषी वाहिनी योजनेच्या प्रकल्पाकरिता निश्चित केलेली शासकीय जमीन ३० वर्षाच्या कालावधीकरिता नाममात्र रू.१/- या दराने भाडेपट्टीने त्या त्या विभागाच्या व महसूल विभागाच्या मान्यतेने उपलब्ध करण्यासाठी स्वतंत्रपणे धोरणात्मक व सविस्तर आदेश महसूल विभागाकडून निर्गमित करण्यात येतील. अशी जमिन महसूल विभाग महानिर्मिती कंपनीस ३० वर्षाच्या भाडेपट्टयाने देईल. महानिर्मिती अशी जमिन सदर योजनेंतर्गत खाजगी गुंतवणूकदारास भाडेपट्टयाने देईल. त्यानुसार करारनाम्यात अटी व शर्ती नमुद करण्यात याव्यात. सौर ऊर्जा प्रकल्पासाठी खाजगी जमिनधारकही आपली पडिक जमिन भाडेकराराने (Lease Basis) देऊ शकतील.

६. सौर कृषि वाहिनीला उपलब्ध करुन देण्यात येणारी जमीन अकृषिक (NA) करण्याची गरज राहणार नाही. महानिर्मिती या प्रकल्पांची नोंदणी महाऊर्जाकडे मोफत करेल. तसेच अशा जमिनीची अकृषिक जमिनीमध्ये रूपांतर करणे अनिवार्य राहणार नाही व अशा जमिनीवर वा सौर ऊर्जा प्रकल्पांना महसूल अथवा स्थानिक स्वराज्य संस्था इ.विभागाकडून आकारण्यात येणाऱ्या सर्व करांतून/फी मधून प्रकल्प उभारणी पासून ते ३० वर्षांपर्यंत सूट राहील.

७. सदरची योजना महानिर्मिती कंपनीमार्फत PPP (Public- Private Partnership) तत्वावर राबविण्यात येईल.

८. प्रकल्पाची जागा निश्चित झाल्यावर महानिर्मिती कंपनीकडून PPP (Public- Private Partnership) तत्वावर विहीत कार्यपध्दतीने संभाव्य ग्राहक संख्या विचारात घेऊन पारदर्शक व स्पर्धात्मक निविदा प्रक्रिया (Competitive Bidding Process) राबवून खाजगी गुंतवणूकदाराची निवड करण्यात येईल.

खाजगी गुंतवणूकदाराकडून निविदा प्राप्त झाल्यानंतर ज्याचा सर्वात कमी वीजदर असेल (L-१) त्या निविदा धारकास प्राधान्याने काम देण्यात येईल तथापि L-१ वीजदरापेक्षा आणखी कमी वीज दराने प्रकल्पातून वीज पुरवठा करण्यास अन्य निविदाकारांची तयारी असल्यास त्यापैकी सर्वात कमी वीजदराने वीजपुरवठा करणाऱ्या निविदाकाराची निवड करण्यात येईल व त्यास महाराष्ट्र विद्युत नियामक आयोगाची मान्यता घेण्यात येईल.

९. प्रस्तावित ठिकाणी खाजगी गुंतवणूकदाराकडून सौर कृषी वाहिनी प्रकल्प उभारण्यासाठी महानिर्मिती कंपनीकडून योग्य तो करार विशिष्ट कालावधीकरिता करण्यात येईल. त्यामध्ये वीज खरेदीच्या अटी व शर्तींचा समावेश असेल. त्यापूर्वी स्पर्धात्मक निविदेद्वारे प्राप्त झालेल्या वीज दरास महानिर्मिती कंपनीकडून महाराष्ट्र विद्युत नियामक आयोगाची परवानगी घेण्यात येईल.

१०. खाजगी गुंतवणूकदारांकडून सदर प्रकल्पाची उभारणी व त्याची देखभाल-दुरूस्ती खाजगी गुंवणूकदारासोबत केलेल्या करारात नमूद केल्याप्रमाणे निश्चित कालावधीसाठी करण्यात येईल.

११. सदर प्रकल्प निवड झालेल्या सौर कृषी वाहिनी पर्यंत वीजेचे निष्कासन करण्यासाठी होणारा खर्च महाऊर्जामार्फत हरित ऊर्जा निधीमधून करण्यात येईल.

१२. निवड झालेली सौर कृषी वाहिनी महावितरण कंपनीच्या वीज प्रणालीपासून विलग करून त्या फिडरवरील कृषी ग्राहकांना सौर कृषी वाहिनीमधून होणारा वीज पुरवठा महावितरणकडून करण्यात येईल व सदर वीज वितरण वाहिनीची देखभाल व दुरूस्ती महावितरण कंपनीकडून करण्यात येईल.

१३. सदर सौर कृषी वाहिनीमधील कृषी ग्राहकांच्याकडून वीज वितरण झालेल्या विजेच्या पुरवठ्यापोटी बिलाची वसुली महावितरण कंपनीकडून करण्यात येईल व ती सर्व वसुलीची रक्कम महानिर्मिती कंपनीकडे जमा करण्यात येईल.

१४. सदर वसुलीच्या रक्कमेतील काही निश्चित रक्कम महानिर्मिती कंपनी बिलाची वसुलीकरिता येणाऱ्या खर्चासाठी महावितरण कंपनीस अदा करेल.

१५. अशा ठिकाणी त्या कृषी ग्राहकांना वीज मिटर जोडलेले नसल्यास ते महावितरण कंपनीकडून जोडण्यात येतील.

१६. सदर प्रकल्पामधून निर्माण होणाऱ्या वीजेपैकी जेवढी वीज कृषी ग्राहकांना पुरविण्यात येईल त्या वीजेपोटी महानिर्मिती कंपनीकडून खाजगी गुंतवणूकदारांस वीज बिलाची रक्कम दर महिन्यास अदा करण्यात येईल.

१७. परंतु सदर वाहिनीवरील महावितरण कंपनीकडून संबंधीत कृषी ग्राहकांना दर महिन्यांत जो वीज पुरवठा करण्यात आलेला आहे त्या प्रत्येक युनिटमागे महावितरण कंपनीस सध्या कृषी ग्राहकांसाठी देण्यात येणाऱ्या अनुदानाच्या सबसिडीची रक्कम अधिक महावितरण कंपनीस सध्या मिळणारी क्रॉस सबसिडीची रक्कम किंवा या योजनेस केंद्र शासनाकडून मिळणारा संभाव्य निधी/अनुदान विचारात घेऊन एकूण अनुदानाची रक्कम महानिर्मिती कंपनीस शासनाकडून अदा करण्यात येईल.

१८. ही योजना खाजगी किंवा सहकारी संस्थामार्फत राबविण्यात येईल.

१९. ज्या वीज उपकेंद्रावरील विलगीकरण केलेल्या कृषी वाहिनीचा भार व उपलब्ध शासकीय जमीन यानुसार कृषी वाहिनी सौर ऊर्जा प्रकल्पाची क्षमता अंतिम करण्यात येईल. जेथे शासकीय जमिनीची मुबलक उपलब्धता असेल अशा ठिकाणी उपलब्ध जमिनीवर विविध वीज उपकेंद्रा मधील एकापेक्षा अनेक कृषी वाहिनीचे संयुक्तीकरण करून सौर कृषी वाहिनी प्रकल्प (clustered AG solar Feeder project) उभारण्यात येईल.

२०. राज्यातील शेतीसाठी पाणीपुरवठा करणाऱ्या सर्व लिफ्ट इरिगेशन योजनांना वीज पुरवठा करण्यासाठी सौर कृषी वाहिनी प्रकल्पाद्वारे महानिर्मिती कंपनीकडून प्रयत्न करण्यात येतील.

२१. एक किंवा अनेक शेतकरी यांनी सहकारी संस्था स्थापन करून सदर संस्थेमार्फत सौर कृषी वाहिनी प्रकल्प उभारण्यासाठी महानिर्मिती कंपनीकडे प्रस्ताव सादर करू शकतील. सदर संस्थेमार्फत योग्य तो करार करून व त्यांच्याकडून खाजगी गुंतवणूक मिळवून सौर कृषी वाहिनी उभारू शकतील व त्या प्रकल्पातून संबंधित संस्थेच्या लाभार्थी शेतकऱ्यांना वीज पुरवठा करू शकतील. अशा प्रकल्पातून निर्माण होणाऱ्या वीजेसाठी महानिर्मिती कंपनी स्पर्धात्मक निविदेप्रमाणे वीजदर संबंधित खाजगी गुंतवणूकदारास अदा करेल.

२२. PPP प्रकल्पांतर्गत या योजनेमध्ये सौर कृषी वाहिनीच्या प्रकल्पाची उभारणी व संपूर्ण दुरूस्ती-देखभाल खाजगी गुंतवणूकदाराकडून करण्यात येईल.

२३. सौर कृषी वाहिनी योजनेची अंमलबजावणी योग्यरित्या होण्यासाठी प्रधान सचिव (ऊर्जा) यांच्या अध्यक्षतेखाली समिती गठित करण्यात येत असून त्यामध्ये महावितरण, महानिर्मिती व महाऊर्जामधील संबंधित अधिकारी यांचा समावेश राहील. सदर योजनेची प्रत्यक्ष अंमलबजावणी करताना उद्भवणाऱ्या

अडचणींचा विचार करुन अटी व शर्तीमध्ये सुधारणा वा बदल करण्याचे अधिकार सदर समितीस राहतील.

२४. सदर शासन निर्णय नियोजन विभागाच्या सहमतीने व त्यांच्या अनौपचारिक संदर्भ क्रमांक १७३/का- १४६१,दिनांक २८ मे, २०१७ तसेच वित्त विभागाच्या सहमतीने व त्या विभागाच्या अनौपचारिक संदर्भ क्रमांक १४६/२०१७, दिनांक २६ मे, २०१७ नुसार दिलेल्या सहमतीस अनुसरून निर्गमित करण्यात येत आहे.

२५. हा शासन निर्णय, महाराष्ट्र शासनाच्या www.maharashtra.gov.in या संकेतस्थळावर उपलब्ध करण्यात आला असून त्याचा संकेतांक २०१७०६१४१२०६०८०३१० असा आहे. हा आदेश डिजीटल स्वाक्षरीने साक्षांकित करुन काढण्यात येत आहे.

महाराष्ट्राचे राज्यपाल यांच्या आदेशानुसार व नावाने,

(अशोक आत्राम)
सह सचिव, महाराष्ट्र शासन

प्रत:

१. मा.मुख्यमंत्री यांचे अपर मुख्य सचिव, मंत्रालय, मुंबई
२. मा.मंत्री, (ऊर्जा, नवीन व नवीकरणीय ऊर्जा) यांचे खाजगी सचिव, मंत्रालय, मुंबई
३. मा.राज्यमंत्री, (ऊर्जा, नवीन व नवीकरणीय ऊर्जा) यांचे खाजगी सचिव, मंत्रालय, मुंबई
४. अपर मुख्य सचिव, वित्त / नियोजन विभाग, मंत्रालय, मुंबई.
५. प्रधान सचिव, महसूल विभाग, मंत्रालय, मुंबई.
६. प्रधान सचिव, विधानमंडळ सचिवालय, मुंबई.
७. व्यवस्थापकीय संचालक, महाराष्ट्र राज्य विद्युत मंडळ, सुत्रधार कंपनी मर्या., मुंबई
८. व्यवस्थापकीय संचालक, महाराष्ट्र राज्य विद्युत निर्मिती कंपनी मर्या., मुंबई.
९. व्यवस्थापकीय संचालक, महाराष्ट्र राज्य विद्युत वितरण कंपनी मर्या., मुंबई.
१०. व्यवस्थापकीय संचालक, महाराष्ट्र राज्य विद्युत पारेषण कंपनी मर्या., मुंबई.
११. महासंचालक, महाराष्ट्र ऊर्जा विकास अभिकरण (महाऊर्जा), पुणे.
१२. सर्व मंत्रालयीन विभाग
१३.सर्व विभागीय आयुक्त.
१४. सर्व जिल्हाधिकारी.

१५. सर्व मुख्य कार्यकारी अधिकारी, जिल्हा परिषद.

१६. सर्व विधानसभा सदस्य / विधानपरिषद सदस्य.

१७. निवड नस्ती-ऊर्जा-७ कार्यासन, उद्योग, ऊर्जा व कामगार विभाग, मंत्रालय, मुंबई.

Annexure 08

Specific actions and initiatives undertaken for the improvement of O&M.

Best O&M Practices for reduction in generation loss on O&M factors during remaining period of FY 2023-24 & FY 2024-25:

Sr. No.	Particular	Action Plan
a)	**Reduction in Forced Outages**	1. Regular Field Performance tests are carried-out as per POG schedule or as per requirement of plant conditions. 2. Corrective actions are initiated against any deteriorations / deviations in results of any auxiliary/ system/ sub-system accordingly by concern maintenance deptt; 3. Based on the corrective actions required, action plans are prepared for implementation on Short/ Med/ Long Term basis. 4. Best known O&M practices are adopted. Condition based practices are also be examined and Standard Operating Procedures are prepared for implementation.
b)	**Required material availability at right time to control on inventory.**	**Short Term Methods:** 1. Bifurcation of inventory on the basis of A-B-C analysis is done, so that high valued A type items can be focused for consumption. 2. List of Non moving items and list of items pending for more than 3 years is circulated within the plant and to other TPS, so that those items can be utilized or transferred to other TPS. 3. List of 100 and 500 high value items are taken from inventory and communicated to concerned section for early consumption. Biyearly follow up is taken for above lists for needful action. 4. Materials procured vide Limited Enquiry and Confirmatory on urgent basis only and consumption posting in SAP. 5. Inventory control meeting is conducted to display the status of inventory and to discuss the control measures. 6. Effective utilization of SAP for material management with maintenance planning & regular follow ups. (procurement, consumption, posting etc) **Long Term Methods:** 1. Centralized procurement through central stores is carried out to avoid re-procurement as well as rate contracts for common consumables. 2. Dispatch instructions are issued to supplier to avail the material whenever required and unnecessary increase in the inventory is avoided. 3. Periodic assessment of Obsolete, Insurance, Capital, surplus & Scrap materials.

Sr. No.	Particular	Action Plan
c)	**Increase plant efficiency with lower cost generation.**	1. All the parameters affecting Power Generation Cost *(Landed prices of fuel consumed, its GCV, transit loss of coal and OVC- coal demurrage, rail freight, etc)* are examined and discussed in daily planning meeting to preclude any rise in Cost of Production. 2. NTPC consultants are hired to share their expert knowledge and guide in addressing the local plant O&M issues. 3. EST (Expert Support Team) is established at H.O to look after the plant issues and address them through detailed planning. 4. Regular ORT meetings at TPS to discuss plant related issues 5. Formation of various committees o BTL committee, o Heat Rate improvement/POG committee o Electrical Protection Committee o Coal Mill Improvement Committee o CHP Improvement Committee o Turbine Task Force Committee o MPD Committee o Water Chemistry Committee 6. Hon. CMD Zero disallowance workshop conducted at Nashi and Koradi to sensitize the fixed cost and variable cost disallowance. 7. Pinnacle Award for TPS and MTBF Award (more than 100 days running) for Shift Incharges as an incentive to run units in optimum mode. 8. Motivational awards such as Shaktipunj(loadability), Yantrikottam (Availability), Black Diamond (CHP performance), Quality Circle and Vishwakarma Awards (Technicians) for innovative ideas and problem solving. 9. Daily Director Review Meeting to discuss the Operational performance. 10. Also, the Best O&M Practices are being studied and shall be implemented so as to ensure optimum usage of available resources & reduce Electricity Generation cost.
d)	**Maximizing generation of units**	1. All out efforts are taken viz. undertaking proactive preventive maintenance to reduce forced outages. 2. Timely overhauling of boiler and turbine auxiliaries in order to maintain availability and reliable operation of auxiliaries.

Sr. No.	Particular	Action Plan
e)	**Maintenance planning & its implementation.**	1. Sectionwise/ Auxiliary wise maintenance schedules are prepared on running hour basis at plant level. 2. The schedule is further reworked at H.O level so as to have maximum capacity available even during monsoon to support grid requirements. 3. Operational and maintenance hurdles are identified in the form of loadability constraints and corrective actions are taken at station level. 4. Furthermore, some of the constraints are sent to HO if HO interventions/ approvals are needed for execution.
f)	**Fuel Management and Coal Mix optimization**	1. The principle of selective stacking and selective bunkering has been adopted by CHP sections for precise load prediction. 2. In summer season, water spraying on stacked coal is done in controlled manner so that GCV can be preserved. 3. In monsoon season, the stacked coal is covered with tarpaulin so that maximum availability of dry coal and ensure full loadability of Units to deliver power as per grid demand. 4. Use of imported and washed coal to improve the coal GCV. 5. Better coal mix practices as per receipt of coal from various mines. 6. There is regular communication between H.O Top management and Coal companies for improvement in Coal quality and reduce the GCV difference.
g)	**Availability Factor & Loadability Factor —**	1. Scheduling Committee has already been established at TPS for flawless declaration of Day Ahead Declared Capacity (DADC) based on fuel availability, quality and reliability. 2. To increase availability of Units, the availability of Plant's Vital & Major axiliaries is ensured by Condition monitoring activities and maintaining scheduled Preventive Maintenance. 3. All maintenance sections practice the indentification of Loadability constraints along with suitable corrective actions on monthly basis. Cases which required HO approval/intervention are submitted on monthly basis. 4. Agenda of Daily Planning Meeting broadly cover points viz., status of all MERC commercial parameters & entities affecting them (operational & maintenance hurdles), status of daily defects raised & attended, etc.

Sr. No.	Particular	Action Plan
		5. Based on area of work and need, the suitable training is provided to O&M staff for development of present task competency and increase workability of available manpower & produce greater organization gains.
h)	**Defect Identification and Restoration**	1. The team of O&M staff comprising higher officials of the rank of Dy. CE's and SE's use to take walk down suvey on monthly basis for checking healthiness of plant auxiliaries. 2. The Plant Incharges (Boiler/ Turbine) working in Operations take routine site suvey (rounds) in 'b'and 'c'shift on daily basis. 3. All the defects/abnormalities (upon observing any) are notified by Operation Deptt to the concern Maintenance Deptt via SAP. 4. All notified/ rectified defects are discussed in DPM. 5. The pending defects are prioritized for undertaking maintenance work, based on their nature of urgency, availability of materials/ spares, etc., and probable date of completion is decided accordingly. 6. The concept of "Zero Leakages"is strictly followed at TPS. 7. The Maintenance Departments keep their list of defects ready, in order to rectify them in available opportunity. 8. All the Maintenance Departments of TPS prepare the list of defects by categorising the defects, based on the type of action required and urgency.

Annexure 09

Results of Cost-benefit analysis for Coal Beneficiation for FY 2022-23 to FY 2024-25.

Cost benefit analysis of coal beneficiation for each year from FY 2022-2023 onwa

FY	Coal Company	Mahagenco (RAW Coal)		
		Landed Coal Cost (Rs/MT)	Received GCV	Rs/Kcal
FY-2022-23	WCL	0.00	-	0
	WCL-ROAD	2517.50	2423	1.039
	SECL	3094.38	3080	1.005
	MCL	2320.61	2793	0.831
	SCCL	4471.96	2890	1.547
FY-2023-24	WCL	3635.23	3181	1.143
	WCL-ROAD	2554.55	2672	0.956
	SECL	3558.56	2779	1.281
	MCL	3639.19	3298	1.103
	SCCL	6416.77	3226	1.989
FY-2024-25 (Q1)	WCL	0	-	
	WCL-ROAD	2682.40	2682	1.000
	SECL	2995.43	2845	1.053
	MCL	3397.67	3033	1.120
	SCCL	6872.60	3171	2.167

LANDED COST & GCV DATA FOR FY 2024-25 UPTO JUNE-24

NOTE-WASH COAL MSMC THERE WAS NO SUPPLY FROM SCCL.

NOTE: RAW ROAD LANDED COST DOSE NOT INCLUDE TRANSPORTATION COST .

NOTE:GCV DATA PERTAINS TO 3X660 MW KTPS only.

ards for the MERC Submission

MSMC (Washed Coal)		
Landed Coal Cost (Rs/MT)	Received GCV	Rs/Kcal
4547.86	3767	1.21
4022.05	3648	1.10
3910.95	3890	1.01
4376.14	3716	1.18
NO SUPPLY	NO SUPPLY	
5080.60	3408	1.49
4464.71	3444	1.30
4035.24	3637	1.11
4368.31	3604	1.21
NO SUPPLY	NO SUPPLY	
5086.45	3748	1.36
4542.68	3234	1.40
4064.32	3815	1.07
4480.80	3599	1.25
NO SUPPLY	NO SUPPLY	

Annexure 10

Submission Made to Liquidator regarding settlement of claim against LITL for Koradi # 8 to 10 BoP Contract.

BEFORE THE NATIONAL COMPANY LAW TRIBUNAL,

HYDERABAD BENCH

INTERLOCUTORY APPLICATION NO. _____ OF 2024

IN

COMPANY PETITION (IB) NO. 111 OF 2017

[Under section 60(5) of the Insolvency and Bankruptcy Code, 2016]

In the matter of Insolvency and Bankruptcy Code, 2016;

and

In the matter of the Corporate Insolvency Resolution Process of Lanco Infratech Limited;

and

In the matter of Resolution Plan of KRS Erectors Private Limited

Maharashtra State Power Generation Co. Ltd. (MSPGCL)

O/o Chief Engineer (P&P)

Through Mahendrakumar D. Khade

3rd Floor, Prakashgad,

Bandra (East), Mumbai – 400 051. ....**APPLICANT**

v.s

1. Lanco Infratech Limited

   F-2, Second Floor, Naina Residency Plot.No-344, Road No. 07, Kakatiya Hills , Shaikpet, Telangana, India - 500081.

2. **Ms.** Anuradha Bisani

   Liquidator – Lanco Infratech Limited

   3-6-106/A, Om Shri Sai Towers,

NOTARY M.M. PABALE Mumbai Maha... Reg... Expiry 30-10-2024 GOVT. OF INDIA

Flat No. 102, Street No. 19, Himayatnagar

Hyderabad, Telangana – 500029

3. M/s KRS Erectors Private Limited

F-2, Second Floor, Naina Residency Plot.No-344,

Road No. 07, Kakatiya Hills, Shaikpet, Telangana,

India - 500081.

...RESPONDENTS

In the matter of:

IDBI BANK

...PETITIONER

v.s

LANCO INFRATECH LIMITED

...CORPORATE DEBTOR

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NOTARY M.M. PABALE Mumbai Regd. No. 30-10-2024 GOVT. OF INDIA

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FOR AHMED CHUNAWALA & CO.

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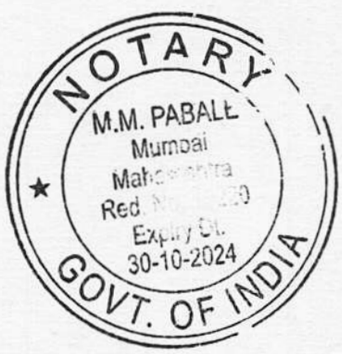

I

BEFORE THE NATIONAL COMPANY LAW TRIBUNAL,

HYDERABAD BENCH

INTERLOCUTORY APPLICATION NO. _____ OF 2024

IN

COMPANY PETITION (IB) NO. 111 OF 2017

[Under section 60(5) of the Insolvency and Bankruptcy Code, 2016]

In the matter of Insolvency and Bankruptcy Code, 2016;

and

In the matter of the Corporate Insolvency Resolution Process of Lanco Infratech Limited;

and

In the matter of Resolution Plan of KRS Erectors Private Limited

Maharashtra State Power Generation Co. Ltd. (MSPGCL)
O/o Chief Engineer (P&P)
Through Mahendrakumar D. Khade
3rd Floor, Prakashgad,
Bandra (East), Mumbai – 400 051. ....**APPLICANT**

v.s

1. Lanco Infratech Limited
   F-2, Second Floor, Naina Residency Plot.No-344, Road No. 07, Kakatiya Hills , Shaikpet, Telangana, India - 500081.
2. **Ms.** Anuradha Bisani
   Liquidator – Lanco Infratech Limited
   3-6-106/A, Om Shri Sai Towers,
   Flat No. 102, Street No. 19, Himayatnagar
   Hyderabad, Telangana – 500029

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11

3. M/s KRS Erectors Private Limited

F-2, Second Floor, Naina Residency Plot.No-344,

Road No. 07, Kakatiya Hills, Shaikpet, Telangana,

India - 500081.

...**RESPONDENTS**

In the matter of:

IDBI BANK

...**PETITIONER**

v.s

LANCO INFRATECH LIMITED

...**CORPORATE DEBTOR**

MEMO OF PARTY

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Expiry Dt.
30-10-2024
GOVT. OF INDIA

A

BEFORE THE NATIONAL COMPANY LAW TRIBUNAL,

HYDERABAD BENCH

INTERLOCUTORY APPLICATION NO. _____ OF 2024

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COMPANY PETITION (IB) NO. 111 OF 2017

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2. **Ms.** Anuradha Bisani

   Liquidator – Lanco Infratech Limited

   3-6-106/A, Om Shri Sai Towers,

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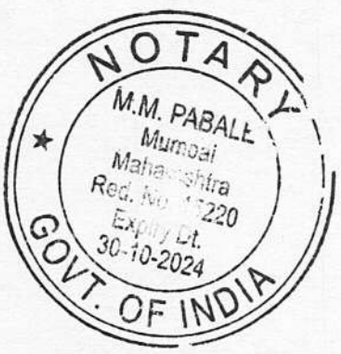
B

Flat No. 102, Street No. 19, Himayatnagar Hyderabad, Telangana – 500029



3. M/s KRS Erectors Private Limited
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...RESPONDENTS

In the matter of:

IDBI BANK

...PETITIONER

v.s

LANCO INFRATECH LIMITED

...CORPORATE DEBTOR

SYNOPSIS

1. The Applicant Company incorporated on 31st May 2005.
2. The Applicant on 27.07.2010 date awarded contract to Corporate Debtor viz Respondent No. 1
3. On 7th August, 2017 the Corporate Debtor Company admitted under section 7 for Insolvency process.
4. On 27th August, 2018 the NCLT Hyderabad was pleased to order the liquidation of Corporate Debtor Company (LITL).
5. On the 17th day of November, 2018, the Applicant addressed an letter to Resolution professional/ Liquidator (Shri Savan Godiawala) for recovery of claim from (LITL) of Rs. 208.125 Crores vide letter no. CE/P&P/ KRD/COMM/LITL/Claim/1770

C

6. On 10th January, 2019 the Shri Savan Godiawala (Resolution Professional/ Liquidator of LITL) addressed an email to the Applicant as per verification and that he had arrived at a figure of Rs. 77.29 Crores

7. On 20th of June 2019 , the Applicant once again addressed an letter vide letter no CE/P&P/ KRD/COMM/LITL/Claim/0678 for Clarification of Balance Claim.

8. On 2nd day of December 2019 the Applicant addressed the third letter of revised claim of Rupees 267.324 Crores vide letter no. CE/P&P/ KRD/COMM/LITL/Claim/1513.

9. On 9th December, 2020 the Corporate Debtor (LITL) address an email to Applicant with the revised admitted amount is Rs. 133.544 Crores admitted by the Resolution Professional/ Liquidator of (LITL).

10. On 9th of September 2021, the Applicant once again addressed an letter vide letter no CE/P&P/ KRD/COMM/LITL/Claim/0954 through RPAD to Resolution Professional/ Liquidator (Shri Savan Godiawala) for Justification of balance rejected claims.

11. On 10th day of October, 2022 the NCLT Hyderabad ordered to change the Liquidator from Shri Savan Godiawala to Respondent No. 2 viz., Anuradha Bisani as the Liquidator in the matter of M/s Lanco Infratech Limited.

12. On 26th September, 2022 The Hon'ble National Company Law Tribunal, Hyderabad Bench - I approved, authorised and allowed the Acquisition Plan presented by KRS Erectors Private Limited.

13. On 25th day of April 2024 the Applicant addressed a reply of 26th march 2024, through vide letter no CE/P&P/ KRD/COMM/LITL/Claim/0443, as per the list of the operation creditor retrieved from the official website of corporate Debtor Lanco Infratech Limited, the applicant name is at Sr no. 280 claims of Rs. 133.54 Crores have been admitted.

14. On 25th day of April, 2024 the Applicant addressed an email to the Respondent No. 2 for convey the settlement claims

NOTARY M.M. PABALE Mumbai Maharashtra Reg. No. 15220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

D

15. On 3rd day of May, 2024 the Respondent No. 2 (Liquidator of LITL) reply to Applicant and express inability to share the Acquisition Plan.

16. On 20th day of June, 2024 the Applicant addressed an email to the Respondent No. 3 for the Acquisition Plan

FOR AHMED CHUNAWALA & CO.

Ahmed

NOTARY
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E

BEFORE THE NATIONAL COMPANY LAW TRIBUNAL,

HYDERABAD BENCH

INTERLOCUTORY APPLICATION NO. _____ OF 2024

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Maharashtra State Power Generation Co. Ltd. (MSPGCL)

O/o Chief Engineer (P&P)

Through Mahendrakumar D. Khade

3rd Floor, Prakashgad,

Bandra (East), Mumbai – 400 051. ....**APPLICANT**

v.s

4. Lanco Infratech Limited

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5. **Ms.** Anuradha Bisani

   Liquidator – Lanco Infratech Limited

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Flat No. 102, Street No. 19, Himayatnagar

Hyderabad, Telangana – 500029

6. M/s KRS Erectors Private Limited

F-2, Second Floor, Naina Residency Plot.No-344, Road No. 07, Kakatiya Hills, Shaikpet, Telangana, India - 500081.

...**RESPONDENTS**

In the matter of:

IDBI BANK

...**PETITIONER**

v.s

LANCO INFRATECH LIMITED

...**CORPORATE DEBTOR**

LIST OF DATES

Sr no.	Events	Date
1.	Applicant Company Incorporated on	31st May 2005
2.	The Applicant on 27.07.2010 date awarded contract to Corporate Debtor viz Respondent No. 1	27, June 2010
3.	The Corporate Debtor Company admitted under section 7 for Insolvency process	7th August, 2017
4.	The NCLT Hyderabad was pleased to order the liquidation of Corporate Debtor Company (LITL).	27th August, 2018
5.	The Applicant addressed an letter to Resolution professional/ Liquidator (Shri Savan Godiawala) for recovery of claim from (LITL) of Rs. 208.125 Crores	17th November, 2018
6.	The Shri Savan Godiawala (Resolution Professional/ Liquidator of LITL) addressed an email to the Applicant as per verification and that he had arrived at a figure of Rs. 77.29 Crores	10th January, 2019

G

7.	The Corporate Debtor (LITL) address an email to Applicant with the revised admitted amount is Rs. 133.544 Crores	9th December, 2020
8.	The NCLT Hyderabad ordered to change the Liquidator from Shri Savan Godiawala to Respondent No. 2 viz., Anuradha Bisani as the Liquidator in the matter of M/s Lanco Infratech Limited.	10th October, 2022
9.	The Hon'ble National Company Law Tribunal, Hyderabad Bench - I approved, authorised and allowed the Acquisition Plan presented by KRS Erectors Private Limited	26th September, 2022
10.	The Applicant addressed an email to the Respondent No. 2 for convey the settlement claims	25th day of April, 2024

Ahmed

NOTARY
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Mumbai
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Regd. No. [illegible]
Expiry On
30-10-2024
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(1)

BEFORE THE NATIONAL COMPANY LAW TRIBUNAL,

HYDERABAD BENCH

INTERLOCUTORY APPLICATION NO. _____ OF 2024

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Executive Engineer

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NOTARY M.M. PABALE Mumbai Maha. Govt. Reg. No. 13220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

2. **Ms.** Anuradha Bisani

Liquidator – Lanco Infratech Limited

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Flat No. 102, Street No. 19, Himayatnagar Hyderabad, Telangana – 500029

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NOTARY M.M. PABALE Mumbai Maharashtra Regd. No. 15220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

...**RESPONDENTS**

In the matter of:

IDBI BANK

...**PETITIONER**

v.s

LANCO INFRATECH LIMITED

...**CORPORATE DEBTOR**

TO,
THE HON'BLE PRESIDENT AND
THE MEMBERS OF THE NATIONAL
COMPANY LAW TRIBUNAL

HUMBLE APPLICATION OF THE APPLICANT ABOVENAMED.

MOST RESPECTFULLY SHEWETH:

1. The present Interlocutory Application is being preferred by the Applicant above named under the provisions of section 60(5) of the Insolvency and Bankruptcy Code, 2016 ("**IBC**"). The

NOTARY
M.M. PABALL
Mumbai
Maharashtra
Regd. No. 15220
Expiry Dt.
30-10-2024
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Applicant is an Operational Creditor of the Lanco Infratech Limited. The Applicant is Maharashtra State Power Generation Co Ltd. (herein after referred to as "The Company") has been incorporated under Indian Companies Act 1956 pursuant to decision of Govt. of Maharashtra to reorganize Erstwhile Maharashtra State Electricity Board (herein after referred to as "MSEB"). The said reorganization of the MSEB has been done by Govt. of Maharashtra pursuant to Part XIII read with section 131 of The Electricity Act 2003. Mahagenco has been incorporated on 31.5.2005 with The Registrar of Companies, Maharashtra, Mumbai and has obtained Certificate of Commencement of Business on 15.09.2005. Mahagenco is engaged in the business of generation and supply of Electricity and has been vested with generation assets, interest in property, rights and liabilities of MSEB as per Gazette Notification dated 4th June 2005 issued by Industry, Energy and Labour Dept of Govt of Maharashtra pursuant to section 131 of Electricity Act 2003.

2. The Applicant Company has given the Authorisation to Mr. Mahendrakumar D. Khade on behalf of the Applicant Company. A Copy of Authorised Letter is being annexed to the present Application and marked as **Exhibit "A"**.

3. The Applicant Company Maharashtra State Power Generation Co. Ltd. (MSPGCL) is a Public Company was Incorporated on 31st May 2005 and registered office address is 2nd Floor, Prakashgad, Bandra (East), Mumbai – 400 051. A copy of Master Data of

Applicant Company is marked as **Exhibit "B"** to this Application.

4. The Applicant is a company incorporated under the provisions of the Companies Act, 2013. As stated above, the Applicant is a prospective resolution applicant of the Corporate Debtor. The Respondent No. 1 is the Corporate Debtor. The Respondent No. 2 is the Liquidator. The Respondent No. 3 is the Acquirers of Lanco Infratech Limited.

II. JURISDICTION OF THE BENCH

5. The Applicant humbly submits that the present bench of the National Company Law Tribunal was established by way of a notification dated the 1st of June, 2016, published in the Official Gazette bearing reference no. S.O. 1935(E), to exercise jurisdiction over, inter alia, the State of Maharashtra/ Telangana. The Corporate Debtor has its registered office within the State of Telangana. Therefore, it is submitted that this Hon'ble Tribunal has the jurisdiction to hear the present matter, as the Corporate Debtor is currently undergoing Liquidation under the aegis of this Hon'ble Tribunal.

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III. LIMITATION

6. The Applicant declares that this application is being filed within the period of limitation set down as per the provisions of the Limitation Act, 1963.

IV. FACTS OF THE CASE

7. The Corporate Debtor is a company involved in Civil Works, supply, erection, testing & commissioning of Balance of plant (BOP) package for 3x660 MW Koradi TPS Project.

8. The Applicant on 27.07.2010 date awarded contract vide

I. LOA No. DG/Koradi 3x660 MW /BOP /Civil/3193 dtd. 27.07.2010 & subsequently Contract agreement No. DG/Koradi 3x660 MW /BOP /Civil dated 01.07.2011

II. LOA No. DG/Koradi 3x660 MW /BOP /Supply/3194 dtd. 27.07.2010 & subsequently Contract agreement No. DG/Koradi 3x660 MW /BOP /Supply

III. LOA No. DG/Koradi 3x660 MW /BOP /Erection/3195 dtd. 27.07.2010 & subsequently Contract agreement No. DG/Koradi 3x660 MW /BOP /Erection dated 01.07.2011

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for BOP package for 3 x 660 MW Koradi TPS project to M/s Lanco Infratech Limited (LITL) for Civil Works, Supply, erection, testing & commissioning amounting Rs. 1305 Crores. 1. A copy of Contract awarded to Corporate Debtor (Lanco Infratech Limited) from

Applicant is being annexed to the present Application and marked as **Exhibit "C".**

9. The Applicant Submits that as per the contract schedule the Respondent No. 1/ Corporate Debtor had to complete all the work by August 2013. The Applicant submit that on several Occasion the Corporate Debtor had requested Applicant to extend the time of contract. The Applicant Submits that they have never completed the work in timely manner and that they have always failed to complete the project in timely manner.

10. On 7th August, 2017 the Corporate Debtor Company admitted under section 7 for Insolvency process.

11. Accordingly due to poor performance of Corporate Debtor Notice for termination of contract is issued to M/s LITL on 17.02.2018. MSPGCL had opted to complete the pending balance BoP works at the 'Risk and Cost' of M/s LITL.

12. On 27th August, 2018 the NCLT Hyderabad was pleased to order the liquidation of Corporate Debtor Company (LITL).

13. The Respondent No. 2 was appointed as the Resolution Professional of Corporate Debtor (LITL) and began acting as such. To the best of the knowledge of the Applicant, the Respondent No. 2 was subsequently confirmed as the Resolution Professional of the Corporate Debtor.

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14. On the 17th day of November, 2018, the Applicant addressed an letter to Resolution professional/ Liquidator (Shri Savan Godiawala) for recovery of claim from (LITL). The Applicant Submits that the claim of Rs. 208.125 Crores vide letter no. CE/P&P/ KRD/COMM/LITL/Claim/1770 for balance incomplete work of Koradi Thermal Power Station Units 8,9 and 10 (3 x 660 MW) BOP after the encashment of BG's including cash retentions with Project & Civil. A copy of the letter to Resolution Professional with Clarification of recovery of Claim of Rs. 208 Crores is being annexed to the present application and is marked as "**Exhibit D".**

15. On 10th January, 2019 the Shri Savan Godiawala (Resolution Professional/ Liquidator of LITL) addressed an email to the Applicant stating that he had received a claim of Rs. 208.12 Crores against M/s Lanco Infratech Limited, Respondent No. 1 as per verification and that he had arrived at a figure of Rs. 77.29 Crores as the amount is admissible and rejected the balance claim. A copy of email reply to letter no. CE/P&P/ KRD/COMM/LITL/Claim/1770 from Liquidator/ Resolution Professional to Applicant is marked as "**Exhibit E**" to this Application.

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16. On 20th of June 2019 , the Applicant once again addressed an letter vide letter no CE/P&P/ KRD/COMM/LITL/Claim/0678 through RPAD to Liquidator/ Resolution professional (Shri Savan Godiawala) for Justification of balance rejected claims through letter no. CE/P&P/ KRD/COMM/LITL/Claim/0678 as per the

contractual the liquidation Damages and other recoveries, Proposal for fire-fighting and urgent work and incompletion of BOP. A copy of the letter no CE/P&P/ KRD/COMM/LITL/Claim/0678 to Resolution Professional/ Liquidator with Clarification of recovery of claim of Rupees 204.02 Crore is being annexed to the present application and is marked as "**Exhibit F"** to this application.

17. On 2nd day of December 2019 the Applicant addressed the third letter of revised claim vide letter no. CE/P&P/ KRD/COMM/LITL/Claim/1513 to Shri Savan Godiawala (Resolution Professional/ Liquidator of LITL) as there was no reply to the Letter no. CE/P&P/ KRD/COMM/LITL/Claim/0678 dated 20th June, 2019 from the Shri Savan Godiawala (Resolution Professional/ Liquidator of LITL) in the letter no. CE/P&P/ KRD/COMM/LITL/Claim/1513 the applicant submitted the revised claim of Rs 267.324 Crores and justified the difference amount of Rs 63.302 Crores from last letter to Liquidator. A copy of the letter no.CE/P&P/ KRD/COMM/LITL/Claim/1513 to Resolution Professional/ Liquidator with all the Clarification of recovery of revised claim of Rs. 267.324 Crores is being annexed to the present application and is marked as "**Exhibit G".**

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18. On 21st October, 2020 the Resolution Professional/ Liquidator addressed an email to the applicant for the soft copies of document supporting additional revised claim of Rs. 63.302 Crores. A copy of email dated 21st October, 2020 is being annexed to the present application and is marked as "**Exhibit H".**

19. On 7th December, 2020 the applicant addressed an email to M/s LITL and Liquidator of LITL with soft copies of the document supporting the additional claims of Rs. 63.302 Crores. A copy of email dated 7th December, 2020 is being annexed to the present application and is marked as "**Exhibit I".**

20. On 9th December, 2020 the Corporate Debtor (LITL) address an email to Applicant with the revised admitted amount is Rs. 133.544 Crores admitted by the Resolution Professional/ Liquidator of (LITL). A copy of the revised admitted amount email dated 9th December, 2020 is is being annexed to the present application and is marked as "**Exhibit "J".**

Below are the details of the admitted claim amount,

Particulars	As per Mahagenco's revised claim in Crore	As per liquidator after verification of claim in Crore
Contractual & Other recoveries	554.754	474.383
Balance works	238.426	186.098
Balance works as per scope of contract but proposed for descoping by LITL	12.360	12.355

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Payment for Vendors done by MSPGCL	11.745	10.675
Net total	817.286	683.510
Less: BG & Retention	-427.560	-427.560
Less: Balance Billing & Extra Claim	-122.406	-122.406
Final Admissible amount	267.320	133.544

21. On 9th of September 2021, the Applicant once again addressed an letter vide letter no CE/P&P/ KRD/COMM/LITL/Claim/0954 through RPAD to Resolution Professional/ Liquidator (Shri Savan Godiawala) for Justification of balance rejected claims of Rs. 137.885 Crores through letter no. CE/P&P/ KRD/COMM/LITL/Claim/0954 as per the contractual the liquidation Damages, other recoveries, BOCW, Proposal for fire fighting and urgent work, Purchase of Mandatory Spares, Supervision charges and incompletion of BOP. The total Claim in letter no. CE/P&P/ KRD/COMM/LITL/Claim/0954 by applicant is Rs. 271.430 Crores and amount admitted by the Resolution Professional/ Liquidator is Rs.133.545 Crores. As per the admitted amount by the Resolution Professional/ Liquidator of LITL there is difference of Rs. 137.885 Crores which is justified by Applicant in the letter no CE/P&P/

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KRD/COMM/LITL/Claim/0954. A copy of letter No. CE/P&P/ KRD/COMM/LITL/Claim/0954 is being annexed to the present application and is marked as "**Exhibit K**".

22. On 10th day of October, 2022 the NCLT Hyderabad ordered to change the Liquidator from Shri Savan Godiawala to Respondent No. 2 viz., Anuradha Bisani as the Liquidator in the matter of M/s Lanco Infratech Limited.

23. On 8th August, 2023 the Applicant address an email to Respondent No. 2 viz., Anuradha Bisani that applicant had awarded a contract for 3x660 MW Koradi TPS Project Balance of Plant (BOP) package to corporate Debtor, however the contract was not completed by Corporate Debtor, the applicant submitted a claim of Rs. 271.430 Crores vide letter no CE/P&P/ KRD/COMM/LITL/Claim/0954 and the previous emails/ claim form and other correspondence from the previous Liquidator which had admitted Rs. 133.544 Crores and Applicant attached all soft copy of previous letters of justification of recovery of claims and requested to confirm the status of claims submitted by Applicant. A copy of Email dated 8th August, 2023 to the Respondent No. 2 is being annexed to the present application and is marked as "**Exhibit L**".

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24. On 22nd March, 2024 the Applicant addressed an letter of revised claim vide letter no CE/P&P/ KRD/COMM/LITL/Claim/0290 to Respondent No. 2 viz., Anuradha Bisani as there was no reply to the Email dated 8th August, 2023 from the Respondent No. 2 viz.,

Anuradha Bisani in the letter no CE/P&P/ KRD/COMM/LITL/Claim/0290 the applicant submit the revised claim of Rs. 290.339 and justified the difference amount. As per the contractual terms the liquidated Damages, other recoveries, BOCW, Proposal for fire-fighting and urgent work, Purchase of Mandatory Spares, Supervision charges and incompletion of BOP. The total Claim in letter no. CE/P&P/ KRD/COMM/LITL/Claim/0290 by applicant is Rs. 290.339 Crores and amount admitted by the (Liquidator of LITL) is Rs. 133.545 Crores. As per the admitted amount by the Respondent No. 2 viz., Anuradha Bisani of LITL there is difference of Rs. 156.794 Crores which is justifies by Applicant in the Letter no CE/P&P/ KRD/COMM/LITL/Claim/0290. A copy of letter No. CE/P&P/ KRD/COMM/LITL/Claim/0290 is being annexed to the present application and is marked as "**Exhibit "M".**

25. On 26th day of March, 2024 the Respondent No. 2 viz., Anuradha Bisani reply to Applicant that the Corporate Debtor (Lanco Infratech Limited) was sold as a going concern to the Acquisition Plan presented by KRS Erectors Private Limited as Respondent No. 3. The Hon'ble National Company Law Tribunal, Hyderabad Bench - I approved, authorised and allowed the same on 26th September, 2022. As a Liquidator of M/s Lanco Infratech Limited the role and responsibilities are restricted as per approved plan and no other option other than to decline your request for admission of revised claims. A copy of Letter dated 26th March, is

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being annexed to the present application and is marked as "**Exhibit "N".**

26. On 25th day of April 2024 the Applicant addressed a reply of 26th march 2024, through vide letter no CE/P&P/ KRD/COMM/LITL/Claim/0443 through RPAD to Respondent No. 2 (Liquidator of LITL) that as NCLT has approved, authorized and allowed the Acquisition Plan Present by Respondent No. 3. As per the list of the operation creditor retrieved from the official website of corporate Debtor Lanco Infratech Limited, the applicant name is at Sr no. 280 claims of Rs. 133.54 Crores have been admitted, so the applicant request for the Acquisition Plan and request to convey the settlement claim amount as approved in the Acquisition Plan. A copy of letter no CE/P&P/ KRD/COMM/LITL/Claim/0443 and Operation Creditors List from official website of Corporate Debtor is being annexed to the present application and is marked as "**Exhibit O"**.

27. On 25th day of April, 2024 the Applicant addressed an email to the Respondent No. 2 for convey the settlement claims as per approved by the Acquisition plan. A copy of email dated 25th April, 2024 is being annexed to the present application and is marked as "**Exhibit P".**

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28. On 3rd day of May, 2024 the Respondent No. 2 (Liquidator of LITL) reply on email dated 25th April, 2024 that for the ease of communication Respondent No. 2 marking this email to Respondent No. 3 also that as per the terms and condition the

approved Acquisition Plan envisaged payment to be shared between the secured creditors and the successful acquirer in a predetermined percentage basis and it is a confidential document and Respondent No. 2 express inability to share the same. A copy of email dated 3rd May, 2024 is being annexed to the present application and is marked as **"Exhibit Q".**

29. On 20th day of June, 2024 the Applicant addressed an email to the Respondent No. 3 for the Acquisition Plan as per the Operational Creditors list on the Corporate Debtor's official website the applicant's name is at Sr no. 280 with a admitted claim of Rs. 133.54 Crores and the Applicant mentioned the reason for communicating the Respondent No. 3 as the Respondent No. 2 had expressed inability to share the Acquisition Plan and the Applicant also mentioned as it is a government organisation and has to submit the details with Hon. Maharashtra Electricity Regulatory Commission (MERC) for cost capitalisation so the Applicant requested to convey the details of admitted Claim of Applicant in Acquisition Plan. A copy of Email dated 20th June, 2024 is being annexed to the present application and is marked as **"Exhibit R".**

30. MSPGCL owns and operates portfolio of 12791 MW, which is regulated by the Maharashtra State Electricity Regulatory Commission (MERC) under Section 62 of the Electricity Act, 2003. The approved capital cost for the power station which is a key input for determination of tariff by the Hon. Maharashtra Electricity Regulatory Commission (MERC).

31. The Hon. Maharashtra Electricity Regulatory Commission (MERC), determined Capital cost of Koradi 3x660 MW vide its Order dated 14th December 2017 in Case No. 59 of 2017 as shown below.

Table 1: Capital cost as on COD of Koradi Units 8-10 (Rs. Crore)

Particulars		Approved in Case No. 59 of 2017
Capital cost including IDC (as on COD)	(A)	12243.36
LD amount BTG (BHEL)		824.99
LD amount BoP (Lanco Infratech Ltd)		268.53
Total LD (provisionally considered)	(B)	1093.02
50% of LD	(C)	546.51
Net capital cost, considered by MERC for tariff purpose	(A) – (C)	11696.85

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- MERC had mentioned that it shall revisit the LD now provisionally approved after finalisation of amount.
- Further, MSPGCL filed MYT petition (Case No 227 of 2022) and claimed revision in capital cost in light of finalisation of LD of BHEL and liquidation of Lanco Infratech Ltd as below.

Particulars		Case 227 of 2022	
		MSPGCL Claim	MERC Approval
Capital cost including IDC (as on COD)	(A)	12243.36	12243.36
LD amount BTG (BHEL)		102.50	102.50
LD amount BoP (Lanco Infratech Ltd)		Nil	267.86
Total LD	(B)	102.50	370.36

50% of LD	(C)	51.25	185.18
Net capital cost	(B)–(C)	12192.11	12058.18
Deviation	(C)		133.93

- However as the matter regarding liquidation of M/s. Lanco was pending, the commission rejected the request for revision in capital cost considering nil LD tecovery. The commission continued with the LD amount Rs. 268.53 (Refer Table 1) for BoP package M/s. Lanco Infratech Limited for arriving net capital cost Koradi units 8-10. Excerpts of Commissions order is provided below

  The Commission is of the view that revising the LD amount of BoP package to Nil at this stage would not be in the best interest of the stakeholders as MSPGCL would not be incited to pursue the matter diligently. ***Accordingly, the Commission has considered the LD amount of BoP package as Rs. 267.87 Crore. The Commission shall consider the revision of the LD amount of BoP package after finalisation of the matter before the liquidator.***

  The lower capital cost has impact on Annual fixed cost (AFC) leading to under recovery of AFC elements, i.e Return on equity, Interest on Loan Depreciation, Working capital requirement from COD (17th Jan 2017).

- If the interpretation of NCLT order i.e. receivable LD amount from M/s. Lanco Infratech Limited liquidation is not submitted in this MYT petition, the next opportunity available for MSPGCL is 1st Nov 2029. And this will delay the recovery till next order and at that time consumers will be burdened with carrying cost also from date of CoD.

32. Hence, with the liquidation of the Corporate Debtor (Lanco Infratech Limited) being complete, the inability shown by the liquidator 'to share Acquisition Plan of Corporate Debtor, the details of distribution of assets, to provide other information as to what happened to the Admitted Amount of the MSPGCL and the details as to when the amount admitted by the liquidator will be

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distributed to the MSPGL', is providing to be constraint for MSPGCL to raise the request for revision in capital cost and ensure subsequent recovery of legitimate cost already incurred. MSPGCL hereby request to share the same.

V. RELIEF SOUGHT

33. In the above circumstances, the Applicant humbly prays that this Hon'ble Tribunal may be pleased to:

i) Direct the Respondent No. 2 and 3 to provide the Acquisition Plan of Corporate Debtor as the Applicant is a Government Organisation and Convey the admitted amount as mentioned in the Operational Creditor List at Sr no. 280 of official website of Corporate Debtor.

ii) Direct the Respondent No. 2 and 3 to provide the details of distribution of assets received from Respondent No. 2.

iii) Direct the Respondent No. 2 and 3 and to provide other information as to what happened to the Admitted Amount of the Applicant.

iv) Direct the Respondent No. 2 and 3 to provide the details as to when the amount admitted by the Respondent No. 2 will be distributed to the Applicant.

v) Any other order that this Hon'ble Tribunal may deem fit in the facts and circumstances of this case.

VI. PARTICULARS OF BANK DRAFT EVIDENCING PAYMENT OF FEES FOR THE PETITION MADE

Baratkosh Receipt No.: _____

Date: _____

Amount: Rs 1000/-

For the Applicant

Date: ___ October 2024)

Place: Mumbai)

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Exhibit - A

MAHAGENCO

MAHARASHTRA STATE POWER GENERATION CO. LTD.

Office of Chief Engineer (Projects & Planning),
'Prakashgad', 3rd floor, Bandra (East), MUMBAI-400 051
Phone: 022-69852200/022-69853535 (Extn.3520) Email- cgmgpp@mahagenco.in

Ref. No. CE/P&P/Comm/Authorization/ 01054 Date: 22 OCT 2024

AUTHORIZATION LETTER

Authorization in the matter at National Company Law Tribunal (NCLT) and the proceedings arising thereafteragainst a) Lanco Infratech Ltd.(LITL) b) Liquidator Ms. Anuradha Bisani of M/s LITL c) M/s KRS Erectors Pvt. Ltd.

I, Atul P. Sonaje, Chief Engineer (P&P), Mahagenco hereby authorize Shri. Mahendrakumar D. Khade, Executive Engineer, Project & Planning section for signing and doing all legal acts and deeds in the matter at National Company Law Tribunal (NCLT) and the proceedings arising thereafter against a) Lanco Infratech Ltd.(LITL) b) Liquidator Ms. Anuradha Bisani of M/s LITL c) M/s KRS Erectors Pvt. Ltd.

22.10.2024

Chief Engineer (P&P)

Place: Mumbai
Date – 22.10.2024

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PROJECT & PLANING
MAHAGENCO

Exhibit - 13

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Ministry Of Corporate Affairs

Date : 25-10-2024 1:28:28pm

Company Information

CIN	U40100MH2005SGC153648
Company Name	MAHARASHTRA STATE POWER GENERATION COMPANY LIMITED
ROC Name	ROC Mumbai
Registration Number	153648
Date of Incorporation	31/05/2005
Email Id	cs@mahagenco.in
Registered Address	PRAKASHGAD PLOT NO G-9ANANT KANEKAR MARG BANDRA (EAST), MUMBAI, Maharashtra, India, 400051
Address at which the books of account are to be maintained	-
Listed in Stock Exchange(s) (Y/N)	No
Category of Company	Company limited by shares
Subcategory of the Company	State government company
Class of Company	Public
ACTIVE compliance	ACTIVE Compliant
Authorised Capital (Rs)	4,00,00,00,00,000
Paid up Capital (Rs)	2,63,04,18,63,260
Date of last AGM	12/10/2023
Date of Balance Sheet	31/03/2023
Company Status	Active

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Jurisdiction	
ROC (name and office)	ROC Mumbai
RD (name and Region)	RD, Western Region

Exhibit - C

MAHAGENCO
MAHARASHTRA STATE POWER GENERATION CO. LTD.
Office of Chief General Manager (P&P), 'Prakashgad', 3rd floor, Bandra (East), MUMBAI 400 051
Phone: (O) 2647 4211 / 2647 2131 (P) 26475759 Fax No. 022-2647 5329

Ref. No. DG/Koradi 3x660 MW/BOP/Supply/ **3194** Date: **27.07.2010**

BY FAX / COURIER
Fax No. 0124-4692554

LETTER OF AWARD

FOR SUPPLY OF BALANCE OF PLANT PACKAGE.

To
M/s. Lanco Infratech Ltd.,
EPC Division,
Plot No. 229, Phase – I,
Udyog Vihar,
Gurgaon (Haryana) – 122 016
India

Attn: Shri. S.C. Manocha CEO-EPC Division

Sub: Koradi TPS Expansion Project 3x660 MW – Balance of Plant Package – Supply of all the Equipments, Mandatory Spares and other Auxiliary Equipments – Reg.

Ref:
1) Bid Specification No. DG/KORADI EXPN. 3X660 MW /BOP/T-2
2) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1553 dated 17.04.2010
3) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1583 dated 19.04.2010
4) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1595 dated 20.04.2010
5) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1701 dated 28.04.2010
6) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1741 dated 30.04.2010
7) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1870 dated 11.05.2010
8) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1903 dated 12.05.2010
9) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1953 dated 15.05.2010
10) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/2002 dated 18.05.2010
11) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/2067 dated 21.05.2010
12) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/2133 dated 26.05.2010
13) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/2162 dated 28.05.2010
14) Your bid No. LITL/EPC/2010-11/Koradi/BoP/1 dated 21st May 2010
15) T.O. letter No. DG/Koradi 3x660 MW/BOP/T-2/2540 dated 18.06.2010.
16) Your letter LITL/EPC/2010-11/KORADI/BOP/5 dated 23.06.2010
17) T.O. letter No. DG/Koradi 3x660 MW/BOP/T-2/2855 dated 05.07.2010.
18) Your letter LITL/EPC/2010-11/KORADI/BOP/7 dated 07.07.2010.
19) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/2991 dated 14.07.2010.
20) Your letter LITL/EPC/2010-11/KORADI/BOP/8 dated 24.07.2010
21) T.O.Letter No. DG/Koradi 3x660 MW/BOP/Civil/ 3193 dtd.27.07.2010
22) T.O.Letter No. DG/Koradi 3x660 MW/BOP/Erection/ 3195 dtd.27.07.2010

Dear Sirs,

With reference to your Bid Proposal cited under ref. 14 and subsequent correspondence in respect of the Supply, Civil Works and Erection, Testing and Commissioning of Balance of Plant Package at Koradi TPS Expansion Project 3x660MW, this is to inform you as under.

MAHARASHTRA STATE POWER GEN. CO. LTD. BANDRA (E) MUMBAI-51

LANCO INFRATECH LIMITED

1

NOTARY 10
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Mumbai
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1.0 AWARD OF CONTRACT

1.1 In accordance with documents and correspondence referred above, we are pleased to accept your bid proposal modified up to date and award the work of Supply of all the Equipments & Mandatory Spares including Special Tools & Tackles, and Other Auxiliary Equipments, for Balance of Plant Package of 3x660 MW Koradi TPS Expansion Project.

1.2 The Bid Specification and the subsequent correspondence referred above shall form the integral part of this contract.

2.0 SCOPE OF CONTRACT

2.1 The scope of the contract includes Design, Engineering, Manufacture, Assembly, Testing at Works, Inspection at Works, Transportation, FOR site supply of all equipment & material including Mandatory Spares and other auxiliary equipment of Balance of Plant Package of 3x660MW Koradi TPS Expansion Project as detailed in the Bid Specification cited under reference read with subsequent amendments, clarifications and resolutions issued by Mahagenco. The above shall also include port handling & custom clearance, inland transportation and FOR delivery at site for imported items. The delivery of Mandatory Spares pertaining to particular equipment shall be affected along with or after supply of that particular equipment to site for Unit No.8.

2.2 The scope of contract also shall include Supply of the commissioning spares as required during Erection, Testing and Commissioning of the equipment covered in the Bid Specification and all consumables like grease, lubricating oils, chemicals, paints, ink and graphs for recorders etc. up to satisfactory completion of trial operation.

2.3 The equipment / system which are not specifically mentioned but are required as part of Balance of Plant Package which are covered in Bid Specification shall also be covered in the scope of the Contract.

3.0 CONTRACT PRICE

3.1 The total price for the supply of Balance of Plant Package along with Mandatory Spares for 3x660 MW Koradi TPS Expansion Project, for the scope of supply as mentioned above, shall be Rs. 433,04,63,334/- (Rupees Four Hundred Thirty Three Crores Four Lakhs Sixty Three Thousand Three Hundred Thirty Four only).

3.2 In terms of Mega Power Project Policy read with Foreign Trade Policy of Govt. of India, this project is eligible for the Mega Power Project status benefits declared by Govt. of India.

3.3 The estimated amount of Taxes & Duties considering Mega Power Project Status Benefits prevailing as on record date i.e. 25.05.2010 as quoted by you is Rs. 28,92,38,402/- (Rupees Twenty Eight Crores Ninety Two Lakhs Thirty Eight Thousand Four Hundred Two only). However, the applicable Taxes & Duties shall be reimbursed to you at actuals, but limited to Rs. 28,92,38,402/- (Rupees Twenty Eight Crores Ninety Two Lakhs Thirty Eight Thousand Four Hundred Two only).

MAHARASHTRA STATE POWER GEN. CO. LTD. (BANDRA (E) MUMBAI-51)

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The Break up of the Price is as below.

Sr. No.	Item Description	Price	Estimated Taxes & Duties
1.	Price for Supply of the equipments and Mandatory Spares	Rs.423,48,22,865/-	CST @ 2% = Rs.4,57,36,087/- VAT @ 12.5% = Rs.24,35,02,315/-
2.	Inland Transportation Charges	*Rs.9,56,40,469/-*	*Nil*
	Total	Rs. 433,04,63,334/-	Rs. 28,92,38,402/-

Total Price including Estimated Taxes & Duties = Rs.461,97,01,736/-

(Rupees Four Hundred Sixty One Crores Ninety Seven Lakhs One Thousand Seven Hundred Thirty Six only)

3.4 Statutory variation shall be to Owner's account as stipulated in Bid specification.

3.5 Price Variation shall be paid as per the Bid Specification.

3.6 The charges for Marine-Cum-Erection (MCE) Insurance for the supply of Balance of Plant Package against this LOA are covered under the separate LOA for erection, testing and commissioning of Balance of Plant equipments.

3.7 In terms of Foreign Trade Policy of Govt. of India, the Owner, at the request of the Contractor shall issue Project Authority Certificate.

4.0 CONTRACT PERFORMANCE SECURITY.

4.1 The Contractor within thirty (30) days of issue of Letter of Award, shall submit the Contract Performance Security in the form of Bank Guarantee issued by any Scheduled Commercial Bank notified by Reserve Bank of India amounting to 10% of the total contract price for due performance of the contract. The Bank Guarantee should be in the proforma enclosed with the Bid Document. This Bank Guarantee shall be valid till the expiry of 90 days after the end of the guarantee / warrantee period for the works of all the three Units and till fulfillment of other obligations under the contract whichever is later.

5.0 ZERO DATE OF THE CONTRACT:-

Zero date of the Contract / Date of Contract shall be the date of issuance of this letter.

6.0 INSURANCE

6.1 The Contractor shall obtain Comprehensive Marine-cum-Erection Insurance Policy for the contract work, the charges for which are covered in the price for erection, testing & commissioning against separate LOA. Marine-cum-Erection Insurance shall be arranged from the Director of Insurance, Govt. of Maharashtra, Mumbai.

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7.0 WORK COMPLETION PERIOD

7.1 Complete design, engineering, seeking approval of design & drawings, manufacturing, despatch, receipt of material and storage at site, handling of materials at site, civil works, including fabrication and structural steel works, erection, testing, commissioning and handing over of all the equipments covered under this bid documents, are to be programmed in such a way that various activities are completed by the Contractor so as to match with the enclosed Project Completion Schedule of Main Plant BTG Package for the Project. However, Contractor should ensure that in any case all the works under the contract shall be completed as under:

Sr. No.	Name of the Equipment / Plant	Date of completion of trial operation of the Equipment/Plant
1.	DM Water Plant	June 2012
2.	Compressed Air System	December 2012
3.	Fuel Oil Handling Plant	February 2013.
4.	Natural Draft Cooling Tower Unit-8 Unit-9 Unit-10	 February 2013. August 2013. February 2014.
5.	Ash Handling Plant	August 2013.
6.	Coal Handling Plant	
7.	All other auxiliaries, systems covered under the scope of contract	

8.0 PAYMENT OF ADVANCE TOWARDS SUPPLY OF EQUIPMENTS:

8.1 First Advance.

8.1.1 Five percent (5%) of the Total Contract Price (excluding taxes, duties, cess etc.) shall be paid as First Advance within thirty (30) days of the fulfillment of the following.

i) Submission of Acceptance of Letter of Award by the Contractor.

ii) Submission of invoice in triplicate (1 Original + 2 copies) by the Contractor.

iii) Submission of Contract Performance Security by the Contractor.

iv) Submission of Bank Guarantee by the Contractor from a Scheduled Commercial Bank notified by Reserve Bank of India in the enclosed Pro-forma completely covering the advance amount which shall be initially kept valid till ninety (90) days beyond the scheduled date of work completion.

8.2 Second Advance

8.2.1 Two & half Percent (2.5%) of the total Contract Price (excluding taxes & duties, cess etc.) shall be paid as Second Advance after six (6) months of release of First Advance on submission of the following documents.

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i) Submission of invoice in triplicate (1 Original + 2 copies) by the Contractor.

ii) Submission of Bank Guarantee by the Contractor from a Scheduled Commercial Bank notified by Reserve Bank of India in the enclosed Pro-forma completely covering the advance amount which shall be initially kept valid till ninety (90) days beyond the scheduled date of work completion.

8.3 Third Advance

8.3.1 Two & half Percent (2.5%) of the total Contract Price (excluding taxes & duties, cess etc.) shall be paid as Third Advance within twelve (12) months from the date of LOA on submission of the following documents.

i) Submission of invoice in triplicate (1 Original + 2 copies) by the Contractor.

ii) Submission of Bank Guarantee by the Contractor from a Scheduled Commercial Bank notified by Reserve Bank of India in the enclosed Pro-forma completely covering the advance amount which shall be initially kept valid till ninety (90) days beyond the scheduled date of work completion.

8.4 The advances referred in clause no. 8.1, 8.2, & 8.3 shall be utilized for the purpose for which they are sanctioned / released and the contractor shall demonstrate the same documentarily to the project authorities.

8.5 Statutory deduction towards Income Tax under the Income Tax Act and any other taxes & duties as applicable, shall be made by the Owner from the Contractor's monthly invoice, as per the prevailing statutory requirements and necessary TDS certificate shall be issued by the Owner.

8.6 For all payments the application and the invoices along with the documents listed in the relevant clauses of terms of payment shall be submitted by the Contractor to the Chief General Manager (Project), MAHAGENCO, Koradi and the payment shall be released by Chief General Manager (Project), MAHAGENCO, Koradi/ PFC

9.0 CROSS–FALL BREACH AGREEMENT:-

9.1 All the three contracts will contain a cross fall breach clause specifying that breach of any one contract will constitute breach of the other two contracts. The award of three contracts shall not in any way dilute the responsibility of the contractor for the successful completion of the project as per specification on single source responsibility basis & a breach in one contract shall automatically be construed as a breach of the other contracts which will confer a right on the owner to terminate the other contract(s) also at the risk & cost of the contractor.

10.0 CONSULTANTS:-

10.1 MahaGenco has engaged M/s. Development Consultants Pvt. Ltd., Navi Mumbai as the Consultants for design and engineering of all the works covered in the scope of this specification. The postal address and contact phone numbers of the Consultants are as below.

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NOTARY M.M. PABALE Mumbai Maharashtra Regd. No. 15220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

M/s. Development Consultants Pvt. Ltd.
Apeejay Commercial Complex, 5th Floor,
Plot No. 87, Sector-17, Vashi, Navi Mumbai – 400 703

Phone No. : (91) 022-2789 2863 / 2978 / 3203 / 4541
Fax No. : (91) 022-2789 2933
e-mail ID : dcplbom@dclgroup.com

You should note that the design basis / criteria, design calculations, selection of equipment type & capacities, engineering designs and all drawings, engineering documents etc., as envisaged in the bid specification, shall be invariably got approved from the Consultants prior to start of related activities. Consultants shall approve all the design & engineering documents and drawings on behalf of the Owner.

11.0 The Terms & Conditions as per the Bid Specification read with subsequent clarifications / amendments / corrigendum/ resolutions, if any, issued by MahaGenco shall be applicable for the contract concluded vide this Letter of Award.

You are requested to confirm the acceptance of this Letter of Award and furnish the Contract Performance Security towards performance of the Contract at the earliest. You are also requested to submit the draft contract agreement at the earliest for our review.

Thanking you,

Yours faithfully,

23.7.10

Chief General Manager (P&P)

Encl: As above

Copy s.w.r. to:

Director (Projects)
Director (Operation)
Director (Finance)
ED (Projects-I)
ED (Projects-II), Koradi
ED (C&F), Mumbai.
ED (O&M), Mumbai.
ED (O&M), Nagpur.

Copy f.w.c. to:

Power Finance Corporation Ltd.
'Urjanidhi',
1, Barakhamba Lane, Connaught Place
New Delhi-110 001

Secretary (Energy),
Industries, Energy & Labour Deptt.,
Govt. of Maharashtra, Mantralaya,
MUMBAI – 400 032

CGM (Project), Koradi
CGM (Civil – I)
CGM (Civil – II), Koradi
CGM (Const.), Koradi

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MAHARASHTRA STATE POWER GEN. CO. LTD.

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CGM (O&M), Koradi
CGM (Works), Mumbai.
CGM (Fuel Management Cell)
CGM (PMG)
CGM (RCD)
CGM (CEHSU)
CGM (Finance)
CGM (Accounts)

M/s. Development Consultants Pvt. Ltd.
Apeejay Commercial Complex, 5th Floor,
Plot No. 87, Sector-17, Vashi, Navi Mumbai – 400 703.
Fax No. : (91) 022-2789 2933

Copy to:
GM-I / GM-II/ GM-III
GM (Project), Koradi
SE (Civil), Koradi Project
OSD to MD
Dy. CAO (P&P), Mumbai
- This has reference to IA No. 206 dtd. 27.07.2010.

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NOTARY
M.M. PABALE
Mumbai
Maharashtra
Regd. No. 15220
Expiry Dt.
30-10-2024
GOVT. OF INDIA

MAHARASHTRA STATE POWER GEN. CO LTD
DAMODRA (E)
MUMBAI-51

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Koradi TPS Expansion Project 3x660MW

Project Completion Schedule of Main Plant BTG Package

Sr. No.	Milestone / Activities	Schedule Date		
		Unit No.8	Unit No.9	Unit No.10
1	Project – NTP (Zero date of Contract)	23-Sep-09		
2	Commencement of Boiler Foundation Works	12-May-10	10-Nov-10	12-May-11
3	Commencement of Boiler Erection	23-Mar-11	21-Sep-11	22-Mar-12
4	Commencement of TG building foundations	30-Jul-10	28-Jan-11	30-Jul-11
5	Commencement of TG foundations & deck	25-Jun-10	24-Dec-10	25-Jun-11
6	Completion of STG Foundations & Deck	17-Nov-11	17-May-12	16-Nov-12
7	Commencement of Structural erection for TG building	15-Dec-10	15-Jun-11	15-Dec-11
8	Completion of TG hall with EOT crane for TG erection	16-Jan-12	16-Jul-12	15-Jan-13
9	Readiness of foundation for ESP column erection	25-May-11	23-Nov-11	24-May-12
10	Readiness of ID / FD / PA / fan Foundations	11-Jan-12	11-Jul-12	10-Jan-13
11	Readiness of GT Foundation	16-Jan-12	16-Jul-12	15-Jan-13
12	Commencement of Stator Lifting	23-Jul-12	21-Jan-13	23-Jul-13
13	Hydro test	22-Sep-12	23-Mar-13	22-Sep-13
14	Completion of De-aerator Erection	26-Apr-12	25-Oct-12	26-Apr-13
15	Completion of Condenser Erection	16-Nov-12	17-May-13	16-Nov-13
16	Chemical cleaning of Boiler	22-Apr-13	21-Oct-13	22-Apr-14
17	TG Box up	22-Apr-13	21-Oct-13	22-Apr-14
18	Readiness of DCS for BLU	22-Mar-13	20-Sep-13	22-Mar-14
19	Completion of Oil Flushing	22-May-13	20-Nov-13	22-May-14
20	Boiler Light Up	22-Jun-13	21-Dec-13	22-Jun-14
21	Readiness of GT	15-Jul-13	13-Jan-14	15-Jul-14
22	Roads & Paving Complete	14-May-13	12-Nov-13	14-May-14
23	Synchronization / Coal firing of Unit	21-Sep-13	22-Mar-14	21-Sep-14
24	Completion of Trial Operation & Handing over of Unit	21-Dec-13	21-Jun-14	21-Dec-14
25	Mandatory Spares Supply Completion	21-Dec-13		

NOTARY M.M. PABALE Mumbai Maharashtra Regd. No. 16220 Expiry Date 30-10-2024 GOVT. OF INDIA

MAHARASHTRA STATE POWER GEN CO LTD. (BANDRA(E)) MUMBAI-51

LANCO INFRATECH LIMITED

MAHAGENCO
MAHARASHTRA STATE POWER GENERATION CO. LTD.
Office of Chief General Manager (P&P), 'Prakashgad', 3rd floor, Bandra (East), MUMBAI 400 051
Phone: (O) 2647 4211 / 2647 2131 (P) 26475759 Fax No. 022-2647 5329

Ref. No. DG/Koradi 3x660 MW/BOP/Erection/ **3195** dtd.**27.07.2010**

BY FAX / COURIER
Fax No. 0124-4692554

LETTER OF AWARD

FOR ERECTION, TESTING & COMMISSIONING OF BALANCE OF PLANT PACKAGE.

To
M/s. Lanco Infratech Ltd.,
EPC Division,
Plot No. 229, Phase – I,
Udyog Vihar,
Gurgaon (Haryana) – 122 016
India

Attn: Shri. S.C. Manocha CEO-EPC Division

Sub: Koradi TPS Expansion Project 3x660 MW – Balance of Plant Package – Erection, Testing & Commissioning of the equipments – Reg.

Ref:
1) Bid Specification No. DG/KORADI EXPN. 3X660 MW /BOP/T-2
2) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1553 dated 17.04.2010
3) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1583 dated 19.04.2010
4) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1595 dated 20.04.2010
5) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1701 dated 28.04.2010
6) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1741 dated 30.04.2010
7) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1870 dated 11.05.2010
8) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1903 dated 12.05.2010
9) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1953 dated 15.05.2010
10) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/2002 dated 18.05.2010
11) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/2067 dated 21.05.2010
12) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/2133 dated 26.05.2010
13) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/2162 dated 28.05.2010
14) Your bid No. LITL/EPC/2010-11/Koradi/BoP/1 dated 21st May 2010
15) T.O. letter No. DG/Koradi 3x660 MW/BOP/T-2/2540 dated 18.06.2010.
16) Your letter LITL/EPC/2010-11/KORADI/BOP/5 dated 23.06.2010
17) T.O. letter No. DG/Koradi 3x660 MW/BOP/T-2/2855 dated 05.07.2010.
18) Your letter LITL/EPC/2010-11/KORADI/BOP/7 dated 07.07.2010.
19) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/2991 dated 14.07.2010.
20) Your letter LITL/EPC/2010-11/KORADI/BOP/8 dated 24.07.2010.
21) T.O.Letter No. DG/Koradi 3x660 MW/BOP/ Civil / 3193 dtd.27.07.2010
22) T.O.Letter No. DG/Koradi 3x660 MW/BOP/ Supply / 3194 dtd.27.07.2010

Dear Sirs,

With reference to your Bid Proposal cited under ref. 14 and subsequent correspondence in respect of the Supply, Civil Works and Erection, Testing and Commissioning of Balance of Plant Package at Koradi TPS Expansion Project 3x660MW, this is to inform you as under.

MAHARASHTRA STATE POWER GEN. CO. LTD. BANDRA (E) MUMBAI-51

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LANCO INFRATECH LIMITED

NOTARY M.M. PABALE Mumbai Maharashtra Reg. No. 5220 Exp. 30-10-2024 GOVT. OF INDIA

1.0 AWARD OF CONTRACT

1.1 In accordance with documents and correspondence referred above, we are pleased to accept your bid proposal modified up to date and award the Erection, Testing & Commissioning Works including Marine-Cum-Erection insurance, for Balance of Plant Package of 3x660 MW Koradi TPS Expansion Project.

1.2 The Bid Specification and the subsequent correspondence referred above shall form the integral part of this contract.

2.0 SCOPE OF CONTRACT

2.1 The scope of contract covers unloading, taking delivery at site, handling at site, inter-site transportation, inter-site handling, Insurance, erection, supervision, inspection, testing & commissioning, trial operation, performance guarantee tests of Balance of Plant Package of 3x660MW Koradi TPS Expansion Project as detailed in the Bid Specification cited under reference read with subsequent amendments, clarifications and resolutions issued by MahaGenco. All plant / equipment/ system shall be erected and commissioned to meet the requirement of the specification including item/ equipment, which are necessary to complete the intent of specification or otherwise to complete the entire work of Balance of Plant Package of 3x660MW Koradi TPS Expansion Project.

2.2 The scope of work against this LOA shall also include unloading, storage and handing over of Mandatory Spares to MahaGenco's stores after receipt of the same at site in good condition and joint verification at site by the representatives of the Contractor and the Owner.

2.3 The scope of work also includes preservative painting at site as required, primer painting and final painting as per the bid specification, including supply of paints and consumables as required. The scope shall also include all temporary works as required for completion of the works.

2.4 The scope of work also includes the Comprehensive Marine-Cum-Erection insurance, for Balance of Plant Package at Koradi TPS Expansion Project 3x660MW as per the Bid Specification.

2.5 The equipment / system which are not specifically mentioned but are required as part of Balance of Plant Package which are covered in Bid Specification shall also be covered in the scope of the Contract.

3.0 CONTRACT PRICE

3.1 The total price for Erection, Testing & Commissioning Works including inland insurance charges of Balance of Plant Package for 3x 660MW at Koradi TPS Expansion Project, for the scope as mentioned above, shall be Rs 58,27,33,750/- (Rupees Fifty Eight Crores Twenty Seven Lakhs Thirty Three Thousand Seven Hundred Fifty only).

3.2 Estimated amount of Taxes & Duties prevailing as on record date i.e. 25.05.2010 as quoted by you is Rs. 6,01,38,123/- (Rupees Six Crores One Lakhs Thirty Eight Thousand One Hundred Twenty Three only). However, the applicable Taxes & Duties shall be reimbursed to you at actuals, but limited to Rs. 6,01,38,123/-

NOTARY M.M. PABALE Mumbai Maha... Regd. ... Expires ... 30-10-2024 GOVT. OF INDIA

MAHARASHTRA STATE POWER GENERATION CO. LTD. BANDRA (E) MUMBAI

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NOTARY
M.M. PABALE
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Maharashtra
Reg. No. 15220
Expiry Dt.
30-10-2024
GOVT. OF INDIA

(Rupees Six Crores One Lakhs Thirty Eight Thousand One Hundred Twenty Three only).

Break up of the above prices is as under

Sr. No.	Item Description	Price	Estimated Taxes & Duties
1.	Erection, Testing & Commissioning (excluding Inland Insurance Charges)	Rs.57,42,64,104/-	Ser. Tax @ 10.32% = Rs. 5,92,64,056/-
2.	Comprehensive Marine Cum Erection Insurance Charges	Rs.84,69,646/-	Ser. Tax @ 10.32% = Rs.8,74,067/-
	Total	Rs.58,27,33,750/-	Rs.6,01,38,123/-

Total Price including Estimated Service Tax = Rs.64,28,71,873/-

(Rupees Sixty Four Crores Twenty Eight Lakhs Seventy One Thousand Eight Hundred Seventy Three only).

3.3 Statutory variation shall be to Owner's account as stipulated in Bid specification.

3.4 Price Variation shall be paid as per the Bid Specification.

4.0 CONTRACT PERFORMANCE SECURITY.

4.1 The Contractor within thirty (30) days of issue of Letter of Award, shall submit the Contract Performance Security in the form of Bank Guarantee issued by any Scheduled Commercial Bank notified by Reserve Bank of India amounting to 10% of the total contract price for due performance of the contract. The Bank Guarantee should be in the proforma enclosed with the Bid Document. This Bank Guarantee shall be valid till the expiry of 90 days after the end of the guarantee / warrantee period for the works of all the three Units and till fulfillment of other obligations under the contract whichever is later.

5.0 ZERO DATE OF THE CONTRACT:-

Zero date of the Contract / Date of Contract shall be the date of issuance of this letter.

6.0 INSURANCE

6.1 The Contractor shall obtain Comprehensive Marine-cum-Erection Insurance Policy for the contract work, the charges for which are covered in the price for erection, testing & commissioning. Marine-cum-Erection Insurance shall be arranged from the Director of Insurance, Govt. of Maharashtra, Mumbai.

7.0 WORK COMPLETION PERIOD

7.1 Complete design, engineering, seeking approval of design & drawings, manufacturing, despatch, receipt of material and storage at site, handling of materials at site, civil works, including fabrication and structural steel works, erection, testing, commissioning and handing over of all the equipments covered under this bid documents, are to be programmed in such a way that various

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NOTARY
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Maharashtra
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activities are completed by the Contractor so as to match with the enclosed Project Completion Schedule of Main Plant BTG Package for the Project. However, Contractor should ensure that in any case all the works under the contract shall be completed as under:

Sr. No.	Name of the Equipment / Plant	Date of completion of trial operation of the Equipment/Plant
1.	DM Water Plant	June 2012
2.	Compressed Air System	December 2012
3.	Fuel Oil Handling Plant	February 2013.
4.	Natural Draft Cooling Tower Unit-8 Unit-9 Unit-10	 February 2013 August 2013 February 2014
5.	Ash Handling Plant	August 2013
6.	Coal Handling Plant	
7.	All other auxiliaries, systems covered under the scope of contract	

8.0 PAYMENT OF ADVANCE TOWARDS ERECTION, TESTING & COMMISSIONING WORKS

8.1 First Advance

8.1.1 Five percent (5%) of the Total Contract Price shall be paid as First Advance within thirty (30) days of the fulfillment of the following.

i) Submission of Acceptance of Letter of Award by the Contractor.

ii) Submission of invoice in triplicate (1 Original + 2 copies) by the Contractor.

iii) Submission of Contract Performance Security by the Contractor.

iv) Submission of Bank Guarantee by the Contractor from a Scheduled Commercial Bank notified by Reserve Bank of India in the enclosed Pro-forma completely covering the advance amount which shall be initially kept valid till ninety (90) days beyond the scheduled date of work completion.

v) Certificate from General Manager (Project), Koradi about mobilization of contractor's establishment at site for taking up Erection works.

8.2 Second Advance

8.2.1 Two & half Percent (2.5%) of the total Contract Price shall be paid as second advance after four (4) months on submission of the following documents.

i) Submission of invoice in triplicate (1 Original + 2 copies) by the Contractor.

ii) Submission of Bank Guarantee by the Contractor from a Scheduled Commercial Bank notified by Reserve Bank of India in the enclosed Pro-forma completely covering the advance

MAHARASHTRA STATE POWER GEN CO LTD BANDRA (E) MUMBAI-51
LANCO INFRATECH LIMITED

amount which shall be initially kept valid till ninety (90) days beyond the scheduled date of work completion.

8.3 Third Advance

8.3.1 Two & half Percent (2.5%) of the total Contract Price shall be paid as Third Advance within twelve (12) months from the date of LOA on submission of the following documents.

i) Submission of invoice in triplicate (1 Original + 2 copies) by the Contractor.

ii) Submission of Bank Guarantee by the Contractor from a Scheduled Commercial Bank notified by Reserve Bank of India in the enclosed Pro-forma completely covering the advance amount which shall be initially kept valid till ninety (90) days beyond the scheduled date of work completion.

The service tax, if any, applicable on the payment towards release of advance payment shall also be made along with the payment of advance.

8.4 The advances referred in clause no. 8.1, 8.2, & 8.3 shall be utilized for the purpose for which they are sanctioned / released and the contractor shall demonstrate the same documentarily to the project authorities.

8.5 Statutory deduction towards Income Tax under the Income Tax Act and any other taxes & duties as applicable, shall be made by the Owner from the Contractor's monthly invoice, as per the prevailing statutory requirements and necessary TDS certificate shall be issued by the Owner.

8.6 For all payments the application and the invoices along with the documents listed in the relevant clauses of terms of payment shall be submitted by the Contractor to the Chief General Manager (Project), MAHAGENCO, Koradi and the payment shall be released by Chief General Manager (Project), MAHAGENCO, Koradi/ PFC

9.0 CROSS–FALL BREACH AGREEMENT:-

9.1 All the three contracts will contain a cross fall breach clause specifying that breach of any one contract will constitute breach of the other two contracts. The award of three contracts shall not in any way dilute the responsibility of the contractor for the successful completion of the project as per specification on single source responsibility basis & a breach in one contract shall automatically be construed as a breach of the other contracts which will confer a right on the owner to terminate the other contract(s) also at the risk & cost of the contractor.

10.0 CONSULTANTS:-

10.1 MahaGenco has engaged M/s. Development Consultants Pvt. Ltd., Navi Mumbai as the Consultants for design and engineering of all the works covered in the scope of this specification. The postal address and contact phone numbers of the Consultants are as below.

M/s. Development Consultants Pvt. Ltd.
Apeejay Commercial Complex, 5th Floor,
Plot No. 87, Sector-17, Vashi, Navi Mumbai – 400 703

Phone No. : (91) 022-2789 2863 / 2978 / 3203 / 4541
Fax No. : (91) 022-2789 2933
e-mail ID : dcplbom@dclgroup.com

NOTARY M.M. PARALE Mumbai Maharashtra Regd. No. 15220 Expiry 30-10-2

LANCO INFRATECH LIMITED

You should note that the design basis / criteria, design calculations, selection of equipment type & capacities, engineering designs and all drawings, engineering documents etc., as envisaged in the bid specification, shall be invariably got approved from the Consultants prior to start of related activities. Consultants shall approve all the design & engineering documents and drawings on behalf of the Owner.

11.0 The Terms & Conditions as per the Bid Specification read with subsequent clarifications / amendments / corrigendum/ resolutions, if any, issued by MahaGenco shall be applicable for the contract concluded vide this Letter of Award.

You are requested to confirm the acceptance of this Letter of Award and furnish the Contract Performance Security towards performance of the Contract at the earliest. You are also requested to submit the draft contract agreement at the earliest for our review.

Thanking you,

Yours faithfully,

27.7.10

Chief General Manager (P&P)

Encl: As above

Copy s.w.r. to:

Director (Projects)
Director (Operation)
Director (Finance)
ED (Projects-I)
ED (Projects-II), Koradi
ED (C&F), Mumbai.
ED (O&M), Mumbai.
ED (O&M), Nagpur.

Copy f.w.c. to:

Power Finance Corporation Ltd.
'Urjanidhi',
1, Barakhamba Lane, Connaught Place
New Delhi-110 001

Secretary (Energy),
Industries, Energy & Labour Deptt.,
Govt. of Maharashtra,
Mantralaya,
MUMBAI – 400 032

CGM (Project), Koradi
CGM (Civil – I)
CGM (Civil – II), Koradi
CGM (Const.), Koradi
CGM (O&M), Koradi
CGM (Works), Mumbai.
CGM (Fuel Management Cell)
CGM (PMG)

NOTARY M.M. PABALE Mumbai Maharashtra Reg. No. 15220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

MAHARASHTRA STATE POWER GEN. CO. LTD. BANDRA (E) MUMBAI-51

LANCO INFRATECH LIMITED

CGM (RCD)
CGM (CEHSU)
CGM (Finance)
CGM (Accounts)

M/s. Development Consultants Pvt. Ltd.
Apeejay Commercial Complex, 5th Floor,
Plot No. 87, Sector-17, Vashi, Navi Mumbai – 400 703.
Fax No. : (91) 022-2789 2933

Copy to:

GM-I / GM-II/ GM-III
GM (Project), Koradi
SE (Civil), Koradi Project
OSD to MD
Dy. CAO (P&P), Mumbai
- This has reference to IA No. 207 dtd. 27.07.2010.

NOTARY
M.M. PARALE
Mumbai
Maharashtra
Reg. No. 15220
Exp. Dt.
30-10-2024
GOVT. OF INDIA

MAHARASHTRA STATE POWER GEN CO LTD
BANDRA (E) MUMBAI-51

LANCO INFRATECH LIMITED

Koradi TPS Expansion Project 3x660MW

Project Completion Schedule of Main Plant BTG Package

S. No.	Milestone / Activities	Schedule Date		
		Unit No.8	Unit No.9	Unit No.10
1	Project – NTP (Zero date of Contract)	23-Sep-09		
2	Commencement of Boiler Foundation Works	12-May-10	10-Nov-10	12-May-11
3	Commencement of Boiler Erection	23-Mar-11	21-Sep-11	22-Mar-12
4	Commencement of TG building foundations	30-Jul-10	28-Jan-11	30-Jul-11
5	Commencement of TG foundations & deck	25-Jun-10	24-Dec-10	25-Jun-11
6	Completion of STG Foundations & Deck	17-Nov-11	17-May-12	16-Nov-12
7	Commencement of Structural erection for TG building	15-Dec-10	15-Jun-11	15-Dec-11
8	Completion of TG hall with EOT crane for TG erection	16-Jan-12	16-Jul-12	15-Jan-13
9	Readiness of foundation for ESP column erection	25-May-11	23-Nov-11	24-May-12
10	Readiness of ID / FD / PA / fan Foundations	11-Jan-12	11-Jul-12	10-Jan-13
11	Readiness of GT Foundation	16-Jan-12	16-Jul-12	15-Jan-13
12	Commencement of Stator Lifting	23-Jul-12	21-Jan-13	23-Jul-13
13	Hydro test	22-Sep-12	23-Mar-13	22-Sep-13
14	Completion of De-aerator Erection	26-Apr-12	25-Oct-12	26-Apr-13
15	Completion of Condenser Erection	16-Nov-12	17-May-13	16-Nov-13
16	Chemical cleaning of Boiler	22-Apr-13	21-Oct-13	22-Apr-14
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18	Readiness of DCS for BLU	22-Mar-13	20-Sep-13	22-Mar-14
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23	Synchronization / Coal firing of Unit	21-Sep-13	22-Mar-14	21-Sep-14
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25	Mandatory Spares Supply Completion	21-Dec-13		

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MAHARASHTRA STATE POWER GEN. CO. LTD. BANDRA (E) MUMBAI-51

LANCO INFRATECH LIMITED

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MAHAGENCO
MAHARASHTRA STATE POWER GENERATION CO. LTD.
Office of Chief General Manager (P&P), 'Prakashgad', 3rd floor, Bandra (East), MUMBAI 400 051
Phone: (O) 2647 4211 / 2647 2131 (P) 26475759 Fax No. 022-2647 5329

Ref. No. DG/Koradi 3x660 MW/BOP/ Civil/ 3193 Date: 27.07.2010

BY FAX / COURIER
Fax No. 0124-4692554

LETTER OF AWARD

FOR CIVIL WORKS OF BALANCE OF PLANT PACKAGE.

To
M/s. Lanco Infratech Ltd.,
EPC Division,
Plot No. 229, Phase – I,
Udyog Vihar,
Gurgaon (Haryana) – 122 016
India

Attn: Shri. S.C. Manocha CEO-EPC Division

Sub: Koradi TPS Expansion Project 3x660 MW – Balance of Plant Package – Civil, Structural as well as Architectural Works. – Reg.

Ref:
1) Bid Specification No. DG/KORADI EXPN. 3X660 MW /BOP/T-2
2) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1553 dated 17.04.2010
3) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1583 dated 19.04.2010
4) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1595 dated 20.04.2010
5) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1701 dated 28.04.2010
6) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1741 dated 30.04.2010
7) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1870 dated 11.05.2010
8) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1903 dated 12.05.2010
9) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/1953 dated 15.05.2010
10) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/2002 dated 18.05.2010
11) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/2067 dated 21.05.2010
12) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/2133 dated 26.05.2010
13) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/2162 dated 28.05.2010
14) Your bid No. LITL/EPC/2010-11/Koradi/BoP/1 dated 21st May 2010
15) T.O. letter No. DG/Koradi 3x660 MW/BOP/T-2/2540 dated 18.06.2010.
16) Your letter LITL/EPC/2010-11/KORADI/BOP/5 dated 23.06.2010
17) T.O. letter No. DG/Koradi 3x660 MW/BOP/T-2/2855 dated 05.07.2010.
18) Your letter LITL/EPC/2010-11/KORADI/BOP/7 dated 07.07.2010.
19) T.O Letter No DG/Koradi Expn. Proj/3 x660 MW/BOP/2991 dated 14.07.2010.
20) Your letter LITL/EPC/2010-11/KORADI/BOP/8 dated 24.07.2010.
21) T.O.Letter No. DG/Koradi 3x660 MW/BOP/Supply/ 3194 dtd.27.07.2010
22) T.O.Letter No. DG/Koradi 3x660 MW/BOP/Erection/ 3195 dtd.27.07.2010

Dear Sirs,

With reference to your Bid Proposal cited under ref. 14 and subsequent correspondence in respect of the Supply, Civil Works and Erection, Testing and Commissioning of Balance of Plant Package at Koradi TPS Expansion Project 3x660MW, this is to inform you as under.

1.0 AWARD OF CONTRACT

1.1 In accordance with documents and correspondence referred above, we are pleased to accept your bid proposal modified up to date and award the Civil, Structural as

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MAHARASHTRA STATE POWER GEN CO LTD

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well as Architectural Works, for Balance of Plant Package of 3x660 MW Koradi TPS Expansion Project.

1.2 The Bid Specification and the subsequent correspondence referred above shall form the integral part of this contract.

2.0 SCOPE OF CONTRACT

2.1 The scope of contract includes Design, Engineering, Preparation of General Arrangement, Construction as well as Fabrication drawings, Supply of all Labour as well as all Materials including Supply of Cement, Reinforcement Steel, Structural Steel and Construction of all Civil, Structural as well as Architectural works of Balance of Plant Package of 3x660MW Koradi TPS Expansion Project as detailed in the Bid Specification cited under reference read with subsequent amendments, clarifications and resolutions issued by MahaGenco.

2.2 The equipment / system which are not specifically mentioned but are required as part of Balance of Plant Package which are covered in Bid Specification shall also be covered in the scope of the Contract.

3.0 CONTRACT PRICE.

3.1 The total price for the Civil, Structural as well as Architectural works of Balance of Plant Package for 3 x 660 MW at Koradi TPS Expansion Project, for the scope as mentioned above, shall be Rs. 698,06,10,400/- (Rupees Six Hundred Ninety Eight Crores Six Lakhs Ten Thousand Four Hundred only).

3.2 Estimated amount of Taxes & Duties prevailing as on record date i.e. 25.05.2010 as quoted by you is Rs. 81,39,79,660/- (Rupees Eighty One Crores Thirty Nine Lakhs Seventy Nine Thousand Six Hundred Sixty only). However, the applicable Taxes & Duties shall be reimbursed to you at actuals, but limited to Rs. 81,39,79,660/- (Rupees Eighty One Crores Thirty Nine Lakhs Seventy Nine Thousand Six Hundred Sixty only).

Break up of the above prices is as under

Sr. No.	Item Description	Price	Estimated Taxes & Duties
1.	Price for Civil, Structural, Architectural Works including Supply of Steel & Cement	Rs.684,09,98,192/-	Ser. Tax @10.32% = Rs.21,17,97,304/- VAT @ 12.5%. = Rs.59,85,87,342/-
2.	Inland Transportation Charges	Rs.13,96,12,208/-	Ser. Tax @10.32% = Rs.35,95,014/-
	Total	Rs.698,06,10,400/-	Rs.81,39,79,660/-

Total Price including Estimated Taxes & Duties = Rs.779,45,90,060/-

(Rupees Seven Hundred Seventy Nine Crores Forty Five Lakhs Ninety Thousand Sixty only).

3.3 Statutory variation shall be to Owner's account as stipulated in Bid specification.

3.4 Price Variation shall be paid as per the Bid Specification.

NOTARY M.M. PABALL Mumbai Maha. State Regd. No. 5220 Expires on 30-10-2014 GOVT. OF INDIA

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3.5 The charges for Marine-Cum-Erection (MCE) Insurance for the Civil, Structural as well as Architectural works of Balance of Plant Package against this LOA are covered under the separate LOA for Erection, Testing and Commissioning of Balance of Plant Package.

4.0 CONTRACT PERFORMANCE SECURITY.

4.1 The Contractor within thirty (30) days of issue of Letter of Award, shall submit the Contract Performance Security in the form of Bank Guarantee issued by any Scheduled Commercial Bank notified by Reserve Bank of India amounting to 10% of the total contract price for due performance of the contract. The Bank Guarantee should be in the proforma enclosed with the Bid Document. This Bank Guarantee shall be valid till the expiry of 90 days after the end of the guarantee / warrantee period for the works of all the three Units and till fulfillment of other obligations under the contract whichever is later.

5.0 ZERO DATE OF THE CONTRACT:-

Zero date of the Contract / Date of Contract shall be the date of issuance of this letter.

6.0 INSURANCE

6.1 The Contractor shall obtain Comprehensive Marine-cum-Erection Insurance Policy for the contract work, the charges for which are covered in the price for erection, testing & commissioning against separate LOA. Marine-cum-Erection Insurance shall be arranged from the Director of Insurance, Govt. of Maharashtra, Mumbai.

7.0 WORK COMPLETION PERIOD

7.1 Complete design, engineering, seeking approval of design & drawings, manufacturing, despatch, receipt of material and storage at site, handling of materials at site, civil works, including fabrication and structural steel works, erection, testing, commissioning and handing over of all the equipments covered under this bid documents, are to be programmed in such a way that various activities are completed by the Contractor so as to match with the enclosed Project Completion Schedule of Main Plant BTG Package for the Project. However, Contractor should ensure that in any case all the works under the contract shall be completed as under:

Sr. No.	Name of the Equipment / Plant	Date of completion of trial operation of the Equipment/Plant
1.	DM Water Plant	June 2012
2.	Compressed Air System	December 2012
3.	Fuel Oil Handling Plant	February 2013
4.	Natural Draft Cooling Tower Unit-8 Unit-9 Unit-10	 February 2013 August 2013 February 2014
5.	Ash Handling Plant	August 2013
6.	Coal Handling Plant	
7.	All other auxiliaries, systems covered under the scope of contract	

MAHARASHTRA STATE POWER GEN. CO. LTD.

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LANCO INFRATECH LIMITED

8.0 PAYMENT OF ADVANCE TOWARDS CIVIL WORKS:

8.1 First Advance

8.1.1 Five percent (5%) of the Total Contract Price shall be paid as First Advance within thirty (30) days of the fulfillment of the following.

i) Submission of Acceptance of Letter of Award by the Contractor.

ii) Submission of invoice in triplicate (1 Original + 2 copies) by the Contractor.

iii) Submission of Contract Performance Security by the Contractor.

iv) Submission of Bank Guarantee by the Contractor from a Scheduled Commercial Bank notified by Reserve Bank of India in the enclosed Pro-forma completely covering the advance amount which shall be initially kept valid till ninety (90) days beyond the scheduled date of work completion.

v) Certificate from General Manager (Project), Koradi about mobilization of contractor's establishment at site for taking up Civil works.

8.2 Second Advance

8.2.1 Two & half Percent (2.5%) of the total Contract Price shall be paid as second advance after four (4) months on submission of the following documents.

i) Submission of invoice in triplicate (1 Original + 2 copies) by the Contractor.

ii) Submission of Bank Guarantee by the Contractor from a Scheduled Commercial Bank notified by Reserve Bank of India in the enclosed Pro-forma completely covering the advance amount which shall be initially kept valid till ninety (90) days beyond the scheduled date of work completion.

8.3 Third Advance

8.3.1 Two & half Percent (2.5%) of the total Contract Price shall be paid as Third Advance within twelve (12) months from the date of LOA on submission of the following documents.

i) Submission of invoice in triplicate (1 Original + 2 copies) by the Contractor.

ii) Submission of Bank Guarantee by the Contractor from a Scheduled Commercial Bank notified by Reserve Bank of India in the enclosed Pro-forma completely covering the advance amount which shall be initially kept valid till ninety (90) days beyond the scheduled date of work completion.

The service tax, if any, applicable on the payment towards release of advance payment shall also be made along with the payment of advance.

8.4 The advances referred in clause no. 8.1, 8.2, & 8.3 shall be utilized for the purpose for which they are sanctioned / released and the contractor shall demonstrate the same documentarily to the project authorities.

8.5 Statutory deduction towards Income Tax under the Income Tax Act and any other taxes & duties as applicable, shall be made by the Owner from the Contractor's

MAHARASHTRA STATE POWER GEN. CO LTD

NOTARY M.M. PABALE Mumbai Maharashtra Reg. No. 15220 Expiry Dt. 30-10-2024 GOVT OF INDIA

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LANCO INFRATECH LIMITED

monthly invoice, as per the prevailing statutory requirements and necessary TDS certificate shall be issued by the Owner.

8.6 For all payments the application and the invoices along with the documents listed in the relevant clauses of terms of payment shall be submitted by the Contractor to the Chief General Manager (Project), MAHAGENCO, Koradi and the payment shall be released by Chief General Manager (Project), MAHAGENCO, Koradi/ PFC

9.0 CROSS–FALL BREACH AGREEMENT:-

9.1 All the three contracts will contain a cross fall breach clause specifying that breach of any one contract will constitute breach of the other two contracts. The award of three contracts shall not in any way dilute the responsibility of the contractor for the successful completion of the project as per specification on single source responsibility basis & a breach in one contract shall automatically be construed as a breach of the other contracts which will confer a right on the owner to terminate the other contract(s) also at the risk & cost of the contractor.

10.0 CONSULTANTS:-

10.1 MahaGenco has engaged M/s. Development Consultants Pvt. Ltd., Navi Mumbai as the Consultants for design and engineering of all the works covered in the scope of this specification. The postal address and contact phone numbers of the Consultants are as below.

M/s. Development Consultants Pvt. Ltd.
Apeejay Commercial Complex, 5th Floor,
Plot No. 87, Sector-17, Vashi, Navi Mumbai – 400 703

Phone No.	:	(91) 022-2789 2863 / 2978 / 3203 / 4541
Fax No.	:	(91) 022-2789 2933
e-mail ID	:	dcplbom@dclgroup.com

You should note that the design basis / criteria, design calculations, selection of equipment type & capacities, engineering designs and all drawings, engineering documents etc., as envisaged in the bid specification, shall be invariably got approved from the Consultants prior to start of related activities. Consultants shall approve all the design & engineering documents and drawings on behalf of the Owner.

11.0 The Terms & Conditions as per the Bid Specification read with subsequent clarifications / amendments / corrigendum/ resolutions, if any, issued by MahaGenco shall be applicable for the contract concluded vide this Letter of Award.

You are requested to confirm the acceptance of this Letter of Award and furnish the Contract Performance Security towards performance of the Contract at the earliest. You are also requested to submit the draft contract agreement at the earliest for our review.

Thanking you,

Yours faithfully,

Encl: As above

27.7.10

Chief General Manager (P&P)

MAHARASHTRA STATE POWER GEN. CO. LTD.

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LANCO INFRATECH LIMITED

Copy s.w.r. to:

Director (Projects)
Director (Operation)
Director (Finance)
ED (Projects-I)
ED (Projects-II), Koradi
ED (C&F), Mumbai.
ED (O&M), Mumbai.
ED (O&M), Nagpur.

Copy f.w.c. to:

Power Finance Corporation Ltd.
'Urjanidhi',1, Barakhamba Lane, Connaught Place
New Delhi-110 001

Secretary (Energy),
Industries, Energy & Labour Deptt.,
Govt. of Maharashtra,
Mantralaya, MUMBAI – 400 032

CGM (Project), Koradi
CGM (Civil – I)
CGM (Civil – II), Koradi
CGM (Const.), Koradi
CGM (O&M), Koradi
CGM (Works), Mumbai.
CGM (Fuel Management Cell)
CGM (PMG)
CGM (RCD)
CGM (CEHSU)
CGM (Finance)
CGM (Accounts)

M/s. Development Consultants Pvt. Ltd.
Apeejay Commercial Complex, 5th Floor,
Plot No. 87, Sector-17, Vashi, Navi Mumbai – 400 703
Fax No. : (91) 022-2789 2933

NOTARY M.M. PABALE Mumbai Maharashtra Regd. No. 15220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

Copy to:

GM-I / GM-II/ GM-III
GM (Project), Koradi
SE (Civil), Koradi Project
OSD to MD
Dy. CAO (P&P), Mumbai

- This has reference to IA No. 205 dtd. 27.07.2010.

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MAHARASHTRA STATE POWER GEN. CO. LTD. BANDRA (EAST) MUMBAI-51

LANCO INFRATECH LIMITED

Koradi TPS Expansion Project 3x660MW

Project Completion Schedule of Main Plant BTG Package

S. No.	Milestone / Activities	Schedule Date		
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25	Mandatory Spares Supply Completion	21-Dec-13		

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MAHARASHTRA STATE POWER GEN. CO. LTD.

LANCO INFRATECH LIMITED

44

Exhibit - D

MAHAGENCO

MAHARASHTRA STATE POWER GENERATION CO. LTD.

Office of Chief Engineer (P&P),'Prakashgad', 3rd floor, Bandra (East), MUMBAI 400 051
(O) 2647 4211 / 2647 2131 (P) 26475759 Fax No. 022-2647 5329

Ref. No. CE/P&P/KRD/COMM/LITL/Claim/ 1770 Date: 17 NOV 2018

To,
Shri Savan Godiawala,
Liquidator (for M/s. Lanco Infratech Ltd.),
22nd Floor, Building No. 5, Tower A,
DLF Cyber City Phase III,
Gurugram - 122002, Haryana,

Sub: Koradi Thermal Power Station Unit 8, 9 & 10 (3 x 660 MW) - BoP -Regarding Recoveries from M/s LITL after liquidation.

Dear Sir,

A contract for Balance of Plant (BOP) package for 3x660MW Koradi TPS Project was awarded to M/s Lanco Infratech Ltd. (LITL) for civil & architectural works, Supply, Erection, Testing & Commissioning respectively. As per Contractual Schedule, M/s LITL had to complete all the works by Feb-2014. However, various supplies & works of BOP packages are balance & yet to be completed in all respects as per the scope of contract. It is learnt that M/s LITL is now liquidated on dtd. 27.08.2018 and it is necessary to put up our claims within stipulated period.
The various BOP works of the project were continuously delayed by M/s LITL.

M/s LITL on various occasions had requested Mahagenco to extend the contractual time limit. On requests of M/s LITL, Mahagenco had permitted M/s LITL to carry out the work without prejudice to the right of Mahagenco to recover the LD for delay in terms of the contract. Also after the scheduled contractual time limit was over, Mahagenco started to retain the amount towards LD from the invoices of M/s LITL.

NOTARY
M.M. PABALE
Mumbai
Maharashtra
Red. No. 15220
Expiry Dt.
30-10-2024
GOVT. OF INDIA

In order to expedite the project, Mahagenco decided to take various steps in the interest of completion of the project by extending financial help to LITL.

Despite the various efforts taken by Mahagenco, M/s LITL repeatedly failed to meet their own commitments to complete the project. O&M was pressing hard for completion of all the balance works and to make available all the systems on auto to facilitate safe, smooth & reliable operation of Units & to meet statutory /environmental norms. Units-8, 9 & 10 are running on commercial basis from 16.12.15, 22.11.16 & 17.01.17 respectively, as such, to run all units on sustainable basis, it is essential to complete the balance works of BOP package.

The works of finalising the estimate for completion of balance works through single tender is under process. However, utmost efforts are taken in preparing the estimates. Accordingly, MSPGCL shall require an estimated amount of Rs. 187.571 Cr to complete the balance works of BoP package as per scope of contract and GST @18%. An amount of Rs. 558.774 Cr against direct payment & advances, interest thereon and liquidated damages are ascertained. An amount of Rs. 11.745 Cr is required to recover from M/s LITL against the payment made by MSPGCL to LITL vendors who had recently completed the works and not paid by LITL. Thus a total recovery comes out to Rs. 758.091 Cr.

An amount of Rs. 427.560 Cr is available with MSPGCL after encashment of BGs, including cash retentions with Project & Civil office. Considering the balance billing of Rs. 84.16 Cr & extra claims of Rs. 28.12 Cr, net recoverable amount from M/s LITL is Rs. 208.125 Cr. An estimated amount of Rs. 15 Cr (in earlier notes & BR) was considered for the material with LITL stores. The available material can be categorized as –

a. Available material which is paid for.
b. BBU & Non-BBU material required for completion of systems, payment of which will be covered in balance payment of Rs. 84.16 Cr.
c. Apart from (a) & (b) above i.e. material in excess of system requirement, T&P and material of capital nature.

NOTARY
M.M. PABALE
Mumbai
Maharashtra
Reg. No. 15220
Expiry Dt.
30-10-2024
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Financial Status of M/s LITL (Amount in Crores)		
A)	BG, Retention & Recoveries	427.560
B)	Special Advances, Direct Payment, Contractual & Other Recoveries	558.774
C)	Amount Required to Complete Balance Works	187.571
D)	Payment to LITL's Sub-vendors by MSPGCL	11.745
E)	**Total Expenses (B+C+D)**	**758.090**
F)	Balance Billing & Extra Claims	122.406
G)	**Net Recoverable from LITL (E-A-G)**	**208.125**

M/s LITL was time & again requested to co-operate in sorting out the material for its valuation but response was very poor. In such a situation, MSPGCL is finding it really very difficult to sort out the material and carry out its valuation.

In this regard with this letter MSPGCL is lodging the claim of Rs. 208.125 Crs with the Liquidators appointed for M/s LITL against the various heads mentioned as above. Enclosing herewith the required proforma 'C' to entertain the claim by operational creditor namely M/s MSPGCL for your kind perusal.

Thanking you,

Yours Sincerely,

17/11/18

Chief Engineer (Projects & Planning)
MSPGCL, Mumbai.

Copy to:
Shri Savan Godiawala,
Deloitte Touche Tohmatsu India LLP
19th Floor, Shapath-V, S G Road,
Ahmedabad - 380015

NOTARY
M.M. PABALE
Mumbai
Maha...shtra
Reg. No. ...5220
Expires On
30-10-20...
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First claim

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FORM C

PROOF OF CLAIM BY OPERATIONAL CREDITORS EXCEPT WORKMEN AND EMPLOYEES

(Under Regulation 17 of the Insolvency and Bankruptcy Board of India (Liquidation Process) Regulations, 2016)

To
Shri Savan Godiawala,
Liquidator/ Resolution Professional of M/s. Lanco Infratech Ltd.,
Deloitte Touche Tohmatsu India LLP
19th Floor, Shapath-V, S G Road,
Ahmedabad – 380015

From
SHYAMSUNDER BAJRANGLAL SONI
Chief Engineer (P&P)
MSPGCL
3rd Floor, Prakashgad,
Bandra (E), Mumbai - 51

Subject: Submission of proof of claim in respect of the liquidation of M/s LITL under the Insolvency and Bankruptcy Code, 2016.

Madam/Sir.

Shri. SHYAMSUNDER BAJRANGLAL SONI, Chief Engineer (P&P), hereby submits this proof of claim in respect of the liquidation of M/s. Lanco Infratech Ltd . The details for the same are set out below:

1.	NAME OF OPERATIONAL CREDITOR	SHYAMSUNDER BAJRANGLAL SONI Chief Engineer (P&P) Maharashtra State Power Generation Co. Ltd.(MSPGCL), Mumbai
2.	ADDRESS OF OPERATIONAL CREDITOR FOR CORRESPONDENCE	3rd Floor, Prakashgad, Bandra (E), Mumbai - 51
3.	TOTAL AMOUNT OF CLAIM, INCLUDING ANY INTEREST, AS AT LIQUIDATION COMMENCEMENT DATE AND DETAILS OF NATURE OF CLAIM	PRINCIPAL: Rs. 194.018 Cr INTEREST: Rs. 14.107 Cr TOTAL CLAIM: 208.125 Cr
4.	DETAILS OF DOCUMENTS BY REFERENCE TO WHICH THE DEBT CAN BE SUBSTANTIATED	Detail list of claims for Rs. 208.125 Cr is enclosed

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Maharashtra
Regd. No. 15220
Expiry Dt.
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5.	DETAILS OF ANY DISPUTE AS WELL AS THE RECORD OF PENDENCY OF SUIT OR ARBITRATION PROCEEDINGS	Nil
6.	DETAILS OF HOW AND WHEN DEBT INCURRED	Mahagenco had awarded contract to M/s LITL for Civil works, supply, erection, testing & commissioning of BOP package amounting Rs. 1305 Cr. However agency has not completed the works as per contract. Hence, Mahagenco has initiated proposals at the risk & cost of M/s LITL. Total claims of 208.125 Cr include following components – a) Special advance and direct payments made to vendors on behalf of M/s LITL & interest thereon. b) Liquidated damages & GST on the same as per contract terms c) Balance payments of LITL vendors made by MSPGCL with concurrence of LITL/IRP. d) Works carried out by MSPGCL at risk & cost of M/s LITL during execution of project by LITL e) LITL POs placed by MSPGCL for balance works at risk cost of LITL. f) Estimated cost of balance works to be carried out by MSPGCL through single implementing agency by floating tender at risk & cost of LITL
7.	DETAILS OF ANY MUTUAL CREDIT, MUTUAL DEBITS, OR OTHER MUTUAL DEALINGS BETWEEN THE CORPORATE DEBTOR AND THE OPERATIONAL CREDITOR WHICH MAY BE SET-OFF AGAINST THE CLAIM	Nil
8.	DETAILS OF ANY RETENTION OF TITLE IN RESPECT OF GOODS OR PROPERTIES TO WHICH THE DEBT REFERS OR ANY OTHER SECURITY	Assets like M/s LITL's site office, furniture, vehicles and T&P are lying at Koradi plant site.
9.	DETAILS OF ANY ASSIGNMENT OR TRANSFER OF DEBT IN HIS FAVOUR	Nil
10.	DETAILS OF THE BANK ACCOUNT TO WHICH THE OPERATIONAL CREDITOR'S SHARE OF THE PROCEEDS OF LIQUIDATION CAN BE TRANSFERRED	A/c Name – Maharashtra State Power Generation Company Ltd. Bank – Canara Bank Branch – Prime Corporate Branch, Nariman Point, Mumbai A/c No. – 0239261010705 NEFT/RTGS/IFS No. – CNRB0001903

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11.	LIST OUT AND ATTACH THE DOCUMENTS RELIED ON IN SUPPORT OF THE CLAIM	(i) Contract Agreement (ii) Notice for termination of contract (iii) Details of works to be carried out at risk & cost of M/s LITL.

Signature of operational creditor or person authorized to act on his behalf

Shri Shyamsunder Bajranglal Soni

Name in BLOCK LETTERS : SHYAMSUNDER BAJRANGLAL SONI
CHIEF ENGINEER (P&P)
MSPGCL, Mumbai

Position with or in relation to creditor : OWNER

Address of person signing : 3RD FLOOR, PRAKASHGAD, BANDRA (E), MUMBAI-51

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Mumbai
Maharashtra
Reg. No. 15220
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50

AFFIDAVIT

I, Shri. SHYAMSUNDER BAJRANGLAL SONI, Chief Engineer (P&P), Maharashtra State Power Generation Co. Ltd., having my office at Prakashgad, Bandra (E), Mumbai-51, do solemnly affirm and state as follows:

1. The above named corporate debtor was, at liquidation commencement date, that is, the 27th day of August 2018 and still is, justly and truly indebted to MSPGCL, in the sum of Rs. **208.125 Cr** for recovery of advance payments, direct payment made to LITL vendors, liquidated damages, balance payment of LITL vendors made by MSPGCL, works carried out by MSPGCL at the risk & cost of M/s LITL.

2. In respect of above claim of the said sum or any part thereof, I have relied on and the documents specified below:
   (i) Concurrence of LITL/IRP for making balance payments to M/s LITL vendors.
   (ii) Various Estimates for pending balance work of M/s LITL BOP (Balance of Plant) package.
   (iii) LITL POs placed by MSPGCL for balance works at risk & cost of LITL.
   (iv) Contract Agreements
   (v) Notice for termination of contract
   (vi) Audited Financial Statement of M/s LITL submitted by Koradi Site Office.

3. The said documents are true, valid and genuine to the best of my knowledge, information and belief.

4. In respect of the said sum or any part thereof, I have not, nor have any of my officer, nor has any person, by my/our order/, to my/our knowledge or belief, for my/our use, had or received any manner of satisfaction or security whatsoever. The audited statement of the financial status of M/s LITL is annexed herewith.

Solemnly, affirmed at _____ on _____ day, the 17 NOV 2018 of _____ 20____.

Before me,

Notary

NOTARY SANTOSH K. SINGH GR. MUMBAI Maharashtra Regn. No.11167 GOVERNMENT OF INDIA

BEFORE ME
SANTOSH K. SINGH
NOTARY
MAHARASHTRA
(Govt. of India)

Deponent's signature

SHYAMSUNDER BAJRANGLAL SONI

17 NOV 2018

Registe- No. 7319
Santosh K. Singh 17/11/2018

VERIFICATION

I, Shri. SHYAMSUNDER BAJRANGLAL SONI, the Deponent hereinabove, do hereby verify and affirm that the contents of para 1 to 4 of this affidavit are true and correct to my knowledge and belief. Nothing is false and nothing material has been concealed therefrom.

Verified at _____ on this _____ day of _____ 20 17 NOV 2018

NOTARY SANTOSH K. SINGH MUMBAI MAHARASHTRA Regd. No. 11167 Exp. Dt. 6-4-2020 GOVERNMENT OF INDIA

Deponent's signature

SHYAMSUNDER BAJRANGLAL SONI

Exhibit - E

51

LITL | Verification of Claim submitted by Mahagenco

1/10/19 1:38 PM

From: "IN, Lanco Infratech IP (IN - Mumbai)" <inlancoinfratechip@deloitte.com>

To: "cgmgpp@mahagenco.in" <cgmgpp@mahagenco.in>

Cc: "Godiawala, Savan (IN - Ahmedabad)" <sgodiawala@deloitte.com>, "Manish K, Sharma (IN - Delhi)" <smanish@deloitte.com>, "IN, Project Lanco (IN - Mumbai)" <inprojectlanco@deloitte.com>

Dear Sir/ Madam,

We have received your claim of INR 208.12 Crs against Lanco Infratech Limited under liquidation. We have verified the claim on the basis of various supporting documents provided by you and on the basis of such verification, we have arrived at a figure of INR 77.29 Crs as the amount admissible. The detailed working along with reasons for rejection of the part claim are provided in the attached excel file for your perusal. Please let us know if you have any comments / observations with respect to the same.

Best Regards,
For or on behalf of Savan Godiawala
Liquidator for Lanco Infratech Limited
Insolvency Professional Regn.No.: IBBI/IPA-001/IP-P00239/2017-18/10468

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Attachments:

- Letter to RP from Mahagenco LD & Balance Supplu & Balance Work.pdf
- Letter issued by Mahagenco for direct payment.pdf
- InLanco 630.pdf
- MAHAGENCO Claim Verification.xlsx

Exhibit-F

52

MAHAGENCO

MAHARASHTRA STATE POWER GENERATION CO. LTD.

Office of Chief Engineer (P&P),'Prakashgad', 3rd floor, Bandra (East), MUMBAI 400 051
(O) 2647 4211 / 2647 2131 (P) 26475759 Fax No. 022-2647 5329

Ref. No. CE/P&P/KRD/COMM/LITL/Claim/ Date: 20 JUN 2019

Letter to be dispatched through register A.D.
No-0678

To,
Shri Savan Godiawala,
Liquidator (for M/s. Lanco Infratech Ltd.),
22nd Floor, Building No. 5, Tower A,
DLF Cyber City Phase III,
Gurugram – 122002, Haryana,

Sub: Koradi Thermal Power Station Unit 8, 9 & 10 (3 x 660 MW) – BoP –Regarding Recoveries from M/s LITL after liquidation. Justification of rejected claims.

Ref. : Claims lodged by MAHAGENCO vide letter no. CE/ P&P/ KRD/ COMM/ LITL/ Claim/1770 dtd. 17.11.2019.

Dear Sir,

This has a reference to your mail dtd. 10.01.2019, wherein you have stated that the claims lodged by MAHAGENCO, referred above, are verified by you and that claims of Rs. 77.29 Crs are only admissible.

The justification of the claims not admitted by you is given as below along with the supporting documents (annexed).

As per the sheets enclosed with e-mail, following claims are rejected:

A. Contractual & Other Recoveries (Amount in Cr)

SN	Description of Recovery	As per MSPGCL	As per LITL	Remarks
1	Recovery of LD	267.874	203.310	As per letter no. 0551 dtd. 07.04.18
2	Other Recoveries	1.890	-	Not admissible due to lack of supporting documents to substantiate the same
3	BOCW Cess	12.420	6.104	Provision @ 1% of total cost as per BOCW Act

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B. Amount required to complete the balance works (Amount in Cr)

SN	Description of Work	As per MSPGCL	As per LITL	Remarks
1	Proposal for Fire Fighting & Urgent works	2.77	-	Not admissible due to lack of supporting documents to substantiate the same.
2	Amount proposed for purchase of Mandatory spares	15.00	-	
3	Supervision charges @ 15%	20.734	-	
4	Payment of vendors done by MSPGCL	11.745	10.675	As per letter no. 0551 dtd. 07.04.18

C8

The claims other than above are shown admissible and amount of GST is calculated on admissible claims.

Justification of Rejected Claims :

A) Contractual and Other Recoveries :

1. **Liquidated Damages:** IRP has rejected the claim with ref. to Mahagenco letter no.0551 dated 07.04.2018. However, in the letter Mahagenco has stated that the said financials are provisional subject to report from M/s CPRI for delay analysis. If there is any shortfall in available amount after findings of third party delay analysis report, MSPGCL reserve the right to recover the same from M/s LITL and/or its successor(s). Moreover, the letter also states that Mahagenco has decided to **reduce retention** amount of LITL against LD from Rs. 267.47 Cr to 203.31 Cr. It means reduction in retention amount only and not the LD amount.

   A4-A5

   As per contract clause no. 6.1.3, the total liquidated damages shall be limited to 20% of the contract price. Thus maximum LD of Rs. 267.874 Cr is leviable and the same is considered in the claims lodged with the Liquidator. However, the LD claim of Rs. 203.31 Cr is considered.

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The delay in Ash Handling Plant, Coal Handling Plant, Fuel Oil Pump House & Auxiliary Boiler was reviewed as per Section-3, Special Conditions of contract, Clause no. 6.3, considering the following aspects:

- Delay in handing over of front to BOP agency.
- System is available for start of trial operation.
- BOP agency has taken all the efforts in its financial capability to provide inputs whenever required by BTG agency, even at an additional cost by making contingency arrangement.

Clause No. 6.3 is reproduced below:

The Liquidated Damages Penalties will be levied unit wise and for the purpose of levy of liquidated damages Penalties 1/3rd of the total contract price shall be considered as contract price for the BOP package for one Unit.

This could result in reduction of LD to Rs. 203.31 Cr. But the LD clause does not limit the LD to 20% of package cost hence the inordinate delay in other packages (incomplete till date) continue to add in LD @ ½% per week limited to 20% of total contract cost.

LD calculated on completed packages as per delay = 42.69 Cr (On package cost of 534.23 Cr with PV for AHP, CHP, FOPH & Aux Boiler)

LD on balance incomplete packages upto 28.02.2018 = 839.28 Cr (On package cost of 803.14 Cr with PV. Delay of 209 weeks from 28.02.14 to 28.02.18. LD @ ½% per week shall be 104.5%).

However, as per contract clause no. 6.1, LD shall be limited to 20% of total contract cost including PV which comes to Rs. 267.874 Cr.

2. **Other Recoveries** (1.890 Cr) : This is not accepted by the liquidator due to lack of supporting documents to substantiate the claim.

The other recoveries include miscellaneous recoveries of Rs. 47,86,849/- from Project office & Rs. 1,67,18,716/- from Civil office. Project office recoveries include electricity charges and travelling expenses for extension of Bank Guarantees of LITL. Separate sheet showing the details is enclosed as Annexure - IA & IB.

C-35
C-37

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3. **BOCW Cess :** Total executed value of contract including price variation is Rs. 1242.33 Cr. As such 1% of executed value i.e. Rs. 12.42 Cr was proposed against BOCW cess in claims. However, LITL consider BOCW cess as 6.104 Cr. Executed value of civil works with PV is Rs. 770.46 Cr & accordingly 1% cess shall be Rs. 7.71 Cr. Similarly executed value of E&M ETC with PV is Rs. 42.52 Cr & accordingly 1% cess shall be Rs. 0.43 Cr. Thus total BOCW cess shall be Rs. 8.14 Cr. Statement showing the details of Billed works is enclosed Annexure - IIA & IIB. C-39 C-41

As per GoM circular No. BOCW/CESS/2018/4230 dated 10.07.2018 (enclosed) BOCW cess is to be recovered from contractor. A28-A31

B) Amount Required to complete the Balance Works :

1. **Proposal for Fire Fighting and Urgent works** (2.770 Cr) : This is not accepted by the liquidator due to lack of supporting documents to substantiate the claim.

   This claim was inclusive of following costs –

1	Fire Fighting system proposal processed by site office due to urgency	79,88,000.00
2	Fire Fighting system at critical locations order placed by site office due to urgency	14,32,600.00
3	Supply & erection of Fire retardant cable coating compound on cable & fire stop mortar seal	1,58,83,000.00
4	Urgent proposal for AHP Transport Air & Conveying air system	24,35,398.00

All three Units of 660 MW are running on commercial basis with lot of incomplete BoP works. Fire fighting works are of utmost priority for safety of the plant. The plant was not ready to handle any unfortunate eventuality due to fire hazard. Hence following orders are issued to complete the urgent works of fire fighting system :

Sr.No. 1 - Order placed by this office, copy of the same is enclosed. Work is in progress. (PO No. 4500100597) A18 -A20

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A21 - A27

Sr.No. 2 - Three nos. of orders placed by this office, copies enclosed. Work completed. (PO Nos. 4500086576, 4500089135 & 4500091424)

Sr.No. 3 - Fire Mortar seal - Tender is floated by this office. Copy of cover page of tender is enclosed. A17

Sr.No. 4 - The proposal for spares for conveying system of AHP was initiated. But due to inadequate response, the proposal is cancelled and the spares will be included in single tender and the amount will also be included in the future claims that will be lodged by MAHAGENCO until the completion of the project.

2. **Amount proposed for purchase of Mandatory Spares** (15.00 Cr) : This amount is not accepted assuming that the mandatory spares are included in the single tender.
   As per Resolution No. 2018/2664 passed at the meeting of Board held on 10.02.2018, the Board accorded approval to procure mandatory spares of amount **Rs. 15.00 Cr by O&M** as required. As such, the mandatory spares are not included in the scope of proposed single tender for balance works of BoP. Hence the amount of Rs. 15.00 Cr is claimed separately for mandatory spares.
3. **Supervision Charges @ 15%** (20.74 Cr) : This is not accepted by the liquidator due to lack of supporting documents to substantiate the claim. A32-A34
   MSPGCL has to deploy its manpower for carrying out works at risk & cost of any contractor. This includes preparation of proposal with estimate, tendering and placing order as per purchase procedure of MSPGCL, inspection & storage of material, if any, quality checks & supervision of works. As these works are in addition to the regular works of MSPGCL, 15% charges are levied on the works carried out by MSPGCL at the risk & cost of contractor on account of administrative & supervision charges. The relevant clause for 15% supervision charges as per general conditions in MSPGCL is enclosed for reference. A34

4. **Payment of vendors done by MSPGCL** : An amount of Rs. 10.675 Cr is admitted against our claim of Rs. 11.745 Cr.
   An amount of Rs. 10.675 Cr is disbursed to the vendors of M/s LITL as per the consent received from IRP vide letter no. InLanco/630 dtd. 25.07.2018. C7
   Further, three other vendors (M/s CDSS, M/s SMCS & M/s HMC) came up with their claims which was not included in the list of Rs. 10.67 Cr submitted by M/s LITL/IRP for payment disbursement. The payment issue of the labours of these agencies was taking a serious mode and was disturbing industrial peace & harmony. This was disturbing the works of O&M as well as balance works of project. The matter was reported vide

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various communications. It is essential to make the outstanding payment of these vendors in order to maintain industrial peace and to carry out balance works smoothly. As such, it was proposed to release the outstanding payment of these vendors, amounting to Rs. 1.07 Cr, vide office note no. 1757 dtd. 04.09.2018. The payment is not released as concurrence of competent authority is not received till date. As such, the amount of Rs. 1.07 Cr was proposed in the claims as proposed balance payment to LITL vendors.

Justified Amount for the claims not admitted by M/s LITL: (Amount In Crores)

SN	Description of Recovery	As per MSPGCL	As per LITL	**Amount as justified above**
1	Recovery of LD	267.874	203.310	**267.874**
2	Other Recoveries	1.890	-	**2.15**
3	BOCW Cess	12.420	6.104	**8.14**
1	Proposal for Fire Fighting & Urgent works	2.77	-	**2.70**
2	Amount proposed for purchase of Mandatory spares	15.00	-	**15.00**
3	Supervision charges @ 15%	20.734	-	**20.734**
4	Payment of vendors done by MSPGCL	11.745	10.675	**11.745**
5	**Final Admissible Amount**	**208.125**	**77.229**	**204.02**

In view of the above all the claims lodged by MAHAGENCO on dt 17.11.2018 are justified as above.

Thanking you,

Yours truly,

20.6.19
Chief Engineer (Projects & Planning)
MSPGCL, Mumbai.

Copy to:
Shri Savan Godiawala,
Deloitte Touche Tohmatsu India LLP
19th Floor, Shapath-V, S G Road,
Ahmedabad - 380015

DYCE (Comm)
SE (Comm)/EE (Comm)/AEE (Comm)
19/6/19

Exhibit - G

C27

MAHAGENCO

MAHARASHTRA STATE POWER GENERATION CO. LTD.

Office of Chief Engineer (P&P),'Prakashgad', 3rd floor, Bandra (East), MUMBAI 400 051
(O) 2647 4211 / 2647 2131 (P) 26475759 Fax No. 022-2647 5329

Ref. No. CE/P&P/KRD/COMM/LITL/Claim/ No-1513 Date: - 2 DEC 2019

To,
Shri Savan Godiawala,
Liquidator (for M/s. Lanco Infratech Ltd.),
22nd Floor, Building No. 5, Tower A,
DLF Cyber City Phase III,
Gurugram – 122002, Haryana,

Sub: Koradi Thermal Power Station Unit 8, 9 & 10 (3 x 660 MW) – BoP –Regarding Recoveries from M/s LITL after liquidation. Justification of rejected claims.

Ref. : 1. Claims lodged by MAHAGENCO vide letter no. CE/ P&P/ KRD/ COMM/ LITL/ Claim/1770 dtd. 17.11.2018.
2. Revised Claims lodged by MAHAGENCO vide letter no. CE/ P&P/ KRD/ COMM/ LITL/ Claim/648 dtd. 20.06.2019.

Dear Sir,

Mahagenco has terminated the contract for Balance of Plant (BOP) package for 3x660MW Koradi TPS Project, awarded to M/s Lanco Infratech Ltd. (LITL), on 17.02.2017. As per Contractual Schedule, M/s LITL had to complete all the works by Feb-2014. However, various supplies & works of BOP packages are balance & yet to be completed in all respects as per the scope of contract.

Claims

M/s LITL is now liquidated on dtd. 27.08.2018 and Mahagenco had lodged the claims of Rs. 208.125 Crores with IRP, vide letter dtd.17.11.2018 (ref.1 above), for various balance and pending works at Koradi site.

The IRP dismissed some of the claims as mentioned in the table A below.

A. Claims not admitted by IRP

SN	Description of Claims	As per MSPGCL	As per IRP
1	Recovery of LD	267.874	203.310
2	Other Recoveries	1.890	-
3	BOCW Cess	12.420	6.104
4	Proposal for Fire Fighting & Urgent works	2.77	-
5	Amount proposed for purchase of Mandatory spares	15.00	-
6	Supervision charges @ 15%	20.734	-
7	Payment of vendors done by MSPGCL	11.745	10.675

...rto IRP-from CMD-additional Claims

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Revised Claims

A revised claim was again lodged with the IRP vide letter dtd. 20.06.2019, wherein the claims not admitted by the IRP were justified and submitted. These revised claims were for the amount of Rs. 204.02 Crores, the details are enclosed as annexure A. The summary of the claims lodged with IRP is as given below.

B. Additional Claims to be lodged with IRP : (Amount In Crores)

		Claims Lodged on 17.11.18	As Admitted by IRP on 01.01.19	Claims Lodged (revised) 20.06.19
A)	BG, Retention & Recoveries	427.56	427.56	427.56
B)	Special Advances, Direct Payment, Contractual & Other Recoveries	558.774	474.383	554.754
C)	Amount Required to Complete Balance Works	187.571	142.137	187.489
D)	Payment to LITL's Sub-vendors by MSPGCL	11.745	10.675	11.745
E)	**Total Expenses (B+C+D)**	758.09	627.195	753.988
F)	Balance Billing & Extra Claims	122.406	122.406	122.406
G)	**Net Recoverable from IRP (E-A-F)**	**208.124**	**77.229**	**204.022**

The admission by IRP for the revised claims of Rs. 204.022 Crores is still awaited.

Additional Claims :

The IRP has admitted the claims, dtd.17.11.2018, for floating a single tender for balance Civil Works (Rs. 33.62 Crs) and E&M Works (Rs. 60.995 Crs).

Mahagenco floated the tenders and placed the orders for these works as follows: A14 - A26

1. Balance Civil & Structural Works- Work order no. CE(C)-I /KRD /BOP/ Risk & Cost /T-589/2018-19/654 dtd.24.07.2019 for Amount of Rs. 47.26 Crores and GST of Rs. 8.51 Crs.
2. E&M Balance Works- Work order no. P&P/Koradi 3x660MW/Balance BOP U-8,9&10/1209 dtd.01.10.2019 for Amount of Rs. 84.96 Crores and GST of Rs. 15.29 Crs. A1 - A13

As such, there is an additional expenditure of Rs. 50.936 Crores (Rs. 13.64 (Civil) + Rs. 23.97 (E&M) + Rs. 5.64 (15% Supervision charges) + Rs. 7.69 (GST)) for completing the various balance and pending works at Koradi site.

In addition to the above, there are other balance works, amounting to Rs. 12.364 Crores, as per scope of contract but proposed for de-scoping by M/s LITL. A27 - A28

The supporting documents for these additional claims are enclosed herewith.

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Reg. No. 5220
Exp. Dt. 30-10-2024
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In view of the above, the additional claims amounting to Rs. 63.30 Crores (inclusive of GST) are being lodged herewith by Mahagenco as follows:

	Description of Claims	Claims Lodged (revised) 20.06.19	Revised claims to be lodged	Additional Claims (Difference)
A)	BG, Retention & Recoveries	427.56	427.56	0
B)	Special Advances, Direct Payment, Contractual & Other Recoveries	554.754	554.756	0.002
C)	Amount Required to Complete Balance Works	187.489	238.425	50.936
D)	Payment to LITL's Sub-vendors by MSPGCL	11.745	11.745	0.000
E)	Balance works as per scope of contract but proposed for descoping by LITL	0	12.364	12.364
F)	**Total Expenses (B+C+D+E)**	**753.988**	**817.290**	**63.302**
G)	Balance Billing & Extra Claims	122.406	122.406	0
H)	**Net Recoverable from LITL (F-A-G)**	**204.022**	**267.324**	**63.302**

It is once again requested to settle all claims lodged by Mahagenco till date, at the earliest.

Thanking you,

NOTARY ... GOVT. OF INDIA ... Exp. Dt. 30-10-2024

Yours Sincerely,

2.12.19

Chief Engineer (Projects & Planning)
MSPGCL, Mumbai.

Copy to:
Shri Savan Godiawala,
Deloitte Touche Tohmatsu India LLP
19th Floor, Shapath-V, S G Road,
Ahmedabad – 380015

Exhibit - H

61

Insolvency Professional Regn.No.: IBBI/IPA-001/IP-P00239/2017-18/10468
Deloitte Touche Tohmatsu India LLP
19th Floor, Shapath – V, S.G. Road, Ahmedabad – 380015

From: Gupta, Anusha <anushagupta@deloitte.com>
Sent: 21 October 2020 15:10
To: cgmgpp@mahagenco.in
Cc: Godiawala, Savan <sgodiawala@deloitte.com>; Manish K, Sharma <smanish@deloitte.com>; IN, Lanco Infratech IP <inlancoinfratechip@deloitte.com>; Vaithilinganadar Thangapandian <directorproj@mahagenco.in>; directorf@mahagenco.in; tdgpp@mahagenco.in; tatomd@mahagenco.in; Kumari, Puja <puja.kumari@AMSShardul.com>
Subject: RE: [EXT] Koradi Thermal Power Station Unit 8, 9 & 10 (3 x 660 MW) – BoP –Regarding concurrence of sub-vendors payment against BOP package-reg.

Dear Sir,

This has reference to the revised claim filed by you on 2 December 2019, for an amount of INR 267.32 crore. In this regard, reference is drawn to your letter no. CE/P&P/KRD/COMM/LITL/Claim/1513 dated 2 December 2019, wherein additional claims amounting to INR 63.30 crore have been filed. We request you to kindly arrange to send soft copies of documents supporting the aforesaid additional claim of INR 63.30 crore on Liquidator's email id : inlancoinfratechip@deloitte.com . We shall verify and examine the admissibility of the revised claim once the above supporting documents are received.

Kind regards,
For or on behalf of Savan Godiawala
Liquidator for Lanco Infratech Limited
Insolvency Professional Regn.No.: IBBI/IPA-001/IP-P00239/2017-18/10468
Deloitte Touche Tohmatsu India LLP
19th Floor, Shapath – V, S.G. Road, Ahmedabad – 380015

From: cgmgpp@mahagenco.in <cgmgpp@mahagenco.in>
Sent: Friday, October 16, 2020 11:05 AM
To: Godiawala, Savan <sgodiawala@deloitte.com>
Cc: Vaithilinganadar Thangapandian <directorproj@mahagenco.in>; directorf@mahagenco.in; tdgpp@mahagenco.in; tatomd@mahagenco.in
Subject: [EXT] Koradi Thermal Power Station Unit 8, 9 & 10 (3 x 660 MW) – BoP –Regarding concurrence of sub-vendors payment against BOP package-reg.

Sir,

Please find attached herewith letter no. 643 dated 15.10.2020 regarding above subject.

Thanks with regards,

O/o Chief Engineer (P&P), Mumbai

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NOTARY
M.M. PARALE
Mumbai
Maharashtra
Reg. No. 5220
Expiry Dt.
30-10-2024
GOVT. OF INDIA

Exhibit - I 63

Further, with reference to our earlier mail dated 25.11.2020, MAHAGENCO is requested to provide the details of payments made to sub-contractors of LITL for an additional amount of INR 1.07 crore (i.e. invoices and / or proof of payment).

Please let us know in case of any clarification required.

Kind regards,
For or on behalf of Savan Godiawala
Liquidator for Lanco Infratech Limited
Insolvency Professional Regn.No.: IBBI/IPA-001/IP-P00239/2017-18/10468
Deloitte Touche Tohmatsu India LLP
19th Floor, Shapath – V, S.G. Road, Ahmedabad – 380015

From: Chief Engineer - GPP <cgmgpp@mahagenco.in>
Sent: 07 December 2020 16:58
To: IN, Lanco Infratech IP <inlancoinfratechip@deloitte.com>
Cc: Godiawala, Savan <sgodiawala@deloitte.com>; Manish K, Sharma <smanish@deloitte.com>; Director (Projects) <directorproj@mahagenco.in>; tdgpp <tdgpp@mahagenco.in>; TA to Chairman & Managing Director <tatomd@mahagenco.in>; Sreeram Venkatesh <venkatesh.s@lancogroup.com>; Chief Engineer - Koradi Projects <cgmkrdproj@mahagenco.in>
Subject: [EXT] Re: Koradi Thermal Power Station Unit 8, 9 & 10 (3 x 660 MW) – BoP –Regarding supporting documents for Rs. 63.30 crs additional claims.

Dear Sir,
Referring to you trailing mail, letter No.867 dtd. 07.12.2020 along with soft copies of supporting documents to substantiate the additional claim of INR 63.30 crore are attached herewith.

Warm Regards,

Chief Engineer (P&P)
MAHAGENCO,

NOTARY M.M. PABALE Mumbai Maharashtra Regd. No. 10220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

From: IN, Lanco Infratech IP <inlancoinfratechip@deloitte.com>
Sent: Friday, December 4, 2020 2:02 PM
To: Chief Engineer - GPP <cgmgpp@mahagenco.in>
Cc: Godiawala, Savan <sgodiawala@deloitte.com>; Manish K, Sharma <smanish@deloitte.com>; IN, Lanco Infratech IP <inlancoinfratechip@deloitte.com>; Director (Projects) <directorproj@mahagenco.in>; Director (Finance) <directorf@mahagenco.in>; tdgpp <tdgpp@mahagenco.in>; TA to Chairman & Managing Director <tatomd@mahagenco.in>; Sreeram Venkatesh <venkatesh.s@lancogroup.com>
Subject: [EXTERNAL] - FW: Koradi Thermal Power Station Unit 8, 9 & 10 (3 x 660 MW) – BoP –Regarding concurrence of sub-vendors payment against BOP package-reg.

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Sir,

This is a gentle reminder to kindly arrange to send soft copies of supporting documents to substantiate the additional claim of INR 63.30 crore as requested in our trailing mail dated 21 October 2020.

Kind regards,
For or on behalf of Savan Godiawala
Liquidator for Lanco Infratech Limited

Exhibit-J - 64

Fw: [EXTERNAL] - RE: Koradi Thermal Power Station Unit 8, 9 & 10 (3 x 660 MW) – BoP –Regarding supporting documents for Rs. 63.30 crs additional claims.

tdgpp <tdgpp@mahagenco.in>
Wed 12/9/2020 1:34 PM
To: Chief Engineer - GPP <cgmgpp@mahagenco.in>

2 attachments (1,021 KB)
MAHAGENCO Claim Verification.xlsx; FW: Payments to sub-vendors of M/s LITL;

NOTARY M.M. PABALE Mumbai Maharashtra Regd. No. 15220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

From: IN, Lanco Infratech IP <inlancoinfratechip@deloitte.com>
Sent: Wednesday, December 9, 2020 1:25 PM
To: Chief Engineer - GPP <cgmgpp@mahagenco.in>; IN, Lanco Infratech IP <inlancoinfratechip@deloitte.com>
Cc: Godiawala, Savan <sgodiawala@deloitte.com>; Manish K, Sharma <smanish@deloitte.com>; Director (Projects) <directorproj@mahagenco.in>; tdgpp <tdgpp@mahagenco.in>; TA to Chairman & Managing Director <tatomd@mahagenco.in>; Sreeram Venkatesh <venkatesh.s@lancogroup.com>; Chief Engineer - Koradi Projects <cgmkrdproj@mahagenco.in>
Subject: [EXTERNAL] - RE: Koradi Thermal Power Station Unit 8, 9 & 10 (3 x 660 MW) – BoP –Regarding supporting documents for Rs. 63.30 crs additional claims.

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Sir,

We have duly verified the revised claim submitted by you amounting INR 267.32 crore, and the status of your claim is as below:

(INR Crore)

Particulars	As per Mahagenco's Original Claim	As per Mahagenco's Revised Claim	As per Liquidator after verification of claim
Contractual and Other Recoveries	558.774	554.754	474.383
Balance Works	187.571	238.426	186.098
Balance Works as per scope of contract but proposed for de-scoping by LITL	-	12.360	12.355
Payment for Vendors done by MSPGCL	11.745	11.745	10.675
Net total	**758.091**	**817.286**	**683.510**
Less : BG & Retention	-427.560	-427.560	-427.560
Less : Balance Billing & Extra Claim	-122.406	-122.406	-122.406
Final Admissible Amount	**208.125**	**267.320**	**133.544**

The detailed item-wise reasons for rejection are as given in the attached excel file. Kindly refer the same. In respect of claim for "Balance Works as per scope of contract but proposed for de-scoping by LITL", MAHAGENCO is requested to provide letter no. CE(C)-II/KRD/Tech/2299 dated 16.11.2017 for our internal record.

Exhibit - K

65

MAHAGENCO

MAHARASHTRA STATE POWER GENERATION CO. LTD.

Office of Chief Engineer (P&P),'Prakashgad', 3rd floor, Bandra (East), MUMBAI 400 051
(O) 2647 4211 / 2647 2131 (P) 26475759 Fax No. 022-2647 5329

Ref. No. CE/P&P/KRD/COMM/LITL/Claim/No-0954 Date: 29 SEP 2021

To,
Shri Savan Godiawala,
Liquidator (for M/s. Lanco Infratech Ltd.),
22nd Floor, Building No. 5, Tower A,
DLF Cyber City Phase III,
Gurugram – 122002, Haryana,

Sub: Koradi Thermal Power Station Unit 8, 9 & 10 (3 x 660 MW) – BoP: Regarding acceptance of rejected/partially rejected Claims and revised claims thereof.

Ref. : 1. Revised Claims lodged by MSPGCL vide letter no. CE/ P&P/ KRD/ COMM/ LITL/ Claim/1513 dtd. 02.12.2019.
2. your mail dtd. 09.12.2020.

Dear Sir,

This has reference to your mail dtd. 09.12.2020, vide which you have rejected / partially rejected some of the claims submitted by MSPGCL vide letter under ref-1. MSPGCL has reviewed the details of these claims and reasons for rejection. Accordingly, supporting documents, wherever necessary (enclosed herewith) and claim-wise justification to substantiate the claims is as below.

Justification of Rejected/partially rejected/Additional Claims:

1. **Recovery of L.D. and applicable GST on L.D**:

The claim to the tune of Rs.64.874 Crs has been rejected, giving reference of MSPGCL letter no. 0551 dated 07.04.2018. In this regard, it is to submit that, MSPGCL vide this letter has not conveyed amount of applicable L.D., whereas informed regarding decision of MSPGCL to reduce retention amount against L.D. to Rs. 203.310 crores. Vide this letter, it is also communicated that, the amount of L.D. shall be finalized after receipt of third party delay analysis report from M/s. CPRI and MSPGCL reserves the right to recover any additional amount than retention against L.D., from M/s. LITL or/and its successor.

Due to delay in providing major inputs (viz. NDCT, AHP etc.), there is delay in completion of trial operation of units as follows: Unit-8: @23 months, Unit-9: @23 months, Unit-10: @26 months. On the date of termination, most of the BoP facilities were incomplete. As per Delay analysis and relevant clauses of contract with M/s. LITL, L.D. is applicable to full extent. Accordingly, the total L.D. shall be 20% of the contract price along with applicable price variation, and less the price for supply of Mandatory Spares excluding taxes & duties, which work out to Rs. 267.874 crs. **Calculations of applicable L.D. has been submitted vide MSPGCL letter dated 20.06.2019.** In view of above, the rejection of partial amount of the claim against L.D. is not justifiable.

NOTARY M.M. PABALE Mumbai Maharashtra Reg. No. 15220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

2. **Other recoveries:**

MSPGCL has lodged comprehensive claim of Rs. 2.151 Crs against various recoveries to be made from M/s LITL. This claim has been rejected with reason that 'Lack of supporting documents to substantiate the claim'.

It is to submit that, these recoveries include electricity charges accountable to M/s LITL, travelling expenses incurred by MSPGCL for extension of Bank Guarantees of LITL, difference amount of GST/Service Tax on extra claims etc. Detail breakup of these recoveries is as below.

Electricity charges	: Rs. 46,42,518/-
Recovery against travelling expenses	: Rs. 1,68,342/-
Service Tax recovery against mobilization advance	: Rs. 8,40,205/-
GST & Service tax on extra claim	: Rs.1,58,50,000/-

N15
N47

Documentary evidences about these recoveries are enclosed herewith.

3. **BOCW Cess:**

MSPGCL has lodged claim of Rs.8.140 Crs against BOCW Cess, considering applicability on executed value of civil works with PV plus executed value of E&M ETC work along with P.V. However, BOCW cess of Rs. 6.104 Cr has been admitted.

In this regard, it is to submit that, 1% Cess on executed value of civil works with PV (Rs. 770.46 Cr) works out to Rs. 7.71 Cr. Similarly, 1% cess on executed value of E&M ETC work (Rs. 42.52 Cr) works out to Rs. 0.43 Cr. As such, total amount of Rs. 8.14 Cr. against BOCW cess shall need to be considered for admittance.

N49

Statement showing the details of Billed works for BOCW Cess consideration is enclosed.

4. **Fire fighting and urgent work:**

MSPGCL has lodged claim of Rs. 2.770 Crs against Fire fighting related urgent work. The same is rejected with reason: 'Lack of supporting documents to substantiate the same'.

In this regard it is to submit that, project site office has carried out the Fire fighting related work, by placing orders, amounting to Rs.1.116 Crs. Since the subject work is included in BoP scope of work, same need to be admitted against the BoP contract.

The statement showing item-wise reference of corresponding BBU, copies of Purchase orders and final invoices with certification regarding satisfactory completion of work are attached herewith.

N51 - N66

Further, supply of Fire Mortar seal and cable compound is in the scope of M/s LITL. The estimated cost for supply of these items is Rs. 1.58 Crs. Since the subject procurement is included in BoP scope of work, and not included in Single order placed for Balance BoP work; cost of the same amounting to Rs 1.58 Crs is being lodged by MSPGCL for admittance against the BoP contract. However the actual amount of claim shall be submitted to Liquidator, after placement of order for the same. **The copy of BBU PO to M/s. LITL for this supply items is enclosed herewith in support of claim**

N79-1

5. **Purchase of mandatory spares:**

MSPGCL has lodged claim of Rs. 15 Crs against Purchase of mandatory spares. The same is rejected by Liquidator with reason: 'already included in single orders for balance work'.

NOTARY
M.M. PABALE
Mumbai
Maharashtra
Reg. No. 15220
Expiry Dt. 30-10-2024
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In this regard it is to submit that, BoD MSPGCL has accorded approval to procure mandatory spares of BoP package, with estimated cost of Rs.15 Crs. **The proposed procurement of the mandatory spares was within the scope of the BOP Contractor and not included in the scope of the single tender floated for completion of the balance works.** As such the reason for rejection of this claim is not justifiable. Hence the claim against estimated cost for procurement of mandatory spares amounting to Rs. 15 crs is being resubmitted herewith by MSPGCL for acceptance. However, actual cost of the mandatory spares shall be submitted after placement of order/s.

6. **M.S. Pipes for ADPL:**

In view to complete work of Ash Disposal Pipe Line (ADPL) from Koradi TPS to Khasara ash bund, M.S. pipes need to be procured. The estimated cost of procurement is tabulated as below.

(Amount in Rs. Crores)

SN	Description of claims for admittance	MSPGCL's claims
	Amount required to complete the balance work:	
i	Supply of MS Pipes for ADPL	**3.323**
ii	Supervision charges @ 15% on (i) above.	**0.498**
iii	GST @ 18% on (i) & (ii) above.	**0.688**
iv	Total	**4.509**

N71

Since the subject procurement is included in BoP scope of work, additional claim of Rs.4.509 Crs. as detailed above, is being lodged herewith by MSPGCL for admittance against the BoP contract. However, actual cost of procurement shall be conveyed, after placement of order/s. **The copy of BBU for this supply items is enclosed herewith in support of claim.**

N69

7. **Supervision Charges:**

MSPGCL has lodged claim of Rs. 26.374 Crs against supervision charges for carrying out balance work of BoP package. The same is rejected by Liquidator with reason: 'No any provision in LoA, furnished for the balance work'.

In this regard, it is to submit that the supervision charges are claimed for additional supervisory and other work required to be carried out by MSPGCL personnel for completion of the balance work of BoP package. The detail elaboration regarding above claim is as below:

MSPGCL has to deploy its manpower for carrying out works at risk & cost of any contractor. This includes preparation of proposal with estimate, tendering and placing order as per purchase procedure of MSPGCL, inspection & storage of material, quality checks & supervision of works. These works are in addition to the regular works of MSPGCL. As per standard practice and General Terms and conditions of the Tender guidelines; 15% charges are levied on the works carried out at the risk & cost of contractor on account of administrative & supervision charges. The corrected amount of claim against supervision charges for carrying out balance work is Rs. 26.810 Crs., including the supervision charges as per mentioned in sr. no.6 above. **The copy of MSPGCL's General requirement, Terms & Conditions applicable to tender works is enclosed herewith for reference.**

N77

NOTARY
M.M. PABALE
Mumbai
Maharashtra
Reg. No. 15220
Exp. Dt.
30-10-2024
GOVT. OF INDIA

With justification as above, the summary of claims is tabulated as below:

(Amount in Rs. Crores)

Sr. no.	Description of claims for admittance	MSPGCL's justified amount of claims	Amount of claim admitted by liquidator of LITL till date	Balance amount of claims being submitted for admittance	Remark
(A)	**Special Advances, Direct Payment, Contractual & Other Recoveries:**				
1	Recovery of LD	267.874	203.310	64.564	Ref point-1
2	GST applicable on LD	48.217	36.596	11.621	
3	Recovery of direct payment & special advance	197.601	197.601	0.000	
4	Recovery of Mobilization advance	9.155	9.155	0.000	
5	Recovery of interest on advance payment	14.107	14.107	0.000	
6	Recovery against Risk & Cost work	7.510	7.510	0.000	
7	Other recoveries: (Total Rs.2.151 Crs)				
7a	Electricity charges	0.464	0.000	0.464	
7b	Recovery against travelling expenses	0.017	0.000	0.017	
7c	Service Tax recovery against mobilization advance	0.0840	0.000	0.084	Ref point-2
7d	GST & Service tax on extra claim	1.585	0.000	1.585	
8	BOCW Cess	8.140	6.104	2.036	Ref point-3
9	**Total of A (A1 to A8)**	**554.755**	**474.383**	**80.372**	
(B)	**Amount required to complete balance work:**				
1	Execution of LITL PO's for E&M	17.020	17.020	0.000	
2	Execution of LITL PO's for Civil	1.940	1.940	0.000	
3	Amount for execution of above PO's (Consumable, T&P)	5.000	5.000	0.000	
4	Single tender for balance E&M work	84.960	84.960	0.000	
5	Single tender for balance Civil work	47.260	47.260	0.000	
6	OEM nature work for PLC & EPABX	1.530	1.530	0.000	
7	Fire Fighting and urgent work (Total Rs. 2.700 Crs.)				
7a	Balance BoP erection work of fire detection & protection system in various areas (PO-1)	0.947	0.000	0.947	
7b	Balance BoP erection work of fire detection & protection system in various areas (PO-2)	0.055	0.000	0.055	
7c	Balance BoP erection work of fire detection & protection system in various areas (PO-3)	0.057	0.000	0.057	Ref point-4
7d	Balance BoP erection work of fire detection & protection system in various areas (PO-4)	0.057	0.000	0.057	
7e	Balance BoP supply/work of Fire Mortar seal and cable compound	1.588	0.000	1.588	
8	Amount proposed for purchase of mandatory spares	15.000	0.000	15.000	Ref point-5
9	Amount proposed for purchase of MS Pipes for ADPL	3.323	---	3.323	Ref point-6
10	Supervision charges @15% on B1 to B9	26.810	---	26.810	Ref point-7
11	GST @18% on B1 to B10	36.998	28.388	8.610	
12	**Total of B (B1 to B11)**	**242.541**	**186.098**	**56.443**	
(C)	**Payment to LITL's Sub-vendors by MSPGCL**	**11.745**	**10.675**	**1.070**	
(D)	**Balance works as per scope of contract but proposed for de-scoping by LITL**	**12.355**	**12.355**	**0.000**	
(E)	**Total Expenses (A+B+C+D)**	**821.396**	**683.511**	**137.885**	
(F)	**BG, Retention & Recoveries**	**427.560**	**427.560**	**0.000**	
(G)	**Balance Billing & Extra Claims**	**122.406**	**122.406**	**0.000**	
(H)	**Net Recoverable from LITL (E-F-G)**	**271.430**	**133.545**	**137.885**	

It is requested to settle the due claims amounting to Rs. 137.885 Crs as per the above table by admittance of the same against BoP contract of M/s LITL for 3x660 MW Koradi Project.

Further, it is to submit that, MSPGCL has issued POs, to sub vendors of M/s LITL for the scope as per M/s LITL's POs to them and as per their consent. However, some of these vendors are not responding in spite of vigorous follow up from MSPGCL. As such, these works will be carried out by initiating fresh proposals. Cost difference, if any due to this shall be intimated separately after finalization of the orders against fresh proposals.

Thanking you,

Encl: As above

Yours truly,

Chief Engineer (P&P)
MSPGCL, Mumbai.

Copy to:
Shri Savan Godiawala,
Deloitte Touche Tohmatsu India LLP
19th Floor, Shapath-V, S G Road,
Ahmedabad – 380015

Exhibit - L 70

Claims of Mahagenco on M/s Lanco towards execution of balance works at the Risk & Cost of M/s Lanco

Chief Engineer - GPP <cgmgpp@mahagenco.in>

Tue 08-Aug-23 15:50

To:bisanianu@gmail.com <bisanianu@gmail.com>

4 attachments (14 MB)

1 Revised claim to Liquidator dtd.09.09.21.pdf; 2 Liqui mail dtd.09.12.2020.pdf; 3 claims ltr 1513 dtd.02.12.19.pdf; 4 Terminatio Notice to lanco...pdf;

Dear Madam,

This has reference to 'Attendance cum Order Sheet of the Hearing held on 10.10.22' in the National Company Law Tribunal Hyderabad Bench-I vide which you have been appointed as the Liquidator in the matter of Lanco Infratech Limited.

In this connection, it is to inform you that Mahagenco had awarded a contract for 3x660MW Koradi TPS Project, Balance of Plant (BoP) Package to M/s Lanco Infratech Limited. However, the works under the contract were not completed by M/s Lanco. As such, Mahagenco vide letter dated 02.12.19 has submitted a Claim of Rs. 267.324 crores recoverable from M/s LITL; to your predecessor. However, the liquidator has admitted the claims of only Rs. 133.544 Crores. As such, Mahagenco vide Letter dated 09.09.21 submitted an updated claim of Rs. 271.430 Crores along with justifications for admissibility of claims.

Moreover, as mentioned in the letter dated 09.09.21, the works for which fresh proposals were initiated, the claim for cost difference shall be intimated separately.

The correspondence exchanged between the Liquidator and Mahagenco is attached herewith for your reference.

You are requested to confirm the status of the claims submitted by Mahagenco.

Thanking you

Regards
Chief Engineer (Projects & Planning)
Maharashtra State Power Generation Co. Ltd. (Mahagenco)
3rd Floor, 'Prakashgad',
A K Marg
Bandra (E), Mumbai-51.

Exhibit - M

MAHAGENCO

MAHARASHTRA STATE POWER GENERATION CO. LTD.

Office of Chief Engineer (Projects & Planning),
'Prakashgad', 3rd floor, Bandra (East), MUMBAI-400 051
Phone-022-69852200 /022-69853535(Extn.3520) Email-cgmgpp@mahagenco.in

Ref. No. CE/P&P/COMM/KRD/LITL/Claim/ 0290 Date: 22 MAR 2024

To
Ms. Anuradha Bisani,
Liquidator (for M/s. Lanco Infratech Ltd.),
3-6-106/A, Om Sri Sai Towers,
Flat No. 102, Street No. 19,
Himayatnagar,
Near Vijaya Diagnostic Centre,
Hyderabad-500029
Telangana.
E-mail ID – bisanianu@gmail.com

NOTARY M.M. PABALE Mumbai Maharashtra Regd. No. 15220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

Subject : Koradi Thermal Power Station Unit 8, 9 & 10 (3 x 660 MW) - revised claims of Mahagenco.

Reference : 1. Our Letter No. CE/P&P/KRD/COMM/LITL/Claims/1513 dated 02.12.2019.
2. Our Letter No. CE/P&P/KRD/COMM/LITL/Claims/0954 dated 09.09.2021.
3. Our E-mail dated 08.08.23.

Dear Madam,

This has reference to our E-mail dated 08.08.23; addressed to you, vide which we have forwarded correspondence exchanged with your predecessor regarding claims of Mahagenco.

Mahagenco, vide letter under reference 2 above, had submitted the latest updated claims. It was further informed that, the works for which Purchase Order (PO) has not been placed, however, the claims were admitted based on cost estimate, the claims for cost difference shall be submitted after placement of orders.

In line with above, revised updated claims with net recoverable amount of Rs. 290.339 crore are as per enclosed Annexure –A.

Item-wise justification for revision in earlier claimed amount, is as below:

1. **Fire Fighting works** (Annexure-A, sr. no. 7a to 7e):

Reason for revision:

i. In the earlier submission, total value (including GST) was claimed for items 7a to 7d below, and again the GST was claimed on total value; which resulted in tax on

NOTARY
M.M. PABALE
Mumbai
Maharashtra
Regd. No. 15220
Expiry Dt.
30-10-2024
GOVT. OF INDIA

tax. Total Gross Price (excluding GST) is being claimed and GST is calculated separately.

ii. **Balance work of fire Mortar seal and cable compound** (Annexure-A, sr. no. 7e): In the earlier submission, claim was submitted based on Cost estimate. Now Purchase Order (PO) has been placed and work execution is completed; as such actual claim as per PO is being submitted.

Accordingly, the Item-wise details of earlier claim & revised claim are as tabulated below:

Sr. No.	Description	Earlier claim amount as per estimate (in Rs. Crore)	Revised claim amount as per PO (in Rs. Crore)	
7a	Balance BoP erection work of fire detection & protection system in various areas	0.947	0.802	C-1 to C-10
7b	Balance BoP erection work of fire detection & protection system in various areas	0.055	0.047	C-11 to C-16
7c	Balance BoP erection work of fire detection & protection system in various areas	0.057	0.048	C-17 to C-21
7d	Balance BoP erection work of fire detection & protection system in various areas.	0.057	0.048	C-22 to C-26
7e	Supply & erection of Fire retardant cable coating compound on cable & fire stop mortar seal	1.588	1.540	C-27 to C-29

Copies of POs are enclosed herewith.

2. **Supply of MS Pipes for ADPL:** (Annexure-A, sr. no. 9)

Reason for revision:

In the earlier submission claim was submitted based on Cost estimate. Now Purchase Order (PO) has been placed; as such actual claim as per PO is being submitted.

Accordingly, the details of earlier claim & revised claim are as tabulated below:

Description	Earlier claim amount as per estimate (in Rs. Crore)	Revised claim amount as per PO (in Rs. Crore)	
Supply of MS Pipes for ADPL	3.323	5.312	C-30 to C-35

Copy of PO is enclosed herewith.

3. **Balance ETP & CW Treatment systems:** (Annexure-A, sr. no. 10)

As intimated earlier vide letter under reference 2 above, the works for which Sub-vendors of M/s LITL refused to carry out the work as per M/s LITL's POs; after

termination of M/s LITL's contract, fresh proposals are initiated by Mahagenco to carry out the balance work of ETP & CW treatment systems.

Accordingly, the details of claim are as tabulated below:

Sr. No.	Description	Earlier claimed amount (in Rs. Crore)	Revised claim amount (in Rs. Crore)	
10	**Execution of balance work of ETP & CW Treatment systems**			
i	Supply & ETC work of Clarifier of Effluent Treatment plant	Nil	2.15	C-50 to C-59
ii	Supply, ETC & civil construction, structural, architectural work of CW treatment system	Nil	8.46	C-36 to C-49
iii	Supply & ETC work of ETP dosing system, oil & water separator etc.	Nil	1.55 (Based on Estimate)	C-60 to C-66
	Total	Nil	12.16	

Copies of POs for sr. no. i & ii are enclosed herewith. Actual amount of claim for sr.no. iii shall be submitted after placement of PO.

It is requested to settle our claims of Rs. 290.339 Crores, at the earliest.

Further, the actual cost of Effluent treatment Plant; Dosing system, oil & water separator etc. shall be intimated, after placement of Purchase Order.

Thanking you,

Enclosed : As above

Yours truly,

Chief Engineer (Projects & Planning)
MSPGCL, Mumbai.

NOTARY M.M. PARALL Mumbai Maharashtra Regd. No. 16220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

NOTARY
M.M. PABALE
Mumbai
Maharashtra
Reg.No. 15220
Expiry Dt.
30-10-2024
GOVT. OF INDIA

Annexure - A

Sr. No.	Description of claims for admittance	MSPGCL's justified amount of claims	Amount of claim admitted by liquidator of LITL till date	Balance amount of claims being submitted for admittance	Remark
A	**Special Advances, Direct Payment, Contractual & Other Recoveries:**				
1	Recovery of LD	267.874	203.310	64.564	
2	GST applicable on LD	48.217	36.596	11.621	
3	Recovery of direct payment & special advance	197.601	197.601	0.000	
4	Recovery of Mobilization advance	9.155	9.155	0.000	
5	Recovery of interest on advance payment	14.107	14.107	0.000	
6	Recovery against Risk & Cost work	7.510	7.510	0.000	
7	**Other recoveries:**				
7a	Electricity charges.	0.464	0.000	0.464	
7b	Recovery against travelling expenses	0.017	0.000	0.017	
7c	Service Tax recovery against mobilization advance	0.084	0.000	0.084	
7d	GST & Service tax on extra claim	1.585	0.000	1.585	
8	BOCW Cess	8.140	6.104	2.036	
9	**Total of A (A1 to A8)**	**554.755**	**474.383**	**80.372**	
(B)	**Amount required to complete balance work:**				
1	Execution of LITL POs for E&M	17.020	17.020	0.000	
2	Execution of LITL POs for Civil	1.940	1.940	0.000	
3	Amount for execution of above PO's (Consumable, T&P)	5.000	5.000	0.000	
4	Single tender for balance E&M work	84.960	84.960	0.000	
5	Single tender for balance Civil work	47.260	47.260	0.000	
6	OEM nature work for PLC & EPABX	1.530	1.530	0.000	
7	**Fire Fighting and urgent work**				
7a	Balance BoP erection work of fire detection & protection system in various areas (PO-1).	0.802	0.000	0.802	Ref Para 1
7b	Balance BoP erection work of fire detection & protection system in various areas (PO-2).	0.047	0.000	0.047	
7c	Balance BoP erection work of fire detection & protection system in various areas (PO-3).	0.048	0.000	0.048	
7d	Balance BoP erection work of fire detection & protection system in various areas (PO-4).	0.048	0.000	0.048	
7e	Balance BoP supply/work of fire Mortar seal and cable compound (PO-5).	1.540	0.000	1.540	
8	Amount proposed for purchase of mandatory spares.	15.000	0.000	15.000	
9	Supply of MS Pipes for ADPL at risk and cost of M/s LITL for ADPL.	5.312	0.000	5.312	Ref Para 2
10	Execution of ETP & CW Treatment systems not included in (B-1) above.	12.16	0	12.16	Ref Para 3
11	Supervision charges @15% on B1 to B10	28.900	0.000	28.900	
12	Total of B1 to B11	221.567	157.710	63.857	
13	GST @18% on (B1toB11)	39.882	28.388	11.494	
14	**Total of B (B1 to B13)**	**261.450**	**186.098**	**75.352**	
(C)	Payment to LITL's Sub-vendors by MSPGCL	11.745	10.675	1.070	
(D)	Balance works as per scope of contract but proposed for de-scoping by LITL	12.355	12.355	0.000	
(E)	Total Expenses (E= A+B+C+D)	840.305	683.511	156.794	
(F)	BG, Retention & Recoveries	427.560	427.560	0.000	
(G)	Balance Billing & Extra Claims	122.406	122.406	0.000	
(H)	**Net Recoverable from LITL (H=E-F-G)**	290.339	133.545	156.794	

Exhibit - N

75

LANCO
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To
The Chief Engineer (Projects & Planning),
Maharashtra State Power Generation Co. Ltd.,
'Prakashgad', 3rd Floor, Bandra (East),
Mumbai-400051
Email : cgmgpp@mahagenco.in

Date: 26.03.2024

NOTARY M.M. PABALE Mumbai Maharashtra Regd. No. 15220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

From
Anuradha Bisani
Liquidator- Lanco Infratech Limited
3-6-106/A, Om Sri Sai Towers,
Flat No.102, Street No. 19, Himayatnagar,
Hyderabad, Telangana-500029
Email: liq.lancoinfra@gmail.com

Sub. : Reply to the Letter dated 22.03.2024 for revised claim of **Mahagenco Koradi** Thermal Station Unit 8,9,10 (3 x 660 MW)

Ref. :
1. Letters dated 02.12.2019 & 09.09.2021 referred to in the above letter dated 22.03.2024.
2. Email Communication dated 08.08.2023 referred to in above letter
3. 26.09.2022 date of approval of the sale of M/s Lanco Infratech Limited as a going concern in the form of an Acquisition Plan.

Dear Sir(s),

This is regarding the above subject Notice dated 22.03.2024 received by the undersigned Liquidator of M/s Lanco Infratech Limited. The said notice is addressed to the undersigned to settle your claim of Rs.290.339 Crores by admitting the revised claim to be submitted by your good office.

With this reply, I would like to bring to your attention and inform you that the corporate debtor, **Lanco Infratech Limited,** was sold as a Going Concern pursuant to the **"Acquisition Plan"** presented by **KRS Erectors Private Limited**. The Hon'ble National Company Law Tribunal, Hyderabad Bench-I approved, authorized and allowed the same on 26th Sep 2022.

ANURADHA BISANI IBBI/IPA-002/IP-N000417/2020-21/12722 INSOLVENCY PROFESSIONAL

LANCO
Always Inspiring

Thereafter the Hon'ble Tribunal has ordered the implementation of the approved Acquisition Plan and the same is under implementation as of date as per the terms and conditions indicated in the said plan.

As an esteemed organization, you are aware of the fact that once a Plan for the revival of the corporate debtor is approved by the Adjudicating Authority as a going concern, the role of the Liquidator is set to rest, and the clauses mentioned in the approved plan prohibit the undersigned from deciding any claim or recognizing any status of the creditor, i.e., classification, re-classification, modification, or acceptance of any revised claim of the creditors whatsoever. To the best of my knowledge, ability, and understanding, the acquisition plan does not recognize or entitle any payments to creditors other than those listed in the approved plan. The approved plan's parameter specify the function of the undersigned Liquidator and is limited to the extent of certain corporate actions to be carried out to affect the approved plan. The undersigned Liquidator has no custody of the assets nor is entitled to distribute the amounts realized.

As a Liquidator of M/s Lanco Infratech Limited the Roles and Responsibilities of the undersigned are restricted as per the terms of the Approved Plan. The factual circumstances being as narrated above I have no option other than to decline your request of admission of a revised claim irrespective of verification of the same.

You are aware that any person being aggrieved by the actions, inactions, acceptance, denial, or decision by the Liquidator should be ventilated within the statutory period seeking the appropriate relief as entitled under the Law for the time being in force before the Appropriate Authority.

ANURADHA BISANI
IBBI/IPA-002/IP-N000941/2020-2021/13022
INSOLVENCY PROFESSIONAL

NOTARY
M.M. PABALE
Mumbai
Maharashtra
Regd. No. 15220
Expiry Dt.
30-10-2024
GOVT. OF INDIA

NOTARY

Regd. Office: F-2, Second Floor, Naina Residency, Plot No-344, Road No. 07, Kakatiya Hills,
Madhapur, Shaikpet Hyderabad – 500 081, Telangana, India
Tel: + 040-47766343 ; Fax: +91 40 47766344
Email: info@lancogroup.com Url: www.lancogroup.com
CORPORATE IDENTITY NUMBER: U45200TG1993PLC015545

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This present reply is served without prejudice to the legal rights available to either of us.

Please do not hesitate to contact me if your good office has any further queries.

Thanking you,
Yours sincerely,

ANURADHA BISANI
IBBI/IPA-002/IP-N00941/2020-2021/13022

Anuradha Bisani
Liquidator of Lanco Infratech Limited

Regn No: IBBI/IPA-002/IP-N00941/2020-2021/13022
AFA valid upto 24th May 2024
Email id : liq.lancoinfra@gmail.com
Mobile : 99080 55166

NOTARY
M.M. PABALE
Mumbai
Maharashtra
Exp. On
30-10-2024
GOVT. OF INDIA

Exhibit O

MAHAGENCO

MAHARASHTRA STATE POWER GENERATION CO. LTD.

Office of Chief Engineer (Projects & Planning),
'Prakashgad', 3rd floor, Bandra (East), Mumbai-400 051
Phone: (O) 022-69852200 / 022-69853535 (Extn.3520) Email-cgmgpp@mahagenco.in

Ref. No. CE/P&P/COMM/KRD/LITL/Claim/ NO-0443 Date: 25 APR 2024

To,

Ms. Anuradha Bisani
Liquidator- Lanco Infratech Limited
3-6-106/A, Om Sri Sai Towers,
Flat No.102, Street No. 19, Himayatnagar,
Hyderabad, Telangana-500029

Sub.: Regarding Approved Acquisition Plan - M/s Lanco Infratech Ltd.
Ref.: 1. This office letter no. CE/P&P/COMM/KRD/LITL/Claim/290 dtd. 22.03.2024.
2. Your letter dtd. 26.03.2024.

Dear Madam,

This has reference to your letter dated 26.03.2024, regarding Mahagenco's revised claim in respect of 3x660 MW Koradi Thermal Project, BoP contract awarded to M/s LITL.

Vide this letter, it is conveyed that, Hon. NCLT, Hyderabad bench has approved, authorized & allowed the Acquisition Plan presented by M/s KRS Erectors Pvt. Ltd. & M/s KRS is now a Going Concern. It is further conveyed that the Acquisition Plan is under implementation as per the terms and conditions of plan & role of Liquidator is set to rest & clauses of Approved Plan prohibit the liquidator for deciding any claim.

As per the list of operational creditors (at sr.no.280 of related parties- claimant) retrieved from official website of M/s LITL, Mahagenco's claims to the tune of Rs.133.54 crores have been admitted.

In view of the above, it is requested to forward copy of Approved Acquisition Plan for Mahagenco's reference.

It is further requested to convey regarding settlement of Mahagenco's admitted claims, as per approved Acquisition Plan.

Thanking you,

Yours faithfully,

Chief Engineer (P&P)
Mahagenco

Copy s.cs.to:
Chief Engineer (Project), Koradi

NOTARY M.M. PABALE Mumbai Maharashtra Regd. No. 15220 Expires On 30-10-2024 GOVT. OF INDIA

Lanco Infratech Limited ('Corporate Debtor' or 'LITL') – under liquidation process

List of Operational Creditors

Summary of Operational Creditors:

(Amount in INR Crores)

Claimant	Claims Received		Claims Reviewed		Claims Status		
Type	No. of Claims	Amount	No. of Claims	Amount	Admitted	Under Verification	Rejected
Statutory	26	627	26	627	410	-	217
Vendors	581	9,788	581	9,788	1,994	-	7,793
Related Parties	21	7,558	21	7,558	4,601	-	2,957
Total	**628**	**17,973**	**628**	**17,973**	**7,005**	-	**10,967**

S.No.	Name of Claimant	Total Claim	Amount Admitted	Amount Under Verification	Amount Rejected	Reasons for Rejection
277	Machinery Sales Agency	22,95,298	22,95,298	-	-	
278	Madhuri Sharma	1,98,270	1,98,270	-	-	
279	Magar Chand Kashyap	17,34,130	17,34,130	-	-	
280	Maharashtra State Power Generation Co. Ltd. (MAHAGENCO)	2,67,31,96,450	1,33,54,43,570	-	1,33,77,52,880	Reasons for rejection separately communicated to the claimant due to large size of information
281	Mahaveer Singh	15,260	15,260	-	-	
282	Mahendra Singh Parihar	2,43,525	2,43,525	-	-	
283	Manasa Constructions	2,31,66,407	1,12,95,769	-	1,18,70,638	Principal : Amount payable as per books of accounts of Corporate Debtor admitted, balance claim rejected Interest : Not admissible
284	Mandyanti Associates	7,33,676	7,27,421	-	6,255	Amount payable as per books of accounts of Corporate Debtor admitted, balance claim rejected
285	Mane A N	2,41,716	2,39,745	-	1,971	
286	Maneesh Pipes Pvt. Ltd., Raipur	2,22,33,246	1,59,72,843	-	62,60,403	Principal : Amount payable as per books of accounts of Corporate Debtor admitted, balance claim rejected Interest : Not admissible
287	Manish Kumar Tiwari	6,12,500	6,08,855	-	3,645	Amount payable as per books of accounts of Corporate Debtor admitted, balance claim rejected
288	Manju Soni	24,962	24,962	-	-	
289	Manjula	4,44,298	4,44,298	-	-	
290	Manmeet Industries	17,63,824	11,65,523	-	5,98,301	Principal : Amount payable as per books of accounts of Corporate Debtor admitted, balance claim rejected Interest : Not admissible

NOTARY M.M. PABALE Mumbai Maharashtra GOVT. OF INDIA

948

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Regarding Approved Acquisition Plan - M/s Lanco Infratech Ltd.

Chief Engineer - GPP <cgmgpp@mahagenco.in>
Thu 25-Apr-24 11:08

To:liq.lancoinfra@gmail.com <liq.lancoinfra@gmail.com>;bisanianu@gmail.com <bisanianu@gmail.com>
Cc:cla <cla@mahagenco.in>;Chief Engineer - Koradi Projects <cgmkrdproj@mahagenco.in>
Bcc:eegpp2 <eegpp2@mahagenco.in>

1 attachments (161 KB)
Lanco claims letter 250424.pdf;

Dear Sir/Madam,

Please find attached herewith letter regarding subject matter in respect of Koradi Thermal power Station Unit 8,9&10 (3x660 MW).

It is requested to convey regarding settlement of Mahagenco's admitted claims, as per approved Acquisition Plan.

Regards,

Chief Engineer (Projects & Planning)
Maharashtra State Power Generation Co. Ltd.
3rd Floor, 'Prakashgad', A.K. Marg,
Bandra(E), Mumbai.

Exhibit-Q

82

[EXTERNAL] - Re: Regarding Approved Acquisition Plan - M/s Lanco Infratech Ltd.

LANCO INFRATECH <liq.lancoinfra@gmail.com>
Fri 03-May-24 13:47

To:Chief Engineer - GPP <cgmgpp@mahagenco.in>;bisanianu@gmail.com <bisanianu@gmail.com>;KRS Erectors Uday Bhaskar <udayabhaskar@lancogroup.com>;KRS Erectors Uday Bhaskar <udayabhaskar@krsepl.com>
Cc:cla <cla@mahagenco.in>;Chief Engineer - Koradi Projects <cgmkrdproj@mahagenco.in>

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Sir,

Good Afternoon.

For your convenience and ease of communication with the successful acquirers of Lanco Infratech Limited, i.e., KRS ERECTORS PRIVATE LIMITED, I am marking this email to them also.

Sir, when the Corporate Debtor was sold as a going concern, the terms of payment as per the approved acquisition plan envisaged payments to be shared only between the secured creditors and the successful acquirer on a predetermined percentage basis.

Acquisition plan, being a confidential document, I express my inability to share the same.

In case of any further queries, please feel free to contact.

From: Chief Engineer - GPP <cgmgpp@mahagenco.in>
Sent: Thursday, April 25, 2024 11:08 AM
To: liq.lancoinfra@gmail.com <liq.lancoinfra@gmail.com>; bisanianu@gmail.com <bisanianu@gmail.com>
Cc: cla <cla@mahagenco.in>; Chief Engineer - Koradi Projects <cgmkrdproj@mahagenco.in>
Subject: Regarding Approved Acquisition Plan - M/s Lanco Infratech Ltd.

Dear Sir/Madam,

Please find attached herewith letter regarding subject matter in respect of Koradi Thermal power Station Unit 8,9&10 (3x660 MW).

It is requested to convey regarding settlement of Mahagenco's admitted claims, as per approved Acquisition Plan.

Regards,

Chief Engineer (Projects & Planning)
Maharashtra State Power Generation Co. Ltd.
3rd Floor, 'Prakashgad', A.K. Marg,
Bandra(E), Mumbai.

"Disclaimer: This e-mail contains privileged information or information belonging to Maharashtra State Power Generation Co. Ltd. and is intended solely for the addressee/s. Access to this email by anyone else is unauthorized. Any copying (whole or partial) or further distribution beyond the original recipient is not intended, and may be unlawful. The recipient acknowledges that Maharashtra State Power Generation Co. Ltd. is unable to exercise control or ensure or guarantee the integrity of the contents of the information contained in e-mail transmissions and further acknowledges

NOTARY M.M. PABALE Mumbai Maharashtra EXPIRY 30.10.2024 GOVT. OF INDIA

Exhibit-R

83

Fw: Regarding Mahagenco's claim in respect of 3x660 MW Koradi Thermal Project BoP contract awarded to M/s Lanco.

Chief Engineer - GPP <cgmgpp@mahagenco.in>
Thu 20-Jun-24 12:44
To:KRS Erectors Uday Bhaskar <udayabhaskar@krsepl.com>
Cc:eegpp2 <eegpp2@mahagenco.in>;cla <cla@mahagenco.in>

Reminder mail:

Dear Sir,

This has reference to trailing mail. In line with this, it is gentle reminder to convey details of Mahagenco's admitted claims with respect to Approved Acquisition Plan of Lanco Infratech Limited.

Regards,

O/o Chief Engineer (P&P)

Maharashtra State Power Generation Co. Ltd.

Mumbai.

NOTARY M.M. PABALE Mumbai Maharashtra 220 30-10-2024 GOVT. OF INDIA

From: Chief Engineer - GPP
Sent: Friday, June 14, 2024 16:46
To: udayabhaskar@krsepl.com <udayabhaskar@krsepl.com>
Cc: eegpp2 <eegpp2@mahagenco.in>
Subject: Regarding Mahagenco's claim in respect of 3x660 MW Koradi Thermal Project BoP contract awarded to M/s Lanco.

Dear Sir,

This has reference to Mahagenco's claim in respect of 3x660 MW Koradi Thermal Project BoP contract awarded to M/s Lanco.

As per the list of Operational Creditors (at Sr. No. 280 of related parties-claimant) retrieved from official website of M/s LITL, Mahagenco's claim of Rs. 133.54 have been admitted.

Hon. National Company Law Tribunal (NCLT) Hyderabad Bench-1 has approved, authorized and allowed the "Acquisition Plan" presented by KRS Erectors Pvt. Ltd., as a Going Concern.

In this connection, as an Operational Creditor, vide email Mahagenco had requested Liquidator to forward copy of Acquisition Plan for reference. Liquidator expressed their inability to share the same quoting the reason that, Acquisition plan, being a confidential document, cannot be shared. Liquidator also conveyed that, for convenience and ease of communication with the successful acquirer of Lanco Infratech Limited, i.e. KRS ERECTORS PRIVATE LIMITED, they have marked email to acquirer."

It is to mention that, Mahagenco, as a Government Organisation has to submit the claim related details with Hon. MERC for cost capitalisation.

In this regard, it is requested to convey details of Mahagenco's admitted claim with respect to Approved Acquisition Plan.

we are not the member of welfare fund

BEFORE THE NATIONAL COMPANY LAW TRIBUNAL,

HYDERABAD BENCH

INTERLOCUTORY APPLICATION NO. _____ OF 2024

IN

COMPANY PETITION (IB) NO. 1142 OF 2023

[Under section 60(5) of the Insolvency and Bankruptcy Code, 2016]

Maharashtra State Power Generation Co. Ltd. (MSPGCL)

Through Mahendrakumar D. Khade

...APPLICANTS

v.

Lanco Infratech Limited and Anr

...RESPONDENTS

In the matter of:

IDBI BANK

...PETITIONER

v.

Lanco Infratech Limited **...CORPORATE DEBTOR**

VAKALATNAMA

To,

The Registrar,

National Company Law Tribunal,

Hyderabad Bench.

Dear Sir,

I, I, Mahendrakumar D. Khade, Adult, Indian Inhabitant being the authorized signatory of the Applicant abovenamed having its registered address at 3rd Floor, Prakashgad, Bandra (East), Mumbai – 400 051, do hereby appoint Ahmed Chunawala, Advocate, having his office at 407/408, 4th Floor, Commerce House, Master Nagindas Road, Fort, Mumbai 400 001 to act, appear, and plead on my behalf in the above captioned matter.

Dated this ___ day of October, 2024.

( )

For the Applicant

***Accepted by me*:**

Ahmed Chunawala,
Advocate for the Applicant
407/408, 4th Floor, Commerce House,
Master Nagindas Road, Fort
Mumbai 400 001
Chunawala.ahmed@gmail.com
+91 9892540331
MAH/6331/2016

NOTARY
M.M. PABALE
Mumbai
INDIA

BEFORE THE NATIONAL COMPANY LAW TRIBUNAL,

HYDERABAD BENCH

INTERLOCUTORY APPLICATION NO. _____ OF 2024

IN

COMPANY PETITION (IB) NO. 1142 OF 2023

[Under section 60(5) of the Insolvency and Bankruptcy Code, 2016]

Maharashtra State Power Generation Co. Ltd. (MSPGCL)

Through Mahendrakumar D. Khade

...APPLICANTS

v.

Lanco Infratech Limited, And ANR

...RESPONDENTS

In the matter of:

IDBI BANK

...PETITIONER

v.

Lanco Infratech Limited **...CORPORATE DEBTOR**

NOTARY M.M. PABALE Mumbai Maharashtra 30-10-2024 GOVT. OF INDIA

महाराष्ट्र MAHARASHTRA ◑ 2024 ◑ CU 508781

NOTARY
M.M. PABALE
Mumbai
Maharashtra
Reg. No. 2220
Expiry Dt.
30-10-2024
GOVT. OF INDIA

प्रधान मुद्रांक कार्यालय, मुंबई
प.मु.वि.क ८०००९०
23 OCT 2024
सक्षम अधिकारी

श्रीमती सायली कोळी

GENERAL AFFIDAVIT VERIFYING APPLICATION

I, Mahendrakumar D. Khade, Adult, Indian Inhabitant being the authorized signatory of the Applicant abovenamed having its registered address at 3rd Floor, Prakashgad, Bandra (East), Mumbai – 400 051, do hereby affirm and state as follows:

1. I say that I am the Authorised Signatory of the Applicant in the above captioned matter, and as such am fully aware of the facts and circumstances of the case;

am fully capable of filing this application and making this affidavit verifying the contents therein. I say that I am making this application seeking the reliefs set out in detail there in under.

2. I say that the contents of the accompanying application are true and correct to my knowledge, and that I have personal knowledge of the contents thereof.

3. I say that for the reasons set out in the application, the Applicant is entitled to the reliefs sought for therein. In light of the averments made in the application, I humbly pray that the relief sought for by the Applicant be granted.

4. The statements made in paragraphs of the application herein now shown to me are true to my knowledge, and the statements made in therein are based on information available with me, and I believe them to be true.

Date: 25 October, 2024)

Place: Mumbai)

NOTARY M.M. PABALE Mumbai Maharashtra Regd. No. 15220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

NOTARY M.M. PABALE Mumbai Maharashtra Regd. No. 15220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

AHMED CHUNAWALA

Advocate for the Applicant

Before Me

BEFORE ME

MANISH M. PABALE
B.Sc. LL.M.
ADVOCATE & NOTARY (GOVT. OF INDIA)
04, Natwar Chambers,
94 Nagindas Master Road,
Fort, Mumbai - 400 001.

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NOTARY M.M. PABALE Mumbai Maharashtra Regd. No. 15220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

NOTARY M.M. PABALE Mumbai Maharashtra Regd. No. 15220 Expiry Dt. 30-10-2024 GOVT. OF INDIA

NOTED & REGISTERED
Page No. 20182 Sr. No. 172
Date 25 OCT 2024

Annexure 11

Detailed working of the impact of LD and UDL in case of Koradi units 8-10.

Impact of Finalisation of LD amount in case of Koradi 8-10

Particulars	UoM	Amount (Rs. Crore)
Capital Cost Approved in Case No. 227 of 2022	Rs Crore	12,058.18
Capital Cost to be approved	Rs Crore	12192.40
Additional Capital cost to be allowed	Rs Crore	**134.22**
Approved D/E Ratio		
Loan	%	70%
Equity	%	30%
CoD	17-01-2017	

Impact of discharge of undischarge liabilities in case of Koradi 8-10

FY	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	Remark
Discharge of UDL		-				19.51			*Impact of discharge UDL on capitalisation from FY 22-23 considered in respective years sheet*
	70%	70%	70%	70%	70%	70%	70%	70%	
	30%	30%	30%	30%	30%	30%	30%	30%	

LD Details	As on Date of COD	As per Case 227 of 2022		MYT Submission	
		227 of 2022 submitted	Commission Approved	Submission	Approved
Capital Cost	**12,243.36**	**12,243.36**	**12,243.36**	**12,243.36**	
LD BTG	824.99	102.50	102.50	101.93	
LD BOP	268.23	-	267.87	-	
Total LD	**1,093.02**	**102.50**	**370.37**	**101.93**	**-**
50% LD Deducted (1093.22)	546.51	51.25	185.19	50.97	-
Approved Capital Cost	**11,696.85**	**12,192.11**	**12,058.18**	**12,192.40**	**-**

Koradi 8-10

	17-01-2017	01-04-2017	01-04-2018	01-04-2019	01-04-2020	01-04-2021	01-04-2022	01-04-2023	01-04-2024
Financial Impact	31-03-2017	31-03-2018	31-03-2019	31-03-2020	31-03-2021	31-03-2022	31-03-2023	31-03-2024	31-03-2025
Days	74	365	365	366	365	365	365	366	365
GFA									
GFA Opening	0	134	134	134	134	134	134	154	154
Addition	134.22	-	0	0	0	0	20	0	0
GFA Closing balance	134	134	134	134	134	134	154	154	154
Interest on Loan									
Opening Loan		**93.24**	**86.15**	**79.06**	**71.96**	**64.87**			
Addition of loan	93.95	0.00	0.00	0.00	0.00	0.00			
Loan Repayment	0.72	7.09	7.09	7.11	7.09	7.09			
Closing Loan	**93.24**	**86.15**	**79.06**	**71.96**	**64.87**	**57.78**			
Average Loan	93.24	89.69	82.61	75.51	68.41	61.33			
Interest Rate	11.63%	10.56%	9.80%	9.90%	10.50%	9.97%			
Interest on Loan	2.20	9.47	8.09	7.47	7.18	6.11			
RoE									
Opening Equity	0.00	40.27	40.27	40.27	40.27	40.27			
Addition	40.27	0.00	0.00	0.00	0.00	0.00			
Closing	40.27	40.27	40.27	40.27	40.27	40.27			
Rate of ROE	7.50%	7.50%	15.50%	15.50%	14.00%	14.00%			
ROE	0.31	3.02	6.24	6.26	5.64	5.64			
Depreciation									
Average GFA	67.11	134.22	134.22	134.22	134.22	134.22			
Depreciation rate on Plant and Mahinery	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%			
Depreciation	0.72	7.09	7.09	7.11	7.09	7.09			
Interest on Working Capital									
Addition in Recievable for 2 months	0.55	3.32	3.63	3.53	3.37	3.18			
Rate of Interest	10.79%	10.20%	9.45%	9.66%	8.57%	8.50%	9.30%	10.07%	10.45%
IOWC	0.06	0.34	0.34	0.34	0.29	0.27			
Additional ARR to be allowed	**3.28**	**19.91**	**21.77**	**21.18**	**20.20**	**19.11**			
Normative Availability	85%	85%	85%	85%	85%	85%			
Actual Availability	58.63%	53.98%	46.67%	53.76%	65.78%	63.00%			
Amount to be recovered	2.26	12.65	11.95	13.39	15.63	14.16			

Carrying Cost	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
opening Amount	0	2.26	14.91	26.86	40.25	55.89	70.05	70.05	70.05
Addition during the year	2.26	12.65	11.95	13.39	15.63	14.16	0.00	0.00	0.00
Total Amount	2.26	14.91	26.86	40.25	55.89	70.05	70.05	70.05	70.05
Carrying Cost	**0.02**	**0.88**	**1.97**	**3.24**	**4.12**	**5.35**	**6.51**	**7.05**	**7.32**

Total Amount allowed

Annexure 12

Supporting Documents for Bhusawal Unit 4 & 5 for additional expenses of Rs. 20.76 Cr.

Dated: 20.10.2021

Annexure - O
to
Overall Summary of Financial Reconciliation
for
Bhusawal TPS Expn. Project 2x500 MW (Unit-4&5)

Total amount withheld / retained against Other recoveries (other than LD & Inerest on Advance) against Main Equpt. Supply Contract (refer Annexure-4, Overall Summary of Financial Reconciliation statements for the Contract)	25,67,78,764
Total amount withheld / retained against Other recoveries (other than LD & Inerest on Advance) against Mandatory Spares Contract (refer Annexure-4, Overall Summary of Financial Reconciliation statements for the Contract)	5,30,834
Total amount withheld / retained against Other recoveries (other than LD & Inerest on Advance) against E&C Contract (refer Annexure-4, Overall Summary of Financial Reconciliation statements for the Contract)	3,40,06,419
Gross Total amount withheld / retained against Other recoveries (other than LD & Inerest on Advance) (refer Overall Summary of Financial Reconciliation & BHEL's final claim)	29,13,16,017

Sr. No.	Particulars / Units	Withheld/Recovered/ Retained Amount	Reason								Total
			Recovery towards workdone by Mahagenco on cost & risk of BHEL' Units	Recovery towards Rent & workdone by Mahagenco on cost & risk of BHEL (PSWR Nagpur)	Water & Electricity charges recovery	Taxes Disallowed/ Recovered	PVC Billing Difference	ESP Restoration retention	Other Recoveries	Excess / Balance Advance adjusted	
1	Total amount withheld / retained against Other recoveries (other than LD & Inerest on Advance) against Main Equpt. Supply Contract	25,67,78,764									
i	PS_Mktg.	10,69,65,774	2,76,87,459	85,48,421		6,73,86,346				33,43,548	10,69,65,774
ii	TRICHY FB	8,74,55,434	17,04,207			24,36,409		8,33,14,818			8,74,55,434
iii	RANIPET	3,39,29,541	26,11,400			10,79,321	7,345	3,02,29,475	7,000		3,39,29,541
iv	HYD MILLS	16,30,192	16,30,192								16,30,192
v	IMS BPL	-									-
vi	EDN	-									-
vii	EPD	-									-
viii	JHANSI	-									-
ix	PC CHENNAI	2,56,66,673	2,30,31,305			26,35,368					2,56,66,673
x	HWR	146					120		26		146
xi	HYD PUMPS	-									-
xii	STS BPL	-									-
xiii	TRICHY VALVES	-									-
xiv	PEM	-									-
xv	PSWR (BOP)	-									-
xvi	TRS_BPL	11,22,284				11,22,284					11,22,284
xvii	SCS_BPL	8,720				8,720					8,720
xviii	RUDRAPUR	-									-
	Total-M	25,67,78,764	5,66,64,563	85,48,421	-	7,46,68,448	2,465	11,35,44,293	7,026	33,43,548	25,67,78,764
2	Total amount withheld / retained against Other recoveries (other than LD & Inerest on Advance) against Mandatory Spares Contract	5,30,834									
i	TRICHY-Spares	6,123					6,123				6,123
ii	RANIPET	15,596				11,114	4,482				15,596
iii	HYD MILLS	-									-
iv	IMS BPL	19,320				19,320					19,320
v	EDN	-									-
vi	EPD	-									-
vii	JHANSI	-									-
viii	HERP	26,347					26,347				26,347
ix	HWR	3,35,712			7,205	3,28,507					3,35,712
x	HYD PUMPS	-									-
xi	STS BPL	-									-
xii	TRICHY VALVES	-									-
xiii	PEM	-									-
xiv	PSWR (BOP)	-									-
xv	TRS_BPL	1,17,665				1,17,665					1,17,665
xvi	SCS_BPL	10,071				10,071					10,071
xvii	RUDRAPUR	-									-
	Total-S	5,30,834	-	-	7,205	4,86,677	36,952	-	-	-	5,30,834
3	Total amount withheld / retained against Other recoveries (other than LD & Inerest on Advance) against E&C Contract	3,40,06,419									
i	PSWR	3,40,06,419		1,02,72,573	1,27,70,058				1,09,63,788		3,40,06,419
	Total-E	3,40,06,419	-	1,02,72,573	1,27,70,058	-	-		1,09,63,788	-	3,40,06,419
	Gross Total amount withheld / retained against Other recoveries (other than LD & Inerest on Advance) (Total-M+Total-S+Total-E)	29,13,16,017	5,66,64,563	1,88,20,994	1,27,77,263	7,51,55,125	39,417	11,35,44,293	1,09,70,814	33,43,548	29,13,16,017
	Remarks										

Sr. Manager (F&A)
1 x 660 MW Project
M.S.P.G.Co.Ltd., Bhusawal.
21/10

आशीष कुमार / ASHISH KUMAR
उप अभियंता / Dy. Engineer
21/10/21
पावर क्षेत्र-विपणन / Power Sector-Marketing
भारत हेवी इलेक्ट्रिकल्स लिमिटेड / Bharat Heavy Electricals Ltd.
बी.एच.ई.एल हाउस, सीरी फोर्ट / BHEL House, Siri Fort
नई दिल्ली-110049 / New Delhi-110049

Annexure-3__Dated: 20.10.2021
Project - Bhusawal TPS Expn. Project 2x500 MW (Unit-4&5)
LOA No.: DG/BSL Expn./MP/Erection/0403 dated 23.01.2007
Contract Agreement No. DG/Bhusawal/MP/Erection dated 20.09.2007
Summary of Reconciliation Statement _Erection & Comm. Services

S. NO.	Description / PYMT. TERMS / Region	PSWR
1	**Allocated Basic Contract Price of E&C (excl. Insurance charges)**	**1,61,50,00,000**
2	Addition/ Reduction in Basic Contract Price due to Scope Change**	0
3 = 1+2	**Revised Basic Contract Price of E&C After Adjustment due to Scope Change**	**1,61,50,00,000**
4	**100% Value of Basic Contract Price of E&C Billed**	**1,61,50,00,063**
5	Less Advance Adjusted	16,03,91,721
6	Less Deferred Debts	8,13,76,724
7=4-5-6	Net Billing on E&C services w/o T&D	1,37,32,31,618
8	100% value of Taxes & Duties on E&C	15,77,11,778
9=7+8	Collectible Dues	1,53,09,43,396
10	Less Amount Paid	1,44,07,51,552
11	TDS	3,33,89,414
12	Amount withheld against LD	0
13	Amount withheld towards recovery of Interest on Advance	2,34,96,589
14	Other recoveries / withheld (other than LD & Inerest on Advance)	3,33,05,841
15=9-10-11-12-13-14	Current O/S against E&C	0
16	**Advance billing by Mktg.**	**18,14,61,400**
17	Less Amount Paid	17,73,42,226
18	TDS	41,19,174
19	Amount withheld against LD	0
20	Amount withheld towards recovery of Interest on Advance	0
21	Other recoveries / withheld (other than LD & Inerest on Advance)	0
22=16-17-18-19-20-21	Balance Due agnst Advance & Deferred & Final billing	0
23	**Deferred billing for E&C**	**8,07,29,834**
24	Less Amount Paid	8,04,99,128
25	TDS	0
26	Amount withheld against LD	0
27	Amount withheld towards recovery of Interest on Advance	0
28	Other recoveries / withheld (other than LD & Inerest on Advance)	0
29=23-24-25-26-27-28	Balance Due agnst Advance & Deferred & Final billing	2,30,706
30	**100% Value of PVC Billed for E&C**	**32,30,00,000**
31	Less Deferred Debts	3,23,00,012
32	100% value of Taxes & Duties on Price Variation	3,36,71,160
33=30-31+32	Collectible Dues against PVC for E&C	32,43,71,148
34	Less Amount Paid	31,64,68,624
35	TDS	72,01,946
36	Amount withheld against LD	0
37	Amount withheld towards recovery of Interest on Advance	0
38	Other recoveries / withheld (other than LD & Inerest on Advance)	7,00,578
39=33-34-35-36-37-38	Current O/S against PVC	0
40	**Deferred PV Billed for E&C**	**3,23,00,012**
41	Less Amount Paid	3,23,00,012
42	TDS	0
43	Amount withheld against LD	0
44	Amount withheld towards recovery of Interest on Advance	0
45	Other recoveries / withheld (other than LD & Inerest on Advance)	0
46=40-41-42-43-44-45	Current O/S against Deferred PV for E&C	0
47	**Allocated Insurance Charges**	**120000000**
48	Claimed Insurance Charges	120000000
49	100% value of T&D on Insurance Charges	14832000
50=48+49	Collectible Dues against Insurance Charges	134832000
51	Less Amount Paid	134832000
52	TDS	0
53	Amount withheld against LD	0
54	Amount withheld towards recovery of Interest on Advance	0
55	Other recoveries / withheld (other than LD & Inerest on Advance)	0
56=50-51-52-53-54-55	Current O/S against Insurance Charges	0
57=9+16+23+33+40+50	**Total Collectible Dues for Erection & Comm. Services**	**2,28,46,37,790**
58=10+17+24+34+41+51	**Total Amount Paid for Erection & Comm. Services**	**2,18,21,93,542**
59=57-58	**Total Outstanding**	**10,24,44,248**
60=11+18+25+35+42+52	**Total TDS**	**4,47,10,534**
61=12+19+26+36+43+53	**Total Amount withheld against LD**	**0**
62=13+20+27+37+44+54	**Total Amount withheld towards recovery of Interest on Advance**	**2,34,96,589**
63=14+21+28+38+45+55	**Total Other recoveries / withheld (other than LD & Inerest on Advance)##**	**3,40,06,419**
64=57-58-59-60-61-62	**Total Current Outstanding for Erection & Comm. Services**	**2,30,706**
65=3-4	**Billling Pending (Basic Value) for Erection & Comm.**	**-63**
66=5-16	**Billling/Adjustment Pending against Advance pymt. for Erection & Comm.**	**-11,08,279**
67=6-23	**Billling Pending against Deferred pymt. for Erection & Comm.**	**6,46,890**
68=31-40	**Billling Pending against Deferred pymt. of PV for Erection & Comm.**	**0**
69=47-48	**Billling Pending for Insurance Charges**	**0**

Sr. Manager (F&A)
1 x 660 MW Project
M.S.P.G.Co.Ltd., Bhusawal.

21/10

आशीष कुमार / ASHISH KUMAR 21-12-21
उप अभियंता / Dy. [illegible]
पावर क्षेत्र-निगमन / Power [illegible]
सी इलेक्ट्रिकल्स लिमिटेड / [illegible]
बी.एच.ई.एल हाउस, रीवी कोर्ट / [illegible]
नई दिल्ली-110049 / New Delhi-110049

Annexure-2__Dated: 20.10.2021
Project - Bhusawal TPS Expn. Project 2x500 MW (Unit-4&5)
LOA No.: DG/ESL/MP/Supply/2760 dated 20.06.2007
Contract Agreement No. DG/Bhusawal/MP/Supply dated 20.09.2007
Summary of Reconciliation Statement _Mandatory Spares

Sr. Manager (F&A)
1 x 660 MW Project
MSPGCoLtd, Bhusawal.

सहायक अभियंता / Dy. Engineer
पावर सेक्टर-विपणन / Power Sector-Marketing
भारत हेवी इलेक्ट्रिकल्स लिमिटेड / Bharat Heavy Electricals Ltd.

S. NO.	Description / PYMT. TERMS / UNIT	TRICHY-Spares	RANIPET	HYD MILLS	IMS BPL	EDN	EPD	JHANSI	HERP	HWR	HYD PUMPS	STS BPL	TRICHY VALVES	FEM	PSWR (BOP)	TRS BPL	SCS BPL	BUDRAPUR	GRAND TOTAL
1	Allocated Ex-Work Contract Price for Mand. Spares	12,84,02,092	11,91,02,920	2,12,83,600	8,43,60,000	3,75,35,668	57,60,000	77,60,000	9,23,04,860	28,64,73,262	3,75,96,824	83,14,948	5,99,38,784	2,55,69,600	96,14,400	27,28,800	1,66,52,856	50,26,080	94,84,54,582
2	Addition/ Reduction in Ex-Work Contract Price for Mand. Spares due to Scope Change**	0	0	-4,99,200	0	0	0	-18,48,800	0	0	-4,83,376	0	0	-3,20,000	0	0	-9,888	0	-31,61,264
3 = 1+2	Revised Ex-Work Contract Price for Mand. Spares After Adjustment due to Scope Change	12,84,02,092	11,91,02,920	2,07,84,400	8,43,60,000	3,75,35,668	57,60,000	59,31,200	9,23,04,860	28,64,73,262	3,71,13,448	83,14,948	5,99,38,784	2,52,49,600	96,14,400	27,28,800	1,66,52,856	50,26,080	94,52,93,318
4	100% Value of Ex-Work Contract Price for Mand. Spares Billed	12,76,38,462	11,80,84,342	2,07,84,400	8,43,60,000	3,75,35,668	57,60,000	55,31,200	9,23,04,860	28,63,99,310	3,71,13,513	75,00,368	5,99,38,784	2,52,49,600	96,14,400	27,12,800	1,66,52,856	50,26,080	94,26,06,643
5	Less Advance Adjusted	0	0	0	0	0	0	0	32,450	0	2,50,382	0	0	0	0	0	0	0	2,82,832
6	Less Deferred Debts	1,27,63,842	1,18,08,435	20,78,440	84,36,000	37,53,567	5,76,000	5,93,120	92,29,664	2,86,39,931	37,11,351	7,50,037	59,93,870	25,24,960	9,61,440	2,71,280	16,65,285	5,02,608	9,42,59,830
7=4-5-6	Net Billing on Spares despatch w/o T&D	11,48,74,620	10,62,75,907	1,87,05,960	7,59,24,000	3,37,82,101	51,84,000	53,38,080	8,30,42,746	25,77,59,379	3,31,51,780	67,50,331	5,39,44,914	2,27,24,640	86,52,960	24,41,520	1,49,87,571	45,23,472	84,80,63,981
8	100% value of Taxes & Duties on Mand. Spares	20,14,395	38,62,289	3,12,712	79,09,945	18,35,124	1,15,200	4,25,971	46,67,683	46,23,878	4,00,335	1,50,430	11,98,773	0	0	1,71,921	8,45,386	1,00,522	2,86,34,564
9=7+8	Collectible Dues	11,68,89,015	11,01,38,196	1,90,18,672	8,38,33,945	3,56,17,225	52,99,200	57,64,051	8,77,10,429	26,23,83,257	3,35,52,115	69,00,761	5,51,43,687	2,27,24,640	86,52,960	26,13,441	1,58,32,957	46,23,994	87,66,98,545
10	Less Amount Paid	10,44,64,743	7,15,69,469	1,83,04,656	8,35,02,145	3,44,96,253	52,99,200	57,18,565	8,51,10,437	25,68,21,575	3,22,92,332	67,44,914	5,39,13,488	2,22,19,648	84,60,672	24,41,357	1,55,92,467	32,96,854	81,02,48,773
11	TDS	25,78,279	20,07,417	4,17,382	3,16,000	1,54,599	0	45,488	19,21,485	50,55,217	7,46,201	1,55,847	12,30,199	5,04,992	1,92,288	54,419	2,17,752	1,01,988	1,57,39,553
12	Amount withheld against LD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	Amount withheld towards recovery of Interest on Advance	0	25,68,615	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25,68,615
14	Other recoveries / withheld (other than LD & Inerest on Advance)		9,021	0	15,800	0	0	0	0	3,28,507	0	0	0	0	0	0	0	0	4,81,064
15=9-10-11-12-13-14	Current O/S against Mand. Spares	98,45,993	3,39,83,674	2,96,634	0	9,66,373	0	0	6,78,507	1,37,958	5,13,582	0	0	0	0	0	12,667	12,25,152	4,76,60,540
16	**Advance amount for Mandatory Spares Billed*** Not Applicable**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	Less Amount Paid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	TDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Amount withheld against LD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	Amount withheld towards recovery of Interest on Advance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	Other recoveries / withheld (other than LD & Inerest on Advance)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22=16-17-18-19-20-21	Current O/S against Advance amount of Mandatory Spares	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	**Deferred of Mandatory Spares Billed**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	Less Amount Paid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	TDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	Amount withheld against LD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	Amount withheld towards recovery of Interest on Advance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	Other recoveries / withheld (other than LD & Inerest on Advance)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29=23-24-25-26-27-28	Current O/S against Deferred of Mandatory Spares	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	**100% Value of PVC Billed for Mandatory Spares**	2,43,41,087	2,37,54,425	30,52,167	2,02,73,073	72,57,769	0	6,58,224	1,74,95,934	5,39,68,200	0	9,30,791	1,06,94,144	48,72,982	19,09,736	0	11,47,966	73,251	17,04,29,749
31	Less Deferred Debts	24,34,108	23,75,442	3,05,217	20,27,307	7,25,776	0	65,822	17,49,594	53,96,823	0	93,078	10,69,416	4,87,298	1,90,974	0	1,14,797	7,325	1,70,42,977
32	100% value of Taxes & Duties on Price Variation	4,27,426	8,41,107	61,044	19,20,589	86,078	0	68,487	3,49,916	8,51,251	0	18,616	2,12,292	0	0	0	80,550	13,185	49,30,541
33=30-31+32	Collectible Dues against PVC	2,23,34,405	2,22,20,090	28,07,994	2,01,66,355	66,18,071	0	6,60,889	1,60,96,256	4,94,22,628	0	8,56,329	98,37,020	43,85,684	17,18,762	0	11,13,719	79,111	15,83,17,313
34	Less Amount Paid	2,18,30,253	2,18,06,348	27,45,730	2,00,92,440	63,71,714	0	6,60,889	1,56,81,571	4,55,00,856	0	8,37,713	96,23,137	42,88,225	16,80,567	0	6,80,564	0	15,18,00,007
35	TDS	4,98,029	4,09,260	62,264	70,395	80,400	0	0	3,49,777	10,30,373	0	18,616	2,13,883	97,459	38,195	0	9,604	1,465	28,79,720
36	Amount withheld against LD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	Amount withheld towards recovery of Interest on Advance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	Other recoveries / withheld (other than LD & Inerest on Advance)	6,123	4,482	0	3,520	0	0	0	26,347	3,920	0	0	0	0	0	0	0	0	44,392
39=33-34-35-36-37-38	Current O/S against PVC for Mandatory Spares	0	0	0	0	1,65,957	0	0	38,561	28,87,479	0	0	0	0	0	0	4,23,551	77,646	35,93,194
40	**Deferred PV Billed for Mandatory Spares**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	Less Amount Paid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	TDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	Amount withheld against LD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	Amount withheld towards recovery of Interest on Advance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	Other recoveries / withheld (other than LD & Inerest on Advance)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46=40-41-42-43-44-45	Current O/S against Deferred PV for Mandatory Spares	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	**Freight Allocated for Mandatory Spares**	51,36,085	47,64,117	8,31,376	33,74,400	15,01,426	2,30,400	2,38,720	36,92,194	1,14,58,931	14,84,538	3,32,597	23,97,552	10,09,984	3,84,576	1,09,152	6,66,117	2,01,043	3,78,13,208
48	Freight Billed for Mandatory Spares	51,05,539	47,23,781	8,31,376	33,74,400	15,01,426	2,30,400	2,37,248	36,80,304	1,08,68,524	14,84,538	2,83,117	23,62,054	10,09,984	3,84,576	91,872	6,66,117	2,01,043	3,70,36,299
49	100% value of T&D on Freight for Mandatory Spares	0	69,353	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69,353
50=48+49	Collectible Dues against Freight for Mandatory Spares	51,05,539	47,93,134	8,31,376	33,74,400	15,01,426	2,30,400	2,37,248	36,80,304	1,08,68,524	14,84,538	2,83,117	23,62,054	10,09,984	3,84,576	91,872	6,66,117	2,01,043	3,71,05,652
51	Less Amount Paid	45,62,993	31,68,882	8,01,828	33,61,760	14,49,798	2,22,970	2,35,428	36,80,304	1,06,29,120	14,54,846	2,83,117	23,55,131	9,89,785	0	90,034	2,36,222	0	3,35,22,218
52	TDS	1,05,711	95,452	16,628	12,640	7,575	7,430	1,820	0	1,18,357	29,692	0	6,923	20,199	7,692	1,838	8,598	4,021	4,44,576
53	Amount withheld against LD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	Amount withheld towards recovery of Interest on Advance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	Other recoveries / withheld (other than LD & Inerest on Advance)		2,093	0	0	0	0	0	0	3,285	0	0	0	0	0	0	0	0	5,378
56=50-51-52-53-54-55	Current O/S against Freight for Mandatory Spares	4,36,835	15,26,707	12,920	0	44,053	0	0	0	1,17,762	0	0	0	0	3,76,884	0	4,21,297	1,97,022	31,33,480
57=9+16+23+33+40+50	Total Collectible Dues	14,43,28,959	13,71,51,420	2,26,58,042	10,73,74,700	4,37,36,722	55,29,600	66,62,188	10,74,86,989	32,26,74,409	3,50,36,653	80,40,207	6,73,42,761	2,81,20,308	1,07,56,298	27,05,313	1,76,12,793	49,04,148	1,07,21,21,510
58=10+17+24+34+41+51	Total Amount Paid	13,08,57,989	9,65,44,699	2,18,52,214	10,69,56,345	4,23,17,765	55,22,170	66,14,880	10,44,72,312	31,29,51,551	3,37,47,178	78,65,744	6,58,91,756	2,74,97,658	1,01,41,239	25,31,391	1,65,09,253	32,96,854	99,55,70,998
59=57-58	Total Outstanding	1,34,70,970	4,06,06,721	8,05,828	4,18,355	14,18,957	7,430	47,308	30,14,677	97,22,858	12,89,475	1,74,463	14,51,005	6,22,650	6,15,059	1,73,922	11,03,540	16,07,294	7,65,50,512
60=11+18+25+35+42+52	Total TDS	31,82,019	25,12,129	4,96,274	3,99,035	2,42,574	7,430	47,308	22,71,262	62,43,947	7,75,893	1,74,463	14,51,005	6,22,650	2,38,175	56,257	2,35,954	1,07,474	1,90,63,849
61=12+19+26+36+43+53	Total Amount withheld against LD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62=13+20+27+37+44+54	Total Amount withheld towards recovery of Interest on Advance	0	25,68,615	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25,68,615
63=14+21+28+38+45+55	Total Other recoveries / withheld (other than LD & Inerest on Advance)##	6,123	15,596	0	19,320	0	0	0	26,347	3,35,712	0	0	0	0	0	0	1,17,665	10,071	0	5,30,834
64=57-58-59-60-61-62	Total Current Outstanding	1,02,82,828	3,55,10,381	3,09,554	0	11,76,383	0	0	7,17,068	31,43,199	5,13,582	0	0	0	3,76,884	0	8,57,515	14,99,820	5,43,87,214
65=3-4	Billling Pending against Ex-Work Contract Price for Mandatory Spares	7,63,630	10,18,578	0	0	0	0	0	0	73,952	-65	8,14,580	0	0	0	16,000	0	0	26,86,675
66=5-16	Billling/Adjustment Pending against Advance pymt. for Spares	0	0	0	0	0	0	0	32,450	0	2,50,382	0	0	0	0	0	0	0	2,82,832
67=6-23	Billling Pending against Deferred pymt. of Mandatory Spares	1,27,63,842	1,18,08,435	20,78,440	84,36,000	37,53,567	5,76,000	5,93,120	92,29,664	2,86,39,931	37,11,351	7,50,037	59,93,870	25,24,960	9,61,440	2,71,280	16,65,285	5,02,608	9,42,59,830
68=31-40	Billling Pending against Deferred pymt. of PV for Mandatory Spares	24,34,108	23,75,442	3,05,217	20,27,307	7,25,776	0	65,822	17,49,594	53,96,823	0	93,078	10,69,416	4,87,298	1,90,974	0	1,14,797	7,325	1,70,42,977
69=47-48	Billling Pending for Freight Charges for Mandatory Spares	30,546	40,336	0	0	0	0	1,472	11,890	5,90,407	0	49,480	35,498	0	0	17,280	0	0	7,76,909

Annexure-1, Dated: 20.10.2021
Project - Bhusawal TPS Expn. Project 2x500 MW (Unit-4&5)
LOA No.: DG/Bhusawal Expn./MP/Supply/0402 dated 23.01.2007
Contract Agreement No. DG/Bhusawal/MP/Supply dated 20.05.2007
Summary of Reconciliation Statement _MAIN SUPPLY

21-10-21
Sr. Manager (F&A)
1 x 500 MW Project
NTPC Ltd., Bhusawal

21/10/2021
Power Sector-Marketing
/ BHEL House, Siri Fort

S. NO.	Description / PYMT. TERMS / UNIT	PS_Mktg	TRICHY FE	RANIPET	HYD MILLS	IMS EFL	EDN	EFD	JHANSI	PC CHENNAI	HWR	HYD PUMPS	STS EFL	TRICHY VALVES	PEM	PSWR (EOF)	TRS_EFL	SCS_EFL	RUDRAPUR	GRAND TOTAL
1	Allocated Ex-Work Contract Price for Main Supply		5,70,00,00,000	2,10,00,00,000	81,75,00,000	26,40,00,000	1,16,50,00,000	8,00,00,000	24,50,00,000	1,51,50,00,000	2,90,90,00,000	1,24,65,00,000	31,60,00,000	31,50,00,000	56,00,00,000	41,00,00,000	72,50,00,000	22,20,00,000	15,50,00,000	18,74,50,00,000
2	Addition/ Reduction in Ex-Work Contract Price for Main Supply due to Scope Change**		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-15,70,660	-	-15,70,660
3 = 1+2	Revised Ex-Work Contract Price for Main Supply After Adjustment due to Scope Change		5,70,00,00,000	2,10,00,00,000	81,75,00,000	26,40,00,000	1,16,50,00,000	8,00,00,000	24,50,00,000	1,51,50,00,000	2,90,90,00,000	1,24,65,00,000	31,60,00,000	31,50,00,000	56,00,00,000	41,00,00,000	72,50,00,000	22,04,29,340	15,50,00,000	18,74,34,29,340
4	100% Value of Ex-Work Contract Price for Main Supply Billed		5,69,99,99,958	2,10,00,00,000	81,74,99,994	26,40,00,000	1,16,50,00,000	8,00,00,000	24,49,99,920	1,51,50,00,004	2,90,40,74,500	1,24,64,88,302	31,55,20,400	31,49,96,740	56,00,00,000	40,99,36,000	72,50,00,000	22,04,29,340	15,50,00,000	18,73,79,45,158
5	Less Advance Adjusted		56,99,99,974	20,89,07,333	8,17,49,999	2,64,00,004	11,65,00,000	80,00,000	2,45,00,007	15,14,99,987	29,02,27,524	12,41,08,831	3,15,52,040	3,14,99,666	5,60,00,000	4,09,93,600	7,25,00,000	2,20,42,934	1,55,00,000	1,87,19,81,899
6	Less Deferred Debts		1,42,49,99,966	52,59,10,399	20,43,74,998	6,19,79,658	18,96,25,000	2,00,00,000	4,32,49,969	37,87,49,984	72,60,18,627	31,16,22,077	7,88,80,100	7,87,49,182	14,00,00,000	10,24,84,000	7,25,00,000	2,20,42,934	1,55,00,000	4,39,66,86,894
7=4-5-6	Net Billing on despatch w/o T&D	-	3,70,50,00,018	1,36,51,82,268	53,13,74,997	17,56,20,338	85,88,75,000	5,20,00,000	17,72,49,944	98,47,50,038	1,88,78,28,349	81,07,57,394	20,50,88,260	20,47,47,892	36,40,00,000	26,64,58,400	58,00,00,000	17,63,43,472	12,40,00,000	12,46,92,76,365
8	100% value of Taxes & Duties on Main Supply		68,24,98,115	26,49,06,662	3,91,11,905	3,06,13,610	9,03,14,079	58,29,964	1,98,60,518	11,25,50,078	8,48,59,246	6,68,64,751	3,59,99,015	2,96,87,242	-	-	2,01,77,465	2,18,62,563	47,55,563	1,51,38,90,776
9=7+8	Collectible Dues	-	4,38,74,98,133	1,63,00,88,930	57,04,86,902	20,62,33,948	94,91,89,079	6,18,29,964	19,71,10,462	1,09,73,00,111	1,97,26,87,595	87,76,22,145	24,10,87,275	23,44,35,134	36,40,00,000	26,64,58,400	60,01,77,465	19,82,06,035	12,87,55,563	13,98,31,67,141
10	Less Amount Paid		4,38,11,90,561	1,62,21,14,058	55,83,23,269	20,62,33,948	94,88,02,912	6,18,29,964	19,67,62,617	1,08,42,66,916	1,93,03,93,205	86,56,76,800	24,07,22,516	23,38,18,188	35,80,59,883	26,03,38,400	58,41,29,250	19,78,81,625	12,56,14,618	13,85,61,58,730
11	TDS		38,71,163	40,12,769	98,54,752	-	3,86,167	-	3,47,845	1,01,01,974	3,74,63,515	85,95,398	3,63,600	6,16,946	59,34,104	61,20,000	1,32,28,000	3,15,905	31,00,000	10,43,12,138
12	Amount withheld against LD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	Amount withheld towards recovery of Interest on Advance		-	2,71,382	23,08,840	-	-	-	-	4,82,900	35,17,401	28,09,947	1,159	-	6,013	-	17,40,910	-	40,945	1,11,79,497
14	Other recoveries / withheld (other than LD & Inerest on Advance)		24,36,409	36,90,721	-	-	-	-	-	24,48,320	-	-	-	-	-	-	10,79,305	8,505	-	96,63,260
15=9-10-11-12-13-14	Current O/S against Main Supply	-	-	-	41	-	-	-	-	1	13,13,474	5,40,000	-	-	-	-	-	-	-	18,53,516
16	**Advance amount for Main Supply Billed**	**1,87,45,00,000**																		
17	Less Amount Paid	1,87,45,00,000																		**1,87,45,00,000**
18	TDS	-																		**1,87,45,00,000**
19	Amount withheld against LD	-																		-
20	Amount withheld towards recovery of Interest on Advance	-																		-
21	Other recoveries / withheld (other than LD & Inerest on Advance)	-																		-
22=16-17-18-19-20-21	Current O/S against Deferred of Main Supply	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	**Deferred amount for Main Supply Billed**	**4,37,77,75,000**																		
24	Less Amount Paid	1,78,65,45,686																		**1,78,65,45,686**
25	TDS	5,94,39,000																		**5,94,39,000**
26	Amount withheld against LD	2,41,49,16,699																		**2,41,49,16,699**
27	Amount withheld towards recovery of Interest on Advance	99,07,841																		**99,07,841**
28	Other recoveries / withheld (other than LD & Inerest on Advance)	10,69,65,774																		**10,69,65,774**
29=23-24-25-26-27-28	Current O/S against Deferred of Main Supply	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	**100% Value of PVC Billed for Main Supply**		85,01,90,348	30,22,94,650	13,08,50,297	5,62,17,831	20,96,99,999	1,43,99,999	3,41,00,212	29,93,86,486	51,85,18,411	21,73,68,667	6,31,73,873	6,29,99,998	9,67,05,451	7,16,93,005	2,89,10,579	62,13,770	37,96,057	2,96,65,19,633
31	Less Deferred Debts		8,50,19,025	3,02,29,475	1,30,85,029	56,21,783	2,08,56,907	14,39,999	34,10,023	2,99,38,636	5,18,51,847	2,17,36,867	63,17,393	62,99,995	74,30,148	71,69,300	28,91,059	6,21,376	3,79,605	29,42,98,467
32	100% value of Taxes & Duties on Price Variation		8,85,60,252	3,25,29,948	62,07,746	65,07,481	1,62,02,216	16,44,718	33,74,904	2,27,66,458	1,61,33,165	35,11,190	71,85,870	63,74,278	-	-	5,90,397	6,13,268	75,047	21,22,76,938
33=30-31+32	Collectible Dues against PVC	-	85,37,31,575	30,45,95,123	12,39,73,014	5,71,03,529	20,50,45,308	1,46,04,718	3,40,65,093	29,22,14,308	48,27,99,729	19,91,42,990	6,40,42,350	6,30,74,281	8,92,75,303	6,45,23,705	2,66,09,917	62,05,662	34,91,499	2,88,44,98,104
34	Less Amount Paid		85,27,97,688	30,38,07,583	12,22,65,249	5,71,03,529	20,38,55,246	1,46,04,718	3,40,23,888	29,01,03,977	47,60,98,898	19,47,95,618	6,39,99,014	6,28,16,586	8,79,78,356	6,33,65,314	2,59,88,726	61,96,159	34,15,578	2,86,32,16,127
35	TDS		9,33,887	7,85,195	17,07,765	-	81,794	-	41,205	19,23,283	67,00,711	43,47,372	43,336	2,57,695	12,96,947	11,58,391	5,78,212	9,288	75,921	1,99,41,002
36	Amount withheld against LD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	Amount withheld towards recovery of Interest on Advance		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	Other recoveries / withheld (other than LD & Inerest on Advance)		-	2,345	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39=33-34-35-36-37-38	Current O/S against PVC	-	-	-	-	-	11,08,268	-	-	1,87,048	120	-	-	-	-	-	42,979	215	-	2,32,707
40	**Deferred PV Billed for Main Supply**		8,50,19,025	3,02,29,475	1,30,85,029	56,21,783	2,08,56,907	14,39,999	34,10,023	2,99,38,636	5,18,51,847	2,17,36,867	63,17,393	62,99,995	74,30,148	71,69,300	28,91,059	6,21,376	3,79,605	29,42,98,467
41	Less Amount Paid		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	TDS		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	Amount withheld against LD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	Amount withheld towards recovery of Interest on Advance		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	Other recoveries / withheld (other than LD & Inerest on Advance)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46=40-41-42-43-44-45	Current O/S against Deferred PVC	-	8,50,19,025	3,02,29,475	16,30,192	-	-	-	-	2,30,31,305	-	-	-	-	-	-	-	-	-	-
47	**Freight Allocated for Main Supply**		-	-	1,14,54,837	56,21,783	2,08,56,907	14,39,999	34,10,023	69,07,331	5,18,51,847	2,17,36,867	63,17,393	62,99,995	74,30,148	71,69,300	28,91,059	6,21,376	3,79,605	13,99,09,997
48	Freight Billed for Main Supply		20,08,13,000	11,08,02,000	1,28,36,000	40,95,000	1,55,92,000	11,81,000	84,17,000	4,85,89,000	5,77,30,000	1,96,87,000	57,43,000	49,61,000	90,56,000	43,31,000	1,02,38,000	64,58,000	49,71,000	15,43,88,470
49	100% value of T&D on Freight		20,08,13,000	10,90,44,547	1,28,36,000	39,94,489	1,55,75,188	11,81,000	84,16,968	4,85,88,872	5,75,08,009	1,96,86,799	57,19,230	49,48,503	90,56,000	43,30,324	1,01,74,320	64,58,000	49,23,587	52,55,00,000
50=48+49	Collectible Dues against Freight		27,30,849	94,392	-	-	-	-	-	3,25,498	5,483	-	-	-	-	-	-	-	-	52,32,54,836
51	Less Amount Paid	-	20,35,43,849	10,91,38,939	1,28,36,000	39,94,489	1,55,75,188	11,81,000	84,16,968	4,89,14,370	5,75,13,492	1,96,86,799	57,19,230	49,48,503	90,56,000	43,30,324	1,01,74,320	64,58,000	49,23,587	31,56,222
52	TDS		20,32,04,213	10,90,19,042	1,26,54,513	39,94,489	1,55,75,188	11,81,000	84,16,968	4,85,83,746	5,66,69,930	1,95,05,234	57,19,230	49,48,503	89,56,608	42,43,718	99,70,834	64,58,000	48,25,115	52,64,11,058
53	Amount withheld against LD		1,57,048	1,12,897	1,81,487	-	-	-	-	3,30,623	8,03,926	1,81,565	-	-	99,392	86,606	2,03,486	-	98,472	52,39,26,331
54	Amount withheld towards recovery of Interest on Advance		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22,55,502
55	Other recoveries / withheld (other than LD & Inerest on Advance)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56=50-51-52-53-54-55	Current O/S against Freight	-	-	7,000	-	-	-	-	-	-	26	-	-	-	-	-	-	-	-	-
57=9+16+23+33+40+50	**Total Collectible Dues**	**6,25,22,75,000**	1,82,588	-	-	-	-	-	-	1	39,610	-	-	-	-	-	-	-	-	7,026
58=10+17+24+34+41+51	**Total Amount Paid**	**3,66,10,45,686**	**5,52,97,92,582**	**2,07,40,52,467**	**72,03,80,945**	**27,29,53,749**	**1,19,06,66,482**	**7,90,55,681**	**24,30,02,546**	**1,46,83,67,425**	**2,56,48,52,663**	**1,11,81,88,801**	**31,71,66,248**	**30,87,57,913**	**46,97,61,451**	**34,24,81,729**	**63,98,52,761**	**21,14,91,073**	**13,75,50,254**	**23,94,06,49,770**
59=57-58	**Total Outstanding**	**2,59,12,29,314**	**5,43,71,92,462**	**2,03,49,40,683**	**69,32,43,031**	**26,73,31,966**	**1,16,82,33,346**	**7,76,15,682**	**23,92,03,473**	**1,42,29,54,639**	**2,46,31,62,033**	**1,07,99,77,652**	**31,04,40,760**	**30,15,83,277**	**45,49,94,847**	**32,79,47,432**	**62,00,88,810**	**21,05,35,784**	**13,38,55,311**	**20,90,43,46,874**
60=11+18+25+35+42+52	**Total TDS**	**5,94,39,000**	**49,62,098**	**49,10,861**	**1,17,44,004**	**56,21,783**	**2,24,33,136**	**14,39,999**	**37,99,073**	**4,54,12,786**	**10,16,90,630**	**3,82,11,149**	**67,25,488**	**71,74,636**	**1,47,66,604**	**1,45,34,297**	**1,97,63,951**	**9,55,289**	**36,94,943**	**3,03,63,02,896**
61=12+19+26+36+43+53	**Total Amount withheld against LD**	**2,41,49,16,699**	-	-	-	-	**4,67,961**	-	**3,89,050**	**1,23,55,880**	**4,49,68,152**	**1,31,24,335**	**4,06,936**	**8,74,641**	**73,30,443**	**73,64,997**	**1,40,09,698**	**3,25,193**	**32,74,393**	**18,59,47,642**
62=13+20+27+37+44+54	**Total Amount withheld towards recovery of Interest on Advance**	**99,07,841**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**2,41,49,16,699**
63=14+21+28+38+45+55	**Total Other recoveries / withheld (other than LD & Inerest on Advance)##**	**10,69,65,774**	**8,74,55,434**	**3,39,29,541**	**16,30,192**	-	-	-	**4,82,900**	**35,17,401**	**28,09,947**	**1,159**	-	**6,013**	-	**17,40,910**	-	**40,945**	**2,10,87,338**	**99,07,841**
64=57-58-59-60-61-62	**Total Current Outstanding**	-	**1,82,588**	-	**1,14,54,878**	**56,21,783**	**2,19,65,175**	**14,39,999**	**34,10,023**	**2,56,66,673**	**146**	-	-	-	-	-	**11,22,284**	**8,720**	-	**10,69,65,774**
65=3-4	**Billling Pending against Ex-Work Contract Price for Main Supply**	-	42	-	6	-	-	-	80	-4	49,25,500	11,698	4,79,600	3,260	-	64,000	-	-	-	**25,67,78,764**
66=5-16	**Billling/Adjustment Pending against Advance pymt. for Main Supply**	**-1,87,45,00,000**	56,99,99,974	20,89,07,333	8,17,49,999	2,64,00,004	11,65,00,000	80,00,000	2,45,00,007	15,14,99,987	29,02,27,524	12,41,08,831	3,15,52,040	3,14,99,666	5,60,00,000	4,09,93,600	7,25,00,000	2,20,42,934	1,55,00,000	**15,75,72,453**
67=6-23	**Billling Pending against Deferred pymt. for Main Supply**	**-4,37,77,75,000**	1,42,49,99,966	52,59,10,399	20,43,74,998	6,19,79,658	18,96,25,000	2,00,00,000	4,32,49,969	37,87,49,984	72,60,18,627	31,16,22,077	7,88,80,100	7,87,49,182	14,00,00,000	10,24,84,000	7,25,00,000	2,20,42,934	1,55,00,000	**54,84,182**
68=31-40	**Billling Pending against Deferred Pymt. of PV for Main Supply**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-25,18,101**
69=47-48	**Billling Pending for Freight Charges of Main Supply**	-	-	17,57,453	-	1,00,511	16,812	-	32	128	2,21,991	201	23,770	12,497	-	676	63,680	-	47,413	**1,89,11,894**
																				22,45,164

Annexure-4___Dated: 20.10.2021
Project - Bhusawal TPS Expn. Project 2x500 MW (Unit-4&5)
Contract Agreement No. - DG/Bhusawal/MP/Supply and DG/Bhusawal/MP/Erection dated 20.09.2007

Overall Summary of Financial Reconciliation statements for the Contract, as per Annexure-1, 2 & 3

S. NO.	Description / PYMT. TERMS / UNIT	MAIN EQUIPMENT	MANDATORY SPARES	ERECTION & COMM.	GRAND TOTAL
1	**Allocated Ex-Work Contract Price for Main Supply/Spares/E&C**	**18,74,50,00,000**	**94,84,54,582**	**1,61,50,00,000**	21,30,84,54,582
2	Addition/ Reduction in Ex-Work Contract Price for Main Supply/Spares/E&C due to Scope Change**	-15,70,660	-31,61,264	0	-47,31,924
3 = 1+2	**Revised Ex-Work Contract Price for Main Supply/Spares/E&C After Adjustment due to Scope Change**	**18,74,34,29,340**	**94,52,93,318**	**1,61,50,00,000**	21,30,37,22,658
4	**100% Value of Ex-Work Contract Price for Main Supply/Spares/E&C Billed**	**18,73,79,45,158**	**94,26,06,643**	**1,61,50,00,063**	21,29,55,51,864
5	Less Advance Adjusted	1,87,19,81,899	2,82,832	16,03,91,721	2,03,26,56,452
6	Less Deferred Debts	4,39,66,86,894	9,42,59,830	8,13,76,724	4,57,23,23,448
7=4-5-6	Net Billing on despatch/works w/o T&D	12,46,92,76,365	84,80,63,981	1,37,32,31,618	14,69,05,71,964
8	100% value of Taxes & Duties for Main Supply/Spares/E&C	1,51,38,90,776	2,86,34,564	15,77,11,778	1,70,02,37,118
9=7+8	Collectible Dues	13,98,31,67,141	87,66,98,545	1,53,09,43,396	16,39,08,09,082
10	Less Amount Paid	13,85,61,58,730	81,02,48,773	1,44,07,51,552	16,10,71,59,055
11	TDS	10,43,12,138	1,57,39,553	3,33,89,414	15,34,41,105
12	Amount withheld against LD	0	0	0	0
13	Amount withheld towards recovery of Interest on Advance	1,11,79,497	25,68,615	2,34,96,589	3,72,44,701
14	Other recoveries / withheld (other than LD & Inerest on Advance)	96,63,260	4,81,064	3,33,05,841	4,34,50,165
15=9-10-11-12-13-14	Current O/S against Main Supply/Spares/E&C	18,53,516	4,76,60,540	0	4,95,14,056
16	**Advance Amount billed for Main Supply/Spares/E&C**	**1,87,45,00,000**	**0**	**18,14,61,400**	2,05,59,61,400
17	Less Amount Paid	1,87,45,00,000	0	17,73,42,226	2,05,18,42,226
18	TDS	0	0	41,19,174	41,19,174
19	Amount withheld against LD	0	0	0	0
20	Amount withheld towards recovery of Interest on Advance	0	0	0	0
21	Other recoveries / withheld (other than LD & Inerest on Advance)	0	0	0	0
22=16-17-18-19-20-21	Current O/S against Advance amount billing of Main Supply/Spares/E&C	0	0	0	0
23	**Deferred/Retention of Main Supply/Spares/E&C Billed**	**4,37,77,75,000**	**0**	**8,07,29,834**	4,45,85,04,834
24	Less Amount Paid	1,78,65,45,686	0	8,04,99,128	1,86,70,44,814
25	TDS	5,94,39,000	0	0	5,94,39,000
26	Amount withheld against LD	2,41,49,16,699	0	0	2,41,49,16,699
27	Amount withheld towards recovery of Interest on Advance	99,07,841	0	0	99,07,841
28	Other recoveries / withheld (other than LD & Inerest on Advance)	10,69,65,774	0	0	10,69,65,774
29=23-24-25-26-27-28	Current O/S against Deferred of Main Supply/Spares/E&C	0	0	2,30,706	2,30,706
30	***100% Value of PVC for Main Supply/Spares/E&C Billed***	**2,96,65,19,633**	**17,04,29,749**	**32,30,00,000**	3,45,99,49,382
31	Less Deferred Debts	29,42,98,467	1,70,42,977	3,23,00,012	34,36,41,456
32	100% value of Taxes & Duties on Price Variation	21,22,76,938	49,30,541	3,36,71,160	25,08,78,639
33=30-31+32	Collectible Dues against PVC	2,88,44,98,104	15,83,17,313	32,43,71,148	3,36,71,86,565
34	Less Amount Paid	2,86,32,16,127	15,18,00,007	31,64,68,624	3,33,14,84,758
35	TDS	1,99,41,002	28,79,720	72,01,946	3,00,22,668
36	Amount withheld against LD	0	0	0	0
37	Amount withheld towards recovery of Interest on Advance	0	0	0	0
38	Other recoveries / withheld (other than LD & Inerest on Advance)	2,32,707	44,392	7,00,578	9,77,677
39=33-34-35-36-37-38	Current O/S against PVC for Main Supply/Spares/E&C	11,08,268	35,93,194	0	47,01,462
40	**Deferred PV Billed for Main Supply/Spares/E&C**	**29,42,98,467**	**0**	**3,23,00,012**	32,65,98,479
41	Less Amount Paid	0	0	3,23,00,012	3,23,00,012
42	TDS	0	0	0	0
43	Amount withheld against LD	0	0	0	0
44	Amount withheld towards recovery of Interest on Advance	0	0	0	0
45	Other recoveries / withheld (other than LD & Inerest on Advance)	13,99,09,997	0	0	13,99,09,997
46=40-41-42-43-44-45	Current O/S against Deferred PVC for Main Supply/Spares/E&C	15,43,88,470	0	0	15,43,88,470
47	**Freight Allocated for Main Supply/Spares /Or Allocated Insurance Charges for E&C**	**52,55,00,000**	**3,78,13,208**	**12,00,00,000**	68,33,13,208
48	Freight Billed for Main Supply/Spares /Or billed Insurance Charges for E&C	52,32,54,836	3,70,36,299	12,00,00,000	68,02,91,135
49	100% value of T&D on Freight /Or on Insurance Charges for E&C	31,56,222	69,353	1,48,32,000	1,80,57,575
50=48+49	Collectible Dues against Freight /Or against Insurance Charges for E&C	52,64,11,058	3,71,05,652	13,48,32,000	69,83,48,710
51	Less Amount Paid	52,39,26,331	3,35,22,218	13,48,32,000	69,22,80,549
52	TDS	22,55,502	4,44,576	0	27,00,078
53	Amount withheld against LD	0	0	0	0
54	Amount withheld towards recovery of Interest on Advance	0	0	0	0
55	Other recoveries / withheld (other than LD & Inerest on Advance)	7,026	5,378	0	12,404
56=50-51-52-53-54-55	Current O/S against Freight for Main Supply/Spares /Or against Insurance Charges for E&C	2,22,199	31,33,480	0	33,55,679
57=9+16+23+33+40+50	**Total Collectible Dues**	**23,94,06,49,770**	**1,07,21,21,510**	**2,28,46,37,790**	27,29,74,09,070
58=10+17+24+34+41+51	**Total Amount Paid**	**20,90,43,46,874**	**99,55,70,998**	**2,18,21,93,542**	24,08,21,11,414
59=57-58	**Total Outstanding**	**3,03,63,02,896**	**7,65,50,512**	**10,24,44,248**	3,21,52,97,656
60=11+18+25+35+42+52	**Total TDS**	**18,59,47,642**	**1,90,63,849**	**4,47,10,534**	24,97,22,025
61=12+19+26+36+43+53	**Total Amount withheld against LD**	**2,41,49,16,699**	**0**	**0**	2,41,49,16,699
62=13+20+27+37+44+54	**Total Amount withheld towards recovery of Interest on Advance**	**2,10,87,338**	**25,68,615**	**2,34,96,589**	4,71,52,542
63=14+21+28+38+45+55	**Total Other recoveries / withheld (other than LD & Inerest on Advance)##**	**25,67,78,764**	**5,30,834**	**3,40,06,419**	29,13,16,017
64=57-58-59-60-61-62	**Total current / collectible Outstanding**	**15,75,72,453**	**5,43,87,214**	**2,30,706**	21,21,90,373
65=3-4	**Billling Pending against Ex-Work Contract Price for Main Supply/Spares/E&C**	**54,84,182**	**26,86,675**	**-63**	81,70,794
66=5-16	**Billling/Adjustment Pending against Advance pymt. for Main Supply/Spares/E&C**	**-25,18,101**	**2,82,832**	**-11,08,279**	-33,43,548
67=6-23	**Billling Pending against Deferred pymt. of Main Supply/Spares/E&C**	**1,89,11,894**	**9,42,59,830**	**91,11,026**	12,22,82,750
68=31-40	**Billling Pending against Deferred pymt. of PV for Main Supply/Spares/E&C**	**0**	**1,70,42,977**	**0**	1,70,42,977
69=47-48	**Billing Pending against Freight for Main Supply/Spares /Or against Insurance Charges for E&C**	**22,45,164**	**7,76,909**	**0**	30,22,073

21.10.21
Sr. Manager (F&A)
1 x 660 MW Project

आशीष कुमार / ASHISH KUMAR
उप अभियंता / Dy. Engineer

Annexure-6

Contract Agreement No. - DG/Bhusawal/MP/Supply and DG/Bhusawal/MP/Erection dated 20.09.2007

Dated: 20.10.2021

Bhusawal TPS Expn. Project 2x500 MW (Unit-4&5)

Overall Summary of Financial Reconciliation & BHEL's dues as on

	Revised Ex-W Contract Price	Gross billing of Ex-W Contract Price	Advance adjusted from Gross billing	Retention from Gross billing towards event milestones	Net Progressive Billing done	Taxes & Duties on Gross billing of Ex-W Contract Price	Advnce amount claimed/billed by BHEL	Deferred / Retention amount claimed / billed by BHEL	100% PVC amount billed by BHEL	Amount retained towards 10% PVC retention	Actual 90% PVC amount claimed by BHEL	Taxes & Duties on 100% PVC amount	Amount claimed against 10% PV retaintion_till date	Total Collectible billing done by BHEL_till date	Payment Received against Total Collectible billing by BHEL_till date	Total Outstanding / Balance amount	Value of Shortfall in billing of Ex-W Contract Price	Balance amount to be claimed / Adjusted against Advance payment	Balance payable amount towards Retention against milestones	Balance payable amount against 10% PV retention
	1	2	3	4	5=2-3-4	6	7	8	9	10	11=9-10	12	13	14=5+6+7+8+11+12+13	15	16=14-15	17=1-2	18=3-7	19=4-8	20=10-13
Main Supply	18,74,34,29,340	18,73,79,45,158	1,87,19,81,899	4,39,66,86,894	12,46,92,76,365	1,51,38,90,776	1,87,45,00,000	4,37,77,75,000	2,96,65,19,633	29,42,98,467	2,67,22,21,166	21,22,76,938	29,42,98,467	23,41,42,38,712	20,38,04,20,543	3,03,38,18,169	54,84,182	-25,18,101	1,89,11,894	-
Freight_Main Supply	52,55,00,000	52,32,54,836			52,32,54,836	31,56,222								52,64,11,058	52,39,26,331	24,84,727	22,45,164			
Mand. Spares	94,52,93,318	94,26,06,643	2,82,832	9,42,59,830	84,80,63,981	2,86,34,564	-	-	17,04,29,749	1,70,42,977	15,33,86,772	49,30,541	-	1,03,50,15,858	96,20,48,780	7,29,67,078	26,86,675	2,82,832	9,42,59,830	1,70,42,977
Freight_Mand. Spares	3,78,13,208	3,70,36,299			3,70,36,299	69,353								3,71,05,652	3,35,22,218	35,83,434	7,76,909			
Erection & Comm.	1,61,50,00,000	1,61,50,00,063	16,03,91,721	8,13,76,724	1,37,32,31,618	15,77,11,778	18,14,61,400	8,07,29,834	32,30,00,000	3,23,00,012	29,06,99,988	3,36,71,160	3,23,00,012	2,14,98,05,790	2,04,73,61,542	10,24,44,248	-63	-11,08,279	6,43,890	-
Insurance Charges	12,00,00,000	12,00,00,000			12,00,00,000	1,48,32,000								13,48,32,000	13,48,32,000	-	-			
Grand Total	21,98,70,35,866	21,97,58,42,999	2,03,26,56,452	4,57,23,23,448	15,37,08,63,099	1,71,82,94,693	2,05,59,61,400	4,45,85,04,834	3,45,99,49,382	34,36,41,455	3,11,63,07,926	25,08,78,639	32,65,98,479	27,29,74,09,070	24,08,21,11,414	3,21,52,97,656	1,11,92,867	-33,43,548	11,38,18,614	1,70,42,977

A	Total Outstanding / Balance (A=16)	3,21,52,97,656.00
B	Total TDS deducted	24,97,22,025.00
C	Total Amount withheld / retained against LD	2,41,49,16,699.00
D	Total Amount withheld towards recovery of Interest on Advance	4,71,52,542.00
E	Total amount withheld / retained against Other recoveries (other than LD & Inerest on Advance)	29,13,16,017.00
F	Now, Total current Outstanding (F=A-B-C-D-E)	21,21,90,373.00
G	10% Maximum Contractual LD (considering actual billed PV value) as per MSPGCL , if levied	2,50,24,97,938.00
H	Excess amount withheld / retained against LD (H=C-G)	-8,75,81,239.00
I	Balance payable amount against Retention towards Main Supply/Spares/E&C (I=19)	11,38,18,614.00
J	Balance patable amount against Retention for PVC of Main Supply/Spares/E&C (J=20)	1,70,42,977.00
K	Total amount payable to BHEL is (K=F+H+I+J)	25,54,70,725.00
L	Amount to be retained by MSPGCL towards provision of BOCW cess (L)	1,93,80,000.00
M	Balance total amount payable to BHEL is (M=K-L)	23,60,90,725.00
N	Amount towards Shortfall in billing of Ex-W Contract Price, i.e. to be claimed (N=17)	1,11,92,867.00
O	Hence, Total amount payable to / claimed by BHEL incl. amount towards Shortfall in billing of Ex-W Contract Price is, (O=M+N)	24,72,83,592.00

Note: **The Financial Reconciliation is subject to the following;**

1 The total amount of Rs. 250,24,97,938/- is retained against LD as per MSPGCL letter no. DG/Comm./BSL-2x500MW/MP/Supply/0959 dated 12.05.2015 & letter no. DG/Comm./BSL/2x500MW/MP/Erection/0958 dated 12.05.2015.

2 Any other certificates / No Claim /documents from both sides (Mahagenco / BHEL), if required, to be provided for closure of the contract.

3 As per reconcilition total amount payable to BHEL is only Rs. 23,60,90,725/-, however any other claims/recovery/billing from both sides (Mahagenco / BHEL), if required, to be settled separately.

Chief Engineer
1 x 660 MW Project
M.S.P.G.Co.Ltd., B.

Sr. Manager (F&A)
1 x 660 MW Project
M.S.P.G.Co.Ltd., Bhusawal.

आशिष कुमार / ASHISH KUMAR
उप अभियंता / Dy. Engineer
पावर क्षेत्र-विपणन / Power Sector-Marketing
भारत हेवी इलेक्ट्रिकल्स लिमिटेड / Bharat Heavy Electricals Ltd
बी.एच.ई.एल हाऊस, सीरी फोर्ट / BHEL House, Siri Fort
नई दिल्ली-110049 / New Delhi-110049

MAHARASHTRA STATE POWER GENERATION CO. LTD.

MAHAGENCO
Maharashtra State Power Generation Co. Ltd.

Office of The Chief Engineer (Project),
1x660 MW Bhusawal Project, Deepnagar, Bhusawal,
Dist.: Jalgaon – 425307 (Maharashtra State)
Phone No: 02582- 250268
E. mail : cebslproj660@mahagenco.in

Ref. : CE (P)/BSL/1x660 MW/PMG/ No 02597 Date : 3 DEC 2021

Contract Closing Note

Sub: 2 x 500 MW Bhusawal Expansion Project U#4&5: BTG Contract - Contract Closing Note – Reg.

Ref.:

1) LOA No DG/Bhusawal Expn./MP/Supply/0402 Dtd. 23.01.2007
2) Contract Agreement No. DG/BHUSAWAL/MP/SUPPLY Dtd. 20.09.07
3) LOA No DG/BSL Expn./MP/Erection/0403 Dtd. 23.01.2007
4) Contract Agreement No. DG/BHUSAWAL/MP/ERECTION Dtd. 20.09.07
5) Amendment no.4: DG-Comm./BSL-2x500MW/MP/Supply/959 Dtd. 12.05.2015
6) Amendment no.2: DG-Comm./BSL-2x500MW/MP/Erection/958 Dtd. 12.05.2015
7) CE(P&P) Ltr. No. CE(P&P)/Comm./BHEL/LD issues/425 Dtd. 18.04.2019
8) Overall summary of Financial reconciliation & BHEL's Dues as on 20.10.2021 signed on Dtd. 26.10.2021

The LOA was placed on M/s Bharat Heavy Electrical Ltd. (M/s BHEL) as per Ref.(1&3) for Supply and Erection, Testing & Commissioning of Main Plant equipments consisting of Steam Generator, Steam Turbine & Generator, Control & Instrumentation for the entire Main Plant, Electrical Equipments and Other Auxiliary Equipments including Mandatory spares for 2x500MW Bhusawal Expansion Project Unit No. 4 & 5.The specified time limit for completion of Bhusawal Unit No. 4 is 43 months and for Bhusawal Unit No. 5 is 47 months.

Accordingly, for Bhusawal Unit No. 4 M/s. BHEL have started the supply of materials on 03.01.2008 (Schedule Date 22.12.2007) and boiler erection on 26.03.2008 (Schedule Date 22.02.2008). The Unit is synchronized on 11.05.2011 and Trial Operation was completed on 29.10.2012. The unit was put for Commercial Operation on 16.11.2012 and PG test was completed on Dtd. 21.12.2015.

For Bhusawal Unit No. 5 M/s. BHEL have started the supply of materials on 10.01.2008 (Schedule Date 22.04.2008) and boiler erection on 03.08.2008 (Schedule Date 26.06.2008). The Unit is synchronized on 03.03.2012 and Trial Operation was completed on 01.06.2013. The unit was put for Commercial Operation on 03.01.2014 and PG test was completed on Dtd. 09.02.2016.

The O/o CE (P&P) has issued various amendments for supply and erection contracts. As per amendment No. 959 dtd.12.05.2015 for supply and amendment No. 958 dated 12.05.2015 for erection, FTLE for Main plant BTG Package of Bhusawal U-4 Project was extended upto29.10.2012 and Bhusawal U-5 Project was extended upto 01.06.2013 with levy of LD @ 10% of contract price plus 10% of price variation payable.

Further, M/s BHEL has requested to review LD cases for Main Plant Contracts for Paras U3&4, Parli U6&7, Khaperkheda U5 and Bhusawal U4&5. On this, CE (P&P) vide letter no. 425 Dtd. 18.04.2019 informed M/s BHEL that, there is no alteration in the status-quo of applicability of LD recommended by previously formed JTFC for BTG Packages of Paras U3&4, Parli U6&7, Khaperkheda U5 and Bhusawal U4&5 projects.

The following are the details of Supply and Erection Contract closing based on approved proposal with Amendments of Final Time Limit Extension vide Ref.(5&6)

SN	Description	Details		
1)	**Name of Contractor**	M/s. BHEL, New Delhi.		
2)	**Name of Works**	1) Supply of Main Plant equipments consisting of Steam Generator, Steam Turbine and Generator, Control & Instrumentation for the entire Main Plant, Electrical equipments and Other Auxiliary Equipments for Bhusawal TPS Expansion Project 2 x500MW. 2) Erection, Testing & Commissioning of Main Plant equipments consisting of Steam Generator, Steam Turbine & Generator, , Control & Instrumentation for the entire plant, Electrical Equipments and other auxiliary equipments for 02 nos. of 500MW units at Bhusawal TPS Expansion Project 2x500 MW.		
3)	**Payment status**			
i	**Total Value of the contract**	Price for supply (Main + Mandatory Spares) of Equipment	Price for Erection and commissioning	Total (Rs)
	a)Ex work price	19,69,34,54,582/- 18,74,50,00,000+94,84,54,582)	1,61,50,00,000	21,30,84,54,582/-
	c)Freight and insurance	56,33,13,208/- (52,55,00,000+3,78,13,208)	12,00,00,000/-	68,33,13,208/-
	d)Taxes and duties	344,40,24,699/- (3264690000+179334699)	21,23,60,000	365,63,84,699/-
	d) PV amount	PV shall be subject be limited to (+/-) 20% of the Ex-works price		
	Total contract value excluding PV	23,70,07,92,489/-	194,73,60,000/-	2564,81,52,489/-
ii	**Total value of work done upto actual completion**			
	a. Ex-works Price of supply excluding price variation	19,68,05,51,801 (18,73,79,45,158 +94,26,06,643)	1,61,50,00,063	21,295,551,864
	b. PV amount	3,13,69,49,382 (2,96,65,19,633+17,04,29,749)	32,30,00,000	3,45,99,49,382
	c. Freight & Insurance	56,02,91,135 (52,32,54,836+3,70,36,299)	12,00,00,000	68,02,91,135
	d. Taxes and duties on basic value	1,54,25,25,340 (1,51,38,90,776 +2,86,34,564)	15,77,11,778	170,02,37,118
	e. Taxes and duties on freight/insurance charges	32,25,575 (31,56,222 + 69,353)	1,48,32,000	1,80,57,575
	f. Taxes and duties on PVC value	21,72,07,479 (21,22,76,938 +49,30,541)	3,36,71,160	25,08,78,639
	Total Amount in Rs including PV	25,14,07,50,712	2,26,42,15,001	2740,49,65,713

iii	**Payment effected by H.O. Against supply, spares, WCT etc.**	------		
iv	**Payment effected by Site against Supply, Spares, WCT etc.**			
	a. Payment Status (Site)	As per enclosed Financial Reconciliation statement sheet		
	b. Payment released	21,89,99,17,872 (20,38,04,20,543+52,39,26,331+96,20,48,780+3,35,22,218)	2,18,21,93,542 (2,04,73,61,542+13,48,32,000)	24,08,21,11,414
	c. Balance Payment (Amount of work not done/billing/Adjusted in Ex-work price)	111,92,930 (54,84,182+22,45,164+26,86,675+7,76,909)	-63	1,11,92,867
v	**Outstanding/Balance payment and recoveries**			
	1. Total outstanding /balance payment			3,21,52,97,656
	2. Total TDS deducted			24,97,22,025
	3. Recovery of interest on advance			4,71,52,542
	4. Other recoveries (Other than LD & interest on advance)As per annexure "O"			29,13,16,017
	5. Retain against LD			2,41,49,16,699
	Net current outstanding (1-2-3-4-5)			21,21,90,373
vi	**Retention amount at site**			
	a. Total current outstanding (F)	21,19,59,667 (15,75,72,453+5,43,87,214)	2,30,706	21,21,90,373
	b. Amount retained towards LD	2,41,49,16,699	0	2,41,49,16,699
	c. Amount towards shortfall in billing (N=17)	1,11,92,930 (54,84,182+22,45,164+26,86,675+7,76,909)	-63	1,11,92,867
	d. Balance amount payable against milestone (I=19)	11,31,71,724 (1,89,11,894+9,42,59,830)	6,46,890	11,38,18,614
	e. Amount against PVC deferred (J=20)	1,70,42,977	--	1,70,42,977
	Total retention available (a to e)	276,82,83,997	87,75,533	276,91,61,530
	Balance B.G.	NIL		
vii	LD Applicable as per Amendment	As per FTLE amendment for supply, vide letter under ref (5) and amendment for erection, vide letter under ref (6), the applicable LD is Rs. 2,50,24,97,938/-(Details of LD are given below)		
	a. 10% LD on final revised Ex contract price (Exclusive of PV)	1,93,98,40,000 (1,87,45,00,000+6,53,40,000)	16,15,00,000	2,10,13,40,000
	b. 10% LD on actual PV paid	31,36,94,938 (29,66,51,963+1,70,42,975)	3,23,00,000	34,59,94,938
	c. 10% LD on freight	5,51,63,000 (5,25,50,000+26,13,000)		5,51,63,000
	Total LD in Rs.	2,30,86,97,938	19,38,00,000	2,50,24,97,938

4) Execution Status for Bhusawal Unit-4:

SN	Activity	Schedule Date	Actual Date
i	Start of supply	22.12.2007	03.01.2008
ii	Boiler Erection start	22.02.2008	26.03.2008
iii	TG Erection start	22.01.2009	03.11.2009
iv	Completion of erection & commissioning	22.08.2010	29.10.2012
v	Trial operation	22.08.2010	29.10.2012
vi	Completion of P. G. test	22.09.2010	21.12.2015
vii	Completion of supply	22.08.2010	30.06.2015

Execution Status for Bhusawal Unit-5:

SN	Activity	Schedule Date	Actual Date
i	Start of supply	22.04.2008	10.01.2008
ii	Boiler Erection start	22.06.2008	03.08.2008
iii	TG Erection start	22.05.2009	17.12.2009
iv	Completion of erection & commissioning	22.12.2010	01.06.2013
v	Trial operation	22.12.2010	01.06.2013
vi	Completion of P. G. test	22.01.2011	09.02.2016
vii	Completion of supply	22.08.2010	30.06.2015

5)	**Extension of contract period up to**	Extension of contract period up to 29/10/2012 for Unit no. 4 & up to 01/06/2013 for Unit No. 5 with levy of liquidated damages.
6)	**Guarantee period completion date**	12 calendar months commencing immediately upon satisfactory completion of performance guarantee test.
7)	**Pending supplies**	With the available record, pendency is nil.
8)	**Recoveries if any**	The amount of Rs.1,93,80,000/- against BOCW Cess, as per CE (P&P) letter no. 0695 dated 06.07.2021 is kept as retention. After signing the reconciliation statement, BHEL has not submitted any written objection about this retention.
9)	**Performance during the guarantee period**	The performance of units was satisfactory.
10)	**Status of NOC**	Yet not submitted by BHEL.
11)	**Recommendations:**	1. As per enclosed audited financial account statement for supply & work, the total amount of Rs.276,91,61,530/- is available with Mahagenco as a retention (i.e. towards LD & other retention). 2. The applicable LD amount is Rs. 2,50,24,97,938/- which is accounted for on dtd.01/04/2021 vide JV No.1250933. 3. The amount to be recovered for the BOCW cess is Rs. 193,80,000/- 4. The net payable amount to M/s BHEL is Rs 23,60,90,725/- (Rs.276,91,61,530-250,24,97,938-193,80,000–1,11,92,867), which will be paid after receipt of No Claim Certificate from BHEL. 5. The applicability of GST / Service Tax on liquidated damages shall be ensured by F&A section before release of payment to BHEL.

[Note : 1. *The data regarding payments effected, balance payments, retentions, recoveries is provided by account section / joint reconciliation statement.*
2. *The amount Rs. 1,11,92,867/- shown at point no. 3-vi-c as shortfall in billing. It cannot be considered as retention and hence has to be deducted from retention.*
BHEL has claimed PG tests payments, final (deferred) PVC payments as per the contract and thereby agreed for 100% completion of supply & works.
3. *Mandatory spares – LBBP accumulator bladder found defective. Same was replaced by BHEL in 2020.]*

In view of above, it is requested that after scrutiny, the contract may please be closed with Rs. 1,11,92,867/- unclaimed amount and release the payable amount of Rs.23,60,90,725/- to M/s BHEL.

For scrutiny and further needful action please.

Encl.: As above and additional documents

Audited with remark (A)

03.12.21
Sr. Manager (F&A)
1 x 660 MW Project
M.S.P.G.Co.Ltd., Bhusawal.

Audited

Chief Engineer (Project.)
MSPGCL, Bhusawal

To,
Chief Engineer (Const),
MSPGCL, Koradi

Remark (A) :- As per contract clause 10.4.2. i.e payment toward price variation which is reproduced as -
"The balance 10% of the payment towards Price variation for supply of equipment shall be released against invoice ~~with~~ after release of final payment towards supply of equipment."

As the 10% balance PV payment is done it means final payment towards supply is done hence such claim of short billing of ₹ 1,11,92,867/- is not acceptable at this stage.

Doc.Type : AB (Accounting Document) Normal document					
Doc. Number	1250933	Company Code	MG01	Fiscal Year	2020
Doc. Date	01.04.2020	Posting Date	01.04.2020	Period	01
Calculate Tax	☐				
Ref.Doc.	BHEL LD IMPOSED				
Doc. Currency	INR				
Doc. Hdr Text	LD ACCOUNT FCR				

Itm	SG	PK	Account short text	D/C	Amount	BusA	Account	Order	Assignment	TTy	Text	WBS element
1		50	Project - Material	H	2,502,497,938.00-	B227	80100		LD ON BHEL		LD IMPOSED ON M/S BHEL AGST 2X500MW	P-BSL-04-100-52-16-SE
2		24	BHEL NEW DELHI	S	2,502,497,938.00	B227	50225		LD ON BHEL		LD IMPOSED ON M/S BHEL AGST 2X500MW	

Sr. Manager (F&A)
1 x 660 MW Project
M.S.P.G.Co.Ltd., Bhusawal.

Annexure 12 (a)

Current status and detailed reasons for delay in discharge of undischarged liabilities (UDL) of Koradi Unit 8,9 & 10, Chandrapur Unit 8 & 9 and Parli Unit 8

Current status and reason for delay in discharge of Undischarged Liabilities:

Koradi Units # 8 to 10

MSPGCL submits that Undischarged Liability (UDL) for Koradi 3x660 MW as on COD is in different currencies i.e. INR, USD and JPY is produced below.

Particulars	BTG-INR	BTG-USD	BTG-JPY	BOP	Total
Outstanding Amount - COD (Crore of Respective Currency)	353.42	0.70	51.20	226.55	
Currency Rate	1.00	50.58	0.51	1.00	
Undischarged Liability in Rs Crore	353.42	35.40	25.91	226.55	641.28

Year wise liability discharged in Respective Currency in Crore, till FY 2023-24 is provided below

FY	BTG-INR	BTG-USD	BTG-JPY	BOP	Exchange Rate $	Exchange Rate JPY
As on COD 17.01.2017	353.42	0.70	51.20	226.55		
Discharge of Liability						
FY 2017-18	140.90	0.45	4.49	11.56	62.88	0.58
FY 2018-19	0.00	0.00	0.00	0.00	69.38	0.63
FY 2019-20	12.22	0.00	0.00	0.00	75.37	0.70
FY 2020-21	79.01	0.01	1.26	0.00	73.20	0.66
FY 2021-22	19.02	0.00	0.00	0.00	75.91	0.62
FY 2022-23	84.15	0.23	33.89	0.00	80.54	0.56
FY 2023-24	0	0	0	0		

Liability Discharged after COD and till FY 23-24 with corresponding exchange rates of USD and JPY and outstanding as on 31.03.2024 in Rs Crore provided in following table

	BTG-INR	BTG-USD	BTG-JPY	BOP	Liability Discharged	Cum Discharged	Balance Liability
	BTG			BOP			
COD	353.42	35.40	25.91	226.55			641.28
FY 2017-18	140.90	28.41	2.60	11.56	183.47	183.47	457.82
FY 2018-19	0.00	0.00	0.00	0.00	0.00	183.47	457.82
FY 2019-20	12.22	0.00	0.00	0.00	12.22	195.69	445.59
FY 2020-21	79.01	0.38	0.83	0.00	80.23	275.92	365.37
FY 2021-22	19.02	0.00	0.00	0.00	19.02	294.94	346.35
FY 2022-23	84.15	18.27	19.02	0.00	121.44	416.37	224.91
FY 2023-24	0.00	0.00	0.00	0	0.00	416.37	224.91
Balance UDL			**9.92**	**214.99**			**224.91**

Outstanding balance as on 30.11.2024 with corresponding exchange rate (as on 30.11.2024) in INR Crore is provided below:

Particulars	BTG-INR	BTG-USD	BTG-JPY	BOP	Total
Opening Liability - COD	353.42	0.70	51.20	226.55	
Outstanding Amount – 30.11.2024 (Crore of Respective Currency)	18.11	0.02	11.55	214.99	
Currency Rate	1.00	84.50	0.56	1.00	
Undischarged Liability in Rs Crore (30.11.2024)	18.11	1.36	6.50	214.99	240.97

It is to be appreciated that undischarged liability as on 31-03-2024 is Rs 224.91 Crore. However, due to change currency rate undischarged liability stands at Rs 240.97 Crore. BTG (M/s Larsen and Toubro) stands at Rs 25.97 Crore (considering exchange rates as on 30.11.2024) and that of BOP (originally M/s BGR) at Rs 214.99 Crore.

Estimated time for settlement / discharge of UDL for BTG as shown below:

Sr No	Particulars	Amount	Remark
1	UDL to be discharged after settlement of all dues	15.97	To be discharged in FY 2024-25
2	Amount for balance FDPS work required for completing work	5.09	To be utilised in FY 2024-25
3	Recovery of mandatory spares	3.41	To be crystallised in FY 2024-25
4	Other contractual recoveries	1.85	Financial reconciliation with vendor was long pending and was completed in Nov-24 and will be settled in F.Y.2024-25

For the BoP contracts, the execution of pending additional capitalisation works was delayed due to the liquidation of the BoP vendor, M/s BGR, and the subsequent re-tendering process for executing the works under "Risk & Cost." The retentions held against M/s BGR are being utilised for executing these "Risk & Cost" works, with details provided in Form 4 for capital expenditure. These works are expected to be completed by March 2025. Upon their completion, the current undischarged liability (UDL) will be discharged to that extent.

Chandrapur unit 8-9 (2X500 MW)

The status of UDL for Chandrapur Unit 8-9 along with reason for delay in discharge is provided below

Sr. NO.	Package-Wise details	Agency Name	Retention amount in Crs.	Contractual retention Details	Reasons for delay
1	BOP Package	M/s. BGR	55.01	Contractual retentions against L.D & other dues.	Delay analysis is in process by third party i.e. M/s DCPL, retention will be released after finalization of FTLE.
2	BTG Package	M/s. BHEL	41.57	Contractual retention against L.D & other retentions.	Rs. 41.57 crores is released in F.Y-2024-25, after approval received via HO letter CE(P&P)/Comm/CHN 8 & 9/ BHEL/ OS payment/856 dtd 04.09.2024.
			2.04	Contractual retentions against Excise Duty.	Amount Will be released after reimbursement from Excise department. The MSPGCL claim is in process at excise department.
			2.00	BHEL retention against balance mandatary spares.	Amount Will be Transferred to O & M after estimate received CE (O & M)
3	BOP Package	M/s. Elecon	1.90	Retention against LD	After finalization of FTLE & L.D applicability from competent authority, L.D retention will be released
			0.24	Other contractual retention	Financial reconciliation was long pending from vendor, which is completed on Oct-24, and claim shall be settled in F.Y-2024-25.
		Total	**102.76**		

Liability of M/s BHEL Rs 41.57 Crore was discharged in FY 24-25. Retentions against Excise Duty and Mandatory spares will be released after finalisation of documentation is respective activities.

For BOP Packages: retention of M/s Elecon are expected to get released by March 2025.

Parli unit 8 (1x250 MW):

Details of discharge of Undischarged Liability is provided below (Rs in Crore)

Particulars	BTG	BOP	Others	Total	Liability Discharged	Cum Discharged	Balance Liability
Op Balance	44.65	66.84	16.79	128.28			128.28
Discharge of Liability during FY							

Particulars	BTG	BOP	Others	Total	Liability Discharged	Cum Discharged	Balance Liability
2016-17	0	0	0		0	0	128.28
2017-18	0	0	0.66		0.66	0.66	127.62
2018-19	3.61	2.64	0.73		6.98	7.64	120.64
2019-20*	33.77	1.29	0.95		36.01	43.65	84.63
2020-21	0	0.62	0		0.62	44.27	84.01
2021-22	0	0	0.61		0.61	44.88	83.4
2022-23	0	0	1.09		1.09	45.97	82.31
Balance UDL (Rs. Crore)	**7.27**	**62.29**	**12.75**				**82.31**

It is submitted that discharge of UDL for BTG expected in FY 2024-25.

In case of the BoP contracts, the execution of the pending Additional Capitalisation works got delayed due to liquidation of BoP vendor M/s Sunil Hi Tech Engineers Ltd. and subsequent execution of the works through re-tendering process under "Risk & cost" works. Most of these works are expected to get completed by March 2025 and accordingly the relevant UDL will get discharged subsequently.

Cut-off date as per Regulations :

As per prevailing MERC (MYT) Regulations, cut off date for these units are as shown below:

- Chandrapur Units # 8,9 : 31.3.2019
- Parli Unit # 8 : 31.3.2019
- Koradi units # 8,9,10 : 31.3.2020

Extensions sought to Cut-off date :

Following are the request submitted by MSPGCL with respect to extension of cut-off date of respective new units and ruling of the Hon'ble Commission on the same:

1. "Order Case No. 296 / 2019

2.10 EXTENSION OF CUT OFF DATE FOR UNITS

Suggestions/Objections

2.10.1 PEG submitted that extension on cut-off dates are not to be allowed to ensure that consumers do not continue to bear the burden of time and cost overruns for delays which were partly within the control of MSPGCL.

MSPGCL's replies

2.10.2 MSPGCL submitted that they have only requested for extension of the cut-off date and no additional amount on account of cost-overrun is sought.

Commission's views

2.10.3 The Commission has observed that the Petitioner has only sought time extension of cut-off date to complete the works approved in the original scope of work by the Commission thereby not claiming any cost over run on account of it. The Petitioner has also submitted the reasons for the delay in execution of these works. As discussed in Section 7 of the Order, the Commission has allowed extension of Cut Off date for Chandrapur Units 8, 9 and Parli Unit 8 up to 31.03.2021 and Koradi units 8, 9 & 10 up to 31.03.2021. However, it is to be noted that the MSPGCL will not be allowed any cost over run on account of this time extension of Cut Off date.

2. Order Case No. 180/2020

32. ISSUE XVII: Extension of Cut-off dates for Koradi Unit-8-9 and 10, Chandrapur 8,9 and Parli 8

MSPGCL's submission dated 2 December, 2020:

32.1 MSPGCL filed its additional submission on 2 December, 2020 regarding extension of cut-off dates for Koradi Unit-8-9 and 10, Chandrapur 8,9 and Parli 8. MSPGCL in its MYT Petition Case No. 296 of 2019 has requested Commission for an allowance of additional time till FY 2020- 21 for capitalization of additional capital expenditure.

32.2 The Commission in the Order allowed the extension of cut-off date till 31 March, 2021. However, considering current pandemic situation due to Covid-19 and subsequent entire lockdown of more than three months and subsequent unlocking process followed by Central / State Government, it seems very difficult to complete the capitalization in these units within the extended time limit allowed by the Commission i. e. 31 March, 2021.

32.3 MSPGCL has submitted that 100% unlocking is yet to be achieved and due to certain restrictions still prevailing, the process is taking longer time. Considering the pandemic situation and disturbance in supply chain, MSPGCL has requested the Commission to extend the cut - off date for these units till 31 March, 2022.

Commission's Analysis and Ruling:

32.4 The Commission notes the submission of MSPGCL regarding extension of Cut-off dates for Koradi Unit-8-9 and 10, Chandrapur 8,9 and Parli 8. MSPGCL in its MYT Petition Case No. 296 of 2019 had requested Commission for an allowance of additional time till FY 2020- 21 for capitalization of additional capital expenditure.

32.5 Accordingly, the Commission in the Order allowed the extension of cut-off date till 31 March, 2021.

32.6 MSPGCL has now submitted that considering current pandemic situation due to Covid-19 and subsequent entire lockdown, it seems difficult to complete the capitalization in these Units within the extended time limit allowed by the Commission i. e. 31 March, 2021.

32.7 Considering the pandemic situation and disturbance in supply chain, the Commission is inclined to accept the submission of MSPGCL and extend the cut - off date for these units till 31-03-2022.

3. Order Case No. 227/2022

9.13.17MSPGCL has requested for extension of cut-off date upto 31 March, 2024 for completion of balance works within the original scope of work for Koradi Units 8-10, Chandrapur Units 8&9 and Parli Unit 8. The Commission does not find it prudent to grant the relief sought by

MSPGCL at this stage. The Commission shall take a view on the same based on the submissions of the MSPGCL in the true-up of the respective years on case to case basis.

MSPGCL's submission:

In Case No. 227 of 2022, MSPGCL had requested the Hon'ble Commission for an extension of the cut-off date to March 31, 2024. While the Hon'ble Commission, in its order for the said case, did not explicitly grant the extension, it indicated that it would consider the matter based on submissions made in the true-up petitions for the respective years on a case-by-case basis.

MSPGCL submits that the delay in discharging the undischarged liability (UDL) is primarily due to challenges in executing pending additional capitalisation works, caused by the bankruptcy of BoP vendors and subsequent COVID-related disruptions. Additionally, delays in finalizing the Final Time Limit Extension (FTLE) for various contracts, including BTG and BoP, have further contributed to the delay in discharging UDL related to various retentions.

MSPGCL has made all-out efforts to complete the pending works and finalize the FTLE by March 2025. In view of the above, MSPGCL respectfully requests the Hon'ble Commission to approve an extension of the cut-off date to March 31, 2025, and to permit MSPGCL to approach the Commission after the discharge of liability. For schemes that are delayed beyond FY 2024-25 or UDL discharges delayed beyond FY 2024-25, MSPGCL seeks permission to submit the relevant details in the true-up petition for the respective year.

Annexure 12 (b)

Supporting for unclaimed amount of Rs.27.79 Crs in MTR petition

DG-I-019 Unclaimed expenses in MTR

Khaperkheda TPS- Other coal related costs -Fixed in (Rs.Crs)

GL head	Other coal related costs -Fixed	FY 19-20		FY 20-21		FY 21-22	
		KPKD - 1 TO 4	KPKD -5	KPKD - 1 TO 4	KPKD -5	KPKD - 1 TO 4	KPKD -5
71122	Consumption High Speed Diesel Oil	6.17	0.06	0.84	3.94	0.60	5.65
71141	Consumption of Oil (Other)	-	0.00		0.01	0.03	0.31
71219	Other coal related costs	4.84	9.39	5.01	4.05	9.67	15.44
71221	Oil handling contract charges	-	-			-	-
71211	Coal handling contract charges	-	9.66			-	-
71213	Siding charges	-				-	-
71216	Payments to railway staff	0.15	0.35		0.19	0.03	0.25
71218	Con-Other coal related costs	0.01	0.09			-	-
71299	Price variation 71 Group	0.97	2.27	2.62	9.31	3.06	8.09
71215	Commission to agents					-	-
71600	Consumption Lubricants & consumables	0.93	0.11	0.90	0.12	0.86	0.72
71601	Consumption Lubricants & consumables-Fixed						
	Fixed Other Coal related charges	**13.07**	**21.93**	**9.37**	**17.62**	**14.26**	**30.45**

DG-I-019 Unclaimed expenses in MTR

Koradi TPS-Other coal related costs -Fixed in (Rs.Crs)

GL head	Other coal related costs -Fixed	FY 19-20		FY 20-21		FY 21-22	
		Koradi 6	Koradi 8,9,10	Koradi 6	Koradi 8,9,10	Koradi 6	Koradi 8,9,10
71122	Consumption High Speed Diesel Oil	6.17	0.06	0.84	3.94	0.60	5.65
71141	Consumption of Oil (Other)	-	0.00		0.01	0.03	0.31
71219	Other coal related costs	4.84	9.39	5.01	4.05	9.67	15.44
71221	Oil handling contract charges	-	-			-	-
71211	Coal handling contract charges	-	9.66			-	-
71213	Siding charges	-	-	-	-	-	-
71216	Payments to railway staff	0.15	0.35		0.19	0.03	0.25
71218	Con-Other coal related costs	0.01	0.09			-	-
71299	Price variation 71 Group	0.97	2.27	2.62	9.31	3.06	8.09
71215	Commission to agents					-	-
71600	Consumption Lubricants & consumables	0.93	0.11	0.90	0.12	0.86	0.72
71601	Consumption Lubricants & consumables-Fixed						
	Fixed Other Coal related charges	**13.07**	**21.93**	**9.37**	**17.62**	**14.26**	**30.45**

GL head	FY 21-22	Bhusawal 3	Bhusawal 4-5	Chandrapur 3-7	Chandrapur 8-9	Nashik	Koradi 6	Koradi 8,9,10	KPKD 1-4	KPKD 5	Parli 6-7	Parli 8	PARAS	URAN	Hydro		Total
71122	Consumption High Speed Diesel Oil	0.50	4.17	6.92	3.64	2.98	0.60	5.65	4.22	2.60	0.65	0.40	1.95	0.11	0.31		34.69
71141	Consumption of Oil (Other)	-	-	0.21	0.11	-	0.03	0.31	0.01	-	-	-	-	0.00	0.00		0.67
71219	Other coal related costs	2.00	16.84	10.34	15.77	12.74	9.67	15.44	14.41	4.07	6.79	4.23	11.50	0.03	0.05		123.88
71221	Oil handling contract charges	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-
71211	Coal handling contract charges	0.63	5.31	19.06	29.08	10.37	-	-	2.83	1.66	1.53	0.95	2.88	-			74.30
71213	Siding charges	0.00	0.01	-	-	-	-	-	-	-	-	-	0.09	-			0.10
71216	Payments to railway staff	0.16	1.37	0.05	0.03	0.15	0.03	0.25	0.13	0.08	-	-	-0.08	-			2.17
71218	Con-Other coal related costs	-	-	0.07	0.04	0.12	-	-	-	-	-	-	-	-			0.22
71212	Demurrage on coal wagons	-	-	-	-	-	-	-	-	-	-	-	-	-			-
71299	Price variation 71 Group	0.45	3.76	9.86	5.18	2.30	3.06	8.09	7.33	0.77	-	0.31	1.10	-			
71215	Commission to agents	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-
71600	Consumption Lubricants & consumables	0.37	3.09	2.45	1.29	0.01	0.86	0.72	0.60	0.10	0.13	0.08	0.55	0.03	0.08		10.35
71601	Consumption Lubricants & consumables-Fixed														0.03		0.03
	Fixed Other Coal related charges as per Audited certificate	**4.11**	**34.54**	**48.95**	**55.12**	**28.67**	**14.26**	**30.45**	**29.52**	**9.28**	**9.10**	**5.97**	**17.99**	**0.17**	**0.47**	**0.00**	**288.6054**
	Fixed Other Coal related charges submitted w/o 71600, 71215 & 71601 as per Audited certificate	3.74	31.45	46.50	53.84	28.66	13.40	29.73	28.92	9.18	8.97	5.89	17.44	0.14	0.36	0.00	278.22
	Differential claim	**0.37**	**3.09**	**2.45**	**1.29**	**0.01**	**0.86**	**0.72**	**0.60**	**0.10**	**0.13**	**0.08**	**0.55**	**0.03**	**0.11**	**0.00**	**10.38**

GL head	FY 20-21	Bhusawal 3	Bhusawal 4-5	Chandrapur 3-7	Chandrapur 8-9	Nashik	Koradi 6	Koradi 8,9,10	KPKD 1-4	KPKD 5	Parli 6-7	Parli 8	PARAS	URAN	Hydro	H.O/S.E coal	Total
71122	Consumption High Speed Diesel Oil	0.11	1.93	5.41	3.60	1.18	0.84	3.94	2.11	1.17	0.45	0.32	1.80		0.24		23.10
71141	Consumption of Oil (Other)							0.01							0.01		0.02
71219	Other coal related costs	0.82	14.97	21.58	14.38	4.53	5.01	4.05	9.33	5.18	5.20	5.29	3.51	0.02	0.05		93.92
71221	Oil handling contract charges																-
71211	Coal handling contract charges	0.26	4.85	17.33	11.56	4.82			14.34	3.45	1.61	1.81	2.99	-			63.02
71213	Siding charges	-	0.01	4.99	3.32								0.20	-			8.52
71216	Payments to railway staff	0.11	1.99	0.29	0.20	0.24		0.19	0.05	0.03			0.35	-			3.45
71218	Con-Other coal related costs					0.05											0.05
71212	Demurrage on coal wagons						-										-
71299	Price variation 71 Group	0.31	5.69	8.93	5.95	1.69	2.62	9.31	6.17	3.42	0.41	0.29	1.98	0.02			46.79
71215	Commission to agents																0
71600	Consumption Lubricants & consumables	0.01	0.26	0.79	0.53	0.02	0.90	0.12	0.03	0.02	0.00	0.02	0.04	0.01	0.81	0.03	3.59
	Fixed Other Coal related charges as per Audited certificate	**1.62**	**29.70**	**59.32**	**39.54**	**12.53**	**9.37**	**17.62**	**32.03**	**13.27**	**7.67**	**7.73**	**10.87**	**0.05**	**1.11**	**0.03**	**242.46**
	Fixed Other Coal related charges submitted w/o 71600, 71215 & 71601 as per Audited certificate	1.61	29.44	58.53	39.01	12.51	8.47	17.50	32.00	13.25	7.67	7.71	10.83	0.04	0.30	0.00	238.87
	Differential claim	**0.01**	**0.26**	**0.79**	**0.53**	**0.02**	**0.90**	**0.12**	**0.03**	**0.02**	**0.00**	**0.02**	**0.04**	**0.01**	**0.81**	**0.03**	**3.59**

GL head	FY 19-20	Bhusawal 3	Bhusawal 4-5	Chandrapur 3-7	Chandrapur 8-9	Nashik	Koradi 6&7	Koradi Units 8, 9 & 10	Khaperkheda - 1 TO 4	Khaperkheda -5	Parli Units 6 & 7	Parli Unit 8	Paras Units 3 & 4	URAN	Phophali	SE COAL	Total
71122	Consumption High Speed Diesel Oil	0.09	4.34	4.37	1.67	3.11	6.17	0.06	2.27	1.90	0.58	0.32	1.45	0.00	0.26		26.59
71141	Consumption of Oil (Other)	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.01
71219	Other coal related costs	0.15	13.16	23.94	10.06	10.89	4.84	9.39	10.62	2.67	4.75	5.43	0.00	0.01			95.90
71221	Oil handling contract charges	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00				0.00
71211	Coal handling contract charges	0.08	7.07	14.37	7.33	0.00	0.00	9.66	1.37	0.19	1.88	1.22	0.00	0.00			43.16
71213	Siding charges	0.00	0.01	5.35	3.66	0.00	0.00	-	0.00	0.00	0.00	0.00	0.81				9.83
71216	Payments to railway staff	0.02	1.53	0.33	0.23	0.01	0.15	0.35	0.38	0.06	0.00	0.00	0.36				3.41
71218	Con-Other coal related costs	0.00	0.00	0.00	0.00	0.00	0.01	0.09	0.00	0.09	0.00	0.00	0.00				0.19
71212	Coal Wagon Demurrage- Variable																0.00
71299	Price variation 71 Group	0.05	4.66	5.53	3.69	1.42	0.97	2.27	1.53	1.14			2.06				23.33
71215	Commission to agents			0.39					4.66								5.05
71600	Consumption Lubricants & consumables	0.00	0.38	0.22	0.64	0.02	0.93	0.11	0.03	0.08	5.86	0.00	0.04	0.01	0.41	0.04	8.77
	Fixed Other Coal related charges as per Audited certificate	**0.38**	**31.14**	**54.50**	**27.27**	**15.45**	**13.07**	**21.93**	**20.87**	**6.14**	**13.07**	**6.97**	**4.72**	**0.03**	**0.67**	**0.03802**	**216.25**
	Fixed Other Coal related charges submitted w/o 71600, 71215 & 71601 as per Audited certificate	0.38	30.77	53.89	26.63	15.43	12.14	21.82	16.18	6.06	7.21	6.97	4.68	0.01	0.26	0.00	202.43
	Differential claim	**0.00**	**0.38**	**0.61**	**0.64**	**0.02**	**0.93**	**0.11**	**4.69**	**0.08**	**5.86**	**0.00**	**0.04**	**0.01**	**0.41**	**0.04**	**13.82**

Annexure 13

Certifications in regard to AVF and PLF from MSLDC for 2022-23.

MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO.LTD.
CIN NO. U40109MH2005SGC153646
Maharashtra State Load Dispatch Center
Tele :91-22-27601765/1766/1931/2937
Fax :91-22-27601769/2936
Email : cesldc@mahasldc.in
website : http://www.mahasldc.in
Office of The Chief Engineer
Maharashtra State Load Dispatch Center
Thane-Belapur Road, P.O. Airoli
Navi Mumbai Pin – 400 708.

No. CELD/Tech-SO/ Date:

To,

The Chief Engineer,
Regulatory & Commercial Dept.,
3rd Floor, Prakashgarh MSPGCL,
Bandra (E), Mumbai.

Sub: Certification of Availability & PLF data of MSPGCL's TPS for FY 2022-23.
Ref: Email from MSPGCL dtd 24.07.2023

Dear Sir,

In context with the above subject, please find enclosed herewith the certificate of availability & Plant Load Factor (PLF) of MSPGCL's thermal Power Station for FY 2022-23 i.e. (**Apr-2022 to Mar-2023**).

This is for your information please.

Thanking You,

Encl: Annexure A to N.

Yours faithfully,

(Girish S. Pantoji)
Chief Engineer (I/C)
MSLDC, Airoli.

ANNEXURE-A

Monthly AVF & PLF Certification Data FY- 2022-23

Bhusawal U-3

Month	Inst Cap (MW)	Norm APC (%)	ExBus Cap (MW)	DC (Peak) (MW)	DC (Off-Peak) (MW)	Peak AVF	Off Peak AVF	AVF	Schedule Gen. (Peak) (MW)	SG (Off-Peak) (MW)	Peak PLF	Off Peak PLF	PLF
High Demand Season													
Apr-22	210.00	0.11	186.98	45012.2	226289.0	50.152%	50.425%	50.380%	44349.67	223897.92	49.413%	49.892%	49.813%
May-22	210.00	0.11	186.98	48049.7	239633.2	51.809%	51.676%	51.698%	46979.08	233764.36	50.655%	50.411%	50.451%
Mar-23	210.00	0.11	186.98	75130.0	374169.3	81.008%	80.689%	80.742%	58045.34	308081.99	62.587%	66.437%	65.795%
Average	210.00	0.11	186.98	168191.85	840091.40	61.107%	61.044%	61.055%	149374.09	765744.28	54.270%	55.642%	55.413%
Low Demand Season													
Jun-22	210.00	0.11	186.98	59066.0	293580.0	65.810%	65.420%	65.485%	54799.23	277839.01	61.056%	61.912%	61.770%
Jul-22	210.00	0.11	186.98	26644.0	138599.0	28.729%	29.888%	29.695%	24944.34	131902.40	26.896%	28.444%	28.186%
Aug-22	210.00	0.11	186.98	11608.0	66553.0	12.516%	14.352%	14.046%	11466.00	66057.52	12.363%	14.245%	13.931%
Sep-22	210.00	0.11	186.98	49290.0	245053.1	54.918%	54.607%	54.658%	37281.93	185121.20	41.539%	41.252%	41.299%
Oct-22	210.00	0.11	186.98	59630.0	299405.0	64.295%	64.566%	64.521%	20492.44	98802.00	22.096%	21.306%	21.438%
Nov-22	210.00	0.11	186.98	67200.0	336000.0	74.873%	74.873%	74.873%	0.00	0.00	0.000%	0.000%	0.000%
Dec-22	210.00	0.11	186.98	54770.0	278005.0	59.055%	59.951%	59.802%	20893.10	97823.07	22.528%	21.095%	21.334%
Jan-23	210.00	0.11	186.98	55780.0	274803.6	60.144%	59.261%	59.408%	50797.79	218951.58	54.772%	47.216%	48.476%
Feb-23	210.00	0.11	186.98	66125.0	331125.0	78.937%	79.057%	79.037%	59729.91	289238.17	71.303%	69.056%	69.431%
Average	210.00	0.11	186.98	450113.0	2263123.7	55.111%	55.418%	55.367%	280404.73	1365734.93	34.332%	33.443%	33.591%

Note:

1) The availability of Bhusawal U-3 is 61.055 % during high demand season for FY 22-23.

2) The availability of Bhusawal U-3 is 55.367% during low demand season for FY 22-23.

3) Certification is based on data submitted by MSPGCL.

(Girish S. Pantoji)
Chief Engineer (I/C),
MSLDC, Airoli.

Monthly AVF & PLF Certification Data FY- 2022-23

Bhusawal U4 &5

Month	Inst Cap (MW)	Norm APC (%)	ExBus Cap (MW)	DC (Peak) (MW)	DC (Off-Peak) (MW)	Peak AVF	Off Peak AVF	AVF	Schedule Gen. (Peak) (MW)	SG (Off-Peak) (MW)	Peak PLF	Off Peak PLF	PLF
High Demand Season													
Apr-22	1000.00	0.06	940.00	348462.50	1702632.25	77.230%	75.471%	75.764%	348171.50	1701768.63	77.166%	75.433%	75.722%
May-22	1000.00	0.06	940.00	326718.50	1698304.40	70.075%	72.851%	72.388%	318023.18	1665279.54	68.210%	71.434%	70.897%
Mar-23	1000.00	0.06	940.00	450504.00	2228340.00	96.625%	95.588%	95.761%	372472.04	1953071.24	79.888%	83.780%	83.131%
Average	1000.00	0.06	940.00	1125685.00	5629276.65	81.354%	81.367%	**81.365%**	1038666.73	5320119.41	75.066%	76.898%	**76.593%**
Low Demand Season													
Jun-22	1000.00	0.06	940.00	373055.00	1832939.00	82.681%	81.247%	81.486%	352742.18	1785907.53	78.179%	79.163%	78.999%
Jul-22	1000.00	0.06	940.00	314805.00	1549446.65	67.520%	66.466%	66.641%	290627.25	1440590.30	62.334%	61.796%	61.886%
Aug-22	1000.00	0.06	940.00	215909.45	1043492.45	46.309%	44.762%	45.020%	196733.40	983796.03	42.196%	42.201%	42.200%
Sep-22	1000.00	0.06	940.00	241466.85	1178054.05	53.517%	52.219%	52.435%	222683.71	1072909.61	49.354%	47.558%	47.857%
Oct-22	1000.00	0.06	940.00	349752.50	1755700.20	75.016%	75.313%	75.264%	295360.97	1527566.06	63.350%	65.527%	65.164%
Nov-22	1000.00	0.06	940.00	370805.00	1816440.00	82.182%	80.516%	80.794%	350716.62	1667646.89	77.730%	73.921%	74.555%
Dec-22	1000.00	0.06	940.00	449590.00	2230528.75	96.429%	95.682%	95.806%	439411.79	1980489.94	94.246%	84.956%	86.504%
Jan-23	1000.00	0.06	940.00	387309.00	1951681.05	83.071%	83.720%	83.612%	378214.12	1632421.49	81.120%	70.025%	71.874%
Feb-23	1000.00	0.06	940.00	398456.00	1940972.20	94.618%	92.181%	92.588%	391989.04	1825570.16	93.083%	86.701%	87.764%
Average	1000.00	0.06	940.00	3101148.80	15299254.4	75.529%	74.523%	**74.691%**	2918479.10	13916897.99	71.080%	67.789%	**68.338%**

Note:

1) The availability of Bhusawal U-4&5 is 81.365 % during high demand season for FY 22-23
2) The availability of Bhusawal U-4&5 is 74.691 % during low demand season for FY 22-23.
3) Certification is based on data submitted by MSPGCL.

(Girish S. Pantoji)
Chief Engineer (I/C),
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ANNEXURE-C

Monthly AVF & PLF Certification Data FY- 2022-23

Khaperkheda U-1 to 4

Month	Inst Cap (MW)	Norm APC (%)	ExBus Cap (MW)	DC (Peak) (MW)	DC (Off-Peak) (MW)	Peak AVF	Off Peak AVF	AVF	Schedule Gen. (Peak) (MW)	SG (Off-Peak) (MW)	Peak PLF	Off Peak PLF	PLF
High Demand Season													
Apr-22	840.00	0.10	758.52	248518.00	1201986.00	68.257%	66.027%	66.399%	248140.88	1200883.17	68.154%	65.966%	66.331%
May-22	840.00	0.10	758.52	251970.00	1239700.71	66.973%	65.902%	66.080%	247263.92	1222528.10	65.722%	64.989%	65.111%
Mar-23	840.00	0.10	758.52	279490.00	1385601.29	74.288%	73.658%	73.763%	239251.70	1250313.71	63.593%	66.466%	65.987%
Average	840.00	0.10	758.52	779978.00	3827288.00	69.857%	68.556%	**68.773%**	734656.50	3673724.98	65.798%	65.805%	**65.804%**
Low Demand Season													
Jun-22	840.00	0.10	758.52	202866.00	996943.00	55.719%	54.764%	54.923%	195274.62	982285.88	53.634%	53.958%	53.904%
Jul-22	840.00	0.10	758.52	199358.00	985980.29	52.989%	52.414%	52.510%	190500.43	945641.09	50.635%	50.270%	50.331%
Aug-22	840.00	0.10	758.52	179565.00	900430.48	47.728%	47.866%	47.843%	169416.16	864680.11	45.030%	45.966%	45.810%
Sep-22	840.00	0.10	758.52	214721.00	1069983.66	58.975%	58.776%	58.809%	191607.06	952763.31	52.626%	52.337%	52.385%
Oct-22	840.00	0.10	758.52	264530.00	1341808.61	70.311%	71.330%	71.160%	226749.38	1125138.29	60.269%	59.812%	59.888%
Nov-22	840.00	0.10	758.52	239640.00	1222742.45	65.819%	67.167%	66.942%	218802.49	1093497.49	60.096%	60.067%	60.072%
Dec-22	840.00	0.10	758.52	257920.00	1327222.74	68.555%	70.555%	70.221%	246298.53	1170138.48	65.466%	62.204%	62.748%
Jan-23	840.00	0.10	758.52	256890.00	1312869.03	68.281%	69.792%	69.540%	246547.91	1121295.06	65.532%	59.608%	60.595%
Feb-23	840.00	0.10	758.52	220455.00	1114925.16	64.875%	65.619%	65.495%	215680.81	1040876.57	63.470%	61.261%	61.629%
Average	840.00	0.10	758.52	2035945.0	10272905.4	61.449%	62.012%	**61.918%**	1900877.38	9296316.27	57.373%	56.117%	**56.326%**

Note:

1) The availability of Khaperkheda U-1 to 4 is 68.773 % during high demand season for FY 22-23.

2) The availability of Khaperkheda U-1 to 4 is 61.918 % during low demand season for FY 22-23.

3) Certification is based on data submitted by MSPGCL.

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ANNEXURE-D

Monthly AVF & PLF Certification Data FY- 2022-23													
Khaperkheda U-5													
Month	Inst Cap (MW)	Norm APC (%)	ExBus Cap (MW)	DC (Peak) (MW)	DC (Off-Peak) (MW)	Peak AVF	Off Peak AVF	AVF	Schedule Gen. (Peak) (MW)	SG (Off-Peak) (MW)	Peak PLF	Off Peak PLF	PLF
High Demand Season													
Apr-22	500.00	0.06	470.00	202322.00	1026913.00	89.682%	91.038%	90.812%	201967.25	1026835.45	89.524%	91.032%	90.780%
May-22	500.00	0.06	470.00	213383.00	1083848.00	91.534%	92.986%	92.744%	207983.30	1073103.03	89.217%	92.064%	91.590%
Mar-23	500.00	0.06	470.00	206213.00	1051171.00	88.458%	90.183%	89.895%	190908.45	981869.74	81.893%	84.237%	83.847%
Average	500.00	0.06	470.00	621918.00	3161932.00	89.893%	91.406%	**91.154%**	600859.00	3081808.21	86.849%	89.090%	**88.717%**
Low Demand Season													
Jun-22	500.00	0.06	470.00	204123.00	1025371.00	90.480%	90.902%	90.831%	198627.40	1015530.84	88.044%	90.029%	89.698%
Jul-22	500.00	0.06	470.00	172537.50	873917.50	74.012%	74.976%	74.815%	161385.42	813034.81	69.228%	69.752%	69.665%
Aug-22	500.00	0.06	470.00	153057.50	791859.00	65.656%	67.936%	67.556%	141992.77	746698.35	60.910%	64.061%	63.536%
Sep-22	500.00	0.06	470.00	184335.50	910319.50	81.709%	80.702%	80.870%	159926.53	770391.17	70.889%	68.297%	68.729%
Oct-22	500.00	0.06	470.00	205132.00	1030137.00	87.994%	88.378%	88.314%	159010.95	811829.06	68.210%	69.649%	69.409%
Nov-22	500.00	0.06	470.00	179930.00	897794.00	79.756%	79.592%	79.619%	169289.87	837644.42	75.040%	74.259%	74.389%
Dec-22	500.00	0.06	470.00	188700.00	945496.00	80.945%	81.117%	81.088%	188389.09	909259.82	80.812%	78.008%	78.475%
Jan-23	500.00	0.06	470.00	204169.00	1019575.00	87.581%	87.472%	87.490%	202215.35	929533.11	86.743%	79.747%	80.913%
Feb-23	500.00	0.06	470.00	197167.00	985309.00	93.639%	93.589%	93.598%	196028.02	963472.88	93.098%	91.515%	91.779%
Average	500.00	0.06	470.00	1689151.50	8479778.00	82.279%	82.610%	**82.555%**	1576865.38	7797394.45	76.809%	75.962%	**76.104%**

Note:

1) The availability of Khaperkheda U-5 is 91.154% during high demand season for FY 22-23.

2) The availability of Khaperkheda U-5 is 82.555% during low demand season for FY 22-23.

3) Certification is based on data submitted by MSPGCL.

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ANNEXURE-E

Monthly AVF & PLF Certification Data FY- 2022-23

Nashik U-3 to 5

Month	Inst Cap (MW)	Norm APC (%)	ExBus Cap (MW)	DC (Peak) (MW)	DC (Off-Peak) (MW)	Peak AVF	Off Peak AVF	AVF	Schedule Gen. (Peak) (MW)	SG (Off-Peak) (MW)	Peak PLF	Off Peak PLF	PLF
High Demand Season													
Apr-22	630.00	0.11	562.28	140503.00	777819.79	52.059%	57.639%	56.709%	154358.67	723079.89	57.193%	53.583%	54.185%
May-22	630.00	0.11	562.28	211105.00	1013785.93	75.695%	72.702%	73.201%	185820.16	913927.29	66.629%	65.541%	65.722%
Mar-23	630.00	0.11	562.28	241450.00	1194318.14	86.576%	85.648%	85.803%	117981.08	631222.50	42.304%	45.267%	44.773%
Average	630.00	0.11	562.28	593058.00	2985923.86	71.654%	72.153%	**72.070%**	458159.90	2268229.69	55.355%	54.810%	**54.901%**
Low Demand Season													
Jun-22	630.00	0.11	562.28	183135.00	920641.86	67.855%	68.223%	68.162%	164150.08	850724.89	60.821%	63.042%	62.672%
Jul-22	630.00	0.11	562.28	107240.00	537231.74	38.453%	38.527%	38.514%	94461.69	492505.53	33.871%	35.319%	35.078%
Aug-22	630.00	0.11	562.28	117730.00	585332.09	42.214%	41.976%	42.016%	106953.48	548833.88	38.350%	39.359%	39.191%
Sep-22	630.00	0.11	562.28	120556.00	600033.86	44.668%	44.465%	44.499%	108188.49	541826.21	40.086%	40.151%	40.140%
Oct-22	630.00	0.11	562.28	201590.00	1004733.86	72.283%	72.053%	72.091%	109478.55	524369.44	39.255%	37.604%	37.879%
Nov-22	630.00	0.11	562.28	200522.00	988249.65	74.297%	73.233%	73.410%	121562.02	544804.63	45.041%	40.372%	41.150%
Dec-22	630.00	0.11	562.28	203580.00	1045738.60	72.997%	74.993%	74.661%	121883.95	572635.81	43.703%	41.066%	41.505%
Jan-23	630.00	0.11	562.28	218910.00	1088724.93	78.494%	78.076%	78.146%	133389.86	586357.28	47.829%	42.050%	43.013%
Feb-23	630.00	0.11	562.28	213329.00	1056707.86	84.688%	83.899%	84.031%	119974.87	565723.56	47.628%	44.917%	45.369%
Average	630.00	0.11	562.28	1566592.0	7827394	63.786%	63.741%	**63.748%**	1080042.99	5227781.23	43.975%	42.571%	**42.805%**

Note:

1) The availability of Nashik U-3 to 5 is 72.070% during high demand season for FY 22-23.

2) The availability of Nashik U-3 to 5 is 63.748% during low demand season for FY 22-23.

3) Certification is based on data submitted by MSPGCL.

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ANNEXURE-F

Monthly AVF & PLF Certification Data FY- 2022-23

Chandrapur U-3 to 7

Month	Inst Cap (MW)	Norm APC (%)	ExBus Cap (MW)	DC (Peak) (MW)	DC (Off-Peak) (MW)	Peak AVF	Off Peak AVF	AVF	Schedule Gen. (Peak) (MW)	SG (Off-Peak) (MW)	Peak PLF	Off Peak PLF	PLF
High Demand Season													
Apr-22	1920.00	0.08	1770.24	579935.00	2895247.00	68.251%	68.146%	68.164%	577481.38	2888434.64	67.962%	67.986%	67.982%
May-22	1920.00	0.08	1770.24	596496.00	2997963.00	67.935%	68.288%	68.229%	579997.30	2924033.82	66.056%	66.604%	66.512%
Mar-23	1920.00	0.08	1770.24	599727.00	2979389.95	68.303%	67.865%	67.938%	488829.50	2590145.96	55.673%	58.998%	58.444%
Average	1920.00	0.08	1770.24	1776158.00	8872599.95	68.162%	68.099%	**68.110%**	1646308.17	8402614.43	63.179%	64.492%	**64.273%**
Low Demand Season													
Jun-22	1920.00	0.08	1770.24	446302.00	2250984.00	52.524%	52.982%	52.906%	428114.19	2199866.83	50.383%	51.779%	51.546%
Jul-22	1920.00	0.08	1770.24	259394.00	1311761.00	29.542%	29.879%	29.823%	256494.00	1302568.44	29.212%	29.670%	29.594%
Aug-22	1920.00	0.08	1770.24	268043.00	1383740.07	30.527%	31.519%	31.354%	267564.50	1382121.81	30.473%	31.482%	31.314%
Sep-22	1920.00	0.08	1770.24	432155.00	2167016.85	50.859%	51.006%	50.981%	405605.48	2042355.77	47.734%	48.072%	48.015%
Oct-22	1920.00	0.08	1770.24	556630.00	2787496.30	63.395%	63.494%	63.477%	446721.13	2195951.06	50.877%	50.019%	50.162%
Nov-22	1920.00	0.08	1770.24	490080.00	2447432.97	57.676%	57.606%	57.618%	447928.03	2228829.01	52.715%	52.461%	52.503%
Dec-22	1920.00	0.08	1770.24	415554.00	2088278.86	47.328%	47.567%	47.527%	400906.01	1909131.92	45.659%	43.486%	43.848%
Jan-23	1920.00	0.08	1770.24	392648.00	2007776.85	44.719%	45.733%	45.564%	377849.31	1778908.12	43.033%	40.520%	40.939%
Feb-23	1920.00	0.08	1770.24	334595.00	1678614.00	42.190%	42.332%	42.308%	321441.62	1543271.18	40.531%	38.919%	39.188%
Average	1920.00	0.08	1770.24	3595401.0	18123100.90	46.498%	46.876%	**46.813%**	3352624.27	16583004.13	43.358%	42.892%	**42.970%**

Note:

1) **The availability of Chandrapur U-3 to 7 is 68.110% during high demand season for FY 22-23.**
2) **The availability of Chandrapur U-3 to 7 is 46.813% during low demand season for FY 22-23.**
3) **Certification is based on data submitted by MSPGCL.**

(Girish S. Pantoji)
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ANNEXURE-G

Monthly AVF & PLF Certification Data FY- 2022-23

Chandrapur U-8 to 9

Month	Inst Cap (MW)	Norm APC (%)	ExBus Cap (MW)	DC (Peak) (MW)	DC (Off-Peak) (MW)	Peak AVF	Off Peak AVF	AVF	Schedule Gen. (Peak) (MW)	SG (Off-Peak) (MW)	Peak PLF	Off Peak PLF	PLF
High Demand Season													
Apr-22	1000.00	0.06	940.00	384203.00	1937676.00	85.151%	85.890%	85.767%	384032.90	1937676.00	85.114%	85.890%	85.761%
May-22	1000.00	0.06	940.00	396690.00	1972515.00	85.083%	84.614%	84.692%	387975.02	1961127.04	83.214%	84.125%	83.973%
Mar-23	1000.00	0.06	940.00	445663.00	2214640.00	95.587%	95.000%	95.098%	392585.64	2007592.97	84.202%	86.118%	85.799%
Average	1000.00	0.06	940.00	1226556.00	6124831.00	88.644%	88.530%	**88.549%**	1164593.55	5906396.01	84.166%	85.372%	**85.171%**
Low Demand Season													
Jun-22	1000.00	0.06	940.00	372849.00	1877292.00	82.635%	83.213%	83.117%	369946.90	1870277.53	81.992%	82.902%	82.751%
Jul-22	1000.00	0.06	940.00	385793.00	1788066.00	82.746%	76.702%	77.709%	375029.45	1723666.79	80.437%	73.939%	75.022%
Aug-22	1000.00	0.06	940.00	380723.00	1882160.00	81.658%	80.738%	80.891%	352812.37	1802535.42	75.672%	77.322%	77.047%
Sep-22	1000.00	0.06	940.00	230687.00	1151143.00	51.127%	51.026%	51.043%	209793.71	1030691.94	46.497%	45.687%	45.822%
Oct-22	1000.00	0.06	940.00	314437.00	1551743.00	67.441%	66.564%	66.710%	244763.57	1252644.26	52.497%	53.734%	53.528%
Nov-22	1000.00	0.06	940.00	378103.00	1885697.00	83.799%	83.586%	83.621%	332729.64	1627119.03	73.743%	72.124%	72.394%
Dec-22	1000.00	0.06	940.00	416811.00	2083660.00	89.398%	89.381%	89.384%	397188.74	1860877.07	85.190%	79.825%	80.719%
Jan-23	1000.00	0.06	940.00	459982.00	2312037.00	98.658%	99.178%	99.091%	452910.32	2019209.20	97.141%	86.617%	88.371%
Feb-23	1000.00	0.06	940.00	368429.00	1814232.00	87.488%	86.162%	86.383%	365700.76	1753033.34	86.840%	83.256%	83.853%
Average	1000.00	0.06	940.00	3307814.00	16346030.00	80.562%	79.622%	**79.778%**	3100875.44	14940054.57	75.522%	72.773%	**73.231%**

Note:

1) The availability of Chandrapur U-8 to 9 is 88.549% during high demand season for FY 22-23.

2) The availability of Chandrapur U-8 to 9 is 79.778% during low demand season for FY 22-23.

3) Certification is based on data submitted by MSPGCL.

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ANNEXURE-H

Monthly AVF & PLF Certification Data FY- 2022-23

Paras U-3 & 4

Month	Inst Cap (MW)	Norm APC (%)	ExBus Cap (MW)	DC (Peak) (MW)	DC (Off-Peak) (MW)	Peak AVF	Off Peak AVF	AVF	Schedule Gen. (Peak) (MW)	SG (Off-Peak) (MW)	Peak PLF	Off Peak PLF	PLF
High Demand Season													
Apr-22	500.00	0.09	453.50	182009.50	917708.41	83.613%	84.317%	84.200%	180832.18	909883.68	83.072%	83.598%	83.511%
May-22	500.00	0.09	453.50	171918.00	847362.82	76.430%	75.343%	75.524%	163387.79	810000.10	72.637%	72.020%	72.123%
Mar-23	500.00	0.09	453.50	195951.75	994125.66	87.114%	88.392%	88.179%	187042.58	955493.64	83.154%	84.957%	84.656%
Average	500.00	0.09	453.50	549879.25	2759196.89	82.372%	82.666%	**82.617%**	531262.55	2675377.42	79.584%	80.155%	**80.060%**
Low Demand Season													
Jun-22	500.00	0.09	453.50	172591.00	872940.00	79.287%	80.204%	80.051%	159492.31	830007.77	73.269%	76.259%	75.761%
Jul-22	500.00	0.09	453.50	134434.00	669709.41	59.765%	59.547%	59.583%	125616.76	630730.50	55.846%	56.081%	56.042%
Aug-22	500.00	0.09	453.50	145782.00	728205.41	64.810%	64.748%	64.758%	143027.00	717339.03	63.586%	63.782%	63.749%
Sep-22	500.00	0.09	453.50	138681.00	690584.00	63.709%	63.449%	63.493%	134130.20	656573.47	61.618%	60.325%	60.540%
Oct-22	500.00	0.09	453.50	84061.00	429650.41	37.371%	38.202%	38.064%	78194.15	412350.10	34.763%	36.664%	36.347%
Nov-22	500.00	0.09	453.50	145770.00	745287.00	66.965%	68.475%	68.224%	145535.74	743682.02	66.858%	68.328%	68.083%
Dec-22	500.00	0.09	453.50	171357.00	848455.41	76.180%	75.440%	75.563%	171357.00	843813.46	76.180%	75.027%	75.219%
Jan-23	500.00	0.09	453.50	170138.00	852266.25	75.638%	75.779%	75.755%	170138.00	843276.87	75.638%	74.979%	75.089%
Feb-23	500.00	0.09	453.50	183856.25	904462.16	90.495%	89.036%	89.279%	183837.25	904323.84	90.485%	89.022%	89.266%
Average	500.00	0.09	453.50	1346670.3	6741560.05	67.983%	68.066%	**68.052%**	1311328.40	6582097.06	66.199%	66.456%	**66.413%**

Note:

1) The availability of Paras U-3 & 4 is 82.617% during high demand season for FY 22-23.

2) The availability of Paras U-3 & 4 is 68.052% during low demand season for FY 22-23.

3) Certification is based on data submitted by MSPGCL.

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ANNEXURE-I

Monthly AVF & PLF Certification Data FY- 2022-23													
Parli U-6 & 7													
Month	Inst Cap (MW)	Norm APC (%)	ExBus Cap (MW)	DC (Peak) (MW)	DC (Off-Peak) (MW)	Peak AVF	Off Peak AVF	AVF	Schedule Gen. (Peak) (MW)	SG (Off-Peak) (MW)	Peak PLF	Off Peak PLF	PLF
High Demand Season													
Apr-22	500.00	0.09	453.50	153727.00	765575.41	70.621%	70.340%	70.386%	151224.29	755097.01	69.471%	69.377%	69.392%
May-22	500.00	0.09	453.50	147931.00	748429.23	65.766%	66.546%	66.416%	133364.59	695282.15	59.290%	61.820%	61.399%
Mar-23	500.00	0.09	453.50	214681.75	1092800.21	95.441%	97.165%	96.878%	152669.40	848582.89	67.872%	75.451%	74.188%
Average	500.00	0.09	453.50	516339.75	2606804.85	77.348%	78.100%	**77.975%**	437258.27	2298962.04	65.502%	68.877%	**68.315%**
Low Demand Season													
Jun-22	500.00	0.09	453.50	180356.00	892586.64	82.854%	82.009%	82.150%	140838.18	767905.23	64.700%	70.554%	69.578%
Jul-22	500.00	0.09	453.50	162651.00	830775.87	72.310%	73.868%	73.608%	134883.83	727848.81	59.965%	64.716%	63.924%
Aug-22	500.00	0.09	453.50	155891.00	775458.64	69.305%	68.949%	69.008%	138472.80	719599.23	61.561%	63.983%	63.579%
Sep-22	500.00	0.09	453.50	157687.00	799437.05	72.440%	73.451%	73.282%	137483.51	700497.65	63.159%	64.360%	64.160%
Oct-22	500.00	0.09	453.50	181946.00	912049.94	80.888%	81.094%	81.060%	112975.64	549594.40	50.226%	48.867%	49.093%
Nov-22	500.00	0.09	453.50	172277.78	875027.15	79.143%	80.396%	80.187%	126217.00	654486.15	57.983%	60.133%	59.775%
Dec-22	500.00	0.09	453.50	204488.00	1038570.21	90.909%	92.344%	92.105%	180884.86	800298.70	80.416%	71.158%	72.701%
Jan-23	500.00	0.09	453.50	101063.00	516646.69	44.930%	45.937%	45.769%	93765.66	397490.97	41.685%	35.343%	36.400%
Feb-23	500.00	0.09	453.50	135339.20	676207.47	66.614%	66.566%	66.574%	123770.81	583720.39	60.920%	57.462%	58.038%
Average	500.00	0.09	453.50	1451698.98	7316759.66	73.285%	73.874%	**73.775%**	1189292.28	5901441.53	60.038%	59.584%	**59.660%**

Note:

1) The availability of Parli U-6 & 7 is 77.975% during high demand season for FY 22-23.

2) The availability of Parli U-6 & 7 is 73.775% during low demand season for FY 22-23.

3) Certification is based on data submitted by MSPGCL.

(Girish S. Pantoji)
Chief Engineer (I/C),
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Monthly AVF & PLF Certification Data FY- 2022-23

Parli U-8

Month	Inst Cap (MW)	Norm APC (%)	ExBus Cap (MW)	DC (Peak) (MW)	DC (Off-Peak) (MW)	Peak AVF	Off Peak AVF	AVF	Schedule Gen. (Peak) (MW)	SG (Off-Peak) (MW)	Peak PLF	Off Peak PLF	PLF
High Demand Season													
Apr-22	250.00	0.09	228.75	56001.00	286249.00	51.003%	52.140%	51.951%	55997.00	286167.09	50.999%	52.125%	51.937%
May-22	250.00	0.09	228.75	47325.00	244512.26	41.711%	43.101%	42.869%	47325.00	244504.26	41.711%	43.100%	42.868%
Mar-23	250.00	0.09	228.75	71807.00	357084.96	63.288%	62.945%	63.002%	65406.25	332150.88	57.647%	58.549%	58.399%
Average	250.00	0.09	228.75	175133.00	887846.22	52.011%	52.735%	**52.614%**	168728.25	862822.23	50.109%	51.249%	**51.059%**
Low Demand Season													
Jun-22	250.00	0.09	228.75	42515.00	213805.00	38.720%	38.944%	38.907%	42515.00	213805.00	38.720%	38.944%	38.907%
Jul-22	250.00	0.09	228.75	48145.00	235587.66	42.433%	41.528%	41.679%	44095.40	218077.72	38.864%	38.441%	38.512%
Aug-22	250.00	0.09	228.75	68323.00	342193.74	60.218%	60.320%	60.303%	64795.76	329046.91	57.109%	58.002%	57.853%
Sep-22	250.00	0.09	228.75	69335.00	340784.00	63.147%	62.074%	62.252%	64491.44	321601.77	58.735%	58.580%	58.606%
Oct-22	250.00	0.09	228.75	64572.00	321346.48	56.912%	56.645%	56.689%	43912.00	221580.26	38.703%	39.059%	38.999%
Nov-22	250.00	0.09	228.75	68495.00	358754.66	62.382%	65.347%	64.853%	59368.44	304984.82	54.070%	55.553%	55.306%
Dec-22	250.00	0.09	228.75	69024.00	338010.00	60.836%	59.582%	59.791%	66195.89	309608.18	58.343%	54.576%	55.204%
Jan-23	250.00	0.09	228.75	64850.00	328213.70	57.157%	57.855%	57.739%	60390.64	272042.99	53.226%	47.954%	48.833%
Feb-23	250.00	0.09	228.75	61845.00	301828.18	60.348%	58.905%	59.145%	57674.58	275727.76	56.279%	53.811%	54.222%
Average	250.00	0.09	228.75	557104.0	2780523.4	55.756%	55.656%	**55.673%**	503439.15	2466475.41	50.385%	49.370%	**49.539%**

Note:

1) The availability of Parli U-8 is 52.614% during high demand season for FY 22-23.

2) The availability of Parli U-8 is 55.673% during low demand season for FY 22-23.

3) Certification is based on data submitted by MSPGCL.

(Girish S. Pantoji)
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ANNEXURE-K

Monthly AVF & PLF Certification Data FY- 2022-23

Koradi U-6 & 7

Month	Inst Cap (MW)	Norm APC (%)	ExBus Cap (MW)	DC (Peak) (MW)	DC (Off-Peak) (MW)	Peak AVF	Off Peak AVF	AVF	Schedule Gen. (Peak) (MW)	SG (Off-Peak) (MW)	Peak PLF	Off Peak PLF	PLF
High Demand Season													
Apr-22	210.00	0.09	191.10	75456.00	366595.90	82.261%	79.931%	80.319%	75145.62	366407.35	81.922%	79.890%	80.229%
May-22	210.00	0.09	191.10	63880.00	337575.00	67.394%	71.229%	70.590%	62966.39	334444.21	66.430%	70.569%	69.879%
Mar-23	210.00	0.09	191.10	85294.10	427094.70	89.986%	90.118%	90.096%	82294.28	415181.52	86.821%	87.604%	87.474%
Average	210.00	0.09	191.10	224630.10	1131265.60	79.855%	80.431%	**80.335%**	220406.28	1116033.08	78.353%	79.348%	**79.183%**
Low Demand Season													
Jun-22	210.00	0.09	191.10	65365.00	339445.00	71.260%	74.011%	73.553%	65017.20	338531.60	70.880%	73.812%	73.323%
Jul-22	210.00	0.09	191.10	43095.00	218570.90	45.466%	46.119%	46.010%	43040.60	218098.81	45.408%	46.019%	45.918%
Aug-22	210.00	0.09	191.10	48320.00	260290.90	50.978%	54.922%	54.265%	48265.70	259707.30	50.921%	54.799%	54.153%
Sep-22	210.00	0.09	191.10	24120.00	119735.00	26.295%	26.107%	26.138%	24044.60	119481.79	26.213%	26.051%	26.078%
Oct-22	210.00	0.09	191.10	49309.00	255391.90	52.022%	53.888%	53.577%	46893.01	249703.58	49.473%	52.688%	52.152%
Nov-22	210.00	0.09	191.10	83592.00	415713.00	91.130%	90.640%	90.722%	83530.20	415144.03	91.063%	90.516%	90.607%
Dec-22	210.00	0.09	191.10	92986.80	469829.10	98.102%	99.135%	98.963%	92986.80	469632.50	98.102%	99.094%	98.928%
Jan-23	210.00	0.09	191.10	82141.30	412025.50	86.660%	86.938%	86.892%	82141.30	410641.44	86.660%	86.646%	86.649%
Feb-23	210.00	0.09	191.10	74377.80	371360.40	86.877%	86.753%	86.774%	74377.80	371329.50	86.877%	86.746%	86.768%
Average	210.00	0.09	191.10	563306.90	2862361.70	67.484%	68.582%	**68.399%**	560297.21	2852270.53	67.124%	68.340%	**68.138%**

Note:

1) The availability of Koradi U-6 & 7 is 80.335% during high demand season for FY 22-23.

2) The availability of Koradi U-6 & 7 is 68.399% during low demand season for FY 22-23.

3) Certification is based on data submitted by MSPGCL.

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ANNEXURE-L

Monthly AVF & PLF Certification Data FY- 2022-23

Koradi U-8 to 10

Month	Inst Cap (MW)	Norm APC (%)	ExBus Cap (MW)	DC (Peak) (MW)	DC (Off-Peak) (MW)	Peak AVF	Off Peak AVF	AVF	Schedule Gen. (Peak) (MW)	SG (Off-Peak) (MW)	Peak PLF	Off Peak PLF	PLF
High Demand Season													
Apr-22	1980.00	0.06	1861.20	626560.00	3098010.00	70.134%	69.355%	69.485%	626252.89	3096562.00	70.100%	69.323%	69.452%
May-22	1980.00	0.06	1861.20	747580.00	3717295.00	80.981%	80.535%	80.609%	738807.29	3707656.75	80.031%	80.326%	80.277%
Mar-23	1980.00	0.06	1861.20	663597.00	3270897.40	71.884%	70.863%	71.033%	634041.21	3139975.67	68.682%	68.027%	68.136%
Average	1980.00	0.06	1861.20	2037737.00	10086202.40	74.378%	73.630%	**73.755%**	1999101.39	9944194.42	72.968%	72.594%	**72.656%**
Low Demand Season													
Jun-22	1980.00	0.06	1861.20	616900.00	3121255.00	69.053%	69.876%	69.738%	614968.09	3116057.86	68.836%	69.759%	69.605%
Jul-22	1980.00	0.06	1861.20	369005.00	1829160.00	39.972%	39.628%	39.686%	367707.04	1811517.66	39.832%	39.246%	39.344%
Aug-22	1980.00	0.06	1861.20	325570.00	1594877.37	35.267%	34.553%	34.672%	319211.30	1580871.36	34.578%	34.249%	34.304%
Sep-22	1980.00	0.06	1861.20	437605.00	2145610.00	48.983%	48.034%	48.192%	426463.22	2086188.41	47.736%	46.703%	46.876%
Oct-22	1980.00	0.06	1861.20	398440.00	2008620.00	43.161%	43.516%	43.457%	380590.33	1951274.22	41.227%	42.274%	42.100%
Nov-22	1980.00	0.06	1861.20	643800.00	3161817.00	72.064%	70.784%	70.997%	638009.54	3109947.64	71.416%	69.622%	69.921%
Dec-22	1980.00	0.06	1861.20	753770.80	3757403.60	81.652%	81.404%	81.445%	752720.25	3699943.58	81.538%	80.159%	80.389%
Jan-23	1980.00	0.06	1861.20	708640.80	3480286.40	76.763%	75.400%	75.627%	708025.89	3436200.94	76.696%	74.445%	74.820%
Feb-23	1980.00	0.06	1861.20	693350.00	3409595.00	83.154%	81.783%	82.011%	693089.37	3406835.48	83.122%	81.717%	81.951%
Average	1980.00	0.06	1861.20	4947081.60	24508624.37	60.852%	60.294%	**60.387%**	4900785.02	24198837.13	60.282%	59.532%	**59.657%**

Note:

1) The availability of Koradi U-8 to 10 is 73.755% during high demand season for FY 22-23.

2) The availability of Koradi U-8 to 10 is 60.387% during low demand season for FY 22-23.

3) Certification is based on data submitted by MSPGCL.

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ANNEXURE-M

Monthly AVF & PLF Certification Data FY- 2022-23

Uran

Month	Inst Cap (MW)	Norm APC (%)	ExBus Cap (MW)	DC (Peak) (MW)	DC (Off-Peak) (MW)	Peak AVF	Off Peak AVF	AVF	Schedule Gen. (Peak) (MW)	SG (Off-Peak) (MW)	Peak PLF	Off Peak PLF	PLF
High Demand Season													
Apr-22	672.00	0.03	651.17	122066.00	624876.00	39.054%	39.984%	39.829%	122066.00	624876.00	39.054%	39.984%	39.829%
May-22	672.00	0.03	651.17	109282.00	550109.00	33.836%	34.065%	34.026%	107108.00	538868.00	33.162%	33.369%	33.334%
Mar-23	672.00	0.03	651.17	90877.00	478561.00	28.137%	29.634%	29.385%	69898.00	365372.00	21.642%	22.625%	22.461%
Average	672.00	0.03	651.17	322225.00	1653546.00	33.617%	34.502%	**34.355%**	299072.00	1529116.00	31.201%	31.906%	**31.788%**
Low Demand Season													
Jun-22	672.00	0.03	651.17	82765.00	422898.00	26.480%	27.060%	26.963%	82765.00	422892.00	26.480%	27.060%	26.963%
Jul-22	672.00	0.03	651.17	74105.00	367476.00	22.944%	22.755%	22.787%	74105.00	367476.00	22.944%	22.755%	22.787%
Aug-22	672.00	0.03	651.17	97770.00	492920.00	30.271%	30.523%	30.481%	97770.00	492920.00	30.271%	30.523%	30.481%
Sep-22	672.00	0.03	651.17	50724.20	249417.80	16.229%	15.960%	16.004%	50733.20	249411.80	16.231%	15.959%	16.005%
Oct-22	672.00	0.03	651.17	44853.00	227499.00	13.887%	14.088%	14.054%	44853.00	227493.00	13.887%	14.087%	14.054%
Nov-22	672.00	0.03	651.17	56476.00	293755.00	18.069%	18.797%	18.675%	56476.00	293755.00	18.069%	18.797%	18.675%
Dec-22	672.00	0.03	651.17	81309.00	411540.00	25.175%	25.484%	25.432%	81309.00	411540.00	25.175%	25.484%	25.432%
Jan-23	672.00	0.03	651.17	92871.00	471026.00	28.754%	29.168%	29.099%	92871.00	471026.00	28.754%	29.168%	29.099%
Feb-23	672.00	0.03	651.17	80256.00	406513.00	27.511%	27.870%	27.810%	80202.00	406356.00	27.492%	27.859%	27.798%
Average	672.00	0.03	651.17	661129.2	3343044.8	23.244%	23.507%	**23.463%**	661084.20	3342869.80	23.242%	23.506%	**23.462%**

Note:

1) The availability of Uran plant is 34.355% during high demand season for FY 22-23.

2) The availability of Uran plant is 23.463% during low demand season for FY 22-23.

3) Certification is based on data submitted by MSPGCL.

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ANNEXURE-N

Monthly AVF & PLF Certification Data FY- 2022-23

AVF

STATION NAME	HIGH DEMAND SEASON	
	Peak AVF	Off Peak AVF
BHUSAWAL (Unit 3)	61.107%	61.044%
BHUSAWAL (Unit 4-5)	81.354%	81.367%
KHAPARKHEDA (Unit 1- 4)	69.857%	68.556%
KHAPARKHEDA U # 5	89.893%	91.406%
NASHIK (Unit 3-5)	71.654%	72.153%
CHANDRAPUR (Unit 3-7)	68.162%	68.099%
CHANDRAPUR (Unit- 8 & 9)	88.644%	88.530%
PARAS (Unit 3- 4)	82.372%	82.666%
PARALI (UNIT 6-7)	77.348%	78.100%
PARALI (UNIT 8)	52.011%	52.735%
KORADI (Unit 6-7)	79.855%	80.431%
KORADI (Unit- 8, 9 & 10)	74.378%	73.630%
GTPS URAN (Unit 5 -10)	33.617%	34.502%

AVF

LOW DEMAND SEASON	
Peak AVF	Off Peak AVF
55.111%	55.418%
75.529%	74.523%
61.449%	62.012%
82.279%	82.610%
63.786%	63.741%
46.498%	46.876%
80.562%	79.622%
67.983%	68.066%
73.285%	73.874%
55.756%	55.656%
67.484%	68.582%
60.852%	60.294%
23.244%	23.507%

PLF

STATION NAME	HIGH DEMAND SEASON	
	Peak PLF	Off Peak PLF
BHUSAWAL (Unit 3)	54.270%	55.642%
BHUSAWAL (Unit 4-5)	75.066%	76.898%
KHAPARKHEDA (Unit 1- 4)	65.798%	65.805%
KHAPARKHEDA U # 5	86.849%	89.090%
NASHIK (Unit 3-5)	55.355%	54.810%
CHANDRAPUR (Unit 3-7)	63.179%	64.492%
CHANDRAPUR (Unit- 8 & 9)	84.166%	85.372%
PARAS (Unit 3- 4)	79.584%	80.155%
PARALI (UNIT 6-7)	65.502%	68.877%
PARALI (UNIT 8)	50.109%	51.249%
KORADI (Unit 6-7)	78.353%	79.348%
KORADI (Unit- 8, 9 & 10)	72.968%	72.594%
GTPS URAN (Unit 5 -10)	31.201%	31.906%

PLF

LOW DEMAND SEASON	
Peak PLF	Off Peak PLF
34.332%	33.443%
71.080%	67.789%
57.373%	56.117%
76.809%	75.962%
43.975%	42.571%
43.358%	42.892%
75.522%	72.773%
66.199%	66.456%
60.038%	59.584%
50.385%	49.370%
67.124%	68.340%
60.282%	59.532%
23.242%	23.506%

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Annexure 14

Detail reasoning for the deviations in plant performance parameters (AVF, SHR, % Auxiliary Consumption & Specific Oil Consumption) for FY 2022-23 and FY 2023-24.

Reasons for deviation in Performance Parameters for FY 2023-24

1) Availability factor (%)

STATION	Capacity (MW)	Norm (%)	HIGH DEMAND SEASON		LOW DEMAND SEASON		Reasons for deviation
			Peak AVF	Off Peak AVF	Peak AVF	Off Peak AVF	
BHUSAWAL (Unit 3)	210	80	78.91%	79.52%	56.25%	56.26%	**HDS** : Poor coal quality (9.90 %) **LDS** : Poor coal quality (8.21 %),Wet coal problems (2.65%),Boiler tube elakage (2.58% %),Condenser vacuum/CWP problem(6.83%),Seal oil system(5.29%)
BHUSAWAL (Unit 4-5)	1000	85	79.59%	77.73%	82.61%	82.08%	**HDS** : Poor coal quality (3.97 %),Boiler tube leakage (11.68%) **LDS** : Poor coal quality (4.00 %),Wet coal problems (1.60%)
KHAPARKHEDA (Unit 1- 4)	840	85	73.65%	73.70%	63.08%	62.75%	**HDS** : Poor coal quality (10.99 %),Boiler tube leakage (1.11 %), Clinker formation (3.49%) **LDS** : Poor coal quality (9.06%),Wet coal problems (1.47%),Boiler tube leakage (2.02 %), Coal cycle problem(3.26%),Clinker formation (2.88%).Air heater (3.54%)
KHAPARKHEDA U # 5	500	85	82.24%	83.03%	84.82%	83.81%	**HDS** : Poor coal quality (3.91 %) **LDS** : Poor coal quality (4.63 %),Wet coal problems (1.62%)
NASHIK (Unit 3-5)	630	80	83.00%	83.53%	80.66%	80.41%	AVF achieved in HDS and LDS
CHANDRAPUR (Unit 3-7)	1920	80	75.63%	74.98%	51.03%	51.33%	**HDS** : Poor coal quality (6.51 %),Boiler tube leakage (2.58 %) **LDS** : Poor coal quality (5.31 %),Wet coal problems (3.58%),Boiler tube leakage (4.25%).Fan problems (3.14%),Air heaters (5.12%),Turbine side problem(2.23%)
CHANDRAPUR (Unit- 8 & 9)	1000	85	86.86%	86.36%	86.35%	85.76%	AVF achieved in HDS and LDS
PARAS (Unit 3- 4)	500	85	86.36%	86.48%	82.33%	81.82%	HDS : AVF achieved . LDS : Poor coal quality (8.38%)
PARALI (UNIT 6-7)	500	85	86.99%	86.75%	89.96%	90.38%	AVF achieved both in HDS and LDS
PARALI (UNIT 8)	250	85	77.10%	78.32%	72.75%	73.07%	**HDS :** Boiler tube elakage (1.35%%),Coal cycle problems (7.97%) **LDS** : Poor coal quality (2.79 %), coal cycle problems (8.82%),Boiler tube leakage (0.91%)
KORADI (Unit 6)	210	72	77.28%	76.85%	74.88%	75.08%	AVF achieved both in HDS and LDS
KORADI (Unit- 8, 9 & 10)	1980	85	66.44%	65.73%	69.64%	69.20%	**HDS :** Poor coal quality (6.47%),Boiler tube elakage(19.22%) **LDS** : Poor coal quality (8.55%, Wet Coal problem (1.23 %),Boiler Tube Leakage (7.98 %)
GTPS URAN (Unit 5 -10)	672	38	35.09%	36.93%	33.67%	34.32%	The annual average gas availability to GTPS Uran for the year 2023-24 was 1.31 MMCMD against the contracted quantity of 3.5 MMCMD.

2) Plant load factor factor (%)

STATION	Capacity (MW)	Norm (%)	HIGH DEMAND SEASON		LOW DEMAND SEASON		Reasons for deviation
			Peak PLF	Off Peak PLF	Peak PLF	Off Peak PLF	
BHUSAWAL (Unit 3)	210	80	63.74%	70.13%	50.18%	49.99%	**HDS** : Low system demand (9.25%) **LDS** : Low system demand (5.60 %) + Reasons as mentioned in AVF above
BHUSAWAL (Unit 4-5)	1000	85	71.34%	74.32%	74.92%	74.39%	**HDS** : Low system demand (3.89%) **LDS** : Low system demand (6.96 %) + Reasons as mentioned in AVF above
KHAPARKHEDA (Unit 1- 4)	840	85	69.49%	72.09%	59.90%	59.72%	**HDS** : Low system demand (1.58%) **LDS** : Low system demand (2.35 %) + Reasons as mentioned in AVF above
KHAPARKHEDA U # 5	500	85	81.34%	82.63%	82.18%	81.37%	**HDS** : Low system demand (0.41%) **LDS** : Low system demand (2.30%) + Reasons as mentioned in AVF above
NASHIK (Unit 3-5)	630	80	46.09%	49.72%	45.41%	45.80%	**HDS** : Low system demand (3.31%),Tolling of one unit (26.82%) **LDS** : Low system demand (3.67 %),Tolling of one unit (14.87%) + Reasons as mentioned in AVF above
CHANDRAPUR (Unit 3-7)	1920	80	64.07%	68.68%	47.14%	46.99%	**HDS** : Low system demand (6.79%) **LDS** : Low system demand (3.89 %) + Reasons as mentioned in AVF above
CHANDRAPUR (Unit- 8 & 9)	1000	85	82.31%	84.62%	81.26%	81.67%	**HDS** : Low system demand (2.01%) **LDS** : Low system demand (3.82 %) + Reasons as mentioned in AVF above
PARAS (Unit 3- 4)	500	85	82.21%	85.28%	79.36%	80.44%	**HDS** : Low system demand (1.50%) **LDS** : Low system demand (1.39%) + Reasons as mentioned in AVF above
PARALI (UNIT 6-7)	500	85	61.23%	71.12%	58.66%	60.43%	**HDS :** Low system demand (15.76%) **LDS :** Low system demand and Zero schedule (28.56 %) + Reasons as mentioned in AVF above
PARALI (UNIT 8)	250	85	58.09%	66.25%	53.84%	53.96%	**HDS** : Low system demand (12.30%) **LDS :** Low system demand and Zero schedule (18.81 %) + Reasons as mentioned in AVF above
KORADI (Unit 6)	210	72	76.53%	76.66%	73.20%	74.23%	PLF achieved both in HDS and LDS
KORADI (Unit- 8, 9 & 10)	1980	85	65.69%	65.43%	67.34%	67.58%	**HDS** : Low system demand (0.34%) **LDS** : Low system demand (1.52 %) + Reasons as mentioned in AVF above
GTPS URAN (Unit 5 -10)	672	38	30.54%	32.46%	29.10%	29.68%	The annual average gas availability to GTPS Uran for the year 2023-24 was 1.31 MMCMD against the contracted quantity of 3.5 MMCMD.

3) Specific oil consumption (ml/kwh)

STATION	Capacity (MW)	Norm	Actual	Reasons for deviation
BHUSAWAL (Unit 3)	210	1.400	3.608	For stability of unit and to avoid unnecessary tripping due to Poor Coal Quality (flame stability) & Wet coal problem + 20 times start-up out of this 4 times cold start-up.
BHUSAWAL (Unit 4-5)	1000	0.500	0.979	More number of startups - Total 32 startups.2. Excess Oil consumption due to Oil support due to Flame stability & Wet coal,Oil consumption due to PA FAN Problem of U#5
KHAPARKHEDA (Unit 1- 4)	840	1.200	2.534	No of outages/Trippings on higher side - 68 Nos.
KHAPARKHEDA U # 5	500	0.500	0.348	Less than normative value
NASHIK (Unit 3-5)	630	1.000	1.717	Partial loading due to poor coal quality,Wet coal problems and more statrtups (47 Nos)
CHANDRAPUR (Unit 3-7)	1920	1.000	2.006	More number of startups Excess Oil consumption due to Oil support due to Flame stability & Wet coal,
CHANDRAPUR (Unit- 8 & 9)	1000	0.500	0.287	Less than normative value
PARAS (Unit 3- 4)	500	0.500	0.476	Less than normative value
PARALI (UNIT 6-7)	500	0.500	2.074	More startups (19 Nos)
PARALI (UNIT 8)	250	0.500	1.219	More startups (14 Nos)
KORADI (Unit 6)	210	2.810	2.798	Less than normative value
KORADI (Unit- 8, 9 & 10)	1980	0.500	0.771	Higher secondary fuel oil consumption due to more number of unit startups, wet coal problem, ID Fan Problem, Bottom Ash Evacuation problem, Clinker formation, system problem, low system demand, Flame unstability and Coal Handling Plant problems and foreign material in coal mills.

4) SHR (Kcal/kwh)

STATION	Capacity (MW)	Norm	Actual	Reasons for deviation
BHUSAWAL (Unit 3)	210	2787	2906	1) Partial loading + Low PLF and Poor Coal Quality & Wet coal. (Actual Coal CV 3042 , Design CV 5000 Kcal/kg) 2) Excess oil consumption, 20 times start-up out of this 4 times cold start-up. 3) Due for overhaul since 2016
BHUSAWAL (Unit 4-5)	1000	2375	2449	Average Bunkered Coal GCV was 3114 kcal/kg against desgin Coal 3400 kcal/kg. Excess Oil consumption for flame stabilty due to Wet and Lumpy coal.Partial loading due to Poor coal quality,LDBD etc
KHAPARKHEDA (Unit 1- 4)	840	2630	2740	Partial loadability ,Low PLF and high oil consumption
KHAPARKHEDA U # 5	500	2375	2451	Partial loadability ,Low PLF and high oil consumption
NASHIK (Unit 3-5)	630	2754	2761	Marginally more than normative due to partial loading and high oil consumption
CHANDRAPUR (Unit 3-7)	1920	2688	2711	Low PLF/Partial loadability and more oil consumption
CHANDRAPUR (Unit- 8 & 9)	1000	2375	2374	Norm achieved
PARAS (Unit 3- 4)	500	2430	2425	Less than normative value
PARALI (UNIT 6-7)	500	2430	2463	Low PLF/Partial loadability and more oil consumption
PARALI (UNIT 8)	250	2430	2448	Low PLF/Partial loadability and more oil consumption
KORADI (Unit 6)	210	2622	2514	Less than normative value
KORADI (Unit- 8, 9 & 10)	1980	2230	2402	Heat Rate is on higher side due to partial loading on account of Poor Coal Quality, Wet Coal Problem, CHP Problems, BTL, LDBD, PA Fan, HP Heaters, Condenser Vaccum etc. and more number of forced outages. Also Coal GCV is less as compared to Design GCV due to which loadability was less and higher Heat Rate.
GTPS URAN (Open cycle)		2900	3345	GT-5&6 were on open cycle mode throughout the year and GT7&8 were also in open cycle mode from 24.06.2023 to 28.08.2023 . There was no continuous schedule to these open cycle units due to the high MOD rate and these units were synchronized/withdrawn according to the demand of LD Kalwa and also considering the actual gas availability. Due to these factors there were increased synchronization/withdrawals which resulted in high heat rate. Also, the gas turbines of GTPS Uran are 39 years old and Steam turbines are 30 years old. As the useful life of the plant has been passed by, the heat rate norms may not be achievable.
GTPS URAN (Combine cycle))		2035	2090	As above

5) Auxiliary Power Consumption (%)

STATION	Capacity (MW)	Norm	Actual	Reasons for deviation
BHUSAWAL (Unit 3)	210	10.96%	13.35%	Partial loading & Low PLF due to LDBD, Wet Coal & Poor Coal Quality. Total 20 nos. trippings (17 Forced, 02 Planned, 01 System Problem). 4) Due for AOH since 2016.
BHUSAWAL (Unit 4-5)	1000	6.00%	6.81%	1. Excess APC due to partial loading due to LDBD, PCQ & Wet Coal. 2. Excess APC due to high outage period (Total 35 Nos. of outages).
KHAPARKHEDA (Unit 1- 4)	840	9.70%	10.99%	Partial loadability (63,08%) and low PLF
KHAPARKHEDA U # 5	500	6.00%	6.36%	Unit is due for overhaul since long period(Last overhaul in Feb 2021)
NASHIK (Unit 3-5)	630	10.75%	12.55%	Partial loading/Low PLF and more outages
CHANDRAPUR (Unit 3-7)	1920	7.80%	10.50%	Low PLF (53.6 %) with partial loadability (67.2 %.),Impact (of MDBFP running 0.26 % Impact)
CHANDRAPUR (Unit- 8 & 9)	1000	6.00%	6.02%	Marginally higher due to MDBFP running
PARAS (Unit 3- 4)	500	9.30%	10.48%	1) Partial loss due to LDBD, Wet Coal, Poor Coal Quality etc. 2) Total 10 nos trippings (10 start-ups). 3) CPRI APC audit conducted in Feb 2024. As per CPRI final report Achievable value of APC for Paras TPS at 85% PLF is 10.21 % 4) FGD construction power was also included in APC.
PARALI (UNIT 6-7)	500	9.30%	11.48%	Low PLF/Partial loading and more startups
PARALI (UNIT 8)	250	8.50%	12.14%	Low PLF/Partial loading and more startups
KORADI (Unit 6)	210	10.81%	11.26%	APC is on higher side due to partial loading on account of Poor Coal Quality(10.86%), Wet & Sticky Coal Problem(4%), CHP Problems(2.10%), BTL(3.57%), LDBD(0.56%), No ID Fan Margin due to expansion joints leakages
KORADI (Unit- 8, 9 & 10)	1980	6.00%	7.28%	Low PLF / partial loading on account of Poor Coal Quality, Wet Coal Problem, CHP Problems, BTL, LDBD,Condenser Vaccum etc. and Unit 10 Capital Overhaul.
GTPS URAN (Open cycle)		1.00%	2.75%	From 24.06.2023 to 28.08.2023, all gas turbine units of GTPS Uran were available in open cycle mode only. Both steam turbines were under shut down and the standby consumption of the steam turbines auxilliaries got added in the total station auxilliary power consumption. As the machine was available in open cycle only, the excess consumption of steam turbine auxiliaries incresed the open cycle Auxiliary power consumption.
GTPS URAN (Combine cycle))		3.00%	2.93%	Normative achieved

Reasons for deviation in Performance Parameters for FY 2022-23

1) Availability factor (%)

STATION	Capacity (MW)	Norm (%)	HIGH DEMAND SEASON		LOW DEMAND SEASON		Reasons for deviation
			Peak AVF	Off Peak PLF	Peak AVF	Off Peak PLF	
BHUSAWAL (Unit 3)	210	80	61.11%	61.04%	55.11%	55.42%	**HDS** : Critical coal stock (12.37 %),Poor coal quality (8.31 %),Governing problem (9.48 %) **LDS** : Critical coal stock (8.88 %),Poor coal quality (6.89 %),Wet coal problems (9.29%),Boiler tube elakage (7.23% %)
BHUSAWAL (Unit 4-5)	1000	85	81.35%	81.37%	75.53%	74.52%	**HDS** : Critical coal stock (6.41 %) **LDS** : Poor coal quality (5.29 %),Wet coal problems (6.96%),Boiler tube elakage (3.17% %)
KHAPARKHEDA (Unit 1- 4)	840	85	69.86%	68.56%	61.45%	62.01%	**HDS** : Poor coal quality (10.57 %),Boiler tube /Pr.part leakage (3.36 %), Clinker formation (3.82%), Airpreheater problem(3.07%) **LDS** : Critical coal stock (3.87 %),Poor coal quality (11.52 %),Wet coal problems (3.42%),Boiler tube/pr part leakage (2.45 %), Coal cycle problem(2.51%),Clinker formation (2.76%)
KHAPARKHEDA U # 5	500	85	89.89%	91.41%	82.28%	82.61%	AVF achieved in HDS. Loss of AVF during LDS mainly due to Poor coal quality (8.11 %)
NASHIK (Unit 3-5)	630	80	71.65%	72.15%	63.79%	63.74%	**HDS** : Critical coal stock (11.51 %) **LDS** : Poor coal quality (9.64 %),Wet coal problems (18.39%)
CHANDRAPUR (Unit 3-7)	1920	80	68.16%	68.10%	46.50%	46.88%	**HDS** : Poor coal quality (6.69 %),Boiler tube leakage (3.30 %), Ash handling system (8.63%) **LDS** : Critical coal stock (1.61 %),Poor coal quality (5.84 %),Wet coal problems (7.42%),U7 Outage for Turbine problem (12.79%)
CHANDRAPUR (Unit- 8 & 9)	1000	85	88.64%	88.53%	80.56%	79.62%	AVF achieved in HDS. Loss of AVF during LDS mainly due to Poor coal quality (4.03 %) & Wet coal problems (4.28 %)
PARAS (Unit 3- 4)	500	85	82.37%	82.67%	67.98%	68.07%	**HDS :** Critical coal stock (1.36 %),Poor coal quality (6.23 %) **LDS :** Poor coal quality (8.09 %), Wet coal problems (5.69 %), U-4 Outage for turbine brg problem (3.37 %)
PARALI (UNIT 6-7)	500	85	77.35%	78.10%	73.29%	73.87%	**HDS :** Critical coal stock (4.51 %),Poor coal quality (1,30 % ,Boiler tube elakage (8.95%%) **LDS :** Critical coal stock (6.17%),Poor coal quality (2.12 %), Boiler tube leakage(1.80 %),Coal cycle problem(1.76%)
PARALI (UNIT 8)	250	85	52.01%	52.73%	55.76%	55.66%	**HDS :** Critical coal stock (6.83 %),Boiler tube elakage (3.50%%),Condenser Vacuum (11.70%) **LDS** : Critical coal stock (7.22%),Poor coal quality (4.60 %),Wet coal problems (2.43%),Boiler tube/Pr.part leakage (4.35%)Coal cycle problem(8.90%),Condenser vacuum (6.05 %)
KORADI (Unit 6)	210	72	79.85%	80.43%	67.48%	68.58%	AVF achieved in HDS. Loss of AVF during LDS mainly due to Poor coal quality (5.40 %) & Wet coal problems (7.05 %)
KORADI (Unit- 8, 9 & 10)	1980	85	74.38%	73.63%	60.85%	60.29%	**HDS :** Poor coal quality (6.63%),Boiler tube elakage(5.22%) **LDS** : Unit 08 & 09 were under shutdown for Annual overhaul (9.53 %), Poor coal quality (14.02%, Wet Coal problem (2.23 %),Boiler Tube Leakage (7.16 %)
GTPS URAN (Unit 5 -10)	672	38	33.62%	34.50%	23.24%	23.51%	Annual average gas availability was 1.16 MMCMD against the contracted quantity of 3.5 MMCMD.

2) Plant load factor factor (%)

STATION	Capacity (MW)	Norm (%)	HIGH DEMAND SEASON		LOW DEMAND SEASON		Reasons for deviation
			Peak PLF	Off Peak AVF	Peak AVF	Off Peak AVF	
BHUSAWAL (Unit 3)	210	80	54.27%	55.64%	34.33%	33.44%	**HDS** : Low system demand (4.77%) **LDS** : Low system demand + Zero schedule (27.54 %) + Reasons as mentioned in AVF above
BHUSAWAL (Unit 4-5)	1000	85	75.07%	76.90%	71.08%	67.79%	**HDS** : Low system demand (4.59%) **LDS** : Low system demand (5.94 %) + Reasons as mentioned in AVF above
KHAPARKHEDA (Unit 1- 4)	840	85	65.80%	65.81%	57.37%	56.12%	**HDS** : Low system demand (2.37%) **LDS** : Low system demand (4.42 %) + Reasons as mentioned in AVF above
KHAPARKHEDA U # 5	500	85	86.85%	89.09%	76.81%	75.96%	PLF achieved in HDS. Loss of PLF during LDS due to Low system demand (6.49 %) + Reasons as mention in AVF above
NASHIK (Unit 3-5)	630	80	55.36%	54.81%	43.98%	42.57%	**HDS** : Low system demand (4.65%),Tolling of one unit (11.19%) **LDS** : Low system demand (5.41 %),Tolling of one unit (18.19%) + Reasons as mentioned in AVF above
CHANDRAPUR (Unit 3-7)	1920	80	63.18%	64.49%	43.36%	42.89%	**HDS** : Low system demand (3.19%) **LDS** : Low system demand (2.75 %) + Reasons as mentioned in AVF above
CHANDRAPUR (Unit- 8 & 9)	1000	85	84.17%	85.37%	75.52%	72.77%	PLF achieved in HDS. Loss of PLF during LDS due to Low system demand (5.83 %) + Reasons as mention in AVF above
PARAS (Unit 3- 4)	500	85	79.58%	80.15%	66.20%	66.46%	**HDS** : Low system demand (2.24%) **LDS** : Low system demand (1.47 %) + Reasons as mentioned in AVF above
PARALI (UNIT 6-7)	500	85	65.50%	68.88%	60.04%	59.58%	**HDS :** Low system demand (8.32%) **LDS :** Low system demand and Zero schedule (12.38 %) + Reasons as mentioned in AVF above
PARALI (UNIT 8)	250	85	50.11%	51.25%	50.39%	49.37%	**HDS** : Low system demand (1.47%) **LDS :** Low system demand and Zero schedule (6.27 %) + Reasons as mentioned in AVF above
KORADI (Unit 6)	210	72	78.35%	79.35%	67.12%	68.34%	**HDS** : Low system demand (0.91%) **LDS** : Low system demand (0.19 %) + Reasons as mentioned in AVF above
KORADI (Unit- 8, 9 & 10)	1980	85	72.97%	72.59%	60.28%	59.53%	**HDS** : Low system demand (0.95%) **LDS** : Low system demand (0.55 %) + Reasons as mentioned in AVF above
GTPS URAN (Unit 5 -10)	672	38	31.20%	31.91%	23.24%	23.51%	Annual average gas availability was 1.16 MMCMD against the contracted quantity of 3.5 MMCMD.

3) Specific oil consumption (ml/kwh)

STATION	Capacity (MW)	Norm	Actual	Reasons for deviation
BHUSAWAL (Unit 3)	210	1.400	5.757	Oil Support for flame stability to avoid tripping (Poor Coal Quality & Wet coal problem), 19 start-ups , out of this 7 times cold start-up.
BHUSAWAL (Unit 4-5)	1000	0.500	2.027	More number of startups (Total 32 startups),Excess Oil consumption for Flame stability & Wet coal problems
KHAPARKHEDA (Unit 1- 4)	840	1.200	4.910	No of trippings on higher side (Total 50 startups)
KHAPARKHEDA U # 5	500	0.500	0.334	MERC Normative Achieved
NASHIK (Unit 3-5)	630	1.000	4.552	More number of startups (Total 36 startups),Oil Support for flame stability to avoid tripping (Poor Coal Quality & Wet coal problem),
CHANDRAPUR (Unit 3-7)	1920	1.000	4.759	Wet Coal problems,more startups (63 Nos)
CHANDRAPUR (Unit- 8 & 9)	1000	0.500	0.363	MERC Normative Achieved
PARAS (Unit 3- 4)	500	0.500	1.743	Oil Support for stability of unit and to avoid unnecessary tripping due to Poor Coal Quality (flame stability) & O&M problems due to Wet coal . Excess oil consumption. 43times start-up out of this 7 times cold start-up
PARALI (UNIT 6-7)	500	0.500	3.779	More Forced outage, O&M problems , multiple start ups = 38 nos
PARALI (UNIT 8)	250	0.500	5.147	More Forced outage, O&M problems , multiple start ups = 14 nos
KORADI (Unit 6)	210	2.810	5.586	More number of unit start-ups, wet & Sticky coal problem during Monsoon, low system demand, Flame instability due to PCQ and Coal Handling Plant problems
KORADI (Unit- 8, 9 & 10)	1980	0.500	0.635	More number of startups, wet coal problem, ID Fan Problem, Bottom Ash Evacuation problem, system problem, low system demand, Flame unstability and Coal Handling Plant problems

4) SHR (Kcal/kwh)

STATION	Capacity (MW)	Norm	Actual	Reasons for deviation
BHUSAWAL (Unit 3)	210	2787	3085	1) Low PLF / partial loadabilitty due to Poor Coal Quality & Wet coal. (Actual Coal CV 2879 Kcal/kg, Design CV 5000 Kcal/kg)
BHUSAWAL (Unit 4-5)	1000	2375	2417	1. Average Bunkered Coal GCV was 2981 kcal/kg against desgin Coal 3400 kcal/kg.
KHAPARKHEDA (Unit 1- 4)	840	2630	2726	Low PLF / Partial loadability and high oil consumption
KHAPARKHEDA U # 5	500	2375	2463	9 number's of forced outages (2.86%), partial loading outages (18.63%), so loadability (80.82%) was reduced .
NASHIK (Unit 3-5)	630	2754	2781	Low PLF / Partial loadability and high oil consumption
CHANDRAPUR (Unit 3-7)	1920	2688	2733	Partial loadability as Actual PLF was 48.34 %,
CHANDRAPUR (Unit- 8 & 9)	1000	2375	2386	HR slightly deviated from normative as Actual PLF was 76.24 %.
PARAS (Unit 3- 4)	500	2430	2447	1) Due to Poor Coal Quality & Wet coal. (Actual Coal CV 3138.44 Kcal/kg, Design CV 3400 Kcal/kg)
PARALI (UNIT 6-7)	500	2430	2517	Low PLF / Partial loadability and high oil consumption
PARALI (UNIT 8)	250	2430	2536	Low PLF / Partial loadability and high oil consumption
KORADI (Unit 6)	210	2622	2603	Achieved
KORADI (Unit- 8, 9 & 10)	1980	2230	2480	Heat Rate is on higher side due to partial loading on account of Poor Coal Quality, Wet Coal Problem, CHP Problems, BTL, LDBD,Condenser Vaccum etc. and more number of forced outages. Also Coal GCV is less as compared to Design GCV due to which loadability was less and higher Heat Rate.
GTPS URAN (Open cycle)		2900	3154	GT-5&6 were on open cycle mode from 07.09.2022 on wards. There was no continuous schedule to these open cycle units and these units were synchronized/withdrawn according to the demand of LD Kalwa and also considering the actual gas availability. Due to these factors there were increased synchronization/withdrawals which resulted in high heat rate. Also, the gas turbines of GTPS Uran are 39 years old and Steam turbines are 30 years old. As the useful life of the plant has been passed by, the heat rate norms may not be achievable.
GTPS URAN (Combine cycle))		2035	2156	Due to the less gas availability, the steam turbines of GTPS Uran were often operated on 1GT-1 ST combination. Single GT operations of steam turbine increase the heat rate significantly. Also less gas availability leads to increase in withdrawal and rolling of the machines. Increase in number of machine synchronizing also leads to increase in heat rate. In the year 2022-23, the gas turbines were withdrawn 39 times due to gas shortage while in combine cycle mode of operation. Also, the gas turbines of GTPS Uran are 39 years old and Steam turbines are 30 years old. As the useful life of the plant has been passed by, the heat rate norms may not be achievable.

5) Auxiliary Power Consumption (%)

STATION	Capacity (MW)	Norm	Actual	Reasons for deviation
BHUSAWAL (Unit 3)	210	10.96%	14.56%	1) Increase in APC is mainly due to RSD (Zero Schedule by MSEDCL) & External Forced trippings. 2) Partial loss due to LDBD, Wet Coal, Poor Coal Quality & Poor Coal Receipt. 3) Total 18 nos trippings (19 start-ups). 4) Last AOH carried out in 2016.
BHUSAWAL (Unit 4-5)	1000	6.00%	6.36%	1. Excess APC due to partial loading due to LDBD, PCQ & Wet Coal. 2. Excess APC due to Unit No.5 out for AOH for the period of 34 days.
KHAPARKHEDA (Unit 1- 4)	840	9.70%	11.25%	Low PLF / Loadability -63.936%, more no of outages
KHAPARKHEDA U # 5	500	6.00%	5.85%	Achieved
NASHIK (Unit 3-5)	630	10.75%	12.61%	Low PLF / Loadability -66 %, more no of outages
CHANDRAPUR (Unit 3-7)	1920	7.80%	11.09%	Loadability was 62.64 %. Running of MDBFP at part load operation & during unit startups as well as LDBD leads to additional APC of 1.35% (i.e excluding LDBD & MDBFP it was 9.75 %)
CHANDRAPUR (Unit- 8 & 9)	1000	6.00%	5.51%	Achieved
PARAS (Unit 3- 4)	500	9.30%	10.98%	Partial loss due to LDBD, Wet Coal, Poor Coal Quality & Poor Coal Receipt, Total 43 nos trippings (43 start-ups)
PARALI (UNIT 6-7)	500	9.30%	11.58%	Partial loadability and Lowwr PLF as mentioned in PLF deviation reasons
PARALI (UNIT 8)	250	8.50%	13.59%	Partial loadability and Lowwr PLF as mentioned in PLF deviation reasons
KORADI (Unit 6)	210	10.81%	11.28%	APC is on higher side as generation is less due to partial loading on account of Poor Coal Quality, Wet & Sticky Coal Problem, CHP Problems, BTL, LDBD, Condenser Vacuum Mini Overhaul (Planned Outage) etc.
KORADI (Unit- 8, 9 & 10)	1980	6.00%	7.34%	APC is on higher side as generation is less due to partial loading on account of Poor Coal Quality, Wet Coal Problem, CHP Problems, BTL, LDBD,Condenser Vaccum etc. and Unit 8 & 9 Annual Overhaul.
GTPS URAN (Open cycle)		1.00%	1.82%	From 07.09.2022 to 20.11.2022, all gas turbine units of GTPS Uran were available in open cycle mode only. Both steam turbines were under shut down and the standby consumption of the steam turbines auxilliaries got added in the total station auxilliary power consumption. This incresed the open cycle Auxiliary power consumption
GTPS URAN (Combine cycle))		3.00%	3.11%	Due to less gas availability, Out of the total service hours of 7536 Hrs the steam turbines were in 1GT-1 ST combination for 6058 Hrs . The auxiliary consumption on the steam turbine side remains almost the same for both single GT and double GT operations, but the generation reduces by 50%. These single GT operations resulted in high APC.

Title: Reasons for deviation in Operational Parameters for True up Period

A. MERC Availability, SOC, APC, Heat Rate and transit loss :

1) Critical Coal Stock : during **FY 2022-23**

Tariff Station	AVF Loss (%) during HDS	AVF Loss (%) during LDS	Coal Stock (LMT) as on 01.04.2022	Coal Stock No. of days	Imported coal used
Bhusawal-3	12.37	8.88	0.003	2.2	Not used
Bhusawal-4&5	6.41	Nil	0.349		Used
Chandrapur-3to7	Nil	1.61	3.544	13.1	Used
Chandrapur-8&9	AVF achieved	Nil	1.156		
Koradi-6	AVF achieved	Nil	0.777	2.8	Not used
Koradi-8to10	Nil	Nil			
Khaperkheda-1to4	Nil	3.87	0.835	5.2	Used
Khaperkheda-5	AVF achieved	Nil			
Nashik-3to5	11.51	Nil	0.278	4.7	Used
Paras-3&4	1.36	Nil	0.252	6.3	Not used
Parli-6&7	4.51	6.17	0.257	1.6	Not used
Parli-8	6.83	7.22			

During FY 2021-22 after covid-19 second wave, due to increase in demand and supply of electricity, the share of coal based generation was increased. As per Ministry of Power Letter dated 30.08.2021, about 90 power plants were having less than 10 days stock. CMT – Core Management Team consisting representatives from MOP, CEA and Coal India Limited (CIL) was constituted to monitor and ensure supply of coal to power plants.

In spite of all these efforts, coal stock at MSPGCL was critical and Ministry of Power vide letter dtd. 07.12.2021 had also acknowledged that the supply from CIL was not commensurate with the requirement of thermal power plants. Hence directed Power Generating companies for use of 4% imported coal and to immediately import and arrange the coal by May-2022. MSPGCL 4% imported coal requirement was worked out @ 1.386 MMT as per Ministry of Power letter dtd 07.12.2021.

Again Ministry of Power, revised advisory guidelines were issued vide letter dtd. 28.04.2022 and salient features as below;

- The imported coal blending to be done @ 10% with placement of awards of contracts to be completed by 31.05.2024 and shall follow;
  - Delivery of 50% allocated quantity by 30.06.2022.
  - Delivery of 40% allocated quantity by 31.08.2022.
  - Remaining 10% by 31.10.2022.
- The revised 10% imported coal quantity for MSPGCL was assigned @ 3.464 MMT.

Ministry of Power, Govt. of India, advisory guidelines were issued vide letter dtd. 01.06.2022 and salient features as below;

- Advisory issued on 28.05.2022 and 01.06.2022 pertaining to importing coal for blending purposes, those state GENCOs/ IPPs who have either

placed their indents with CIL or initiated their own tender process, they will be allocated domestic coal as mentioned in the letter dated 18.05.2022;

- **Those GENCOs / IPPs who either do not place their indents with CIL by 03.06.2022 or have not initiated their own tender process for purchase of imported coal for blending purposes, they will be allocated only 70% of quantity of domestic coal of the quantity as mentioned in the letter 18.05.2022, from 7.06.2022 and allocation will be further reduced to 60% from 15.06.2022. Domestic coal thus saved on this account shall be allocated to those GENCOs/IPPs who have already commenced blending**.

These Ministry of Power letters dtd 18.05.2022 & 01.06.2022 are reproduced here.

No. FU-21/2020-FSC
Government of India
Ministry of Power
****

Shram Shakti Bhawan, Rafi Marg.
New Delhi, dated 18.05.2022

To,

1. Principal Secretaries / Secretaries (Power / Energy) of State Governments and UTs
2. CMDs, Thermal Generating Stations (State GENCOs/IPPs) (As per the list)

Sub: Direction to all Gencos including Independent Power Producers (IPPs) for timely Import of Coal for blending purposes and maximising production in captive coal mines – reg.

Ministry of Power (MoP) on 07.12.2021 had issued advisory to all domestic coal based power plants to import coal to meet their requirements by blending with imported coal to the extent of 4 % by State Gencos & Independent Power Producers (IPPs). Further, taking into consideration the circumstances and increased demand of electricity while coal supplies from domestic coal companies were not commensurate with the increased consumption of coal, MoP had issued the revised advisory on 28.04.2022 for importing coal for blending purpose to meet the requirement at 10% of the total requirement by 31.10.2022. The requirement for blending for each Genco and IPPs at 10% was also intimated and it was advised to place the awards for import of coal (for blending) by 31.05.2022 in order to ensure that 50% quantity is received by 30.06.2022, 40 % quantity by 31.08.2022 and 10% quantity by 31.10.2022.

2. Due to the recent surge in power demand, the domestic coal supply is not able to match the consumption, resulting in depletion of stocks at thermal power plants. In the light of the emergent situation, it is essential that the imported coal based plants run and the State import coal for blending, as in the previous years. Ministry of Power have issued directions u/s 11 of the Electricity Act that all the imported coal based plants start running and most of them have started running. However, the import by States of coal for blending is not satisfactory. In 2018-19 a total of 21.4 Million Tonnes of coal were imported for blending. In 2019-20, the total import for blending was 23.8 Million Tonnes whereas in 2021-22, it was only 8.3 Million Tonnes. This is the cause of the stress in the availability of coal.

3. In view of the above, it has been decided that if the orders for import of coal for blending are not placed by Gencos by 31.05.2022 and if the imported coal for blending purpose do not start arriving at the power plants by 15.06.2022, all the defaulter Gencos would have to import coal for blending purpose to the extent of 15% (in order to meet shortfall of imported coal for blending purpose in Quarter1 i.e. Apr-June 2022) in the remaining period upto 31.10.2022.

3.1 Since, not much blending has taken place in the months of April and May 2022, the power plants (who have not yet started blending by imported coal) will ensure that they blend coal at the rate of 15 % upto Oct 2022 and thereafter at the rate of 10% from November 2022 to March 2023.

4. Keeping in view the likely less materialization of coal supply from domestic sources as compared with the requirement to meet power demand, it has been decided that domestic coal will be allocated proportionately to all Gencos based on likely availability from 01.06.2022 (**as per Annexure attached**) and the balance requirement will need to be met from imported coal for blending purpose and target set for production in captive coal mines. If blending with domestic coal is not started by 15.06.2022 then the domestic allocation of the concerned defaulter thermal power plants will be further reduced by 5%. Any additional domestic coal supply available in June 22 will be allocated for stock building to those Gencos which prove commendable level of blending of coal in the month of June 22. Accordingly, revised allocation of domestic coal for the month of July,2022 onwards will be conveyed based on the above methodology.

5. All Gencos are hereby advised to take action accordingly and ensure adequate stocks at their power plants for smooth operation until Oct,2022.

6. This issues with the approval of Hon'ble Minister of Power, New & Renewable Energy.

(S.Majumdar)
Under Secretary to the Govt. of India
Tel – 2335-6938
Email: suman.m@nic.in

Copy to:

1. Secretary, Ministry of Coal
2. Chairman, Railway Board
3. Chairman, Central Electricity Authority
4. DG, Association of Power Producers(APP)

Distribution for June-2022

	Capacity (MW)	Coal Requirement based on GT(TT)	Target of Import for blending-2022-23 (TT)	Import target for June-22 (TT)	Eqv. Domestic Coal (TT)	Likely availability from Captive Mines (TT)	Balance to be supplied from CIL + SCCL
NTPC	48110	16769	16032	1336	2004	1980	12785
NTPC-JV	8190	2324	2533	211	317	0	2008
NTPC and its JVs	**56300**	**19094**	**18565**	**1547**	**2321**	**1980**	**14793**
DVC	6750	2281	2235	186	279	0	2002
NTPL	1000	385	0	0	0	400	0
Total-Central Gencos	**64050**	**21760**	**20799**	**1733**	**2600**	**2380**	**16795**
HPGCL	2510	729	904	75	113	0	616
PSPCL	1760	374	594	49	74	0	300
RRVUNL	7580	2304	966	81	121	1300	1168
UPRVUNL	6129	2163	1896	158	237	0	1925
CSPGCL	2840	1095	1063	89	133	349	659
GSECL	4010	1137	1345	112	168	0	969
MPPGCL	5400	1690	1943	162	243	0	1447
MAHAGENCO	9540	3665	3464	289	433	0	3232
APGENCO	5010	2394	1818	151	227	0	2167
KPCL	5020	1559	1591	133	199	208	1153
TANGEDCO	4320	1643	2194	183	274	0	1369
TSGENCO	5243	2039	1472	123	184	459	1396
TVUNL	420	147	156	13	20	0	128
OPGCL	1740	875	721	60	90	500	285
WBPDCL	4810	1705	1766	147	221	1534	92
Total-State Gencos	**66332**	**23521**	**21894**	**1824**	**2737**	**4350**	**16906**
IPP	53342	17634	15936	1328	1992	2052	13751
TOTAL	**183724**	**62915**	**58629**	**4886**	**7329**	**8782**	**47451**

Methodology:

1. Coal Requirement for June-2022 is based on Generation Target (62.9 MT)
2. Expected Import for blending during June-2022 has been calculated from the target for 2022-23 (4.9 MT)
3. Equivalent domestic coal (1.5 x Import = 7.3 MT) and availability from captive mines (8.8 MT) have been reduced from requirement.
4. Balance requirement from CIL and SCCL is about 47.5 MT

No.FU-21/2020-FSC
Government of India
Ministry of Power

Shram Shakti Bhawan, Rafi Marg,
New Delhi, dated 01.06.2022

To,
1. All Additional Chief Secretary (ACS)/Pr.Secretary(Power/Energy) of State Governments and UTs.
2. All State Generating Companies (State Gencos) and Independent Power Producers (IPPs)

Subject: Import of coal for blending purpose - regarding

In continuation of the letter of this Ministry dated 28.4.2022 (Copy enclosed at Annexure I), all the State GENCOs /IPPs are directed that the blending targets for imported coal at the rate of 10% (by weight) would cover coal available from all domestic sources (CIL/SCCL/CAPTIVE).

2. With reference to the advisory issued on 28.05.2022 (copy at Annexure II) and 01.06.2022 (copy at Annexure III) pertaining to importing coal for blending purposes, those state GENCOs / IPPs who have either placed their indents with CIL or initiated their own tender processes, they will be allocated domestic coal as mentioned in the letter dated 18.05.2022 (copy enclosed at Annexure IV).

3. Those GENCOs/IPPs who either do not place their indents with CIL by 03.06.2022 or have not initiated their own tender processes for purchase of imported coal for blending purposes, they will be allocated only 70% of the quantity of domestic coal of the quantity as mentioned in the letter 18.05.2022, from 07.06.2022 and allocation will be further reduced to 60% from 15.06.2022. Domestic coal thus saved on this account shall be allocated to those GENCOs/IPPs who have already commenced blending.

4. This issues with the approval of Hon'ble Minister of Power & New and Renewable Energy.

(S. Majumdar)
Under Secretary to the Government of India
Telefax : 23356938

Copy to:
1. Secretary (Coal), Government of India
2. Chairman, CEA
3. CMD, Coal India Limited

Accordingly after following procurement procedure, MSPGCL floated tender no MAHAGENCO/CE/FM/IMP-COAL/FORD/2021-22/T-01 on dtd 15/11/2021 for procurement of imported coal quantity of 2.0 MMT with TPS wise allocation as below;

TPS	KPKD	BSL	NSK	CHN	Total
Quantity to be procured in MMT	0.40	0.45	0.15	1.0	2.0

The delivery schedule mentioned in the table below;

Month (after 35 days from the date of issue of LOA)	**Quantity for Khaperkheda Unit – 1 to 5 (4 x 210 + 1 x 500 MW) in MT**	**Quantity for Chandrapur Unit 3 to 9 (2 x 210 MW & 5x500 MW) in MT**	**Quantity for Bhusawal Unit - 4 & 5 (2 x 500 MW) in MT**	**Quantity for Nashik Unit -3, 4 & 5 (3 x 210 MW) in MT**
1st Month	50,000	1,25,000	50,000	20,000
2nd Month	50,000	1,25,000	60,000	20,000
3rd Month	50,000	1,25,000	60,000	20,000
4th Month	50,000	1,25,000	60,000	20,000
5th Month	50,000	1,25,000	60,000	20,000
6th Month	50,000	1,25,000	60,000	20,000
7th Month	50,000	1,25,000	60,000	20,000

8th Month	50,000	1,25,000	40,000	10,000
Total	**4,00,000**	**10,00,000**	**4,50,000**	**1,50,000**

The LOA for imported coal was issued on dtd. 18.04.2022 & 26.04.2022. The Khaperkheda TPS quantity was diverted to Koradi-3x660 and quantity diversion/extension was also done to meet the revised Ministry of Power guidelines and target quantity of 34.64 LMT and detailed as below;

Item No.	TPS	Qty. ordered (LMT)	Date of issuance of LOA/Amendment	Actual Date of Commencement of Supply
1	Khaperkheda Unit 1 to 5 (4 x 210 MW + 1 x 500 MW)	3.0	18-04-2022	12.06.2022
		2.32 (Further Extended Quantity)	29.09.2022	
2	Koradi Unit 8, 9 & 10 (3 X 660 MW)	3.0 (Extended and Diverted qty. of Khaperkheda TPS)	04-05-2022	23.06.2022
		2.32 (Extended and Diverted qty. of Khaperkheda TPS)	29.09.2022	
3	Chandrapur Unit 3 to 9 (2 x 210 MW & 5x500 MW)	10.0	09-05-2022	15.06.2022
		5.0 (Extension quantity)	08.09.2022	
4	Bhusawal Unit 4 & 5 (2 X 500 MW)	4.5	26-04-2022	25.05.2022
		2.25 (Extension quantity)	08.09.2022	
5	Nashik Unit 3 to 5 (3 x 210 MW)	1.5	26-04-2022	27.05.2022
		0.75 (Extension quantity)	08.09.2022	
	Total price	34.64		

Month	Khaperkheda		Koradi		Chandrapur		Bhusawal		Nashik		**MSPGCL Total**	
	Import Schedule (MT)	Import Receipt (MT)	Import Schedule (MT)	Import Receipt (MT)	Import Schedule (MT)	Import Receipt (MT)	Import Schedule (MT)	Import Receipt (MT)	Import Schedule (MT)	Import Receipt (MT)	**Import Schedule (MT)**	**Import Receipt (MT)**
May-22	18500	0	0	0	0	0	28000	3914	24000	23815	**70500**	**27729**
Jun-22	65000	30751	65000	11293	113000	72840	120000	85410.48	37500	30100	**400500**	**230394.48**
Jul-22	65000	72158	65000	75983.52	200000	75674	72500	52967.93	23000	22509	**425500**	**299292.45**
Aug-22	65000	64435	65000	51144.37	200000	175488	72500	112693.63	23000	31039	**425500**	**434800**
Sep-22	65000	54255	65000	55290	200000	260615	78500	74064.3	21000	23313	**429500**	**467537.3**
Oct-22	65000	51349	65000	76842	200000	414586	78500	87472.93	21500	18865	**430000**	**649114.93**

Nov-22	65000	65198	70000	81240	150000	77725	75000	93118	25000	27514	**385000**	**344795**
Dec-22	65000	101161	70000	77408.31	1,50,000	137789.44	30,000	66284	25,000	50687	**340000**	**433329.75**
Jan-23	30200	50304	67000	104806	1,50,000	144987	60,000	69872	25,000	1730	**332200**	**371699**
Feb-23	28300	50510	0	0	1,37,000	131731	60,000	42525	0	0	**225300**	**224766**
Mar-23	0	580.65	0	0	0	215	0	0	0	0	**0**	**795.65**
Apr-23	0	0	0	0	0	705	0	0	0	0	**0**	**705**
Total	**532000**	**540701.65**	**532000**	**534007.2**	**1500000**	**1492355.44**	**675000**	**688322.27**	**225000**	**229572**	**3464000**	**3484958.56**

The following table indicates the imported coal consumption (MT) & its blending ratio (%) during FY 2022-23.

TPS	Imported coal consumption (MT)	Total coal consumption (MT)	Blending Ratio (%)
Bhusawal	6,86,624	56,77,331	12.09
Chandrapur	13,98,744	97,34,437	14.37
Khaperkheda	5,24,773	66,14,205	7.93
Koradi	5,48,463	93,60,065	5.86
Nashik	2,29,629	24,90,916	9.22
Paras	0	23,76,720	0
Parli	0	30,07,372	0
MSPGCL	**33,88,233**	**3,92,61,046**	**8.63**

Hence MSPGCL has optimized imported coal use by following the guidelines issued by Ministry of Power, GoI and decision to use imported coal at Bhusawal-4&5, Chandrapur-3to9, Khaperkheda-1to5, Koradi-3x660, Nashik-3to5.

The ministry of Power, GoI had acknowledged vide various letters and policy guidelines for imported coal use, that Coal India Limited could not cope up the production and coal stock at @ 90 TPS in India was critical.

Hence the following % contribution of Critical coal stock during HDS & LDS, may be considered for the achievement of MERC normative availability as force majeure;

Tariff Station	AVF Loss (%) during HDS	AVF Loss (%) during LDS
Bhusawal-3	12.37	8.88
Bhusawal-4&5	6.41	Nil
Chandrapur-3to7	Nil	1.61
Khaperkheda-1to4	Nil	3.87
Nashik-3to5	11.51	Nil
Paras-3&4	1.36	Nil
Parli-6&7	4.51	6.17
Parli-8	6.83	7.22

2) Wet coal problems due to excessive rain falls above LPA (Long Period Average) during 2022 & 2024 monsoon

Monsson 2022 : All India rainfall during June to Sept-2022 was 106% above LPA.

- The Southwest monsoon seasonal rainfall during June to September 2022 for the country as a whole had been above normal (105 -110% of Long Period Average (LPA)) as per IMD press release dtd 01.10.2022
- Quantitatively, all India monsoon seasonal rainfall during 1 June to 30 September 2022 had been 92.5 cm against the Long Period Average of 87.0 cm based on data of 1971-2020 (106% of its LPA) as in Fig.1.
- The Southwest monsoon seasonal (June to September 2022) rainfall had been Above Normal over South peninsula (122% of LPA) and Central India (119 % of LPA). Seasonal rainfall had been Normal over Northwest India (101%) and Below Normal over East and Northeast India (82%). Monthly and seasonal total rainfall over four homogeneous regions and for all India are given in Fig.2.
- Out of the total 36 meteorological subdivisions, 12 subdivisions constituting 40% of the total area of the country received excess, 18 subdivisions (43% of the total area) received normal rainfall and 6 subdivisions (17% of the total area) received deficient season rainfall (Fig. 3). These 6 Met subdivisions which got deficient rainfall are West Uttar Pradesh, East Uttar Pradesh, Bihar, Jharkhand, Gangetic West Bengal, and Nagaland, Manipur, Mizoram & Tripura (NMMT) (Fig. 3). Out of these six Subdivisions, majority of them lie in the Gangetic Plains.

Monsoon 2024 : La-Nina effect – All India rainfall during June to Sept-2024 was 108% above LPA

- Rainfall over the country as a whole during the 2024 southwest monsoon season (June- September) was 108% of its long period average (LPA). Thus the seasonal rainfall was above normal (>104% of LPA) as per the IMD forecast.
- Seasonal rainfalls over Northwest India, Central India, South Peninsula and Northeast (NE) India were 107%, 119%, 114% and 86% of respective LPA.
- The southwest monsoon seasonal (June to September) rainfall over the monsoon core zone, which consists of most of the rain fed agriculture regions in the country received 122% of LPA.
- Out of the total 36 meteorological subdivisions, 2 subdivisions received large excess rainfall (9% of the total area of the country), 10 subdivisions constituting 26% of the total area received excess, 21 subdivisions received normal rainfall (54% of the total area) and 3 subdivisions (Arunachal Pradesh, Punjab, J & K and Ladakh) constituting 11% of the total area) received deficient season rainfall.
- Monthly rainfall over the country as a whole was 89% of LPA in June, 109% of LPA in July, 115% of LPA in August, and 112% of LPA in September.

During 2023 Monsoon was 95% of LPA. Vidharbha 98% of LPA.

MSPGCL Power stations performance is mainly affected due to wet coal from WCL and other CIL companies during monsoon season.

Effect of wet and sticky coal on thermal power generation.

The wet and sticky coal usually supplies from WCL mines area of Ghugus, Hindustan Lalpeth, Majri, Dumri, Gaurideep, Wani, etc.
Due to receipt of wet and sticky coal chocking up of transfer chutes, feed gates of coal mill, bunker hoppers, wagon tippler grill etc occurs very frequently. Unloading time for clearing wagons and left over part in the wagon by manual means due to stickiness takes very long time and resulting into heavy demurrages.
Receipt of wet and sticky coal leading to delay in time increasing maintenance and generation loss due to increase in total moisture content than design coal.

The % contribution of wet coal loss of MERC AVF during LDS 2022-23, 2023-24 & 2024-25 (June-2024 to Sept-2024) is tabulated below;

Tariff Station	% AVF loss LDS FY 2022-23 due to wet coal	% AVF loss LDS FY 2023-24 due to wet coal	% AVF loss LDS FY 2024-25 (June-Sept-2024) due to wet coal
Bhusawal-3	9.29	2.65	11.10
Bhusawal-4&5	6.96	1.60	1.82
Chandrapur-3to7	7.42	3.59	9.65
Chandrapur-8&9	4.28	3.85	3.14
Koradi-6	7.05	5.34	9.53
Koradi-8to10	2.06	1.23	5.03
Khaperkheda-1to4	3.42	1.47	3.29
Khaperkheda-5	AVF achieved (2.56)	1.62	1.36
Nashik-3to5	18.39	2.05	6.63
Paras-3&4	5.69	3.83	4.42
Parli-6&7	0.51	0.39	2.85
Parli-8	2.43	0.20	2.24

The impact of monsoon is clearly seen from above particularly during 2022 & 2024, there was all India rainfall 6% & 8% above LPA. During FY 2022-23 & FY 2024-25 (June-Sept-2024), the contribution of wet coal loss in MERC AVF is significantly higher compared with FY 2023-24 values.

Above than average rainfall during monsoon severely affects the performance of MSPGCL stations impacting it's;

a) MERV AVF (%),

b) Sp. Oil consumption (ml/kwh)

c) Station Heat Rate (kcal/kwh) – 1% increase in moisture in coal increases Heat rate by 50 Kcal/kwh. This affects milling plant performance adversely. Also partial loading during monsoon increases SHR significantly.

d) Auxiliary Power consumption (%) – Partial loading due to wet coal increase in APC.

2a) MERC AVF (%)

The % contribution of wet coal loss of MERC AVF during LDS 2022-23, 2023-24 & 2024-25 (June-2024 to Sept-2024) is tabulated below;

Tariff Station	% AVF loss LDS FY 2022-23 due to wet coal	% AVF loss LDS FY 2023-24 due to wet coal	% AVF loss LDS FY 2024-25 (June-Sept-2024) due to wet coal
Bhusawal-3	9.29	2.65	11.10
Bhusawal-4&5	6.96	1.60	1.82
Chandrapur-3to7	7.42	3.59	9.65
Chandrapur-8&9	4.28	3.85	3.14
Koradi-6	7.05	5.34	9.53
Koradi-8to10	2.06	1.23	5.03
Khaperkheda-1to4	3.42	1.47	3.29
Khaperkheda-5	AVF achieved (2.56)	1.62	1.36
Nashik-3to5	18.39	2.05	6.63
Paras-3&4	5.69	3.83	4.42
Parli-6&7	0.51	0.39	2.85
Parli-8	2.43	0.20	2.24

If FY 2023-24 monsoon data to be referred as base case (98%LPA for Vidharbha region where WCL mines are located), FY 2022-23 & FY 2024-25 monsoon above 106% & 108% all India above LPA and % wet coal loss also indicates the similar trends.

Hence, FY 2023-23 is to be taken as base case and incremental MERC AVF (%) loss to be considered as force major due to above average LPA – Long period average as wet coal loss for FY 2022-23 to be considered for achievement of MERC AVF(%) as mentioned in table below (**Column D**);.

Tariff Station	% AVF loss LDS FY 2022-23 due to wet coal	% AVF loss LDS FY 2023-24 due to wet coal	Incremental % AVF loss LDS FY 2022-23 w.r.to. 2023-24 due to wet coal
Column A	Column B	Column C	**Column D**
Bhusawal-3	9.29	2.65	**6.64**
Bhusawal-4&5	6.96	1.60	**5.36**
Chandrapur-3to7	7.42	3.59	**3.83**
Chandrapur-8&9	4.28	3.85	**0.43**
Koradi-6	7.05	5.34	**1.71**
Koradi-8to10	2.06	1.23	**0.83**
Khaperkheda-1to4	3.42	1.47	**1.95**
Khaperkheda-5	AVF achieved	1.62	**AVF achieved**
Nashik-3to5	18.39	2.05	**16.34**
Paras-3&4	5.69	3.84	**1.86**
Parli-6&7	0.51	0.39	**0.12**
Parli-8	2.43	0.20	**2.23**

2b) Sp. Oil consumption (ml/kwh)

During low load and unstable operation in monsoon season, oil support is taken for the purpose of flame stability and as per the interlocks to avoid the tripping of the unit.

The following are the details of oil consumption during monsoon season due to wet coal is mentioned below;

Tariff Station	FY 2022-23 (June to Oct-2022)		FY 2023-24 (June to Oct-2023)	
Column A	Oil consumption (KL)	ml/kwh contribution in annual SOC	Oil consumption (KL)	ml/kwh contribution in annual SOC
Bhusawal-3	611	0.854	1189	1.170
Bhusawal-4&5	7462	1.219	750	0.114
Chandrapur-3to7	24416	2.902	7218	0.799
Chandrapur-8&9	438	0.066	268	0.037
Koradi-6	2932	2.222	2097	1.510
Koradi-8to10	704	0.064	1025	0.087
Khaperkheda-1to4	3613	0.833	493	0.105
Khaperkheda-5	66	0.019	0	0.000
Nashik-3to5	7907	3.128	488	0.184
Paras-3&4	740	0.241	81	0.023
Parli-6&7	745	0.267	0	0.000
Parli-8	299	0.263	0	0.000

FY 2022-23 data shows that 106% above PLA rain fall affected oil consumption pattern and also critical coal stock level at MSPGCL Power Stations and all India 90 TPS resulted in higher oil consumption. As mentioned in Point No-1 " The ministry of Power, GoI had acknowledged vide various letters and policy guidelines for imported coal use, that Coal India Limited could not cope up the production and coal stock at @ 90 TPS in India was critical."

FY 2022-23 situation is to be considered as forced majeure and incremental specific oil consumption during June-2022 to Oct-2022 (over June-2023 to Oct-2023) as mentioned in Column D to be considered above normative while trueing up of SOC during FY 2022-23.

Tariff Station Column A	FY 2023-24 (June-2024 to Sept-2024)		For FY 2022-23 Incremental Oil consumption to be allowed over FY 2023-24	
	Oil consumption (KL)	ml/kwh contribution in annual SOC	Oil consumption (KL)	**Incremental SOC (for FY 2022-23)**
Column	**A**	**B**	**C**	**D**
Bhusawal-3	1465	2.903	0	**0.000**
Bhusawal-4&5	161	0.055	6712	**1.097**
Chandrapur-3to7	6124	1.223	17198	**2.044**
Chandrapur-8&9	0	0.000	170	**Normative Achieved**
Koradi-6	939	1.490	835	**0.633**
Koradi-8to10	190	0.031	0	**0.000**
Khaperkheda-1to4	714	0.277	3120	**0.719**

Khaperkheda-5	0	0.000	66	Normative Achieved
Nashik-3to5	3101	2.195	7419	**2.935**
Paras-3&4	22	0.016	658	**0.215**
Parli-6&7	31	0.026	745	**0.267**
Parli-8	59	0.091	299	**0.263**

2c) Station Heat Rate (kcal/kwh)

1% increase in moisture in coal increases Heat rate by 50 Kcal/kwh. This affects milling plant performance adversely. Also partial loading during monsoon increases SHR significantly.

The following are the details of impact on SHR during monsoon season due to wet coal is mentioned below;

FY 2022-23 increased SHR due to reduced unit loading attributed by wet coal

Heat Rate (Kcal/kwh) impact of % loadability w.r.to HBD / 0.85 (Boiler Efficiency) due to wet coal	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Annual impact on SHR
Bhusawal-3	5	41	121	199	104	27.97
Bhusawal-4	0	157	125	98	93	36.14
Bhusawal-5	0	213	204	73	71	28.65
Bhusawal-4&5	0	184	139	91	83	32.64
Chandrapur-3	0	52	194	57	0	14.83
Chandrapur-4	0	139	76	30	1	14.51
Chandrapur-5	1	95	131	53	16	21.58
Chandrapur-6	7	179	155	63	17	28.89
Chandrapur-7	0	0	174	99	15	22.80
Chandrapur-3to7	2	130	151	65	13	22.31
Chandrapur-8	1	51	41	27	17	9.12
Chandrapur-9	3	62	41	30	34	14.05
Chandrapur-8&9	2	57	41	30	28	11.66
Koradi-6	24	72	53	53	7	11.61
Koradi-8	1	4	38	20	9	3.81
Koradi-9	1	17	17	19	3	1.99
Koradi-10	0	24	24	30	20	8.06
Koradi-8 to10	1	20	20	26	16	4.56
Khaperkheda-1	8	47	82	57	8	14.55
Khaperkheda-2	4	39	77	69	13	12.17
Khaperkheda-3	0	30	54	20	3	8.45
Khaperkheda-4	0	49	37	31	11	9.23
Khaperkheda-1to4	4	40	58	40	8	10.87
Khaperkheda-5	0	12	15	15	5	3.38
Nashik-3	3	117	117	117	86	34.77
Nashik-4	1	108	0	108	31	16.19
Nashik-5	12	93	111	111	15	27.97
Nashik-3to5	8	108	119	114	38	27.17
Paras-3	16	62	54	30	10	12.53
Paras-4	5	43	53	38	0	10.59
Paras-3&4	11	52	54	33	10	11.63

Parli-6	0	44	49	44	61	16.45
Parli-7	0	38	6	35	35	9.12
Parli-6&7	0	35	29	35	59	12.84
Parli-8	0	41	76	59	12	16.73

FY 2023-24 increased SHR due to reduced unit loading attributed by wet coal

Heat Rate (Kcal/kwh) impact of % loadability w.r.to HBD / 0.85 (Boiler Efficiency) due to wet coal	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Annual impact on SHR
Bhusawal-3	0	0	8	144	0	11.82
Bhusawal-4	0	11	13	30	0	4.42
Bhusawal-5	0	9	16	29	2	4.56
Bhusawal-4&5	0	10	15	30	1	4.49
Chandrapur-3	0	52	60	32	8	10.99
Chandrapur-4	0	38	0	44	19	6.52
Chandrapur-5	0	0	0	0	0	0.00
Chandrapur-6	3	47	50	105	34	17.74
Chandrapur-7	3	55	69	100	50	20.22
Chandrapur-3to7	2	50	60	83	32	12.96
Chandrapur-8	1	23	25	48	5	8.09
Chandrapur-9	1	21	35	37	11	8.41
Chandrapur-8&9	1	22	30	42	8	8.25
Koradi-6	0	39	39	24	0	7.55
Koradi-8	0	5	6	8	0	1.60
Koradi-9	1	12	29	33	0	5.50
Koradi-10	2	0	0	55	0	1.85
Koradi-8to10	1	9	22	26	0	3.53
Khaperkheda-1	1	0	0	23	10	2.83
Khaperkheda-2	3	10	8	6	0	2.25
Khaperkheda-3	3	14	19	23	2	4.93
Khaperkheda-4	2	7	18	35	12	5.72
Khaperkheda-1to4	2	11	13	24	7	4.17
Khaperkheda-5	1	6	12	10	1	2.34
Nashik-3	0	2	7	31	1	5.16
Nashik-4	0	0	14	45	12	5.57
Nashik-5	0	10	29	31	1	5.53
Nashik-3to5	0	2	12	34	2	4.40
Paras-3	2	33	23	35	1	6.77
Paras-4	5	45	26	31	2	7.92
Paras-3&4	3	40	25	33	1	7.37
Parli-6	0	0	0	14	26	4.07
Parli-7	0	0	0	20	7	2.46
Parli-6&7	0	0	0	14	0	1.27
Parli-8	0	0	8	5	0	1.09

FY 2022-23 data shows that 106% above PLA rain fall affected oil consumption pattern and also critical coal stock level at MSPGCL Power Stations and all India 90 TPS resulted in higher SHR. As mentioned in Point No-1 " The ministry of Power, GoI had acknowledged vide various letters and policy guidelines for imported coal use, that Coal India Limited could not cope up the production and coal stock at @ 90 TPS in India was critical."

FY 2022-23 situation is to be considered as forced majeure and incremental SHR during June-2022 to Oct-2022 (over June-2023 to Oct-2023) as mentioned in Column C to be considered above normative while trueing up of SOC during FY 2022-23.

FY 2022-23 increased incremental SHR over FY 2023-24 due to reduced unit loading attributed by wet coal

Heat Rate (Kcal/kwh) impact of % loadability w.r.to HBD / 0.85 (Boiler Efficiency) due to wet coal	FY 2022-23 (Jul-2022 to Oct-2022) Annual impact SHR	FY 2023-24 (Jul-2023 to Oct-2023) Annual impact SHR	FY 2022-23 (Jul-2022 to Oct-2022) Incremental Annual SHR impact w.r.to. FY 2023-24
Column	**A**	**B**	**C**
Bhusawal-3	27.97	11.82	**16.15**
Bhusawal-4&5	32.64	4.49	**28.15**
Chandrapur-3to7	22.31	12.96	**9.35**
Chandrapur-8&9	11.66	8.25	**3.41**
Koradi-6	11.61	7.55	**4.06**
Koradi-8to10	4.56	3.53	**1.03**
Khaperkheda-1to4	10.87	4.17	**6.70**
Khaperkheda-5	3.38	2.34	**1.04**
Nashik-3to5	27.17	4.40	**22.77**
Paras-3&4	11.63	7.37	**4.26**
Parli-6&7	12.84	1.27	**11.57**
Parli-8	16.73	1.09	**15.64**

2d) Auxiliary Power consumption (%)

Partial loading due to wet coal increase in APC (%). During wet coal low load operation unit trips on Flame failure/Furnace draught / drum level.

The following are the details of **impact on APC due to partial loading** during monsoon season due to wet coal is mentioned below;

FY 2022-23 increased APC due to reduced unit loading attributed by wet coal

APC (%) increase as per curve corresponding to reduced loadability due to Wet coal in comparison w.r.to average loadability (%) of April & May	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Incremental APC impact (%)
Bhusawal-3	0.06	1.19	3.44	4.50	3.56	0.72
Bhusawal-4&5	0.00	1.22	2.88	2.45	1.11	0.46
Chandrapur-3to7	1.14	3.52	5.49	2.95	1.46	0.98
Chandrapur-8&9	0.15	-0.09	0.01	0.52	1.00	0.09
Koradi-6	0.80	5.96	3.19	0.99	0.31	0.66
Koradi-8to10	0.02	0.49	0.78	0.63	0.39	0.13
Khaperkheda-1to4	0.11	1.71	2.53	1.42	0.13	0.42
Khaperkheda-5	0.00	0.48	0.76	0.39	0.71	0.17
Nashik-3to5	0.68	2.47	2.58	2.78	2.16	0.77

Paras-3&4	0.00	1.53	1.15	0.39	0.00	0.22
Parli-6&7	0.00	0.00	0.15	0.15	1.26	0.11
Parli-8	0.00	0.52	0.00	0.00	0.55	0.07

FY 2023-24 increased APC due to reduced unit loading attributed by wet coal

APC (%) increase as per curve corresponding to reduced loadability due to Wet coal in comparison w.r.to average loadability (%) of April & May	Jun-23	Jul-23	Aug-23	Sep-23	Oct-24	Incremental APC impact (%)
Bhusawal-3	0.00	0.28	0.98	4.52	0.20	0.48
Bhusawal-4&5	0.00	0.54	0.89	1.15	1.16	0.30
Chandrapur-3to7	1.32	3.21	2.90	4.10	2.74	0.86
Chandrapur-8&9	0.52	0.55	0.33	0.72	0.75	0.24
Koradi-6	0.18	2.74	2.53	1.61	0.00	0.53
Koradi-8to10	0.00	0.24	0.50	0.64	0.00	0.08
Khaperkheda-1to4	0.16	1.16	0.41	1.42	0.19	0.24
Khaperkheda-5	0.10	0.46	0.41	0.52	0.04	0.12
Nashik-3to5	0.00	1.12	0.81	1.40	1.45	0.42
Paras-3&4	0.38	0.96	0.38	0.77	0.00	0.18
Parli-6&7	0.00	0.00	0.00	1.25	0.00	0.11
Parli-8	0.00	0.00	0.00	0.25	0.00	0.02

FY 2022-23 data shows that 106% above PLA rain fall affected oil consumption pattern and also critical coal stock level at MSPGCL Power Stations and all India 90 TPS resulted in higher APC. As mentioned in Point No-1 " The ministry of Power, GoI had acknowledged vide various letters and policy guidelines for imported coal use, that Coal India Limited could not cope up the production and coal stock at @ 90 TPS in India was critical."

FY 2022-23 situation is to be considered as forced majeure and incremental APC during June-2022 to Oct-2022 (over June-2023 to Oct-2023) as mentioned in Column C to be considered above normative while trueing up of SOC during FY 2022-23.

FY 2022-23 increased incremental APC over FY 2023-24 due to reduced unit loading attributed by wet coal

APC (%) increase as per curve corresponding to reduced loadability due to Wet coal in comparison w.r.to average loadability (%) of April & May	FY 2022-23 (Jul-2022 to Oct-2022) Annual impact APC (%)	FY 2023-24 (Jul-2023 to Oct-2023) Annual impact APC (%)	FY 2022-23 (Jul-2022 to Oct-2022) Incremental Annual APC (%) impact w.r.to. FY 2023-24
Column	**A**	**B**	**C**
Bhusawal-3	0.72	0.48	**0.24**
Bhusawal-4&5	0.46	0.30	**0.16**
Chandrapur-3to7	0.98	0.86	**0.11**
Chandrapur-8&9	0.09	0.24	**Normative Achieved**
Koradi-6	0.66	0.53	**0.14**
Koradi-8to10	0.13	0.08	**0.04**
Khaperkheda-1to4	0.42	0.24	**0.18**
Khaperkheda-5	0.17	0.12	**Normative Achieved**

Nashik-3to5	0.77	0.42	**0.35**
Paras-3&4	0.22	0.18	**0.04**
Parli-6&7	0.11	0.11	**0.00**
Parli-8	0.07	0.02	**0.05**

3) Impact of thermal stresses due to bi-directional changes in Scheduled Generation during Backing Down instructions on Boiler Tube Leakages :

With increase in Renewable Energy in grid, the incidence of backing down instructions with bi-directional changes in real time SG are increasing day by day. The impact of these backing down instructions on Unit equipments' are thermal stresses due to short term over heating or thermal fatigue of boiler components such as water walls, super heaters, re-heaters.

a. Historically, the problem with superheaters, reheaters, and associated components has been thermal fatigue, in which the problems are exacerbated by weak heavy-section components, complex geometries, and bending stresses.
b. Fatigue stresses can result from piping movement in the plant during heat-up and cool down, when load changes occur. Here, the advantage is with strong, thin-wall members having innate flexibility and deadweight that does not overwhelm pipe support systems that are in proper working order.

Thermal fatigue

c. Thermal fatigue is the result of cyclic stress caused by variations in temperature. Damage takes the form of fatigue cracks that can occur anywhere in a metallic component where relative movement or differential expansion is constrained, particularly under repeated thermal cycling.
d. Thermal fatigue involves a variable stress at an elevated temperature high enough to form iron oxide on the crack surfaces. Circumferential cracks in superheater and reheater tube-to-header welds are a common form of thermal fatigue. The two key factors affecting thermal fatigue are the magnitude of the temperature swing and the number of cycles.

short-term overheat

e. failure occurs when the stress, as a result of service conditions, exceeds the strength of the metal at service temperature. When a sudden increase in temperature happens and the hoop stress due to the internal pressure equals the strength of the steel, failure occurs; it is said to be short-term overheat.
f. Both abnormal coolant flow and excessive gas temperature can cause overheating in water-cooled furnace tubes. Steam-touched tubes are more likely than water-touched tubes to experience short-term overheating failure versus long-term overheating (creep) failure.
g. A very aggressive ramp rate will cause a reheat or superheat tube blocked with condensation to fail from short-term overheat.

The unit-wise number of incidences of incidences (15 minutes time blocks) of bi-directional changes in Scheduled Generation during FY 2022-23, 2023-24 & FY 2024-25 (April to Sept-2024) are tabulated below;

FY 2022-23

Station	U-1	U-2	U-3	U-4	U-5	U-6	U-7	U-8	U-9	U-10
Bhusawal	---	---	2740	4764	4160	---	---	---	---	---
Chandrapur	---	---	3143	2302	2546	3341	1772	3631	4333	---

Khaperkheda	2381	2432	4548	3678	4248	---	---	---	---	---
Koradi	---	---	---	---	---	713	---	1560	999	1949
Nashik	---	---	4352	4233	4308	---	---	---	---	---
Paras	---	---	2436	1965	---	---	---	---	---	---
Parli	---	---	---	---	---	6277	5245	2845	---	---

FY 2023-24

Station	U-1	U-2	U-3	U-4	U-5	U-6	U-7	U-8	U-9	U-10
Bhusawal	---	---	4148	4839	5226	---	---	---	---	---
Chandrapur	---	---	3258	2849	3790	3830	3902	3303	3679	---
Khaperkheda	1990	1332	3249	3629	2000	---	---	---	---	---
Koradi	---	---	---	---	---	1041	---	1658	1759	1436
Nashik	3082	4623	4359	---	---	---	---	---	---	---
Paras	---	---	1963	2084	---	---	---	---	---	---
Parli	---	---	---	---	---	6944	7013	5695	---	---

FY 2024-25 (April to Sept-2024)

Station	U-1	U-2	U-3	U-4	U-5	U-6	U-7	U-8	U-9	U-10
Bhusawal	---	---	2480	2447	3300	---	---	---	---	---
Chandrapur	---	---	2008	2662	2815	2482	2846	1855	2017	---
Khaperkheda	1445	1894	1774	2036	1659	---	---	---	---	---
Koradi	---	---	---	---	---	1232		1436	1658	1583
Nashik	---	---	2093	2421	2114	---	---	---	---	---
Paras	---	---	1726	2266	---	---	---	---	---	---
Parli	---	---	---	---	---	2280	2867	2798	---	---

From above number of instances of the bi-directional changes in Scheduled Generations (during 15 minute time blocks) results in thermal stress, thermal fatigue and short term over heating of boiler tubes / coils. This is one of the main reason for increased BTLs at MSPGCL Stations over the years during 2022-2023 to FY 2024-25 (April to Sept-2024).

FY 2022-23

Tariff Station	No of Thermal Fatigue (A)	No of short-term overheat (B)	% MERC AVF loss due to BTLs (A+B)	No of incidences of bi-directional changes in SG
Bhusawal-3	3	2	4.67	2740
Bhusawal-4&5	3	1	1.14	8924
Chandrapur-3to7	0	2	0.59	13104
Chandrapur-8&9	4	1	1.76	7964
Khaperkheda-1to4	3	1	0.53	13039
Khaperkheda-5	3	0	1.82	4248
Koradi-6	4	0	2.31	713
Koradi-8to10	1	6	4.20	4508
Nashik-3to5	3	5	0.80	12893
Paras-3&4	1	0	0.36	4401
Parli-6&7	5	0	1.94	11522
Parli-8	3	0	2.21	2845

FY 2023-24

Tariff Station	No of Thermal Fatigue (A)	No of short-term overheat (B)	% MERC AVF loss due to BTLs (A+B)	No of incidences of bi-directional changes in SG
Bhusawal-3	1	1	1.67	4148
Bhusawal-4&5	8	2	3.88	10065
Chandrapur-3to7	5	10	1.98	17629
Chandrapur-8&9	2	1	1.12	6982
Khaperkheda-1to4	9	1	1.275	10200
Khaperkheda-5	6	0	3.85	2000
Koradi-6	6	1	3.50	1041
Koradi-8to10	8	6	6.62	4853
Nashik-3to5	5	3	1.55	12064
Paras-3&4	2	1	3.11	4047
Parli-6&7	5	0	1.61	13957
Parli-8	2	0	1.01	5695

FY 2024-25 (April to Sept-2024)

Tariff Station	No of Thermal Fatigue (A)	No of short-term overheat (B)	% MERC AVF loss due to BTLs (A+B)	No of incidences of bi-directional changes in SG
Bhusawal-3	1	2	2.47	2480
Bhusawal-4&5	5	2	2.81	5747
Chandrapur-3to7	6	2	1.06	12813
Chandrapur-8&9	2	1	1.16	3872
Khaperkheda-1to4	1	1	0.24	7149
Khaperkheda-5	1	0	0.55	1659
Koradi-6	4	0	2.65	1232
Koradi-8to10	4	3	3.77	4677
Nashik-3to5	2	1	0.59	6628
Paras-3&4	2	1	1.06	3992
Parli-6&7	1	0	0.23	5147
Parli-8	2	0	1.27	2798

4) Auxiliary Power Consumption:

a. 0.2s class CT/PT replacement by MSETCL as per IEGC & metering Code.

0.2s class CT/PT are installed at Chandrapur Unit-8&9, Koradi-3x660, Khaperkheda Unit-1,2,4, Paras Unit-3&4, Parli Unit-6,7&8 at 220/400 KV Switchyards by MSETCL.

The 0.2s class CT/PT are yet to be installed at Bhusawal Unit-3,4&5, Chandrapur Unit-3to7, Koradi Unit-6, Khaperkheda Unit-3&5, Nashik Unit-3to5 at 220/400 KV Switchyards by MSETCL.

The respective TPS has done correspondence with concerned Chief Engineers of MSETCL offices and the matter is also taken at Corporate level by MSPGCL higher authorities with MSETCL higher authorities for expediting the installation of The 0.2s class CT/PT.

b. Assessment of Koradi-3x660 MW APC for FY 2022-23 & 2023-24 as per replacement of CTs/PTs of 0.2s class replacement done.

On dated 19.12.2023, the metering of Unit 8 GT at KTPS 3X660 MW was shifted from 0.2 class CT (protection & metering multi core CT) and protection CVT to 0.2s class CT (dedicated metering CT & metering IVT) as per reference 1. Similarly as per reference 3 and reference 4, metering of Unit 9 and unit 10 was shifted from 0.2 class CT (protection & metering multi core CT) and protection CVT to 0.2s class CT (dedicated metering CT & metering IVT) on dated 12.03.24 and 21.03.24 respectively. However on Dtd 16.03.24, due to snag in R-phase dedicated metering CT at GCR switchyard, the metering was again shifted to 0.2 Class (protection & metering multi core CT) vide MOM mentioned in reference 2.

The location of PT plays a vital role for accurate measurement of injected power. During lagging MVAr sharing GT terminal voltage (HV) is always more than the bus voltage (reactive power flow from higher magnitude voltage level to lower voltage level). When selected bus PT voltage is used for power measurement which is lower than the actual injection point voltage (GT terminal), amount of power/energy measured in such case is less than the actual injected power/energy. To avoid this error the location of PT should be at injection point.

The injection report sent by SLDC, in which block wise, Unit wise and date wise net sent out power is mentioned for every 7 days. Further, this is to inform that, the ABT meters at GCR, MSETCL which were earlier used for Ex-Bus energy measurement are having 0.2 class protection cum metering core CT/CVT connections and the data is being fetched in KTPS local DSM software with 96 blocks data export.

Moreover, the comparison of these two data unit wise and day wise is being carried out for each block for the period since shifting of metering. Difference in energy export for unit 8, 9 and 10 is calculated and categorised for each 10 MW interval as tabulated below.

UNIT 08		
From	To	Difference in MW
0	10	0
10	20	0
20	30	0
30	40	0
40	50	0
50	60	0
60	70	0
70	80	0
80	90	0
90	100	0
100	110	0

UNIT 09		
From	To	Difference in MW
0	10	0
10	20	0
20	30	1
30	40	1
40	50	1
50	60	1
60	70	1
70	80	1
80	90	1
90	100	1
100	110	1

UNIT 10		
From	To	Difference in MW
0	10	0
10	20	0
20	30	2
30	40	3
40	50	3
50	60	3
60	70	3
70	80	3
80	90	3
90	100	3
100	110	3

110	120	0
120	130	0
130	140	0
140	150	0
150	160	0
160	170	0
170	180	0
180	190	0
190	200	0
200	210	0
210	220	0
220	230	0
230	240	0
240	250	0
250	260	0
260	270	0
270	280	0
280	290	0
290	300	0
300	310	0
310	320	0
320	330	0
330	340	0
340	350	0
350	360	1
360	370	1
370	380	1
380	390	1
390	400	1
400	410	1
410	420	1
420	430	1
430	440	1
440	450	1
450	460	1
460	470	1
470	480	1
480	490	1
490	500	1
500	510	2
510	520	2
520	530	2
530	540	2
540	550	2
550	560	2
560	570	2
570	580	3
580	590	3
590	600	3

110	120	1
120	130	2
130	140	2
140	150	3
150	160	3
160	170	3
170	180	3
180	190	3
190	200	3
200	210	3
210	220	3
220	230	3
230	240	3
240	250	3
250	260	3
260	270	3
270	280	5
280	290	5
290	300	5
300	310	5
310	320	5
320	330	5
330	340	5
340	350	5
350	360	5
360	370	6
370	380	6
380	390	6
390	400	6
400	410	6
410	420	6
420	430	6
430	440	6
440	450	6
450	460	6
460	470	6
470	480	7
480	490	7
490	500	7
500	510	8
510	520	8
520	530	8
530	540	8
540	550	8
550	560	9
560	570	9
570	580	9
580	590	9
590	600	9

110	120	4
120	130	4
130	140	4
140	150	4
150	160	4
160	170	4
170	180	4
180	190	5
190	200	5
200	210	5
210	220	6
220	230	6
230	240	6
240	250	6
250	260	6
260	270	6
270	280	6
280	290	6
290	300	6
300	310	6
310	320	6
320	330	6
330	340	7
340	350	7
350	360	7
360	370	7
370	380	7
380	390	8
390	400	8
400	410	8
410	420	8
420	430	8
430	440	8
440	450	8
450	460	8
460	470	8
470	480	8
480	490	9
490	500	9
500	510	9
510	520	9
520	530	9
530	540	9
540	550	10
550	560	10
560	570	10
570	580	10
580	590	10
590	600	10

600	610	3
610	620	4
620	630	4
630	640	4
640	650	4
650	660	4

600	610	9
610	620	9
620	630	9
630	640	9
640	650	9
650	660	9

600	610	10
610	620	10
620	630	10
630	640	10
640	650	10
650	660	10

On the basis of above mentioned master table, the difference in net sent out energy is calculated to finalise the recovery in respect of deemed Auxiliary Power consumption and deemed MERC AVF since commissioning as tabulated below.

FY	**APC (%)**		**Difference**	**MERC AVF (%)**		**Difference**
	Old	**Deemed Impact**		**Old**	**Deemed Impact**	
FY 2015-16	7.77	7.43	0.33	63.06	63.08	0.01
FY 2016-17	7.34	6.74	0.61	52.41	52.58	0.17
FY 2017-18	7.63	6.52	1.12	53.55	54.16	0.61
FY 2018-19	8.45	7.31	1.14	46.67	47.22	0.56
FY 2019-20	8.11	6.97	1.15	53.76	54.39	0.63
FY 2020-21	8.10	7.04	1.06	65.80	66.31	0.51
FY-2021-22 (01.04.21) (10.10.21)	8.43	7.31	1.13	53.71	54.04	0.34
FY-2021-22 (11.10.21) (31.03.22)	6.78	5.64	1.14	73.42	73.84	0.42
FY 2022-23	7.34	6.22	1.12	63.76	64.51	0.76
FY 2023-24	7.28	6.26	1.01	68.23	68.96	0.73

c. Resetting of norms as per CPRI study & recommendations for CSTPS Unit-3to7, Khaperkheda-1to4, Paras-3&4 and Parli-6&7.

B. Difficulty faced during CAPEX Planning and execution of DPR schemes:

Boiler tubes coils referred back schemes in respect of Khaperkheda, Paras TPS in view of MDERC Capex regulations 2022. This affects SPGCL Capex planning, procurement and execution of DPR Schemes. This ultimately results into deterioration of operational performance parameters due to inability to carry out necessary Repairs & maintenance (R&M)/Capex in timely manner.

Comments on MERC Capex Regulations 2022 :

The MERC Capex Regulations has impacted MSPGCL planning & management of inventory for the following reasons;

a) MERC Capex Regulations, 2022 has stronger negative list which affects the capex proposals.
b) Although Hon'ble Commission has been kind considerate for DPR capex proposals when resubmitted & requested relaxation, but limitations arising from Regulatory Provisions result in refer back or dropping of capex.
c) NTPC Capital spares list include 321 items. The negative lists items under MERC Capex Regulations are also included in NTPC Capital spares list such as mill spares, motors, gear boxes, generator rotor, various gear boxes and many other items. The list is enclosed for reference.

C. Power Generation sector policy decisions at various Govt. levels :

No major part capital expenditure and Capital Overhaul of these of units of LMZ 210 mw units were undertaken due to uncertainty in running of these units in future due to CEA & MOEF policy for last 4-5 years. Also these units have already completed more than 38-44 years of service life.

The performance of these units is badly effected due to aging and not doing major maintenance during this period. Now post covid-19 effect on power demand and considering future grid requirement till FY 2030 and beyond, CEA has informed vide Letter no. CEA/Thermal/TPR&M/Misc/2022/713-715 dtd. 02.09.2022 requested to reconsider the decision of retirement of thermal units and insisted on exploring the possibility of R & M of old thermal units for extending its life and enhanced efficiency.

- **R&M LE of Old 210 MW LM Units –**

The following old LMZ 210 MW (6 Units) are identified and being proposed to be considered for need based equipment wise renovation;

Sr.	Power Plant	Unit	Unit Capacity (MW)	Comm. Date	Age in Years as on 31-March-2024
1	Nashik	3	210	26-Apr-79	44
2	Nashik	4	210	10-Jul-80	43
3	Nashik	5	210	30-Jan-81	43
4	Bhusawal	3	210	04-May-82	41
5	Chandrapur	3	210	03-May-85	38
6	Chandrapur	4	210	08-Mar-86	38

Now, based on the current view of CEA as mentioned above, the old LMZ 210 MW units which have already completed their service life can be considered for need based equipment wise minor Renovation and Modernization as the small capacity units are more flexible and suitable for grid variation in reference to load.

CEA vide Letter No. CEA-PL-14-38/1/2018-PDM Division dtd. 07.04.2021 has asked to submit the information about phasing out / retirement of old generating power stations that are above 25 years old and are having SHR above 2600 Kcal/Kwh and not meeting emission norms. Mahagenco had proposed capacity addition programme against replacement/retirement of old units as follows –
The proposed Thermal Capacity Addition/Replacement plan of MSPGCL till 2030 is as below,

Sr. No.	Name of Project	Capacity in MW	Expected Year of Commissioning	Proposed replacement against
1	Bhusawal U-6	660	FY2023-24	Bhusawal-2, Parli-3, Koradi-7
2	Koradi-11	660	FY2027-28	Parli-4 & 5 Koradi-5

3	Koradi-12	660	FY2028-29	Chandrapur 1&2, Bhusawal-3
4	Nashik-6	660	FY2029-30	Nashik-5 Chandrapur 3
5	Chandrapur-10	660	FY2030-31	Nashik 3&4, Chandrapur 4

However, considering future grid requirement till FY 2030 and beyond, CEA has informed vide Letter no. CEA/Thermal/TPR&M/Misc/2022/713-715 dtd. 02.09.2022 requested to reconsider the decision of retirement of thermal units and insisted on exploring the possibility of R & M of old thermal units for extending its life and enhanced efficiency.

As such no major part capital expenditure and Capital Overhaul of these of units of LMZ 210 mw units were undertaken due to uncertainty in running of these units in future due to CEA & MOEF policy for last 4-5 years. Also these units have already completed more than 38-44 years of service life.

The performance of these units is badly effected due to aging and not doing major maintenance during this period.

However, now it is decided to defer the retirement of old 210 MW LMZ units and continue to run these units by taking following measures –
The performance and efficiency improvement of the identified old units can be done by undertaking the following works as required –

- ✓ Need based suitable modifications, up gradations
- ✓ The Units may be run by availing timely AOH/COH by maintaining their reliability and loadability for performance improvement.
- ✓ By carrying out regular preventative maintenance and proactive condition monitoring for reliability improvement.
- ✓ Necessary structural strengthening civil works.
- ✓ Performance/Efficiency improvement measures in BTG & BoP areas to be carried out during AOH/COH.
- ✓ By taking suitable O&M measures/Practices for performance improvement.

Accordingly as a part of need based R&M LE programme as suggested by CEA, Condition Assessment (CA) of these units is done with the help of CPRI and M/S TUV and DPRs are prepared for restoring the existing capacity, ready for flexible operations of units along with necessary modification/repair of Civil Structures, Modifications necessitated due to obsolete technology. Following major works are proposed –

- ✓ Boiler & Auxiliaries - Combustion components, Pressure parts, Coal Mills, ESP
- ✓ Turbine & Auxiliaries
- ✓ Coal Handling Plant
- ✓ Ash Handling Plant
- ✓ Electrical System

- ✓ Control & Instrumentation
- ✓ Water Treatment Plant
- ✓ Civil Structure
- ✓ Fire Fighting System etc.

After execution of the project in accordance with the DPR, the Units shall be operated for extended life as per improvements envisaged in the DPR.

Annexure-A

LIST OF SPARE PARTS, STANDBY EQUIPMENT AND SERVICING EQUIPMENT TO BE CAPITALISED (EXISTING)

Sl.No.	Area	Estimated useful Life (in years)
	Boiler And Auxilliaries	
1	Rotor assemblies/ shaft of Induced Draft/Forced Draft/Primary Air Fans	25
2	Rotor assemblies of Seal Air Fans	25
3	Inlet guide vanes assembly of Induced Draft fan / PA Fan / FD Fan	25
4	Hydraulic Servomotor of Induced Draft/Forced Draft /Primary Air Fans	25
5	Air Motors for Air Pre-heater	25
6	Rotor assemblies / Guide Bearings of Air Pre-heater	25
7	Clutch assembly for Air PreHeaters	25
8	Spray control valves of Desuperheat Station	25
9	Actuator/Valve assemblies for Boiler Main Steam Stop/Control Valve/gate valve class 1500 and above	25
10	Coal Compartment Assemblies	25
11	Steam control valve assembly of soot blowers	25
12	Support bearing assemblies for Air preheaters	25
13	Electromotive relief valve complete assembly / pilot	25
14	Control Circulation pump (CC Pump) assembly	25
15	Gearbox assemblies for air preheaters	25
16	Gearbox assemblies for feeders	25
17	Gearbox assemblies for Mill reject Conveyor	25
18	Fluid coupling of tube mill	25
19	Coupling of Draft fans	25
20	Pulveriser discharge valve assembly	25
21	Pulveriser actuator assembly	25
22	Collecting electrodes for Electro Static Precipitator	25
23	Gravimetric Feeder head pulley assembly	25
24	Gravimetric Feeder main drive gear box complete assembly	25
25	Variable speed coupling for Induced Draft/Primary air fan with scoop tube for variable speed coupling	25
26	Worm & Worm gear with hub for mill	25
27	Air pre-heater wash pump assembly	25
28	Impeller/Blade assembly / inner cone / of Induced Draft/Forced Draft/PrimaryAir Fans/Seal air fan	25
29	Thrust bearing assembly/journal bearing assembly of control circulation pump	25
30	Expansion joints/metal expansion bellows	25
31	Rack & Pinion assembly of Air preheaters	25
32	Air heaters soot blower rotor assembly	25
33	Mill gearbox assembly	25
34	Wheel/Worm shaft for mill	25
35	Mill vertical shaft	25
36	Boiler Tube banks/panels/Coils	25
37	Oil cooler assembly of coal mill	25
38	Soot blower assembly/Gear box assembly	25
39	Steam safety valve assembly (for boiler drum/SH/RH)	25
40	Bowl hub assembly of Mill	25
41	Feed water valve assemblies	25
42	Mill Bottom	25
43	Lifting cradles for mills	25
44	Tube mills support bearing	25
45	Girth Gear & Pinion of tube mill	25

Sl.No.	Area	Estimated useful Life (in years)
46	High Pressure Dosing pump assembly	25
47	Rotating assembly of pumps of WHRB	25
48	Multi louver/diverter dampers, gear box, shaft with links for WHRB	25
49	Pump for diverter damper hydraulic oil system	25
50	Plate hyper heater exchanger plates for WHRB	25
51	Guillotine damper gearbox for WHRB	25
	Seal Oil System	
52	Vacuum Pump assembly for Seal Oil System	25
53	AC Seal oil Pump Assembly	25
54	DC Seal oil Pump Assembly	25
55	Complete differential pressure regulator assembly	25
	Main Turbine	
56	Bladed rotor complete of HP Turbine	25
57	Bladed rotor complete of IP Turbine	25
58	Bladed rotor complete of LP Turbine	25
59	HP / IP turbine module	25
60	Turbine diaphragms/ liners/ set of fixed blades	25
61	Set of blades for HP/IP/LP rotor	25
62	Turbine turning gear complete assembly/ Moving blades of Hydraulic turning gear / Pumps & hydraulic motors for turning gear	25
63	Plate heat exchanger assembly	25
64	Complate nozzle box/ nozzle segments for HP/IP cylinder	25
65	Emergency speed governer	25
66	Over speed testing device	25
67	Over speed latching / release device	25
68	Steam strainers of MS stop & control valve	25
69	Steam line bellows /compensators	25
70	High pressure turbine emergency stop valve assembly	25
71	High pressure turbine control valve assembly	25
72	Intermediate pressure turbine stop valve assembly	25
73	Intermediate pressure turbine control valve assembly	25
74	All journal bearings of turbine and generator & Excitor with torus and support / radial & thrust bearings with liners or thrust pad	25
75	Complete assembly of Main oil pump / Rotating element of Main Oil pump	25
76	Vapour exhauster assembly of Lub oil system	25
77	Main Trip valve assembly	25
78	Complete Auxiliary pump assembly / Rotating element of Auxiliary oil pump	25
79	Complete Emergency oil pump assembly	25
80	Complete AC/DC Jacking oil pump assembly	25
81	Complete assembly of control fluid pump	25
82	Servomotors for all types of stop valves & control valves	25
83	Set of Gland seals / Complete Gland box of HP/ IP/ LP tubines	25
84	Gland steam exhauster assembly	25
85	Pilot valve for all stop valves & control valves	25
86	EHC For all types of Steam Turbine Valves	25
87	Complete assembly of Main oil cooler	25
88	Oil centrifuge complete	25
89	Vacuum breaker valve assembly	25
90	LP Chemical Dosing Pump	25
91	HP/ IP/ LP By pass control valves & stop valve assembly with actuators	25
92	HP/IP/LP bypass spray valve complete assembly	25
93	HP Heaters complete	25
94	LP Heaters Complete	25

Sl.No.	Area	Estimated useful Life (in years)
	Boiler Feed Pump Turbine	
95	BFP turbine bladed rotor	25
96	Journal Bearings & Thrust Bearing	25
97	Main Oil Pump Assembly	25
98	Auxiliary Oil Pump Assembly	25
99	Emergency Oil Pump Assembly	25
100	Turbine Stop & Control Valves Assembly	25
	Boiler Feed Pump	
101	MD/ TD Boiler Feed Pump complete/ rotating element/ impeller/ shaft	25
102	Journal bearings/ Thrust bearing	25
103	Complete main oil pump	25
104	Gear box between turbine & BFP booster pump	25
	Hydraulic Couplings for Boiler Feed Pump	
105	Journal bearings/ Thrust bearing	25
106	Shaft with gears	25
107	Scoop Tube/Assembly For Hydraulic coupling Of BFP	25
108	Set of Internal Gears	25
109	Lube oil pump assembly	25
110	Level Actuator	25
111	Hydraulic Coupling assembly/ Gear Coupling for BFP's	25
112	Complete rotating assembly of BFP booster pump	25
113	Complete Journal bearings assembly/ Complete Thrust bearing assembly	25
	Condensate Extraction Pump	
114	Condensate exctraction pump complete assembly	25
115	CPHRC pump complete assembly/ rotating element/ impeller/shaft	25
116	Main Vacuum pump assembly	25
117	Ball circulation pump assembly	25
118	Tube nest of vacuum pump cooler	25
119	Set of Condenser Tubes	25
	ELECTRICAL	
	Generator	
120	Turbo generator rotor complete	25
121	Complete generator stator	25
122	Stator winding bars all types	25
123	Stator water pump assembly	25
124	Stator water cooler for generator	25
125	Hydrogen/ Air cooler for generator / tube bundle for hydrogen cooler	25
126	Refrigeration type hydrogen drier	25
127	Generator rotor compressor fan blades	25
128	Generator rotor retaining ring	25
129	Fixed and moving contacts for main Generator Circuit Breaker	25
130	GCB complete	25
131	Disturbance recorder	25
132	Synchronizing apparatus	25
133	Slip Ring assembly for generator	25
134	Brush gear assembly complete for Generator	25
135	Terminal bushing of generators	25
136	Capacitor for surge protection of generator winding	25
137	Assembled rotor poles with winding	25
138	Rotor field coil ready for assembly	25
139	Coolers for Guide and Thrust bearings	25
140	Coolers for Upper & Lower guide bearings	25
141	Stator air to water heat exchanger	25

Sl.No.	Area	Estimated useful Life (in years)
142	Set of pads for Generator bearings for Hydro plants	25
143	Generator thrust bearing for Hydro plants	25
144	Thrust Ring for Vertical Motors	25
145	Top & bottom fan assembly for Hydro plants	25
146	Brake dust collection assembly and motor	25
147	Grounding resistor/ transformer for Hydro plants	25
	Exciter and Excitation System	
148	Exciter complete unit	25
149	Rotating rectifier complete assembly	25
150	Electronic Complete Modules for Excitation System	25
151	Dry Type Transformers / Excitation transformers	25
152	Field flashing contactor	25
153	Field breaker Complete	25
154	Thyristor Module with heat sink for excitation system	25
155	Pilot exciter	25
156	Slip ring assembly block	25
157	Commutator and Field coils for exciter	25
158	Exciter rotor	25
	Gas Turbine Start up Devices	
159	Breaker/contactor for starting device	25
160	Isolator complete for starting device	25
161	Gas Turbine start up motor	25
162	Thyristor module for Static frequency Converter (SFC)	25
163	Complete Static frequency Converter (SFC) Control system	25
	Switchyard Equipments	
164	Complete breaker pole for EHV(132 KV& above) system	25
165	Complete circuit breaker for EHV(132 KV& above) system	25
166	Circuit Braker support insulator stack	25
167	CT/VT/LA/Isolator > 11 KV for Solar Plants	25
168	Power Conditioning Unit for Solar Plant	25
169	Bushing with metal parts and gaskets for Transformers 11kV and above.	25
170	CT/CVT/LA complete assembly for EHV(132 KV& above) system	25
171	Shunt Reactor Complete	25
172	Insulators for EHV(132 KV& above) system	25
173	PLCC equipments/ cards	25
174	Operation analyzer suitable for circuit breaker	25
175	SF6 gas filling evacuating filtering, drying pumping set	25
176	Wave trap complete with Line Multiple units	25
177	Isolator & Earth Switch for EHV Switchyard	25
178	Reactor's HV bushing	25
	Control and Relay Panels	
179	Main relays for GRP and Switchyard protection	25
	HT /LT Switchgear	
180	HT/LT Circuit breakers complete	25
181	HT switch gear panel complete 3.3 KV and above	25
182	LT modules complete / Control panel	25
	ESP	
183	BABCON/RAPCON/CAMCON Complete	25
184	Rectifier Transformer	25
	HT/LT Motors	
185	Motor for CC Pump	25
186	Thrust bearing assembly/ journal bearing assembly	25
187	All HT motors	25

Sl.No.	Area	Estimated useful Life (in years)
188	All LT motors with rating above 90 KW	25
189	Guide & Thrust Bearings bearing for vertical HT motors of rating 3.3 KV and above	25
190	All DC Motor	25
191	Stator capsule for HT motors with rating 3.3 kV and above	25
192	Complete Variable frequency drive assembly	25
	Transformers	
193	Bushings for EHV transformer/ reactor	25
194	Complete power transformer	25
195	On load tap changer / tap transition switch	25
196	Bus ducts & flexibles	25
197	Grounding Resistor/ Transformer	25
198	Set of windings for transformer / Reactors	25
199	One set of limbs containing HV winding & one LV winding casted in resin and packed in steel container	25
	DG Set & Battery system	
200	Battery Bank	25
201	Governor of DG set	25
202	Piston for DG engine	25
203	Diesel Engine for DG Set	25
204	Starting air motor	25
205	Lube oil pump assembly/ rotating assembly/ impeller/ shaft	25
206	UPS complete including solar plant	25
207	Battery charger unit	25
208	Alternator	25
209	Voltage regulator for DG Set	25
	OFFSITE	
	Cooling Towers	
210	Cooling Tower drive shaft/ fan blade assembly	25
211	Cooling Tower gear box assembly	25
212	Cooling Tower pump / impellers	25
213	Gear box of CT fan	25
	Air Conditioning system	
214	Compressor assembly	25
215	Chilled water pump Assembly	25
216	Blower Assemblies for Air Handling Units	25
217	AHU/ Fresh Air fan	25
	Water Pretreatment Plant and DM Plant	
218	Clarifier / Turbine drive shaft assembly of Clarifier	25
219	Rake drive shaft assembly of Clarifier	25
220	ARCW / Raw water pump assembly	25
221	Clarified water pump assembly / Impeller for clarified water pump	25
222	Potable water pump assembly	25
223	Sump pump / sludge pump assembly (For all areas of plant)	25
224	Gear box assembly of clarifloculator	25
225	Effluent pump complete assembly	25
226	Middle collector assembly for cation / anion / mixed bed exchanger	25
227	Dosing ejector complete for cation / anion/ mixed/ bed exchanger	25
228	Degasser water pump assembly	25
229	Filter back wash pump assembly	25
230	DM make-up pump assembly	25
231	DM transfer pump assembly	25
	Circulating Water System	
232	Thrust bearing assembly of CW Pump	25

Sl.No.	Area	Estimated useful Life (in years)
233	CW pump complete/ bowl assembly / impeller /shaft	25
234	Non Reverse Ratchet assembly of CW Pumps	25
235	Complete power pack for electro-hydraulic actuator for CW Pump butterfly valves	25
236	Back pullout assembly of ACW Pump	25
237	Screen Wash pump complete assembly	25
	Air compressors	
238	Air compressors for plant & instruments	25
239	Crank shaft assembly	25
240	Pistons of HP / LP compressor	25
241	Compressor for bus duct pressurization / GCB Operation	25
242	Complete cylinder /Sleeve / liner for Cylinder of Air Compressor	25
	Fire Protection System	
243	Rotating assembly of Hydrant booster pump	25
244	Rotating assembly of sprinkler fire water pump	25
245	Pistons for diesel engines	25
246	Main bearing and crankshaft of diesel engine	25
247	Cranking starter assembly complete of diesel engine	25
248	Deluge valve assemblies	25
249	Diesel engine complete	25
250	Foam Pump for fire fighting system	25
251	Connecting rods of diesel engine	25
252	Cam shaft / bearing assembly of diesel engine	25
253	Cylinder liner of diesel engine	25
254	Turbo charger complete/ impeller/ rotor	25
255	Blocks / Lube oil pumps for Diesel Engine	25
256	Air compressor assembly	25
257	Hydrant pump assembly/ rotating assembly/ impeller/ shaft	25
258	Jockey pump assembly/ rotating assembly/ impeller/ shaft	25
	Ventilation System	
259	Unit Air Filtration pump assembly	25
260	Air washer unit assembly for evaporative cooling ventilation system	25
261	Air wash pump assembly	25
262	Supply air fan assembly	25
	Liquid Waste Treatment Plant	
263	Clarified/ Aux-cooling/ Back wash water pumps assembly	25
264	Tube settler system of central monitoring basin	25
265	Service drain pump of central monitoring basin	25
266	Auxillary cooling water recirculation pump	25
267	Pre-treatment filter back wash pumps	25
268	Decanted water pumps of coal settling ponds	25
	Fuel Oil handling	
269	Intertank transfer pump/ impeller/ rotor	25
270	Control and stop valves for Fuel oil handling plant	25
271	Fuel oil unloading/ forwarding pumps	25
272	Complete cartridge assembly of heavy fuel oil pump/ Light fuel Oil Pump	25
273	Floor Heater of Fuel Oil Tanks	25
274	Pump assembly of heavy oil/light fuel oil pump	25
275	Impeller and shaft of Fuel oil pressurizing pump	25
276	Gas pressure reducing valve assembly for Gas stations	25
277	Temperature Control valve complete	25
	Service water / ACW / SACW / BCW pumps/ DMCW pumps	
278	ECW / SACW / ACW / BCW /Pump complete Assembly	25
	CHP	

Sl.No.	Area	Estimated useful Life (in years)
	PADDLE FEEDER	
279	Traverse gear box assembly of Paddle Feeder	25
280	Carriage wheel assembly of Paddle Feeder	25
281	Plough blade assly with hub of Paddle Feeder	25
282	Hydraulic pump of paddle feeder	25
283	Hydraulic motor of Paddle Feeder	25
	CRUSHER	
284	Rotor Assembly of Crusher	25
285	Drive unit of Grizzly Feeder	25
	ROTARY BREAKER	
286	Cage frame for ring granulator	25
	CONVEYORS	
287	Fluid coupling of drive conveyors	25
288	Flap gates	25
289	Complete gearbox of conveyors , gearbox casing , Intermediate / output shaft with gears	25
290	Magnetic separator complete	25
291	Pulleys complete with shaft for conveyors	25
	TRIPPER	
292	Wheel Assembly with Plumber Block & Bearings of Reducers of travelling tripper	25
	STACKER RECLAIMER	
293	Reeling drum assembly of PCRD/CCRD	25
294	Traverse Drive assembly with brake assly of stacker reclaimer	25
295	Complete Bucket wheel assembly with liners of Stacker Reclaimer	25
296	Slewing ring for Stacker, Stacker Reclaimer	25
297	Hydraulic pump assembly of stacker reclaimer	25
298	Planetary gearbox for bucket wheel drive of stacker reclaimer	25
299	Slew drive gearbox of Stacker/ Stacker Reclaimer	25
300	Stacker reclaimer pinions of slew bearing	25
301	Hydraulic cylinder for luffing of Stacker/ Stacker Reclaimer	25
302	Slew Bearing of Stacker	25
	WAGON TIPPLER	
303	Gear Box for Wagon Tippler	25
	Dozers	
304	Main drive gear assembly	25
305	Transmission assembly	25
306	Torque converter assembly	25
307	Cylinder head assembly	25
308	Super charger assembly complete	25
309	Flow amplifier of payloader	25
310	Dozer chain assembly	25
311	Dozer engine assembly	25
312	Axle assembly	25
	AHP	
313	Gearbox of Ash slurry pumps.	25
314	Fluid coupling of Ash slurry pumps > 90 kW	25
315	Complete Ash crusher assembly with gear	25
316	Knife-edge gate valve in Slurry disposal / suction complete assembly	25
317	Bottom discharge ash water recirculation pump	25
318	Complete assembly of ash-slurry pump	25
319	Clinker grinder assembly	25
320	Transfer pump assembly for ash water	25
321	Reduction gear box of scrapper conveyer assembly	25

Annexure 15

Detail Scheme wise amount of cost overrun along with reasons for FY 2022-23 & FY 2023-24.

	Scheme No.	Scheme Name	MERC Approved Amount	Actual Capitalised/ Projected	Cost Over Run amount in INR Cr.	Reason	Financial Year
BTPS 4-5	17.2	Design, engineering, manufacturing, supply, Erection and commissioning of short conveyor from stack yard to belt feeder 112 in CHP 2x500MW BTPS.	3.53	3.96	0.43	Vendor quoted 15% higher than the estimated rates on account of rise in prices of steel material in last three years and huge rise in labour charges	2023-24
CSTPS 3-7	26.1	Pipe Conveyor System for Transporting Coal from Bhatadi Coal Mine to Chandrapur STPS.	196.26	256.82	60.56	**EPC Scope related - Cost overrun** - The alignment of pipe conveyor was passing through WCL land except a stretch of length of 640 m private land. Mahagenco was facing the difficulties in acquisition of the private land and the conveyor route needs to be revised to avoid private land and identify alternate routes passing through WCL land. Accordingly, Mahagenco requested M/s. ThyssenKrupp on 10.07.2017 to check the feasibility of alternate routes to avoid the conveyor through private land. M/s tkII submitted revised route on 01.11.2017. M/s. tkII raised the issue of compensation for additional work performed for exploring alternative routes and increased input costs resulting from project delays. A five - member committee was formed to review tenability of M/s. tkII's claims & finalize methodology for settlement of tenable claims. The committee submitted its report on 20.05.2019 to ED (Projects). Based on committee's recommandations, a prposal was submitted to the board for approval. The MSPGCL Board vide BR dtd. 18.09.2019 accorded approval for following - a. Incorporation of clause regarding "Contract Price Adjustment" b. Reimbursement of extra claim amounting to Rs.1,26,79,175 (Excluding Taxes & Duties) against M/s. tkII extra claims towards additional survey, soil investigation, dynamic analysis, engineering work & Insurance. **Land related Cost Overrun** The alignment of pipe conveyor was mostly passing through WCL land except a stretch of length of 640 m private land. The route of pipe conveyor was fixed in coordination with WCL Local Office & WCL Head Quarter, Nagpur Office. Primarily, it was proposed to acquire private land of 20 m width and 640 m length (1.28 Ha.). Accordingly, proposal was submitted to the District Collector, Chandrapur on 08.03.2017. As land owners were demanding to give rate of Rs. 40 lakhs per acre, acquisition of whole land in their Gats, permanent employment etc. it was decided to go for land acquisition by both ways i.e. by direct negotiation and by land acquisition Act - 2013. As the land acquisition by the way of land acquisition act was time consuming process (@ 2-3 years), it was decided to acquire land by way of private negotiation. The rates for the land acquisition were finalized in the committee meeting headed by the District Collector, Chandrapur. The land acquired in progressive manner after resolving various issues and handed over to M/s Tkii progressively. **WCL Lease related Cost Overrun** WCL accored condiitonal " In-principal" approval to erect pipe conveyor system for transportation of coal from Bhatadi Coal Mines to Padmapur Wagon Loading station. WCL informed that WCL committee has recommanded the base land lease chares of Rs. 12.223 Crs and od Rs. 1,15,700/ annum as licence fees/rental amount payable by MSPCL. As the project was is in interests of WCL, Mahagenco and having benefits like cleaner environment, no splillage assured coal lifting, Hon. EX. Minister Energy had written to Hon. Union Minister of Coal, GoI for Irvying nominal caharges of Rs. 1 towards lease/license fees without base land cost for the scheme. In response, MoC informed that yet no such policy is decided and it may take time. Intially proposal was submitted for the alignment wholly passing through WCL land as land owners of private land protesting for land acquisation. Therafter, land owners agreed for private land acquisation and accordingly revised proposal submitted to WCL. Based on revised proposal WCL informed that the required WCL's acquired land for 31.90 Ha to 20.521 Ha. and chanrge wil be Rs. 7.8629 Crs as base land lease charges and Rs. 74,500/- as licence fees/ annum. Accordingly, Competent authority accorded approval to deposit Base land charges Rs. 7.86 Crore and Licence fees for 4 years Rs. 0.029 Crore = Rs. 7.89 Crs + GST **DE Consultancy - Cost Overrun** Consultancy engineering services for Pipe Conveyor Scheme for Chandrapur STPS- Work order is issued to M/s. Holtec Consulting Pvt Ltd at a contract price of Rs.46,49,122 /-(excl. of Taxes). Due to difficulties in acquisition of the private land, alternate route passing through WCL were explored. This necessiated review & approval of additional structural/equipment drawings, revision in already reviewed drawings. hereafter, M/s Holtec requestd for Increase in Man Power Cost/Escalation per year, Travel Cost Reimbursement . In view of above changes & request of consultant, contract price is amended to Rs. 54,20,783/- (Excl. of Taxes) vide amendment 1 & 2.	FY 2022-23
CSTPS 3-7	HO DPR 10.1	Implementation of IB recommendations- Civil works at various TPS of Mahagenco	9.07	9.61	0.54	PO for the work was finalised @ 5.00% above the estimated cost as quoted by the bidder. This has impacted the cost overrun of (28.16 Lakhs + 5.07 GST = 33.23 Lakh) above the estimated cost considered during approval. The Price variation was not considered in the approved cost. However, as per tender condition price variation was applicable and therefore the cost impact of @ 47.91 + 8.62 GST = 56.53 Lakh above the approved cost was incurred.	FY 2023-24
Koradi 6	5.1	Desilting and Restoration of Pond No.3. a) Providing earthen bund of 10 Mtr top width by utilizing desilted soil. b) Providing walkway of 12-15 Mtr width inside of main bund by utilizing desilted soil.	15.45	30.82	15.37	Approved amount under the scheme is without taxes (taxes = Rs.5.62 Cr.) Agency has quoted rate 8.30% above which is not included in MERC approved amount. Hence amount increased by Rs.1.94Cr. The length of earthen embankment considered in estimate was 5.60 Km whereas actual length of earthen embankment 8.40 Km. Hence amount increased and as per approved Deviation in quantities with excesses vide B.R. 2017/2484, Dt.14.12.2017 Amount Rs. 7.882 Cr.	FY 2022-23
Koradi 6	8.1	Construction of WBM road and drain on filling of hot water canal from Pond No.2 to Pond No.3.	8.52	11.93	3.41	P.O placed amounting to Rs. 8.42 Cr. with GST. As per approved deviation in quantities with excesses vide B.R. 2018/2684, Dt. 25.07.2018 amount Rs. 3.16 Cr. with GST	FY 2022-23
Koradi 6	14.2	Work of strengthening and asphalting of part portion of inspection road (Navegaon to Rohana) of Pench intake pipeline from Pench to Pond No.3 at Koradi.	13.84	14.30	0.46	Agency has quoted the rate 4.90% above. Approved vide B.R. 2019/3125, Dt.18.09.2019 amounting Rs. 0.57 Cr.	FY 2022-23

	Scheme No.	Scheme Name	MERC Approved Amount	Actual Capitalised/ Projected	Cost Over Run amount in INR Cr.	Reason	Financial Year
Koradi 6	HO DPR 8.2	Normal Multipurpose Fire Tender for KTPS	1.25	2.18	0.93	A. The cost estimation for the DPR is based on the budgetary offer dated 02.01.2017. B. The purchase order, PO No. 4370002840, was placed on 02.03.2022. C. The first tender needed to be cancelled because the L1 bidder failed to supply Normal Multipurpose Fire Tenders (NMFTs). D. In the meantime, due to new statutory pollution norms mandated by the Government of India (i.e., chassis specification changed from BS IV to BS VI) and additional compatibility requirements (i.e., transmission changed from manual to automatic with a torque converter and CANBUS system), it became necessary to revise the technical specifications. These revised specifications were recommended by the Fire Advisor and Chief Fire Officer and were approved by the Competent Authority. As a result of these changes, the cost of the Normal Multipurpose Fire Tender increased substantially. E. Additionally, the COVID-19 pandemic and nationwide lockdown led to a significant increase in the cost of input materials, manufacturing, fabrication, and labor. F. According to the Office of the Economic Advisor, the Wholesale Price Index (WPI) from January 2017 to March 2022 is as follows: Materials required for manufacturing of NMFT — WPI for January 2017 — WPI for March 2022 — % Rise Mild steel-Semi finished steel — 89.7 — 132.3 — 47.49% Stainless steel tank — 115 — 134.7 — 17.13% Aluminium metal — 107.6 — 158.7 — 47.49% Rubber components & parts — 92.3 — 126.7 — 37.26% Industrial Worker — 274 — 362.88 — 32.43% G. On 01.07.2017, GST laws were implemented, and an 18% GST was made applicable to fire tender vehicles. Prior to the GST regime, the Central Government's excise duty on fire tender vehicles was nil, and the taxes included 2% CST and 1% Octroi. Consequently, under the GST regime, there is an increase of 15% in the tax burden. H. Comparison of MSPGCL PO rate with other Govt. utility rate to confirm Rate Reasonability Other Utility Name and PO Date — Per unit rate in Lakhs from other Govt. Utilities PO (Incl. GST) — MSPGCL PO Dtd. 02.03.2022 per unit rate in Lakhs (Incl. GST) — % Diff SAIL, New Delhi Dtd. 20.07.2021 — 239.63 — 218.46 — -9.68 Rates for MSPGCL are lower Govt. of Goa, Dir. of Fire & emergency services, Dtd. 22.02.2021 — 218.62 — 218.46 — -0.07 Rates for MSPGCL are lower I. Considering the forced rescheduling due to the L1 bidder's failure to supply the Fire Tender, the mandatory statutory norms introduced by government authorities, the increase in the Wholesale Price Index, and the higher tax burden, the cost overrun is deemed justified.	FY 2022-23

	Scheme No.	Scheme Name	MERC Approved Amount	Actual Capitalised/ Projected	Cost Over Run amount in INR Cr.	Reason	Financial Year
Koradi 660	24.1	Procurement of heating elements for RAPH installed in Unit 10 (660MW) at KTPS Koradi through OEM	12.23	14.52	2.29	A. The cost estimation for the DPR was prepared based on the earlier PO 4500119316 dated 09/05/2022 for 660 MW Unit No. 9 of Koradi TPS placed on the OEM, M/s. L&T MHPS. B. The DPR for the subject scheme has subsequently been approved by MERC, vide letter no. MERC/CAPEX/2023-2024/0249 dated 18.04.2024. C. Despite submitting a budgetary offer dated 08/09/2021 of Rs. 1556.48 Lakhs (including GST), M/s. L&T MHPS, OEM, agreed to supply the HS8 double undulated profile APH Baskets to Koradi TPS for their 660 MW Unit No. 9 at a lower rate to maintain a long-term business relationship with MSPGCL. D. However, in view of the rise in raw material costs and the prevailing global market scenario, M/s. L&T MHPS, OEM, expressed their inability to accept the same discounted rates which they had exceptionally accepted for Unit No. 9 and submitted a fresh budgetary offer of Rs. 1413.64 Lakhs, including GST, for the supply of two complete sets of RAPH Baskets for 660 MW Unit No. 10 of Koradi TPS on 07/11/2022. E. The COVID-19 pandemic and nationwide lockdown led to a significant increase in the cost of input materials, manufacturing, fabrication, and labor. F. The comparison of the MSPGCL PO rate with rates from other government utilities to confirm rate reasonability is as follows: M/s. Nabha Power Ltd, Raipura, Punjab, has placed Purchase Order no. NPL/46000-02228 dated 31.07.2021 for the supply of RAPH for a 2 x 700 MW plant. Received rates against present enquiry no. SP/E-0205/0423 (Rfx No. 3000037386) for 2 Sets of RAPH excluding GST Rs. 1198.00 Lakh Cost of 2 sets of baskets for 2X700 MW plants of Nabha Power Ltd excluding GST Rs. 1115.00 Lakh Difference(Rs in Lakhs) 83.00 Lakh % Difference per year 3.72 % G. According to the Office of the Economic Advisor, the Wholesale Price Index (WPI) from July 2021 (the month of placement of Purchase Order by Nabha Power) to February 2023 (the month of placement of Purchase Order) is as follows: Sr. No. Particular July-2021 Feb-2023 Difference % Increase 1 Alloy steel 127.0 144.8 17.8 14.00 2 Electricity 98.2 157.7 59.5 60.60 From the above table it can be seen that, i) There has been about a 14% rise in the Alloy Steel price index, which is the major constituent of the APH Basket. ii) The electricity index significantly increased from July 2021 to February 2023, i.e., 61%.	FY 2023-24

	Scheme No.	Scheme Name	MERC Approved Amount	Actual Capitalised/ Projected	Cost Over Run amount in INR Cr.	Reason	Financial Year
KPKD 1-4	21.1	Procurement of assembly of baskets for air preheater of type bisector APH 27 VI: 1850, 12 sector in unit no. 1 & 2 and bisector APH 27 VI: 2000; 24 sector in unit no. 3 & 4 (210MW x 4) at TPS, Khaperkheda	5.71	8.09	2.38	A. The subject Capex Scheme pertains to Khaperkheda 210 MW Unit Nos. 1 to 4, which comprise of all 210 MW units of Khaperkheda TPS. The Capex Scheme was expected to be executed in a phased manner, considering system/grid demand, the schedule provided by the Load Dispatch Centre, and the remaining life of the APH baskets. Accordingly, the procurement and replacement of APH baskets were progressively undertaken by Khaperkheda TPS. B. As per the approved Capex Scheme, the indents for APH baskets were processed in phases. Initially, the procurement of APH baskets for Khaperkheda Unit Nos. 2, 3, and 4 was carried out in FY 2018-19, followed by the procurement of the same for Unit No. 1 in FY 2022-23. C. The DPR estimation was prepared based on the earlier PO 4500038739 dated 22.08.2013 and PO 4500072996 dated 03.11.2016. D. Cost Estimation of procurement of APH Baskets 1. The previous procurement of APH baskets for Unit Nos. 2 & 3 was carried out by placing a purchase order with M/s. BHEL. This purchase order was accepted by M/s. BHEL, the L-3 bidder, by matching L-1 rates as an exceptional case, owing to the long business relationship between M/s. BHEL and MSPGCL. M/s. BHEL accepted this price as an exception and informed that this special price would not set a precedent for future purchase orders by MSPGCL. As such, the basis for the estimation of the procurement of baskets for Units No. 2 & 3 was the lowest budgetary offer from M/s. BHEL. Consequently, the open tender was processed, in which four bidders participated, and purchase orders were issued to the L-1 bidders on 23.05.2019. To ensure rate reasonability, recent purchase orders from other power-generating utilities for similar items were reviewed. 2. The estimation for Unit No. 4 APH baskets was based on the last purchase price from PO No. 4370002104 dated 23.05.2019, and the received rates align with this estimation. 3. Due to the COVID-19 pandemic and the deferment of AOH/COH for many units, the tendering process for Unit No. 1 was initiated in June 2022. Due to the pandemic, there was an exponential increase in raw material prices, such as those for steel and alloy steel, on a global scale. Because of the scarcity of raw materials, the last purchase prices were not considered for estimation, and fresh budgetary offers were called from regular suppliers, with the estimation prepared accordingly. Following the tender process, a purchase order was issued, and the received rates are consistent with the revised estimation. Particular May-2019 (Month of placing of Purchase order for Unit No. 2 & 3) Dec-2019 (Month of placing of Purchase order for Unit No. 4) Aug-2022 (Month of placing of Purchase order for Unit No. 1) Alloy Steel Index 109.60 99.50 147.00 Input in Steel Making 105.60 96.60 163.00 Electricity Index 110.70 117.90 136.50 Labour Index 314.00 330.00 374.97 Diesel Index 69.81 69.27 94.27 E. Wholesale Price Index (WPI): According to the Office of the Economic Advisor, the Wholesale Price Index (WPI) from August 2018 (the month of placement of the first Purchase Order) to August 2022 (the month of placement of the last Purchase Order) is as follows: Particular May-2019 (Month of placing of Purchase order for Unit No. 2 & 3) Dec-2019 (Month of placing of Purchase order for Unit No. 4) Aug-2022 (Month of placing of Purchase order for Unit No. 1) Alloy Steel Index 109.60 99.50 147.00 Input in Steel Making 105.60 96.60 163.00 Electricity Index 110.70 117.90 136.50 Labour Index 314.00 330.00 374.97 Diesel Index 69.81 69.27 94.27 F. Rate Reasonability: The comparison of the MSPGCL PO rate with rates from other government utilities to confirm rate reasonableness is as follows: Khaperkheda Unit No. Purchase Order Details of other utilities Other Utility PO Value with GST MSPGCL PO Value with GST Diff in % Unit No. 2 Madhya Pradesh Power Generating Company Ltd PO NO: 3326 Dtd 21.10.2017 165.54 161.95 -2.17 Unit No. 3 Gujarat State Electricity Corporation Limited, Wanakbori TPS(210MW) PO NO:- 860 Dtd 24.08.2017 247.87 172.77 -30.30 Unit No. 4 Kota Super thermal power station (RRVUNL) Dtd 18.06.2019 176.88 176.26 -0.35 Unit No. 1 Rattan India Power Limited, Amravati PO NO:-3382016262 335.00 261.23 -22.02 J. Justification: Justification of Time & Cost Overrun: The following factors caused the delay and increase in the cost of procurement, resulting in the cost overrun of the Capex Scheme: i. An increase in the Wholesale Price Index (WPI) since the Cost Estimation of the DPR to the placement of the last Purchase Order. Particularly during the COVID-19 pandemic, there was a steep increase in related prices. ii. Deferred AOH/COH schedules for many units of MSPGCL due to the COVID-19 pandemic. Reasonability of Cost Overrun: The reasonability of the cost of the Capex Scheme has been confirmed by comparing the procurement cost of the subject materials with purchase orders placed by other government/power utilities, finding them to be in line with those costs, considering the rise in the WPI index. K. Submission: The COVID-19 pandemic and its repercussions were not predicted and were outside the control of MSPGCL. The procurement of materials for the implementation of Capex schemes has been	FY 2023-24
KPKD 1-4		IDC	0.10	0.18	0.08		FY 2023-24
KPKD 1-4	23.1	Supply, erection & commissioning of HT Vacuum Circuit Breakers & SF6 contactors at AHP (Unit#1 to 4, 210MW), Khaperkheda T.P.S.	4.17	4.89	0.72	The scheme is combined for 210 MW & 500MW .The Total PO cost of 210MW and 500MW should be compared with total Hon. MERC approval cost of Both the schemes combinely(i.e SF6 & VCB Both).Then it will cleared that there is no cost overrun.Hence, no cost overrun is found.(Total approved cost for both schemes is Rs. 13.16 Crore and total amount capitalised is Rs. 13.04 Crore(Including IDC))	FY 2022-23

	Scheme No.	Scheme Name	MERC Approved Amount	Actual Capitalised/ Projected	Cost Over Run amount in INR Cr.	Reason	Financial Year
KPKD 1-4	HO DPR 8.2	Normal Multipurpose Fire Tender KPKD 1-4	1.25	2.18	0.93	A. The cost estimation for the DPR is based on the budgetary offer dated 02.01.2017. B. The purchase order, PO No. 4370002840, was placed on 02.03.2022. C. The first tender needed to be canceled because the L1 bidder failed to supply Normal Multipurpose Fire Tenders (NMFTs). D. In the meantime, due to new statutory pollution norms mandated by the Government of India (i.e., chassis specifications changed from BS IV to BS VI) and additional compatibility requirements (i.e., transmission changed from manual to automatic with a torque converter and CANBUS system), it became necessary to revise the technical specifications. These revised specifications were recommended by the Fire Advisor and Chief Fire Officer and were approved by the Competent Authority. As a result of these changes, the cost of the Normal Multipurpose Fire Tender increased substantially. E. Additionally, the COVID-19 pandemic and nationwide lockdown led to a significant increase in the cost of input materials, manufacturing, fabrication, and labor. F. According to the Office of the Economic Advisor, the Wholesale Price Index (WPI) from January 2017 (month of Capex Scheme estimation) to March 2022 (month of placement of Purchase Order) is as follows: Materials required for manufacturing of NMFT WPI for January 2017 WPI for March 2022 % Rise Mild steel-Semi finished steel 89.7 132.3 47.49% Stainless steel tank 115 134.7 17.13% Aluminium metal 107.6 158.7 47.49% Rubber components & parts 92.3 126.7 37.26% Industrial Worker 274 362.88 32.43% G. On 01.07.2017, GST laws were implemented, and an 18% GST was made applicable to fire tender vehicles. Prior to the GST regime, the Central Government's excise duty on fire tender vehicles was nil, and the taxes included 2% CST and 1% Octroi. Consequently, under the GST regime, there is an increase of 15% in the tax burden. H. Comparison of MSPGCL PO rate with other Govt. utility rate to confirm Rate Reasonability Other Utility Name and PO Date Per unit rate in Lakhs from other Govt. Utilities PO (Incl. GST) MSPGCL PO Dtd. 02.03.2022 per unit rate in Lakhs (Incl. GST) % Diff SAIL, New Delhi Dtd. 20.07.2021 239.63 218.46 -9.68 Rates for MSPGCL are lower Govt. of Goa, Dir. of Fire & emergency services, Dtd. 22.02.2021 218.62 218.46 -0.07 Rates for MSPGCL are lower I.I. Justification: Justification of Time & Cost Overrun: The following factors caused the delay and increase in the cost of procurement, leading to the resulting cost overrun of the Capex Scheme: i. The failure of the L1 bidder to supply the Fire Tender necessitated the initiation of a fresh tendering procedure. ii. There was a change in the mandatory statutory norms introduced by government authorities. iii. As a result, the Technical Specifications of the Fire Tender needed to be revised to comply with the new statutory norms. iv. The higher tax burden after the introduction of GST on the Fire Tender was not considered during the estimation of the Capex Scheme. (Before the GST regime, the tax burden was 3%, which increased to 18%.) v. Restrictions imposed during the COVID-19 pandemic. vi. A steep increase in the related Wholesale Price Index (WPI) (ranging from +17.13% to +47.49%). Reasonability of Cost Overrun: The reasonability of the cost of the Capex Scheme has been confirmed by comparing the cost of procurement of the subject material of the Capex Scheme with the purchase orders placed by other government utilities and found to be in line with or lower than those costs. J. Submission: Following situations were not predicted and were outside the control of MSPGCL, i. The denial of the L1 bidder to supply the Fire Tender on the first occasion. ii. The implementation of new statutory norms for Fire Tenders. iii. The implementation of a new tax regime and higher tax burden. iv. The COVID-19 pandemic & its repercussions. The procurement of materials for the implementation of Capex schemes has been made at reasonable rates compared to the procurement of the same by other government utilities. As such, it is submitted to consider the time and cost overruns	FY 2022-23

	Scheme No.	Scheme Name	MERC Approved Amount	Actual Capitalised/ Projected	Cost Over Run amount in INR Cr.	Reason	Financial Year
KPKD 5	12.1	1. Construction of RCC pedestals for laying of ADP Lines from Khaperkheda TPS to Nandgaon Ash Bund. 2. Providing &Laying of ash disposal pipe lines from TPS Khaperkheda to Nandgaon ash bund. 2a) Supply of MSERW and Seamless Pipes 2b) Laying of Ash Disposal & Recovery Pipe Line. 3. Construction of Service road for ash disposal pipe lines from TPS Khaperkheda to Nandgaon ash bund. 4. Design, Engineering & construction of minor bridge, road crossing and culverts in the alignment of ash disposal pipe line from TPS Khaperkheda to Nandgaon Ash Bund 5. Construction of ash water recovery pump house at Nandgaon	65.78	95.66	29.89	**Time overrun** - Reasons for time has been justified vide Office Note. No. DY.CE(C))CCC/KRD/Tech /01272, Dt. 01-11- 021 and same has been approved by Competent Authority and conveyed to vide letter No. CE(C)-/K kheda/1 x500 MW/Balance of works/N.00447 Dt.16-0S-2023 **Cost Overrun** - 1) Total amount of excesses & extra item on 1 instance approved by Competent Authority amounting to. Rs. 4,90,56,733.40(without GST) 2) Total amount of excesses & extra item on 2nd instance approved by Competent Authority amounting to. Rs. 10,40,59,686.00 (without GST) 3) Total Amount paid on account of price variation: - Rs. 8,77,15,241.00 (without GST)	FY 2023-24
KPKD 5	20.1	Utilization of unused water scheme from Bhanegaon Open cast mine	7.55	12.94	5.39	Time Overrun- Reasons for time has been justified vide Office Note. No. CE(C)-II//KRD/Tech/0837, Dt. 16-11-2021 and same has been approved by Competent Authority and conveyed to vide Letter No.CE(C)-III/KPKD/WCL/TLE/1492/5791, Dt 24-06-2022 **Cost Overrun -** 1) Estimated cost put to Tender Rs.7,31,21,842.66 (without GST); Agency quoted 18% above estimated cost i.e., Rs.1,31,61,931.68; Work Order Amount: Rs. 8,62,83,774.00 (without GST) 2) Due to Extra items as below approved by Competent Authority. a) Extra item 1 to 6 amounting to Rs.19,79,885.18 (Without GST) b) Extra item 7 to 14 amounting to Rs.23,29,519.76 (Without GST) c) Extra item 15 to 16 amounting to Rs.23,57,201.00 (Without GST) 3) Due to excesses amounting to Rs.1,69,92,208.79 approved by Competent Authority	FY 2022-23
Nashik	19.2	Procurement and replacement of 220 V, 1285 AH battery set for Unit No. 4 at Nasik Thermal Power Station.	1.39	1.41	0.02	There was a time lapse due to COVID-19 pandemic which resulted in the refloating of the tender and, hence, the amount of the PO for the above said CAPEX scheme differed from the approved cost.	FY 2023-24
Nashik	HO DPR 6.2	Supply, Installation, Commissioning and Operation & Maintenance Services of Continuous Ambient Air Quality Monitoring Stations (CAAQMS) at various TPS	1.33	2.88	1.56	Based on the letter from the Maharashtra Pollution Control Board (MPCB) regarding the "Consent to Run" for various units of the Thermal Power Stations of MSPGCL, the Capex Scheme for Continuous Ambient Air Quality Monitoring Stations (CAAQMS) was approved. Initially, only one CAAQMS unit was planned for Nashik TPS under this scheme, while another unit was proposed through a different Capex Scheme. However, following a thorough survey by the MPCB Authorities at a later stage and their recommendations, one additional CAAQMS unit was redirected from Bhusawal TPS to Nashik TPS with the approval of the Competent Authority under the same scheme. The per-unit cost of the CAAQMS is Rs. 96.14 lakh (including supply, installation, commissioning, and AMC), which is lower than the approved per-unit cost in the Capex Scheme (Rs. 1.33 lakh). Therefore, the capitalization of the other CAAQMS units may not please be considered as cost overrun for Nashik TPS.	FY 2022-23
Nashik	HO DPR 8.2	Normal Multipurpose Fire Tender Nashik	1.25	2.23	0.98	A. The cost estimation for the DPR is based on the budgetary offer dated 02.01.2017. B. The purchase order, PO No. 4370002840, was placed on 02.03.2022. C. The first tender needed to be cancelled because the L1 bidder failed to supply Normal Multipurpose Fire Tenders (NMFTs). D. In the meantime, due to new statutory pollution norms mandated by the Government of India (i.e., chassis specification changed from BS IV to BS VI) and additional compatibility requirements (i.e., transmission changed from manual to automatic with a torque converter and CANBUS system), it became necessary to revise the technical specifications. These revised specifications were recommended by the Fire Advisor and Chief Fire Officer and were approved by the Competent Authority. As a result of these changes, the cost of the Normal Multipurpose Fire Tender increased substantially. E. Additionally, the COVID-19 pandemic and nationwide lockdown led to a significant increase in the cost of input materials, manufacturing, fabrication, and labor. F. According to the Office of the Economic Advisor, the Wholesale Price Index (WPI) from January 2017 to March 2022 is as follows: Materials required for manufacturing of NMFT WPI for January 2017 WPI for March 2022 % Rise Mild steel-Semi finished steel 89.7 132.3 47.49% Stainless steel tank 115 134.7 17.13% Aluminium metal 107.6 158.7 47.49% Rubber components & parts 92.3 126.7 37.26% Industrial Worker 274 362.88 32.43% G. On 01.07.2017, GST laws were implemented, and an 18% GST was made applicable to fire tender vehicles. Prior to the GST regime, the Central Government's excise duty on fire tender vehicles was nil, and the taxes included 2% CST and 1% Octroi. Consequently, under the GST regime, there is an increase of 15% in the tax burden. H. Comparison of MSPGCL PO rate with other Govt. utility rate to confirm Rate Reasonability Other Utility Name and PO Date Per unit rate in Lakhs from other Govt. Utilities PO (Incl. GST) MSPGCL PO Dtd. 02.03.2022 per unit rate in Lakhs (Incl. GST) % Diff SAIL, New Delhi Dtd. 20.07.2021 239.63 218.46 -9.68 Rates for MSPGCL are lower Govt. of Goa, Dir. of Fire 218.62 218.46 -0.07 Rates for MSPGCL are lower	FY 2022-23
Paras	2.1	Ash Handling Plant augmentation scheme at Paras TPS Unit 3 & 4	34.69	58.68	23.99	Additional expenditure was required to complete the approved scope of work due to the following reasons- 1) Highly undulating terrain/geography of existing land 2) Quantities of pipe culverts, Box culverts & Retaining wall increased due to execution of the work in submergence area of Paras Barrage 3) Change in the alignment of ash pipeline corridor & service road 4) The garlanding work of ash Pipeline at Gazipur ash bund5) Additional work of concrete Approach Road towards crematorium at Satargaon Village. CE-Civil-I Letter, RCD comments & Office note are attached	FY 2022-23

	Scheme No.	Scheme Name	MERC Approved Amount	Actual Capitalised/ Projected	Cost Over Run amount in INR Cr.	Reason	Financial Year
Paras	4.1	Procurement of apron feeder system, pan & chain Assembly (2 no.'s)	7.44	7.52	0.08	Cost Overrun is due to change in taxation from S-Tax to GST	FY 2022-23
Paras	7.1	Replacement of complete set of economizer (upper & lower) coil assemblies & LTSH (upper & lower) coil assemblies for Unit-3.	10.60	12.28	1.68	A. The Board of Directors approved the Board Resolution for Paras TPS Unit #3 (MSPGCL/CS/BM-186/186.11 dated 24.12.2018, Resolution No. 2018/2845), with the cost for the supply part of Unit #3 amounting to Rs. 8.6 crores, including GST. B. The estimate for the DPR scheme was prepared based on MSPGCL's last purchase order placed with M/s. L&T MHPS Boilers Pvt. Ltd., PO No. 4370000841 dated 07.11.2016. C. In-principle approval from MERC was received under reference no. MERC/CAPEX/2019-20/2 dated 24.05.2019. D. The CPA received the indent for this procurement from Paras TPS in March 2019, and the tender process was initiated. E. Price bids were opened on 10.10.2019. The rates received were competitive, with four bidders participating in the limited tender. F. The proposal experienced delays due to the COVID-19 pandemic, various technical compliances, and rate reasonability checks. G. Additionally, the COH/AOH was deferred due to the pandemic. Consequently, the delivery of materials was also postponed, with no additional cost to MSPGCL, thus avoiding the need to maintain idle inventory. H. The proposal was approved by the Board of Directors, and the purchase order was issued in November 2020. I. The total cost received against PO Nos. 4370002567 and 4370002563 is Rs. 8.8 crores, including GST for the supply part. It shows a cost overrun of Rs. 20 lakhs compared to the MERC approved cost for the supply part, which is 2.33% higher. J. The Wholesale Price Index (WPI) for the manufacture of steam generators and HSD rose by 1.43% and 4.06%, respectively, during the period from January 2019 (month of Capex Scheme estimation) to October 2019 (month of price bid opening). L. Justification: Justification of Time & Cost Overrun: The following factors caused the delay & increase in the cost of procurement and the resulting cost overrun of the Capex Scheme: i. Restrictions imposed during the COVID-19 pandemic delayed the execution of the Capex Scheme. ii. The increase in the related Wholesale Price Index (WPI) (ranging from +1.43% to +4.06%) iii. Deferred AOH/COH schedules for many units of MSPGCL due to the COVID-19 pandemic. Reasonability of Cost Overrun: The reasonability of the cost of the Capex Scheme has been confirmed by comparing the procurement costs of the subject materials with purchase orders placed by other government utilities, finding them to be in line with or lower than those costs. M. Submission: The COVID-19 pandemic and its repercussions were not predicted and were outside the control of MSPGCL. The procurement of materials for the implementation of Capex schemes has been made at reasonable rates compared to those of other government utilities. As such, it is submitted that the time and cost overruns may please be considered.	FY 2024-25

	Scheme No.	Scheme Name	MERC Approved Amount	Actual Capitalised/ Projected	Cost Over Run amount in INR Cr.	Reason	Financial Year
Paras	HO DPR 8.1	Advance Multipurpose Fire Tender at Paras TPS	1.45	2.92	1.47	B. The purchase order, PO No. 4370001800, was placed on 24.05.2019. C. According to the Office of the Economic Advisor, the Wholesale Price Index (WPI) from January 2017 to May 2019 is as follows: Materials required for manufacturing of Advance MFT — WPI for January 2017 — WPI for May 2019 — % Rise Mild steel-Semi finished steel — 89.7 — 96.7 — 7.8% Stainless steel tank — 115 — 120.9 — 5.13% Aluminium metal — 107.6 — 107.8 — 1.85% Rubber components & parts — 92.3 — 99.6 — 7.90% Industrial Worker — 274 — 314 — 14.60% D. On 01.07.2017, GST laws were implemented, and an 18% GST was made applicable to fire tender vehicles. Prior to the GST regime, the Central Government's excise duty on fire tender vehicles was nil, and the taxes included 2% CST and 1% Octroi. Consequently, under the GST regime, there is an increase of 15% in the tax burden. E. Comparison of MSPGCL PO rate with other Govt. utility rate to confirm Rate Reasonability Other Utility Name and PO Date — Per unit rate in Lakhs from other Govt. Utilities PO (Incl. GST) — MSPGCL PO dtd.24.05.2019 per unit rate in Lakhs (Incl. GST) — % diff Dir. of Fire & emergency services, Diu & Daman Dtd. 17.05.2017 — 188.22 — 177.6 — -5.98 Rates for MSPGCL are lower F. Considering the increase in the Wholesale Price Index and the higher tax burden, the cost overrun is deemed justified. G. In the initial DPR approval, only one Advance Multipurpose Fire Tender was considered for Paras TPS. Subsequently, an additional Fire Tender was redirected from Nashik TPS with the Competent Authority's approval at its depreciated asset value, which should not be considered as cost overrun. Further, in the initial Capex Scheme approval, only one Advance Multipurpose Fire Tender was considered for Paras TPS. Subsequently, considering the necessity of an additional fire tender at Paras TPS, it was redirected from Nashik TPS at its depreciated asset value with the approval of the Competent Authority, which should not be considered a cost overrun.	FY 2022-23
Parli 6-7	18.2	Procurement & replacement of complete set of LTSH upper & lower bank coils for Parli TPS unit-7	10.60	12.32839	1.73	A. The Board of Directors approved the Board Resolution for Parli TPS Units #6 & 7 (MSPGCL/CS/BM-186/186.10 dated 24.12.2018, Resolution No. 2018/2844), with the cost for the supply part of Unit #7 amounting to ₹8.60 crores, including GST. B. The estimate for the DPR scheme was based on MSPGCL's last purchase order placed with M/s. L&T MHPS Boilers Pvt. Ltd., PO No. 4370000841 dated 07.11.2016. C. In-principle approval from MERC was received under reference no. MERC/CAPEX/2019-20/419 dated 26.07.2019. D. The CPA received the indent for this procurement from Parli TPS in March 2019, and the tender process was initiated. E. Price bids were opened on 10.10.2019. The rates received were competitive, with four bidders participating in the limited tender. F. The proposal experienced delays due to the COVID-19 pandemic, various technical compliances, and rate reasonability checks. G. Additionally, the COH/AOH was deferred due to the COVID-19 pandemic. Consequently, the delivery of materials was also deferred, with no additional cost to MSPGCL, thus avoiding the need to maintain idle inventory. H. The proposal was approved by the Board of Directors, and the purchase orders were issued in November 2020. I. The total cost received against PO Nos. 4370002567 and 4370002563 amounts to Rs. 8.8 crores, including GST for the supply part. This results in a cost overrun of Rs. 20 lakhs compared to the MERC-approved cost for the supply part, which is 2.33% higher. J. The Wholesale Price Index (WPI) for the manufacture of steam generators and HSD rose by 1.43% and 4.06%, respectively, during the period from January 2019 (month of Capex Scheme estimation) to October 2019 (month of price bid opening). N. Justification: Justification of Time & Cost Overrun: The following factors caused the delay & increase in the cost of procurement and the resulting cost overrun of the Capex Scheme: i. Restrictions imposed during the COVID-19 pandemic delayed the execution of the Capex Scheme. ii. The increase in the related Wholesale Price Index (WPI) (source: from +1.43% to +4.06%)	FY 2022-23

	Scheme No.	Scheme Name	MERC Approved Amount	Actual Capitalised/ Projected	Cost Over Run amount in INR Cr.	Reason	Financial Year
						ii. The increase in the related Wholesale Price Index (WPI) (ranging from +1.43% to +4.06%) iii. Deferred AOH/COH schedules for many units of MSPGCL due to the COVID-19 pandemic. Reasonability of Cost Overrun: The reasonability of the cost of the Capex Scheme has been confirmed by comparing the procurement costs of the subject materials with purchase orders placed by other government utilities, finding them to be in line with or lower than those costs. O. Submission: The COVID-19 pandemic and its repercussions were not predicted and were outside the control of MSPGCL. The procurement of materials for the implementation of Capex schemes has been made at reasonable rates compared to those of other government utilities. As such, it is submitted that the time and cost overruns may please be considered.	
KGSC	4.7	Up gradation of TG Governing system of Stage-IV Units.	2.22	2.75	0.53	The Scheme was approved in 2016. The PO was placed on Oct 2021. The vendor has quoted 24% higher than the approved DPR cost. There was escalation of 5 years i.e., 4.80% per year.Post covid commodity prices were increased. The approval of the same has been taken from CA during PO approval.	FY 2022-23
KGSC	11.9	Up-gradation of Vibration system at all units of Stage-IV:Stage-IV, KGSC, Pophali	1.44	1.50	0.06	The Scheme was approved in 2019. The PO was placed on Aprl 2022. The vendor has quoted 4.23% higher than the approved DPR cost. There was escalation of 3 years i.e., 1.41% per year.Post covid commodity prices were increased. The approval of the same has been taken from CA duringPO approval.	FY 2023-24
KSGC	15.2	Upgradation of existing unit PLC and SCADA automation of 4	4.23	4.30	0.07	The Scheme was approved in 2019. The PO was placed on Aprl 2022. The vendor has quoted 1.60% higher than the approved DPR cost. There was escalation of 3 years i.e., 0.53% per year.Post covid commodity prices were increased. The approval of the same has been taken from CA duringPO approval.	FY 2024-25
KSGC	15.3	Upgradation of one 1500 KVA DG set at KSGC, Stage-IV	1.60	1.81	0.21	The Scheme was approved in 2019. The PO was placed on May 2023. The vendor has quoted 13% higher than the approved DPR cost. There was escalation of 4 years i.e., 3.25% per year.Post covid commodity prices were increased. The approval of the same has been taken from CA duringPO approval.	FY 2024-25
Tillahri	14.5	Schme-E: Replacement of existing Centralized Air Conditioning System with new at Tillari Hydro Power Stn.	1.25	1.51	0.2577	Office note O. N. No. EE/ Tilari Div/ THPS/ Central AC/ No. 725 dtd 19.09.2019, was put up for approval to cost estimate & procurement procedure for Replacement of existing Centralized Air Conditioning system with new at Tilari Hydro Power Station with as estimated value of Rs. 1.248 Crores (inclusive of taxes). Vide under MERC Approval MERC/CAPEX/2020-21/ WHF/ SBR/19 dtd 17.07.2020, MERC approved cost of DPR, scheme 5- Replacement of existing Centralized Air Conditioning system with new at Tilari Hydro Power Station is Rs. 1.248 Crores. Meanwhile, the validity of budgetary offer of M/s. V Cube Engineering expired. As per email from CPA dtd 29.01.2021 and this office email dtd 15.03.2021, vendor denied extending the validity of offer in view of extensive rise in rates. Hence valid offers from M/s. Blue Star ltd. And M/s. Revan Cooling systems were called. However, as per email from CPA dtd 23.06.2021, it was directed to resubmit the proposal with revised estimate, revised rate reasonability and revised draft PR. In view of the above, fresh budgetary offers were called and revised Office note with estimated value of Rs. 1,21,88,500/- (exclusive of taxes) and Rs. 1,55,28,280 /- (Inclusive of GST) vide under T. O. ON. SE/REC/Tech/DPR-2/Tilari AC Plant/ No. 1093 dtd 16.08.2021, was put up mentioning that- "Estimated cost with GST is more than approved DPR cost. However, being open tender, quoted rates may be lower than estimated rates due to competitive bidding. Further, if quoted rates go higher than approved DPR cost then approval of Competent Authority shall be obtained before processing/ placing Purchase order." Competent Authority has accorded approval for the same. RFx under Tender RFx no. 3000024414 published on 19.01.2022, was published and all 04 bidders were disqualified in the deviation bid scrutiny. Hence the tender was refloated with revised QR-'Experience of having supplied the tendered item to Private Utilities'. Again, RFx under Tender RFx no. 3000035843 published on 18.02.2023, was published, the deviation bid submission was extended twice before opening and thrice after opening of deviation bid. Inspite giving ample amount of time, there was poor response and no bidder was qualified. Competent Authority has now directed to "Refloat the tender with revised QR". Hence, in line with past experiences and after reviewing the proposal, the office note for refloat of tender with	FY 2024-25

Annexure 16

Audited Statement for other Coal related Charges for FY 2022-23 & FY 2023-24.

A I Kothari & Associates
Chartered Accountants
Correspondence Address
201, Aditya Chamber,
Navi Peth, Jalgaon – 425001.
Email: aikothariassociates@gmail.com
Mobile: 9823 00 7773

CERTIFICATE

This is to certified that the following figures of other charges are included in the trial balance of Bhusawal Unit 3, 4 & 5, BTPS (B-105) are as follows:

Other Coal Related Fixed Charges FY 2023-24

(Amount In Crore)

A/cHead	Particular	Unit 3 Amount	Unit 4 & 5 Amount
71600	Consumption Lubricants & consumables	0.02	0.12
71211	Coal handling contract charges	3.24	17.41
71217	Payments to railway staff-Fixed	0.25	1.33
71219	Other coal related costs	3.73	20.05
71299	Price variation 71 Group	0.17	0.89
	TOTAL	7.41	39.81

Other Coal Related Fixed Charges FY 2022-23

(Amount in Crore)

A/c Head	Particular	Unit 3 Amount	Unit 4 & 5 Amount
71211	Coal handling contract charges	1.91	12.51
71217	Payments to railway staff-Fixed	0.26	1.71
71219	Other coal related costs	2.76	18.07
71141	Consumption of Oil (Other)	0.00	0.00
71299	Price variation 71 Group	0.43	2.84
	TOTAL	5.37	35.12

We have verified the same on the basis of audited trial balance and data submitted by the management of MSPGCL,BTPS in respective financial years. This certificate is being issued on a specific request of client to be submitted to MERC. It should not be used by any other person or for any other purpose. Accordingly, we do not accept or assume any liability into whose hands it may comewithout our prior consent in writing. Hence certified

For,
A I Kothari and Associates
Chartered Accountants
FRN-112022W

M/s. A. I. Kothari & Associates Chartered Accountants FRN 112022W

CA Abhishek Kothari-Partner
MRN-191911
Date-24/10/2024
Place-Jalgaon
UDIN - 24191911BKFOPS5778

ABDUL GANI CHANA & ASSOCIATES
CHARTERED ACCOUNTANT
B.Com, LLB, CA
M.NO : 609728 Firm Reg. no. : 157038W

+91 8484988891
@abdulganichana@gmail.com
Taj Manzil, near Memon Jamat Khana, Ambekar Layout, Chandrapur, MH

To,
The Chief Engineer,
Chandrapur Super Thermal Power Station,
Urjanagar, Chandrapur.

Certificate

As the request of The Chief Engineer, Chandrapur Super Thermal Power Station, Maharashtra State Power Generation Company Limited, and based on information and explanation provided to us and books of accounts and related record examined, we have relied on the reports as certified by the management and we hereby confirm the following.

Other Coal Related Fixed Charge for FY 2022-23

(Amount Rs. In Crores)

GL Code	GL Name	Chandrapur Unit 3 to 7	Chandrapur Unit 8 to 9	Total
71215	Commission to agents	-	-	-
71600	Consumption Lubricants & consumables	5.42	2.79	8.21
71601	Consumption Lubricants & consumables-Fi	-	-	-
71211	Coal handling contract charges	11.93	5.32	17.25
71212	Demurrage on coal wagons	-	-	-
71213	Siding charges	-	-	-
71216	Payments to railway staff	0.16	0.08	0.24
71217	Payments to railway staff-Fixed	-	-	-
71218	Con-Other coal related costs	0.15	-	0.15
71219	Other coal related costs	23.55	8.15	31.70
71224	Commission to agents-Fixed	-	-	-
71122	Consumption High Speed Diesel Oil	10.17	5.24	15.40
71141	Consumption of Oil (Other)	0.09	0.04	0.13
71221	Oil handling contract charges	-	-	-
71222	Demurrage on oil receipts	-	-	-
71299	Price variation 71 Group	5.21	2.96	8.18
	Total	**56.68**	**24.59**	**81.28**

We have performed the above-mentioned procedures in accordance with the requirements of the guidance notes on audit report and certificate issued for special purpose issued by The Institute of Chartered accountants of India.

We have been informed that this certificate is required by the company for providing the same to Maharashtra Electricity Regulatory Commission (MERC). Our certificate is solely for the said purpose and it is not be used for any other purpose or to be distributed to any other parties. This Certificate relates only to the matter as specified above and does not extend to any financial statements of the company taken as a whole. We have no responsibility to update this certified for events and circumstances occurring after the date of this certificate.

FOR ABDUL GANI CHANA & ASSOCIATES
CHARTERED ACCOUNTANTS
FRN: 157038W

ABDUL GANI CHANA & ASSOCIATES ★ MRN 609728 FRN 157038W ★ Chartered Accountants

(ABDUL GANI IBRAHIM CHANA)
PROPRIETOR
M No. 609728
UDIN: 24609728BKBJXS8660

Place: Chandrapur
Date: 21-10-2024

ABDUL GANI CHANA & ASSOCIATES
CHARTERED ACCOUNTANT
B.Com, LLB, CA
M.NO : 609728 Firm Reg. no. : 157038W

+91 8484988891
@abdulganichana@gmail.com
Taj Manzil, near Memon Jamat Khana, Ambekar Layout, Chandrapur, MH

To,
The Chief Engineer,
Chandrapur Super Thermal Power Station,
Urjanagar, Chandrapur.

Certificate

As the request of The Chief Engineer, Chandrapur Super Thermal Power Station, Maharashtra State Power Generation Company Limited, and based on information and explanation provided to us and books of accounts and related record examined, we have relied on the reports as certified by the management and we hereby confirm the following.

Other Coal Related Fixed Charge for FY 2023-24

(Amount Rs. In Crores)

GL Code	GL Name	Chandrapur Unit 3 to 7	Chandrapur Unit 8 to 9	Total
71215	Commission to agents	-	-	-
71600	Consumption Lubricants & consumables	1.17	0.65	1.82
71601	Consumption Lubricants & consumables-Fi	-	-	-
71211	Coal handling contract charges	9.21	4.86	14.07
71212	Demurrage on coal wagons	1.09	0.54	1.63
71213	Siding charges	-	-	-
71216	Payments to railway staff	0.16	0.08	0.24
71217	Payments to railway staff-Fixed	-	-	-
71218	Con-Other coal related costs	-	-	-
71219	Other coal related costs	24.42	9.89	34.32
71224	Commission to agents-Fixed	-	-	-
71122	Consumption High Speed Diesel Oil	7.61	4.72	12.33
71141	Consumption of Oil (Other)	-	-	-
71221	Oil handling contract charges	-	-	-
71222	Demurrage on oil receipts	-	-	-
71299	Price variation 71 Group	1.28	0.66	1.94
	Total	**44.95**	**21.40**	**66.35**

We have performed the above-mentioned procedures in accordance with the requirements of the guidance notes on audit report and certificate issued for special purpose issued by The Institute of Chartered accountants of India.

We have been informed that this certificate is required by the company for providing the same to Maharashtra Electricity Regulatory Commission (MERC). Our certificate is solely for the said purpose and it is not be used for any other purpose or to be distributed to any other parties. This Certificate relates only to the matter as specified above and does not extend to any financial statements of the company taken as a whole. We have no responsibility to update this certified for events and circumstances occurring after the date of this certificate.

FOR ABDUL GANI CHANA & ASSOCIATES
CHARTERED ACCOUNTANTS
FRN: 157038W

ABDUL GANI CHANA & ASSOCIATES MRN 609728 FRN 157038W Chartered Accountants

(ABDUL GANI IBRAHIM CHANA)
PROPRIETOR
M No. 609728
UDIN: 24609728BKBJXT5861

Place: Chandrapur
Date: 21-10-2024

Hardik Jayesh Shah & Co.

Chartered Accountants
Plot No.72, Gala Niwas , Behind Axis Bank, Gandhibagh, Nagpur -02
Email Id – hardikjshah_28@rediffmail.com , cahjs28@gmail.com
Mob. No. 9420854275 / 7798565454

To,
The Chief Engineer,
Koradi Thermal Power Station,
Koradi, Nagpur.

Certificate

At the request of The Chief Engineer, Koradi Thermal Power Station, Maharashtra State Power Generation Company Limited, and based on information and explanation provided to us and books of accounts and related records examined, I have relied on the reports certified by the management and we hereby confirm the following.

Other coal related Fixed Charges FY 2023-24

(Amount in Rs. Crores)

Account Head	Particulars	Koradi old	Koradi 8-9-10	Total
71215	Commission to agents	-	-	
71600	Consumption Lubricants & consumables	0.08	1.99	2.07
71601	Consumption Lubricants & consumables-Fi	-	-	
71211	Coal handling contract charges	0.18	1.63	1.81
71212	Demurrage on coal wagons	-	-	
71213	Siding charges	-	-	
71216	Payments to railway staff		0.08	0.08
71217	Payments to railway staff-Fixed	-	-	
71218	Con-Other coal related costs	-	0.09	0.09
71219	Other coal related costs	14.04	21.71	35.75
71224	Commission to agents-Fixed	-	-	
71122	Consumption High Speed Diesel Oil	0.87	7.89	8.76
71141	Consumption of Oil (Other)	0.03	0.26	0.29
71221	Oil handling contract charges	-	-	
71222	Demurrage on oil receipts	-	-	
71299	Price variation 71 Group	0.21	1.54	1.75
	Total	**15.41**	**35.19**	**50.61**

I have been informed that this certificate is required by the company for providing the same to Maharashtra Electricity Regulatory Commission (MERC).

Place : Nagpur

Date : 10/10/2024

UDIN : 24137045BKATDB8174

Hardik Jayesh Shah & Co. NAGPUR FRN 0146147W Chartered Accountants 10/10/24

For Hardik Jayesh Shah & Co.
Chartered Accountants
FRN 0146147W

Proprietor
CA. Hardik Shah
M.No.137045

Hardik Jayesh Shah & Co.

Chartered Accountants
Plot No.72, Gala Niwas , Behind Axis Bank, Gandhibagh, Nagpur -02
Email Id – hardikjshah_28@rediffmail.com , cahjs28@gmail.com
Mob. No. 9420854275 / 7798565454

To,
The Chief Engineer,
Koradi Thermal Power Station,
Koradi, Nagpur.

Certificate

At the request of The Chief Engineer, Koradi Thermal Power Station, Maharashtra State Power Generation Company Limited, and based on information and explanation provided to us and books of accounts and related records examined, I have relied on the reports certified by the management and we hereby confirm the following.

Other Coal Related Fixed Charges FY 2022-23
(Amounts in Rs. Crores)

Account Head	Particulars	Koradi old	Koradi 8-9-10	Total
71215	Commission to agents	-	-	
71600	Consumption Lubricants & consumables	0.50	7.94	8.44
71601	Consumption Lubricants & consumables-Fi	-	-	
71211	Coal handling contract charges	0.72	1.33	2.05
71212	Demurrage on coal wagons	-	-	
71213	Siding charges	-	-	
71216	Payments to railway staff	0.09	0.23	0.33
71217	Payments to railway staff-Fixed	-	-	
71218	Con-Other coal related costs	-	0.23	0.23
71219	Other coal related costs	10.75	23.27	34.02
71224	Commission to agents-Fixed	-	-	
71122	Consumption High Speed Diesel Oil	0.87	7.83	8.70
71141	Consumption of Oil (Other)	0.04	0.34	0.37
71221	Oil handling contract charges	-	-	
71222	Demurrage on oil receipts	-	-	
71299	Price variation 71 Group	0.83	1.14	1.96
	Total	**13.80**	**42.31**	**56.11**

I have been informed that this certificate is required by the company for providing the same to Maharashtra Electricity Regulatory Commission (MERC).

Place : Nagpur

Date : 10/10/2024

UDIN : 24137045BKATDA8186

Hardik Jayesh Shah & Co. NAGPUR FRN 0146147W 10/10/24 Chartered Accountants

For Hardik Jayesh Shah & Co.
Chartered Accountants
FRN 0146147W

Proprietor
CA. Hardik Shah
M.No.137045

CERTIFICATE RELATED TO OTHER COAL RELATED FIXED CHARGES

We hereby certify that other coal related fixed charge of Khaperkheda TPS, unit of M/s Maharashtra State Power Generation Company Ltd for Stage I & II (Unit 1-4) and Stage-III (Unit-5) is as under

Other Coal related fixed charges:

Account Head	Particulars	Amount (Rs. In Crore)			
		F.Y. 2022-23		F.Y. 2023-24	
		KPKD Unit 1-4	KPKD Unit-5	KPKD Unit 1-4	KPKD Unit-5
71600	Consumption Lubricants & consumables	3.15	1.87	3.43	2.04
71211	Coal handling contract charges	9.47	5.64	12.86	8.73
71216	Payments to railway staff	0.20	0.12	0.15	0.09
71219	Other coal related costs	8.70	5.18	8.37	6.30
71122	Consumption High Speed Diesel Oil	4.40	2.62	4.15	2.47
71141	Consumption of Oil (Other)	0.01	0.00	0.03	0.02
71299	Price variation 71 Group	2.37	1.41	1.28	0.76
	Total	**28.29**	**16.84**	**30.27**	**20.41**

This Certificate is issued on the request of M/s Khaperkheda Thermal Power Station, Khaperkheda on the basis of supporting documents submitted before us

Place : Nagpur

Date : 02.12.2024

UDIN :- 24170917BKEMCX5585

For A M Dabke & Associates
Chartered Accountants

A. M. Dabke & Associates * Chartered Accountants * FRN-144213W NAGPUR

Amey M Dabke
Partner
M No.- 170917

N D DHATRAK & CO.

CHARTERED ACCOUNTANT

CA Narayan Dhatrak ***(M.com, FCA)***

Office.: No.101, Hari Amantran, Datta Mandir Road, Datta Mandir, Nashik Road, Nashik- 422 101.
Mob.: 9689325249, 9422450764 | **Off. No.:** (0253) 2451007/3591294 | **Email :** ca.nddhatrak@gmail.com

To **Ref. No.:**

Date : 21-10-24

The Chief Engineer (Gen O & M)

Nashik Thermal Power Station,

Eklahare, Nashik 422101.

CERTIFICATE

As per the request of Chief Engineer (O & M), Nashik Thermal Power Station, Eklahare Nashik following other coal related fixed charges are certified on the basis of information provided to us and examined the books of account record maintained for the audited financial statement for the year ended 31/03/2024.

(Amount in Crores)

Sr.No.	Account Head	Particulars	Other Coal Related Variable Charges	Other Coal Related Fixed Charges	Total Other Coal Related Charges
1	71600	Consumption Lubricants & consumables		0.04	0.04
2	71211	Coal handling contract charges	3.00	12.73	15.73
3	71212	Demurrage on coal wagons	0.19		0.19
4	71216	Payments to railway staff		0.29	0.29
5	71218	Con-Other coal related costs		0.07	0.07
6	71219	Other coal related costs	2.56	10.85	13.42
7	71122	Consumption High Speed Diesel Oil		4.71	4.71
8	71222	Demurrage on oil receipts	0.01		0.01
9	71299	Price variation 71 Group		0.72	0.72
		Total	**5.76**	**29.41**	**35.17**

N. D. DHATRAK AND CO. ★ M. No. 163234 ★ CHARTERED ACCOUNTANTS

This certificate is provided for onward submitting to MERC (

Maharashtra Electricity Regulatory Commission) and is solely for the said purpose. This certificate is related to only the matter as specified above and does not extend to any financial statement of the company taken as whole. We have no responsibility to update this certified for event and circumstances occurring after the date of this certificate.

Thanks

N. D. DHATRAK AND CO. M. No. 163234 CHARTERED ACCOUNTANTS

FOR N D DHATRAK AND COMPANY
Chartered Accountant

21-10-24

Narayan D Dhatrak
Proprietor
M.No 163234 FRN 140219W
UDIN - **24163234BKBVYS3629**

M K M M & ASSOCIATES
CHARTERED ACCOUNTANTS

M. G. Mundada (FCA)
A. G. Mundada (FCA)
A. K. Mahamuni (FCA)
M. B. Karjatkar (FCA)
P. A. Mahamuni (FCA)

Jay Nagar, Shivaji Chowk, Near Akshada Mangal Karyalay, Parli Vaijnath. 431515 Dist. Beed(MS)

Other Branches :- Aurangabad & Pune . Email :- indmuncapr@gmail.com Mob :- 9822247012

CERTIFICATE

This is to certified that the amount of other coal related fixed charges included in the trial balance of MSPGCL, TPS, Parli Vaijnath, (B-135) is as under

Other Coal Related Fixed Charges FY 2022-23 (Amount In Crore)

A/c Head	Particular	Unit 6&7 Amount	Unit 8 Amount
71122	Consumption High Speed Diesel Oil	1.81	0.32
71211	Coal handling contract charges	4.27	4.59
71217	Payments to railway staff-Fixed	0.07	0.04
71219	Other coal related costs	6.14	8.76
71299	Price variation 71 Group	0.10	0.56
	TOTAL COST	12.39	14.27

Other Coal Related Fixed Charges FY 2023-24 (Amount In Crore)

A/c Head	Particular	Unit 6&7 Amount	Unit 8 Amount
71122	Consumption High Speed Diesel Oil	1.09	0.55
71211	Coal handling contract charges	4.86	5.15
71217	Payments to railway staff-Fixed	0.09	0.05
71219	Other coal related costs	10.81	9.25
71299	Price variation 71 Group	0.23	0.12
71600	Consumption Lubricants & Consumables	0.01	0.04
	TOTAL	17.09	15.16

We have verified the same on the basis of audited trial balance, financial data and cost allocation as certified by the management of MSPGCL,TPS Parli Vaijnath (B-135) in respective financial years.
This certificate is being issued on specific request of client for submission to MERC.
It should not be used by any other person or any other purpose. Accordingly we do not accept or assume any liability into whose hands it may come without our prior consent in writing.

Hence certified

For,
M K M M & Associates
Chartered Accountants

Anand Gopikishan Mundada
Digitally signed by Anand Gopikishan Mundada
Date: 2024.10.10 17:45:42 +05'30'

Date :- 10/10/2024
Place :- Parli Vaijnath.

CA Anand Mundada
(Partner) M.NO:- 112599
FRN:- 137189W
UDIN :- ***24112599BJZYQV1904***

P C Bhandari and Co.
CHARTERED ACCOUNTANTS

"First Floor", Kanchan,
Bhandari Bhavan, Ramdas Peth,
Akola-444001
Phone:0724-2439256, 94221-61138
E mail: pcthegreatest@gmail.com

CERTIFICATE FOR FIXED CHARGES INCURRED DURING FY 22-23

This is to certify that the other coal related fixed charges incurred at Maharashtra State Power Generation Co Ltd, Paras Thermal Power Station, Paras during the last Financial Year 2022-23 in respective GL Code is as follows:

(Rs in Crores)

GL Code	Other Coal Related Fixed Chages	FY 2022-23
71211	Coal handling contract charges	5.30
71216	Payments to railway staff	0.18
71219	Other coal related costs	6.78
71122	Consumption High Speed Diesel Oil	2.89
71299	Price variation 71 Group	1.00
	Total	**16.15**

Above figures has been certified on the basis of GL Ledgers & Documents produced before us & explanations provided to us.
This certificate is being issued at the request of Mr. Avinash Rathod Sr.Manager (F&A) at Paras TPS to be provided to Maharashtra Electricity Regulatory Commission, Mumbai.

Place-Akola

Date: 29-10-2024

FOR P.C.BHANDARI & CO.
CHARTERED ACCOUNTANTS

[P C Bhandari- PARTNER]
Membership No - 039710
UDIN: 24039710BKCXOA2065

P C Bhandari and Co.
CHARTERED ACCOUNTANTS

CA INDIA

"First Floor", Kanchan,
Bhandari Bhavan, Ramdas Peth,
Akola-444001
Phone:0724-2439256, 94221-61138
E mail: pcthegreatest@gmail.com

CERTIFICATE FOR FIXED CHARGES INCURRED DURING FY 23-24

This is to certify that the other coal related fixed charges incurred at Maharashtra State Power Generation Co Ltd, Paras Thermal Power Station, Paras during the last Financial Year 2023-24 in respective GL Code is as follows:

(Rs in Crores)

GL Code	Other Coal Related Fixed Chages	FY 2023-24
71211	Coal handling contract charges	6.39
71216	Payments to railway staff	0.22
71219	Other coal related costs	5.59
71122	Consumption High Speed Diesel Oil	2.28
71299	Price variation 71 Group	0.91
	Total	**15.39**

Above figures has been certified on the basis of GL Ledgers & Documents produced before us & explanations provided to us.
This certificate is being issued at the request of Mr. Avinash Rathod Sr.Manager (F&A) at Paras TPS to be provided to Maharashtra Electricity Regulatory Commission, Mumbai.

Place-Akola

Date: 29-10-2024

P.C. BHANDARI & CO. Kanchan, Ramdas Peth, Akola M.S. CHARTERED ACCOUNTANTS

FOR P.C.BHANDARI & CO.
CHARTERED ACCOUNTANTS

PCBhandari

[P C Bhandari- PARTNER]
Membership No - 039710
UDIN: 24039710BKCXOB3607

Annexure 17

IT Expenses – Breakup & Explanation.

MAHAGENCO									
HO-IT									
Expenses for FY 22-23, FY 23-24 & projection for FY 24-25 & PROJECTIONS FOR FY 25-26 TO 29-30									
Sr No.	**Activity**	**FY 22-23 (In Rs. Cr.)**	**FY 23-24 (In Rs. Cr.)**	**FY 24-25 (In Rs. Cr.)**	**FY 25-26 (In Rs. Cr.)**	**FY 26-27 (In Rs. Cr.)**	**FY 27-28 (In Rs. Cr.)**	**FY 28-29 (In Rs. Cr.)**	**FY 29-30 (In Rs. Cr.)**
6	Procurement and implementation of FRS Biometric attendance system - Operation	-	1.14	2.25	2.58	2.97	3.42	3.93	4.52
11	Email O365 E1	0.93	1.33	1.33	1.33	1.53	1.76	2.02	2.33
12	Email O365 E3	-	0.10	0.13	0.13	0.13	0.14	0.17	0.19
13	MS APP O365	-	0.54	0.89	0.89	1.03	1.18	1.36	1.56
14	STPI DC	-	0.22	0.42	0.42	0.42	0.48	0.55	0.63
15	STPI DR	-	-	0.23	0.23	0.23	0.26	0.30	0.35
16	WEBSITE and Mobile App	-	0.20	0.50	0.50	0.50	0.57	0.66	0.76
17	AR	System Under Capex MAHAGENCO			0.23	0.23	0.26	0.30	0.34
18	FISS	MERC Approved - System Under Capex CSTPS			-	2.78	2.78	2.78	2.78
19	AIBCIP	MERC Approved - System Under Capex KGSC			-	14.44	16.61	19.10	21.96
20	AIBCIP	MERC Approved - System Under Capex GTPS			-	2.62	3.01	3.46	3.98
21	CMS	MERC Approved - System Under Capex MAHAGENCO			-	3.91	3.91	3.91	3.91
28	ISO 27001 2013 Recertification for IT OT Infrastructure	-	0.58	0.29	0.29	0.77	0.38	0.38	1.02
31	MDR Antivirus	0.81	2.63	9.03	-	10.38	-	-	11.94
32	UTM firewall	2.99	-	-	3.43	-	-	0.04	-
38	Memory Extension of ERP Landscape (HANA RAM) AND DISK SPACE IN SAP BW Landscape	0.13	0.16	-	-	-	-	-	-
39	MFA	0.13	0.46	0.53	0.61	0.70	0.80	0.92	1.06
40	FOIS	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.07
41	SAC	0.20	0.21	0.25	-	-	-	-	-
42	SAP HEC	7.05	7.05	-	-	-	-	-	-
43	SAP AMS / PREMIUM ENGAGEMENT	1.34	1.34	0.40	3.00	3.00	3.00	3.00	3.00
44	Additional Disk space	0.04	-	-	-	-	-	-	-
45	SAP Learning Hub	0.28	-	-	-	-	-	-	-
46	GRC	0.44	0.44	0.44	0.51	0.59	0.67	0.78	0.89
47	ATS	2.94	3.03	-	-	-	-	-	-
48	E-invoicing Portal	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.04
49	Disk space storage for SAP BW, SRM and cFolders	0.14	-	-	-	-	-	-	-
50	Tomcat	0.03	0.09	0.09	0.09	0.10	0.12	0.13	0.15
51	Additional AMS	-	0.48	-	-	-	-	-	-
52	Upgradation of MAHAGENCO SAP landscape's to RISE	-	14.89	14.16	14.89	14.89	17.13	17.13	17.13
53	Migration of MAHAGENCO SAP landscape's to RISE	-	7.49	-	-	-	-	-	-
54	Procurement,Installation,Commissioning and Maintainenace of Smart Rack Solution	-	-	2.94	-	-	0.60	0.70	0.80
55	Procurement,Installation,Commissioning and Maintainenace of Backup Solution	-	-	12.92	-	-	2.00	2.20	2.40
	Total	**17.50**	**42.45**	**46.84**	**29.18**	**61.27**	**59.17**	**63.91**	**81.82**

Annexure 18

MTBF Certification for FY 2022-23.

MAHATRANSCO
Maharashtra State Electricity Transmission Co. Ltd.

MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO.LTD.
CIN NO. U40109MH2005SGC153646
Maharashtra State Load Dispatch Center

Tele :91-022-27601762 (P)
91-022-27601931 (O) Extn.1003
Email : cesldc@mahasldc.in
website : www.mahasldc.in

Office of The Chief Engineer
Maharashtra State Load Dispatch Center
Thane-Belapur Road, P.O. Airoli
Navi Mumbai Pin – 400 708.

RIGHT TO INFORMATION

No. CELD/Tech-SO/ No 02195 Date: 24 OCT 2024

To,

The Chief Engineer,
Regulatory & Commercial Dept.,
3rd Floor, Prakashgarh MSPGCL,
Bandra (E), Mumbai.

Sub: Certification for Mean Time Between Failure (MTBF) of MSPGCL Generating stations for FY 2022-23.

Ref: MSPGCL Letter No. -RCD22/18E/LT0955 dated 15th Jul 2024.

In context with the above subject and reference, please find enclosed herewith the Certificate for Mean Time Between Failure (MTBF) of MSPGCL Generating Stations for FY 2022-23.

Certificate is issued based on data submitted by MSPGCL and verified as per MSLDC's Daily System Report (DSR) records.

Thanking You,

Yours faithfully,

Encl: Annexure-1 to 9

(Girish Pantoji)
Chief Engineer (I/C),
MSLDC, Airoli.

Annexure-1

Mean Time Between Failure (MTBF) Computation for Bhusawal U-3 to 5

FY 2022-23				
Bhusawal U-3 to 5				
Unit No.3	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	676.58	14	
	Effective Running of unit	8083.42		**24.06**
Unit No.4	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	300.53	15	
	Effective Running of unit	8459.47		**23.50**
Unit No.5	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	527.48	15	
	Effective Running of unit	8232.52		**22.87**

(Girish Pantoji)
Superintending Engineer (Op),
MSLDC, Airoli.

Annexure-2

Mean Time Between Failure (MTBF) Computation for Chandrapur U-3 to 9

FY 2022-23				
Chandrapur U-3 to 9				
Unit No.3	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	783.92	9	
	Effective Running of unit	7976.08		**36.93**
Unit No.4	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	373.03	7	
	Effective Running of unit	8386.97		**49.92**
Unit No.5	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	326.48	11	
	Effective Running of unit	8433.52		**31.95**
Unit No.6	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	709.33	13	
	Effective Running of unit	8050.67		**25.80**
Unit No.7	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	2399.60	13	
	Effective Running of unit	6360.40		**20.39**
Unit No.8	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	208.73	6	
	Effective Running of unit	8551.27		**59.38**
Unit No.9	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	457.53	7	
	Effective Running of unit	8302.47		**49.42**

(Girish Pantoji)
Superintending Engineer (Op),
MSLDC, Airoli.

Annexure-3

Mean Time Between Failure (MTBF) Computation for Khaperkheda U-1 to 5

FY 2022-23					
Khaperkheda U-1 to 5					
Unit No.1	**Particulars**	**Hrs**	**No. of Outages**	**MTBF**	**(Days)**
	Total hrs in FY 2022-23	8760.00			
	Forced Outages	233.37	8		
	Effective Running of unit	8526.63			**44.41**
Unit No.2	**Particulars**	**Hrs**	**No. of Outages**	**MTBF**	**(Days)**
	Total hrs in FY 2022-23	8760.00			
	Forced Outages	30.13	5		
	Effective Running of unit	8729.87			**72.75**
Unit No.3	**Particulars**	**Hrs**	**No. of Outages**	**MTBF**	**(Days)**
	Total hrs in FY 2022-23	8760.00			
	Forced Outages	305.62	16		
	Effective Running of unit	8454.38			**22.02**
Unit No.4	**Particulars**	**Hrs**	**No. of Outages**	**MTBF**	**(Days)**
	Total hrs in FY 2022-23	8760.00			
	Forced Outages	461.23	12		
	Effective Running of unit	8298.77			**28.82**
Unit No.5	**Particulars**	**Hrs**	**No. of Outages**	**MTBF**	**(Days)**
	Total hrs in FY 2022-23	8760.00			
	Forced Outages	247.80	8		
	Effective Running of unit	8512.20			**44.33**

(Girish Pantoji)
Superintending Engineer (Op),
MSLDC, Airoli.

Annexure-4

Mean Time Between Failure (MTBF) Computation for Koradi U-6 to 10

FY 2022-23				
Koradi U-6 to 10				
Unit No.6	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	1001.55	24	
	Effective Running of unit	7758.45		**13.47**
Unit No.7	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	Retired (04/08/2021 At 00.00)		
	Effective Running of unit			
Unit No.8	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	459.43	11	
	Effective Running of unit	8300.57		**31.44**
Unit No.9	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	1255.02	12	
	Effective Running of unit	7504.98		**26.06**
Unit No.10	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	745.32	9	
	Effective Running of unit	8014.68		**37.11**

(Girish Pantoji)
Superintending Engineer (Op),
MSLDC, Airoli.

Annexure-5

Mean Time Between Failure (MTBF) Computation for Nashik U-3 to 5

FY 2022-23				
Nashik U-3 to 5				
Unit No.6	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	1095.42	21	
	Effective Running of unit	7664.58		**15.21**
Unit No.7	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	443.82	8	
	Effective Running of unit	8316.18		**43.31**
Unit No.8	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	1177.20	17	
	Effective Running of unit	7582.80		**18.59**

(Girish Pantoji)
Superintending Engineer (Op),
MSLDC, Airoli.

Annexure-6

Mean Time Between Failure (MTBF) Computation for Paras U-3 & 4

FY 2022-23				
Paras U-3 & 4				
Unit No.3	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	430.58	23	
	Effective Running of unit	8329.42		**15.09**
Unit No.4	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	726.67	17	
	Effective Running of unit	8033.33		**19.69**

(Girish Pantoji)
Superintending Engineer (Op),
MSLDC, Airoli.

Annexure-7

Mean Time Between Failure (MTBF) Computation for Parli U-6 to 8 for FY 2022-23

FY 2022-23				
Parli U-6 to 8				
Unit No.6	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	547.63	20	
	Effective Running of unit	8212.37		**17.11**
Unit No.7	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	478.77	16	
	Effective Running of unit	8281.23		**21.57**
Unit No.8	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	465.32	12	
	Effective Running of unit	8294.68		**28.80**

(Girish Pantoji)
Superintending Engineer (Op),
MSLDC, Airoli.

Annexure-8

Mean Time Between Failure (MTBF) Computation for GTPS, Uran

FY 2022-23				
GTPS, Uran				
Unit No.5	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	3225.58	2	
	Effective Running of unit	5534.42		**115.30**
Unit No.6	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	171.60	11	
	Effective Running of unit	8588.40		**32.53**
Unit No.7	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	8760.00	1	
	Effective Running of unit	0.00		**0.00**
Unit No.8	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	2167.23	11	
	Effective Running of unit	6592.77		**24.97**
Unit No.A0	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	4984.15	4	
	Effective Running of unit	3775.85		**39.33**
Unit No.B0	**Particulars**	**Hrs**	**No. of Outages**	**MTBF (Days)**
	Total hrs in FY 2022-23	8760.00		
	Forced Outages	2676.85	24	
	Effective Running of unit	6083.15		**10.56**

(Girish Pantoji)
Superintending Engineer (Op),
MSLDC, Airoli.

Annexure-9

Mean Time Between Failure (MTBF) Computation of MSPGCL stations for FY 22-23

Sr. No.	Total hrs in FY 22-23 (365*24)	Unit Name	outage hrs	Total Effective running hrs	No. of forced outages	MTBF in days ∑ (Dti-Uti)/N
1	8760	BHUSAWAL_U3	676.58	8083.42	14	**24.06**
2	8760	BHUSAWAL_U4	300.53	8459.47	15	**23.50**
3	8760	BHUSAWAL_U5	527.48	8232.52	15	**22.87**
4	8760	CHANDRAPUR_U3	783.92	7976.08	9	**36.93**
5	8760	CHANDRAPUR_U4	373.03	8386.97	7	**49.92**
6	8760	CHANDRAPUR_U5	326.48	8433.52	11	**31.95**
7	8760	CHANDRAPUR_U6	709.33	8050.67	13	**25.80**
8	8760	CHANDRAPUR_U7	2399.60	6360.40	13	**20.39**
9	8760	CHANDRAPUR_U8	208.73	8551.27	6	**59.38**
10	8760	CHANDRAPUR_U9	457.53	8302.47	7	**49.42**
11	8760	KHAPERKHEDA_U1	233.37	8526.63	8	**44.41**
12	8760	KHAPERKHEDA_U2	30.13	8729.87	5	**72.75**
13	8760	KHAPERKHEDA_U3	305.62	8454.38	16	**22.02**
14	8760	KHAPERKHEDA_U4	461.23	8298.77	12	**28.82**
15	8760	KHAPERKHEDA_U5	247.80	8512.20	8	**44.33**
16	8760	KORADI_U6	1001.55	7758.45	24	**13.47**
17	8760	KORADI_U7	Retired (04/08/2021 At 00.00)			
18	8760	KORADI_U8	459.43	8300.57	11	**31.44**
19	8760	KORADI_U9	1255.02	7504.98	12	**26.06**
20	8760	KORADI_U10	745.32	8014.68	9	**37.11**
21	8760	NASHIK_U3	1095.42	7664.58	21	**15.21**
22	8760	NASHIK_U4	443.82	8316.18	8	**43.31**
23	8760	NASHIK_U5	1177.20	7582.80	17	**18.59**
24	8760	PARAS_U3	430.58	8329.42	23	**15.09**
25	8760	PARAS_U4	726.67	8033.33	17	**19.69**
26	8760	PARLI_U6	547.63	8212.37	20	**17.11**
27	8760	PARLI_U7	478.77	8281.23	16	**21.57**
28	8760	PARLI_U8	465.32	8294.68	12	**28.80**
29	8760	URAN_U5	3225.58	5534.42	2	**115.30**
30	8760	URAN_U6	171.60	8588.40	11	**32.53**
31	8760	URAN_U7	8760.00	0.00	1	**0.00**
32	8760	URAN_U8	2167.23	6592.77	11	**24.97**
33	8760	URAN_UA0	4984.15	3775.85	4	**39.33**
34	8760	URAN_UB0	2676.85	6083.15	24	**10.56**

(Girish Pantoji)
Superintending Engineer (Op),
MSLDC, Airoli.

Annexure 19

Auditors Certificates regarding CMAG Expenses FY 2022-23 & FY 2023-24.

CERTIFICATE

This is to certify that the expenditure incurred on Chief Minister Solar AG Feeder scheme for FY 2022-23 by the office of Chief Engineer, RE-Projects, Pune (Business area B175) are as below:

CMSAG Feeder Scheme Expenditure Details for FY 2022-23		
Sr. No.	**Particulars**	**Amount (in Rs.)**
1	Cost of Material & services Consumed	1,36,24,721
2	Employee Benefit expense	3,06,32,606
3	Finance Cost	138
4	Depreciation and Amortization expense	2,68,832
5	Other Admin and General Expense	11,75,229
	Total	**4,57,01,527**

This certification is based on verified records, financial statements, and relevant information. The details provided are true and accurate to the best of our knowledge and belief.

For M/s Mehta Shah & Company
Chartered Accountants

MEHTA SHAH & CO. F. R. No. 106315W PUNE Chartered Accountants

CA Sandeep R. Mundada
Partner
M.No. 120096
Place: Pune
Date: 10/10/2024
UDIN : **24120096BKAETF6791**

MEHTA SHAH & COMPANY
CHARTERED ACCOUNTANTS

CERTIFICATE

This is to certify that the expenditure incurred on Chief Minister Solar AG Feeder scheme for FY 2023-24 by the office of Chief Engineer, RE-Projects, Pune (Business area B175) are as below:

CMSAG Feeder Scheme Expenditure Details for FY 2023-24		
Sr. No.	**Particulars**	**Amount (in Rs.)**
1	Cost of Material & services Consumed	15,77,942
2	Employee Benefit expense	2,05,95,858
3	Finance Cost	7,001
4	Depreciation and Amortization expense	6,83,468
5	Other Admin and General Expense	40,76,490
	Total	**2,69,40,758**

This certification is based on verified records, financial statements, and relevant information. The details provided are true and accurate to the best of our knowledge and belief.

For M/s Mehta Shah & Company
Chartered Accountants

MEHTA SHAH & CO. ★ F. R. No. 106315W PUNE ★ Chartered Accountants

CA Sandeep R. Mundada
Partner
M.No. 120096
Place: Pune
Date: 10/10/2024
UDIN : **24120096BKAETD7241**

A/1/1, Amitshree Apts., 852, Bhandarkar Institute Road, Pune-04.
Tele: 8983600518, 7276000518. Email: mehtashah83@gmail.com

To,

The Chief Engineer (RE Projects),

MSPGCL, Nagpur, Koradi Complex, Chindwara Road,

Koradi – 441111

CERTIFICATE

On the basis of records produced before us and information and explanation provided to us, this is certified that Expenditures against the Chief Minister Agriculture Feeder Scheme (CMAG) with MERC for petition, the expenditure incurred for the **FY 2022-23 & 2023-24** booked by Civil Construction Circle Koradi in Business Area B174 (RE-Project Nagpur) are as under:

(Amount in Rs.)

S.N.	Particulars	FY 2022-23	FY 2023-24
1	Cost of Material Consumed	0.00	0.00
2	Employee Benefit expense	0.00	0.00
3	Finance Cost	0.00	0.00
4	Depreciation and Amortization expense	0.00	12,82,842.00
5	Other Admin and General Expense	43,28,076.66	10,71,891.45
Total		**43,28,076.66**	**23,54,733.45**

This certificate is issued at the request of Sr. Manager (F&A), CEGC, Koradi.

For Amit Chandak & Associates
Chartered Accountants
Firm Registration No. 152262W

Place: Nagpur
Date: 10/10/2024

Amit Chandak & Associates NAGPUR

CA. Amit Chandak
Proprietor
Membership No. 135442

The Unique Document Identification Number (UDIN) for this document is 24135442BKFQNG6861

205, Rajat Sankul - 2, Near S T Bus Stand, Ganeshpeth, Nagpur - 440 018
☎+91-8605 360 360 | ☎+91-9689 360 360 | ✉ archandak@gmail.com

PRABHU P R & ASSOCIATES
CHARTERED ACCOUNTANT

Mobile: 8691999769

**Room 2, Behind Vasant Trading Co,
Opp Civil Hospital ,Shahapur
Dist Thane-421601.**

Email: caprashantprabhu@gmail.com

Date :-**10/10/2024**

CERTIFICATE

This is to certify that the expenditure incurred on Chief Minister Solar AG Feeder Scheme for FY 2022-23 by the Nashik Regional CE office (Business area B177) are as below :-

CMSAG Feeder Scheme Expenditure Details for FY 2022-23

Sr.No	Particulars	Amount (in Rs)
1	Cost of Material Consumed	-
2	Employee Benefit expense	-
3	Finance Cost	-
4	Depreciation and Amortization expense	-
5	Other Admin and General Expense	49,314
	Total	**49,314**

This Certification is based on verified records ,financial statements , and relevant information. The details provided are true and accurate to the best of my knowledge and belief.

For PRABHU P R & ASSOCIATES
CHARTERED ACCOUNTANT
FRN:- 149232W
MRN :- 151988
Place: SHAHAPUR
UDIN:- 24151988BKEKKF2321

Prashant Raghuram Prabhu

Digitally signed by Prashant Raghuram Prabhu
Date: 2024.10.10 13:31:49 +05'30'

PRABHU P R & ASSOCIATES
CHARTERED ACCOUNTANT

Mobile: 8691999769

**Room 2, Behind Vasant Trading Co,
Opp Civil Hospital ,Shahapur
Dist Thane-421601.**

Email: caprashantprabhu@gmail.com

Date :-**10/10/2024**

CERTIFICATE

This is to certify that the expenditure incurred on Chief Minister Solar AG Feeder Scheme for FY 2023-24 by the Nashik Regional CE office (Business area B177) are as below :-

CMSAG Feeder Scheme Expenditure Details for FY 2023-24

Sr.No	Particulars	Amount (in Rs)
1	Cost of Material Consumed	-
2	Employee Benefit expense	46,32,409
3	Finance Cost	-
4	Depreciation and Amortization expense	-
5	Other Admin and General Expense	1,31,629
	Total	**47,64,038**

This Certification is based on verified records ,financial statements , and relevant information. The details provided are true and accurate to the best of my knowledge and belief.

For PRABHU P R & ASSOCIATES
CHARTERED ACCOUNTANT
FRN:- 149232W
MRN :- 151988
Place: SHAHAPUR
UDIN:- 24151988BKEKKG3937

Prashant Raghuram Prabhu
Digitally signed by Prashant Raghuram Prabhu
Date: 2024.10.10 13:35:26 +05'30'

FY 2022-23					
Sr. No.	Particulars	Nashik Regional CE office (Business Area B177)	Civil Construction Circle Koradi (Business Area B174)	Pune Regional CE office (Business Area B175)	Total
1	Cost of Material & Service Consumed			1,36,24,721.00	
2	Employee Benefit expense			3,06,32,606.00	
3	Finance Cost			138.00	
4	Depreciation and Amortization expense			2,68,832.00	
5	Other Admin and General Expense	49,314.00	43,28,076.66	11,75,229.00	
	Total	**49,314.00**	**43,28,076.66**	**4,57,01,526.00**	**5,00,78,916.66**
		49,314.00	**43,28,076.66**	**4,54,32,694.00**	**4,98,10,084.66**

FY 2023-24					
Sr. No.		Nashik Regional CE office (Business Area B177)	Civil Construction Circle Koradi (Business Area B174)	Pune Regional CE office (Business Area B175)	Total
1	Cost of Material & Service Consumed			15,77,942.00	
2	Employee Benefit expense	46,32,409.00		2,05,95,858.00	
3	Finance Cost			7,001.00	
4	Depreciation and Amortization expense		12,82,842.00	6,83,468.00	
5	Other Admin and General Expense	1,31,629.00	10,71,891.45	40,76,490.00	
	Total	**47,64,038.00**	**23,54,733.45**	**2,69,40,759.00**	**3,40,59,530.45**
	Excl Depr Total	**47,64,038.00**	**10,71,891.45**	**2,62,57,291.00**	**3,20,93,220.45**