

BEFORE THE HON'BLE CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

PETITION NO.....

IN THE MATTER OF : Petition Under Section 62 and 79 (1) (a) of the Electricity Act, 2003 read with Chapter-III of the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 2023 and Chapter-3, Regulation-9 of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2024 for approval of tariff of **Mauda Super Thermal Power Station Stage-I (1000 MW) for the period from 01.04.2024 to 31.03.2029.**

INDEX

Sl. No.	Description	Page No.
1	Summary of Issues	1-2
2	Petition for Approval of Tariff of Mauda-I for 2024-29	3-13
3	Affidavit	14-15
4	Appendix-I (Tariff Forms)	16-82
5	Appendix-I (a) (Suppl. Tariff Forms CM System)	83-101
6	Annexure-A/1	102-134
7	Annexure-A/2	135-158
8	Annexure-A/3	159-166
9	Annexure-A/4	167-169
10	Annexure-A/5	170-216
11	Annexure-A/6	217-220
12	Annexure-A/7	221-226

Sl. No.	Description	Page No.
13	Annexure-A/8	227-228
14	Annexure-A/9	229-233
15	Annexure-A/10	234-237
16	Annexure-A/11	238-239
17	Annexure-A/12	240-242
18	Form-15/ 15A	243-266

Summary of Issues: Determination of Tariff of Mauda Super Thermal Power Station Stage-I (1000 MW) for the period 2024-29

(In compliance with CERC notice dated 07.06.2024)

The major highlights of the Tariff Petition for Mauda Super Thermal Power Station Stage-I (1000 MW) for determination of tariff for the period 2024-29 are as follows:

1. The present petition is being filed under Section 62 and 79 (1) (a) of the Electricity Act, 2003 read with Chapter-III of the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 2023 and Chapter-3, Regulation-9 of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2024 for determination of tariff of Mauda Super Thermal Power Station Stage-I (1000 MW) (hereinafter referred as "Mauda-I") for the 2024-29 based on projected expenditures for the said period.
2. Mauda-I is located at district Nagpur of Maharashtra. The generating station comprises 02 (two) units of 500 MW capacity each, with date of commercial operation (COD) of Unit-1 as 11.03.2013 and that of Unit-2 as 30.03.2014.
3. The power generated from Mauda-I is being supplied to various discoms as per MoP allocation and respective PPAs including Madhya Pradesh Power Management Company Limited, Maharashtra State Electricity Distribution Company, Gujarat Urja Vikas Nigam Limited, Chhattisgarh State Power Distribution Co. Ltd., Electricity Department - Government of Goa, Dadra and Nagar haveli and Daman and Diu Power Distribution Corporation Limited (DNHDDPDCL).
4. The tariff for Mauda-I for the period 2019-24 was determined by the Hon'ble Commission vide order dated 14.11.2022 in Petition No. 437/GT/2020. Subsequently, the petitioner has filed a separate true up petition for the 2019-24 period for revision of tariff in line with the applicable provisions of Tariff Regulations 2019. Accordingly, the opening capital cost as on 01.04.2024 has been considered the same as closing capital cost as on 31.03.2024 as per the said true-up petition, i.e. Rs 6722.72 Cr.

5. The tariff of Mauda-I and supplementary tariff for the CM System for the tariff period 2024-29 based on projected expenditures for the period 2024-29 is annexed with the petition as per provisions of Regulation 10 of CERC Tariff Regulations 2024.
6. The projected additional capital expenditures on cash basis for FY 24-25, FY 25-26, FY 26-27, FY 27-28 and FY 28-29 are Rs 21.32 Cr, Rs 27.80 Cr, Rs 20.77 Cr, Rs 2.97 Cr and Rs 4.38 Cr respectively amounting to total of Rs 77.24 Cr for the period 2024-29. The same has been depicted year wise in Form 9 of the Appendix-I along with applicable regulations and justification for the claims. Supporting documents wherever applicable have also been annexed in the Petition. It is humbly requested to approve the projected Additional Capital expenditure during the 2024-29 period.
7. The Petitioner has also provided the estimated water charges, security expenses and ash transportation expenses in Form-3A of Appendix-I. The Hon'ble Commission may be pleased to allow the same subject to retrospective adjustment based on actuals at the time of truing up. Further, to avoid the interest payment liability of the beneficiaries, it is prayed that the petitioner may be allowed to recover/ pass on the ash transportation charges on a monthly basis subject to true-up at the end of the 2024-29 period.
8. The Petitioner has also prayed in the petition for consideration of Gross Station Heat Rate in terms of design heat rate and applicable operating margin.

In the light of above submissions and as per the Petition being filed by the Petitioner for determination of tariff of Mauda Super Thermal Power Station Stage-I (1000 MW), the Hon'ble Commission may please determine the tariff for the period 2024-29 as per provisions of Tariff Regulations 2024.

BEFORE THE HON'BLE CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

PETITION NO.....

IN THE MATTER OF : Petition Under Section 62 and 79 (1) (a) of the Electricity Act, 2003 read with Chapter-III of the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 2023 and Chapter-3, Regulation-9 of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2024 for approval of tariff of **Mauda Super Thermal Power Station Stage-I (1000 MW) for the period from 01.04.2024 to 31.03.2029.**

Petitioner: : NTPC Ltd.
NTPC Bhawan
Core-7, Scope Complex
7, Institutional Area, Lodhi Road
New Delhi-110 003.

Respondents

1. Madhya Pradesh Power Management Company Ltd.(MPPMCL)
Shakti Bhawan, Vidyut Nagar,
Jabalpur 482 008
2. Maharashtra State Electricity Distribution Co Ltd. (MSEDCL)
Prakashgad, Bandra (East),
Mumbai 400 051
3. Gujarat Urja Vikas Nigam Ltd.(GUVNL)
Vidyut Bhavan, Race Course
Vadodara – 390 007
4. Chhattisgarh State Power Distribution Co. Ltd (CSPDCL)
P.O. Sundar Nagar,
Danganiya, Raipur – 492013

- 5 Electricity Department
Government of Goa
Vidyut Bhawan, Panaji, Goa
- 6 Dadra And Nagar Haveli and Daman and
Diu Power Distribution Corporation Limited
(DNHDDPDCL);
1st & 2nd Floor, Vidyut Bhavan, Silvassa-
396230, DNH, India

The Petitioner humbly states that:

- 1) The Petitioner herein NTPC Ltd. (hereinafter referred to as '**Petitioner**' or '**NTPC**'), is a company incorporated under provisions of the Company Act, 1956 and a Government Company as defined under Section 2(45) of the Companies Act, 2013. Further, NTPC is a 'Generating Company' as defined under Section 2(28) of the Electricity Act, 2003.
- 2) In terms of Section 79(1)(a) of Electricity Act, 2003, the Hon'ble Commission has been vested with the functions to regulate the tariff of NTPC, being a Generating Company owned and controlled by the Central Government. The regulation of the tariff of NTPC is as provided under Section 79(1)(a) read with Section 61, 62 and 64 of the Electricity Act, 2003 and the Regulations notified by the Hon'ble Commission in exercise of powers under Section 178 read with Section 61 of the Electricity Act, 2003.
- 3) The Petitioner is having power stations/ projects at different regions and places in the country. **Mauda Super Thermal Power Station Stage-I (1000 MW)** (hereinafter referred to as Mauda-I is one such station located in the State of Maharashtra. The power generated from Mauda-I is being supplied to the respondents herein above.

- 4) The Hon'ble Commission has notified the Central Electricity Regulatory Commission (Terms & Conditions of Tariff) Regulations, 2024 (hereinafter 'Tariff Regulations 2024') which came into force from 01.04.2024, specifying the terms & conditions and methodology of tariff determination for the period 01.04.2024 to 31.03.2029.
- 5) Regulation 9(2) of Tariff Regulations 2024 provides as follows:

"(2) In case of an existing generating station or unit thereof, or transmission system or element thereof, the application shall be made by the generating company or the transmission licensee, as the case may be, by 30.11.2024, based on admitted capital cost including additional capital expenditure already admitted and incurred up to 31.3.2024 (either based on actual or projected additional capital expenditure) and estimated additional capital expenditure for the respective years of the tariff period 2024-29 along with the true up petition for the period 2019-24 in accordance with the CERC (Terms and Conditions of Tariff) Regulations, 2019.

(3) In case an emission control system is required to be installed in the existing generating station or unit thereof to meet the revised emission standards, an application shall be made for the determination of supplementary tariff (capacity charges or energy charge or both) based on the actual capital expenditure duly certified by the Auditor."

Further, as submitted in detail in the truing-up petition for 2019-24 period for the instant Station, the Petitioner has implemented Combustion Modification (CM) System in the Unit-1 and Unit-2 of the instant Station w.e.f. 31.03.2021 and 23.12.2021 respectively, as part of Emission Control System (ECS) for De-NOx.

In terms of above, the Petitioner is filing the present petition for determination of tariff for the instant Mauda-I Station and determination of supplementary tariff for CM System for the period from 01.04.2024 to 31.03.2029 as per the Tariff Regulations 2024.

- 6) The tariff of the Mauda-I for the tariff period 1.4.2019 to 31.3.2024 was determined by the Hon'ble Commission vide its order dated 14.11.2022 in Petition No.437/GT/2020 in accordance with the CERC (Terms & Conditions of Tariff) Regulations 2019. The petitioner vide affidavit dated 27.11.2024 has filed a separate true up petition for the period 01.04.2019 to 31.03.2024 for revision of tariff in line with the applicable provisions of Tariff Regulations 2019.
- 7) It is submitted that Hon'ble Commission vide order dated 14.11.2022 in Petition no 437/GT/2020 has allowed a capital cost of Rs 6684.10 Cr as on 31.03.2024 based on the admitted projected capital expenditure for the 2019-24 period. It is also pertinent to note that subsequent to the said Order dated 14.11.2022 for 2019-24 period, the Hon'ble Commission vide Order dated 01.05.2024 in Petition No 10/RP/2023 in 393/GT/2020, i.e. Review Petition in the Order issued for truing-up of tariff of the instant Station for the period 2014-19, revised the closing capital cost as on 31.03.2019 to Rs 6639.67 Cr. Further, the actual closing capital cost as on 31.03.2024 has been worked out in the foresaid true-up petition as Rs 6722.72 Cr based on the actual expenditure after truing up exercise for the period 2019-24. Accordingly, the Petitioner has adjusted an amount of Rs 38.66 Cr to the admitted capital cost as on 31.03.2024 and accordingly the opening capital cost as on 01.04.2024 has been considered as Rs 6722.72 Cr in the instant petition. The Hon'ble Commission may be pleased to accordingly adopt this adjustment in the admitted capital cost as on 31.3.2024 and determine the tariff in the present petition for the period 2024-29.
- 8) Further, the actual capital cost for CM System as on 31.03.2024 has been claimed as Rs 15.69 Cr in the truing-up petition for the instant Station for the 2019-24 period and the same has been considered as opening capital cost as on 01.04.2024 in the instant petition.
- 9) The capital cost claimed in the instant petition is based on the opening capital cost as on 01.04.2024 considered as above and projected estimated capital expenditures claimed for the period 2024-29 under Regulation 19, Regulation 25, Regulation 26 and Regulation 102 of the Tariff Regulations, 2024.

- 10) The Petitioner further respectfully submits that as per Regulation 36(1)(6) of the Tariff Regulations 2024, the water charges, security expenses, ash transportation expenses and capital spares consumed for thermal generating stations are to be allowed separately. The details in respect of water charges such as type of cooling water system, rate of water charges, etc. as applicable for 2023-24 have been furnished below. Further, water charges for 2024-29 period have been claimed on projection basis based on pertinent factors such as annual allocation, rate of water charges, etc. and the same may be allowed in the tariff for the 2024-29 period subject to retrospective adjustment at the time of truing-up based on actual water charges paid.

Description	Remarks
Type of Plant	Coal based Thermal Power Plant
Type of cooling water system	Closed Circuit Cooling System
Rate of Water charges (Rs/cubic meter)	12.10
Total Water Charges for Mauda STPS all stages (2320 MW)	Rs 5383.55 lakh

(* For FY 2023-24 as per truing-up petition filed for the instant Station)

- 11) Similarly, the Petitioner is claiming the security and ash transportation expenses based on the estimated expenses for the period 2024-29 and the same shall be subject to retrospective adjustment based on actuals at the time of truing up. In respect of capital spares consumption, it is submitted that the same shall be claimed at the time of true-up in terms of the proviso to the Regulation 36(1)(6) based on actual consumption of spares during the period 2024-29.
- 12) However, it is submitted that the expenditure towards the ash transportation charges is recurring in nature and the Petitioner has been incurring ash transportation expenditure in its stations in the current tariff period also. In case the same is permitted to be recovered after the issuance of the tariff order for the period 2024-29, there will be additional liability on the beneficiary on account of the interest payment for the period till the time the tariff petitions for the period 2024-29 is decided. To avoid the interest payment liability of the beneficiaries,

it is prayed that the petitioner may be allowed to recover/ pass on the ash transportation charges on a monthly basis subject to true-up at the end of the 2024-29 period.

- 13) The petitioner humbly submits that petition no. 227/MP/2024 has been filed by the petitioner concerning Ash Utilization Expenditure for its stations which is under active consideration of this Hon'ble Commission and the outcome of the said petition will be applicable to the instant petition also.
- 14) The present petition is filed on the basis of norms specified in the Tariff Regulations 2024. It is submitted that the petitioner is in the process of installing the Wet Limestone based FGD for De-SO_x as part of Emission Control Systems (ECS) in compliance of the Revised Emission Standards as notified by MOEF vide notification dated 07.12.2015 as amended. Completion of the schemes in compliance of revised emission norms will affect the Station APC, Heat Rate, O&M expenses, water consumption, etc. In addition, the availability of the unit/ station would be also affected due to shutdown of the units for installation of ECS. The petitioner would be filing the details of the same in terms of the Regulation 29 of Tariff Regulations 2024.
- 15) It is submitted that Hon'ble Commission has prescribed boiler efficiency and turbine heat rate separately for deriving the unit heat rate where the Unit Heat Rate is not guaranteed by the suppliers. It is submitted that the instant station was envisaged during the period 2004-09 and equipment including SG and TG specifications for tendering / award was stipulated considering the boiler efficiency and the turbine heat rate prescribed by the Hon'ble Commission in the Tariff Regulations at that time. Based on the same the equipment were ordered through competitive bidding. It was not possible for the petitioner to specify the efficiency parameters at the time of finalizing the contracts on the instant station as per the efficiency parameters specified in Tariff Regulations 2024-29 which are more stringent.

In a similar case, Hon'ble Commission in its order dated 20.02.2014 in Petition No. 160/GT/2012 has considered the design parameters for computing Gross

Heat Rate of the station with appropriate operating margin and has stated as under:

Quote

"161. As per the guaranteed turbine cycle heat rate of 1945 kCal/kWh and boiler efficiency of 88.5% along with the deviation of 6.5 % as per the 2009 Tariff Regulations, the Gross Heat Rate works out to 2340.59 kcal/kWh. Without the margin of Auxiliary consumption of 6.5%, the Gross Heat Rate works out as 2197.74 kcal/kWh. In light of this, achieving a GSHR of 2220 kcal/kWh as per submission of the respondents 1 to 6 is not possible. Also, the EPC contract was finalized in 2006 and there was no possibility for the petitioner to specify the Station Heat Rate as per the 2009 Tariff Regulations. In view of above, we consider a GSHR of 2340.59 kCal/kWh based on guaranteed turbine cycle heat rate 1945 kCal/kWh and boiler efficiency of 88.5% with a deviation of 6.5 % from the guaranteed design value."

UNQUOTE

Further, Hon'ble Commission vide its order dated 21.04.2022 in petition no 362/GT/2020 while determining tariff of Kahalgaon STPS-II of NTPC Limited has relaxed the boiler efficiency for computing Gross Heat Rate of the station with appropriate operating margin. The same is quoted below:

Quote

"157. Accordingly, the Commission considered the SHR of 2425 kCal /kWh as approved for 2009-14 tariff period and in exercise of Power to Relax under Regulation 54 and Power to Remove Difficulty under Regulations 55 of Tariff Regulations, 2014 allowed boiler efficiency of the units of the generating station below 0.85 for the period 2014-19"

UNQUOTE

Further, if the Petitioner had stipulated more stringent unit heat rate this would have increased the capital cost commensurate to the efficiency parameters sought. The benefit of the lower capital cost due to lower efficiency parameters has already been passed onto the beneficiaries in terms of lower capital cost. If now the boiler efficiency for working out the normative heat rate is considered as 86% instead of the actual design efficiency of 84.1%, the Gross Station Heat Rate would work out to be 2347.6 kCal/kWh and the operating margin available

over the design heat rate would be 2.19 % only which is much less than the operating margin of 4.5% allowed in the Tariff Regulations 2024. Moreover, it is submitted that boiler efficiency is largely a function of coal quality. In view of above submission, it is prayed that Gross Station Heat rate of 2400.64 kCal/kWh may be allowed based on guaranteed turbine cycle heat rate of 1932 kCal/kWh and actual boiler efficiency of 84.10 % with an operating margin of 4.5 % from the guaranteed design value. The tariff computation attached at Appendix-I is based on considering Station Heat Rate as per design heat rate with applicable operating margin of 4.5%.

- 16) The petitioner has accordingly calculated the tariff and supplementary tariff (for CM System) for Mauda-I for 2024-29 period based on the above and the same is enclosed as **Appendix-I** and **Appendix-I (a)** to this petition.

- 17) The Petitioner humbly submits that the pay/wage revision for the employees of the Petitioner will be due w.e.f. 01.01.2027. Further, the wage/pay revision of CISF and Kendriya Vidyalaya employees will also be due for revision during the tariff period 2024-29. Regulation-36(1)(8) of CERC (Terms & Conditions of Tariff) Regulations-2024 provides as below:
"In the case of a generating company owned by the Central or State Government, the impact on account of implementation of wage or pay revision shall be allowed at the time of truing up of tariff."
In accordance with the above said regulation, the Petitioner craves liberty to approach the Hon'ble Commission for allowing the impact of Pay/wage revision of employees of the Petitioner i.e. NTPC Limited, CISF and Kendriya Vidyalaya (wherever applicable) as additional O&M expenses.

- 18) It is submitted that in terms of Regulation 60 (5) of the Tariff Regulations 2024, the Petitioner is required to furnish details qua providing the details of Landed Price & Gross Calorific Value ("GCV") of coal in Form 15. It is further submitted that the Petitioner in terms of Regulation 40 of the Tariff Regulations 2019 was

required to furnish the details for Landed Price & GCV of coal also as per Form 15 of the Tariff Regulations, 2019.

- 19) However, in so far as the present Petition is concerned, the Petitioner has prepared & submitted the data of coal as per Form 15 of the Tariff Regulations, 2019. The same is because of the following reasons:-
- (a) This Hon'ble Commission had notified the Tariff Regulations, 2019 on 07.03.2019 and the same was in effect till 31.03.2024.
 - (b) The Petitioner being a diligent utility has been seamlessly providing the said data of coal in terms of the prescribed format (i.e. Form 15 of Annexure-I (Part I)) of the Tariff Regulations, 2019 to this Hon'ble Commission for computation of Interest on Working Capital.
 - (c) Thereafter, this Hon'ble Commission on 15.03.2024 notified the Tariff Regulations, 2024, wherein the format of Form 15 was changed/ amended by this Hon'ble Commission and a new format was placed in the Tariff Regulations 2024 in the month of June'2024.
 - (d) By virtue of the said change, the Petitioner has been obligated to furnish the data of coal for its existing plants month wise for the preceding 12 months i.e. for FY 2023-24 for computation of Interest on Working Capital.
- 20) It is humbly submitted that by virtue of the Tariff Regulations, 2024, this Hon'ble Commission has added a new format/ revised the format of Form-15 which has not prescribed in the past Tariff Regulations i.e. of 2019. Hence, it is only now (in the Tariff Regulations 2024) that the Petitioner has been obligated to furnish the data of coal as per the new format of Form-15.
- 21) It is respectfully submitted that since the format for Form 15 has been changed in Tariff Regulations, 2024 and was notified in the month of June'2024, the Petitioner could not have been aware about the said changes earlier, hence the Petitioner did not maintain the data required in new format of Form 15 of Tariff Regulations, 2024.

- 22) Therefore, this Hon'ble Commission may kindly exempt the Petitioner from furnishing the data of coal in terms of new format of Form 15 of the Tariff Regulations, 2024 & may be allowed to furnish the details of coal for FY 2023-24 in terms of the prescribed format of Form-15 of the Tariff Regulations, 2019.
- 23) In light of the above submissions, it may kindly be noted that no prejudice shall be caused to any party if the Petitioner is allowed for providing the details of Landed Price & GCV of coal to this Hon'ble Commission in terms of Form 15 of the Tariff Regulations, 2019 as the value of Landed Price & GCV of coal will remain unaffected.
- 24) It is submitted that the Petitioner has already paid the requisite filing fee vide Transaction Id 37c568eba62158b7b321 on 24.04.2024 for the year 2024-25 and the details of the same have been duly furnished to the Hon'ble Commission vide our communication dtd. 27.04.2024. For the subsequent years, it shall be paid as per the provisions of the CERC (Payment of Fees) Regulations, 2012 as amended. Further Regulation 94 (1) of Tariff Regulations 2024 provides that the application fee and publication expenses may be allowed to be recovered directly from the beneficiaries at the discretion of the Hon'ble Commission. Accordingly, it is prayed that Hon'ble Commission may be pleased to allow recover filing fee and publication fee directly from the beneficiaries.
- 25) It is submitted that the Petitioner has uploaded the copy of the Petition at CERC site (Saudamini), the access of which is available to all the Respondents mentioned herein above and therefore the petition stands served to all the respondents. Further, the petitioner has also posted the Petition on the company website i.e. www.ntpc.co.in.
- 26) In accordance with the 'Conduct of Business Regulations 2023' of the Hon'ble Commission, the Petitioner shall, after filing the tariff petition, publish a notice about such filing in at least two daily leading digital newspapers one in English language and another in any of the Indian languages, having wide circulation in each of the States and Union Territories where the beneficiaries are situated, as per Form 14 appended to these regulations. Subsequently, the Petitioner

shall submit the proof of publications as soft copies of the publications under an affidavit through the e-filing portal of the Hon'ble Commission within one week from the date of publication. Further, the Petitioner shall also submit the detail of expenses incurred for publication of the notice alongwith the prayer for recovery of Publication Expenses as per Regulation-94 of CERC Tariff Regulations 2024.

- 27) It is submitted that the petitioner is filing this tariff petition subject to the outcome of its various appeals/ petitions pending before different courts. Besides, the petitions filed by NTPC for determination of capital base as on 31.03.2024 through true-up exercise are pending before the Hon'ble Commission and would take some time. The Petitioner, therefore, reserves its right to amend the tariff petition as per the outcome in such appeals/ petitions, if required.

Prayers

In the light of the above submissions, the Petitioner, therefore, prays that the Hon'ble Commission may be pleased to:

- i) Approve tariff of Mauda-I STPS and supplementary tariff for its Combustion Modification (CM) System for the tariff period 01.04.2024 to 31.03.2029.
- ii) Allow the recovery of filing fees as & when paid to the Hon'ble Commission and publication expenses from the beneficiaries.
- iii) Allow reimbursement of Ash Utilization Charges directly from the beneficiaries on monthly basis, subject to true up.
- iv) Allow the recovery of pay/wage revision as additional O&M over and above the normative O&M.
- v) Consider station heat rate based on design heat rate with applicable operating margin.
- vi) Pass any other order as it may deem fit in the circumstances mentioned above.

Petitioner

Noida
Date.....

BEFORE THE CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

PETITION NO.....

IN THE MATTER OF : Petition Under Section 62 and 79 (1) (a) of the Electricity Act, 2003 read with Chapter-III of the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 2023 and Chapter-3, Regulation-9 of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2024 for approval of tariff of Mauda Super Thermal Power Station Stage-I (1000 MW) for the period from 01.04.2024 to 31.03.2029.

Petitioner: : NTPC Ltd.
NTPC Bhawan
Core-7, Scope Complex
7, Institutional Area, Lodhi Road
New Delhi-110 003

Respondents: Madhya Pradesh Power Management
Company Limited,
Shakti Bhawan, Vidyut Nagar,
Jabalpur 482 008

and Others

AFFIDAVIT



I, Sameer Kumar Aggarwal, Son of Late Shri B K Aggarwal, aged about 51 years, working as Additional General Manager (Commercial) in the office of NTPC Limited, having its registered office at NTPC Bhawan, Scope Complex, Core-7, Lodhi Road, New Delhi-110003 do hereby solemnly affirm and state as follows:

1. That the deponent is the Additional General Manager (Commercial) of the Petitioner NTPC Ltd., and is well conversant with the facts and the circumstances of the case and therefore competent to swear this affidavit,



Sk Aggarwal

2. That the accompanying Petition under Section 62 and 79 (1) (a) of the Electricity Act, 2003, has been filed by my authorized representative under my instruction and the contents of the same are true and correct to the best of my knowledge and belief.
3. That the contents as mentioned in the Petition are true and correct based on the my personal knowledge, belief and records maintained in the office.
4. That the annexures annexed to the Petition are correct and true copies of the respective originals.
5. That the Deponent has not filed any other Petition or Appeal before any other forum or court of law with respect to the subject matter of the dispute.

Verification:

Verified at Noida on this day of November 2024, that the contents of my above noted affidavit are true and correct to my knowledge and no part of it is false and nothing material has been concealed therefrom.

sk Aggarwal
(Deponent)
समीर अग्रवाल/SAMEER AGGARWAL
अपर महाप्रबंधक (वाणिज्यिक)
Addl. General Manager (Commercial)
एन टी पी सी लिमिटेड/NTPC LIMITED
EOC, A-8A, Sector-24, Noida-201 301 (U.P.)

sk Aggarwal
(Deponent)
समीर अग्रवाल/SAMEER AGGARWAL
अपर महाप्रबंधक (वाणिज्यिक)
Addl. General Manager (Commercial)
एन टी पी सी लिमिटेड/NTPC LIMITED
EOC, A-8A, Sector-24, Noida-201 301 (U.P.)



ATTESTED
YJ
YOGENDRA SINGH
NOTARY NOIDA
G B NAGAR (U.P.) INDIA

APPENDIX-I

TARIFF FILING FORMS (THERMAL)

FOR DETERMINATION OF TARIFF

FOR

Mauda STPS Stage-I (2x500 MW)

(From 01.04.2024 TO 31.03.2029)

Checklist of Main Tariff Forms and other information for tariff filing for Thermal Stations

Form No.	Title of Tariff Filing Forms (Thermal)	Tick
FORM- 1	Summary of Tariff	✓
FORM -1 (I)	Statement showing claimed capital cost	✓
FORM -1 (II)	Statement showing Return on Equity	✓
FORM-2	Plant Characteristics	✓
FORM-3	Normative parameters considered for tariff computations	✓
FORM-3A**	Statement showing O&M Expenses	✓
FORM- 4	Details of Foreign loans	NA
FORM- 4A	Details of Foreign Equity	NA
FORM-5	Abstract of Admitted Capital Cost for the existing Projects	✓
FORM-5A**	Abstract of Claimed Capital Cost for the existing Projects	✓
FORM- 6	Financial Package upto COD	NA
FORM- 7	Details of Project Specific Loans	NA
FORM- 8	Details of Allocation of corporate loans to various projects	✓
FORM-9A**	Summary of Statement of Additional Capitalisation claimed during the period	✓
FORM-9 ##	Statement of Additional Capitalisation after COD	✓
FORM- 10	Financing of Additional Capitalisation	✓
FORM- 11	Calculation of Depreciation on original project cost	NA
FORM- 12	Statement of Depreciation	✓
FORM- 13	Calculation of Weighted Average Rate of Interest on Actual Loans	✓
FORM- 14	Draw Down Schedule for Calculation of IDC & Financing Charges	NA
FORM- 15	Details of Fuel for Computation of Energy Charges	✓
FORM- 15A	Details of Secondary Fuel for Computation of Energy Charges	✓
FORM- 16	Details of Limestone for Computation of Energy Charge Rate	NA
FORM-17^	Details of Capital Spares	NA
FORM- 18^	Non-Tariff Income	NA
FORM-19^	Details of Water Charges	NA
FORM-20^	Details of Statutory Charges	NA

PART-I

List of Supporting Forms / documents for tariff filing for Thermal Stations

Form No.	Title of Tariff Filing Forms (Thermal)	Tick
FORM-A	Abstract of Capital Cost Estimates	NA
FORM-B	Break-up of Capital Cost for Coal/Lignite based projects	NA
FORM-C	Break-up of Capital Cost for Gas/Liquid fuel based Projects	NA
FORM-D	Break-up of Construction/Supply/Service packages	NA
FORM-E	Details of variables , parameters , optional package etc. for New Project	NA
FORM-F	Details of cost over run	NA
FORM-G	Details of time over run	NA
FORM-H	Statement of Additional Capitalisation during end of the useful life	NA
FORM-I^	Details of Assets De-capitalised during the period	NA
FORM-J^	Reconciliation of Capitalisation claimed vis-à-vis books of accounts	NA
FORM-K^	Statement showing details of items/assets/works claimed under Exclusions	NA
FORM-L	Statement of Capital cost	✓
FORM-M	Statement of Capital Woks in Progress	✓
FORM-N	Calculation of Interest on Normative Loan	✓
FORM- O(j)**	Computation of Energy Charges	✓
FORM-O	Calculation of Interest on Working Capital	✓
FORM-P	Incidental Expenditure up to SCOD and up to Actual COD	NA
FORM-Q	Expenditure under different packages up to SCOD and up to Actual COD	NA
FORM-R	Actual cash expenditure	NA
FORM-S^	Statement of Liability flow	NA
FORM-T	Summary of issues involved in the petition	✓

** Additional Forms

Provided yearwise for the period 2024-29

^ Shall be provided at truing-up

List of supporting documents for tariff filing for Thermal Stations

S. No.	Information / Document	Tick
1	Certificate of incorporation, Certificate for Commencement of Business, Memorandum of Association, & Articles of Association (For New Station setup by a company making tariff application for the first time to CERC)	NA
2	A. Station wise and Corporate audited Balance Sheet and Profit & Loss Accounts with all the Schedules & annexures on COD of the Station for the new station & for the relevant years. B. Station wise and Corporate audited Balance Sheet and Profit & Loss Accounts with all the Schedules & annexures for the existing station for relevant years.	***
3	Copies of relevant loan Agreements	NA
4	Copies of the approval of Competent Authority for the Capital Cost and Financial package.	NA
5	Copies of the Equity participation agreements and necessary approval for the foreign equity.	NA
6	Copies of the BP5A/PPA with the beneficiaries, if any	NA
7	Detailed note giving reasons of cost and time over run, if applicable. List of supporting documents to be submitted: a. Detailed Project Report b. CPM Analysis c. PERT Chart and Bar Chart d. Justification for cost and time Overrun	NA
8	Generating Company shall submit copy of Cost Audit Report along with cost accounting records, cost details, statements, schedules etc. for the Generating Unit wise /stage wise/Station wise/ and subsequently consolidated at Company level as submitted to the Govt. of India for first two years i.e. 2019-20 and 2020-21 at the time of mid-term true-up in 2021-22 and for balance period of tariff period 2019-24 at the time of final true-up in 2024-25. In case of initial tariff filing the latest available Cost Audit Report should be furnished.	NA
9	Any other relevant information, (Please specify)	NA
10	Reconciliation with Balance sheet of any actual additional capitalization and amongst stages of a generating station	NA
11	BBMB is maintaining the records as per the relevant applicable Acts. Formats specified herein may not be suitable to the available information with BBMB. BBMB may modify the formats suitably as per available information to them for submission of required information for tariff purpose.	NA

*** Shall be submitted at the time of trueing up

Summary of Tariff

Name of the Petitioner:	NTPC Limited
Name of the Generating Station:	Mauda-I
Place (Region/District/State):	Western Region/ Nagpur/ Maharashtra

Amount in Rs. Lakhs

S. No.	Particulars	Unit	Existing 2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7	8	9
1.1	Depreciation	Rs Lakh	34,128.04	34,301.94	34,427.07	15,533.08	15,626.23	15,657.82
1.2	Interest on Loan	Rs Lakh	10,700.89	8,143.94	5,806.39	4,209.89	3,006.85	1,755.86
1.3	Return on Equity	Rs Lakh	37,470.02	37,656.95	37,792.04	37,915.09	37,971.49	37,992.20
1.4	Interest on Working Capital	Rs Lakh	11,726.87	10,755.04	10,829.94	10,636.13	10,732.36	10,842.10
1.5	O&M Expenses	Rs Lakh	35,890.29	36954.19	39109.22	41338.13	43705.75	46215.03
1.6	Special Allowance (If applicable)	Rs Lakh						
1.7	Compensation Allowance (If applicable – relevant for column 4 only)	Rs. Lakh						
	Total	Rs Lakh	129916.10	127812.07	127964.65	109632.32	111042.67	112463.00
2.1	Landed Fuel Cost (coal) as per FSA	Rs/Ton	5,260.72	4,595.51	4,595.51	4,595.51	4,595.51	4,595.51
	(%) of Fuel Quantity	(%)						
2.2	Landed Fuel Cost Imported Coal	Rs/Ton						
	(%) of Fuel Quantity	(%)						
2.3	Landed Fuel Cost (coal/gas /RLNG/liquid) other than FSA	Rs/Ton						
	(%) of Fuel Quantity	(%)						
2.4	Landed Fuel Cost Imported Coal other than FSA.	Rs/Ton						
	(%) of Fuel Quantity	(%)						
2.5	Secondary fuel oil cost	Rs/KL	76490.650	78522.425	78522.425	78522.425	78522.425	78522.425
2.6	Energy Charge Rate ex-bus (Rs/kWh)	Rs/Unit	4.042	3.507	3.507	3.507	3.507	3.507

Details as per Form-15

(Petitioner)

Name of the Petitioner: NTPC Limited

Name of the Generating Station: Mauda-I

Amount in Rs. Lakhs

Statement showing claimed capital cost – (A+B)

S. No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7
1	Opening Capital Cost	672272.15	674404.39	677184.39	679261.75	679558.75
2	Add: Addition during the year/period	2132.24	2780.00	2077.36	297.00	438.00
3	Less: De-capitalisation during the year/period	0.00	0.00	0.00	0.00	0.00
4	Less: Reversal during the year / period	0.00	0.00	0.00	0.00	0.00
5	Add: Discharges during the year/ period	0.00	0.00	0.00	0.00	0.00
6	Closing Capital Cost	674404.39	677184.39	679261.75	679558.75	679996.75
7	Average Capital Cost	673338.27	675794.39	678223.07	679410.25	679777.75

Statement showing claimed capital cost eligible for RoE at normal rate (A)

S. No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7
1	Opening Capital Cost	672272.15	674404.39	676641.39	676995.39	677292.39
2	Add: Addition during the year / period	2132.24	2237.00	354.00	297.00	438.00
3	Less: De-capitalisation during the year / period	0.00	0.00	0.00	0.00	0.00
4	Less: Reversal during the year / period	0.00	0.00	0.00	0.00	0.00
5	Add: Discharges during the year / period	0.00	0.00	0.00	0.00	0.00
6	Closing Capital Cost	674404.39	676641.39	676995.39	677292.39	677730.39
7	Average Capital Cost	673338.27	675522.89	676818.39	677143.89	677511.39

Statement showing claimed capital cost eligible for RoE at SBI MCLR plus 350 BP (B)

S. No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7
1	Opening Capital Cost	0.00	0.00	543.00	2266.36	2266.36
2	Add: Addition during the year / period	0.00	543.00	1723.36	0.00	0.00
3	Less: De-capitalisation during the year / period	0.00	0.00	0.00	0.00	0.00
4	Less: Reversal during the year / period	0.00	0.00	0.00	0.00	0.00
5	Add: Discharges during the year / period	0.00	0.00	0.00	0.00	0.00
6	Closing Capital Cost	0.00	543.00	2266.36	2266.36	2266.36
7	Average Capital Cost	0.00	271.50	1404.68	2266.36	2266.36

(Petitioner)

Name of the Petitioner: NTPC Limited

Name of the Generating Station: Mauda-I

Statement showing Return on Equity at Normal Rate

S. No.	Particulars	Amount in Rs. Lakhs				
		2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7
	Return on Equity (@ Normal Rate)					
1	Gross Opening Equity (Normal)	2,00,175.07	2,00,814.74	2,01,485.84	2,01,592.04	201681.1442
2	Less: Adjustment in Opening Equity	-	-	-	-	-
3	Adjustment during the year					
4	Net Opening Equity (Normal)	2,00,175.07	2,00,814.74	2,01,485.84	2,01,592.04	2,01,681.14
5	Add: Increase in equity due to addition during the year / period	639.67	671.10	106.20	89.10	131.40
7	Less: Decrease due to De-capitalisation during the year / period	0.00	0.00	0.00	0.00	0.00
8	Less: Decrease due to reversal during the year / period	0.00	0.00	0.00	0.00	0.00
9	Add: Increase due to discharges during the year / period	0.00	0.00	0.00	0.00	0.00
10	Net closing Equity (Normal)	2,00,814.74	2,01,485.84	2,01,592.04	2,01,681.14	2,01,812.54
11	Average Equity (Normal)	2,00,494.91	2,01,150.29	2,01,538.94	2,01,636.59	2,01,746.84
12	Rate of ROE (%)	18.782	18.782	18.782	18.782	18.782
13	Total ROE	37,656.95	37,780.05	37,853.04	37,871.39	37,892.09

(Petitioner)

Name of the Petitioner: NTPC Limited

Name of the Generating Station: Mauda-I

Statement showing Return on Equity at SBI MCLR plus 350 BP

Amount in Rs. Lakhs

S. No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7
	Return on Equity (@ SBI MCLR plus 350 BP)					
1	Gross Opening Equity (SBI MCLR plus 350 BP)	0.00	0.00	162.90	679.91	679.91
2	Less: Adjustment in Opening Equity	0.00	0.00	0.00	0.00	0.00
3	Adjustment during the year	0.00	0.00	0.00	0.00	0.00
4	Net Opening Equity (SBI MCLR plus 350 BP)	0.00	0.00	162.90	679.91	679.91
5	Add: Increase in equity due to addition during the year / period	0.00	162.90	517.01	0.00	0.00
6	Less: Decrease due to De-capitalisation during the year / period	0.00	0.00	0.00	0.00	0.00
7	Less: Decrease due to reversal during the year / period	0.00	0.00	0.00	0.00	0.00
8	Add: Increase due to discharges during the year / period	0.00	0.00	0.00	0.00	0.00
9	Net closing Equity (SBI MCLR plus 350 BP)	0.00	162.90	679.91	679.91	679.91
10	Average Equity (SBI MCLR plus 350 BP)	0.00	81.45	421.40	679.91	679.91
11	Rate of ROE - post tax (%)	12.15	12.15	12.15	12.15	12.15
12	Rate of ROE - pre tax (%)	14.723	14.723	14.723	14.723	14.723
13	Total ROE (SBI MCLR plus 350 BP)	0.00	11.99	62.04	100.10	100.10

(Petitioner)

Plant Characteristics

Name of the Petitioner	NTPC Ltd.	
Name of the Generating Station	Mauda STPS Stage-I	
Unit(s)/Block(s)/Parameters	Unit-I	Unit-II
Installed Capacity (MW)	500	500
Schedule COD as per Investment Approval		
Actual COD /Date of Taken Over (as applicable)	13.03.2013	30.03.2014
Pit Head or Non Pit Head or Integrated Mine	Non Pit Head	Non Pit Head
Name of the Boiler Manufacture	BHEL	BHEL
Name of Turbine Generator Manufacture	BHEL	BHEL
Main Steams Pressure at Turbine inlet (kg/Cm ²) abs ¹ .	170	170
Main Steam Temperature at Turbine inlet (°C) ¹	537	537
Reheat Steam Pressure at Turbine inlet (kg/Cm ²) ¹	45	45
Reheat Steam Temperature at Turbine inlet (°C) ¹	565	565
Main Steam flow at Turbine inlet under MCR condition (tons /hr) ²	1457.882	1457.882
Main Steam flow at Turbine inlet under VWO condition (tons /hr) ²	1544.9	1544.9
Unit Gross electrical output under MCR /Rated condition (MW) ²	500	500
Unit Gross electrical output under VWO condition (MW) ²	525	525
Guaranteed Design Gross Turbine Cycle Heat Rate (kCal/kWh) ³	1932	1932
	0	0
Conditions on which design turbine cycle heat rate guaranteed		
% MCR	100	100
% Makeup Water Consumption	0	0
Design Capacity of Make up Water System	3	3
Design Capacity of Inlet Cooling System m ³ / hr	54000	54000
Design Cooling Water Temperature (°C)	33	33
Back Pressure	0.1047	0.1047
Steam flow at super heater outlet under BMCR condition (tons/hr)	1590	1590
Steam Pressure at super heater outlet under BMCR condition) (kg/Cm ²)	178	178
Steam Temperature at super heater outlet under BMCR condition (°C)	540	540
Steam Temperature at Reheater outlet at BMCR condition (°C)	568	568
Design / Guaranteed Boiler Efficiency (%) ⁴	84.1	84.1
Design Fuel with and without Blending of domestic/imported coal	Domestic	Domestic
Type of Cooling Tower	IDCT	IDCT

Plant Characteristics

Name of the Petitioner	NTPC Ltd.	
Name of the Generating Station	Mauda STPS Stage-I	
Unit(s)/Block(s)/Parameters	Unit-I	Unit-II
Type of cooling system⁵	Closed	Closed
Type of Boiler Feed Pump⁶	TDBFP	TDBFP
Fuel Details⁷		
-Primary Fuel	COAL	COAL
-Secondary Fuel	LDO	LDO
-Alternate Fuels		
Special Features/Site Specific Features⁸		
Special Technological Features⁹		
Environmental Regulation related features¹⁰	ESP	ESP
Any other special features	De-NOx implemented; Wet Limestone based FGD under implementation Station is having Tangential Fired Boilers.	
1: At Turbine MCR condition.		
2: with 0% (Nil) make up and design Cooling water temperature		
3: at TMCR output based on gross generation, 0% (Nil) makeup and design Cooling water temperature.		
4: With Performance coal based on Higher Heating Value (HHV) of fuel and at BMCR) out put		
5: Closed circuit cooling, once through cooling, sea cooling, natural draft cooling, induced draft cooling etc.		
6: Motor driven, Steam turbine driven etc.		
7: Coal or natural gas or Naptha or lignite etc.		
8: Any site specific feature such as Merry-Go-Round, Vicinity to sea, Intake /makeup water systems etc. scrubbers etc.		
9: Any Special Technological feature like Advanced class FA technology in Gas Turbines, etc.		
10: Environmental Regulation related features like FGD, ESP etc.,		
		Petitioner

Normative parameters considered for tariff computations						PART 1 FORM-3	
Name of the Petitioner: NTPC Limited							
Name of the Generating Station: Mauda-I							
					(Year Ending March)		
Particulars	Unit	Existing 2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7	8
Base Rate of Return on Equity (Normal)	%	15.50%	15.50%	15.50%	15.50%	15.50%	15.50%
Base Rate of Return on Equity for Add Cap @ MCLR plus 350 BP	%		12.15%	12.15%	12.15%	12.15%	12.15%
Effective Tax Rate	%	17.4720%	17.4720%	17.4720%	17.4720%	17.4720%	17.4720%
Target Availability (Peak Hours)	%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%
Target Availability (Off-peak Hours)	%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%
Auxiliary Energy Consumption	%	6.25%	5.75%	5.75%	5.75%	5.75%	5.75%
Gross Station Heat Rate	kCal/kWh	2358.84	2400.64	2400.64	2400.64	2400.64	2400.64
Specific Fuel Oil Consumption	ml/kWh	0.50	0.50	0.50	0.50	0.50	0.50
Cost of Coal/Lignite for WC1	in Days	50.00	50.00	50.00	50.00	50.00	50.00
Cost of Main Secondary Fuel Oil for WC1	in Months	2	2	2	2	2	2
Fuel Cost for WC2	in Months	NA					
Liquid Fuel Stock for WC2	in Months						
Normative O&M Expenses for coal station	Rs lakh / MW	25.84	27.17	28.60	30.10	31.68	33.34
Maintenance Spares for WC	% of O&M	20%	20%	20%	20%	20%	20%
Receivables for WC	in Days	45	45	45	45	45	45
Storage capacity of Primary fuel	MT	1070000	1070000	1070000	1070000	1070000	1070000
Rate of IOWC (SBI MCLR plus 325 BP)	%	12.00	11.90	11.90	11.90	11.90	11.90
B- Average Monthly Frequency Response Performance*	0-1	-	-	-	-	-	-
Blending ratio of domestic coal/imported coal		As per Form-15					
Note:							
i) The storage capacity of primary fuel as indicated above is for the entire Mauda Station (2320 MW).							
* Shall be provided at the time of triung-up							
Petitioner							

Calculation of O&M Expenses

Name of the Company : NTPC Limited
Name of the Power Station : Mauda-I

Amount in Rs. Lakhs

S.No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	7	8
1	O&M expenses under Reg.36(1)(1)					
1a	Normative	27170.00	28600.00	30100.00	31680.00	33340.00
2	O&M expenses under Reg.36(1)(6)					
2a	Water Charges [^]	2556.03	2814.66	3094.83	3405.17	3745.69
2b	Security expenses [^]	1163.79	1280.17	1408.19	1548.71	1703.88
2c	Capital Spares*					
3	O&M expenses-Ash Transportation [^]	6064.36	6414.39	6735.11	7071.87	7425.46
	Total O&M Expenses	36954.19	39109.22	41338.13	43705.75	46215.03

Note:

* Shall be provided at truing-up

[^] On projected basis

Petitioner

Abstract of Admitted Capital Cost for the existing Projects

Name of the Company :	NTPC Limited		
Name of the Power Station :	Mauda-I		
Last date of order of Commission for the project	Date (DD-MM-YYYY)	01.05.2024	
Reference of petition no. in which the above order was passed	Petition no.	10/RP/2023 in 393/GT/2020	
Following details (whether admitted and /or considered) as on the last date of the period for which tariff is approved, i.e. as on 31.03.2019, in the above order by the Commission:		(Rs Lakh)	
Capital cost	(Rs. in lakh)	6,63,966.80	
Amount of un-discharged liabilities included in above (& forming part of admitted capital cost)		-	
Amount of un-discharged liabilities corresponding to above admitted capital cost (but not forming part of admitted capital cost being allowed on cash basis)		10,716.91	
Gross Normative Debt		4,66,283.33	
Cumulative Repayment		1,79,267.07	
Net Normative Debt		2,87,016.26	
Normative Equity		1,97,683.47	
Cumulative Depreciation		1,79,267.07	
Freehold land		-	
(Petitioner)			

Abstract of Claimed Capital Cost for the existing Projects

Name of the Company :	NTPC Limited	
Name of the Power Station :	Mauda-I	
Reference of Final True-up Tariff Petition	Affidavit dated	27.11.2024
Capital Cost as on 31.03.2024 as per Hon'ble Commission's Order dated 14.11.2022 in 437/GT/2020	Rs Lakh	668410
Adjustment as per Para () of this petition		3862.15
Following details as considered by the Petitioner as on the last date of the period for which final true-up tariff is claimed, i.e. as on 31.03.2024:		(Rs Lakh)
Capital cost	(Rs. in lakh)*	6,72,272.15
Amount of un-discharged liabilities included in above (& forming part of admitted capital cost)		0.00
Amount of un-discharged liabilities corresponding to above claimed capital cost (but not forming part of admitted capital cost being allowed on cash basis)		4,475.36
Gross Normative Debt		4,72,097.08
Cumulative Repayment		3,47,984.48
Net Normative Debt		1,24,112.59
Normative Equity		2,00,175.07
Cumulative Depreciation		2,70,635.39
Freehold land		0.00
		(Petitioner)

Form 8
TRANCHE NO
T00001

BP NO 5050000442

D00012

Unsecured Loan From SBI-VIII		
Source of Loan :	SBI-VIII	
Currency :	INR	
Amount of Loan :	1,00,00,00,00,000	
Total Drawn amount :	4,00,00,00,00,000	
Interest Type :	Floating	
Fixed Interest Rate :	-----	
Base Rate, If Floating Interest	D00012-9.30%	
Margin, If Floating Interest :	0.00%	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	Monthly	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	6 Years	
Moratorium effective from :	12.11.2015	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	9 Yearly Installments	
Repayment Type :	AVG	
First Repayment Date :	31.01.2022	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	BARH-I	25,00,00,000
	BONGAIGAON	32,00,00,000
	DARLIPALLI	22,00,00,000
	GADARWARA	56,00,00,000
	KUDGI	30,00,00,000
	LARA	23,00,00,000
	MOUDA-II	44,00,00,000
	NORTH KARANPURA	17,00,00,000
	PAKRI BARWADIH	11,00,00,000
	SOLAPUR	62,00,00,000
	TANDA-II	15,00,00,000
	TAPOVAN VISHNUGAD	18,00,00,000
	UNCHAHAHAR-IV	12,00,00,000
	VINDHYACHAL-V	13,00,00,000
	MOUDA-I	20,00,00,000
Total Allocated Amount		4,00,00,00,000

Form 8

TRANCHE NO

BP NO 5050000442

T00001

D00013

Unsecured Loan From SBI-VIII		
Source of Loan :	SBI-VIII	
Currency :	INR	
Amount of Loan :	1,00,00,00,00,000	
Total Drawn amount :	4,00,00,00,00,000	
Interest Type :	Floating	
Fixed Interest Rate :	-----	
Base Rate, If Floating Interest	D00013-9.30%	
Margin, If Floating Interest :	0.00%	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	Monthly	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	6 Years	
Moratorium effective from :	01.12.2015	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	9 Yearly Installments	
Repayment Type :	AVG	
First Repayment Date :	31.01.2022	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	BARH-I	18,00,00,000
	BONGAIGOAN	14,00,00,000
	DARLIPALLI	45,00,00,000
	GADARWARA	50,00,00,000
	KUDGI	45,00,00,000
	LARA	72,00,00,000
	MOUDA-II	32,00,00,000
	SOLAPUR	45,00,00,000
	UNCHAHAR-IV	21,00,00,000
	RAMMAM	15,00,00,000
	BARH-II	18,00,00,000
	VINDHYACHAL-IV	13,00,00,000
	MOUDA-I	12,00,00,000
Total Allocated Amount		4,00,00,00,000

Form 8

TRANCHE NO

BP NO 5050000442

T00001

D00021

Unsecured Loan From SBI-VIII		
Source of Loan :	SBI-VIII	
Currency :	INR	
Amount of Loan :	1,00,00,00,00,000	
Total Drawn amount :	2,50,00,00,000	
Date of Drawl	21.09.2016	
Interest Type :	Floating	
Fixed Interest Rate :	-----	
Base Rate, If Floating Interest	D00021-9.10%	
Margin, If Floating Interest :	0.00%	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	Monthly	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	6 Years	
Moratorium effective from :	21.09.2016	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	9 Yearly Installments	
Repayment Type :	AVG	
First Repayment Date :	31.01.2022	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	BONGAIGAON	40,00,00,000
	MOUDA-II	15,00,00,000
	KUDGI	84,00,00,000
	BARH-II	8,00,00,000
	KOLDAM	18,00,00,000
	RIHAND-III	57,00,00,000
	VINDHYACHAL-IV	21,00,00,000
	MOUDA-I	7,00,00,000
Total Allocated Amount		2,50,00,00,000

Form 8
TRANCHE NO
T00001

BP NO 5050000442

D00024

Unsecured Loan From SBI-VIII		
Source of Loan :	SBI-VIII	
Currency :	INR	
Amount of Loan :	1,00,00,00,00,000	
Total Drawn amount :	11,50,00,00,000	
Date of Drawl	14.02.2017	
Interest Type :	Floating	
Fixed Interest Rate :	-----	
Base Rate, If Floating Interest	D00024-8.0%	
Margin, If Floating Interest :	0.00%	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	Monthly	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	6 Years	
Moratorium effective from :	14.02.2017	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	9 Yearly Installments	
Repayment Type :	AVG	
First Repayment Date :	31.01.2022	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	BARH-I	3,00,00,00,000
	BONGAIGAON	34,28,57,142
	FARAKKA III	14,28,57,141
	GADARWARA	2,50,00,00,000
	KOLDAM	92,85,71,427
	KORBA-III	2,85,71,428
	KUDGI	1,00,00,00,000
	MOUDA-I	40,71,42,856
	NCTPP-II	15,71,42,855
	NORTH KARANPURA	1,00,00,00,000
	RIHAND-III	32,14,28,570
	SIMHADRI-II	53,28,57,141
	SIPAT-I	21,42,85,711
	SIPAT-II	5,71,42,856
	TAPOVAN VISHNUGAD	50,00,00,000
	VINDHYACHAL IV	32,42,85,714
	PAKRI BARWADIH	4,28,57,159
Total Allocated Amount		11,50,00,00,000

Form 8
TRANCHE NO

BP NO 5050000421

T00001

D00007

Unsecured Loan From HDFC Bank Ltd.-III		
Source of Loan :	HDFC Bank Ltd.-III	
Currency :	INR	
Amount of Loan :	15,00,00,00,000	
Total Drawn amount :	2,00,00,00,000	
Date of Drawal:	30.09.2016	
Interest Type :	Floating	
Fixed Interest Rate :		
Base Rate, If Floating Interest	D00005-9.10%	
Margin, If Floating Interest :	NIL	
Are there any Caps/ Floor:	Y/N	
Frequency of Intt. Payment	MONTHLY	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	6 Years	
Moratorium effective from :	30.09.2016	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	9 Yearly Instalment	
Repayment Type :	AVG	
First Repayment Date :	04.12.2021	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	BONGAIGAON	5,00,00,000
	MOUDA-II	15,00,00,000
	TELANGANA	20,00,00,000
	VINDHYACHAL-IV	10,00,00,000
	MOUDA-I	35,00,00,000
	BARH-I	45,00,00,000
	CHATTI BARIATU	5,00,00,000
	RAMMAM	5,00,00,000
	TAPOVAN VISHNUGAD	5,00,00,000
	SOLAPUR	55,00,00,000
Total Allocated Amount		2,00,00,00,000

Form 8

TRANCHE NO

BP NO 5050000521

T00001

D00001

Unsecured Loan From HDFC Bank Ltd.-IV		
Source of Loan :	HDFC Bank Ltd.-IV	
Currency :	INR	
Amount of Loan :	20,00,00,00,000	
Total Drawn amount :	1,00,00,00,000	
Date of Drawal:	17.04.2017	
Interest Type :	Floating	
Fixed Interest Rate :		
Base Rate, If Floating Interest	7.90%	
Margin, If Floating Interest :		
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	MONTHLY	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	3 Years	
Moratorium effective from :	17.04.2017	
Repayment Period (Inc Moratorium) :	12 Years	
Repayment Frequency :	9 Yearly Instalment	
Repayment Type :	AVG	
First Repayment Date :	17.04.2021	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	RIHAND-III	40,00,00,000.00
	DULANGA COAL MINE	9,00,00,000.00
	VINDHYACHAL-IV	41,00,00,000.00
	MOUDA-I	50,00,00,000.00
	ANANTPUR SOLAR PV	60,00,00,000
Total Allocated Amount		1,00,00,00,000

Form 8

TRANCHE NO

BP NO 5050000561

T00001

D00001

Unsecured Loan From HDFC Bank Ltd. V		
Source of Loan :	HDFC Bank Ltd. V	
Currency :	INR	
Amount of Loan :	25,00,00,00,000	
Total Drawn amount :	5,00,00,00,000	
Date of drawl	25.09.2017	
Interest Type :	Floating	
Fixed Interest Rate :		
Base Rate, If Floating Interest	7.90%	
Margin, If Floating Interest :	NIL	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	MONTHLY	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	6 Years	
Moratorium effective from :	25.09.2017	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	9 Yearly Instalment	
Repayment Type :	AVG	
First Repayment Date :	25.09.2024	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	TANDA-II	13,85,00,000
	RAMMAM	3,00,00,000
	KHARGONE	89,68,00,000
	TELANGANA	16,00,00,000
	MANDSAUR SOLAR PV	11,00,00,000
	ROJMAL WIND	21,00,00,000
	MOUDA-II	39,84,00,000
	KUDGI	2,76,97,00,000
	CHATTI BARIATU CMB	19,13,00,000
	DULANGA COAL MINE	6,00,00,000
	MOUDA-I	3,53,00,000
Total Allocated Amount		5,00,00,00,000

TRANCHE NO		
BP NO 5050000981	T00001	D00004
Unsecured Loan From HDFC Bank Ltd. IX		
Source of Loan :	HDFC Bank Ltd. IX	
Currency :	INR	
Amount of Loan :	50,00,00,00,000	
Total Drawn amount :	16,10,00,00,000	
Date of drawl	24.08.2020	
Interest Type :	Floating	
Fixed Interest Rate :		
Base Rate, If Floating Interest	6.30%	
Margin, If Floating Interest :	NIL	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	MONTHLY	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	3 Years	
Moratorium effective from :	24.08.2020	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	12 Yearly Instalment	
Repayment Type :	AVG	
First Repayment Date :	30.06.2024	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	BARH-II	2,54,31,57,061
	BONGAIGAON	2,06,81,00,000
	CHATTI BARIATU CMP	13,60,00,000
	JETSAR SOLAR	20,00,00,000
	KAHALGAON-II	11,43,64,133
	KHARGONE	1,20,00,00,000
	KOLDAM	4,54,00,000
	KORBA-III	2,14,43,267
	KUDGI	45,00,00,000
	LARA-I	7,85,71,430
	MOUDA-I	69,46,38,787
	MOUDA-II	1,60,00,00,000
	NORTH KARANPURA	50,00,00,000
	PAKRI BARWADIH CMB	1,07,21,55,097
	RAMMAM	50,00,00,000
	RIHAND-III	20,43,00,000
	SIMHADRI-II	22,70,00,000
	SIPAT-I	18,57,38,787
	SOLAPUR	53,79,74,298
	TANDA-II	1,20,00,00,000
	UNCHAHR STPP IV	18,00,00,000
	VINDHYACHAL-IV	85,83,00,000
	VINDHYACHAL-V	1,48,28,57,140
Total Allocated Amount		16,10,00,00,000

Form 8

TRANCHE NO

BP NO 5050000741

T00001

D00002

Unsecured Loan From SBI-XII		
Source of Loan :	SBI-XII	
Currency :	INR	
Amount of Loan :	50,00,00,00,000	
Total Drawn amount :	26,35,00,00,000	
Date of Drawal:	18.02.2019	
Interest Type :	Floating	
Fixed Interest Rate :	-----	
Base Rate, If Floating Interest	8.35%	
Margin, If Floating Interest :	NIL	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	Monthly	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	6 Years	
Moratorium effective from :	18.02.2019	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	9 Yearly Installments	
Repayment Type :	AVG	
First Repayment Date :	31.03.2026	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	BARH-I	90,00,00,000.00
	FARAKKA-III	24,50,00,000.00
	GADARWARA	90,00,00,000.00
	KORBA-III	25,00,00,000.00
	KUDGI	5,00,00,00,000.00
	LARA	1,00,00,00,000.00
	MOUDA-I	21,00,00,000.00
	MOUDA-II	2,25,00,00,000.00
	NCTPP-II	63,50,00,000.00
	NORTH KARANPURA	10,40,00,00,000.00
	PAKRI BARWADIH CMB	1,20,00,00,000.00
	SIMHADRI-II	21,00,00,000.00
	SOLAPUR	2,40,00,00,000.00
	TELANGANA	75,00,00,000.00
	KUDGI	-3,00,00,00,000.00
	BARH-I	50,00,00,000
	NORTH KARANPURA	80,00,00,000
	TAPOVAN VISHNUGARH	20,00,00,000
	TELANGANA	1,50,00,00,000
Total Allocated Amount		26,35,00,00,000.00

Name of the Company
Name of the Power Station

Particulars		23
	4.25 % Euro Bonds 2026	USD 750 Million Drawl III
Source of Loan		
Drawal		
Currency	USD	USD
Amount of loan sanctioned	50,00,00,000	25,00,00,000
Amount of Gross Loan drawn upto 19.03.2024	50,00,00,000	25,00,00,000
Interest Type	Fixed	Floating
Fixed Interest Rate, if applicable	4.25% *	-
Base Rate, if floating interest*	-	6 Month Term SOFR*
Margin, if floating interest rate	-	1.16933%
Are there any Caps / Floor	No	No
If above is Yes, specify Caps / Floor	-	-
Moratorium Period	10 Years	4
Moratorium effective from	26-Feb-2016	25-Apr-2022
Repayment period	Bullet payment	Yearly
Repayment effective from	26-Feb-2026	05-Oct-2026
Repayment frequency	One time	Seven times
Repayment installment	50,00,00,000	3,57,14,286
Base Exchange Rate -		
Are foreign currency loan hedged	No	No
If above is Yes, specify details	-	-
Name of the Projects		%
Mouda-I	0.33%	4.03%
	16.2881	100.7275

FORM-8

Name of the Company 1400 0 0 0 0 0 0 0 0 0 0

(Amount in Rs. Lakhs)

Particulars	XLII 9%	XLIV9.25%	L 2A	L 3A	L 2B	L 3B	LI C	54	66	67
Source of Loan - Bonds Series	XLII 9%	XLIV9.25%	L 2A	L 3A	L 2B	L 3B	LI C	54	66	67
Currency	INR	INR	INR	INR	INR	INR	INR	INR	INR	INR
Amount of Loan sanctioned (In Lakh)	50,000.00	50,000.00	24,994.59	31,202.76	9,139.28	39,996.81	32,000.00	10,30,683.05	3,92,500.00	4,00,000.00
Amount of Gross Loan drawn upto COD (In Lakh)								10,30,683.05	3,92,500.00	4,00,000.00
Interest Type	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Fixed Interest Rate, if applicable	9.00%	9.25%	8.48%	8.66%	8.73%	8.91%	8.61%	8.49%	7.37%	8.30%
Base Rate, if Floating Interest	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Margin, if Floating Interest	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Are there any Caps/Floor	No	No	No	No	No	No	No	No	No	No
If above is yes, specify caps/floor								N/A	N/A	N/A
Moratorium Period (In Years)	10 yrs.	11 yrs	15 yrs	20 yrs.	15 yrs.	20 yrs.	20 yrs.	8	15	10
Moratorium effective from*	25.01.2012	04.05.12	16.12.2013	16.12.2013	16.12.2013	16.12.2013	04.03.2014	25-03-2015	14-12-2016	15-01-2019
Repayment Period	5 yrs	5 yrs	Bullet Repayment	Bullet Repayment	Bullet Repayment	Bullet Repayment	Bullet Repayment	Installments Due on 25/03/2023, 25/03/2024 & 25/03/2025	Bullet Repayment	Bullet Repayment
Repayment effective from	25.01.2023	04.05.23	16.12.2028	16.12.2033	16.12.2028	16.12.2033	04.03.2034	25-03-2023	14-12-2031	15-01-2029
Repayment Frequency	Yearly	Yearly	Bullet Repayment	Bullet Repayment	Bullet Repayment	Bullet Repayment	Bullet Repayment	Installments Due on 25/03/2023, 25/03/2024 & 25/03/2025	Bullet Repayment	Bullet Repayment
Repayment Instalment (In Lakh)	10,000.00	10,000.00	2,49,94,59,000.00	3,12,02,76,000.00	91,39,28,000.00	3,99,96,81,000.00	32,000.00	Installments 1st - 206,136.81 2nd - 412,273.22 3rd - 412,273.22	3,92,500.00	4,00,000.00
Base Exchange Rate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Door to Door Maturity (In Years)	15 yrs.	15yrs	15 yrs.	20 yrs.	15 yrs.	20 yrs.	20 yrs.	10	15	10
Name of the Projects								54	66	67
MAUDA	2400	5000	1456.83	1818.68	532.69	2331.24	9700.00	21900.00	3200.00	715.00

Particulars			
Source of Loan - Bonds Series	69	72	74
Currency	INR	INR	INR
Amount of Loan sanctioned (In Lakh)	4,30,000	4,00,000	3,99,600
Amount of Gross Loan drawn upto COD (In L)	4,30,000	4,00,000	3,99,600
Interest Type	Fixed	Fixed	Fixed
Fixed Interest Rate, if applicable	7.32%	5.45%	6.87%
Base Rate, if Floating Interest	N/A	N/A	N/A
Margin, if Floating Interest	N/A	N/A	N/A
Are there any Caps/Floor	No	No	No
If above is yes,specify caps/floor	N/A	N/A	N/A
Moratorium Period (In Years)	10	5	15 Years and 1 day
Moratorium effective from*	17-07-2019	15-10-2020	20-04-2021
Repayment Period	Bullet Repayment	Bullet Repayment	Bullet Repayment
Repayment effective from	17-07-2029	15-10-2025	21-04-2036
Repayment Frequency	Bullet Repayment	Bullet Repayment	Bullet Repayment
Repayment Instalment (In Lakh)	4,30,000	4,00,000	3,99,600
Base Exchange Rate	N/A	N/A	N/A
Door to Door Maturity (In Years)	10	5	15 Years and 1 day

Name of the Projects	69	72	74
MAUDA I	6,000.00	30,500.00	500.00

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner	NTPC Limited
Name of the Generating Station	Mauda-I
COD	30-03-2014
For Financial Year	2024-29 (Summary)

(Amount in Rs Lakh)

Sl. No.	Head of Work /Equipment	ACE Claimed (Projected on cash basis)					Total 2024-29	Regulation under which claimed
		2024-25	2025-26	2026-27	2027-28	2028-29		
A. For assets eligible for Normal ROE								
1	Raising of Ash Dyke & associated works	1773.76					1773.76	25(1)(c)
2	HMI upgradation	190.00					190.00	25(2)(c)
3	Upgradation of monitoring system of Power Transformers (Online DGA System installation)	168.48					168.48	25(2)(b), 25(2)(c)
4	Replacement of In-motion Weigh Bridge		56.00				56.00	25(2)(a), 25(2)(b)
5	Upgradation of 'Schneider' make DCS Controllers		290.00		220.00	220.00	730.00	25(2)(c)
6	Cyber Security Suite implementation in DDCMIS		1250.00				1250.00	25(2)(b), 26(1)(b)
7	Replacement of 'Emerson' make UPS Battery		65.00	65.00			130.00	25(2)(a), 25(2)(c)
8	Upgradation of Analog based CCTV cameras to IP based cameras		56.00				56.00	25(2)(c), 26(1)(d)
9	Upgradation of PLC System of HCSD Pumps		60.00	21.00			81.00	25(2)(c)
10	Upgradation of Switchyard SCADA System		108.00	105.00			213.00	25(2)(a), 25(2)(c)
11	Upgradation of Switchgear SCADA System		45.00				45.00	25(2)(a), 25(2)(c)
12	Upgradation of Wagon Tippler PLC System		125.00				125.00	25(2)(c), 26(1)(f)
13	Upgradation of TG End Winding Vibration Monitoring System		182.00			218.00	400.00	25(2)(c), 26(1)(d)
14	Upgradation of 24VDC charger of DCS Controller			77.00	77.00		154.00	25(2)(c)
15	ABT Metering System Upgradation			86.00			86.00	25(2)(b), 25(2)(c)
	Total (A)	2132.24	2237.00	354.00	297.00	438.00	5458.24	
B. For assets eligible for RoE @ MCLR plus 350 basis points								
1	Installation of Weighbridge at Ash Dyke		27.00				27.00	26(1)(b), 19(3)(d)
2	Lighting Mast installation in Ash Dyke Area		50.00				50.00	26(1)(b), 26(1)(d)
3	Installation of Energy efficient Fans in Cooling Tower		56.00				56.00	26(1)(f)
4	Replacement of Fastoon Trolley with Energy Chain		60.00				60.00	26(1)(f)
5	Replacement of Gravimetric Feeders with VFD Feeders		350.00				350.00	26(1)(f)
6	Side Stream Filtration (SSF) System in Cooling Tower			855.36			855.36	26(1)(f)
7	BioMass Handling System			868.00			868.00	26(1)(b), 26(1)(g)
8	Total (B)	-	543.00	1,723.36	-	-	2,266.36	
Total Add. Cap. Claimed (A+B)		2,132.24	2,780.00	2,077.36	297.00	438.00	7,724.60	

(Petitioner)

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner : NTPC Ltd
Name of the Generating Station : Mauda-1
COD : 30.03.2014
For Financial Year : 2024-25

Sl. No.	Head of Work / Equipment	ACE (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
A1	For assets eligible for Normal ROE							
1	Raising of Ash Dyke & associated works	1773.76		1773.76		25(1)(c)	It is submitted that raising of ash dyke is required on regular basis to ensure availability of adequate capacity in dyke for disposal of ash being generated on continuous basis. The same is necessary to ensure sustained electricity generation from the Station. Further, ash dyke raising is envisaged in original scope to meet the requirement of adequate capacity of dyke over the life of the Station and is done on deferred basis as per actual requirement to avoid front loading of tariff. It is also relevant to mention that utilization of bottom ash is done from ash dyke only, since bottom ash generated has to be first mandatorily deposited in dyke and utilization of the same takes place from there. Also, since rate of generation of fly ash is higher than its rate of utilization through Fly Ash Silos and since utilization of fly ash is dependent on season and demand from end users, a part of fly ash being generated on continuous basis is also deposited in dyke through High Concentrated Slurry Disposal (HCCSD) System, from where its subsequent utilization takes place. In view of the above, 1st raising of Ash Dyke Lagoon-2 and Lagoon-3 has been taken up and is projected to be completed and put to use in entirety in FY 24-25. Accordingly, Hon'ble Commission may be pleased to allow instant projected capitalization on this behalf.	
2	HMI upgradation	190.00		190.00		25(3)(c)	It is submitted that the HMI (Human-Machine Interface) applications of DCCMIS of the Instant Station, with OEMs as BHEL and Schneider, were based on Windows XP/ Windows 7 operating system. Further, The DCS controller and the HMI system essentially has to be from the same manufacturer, as both the systems have to work in tandem to ensure stability and reliability of the operation, considering factors of safety. However, Microsoft Inc. declared obsolescence and End of Life (EOL) of Windows XP (EOL April 2014) and Windows 7 (EOL Jan 2020). Due to the same, it became imminent to replace HMI application since: i) No security updates are presently available from Microsoft, exposing the system vulnerable to cyber threat. ii) Compatible hardware to run obsolete Windows OS is not available. iii) The HMI application software version available for Win XP/Win 7 OS is not compatible with latest available Windows 10 Operating system. iv) Support for Symantec Antivirus version 10.0 has been withdrawn by the OEM and no more security updates / virus definitions are available for that version. Hence the HMIs-maxStations are prone to vulnerabilities which can tamper the operation of plant. Also, CEA (Cyber Security in Power Sector) Guidelines, 2021 provide for phasing out of legacy systems and ensuring security hardening with additional controls in consultation with the OEM. Obsolescence Certificate issued by OEMs, documents related to End of Life (EOL) for Windows XP/7 declared by Microsoft Inc. and the said CEA Cyber Security Guidelines are attached herewith at Annexure-A/1. Accordingly, the said upgradation was taken up in the Instant Station in FY 23-24 and capitalization as per upgraded systems put to use in FY 23-24 were claimed in FY 23-24. Further, the instant projected capitalization pertains to upgradation being put to use in FY 24-25. Hon'ble Commission may be pleased to allow the same.	

Year wise Statement of Additional Capitalisation after COD								
Name of the Petitioner : NTPC Ltd								
Name of the Generating Station : Mauda-I								
COD : 30.03.2014								
For Financial Year : 2024-25								
Sl. No.	Head of Work / Equipment	ACE (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
3	Upgradation of monitoring system of Power Transformers (Online DGA System Installation)	168.48		168.48		25(2)(b), 29(2)(x)	It is submitted that the Dissolved Gas Analysis (DGA) is one of the most widely used diagnostic tools for detecting and evaluating faults in transformer / reactors. The fundamental purpose of DGA is to discriminate between normal and abnormal condition. The purpose of DGA is to detect the internal faults within the oil-filled electrical equipment at an early stage and also to find incipient faults such as partial discharge, over-heating, arcing etc. Also, the said DGA will be available Online, i.e. it will help condition monitoring of Power Transformers round the clock. Thus, the healthiness of Power Transformers can be ascertained in a much better way resulting into lesser forced outages. Also, the "Standard Specifications and Technical Parameters for Transformers and Reactors (66KV & above voltage class)" issued by CEA, MoP, Govt in April 2021 provides for DGA system for monitoring of power transformers. A copy of relevant extract of the said CEA Standards is provided herewith at Annexure-A/2. Pertinently, the Hon'ble Commission vide Order dated 11.05.2022 in Petition No 232/GT/2020 (for Doyang Hydrz) has allowed similar Online DGA system on replacement basis. In view of the above, Hon'ble Commission may be pleased to allow instant projected capitalization.	
	Sub total A1	2132.24	0.00	2132.24	0.00			
	A2 For assets eligible for RoE @ MCLR plus 350 basis points							
	Sub-total A2	0.00	0.00	0.00	0.00			
	Total Add Cap (A1+A2)	2132.24	0.00	2132.24	0.00			

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner : NTPC Ltd
Name of the Generating Station : Maude-1
COD : 30.03.2014
For Financial Year : 2025-26

Sl. No.	Head of Work / Equipment	ACE (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
A1	For assets eligible for Normal ROE							
1	Replacement of In-motion Weigh Bridge	36.00		36.00		25(2)(a), 25(2)(b)	In-motion Weigh Bridge is being used at the Instant Station for weighing of coal rakes received at the Station on daily basis. The same was installed at the time of COD of Unit-1 in March 2013. Ministry of Railways, Govt vide Circular No.: 2022/ACI/2/1 dated 06.06.2022, issued revised Code of Assets (copy attached herewith at Annexure-A/3). Code of Life is the average life after which assets need to be replaced. As per the said circular, code of life of Electronic In-motion Weigh Bridges is 12 years. As the Electronic In-motion Weigh Bridge installed at the Station will be completing 12 years in March 2025 and considering their present condition, the same will need to be replaced in line with Indian Railways norms. Hon'ble Commission may be pleased to allow instant projected capitalisation on this behalf.	
2	Upgradation of 'Schneider' make DCS Controllers	290.00		290.00		25(2)(c)	DCS controllers are used for communication between servers and field input output cards. All logics (permissive, protection, Interlock, CLCS and OLCS) are implemented in DCS controller. Without proper functioning of DCS controller, operation of Station is not possible and shall result in forced outage. It is submitted that 'Schneider Electric' make DCS Controllers are installed in the Instant Station in SG, TG, AHP, CHP and Offsite areas. The OEM vide its mail dated 01.10.2024 and 28.03.2021 (copy attached herewith at Annexure-A/4) has intimated that the Field Control Processor 270 (FCP 270) has been withdrawn from sales w.e.f. June 26, 2017 and thus has become obsolete and its repair/ support shall be provided for next 05 years from obsolescence. The OEM has further recommended for upgradation of the same in phased manner. Due to obsolescence, Station has been facing issues in repair/ service/ replacement of the spares related to the system. In view of the aforementioned obsolescence and as recommended by OEM, it is planned to carry out upgradation of DCS controllers in different areas of the Instant Station in a phased manner. Accordingly, Hon'ble Commission may be pleased to allow instant projected capitalizations on this behalf.	

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner : NTPC Ltd
Name of the Generating Station : Maude-1
COD : 30.03.2014
For Financial Year : 2025-26

Sl. No.	Head of Work / Equipment	ACE (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
3	Cyber Security Suite Implementation in DDCMS	1250.00		1250.00		25(2)(b), 25(1)(b)	<p>It is submitted that M/s Schneider make Digital Distributed Controls and Management Information System (DDCMS) are Installed in Balance of Plant and Offsite areas of the Instant Station. It is pertinent to mention that, CERT-In, Ministry of Electronics and IT, Govt issued directions dated 28.04.2022 under sub-section (6) of section 70B of the Information Technology Act, 2000 under which It has been mandated to Implement various cyber security measures, including enabling logs of all ICT systems and maintaining them securely for a rolling period of 180 days. Also, CEA has issued draft Central Electricity Authority (Cyber Security in Power Sector), Regulations 2024, which envisages multiple actions for cyber security and calls upon stringent and punitive actions against non-compliance of the requirements. Notably, CEA had earlier issued CEA (Cyber Security in Power Sector), Guidelines 2021. A copy of the said CERT-In directive, draft CEA Regulations 2024, and CEA Guidelines on Cyber Security 2021 are attached herewith at Annexure-A/S.</p> <p>Compliance to above indicated mandatory cyber security requirements need implementation of various functionalities like asset inventory & anomaly detection, windows and application hardening, application whitelisting, Security patch management (WSUS) for security products and centralized patch management, Malicious attack mitigation in addition to traditional Antivirus, services like SIEM dashboard, Active directory and role-based access control with necessary login. Since, the DDCMS (control system & HMIS) is proprietary in nature, the proposed cyber security solution must be implemented from DDCMS OEM to ensure smooth and seamless integration of cyber security functionalities. All these requirements come in the form of a comprehensive 'Cyber security suite' from DDCMS OEM, i.e. M/s Schneider for the Instant Station.</p> <p>In view of the above statutory requirement, Hon'ble Commission may be pleased to allow instant projected capitalization for implementation of Cyber Security Suite in the existing DDCMS of the Instant Station.</p>	
4	Replacement of 'Emerson' make UPS Battery	65.00		65.00		25(2)(a), 25(2)(c)	<p>It is submitted that 'M/s Emerson' make UPS Battery are being used for powering on critical C&I systems such as Flame scanners, TSI system, Analysers, etc. with 230VAC. The said UPS are installed in TG, SG, AHP, CHP and offsite areas. The same were installed at the time of COD of Unit-1 and Unit-2 of the Station in March 2013 and March 2014 respectively. More than 11 years after their installation, the said UPS have completed their useful and have fully depreciated. Further, as per the OEM, the spare parts availability for the UPS systems installed 10 years back is declining. The electronic boards (PCB) used in these models are no longer manufactured because of non-availability of certain components like - IC, on account of their obsolescence. As a result, there are technological limitations for manufacturing the old circuit boards and their reliable working for critical applications.</p> <p>In view of above, it is planned to replace the said UPS with present day models which are superior in terms of efficiency and less pollutant of the electrical power, due to technological advances. Hon'ble Commission may be pleased to allow instant projected capitalizations on this behalf.</p>	

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner : NTPC Ltd
Name of the Generating Station : Maude-1
COD : 30.03.2014
For Financial Year : 2025-26

Sl. No.	Head of Work / Equipment	ACE (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
5	Upgradation of Analog based CCTV cameras to IP based cameras	56.00		56.00		25(2)(c), 25(1)(d)	<p>It is submitted that Analog based CCTV cameras record video by taking in light through a lens and recording it on a physical medium and the feeds are monitored in real time through a physical cable between the monitor and the camera.</p> <p>It is submitted that in very rapidly advancing video surveillance field, Analog based CCTV cameras installed at the Instant Station, more than 10 years back, have become outdated now and Station is finding it difficult to get vendors providing support/ service for the same. Compared to Analog based camera, IP based CCTV cameras are much technologically advanced and offer several advantages such as network intelligence and remote manageability, enhanced data security and reliability, high video quality, better resolution, can be powered over Ethernet cable, wireless option, send video over long distances with clarity, ease of installation, etc.</p> <p>Therefore, in view of the analog based cameras becoming outdated, and enhanced safety/ security capability of IP based cameras, It is proposed to replace the analog based cameras with IP based CCTV cameras. Hon'ble Commission may be pleased to allow instant projected capitalization on this behalf.</p>	
6	Upgradation of PLC System of HCSD Pumps	80.00		80.00		25(2)(c)	<p>It is submitted that 'GE-FANUC' make PLC system is installed in High Concentrated Slurry Disposal (HCSD) system for Fly Ash handling of the Instant Station. The said PLC system ensures complete automation of HCSD Silos and all associated instrumentation systems including auto loop. The said PLC system was commissioned in 2012-13.</p> <p>It is further submitted that the PLC system works in tandem with PLC servers. As servers have been upgraded to Windows 10 version due to obsolescence of the earlier OS based on Windows XP-2003, the interface of the servers with the old hardware of PLC is getting difficult leading to various issues such as frequent hanging up of system, non availability of standby PLC system, etc.</p> <p>Also, 'Siemens' make mini-PLC system is installed for all permissive and protections of HCSD pumps. The same were also commissioned in 2012-13 and in the last 12 years, the PLC system has become mature leading to difficulty in availability of spares. In case of outage of system, I/O cards are not available to revive the system.</p> <p>On account of aforementioned obsolescence, It is proposed for upgradation of the PLC system for HCSD system. Hon'ble Commission may be pleased to allow instant projected capitalization on this behalf.</p>	
7	Upgradation of Switchyard SCADA System	108.00		108.00		25(2)(a), 25(2)(c)	<p>It is submitted that the Switchgear SCADA System for the Instant Station is based on Windows XP/ 7 OS. Pertinently, Microsoft Inc. has declared obsolescence and End of Life (EOL) of Windows XP (EOL April 2014) and Windows 7 (EOL Jan 2020). Also, it is pertinent to note that with respect to cyber security threat to power installations, Ministry of Power, GoI, CEA, CERT-In, have issued several directions in recent years for implementation of latest cyber security provisions in the power systems. CERT-In, Ministry of Electronics and IT, GoI issued directions dated 28.04.2022 mandating to implement various cyber security measures. Also, CEA has issued CEA (Cyber Security in Power Sector), Guidelines 2021 regarding cyber security measures to be adopted in power sector. Significantly, the OEM, M/s Hitachi, vide its letter dated 16.11.2024 (attached herewith at Annexure-A/6), on account of aforesaid reasons has strongly recommended to replace the existing Switchyard SCADA version i.e. MicroSCADA to the latest version MicroSCADA 10 which will ensure compliance to cyber security measures, address issues due to obsolescence of Windows XP/ 7 OS and additionally will provide several advantages as mentioned in the said annexure.</p> <p>In view of above, Hon'ble Commission may be pleased to allow instant projected capitalization on this behalf.</p>	

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner : NTPC Ltd
Name of the Generating Station : Maude-I
COD : 30.03.2014
For Financial Year : 2025-26

Sl. No.	Head of Work / Equipment	ACE (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
8	Upgradation of Switchgear SCADA System	45.00		45.00		25(2)(a), 25(2)(e)	It is submitted that Supervisory Control and Data Acquisition (SCADA) System of Switchgear of the Instant Station is provided by M/s Honeywell Automation India Ltd (HAIL). M/s Honeywell visited the Instant Station from 18.01.2024 to 19.01.2024 and reviewed the software/ hardware healthiness of Data concentrators, Communication from Data Concentrators to numerical relays and communication between Data Concentrator and DDCMS. Accordingly, M/s Honeywell observed that software version installed in the present Data Concentrator System is outdated and recommended for upgrading the same. Also, the hardware and the software, including the operating systems, installed at the site are obsolete and there is no support because of obsolescence. Therefore, M/s Honeywell has recommended for upgrading the Switchgear SCADA system on account of obsolescence. Copy of Minutes of Meeting dated 19.01.2024 in this regard with M/s Honeywell is attached herewith at Annexure-A/7. Accordingly, Hon'ble Commission may be pleased to allow instant projected capitalizations on this behalf.	
9	Upgradation of Wagon Tippler PLC System	125.00		125.00		25(2)(a), 26(2)(i)	It is submitted that in the Wagon Tippler (WT) System, presently there are 03 nos. remote I/O (at individual WT Control Room) for each WT and a common Control room having redundant DPU (+1 standby). Since all the WT are run by single DPU, any problem at DPU panel and eg. power supply failure, communication breakdown or DPU failure, software hang up, results in stopping of unloading of coal racks and incurring of demurrage charges, unsafe operation and may also lead to coal shortage at the Station. In the view of the same, it is proposed that RIO panels located in each WT be reconfigured as stand-alone systems with installation of 1 set of Controllers, 1 no. EWS and DWS for each WT. This configuration would provide reliability against any common problem at main control room DPU panels and have independent operation/control of each WTs. Therefore, following changes are proposed in the control system configuration to have absolute redundancy for each wagon tippler system: 1. Each wagon tippler would have separate set of PLCs in Operator cabin. 2. One Engineering Work Station (EWS) and one Operator Work Station (DWS) station would be configured for each WT. It is submitted that the same will ensure reliability of the control system, safe operation and availability of wagon tipplers. It is also noteworthy that the PLC system for WT installed in the Instant Station are more than 10 years old and have become obsolete and the same would be upgraded during the above mentioned reconfiguration. Hon'ble Commission may be pleased to allow instant projected capitalization on this behalf.	

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner : NTPC Ltd
Name of the Generating Station : Maude-I
COD : 30.03.2014
For Financial Year : 2025-26

Sl. No.	Head of Work / Equipment	ACE (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
10	Upgradation of TG and Winding Vibration Monitoring System	182.00		182.00		25(2)(c), 26(1)(d)	<p>Obsolescence of Technology: It is submitted that Generator stator and winding vibration measuring sensors (accelerometers) are installed to monitor healthiness of stator winding and support system integrity. This is very important on-line generator health monitoring system which are installed in all large modern turbo-generators. BHEL 800 MW generators which are supplied in between year 2002 to 2013, are fitted with piezoelectric type accelerometers having metallic body. However, BHEL generators supplied from year 2014 onwards are fitted with Fibre Optic accelerometers having insulated body and without any metal parts. The piezoelectric type accelerometers have become outdated now and are technologically inferior to the now universally adopted Fibre Optic accelerometers.</p> <p>Safety & Security of equipment & manpower working: It is submitted that certain limitations/ inadequacies of piezoelectric type accelerometers are observed with respect to its mounting location, mounting arrangement insulation quality and sensor cable voltage withstand level, which can lead to flash over inside generators and thereby compromising the safety and security of the equipment and manpower. The event of such flash over with much severe intensity inside in-service generators may take place if the sensor braiding (used for securing sensors on conductor) insulation level is breached during generator earth fault at any location of generator terminal/IPBD/GT LV side/UT HV side (similar incident has already occurred in one of the stations of NTPC).</p> <p>The detailed analysis of the same was done by NTPC along with the TG OEM, i.e., BHEL. It was concluded that a long term solution to avoid such occurrence is to go for replacement of Piezo-electric Accelerometers with Fibre Optic Accelerometer sensors and associated monitoring system. Copy of Minutes of the meeting between NTPC and BHEL dated 31.08.2022, wherein above recommendation was made by BHEL is attached herewith at Annexure-A/B.</p> <p>In view of the above, Hon'ble Commission may be pleased to allow the instant projected capitalization.</p>	
	Sub total A1	2237.00	0.00	2237.00	0.00			
A2	For assets eligible for RoE @ MCLR plus 350 basis points							
1	Installation of Weighbridges at Ash Dyke	27.00		27.00		26(1)(b), 19(1)(d)	<p>MOEF&CC Notification dated 31.12.2021 mandates that every coal or lignite based thermal power plant shall be primarily responsible to ensure 100 percent utilisation of ash and also provides that Statutory obligation of 100 percent utilisation of ash shall be treated as a change in law. A copy of the said Notification dated 31.12.2021 is attached herewith at Annexure-A/B.</p> <p>It is submitted that the Petitioner has taken substantive measures and has been able to achieve 100% ash utilisation in the instant Station. Notably, significant ash utilisation is in road projects, wherein ash is transported ash bulkers. As the frequency of bulkers has increased significantly, Weighbridge is proposed to be installed at Ash Dyke to facilitate the flow of ash transport vehicle as it will reduce waiting time for weighment during peak traffic hours and enable sustaining the 100% ash utilisation.</p> <p>Accordingly, Hon'ble Commission may be pleased to allow the instant projected capitalization on this behalf.</p>	

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner : NTPC Ltd
Name of the Generating Station : Maude-I
COD : 30.03.2014
For Financial Year : 2025-26

Sl. No.	Head of Work / Equipment	ACE (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
2	Lighting Mast Installation in Ash Dyke Area	50.00		50.00		26(1)(b), 26(1)(d)	It is submitted that Lighting Mast is required in the Ash Dyke area to ensure safety and security with regard to ash utilization activities taking place in the dyke area. Pertinently, to achieve 100% ash utilization as mandated by MDEP&CC Notification dated 31.12.2021, there is movement of ash bulkers, loading equipment, etc. often during evening and night hours also. Therefore, additional lighting is required in the dyke area to facilitate ash utilization activities. Hon'ble Commission may be pleased to allow the instant projected capitalization on this behalf.	
3	Installation of Energy efficient Fans in Cooling Tower	56.00		56.00		26(1)(i)	It is submitted that installation of latest Energy Efficient Fans, which are much lighter in weight compared to the existing fans, is proposed in Cooling Towers (CT). The Fans being substantially lighter will enable reduction in Auxiliary Energy Consumption by upto 30% as compared to the APC of the existing CT Fans. Hon'ble Commission may be pleased to allow the instant projected capitalization on this behalf.	
4	Replacement of Treston Trolley with Energy Chain	80.00		80.00		26(1)(i)	The purpose of a treston trolley is to support and manage flexible cables that supply power, control signals in Side Arm Chargers of Wagon Tippler area. Excessive friction between the trolley wheels and the I-beam has resulted in frequent wheel damage. Additionally, the repeated handling of heavy loads has caused consistent failure of the supporting chains and trolleys, leading to operational inefficiencies. It is submitted that for moving equipments like Stackers reclaimers and paddle feeders, energy chain system is required in order to avoid overtension and slackness of cables that pass through a pendulum. With energy chain system, CCRD motors and CRD drums could be avoided thus saving energy and preventing damage/ opening up of control cables. In upcoming thermal power projects, the equipment are equipped with the said energy chain system only and the existing plants are increasingly upgrading to this more efficient and reliable energy chain system. In view of the same, Hon'ble Commission may be pleased to allow the instant projected capitalization.	
5	Replacement of Gravimetric Feeders with VFD Feeders	350.00		350.00		26(1)(i)	It is submitted that M/s BHEL manufactured and supplied Gravimetric Feeders, with eddy clutch speed control drives, are installed presently at the instant station. A frequent problem of feeder speed hunting and running at maximum speed is being reported due to dusty environment and oil ingress through gearbox in drive, which is further leading to bearing damage and malfunctioning of clutch coils, which in turn leads to outages of feeder and partial loading of units. It is pertinent to note that Variable Frequency Drive (VFD) based technologies, prevalent now, are technologically superior particularly for the rotating equipments. VFDs adjust the electrical frequency of the power supplied to a motor to change the motor's rotational speed. In the proposed application, VFD drives will be installed in the coal feeders which will improve the feeder control thus enhancing reliability of operation and will also lead to reduction in Auxiliary Power Consumption by up to 20% to 30% of the present consumption. In view of the above, Hon'ble Commission may be pleased to allow the instant projected capitalization for efficient and reliable operation of the coal feeders.	
Sub total A2		543.00	0.00	543.00	0.00			
Total Add Cap (A1+A2)		2780.00	0.00	2780.00	0.00			

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner : NTPC Ltd
Name of the Generating Station : Maude-I
COD : 30.03.2014
For Financial Year : 2026-27

Sl. No.	Head of Work / Equipment	ACE (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
A1	For assets eligible for Normal ROE							
1	Upgradation of 24VDC charger of DCS Controller	77.00		77.00		25(2)(c)	It is submitted that 'Eittek' make chargers are being used in the instant Station for powering on the DCS controllers with 24VDC. DCS controllers store the logics (protections & interlocks) of all the equipments installed in the Units. Without 24VDC, DCS controllers would not power on and Units cannot be run. The OEM vide its mail dated 21.04.2021 (copy attached herewith at Annexure-A/10) has intimated that the spares of the said Charging system have become obsolete. Owing to unavailability of spares due to obsolescence, there is risk of shutdown of the Charger, which will lead to 24VDC failure, resulting into shutdown of the Units. In view of the same, it is proposed to upgrade the said 24VDC charger. Hon'ble Commission may be pleased to allow instant projected capitalization on this behalf.	
2	Replacement of 'Emerson' make UPS Battery	65.00		65.00		25(2)(a), 25(2)(c)	PI refer justification provided for this item in Form-9 for FY 25-26.	
3	Upgradation of PLC System of HCSD Pumps	21.00		21.00		25(2)(c)	PI refer justification provided for this item in Form-9 for FY 25-26.	
4	Upgradation of Switchgear SCADA System	105.00		105.00		25(2)(a), 25(2)(c)	PI refer justification provided for this item in Form-9 for FY 25-26.	
5	ABT Metering System Upgradation	86.00		86.00		25(2)(a), 25(2)(c)	It is submitted that existing ABT Online DSM is based on DSM Regulations released in 2014. However, subsequent to that there have been several amendments in the DSM Regulations. Consequently, to implement the various provisions as per the extant DSM Regulations including CEA/ CERC guidelines for SAMAST, the metering system needs to be upgraded. Also, in the recent years, CEA, CERT-In, have issued directions for implementation of stringent cyber security measures and therefore to implement the provision with respect to Data Acquisition, Network Infrastructure and cyber security features, the ABT Metering System requires upgradation. The OEM, M/s COSPHI Engineering, vide its report dated 28.10.2024 (attached herewith Annexure-A/11) has recommended to upgrade the ABT Metering System owing to aforesaid reasons. In view of the above, Hon'ble Commission may be pleased to allow the instant projected capitalization.	
	Sub total A1	354.00		354.00				
A2	For assets eligible for RoE @ MCLR plus 350 basis points							

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner : NTPC Ltd
Name of the Generating Station : Maude-I
COD : 30.03.2014
For Financial Year : 2026-27

Sl. No.	Head of Work / Equipment	ACE (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
1	Side Stream Filtration (SSF) System in Cooling Tower	855.36		855.36		26(i)(i)	<p>It is submitted that fine particulate in Cooling Tower's (CT) water supply is the underlying cause of many cooling tower problems. These ultra-fine particles can clog the cooling tower, interrupt heat exchange, ruin the effectiveness of chemical treatments and cause an increase in biological growth, scaling, fouling, etc. thereby reducing the overall efficiency of the CTs.</p> <p>Side Stream Filtration (SSF) systems reduce the amount of suspended solids, organics and silt particles by continuously filtering a percentage (5-15%) of the cooling tower water. The filtered water is then returned to the cooling water system for reuse. Side stream filtration is typically used in high-flow cooling towers.</p> <p>The major benefits expected from the installation of Side Stream Filters are:</p> <p>a) Protection of the cleaner surfaces given that solids have been filtered out of the system. This reduces corrosion rates and increases equipment lifetime.</p> <p>b) Side stream filtration, when paired with chemical treatment, will maintain a cleaner system, thus reducing the need to mechanically clean sumps and exchangers. This in turn lowers maintenance costs.</p> <p>c) Side stream filters keep the system clean for better heat transfer rates, for longer periods, lowering operational costs.</p> <p>d) Removing suspended solids from circulating water can in some cases deliver higher cycles, reducing the need to replace membranes.</p> <p>Therefore, the proposed SSF system will enhance the efficiency of the CTs along by enabling reductions in water and energy consumption, reductions in chemical use, lower maintenance costs, productivity improvements and reduced downtime and better control of biological growth. Hon'ble Commission may be pleased to allow the instant projected capitalization on this behalf.</p>	

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner : NTPC Ltd
Name of the Generating Station : Mauda-I
COD : 30.03.2014
For Financial Year : 2026-27

Sl. No.	Head of Work / Equipment	ACE (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
2	BioMass Handling System	868.00		868.00		26(1)(b), 26(1)(g)	<p>It is submitted that Ministry of Power (MoP), Govt vide their circular dated 08.12.2021 issued "Revised Policy for Biomass Utilization for Power Generation through Co-firing in Coal based Power Plants" as per which coal based power plants are mandated to use bio-mass along with coal for firing. Accordingly, CERC Tariff Regulation 2024 also provides for additional capitalization for works required towards biomass handling system to enable biomass cofiring. A copy of the said Circular dated 08.12.2021 is attached herewith at Annexure-A/12.</p> <p>To handle quantity of biomass pellet as mandated by MoP on daily basis, an automated and fire detection and protection equipped silo-based biomass storage and handling infrastructure is required to enable faster unloading of trucks, avoid damage to biomass pellets while handling, avoid dusting and fire hazard, waterproof storage of biomass in silos, metered and controlled feeding of biomass pellet in desired blend ratio, etc.</p> <p>Biomass pellet has high volatile content and low ignition temperature. Prolonged air contact with stagnant pile of biomass pellet may cause auto ignition due to self-heating and thus silo fire. Biomass dust poses fire hazard and needs to be avoided. The Biomass Handling System envisaged also ensures fire safety by avoiding air contact during silo storage, preventing biomass dust as well as adequate measure for fire detection and protection system.</p> <p>Accordingly, a comprehensive Biomass Handling System is envisaged in Mauda STPS (i.e. Mauda-I of 1000 MW and Mauda-II of 1320 MW) comprising of Biomass Pellet Silo & Active Discharge Aid i.e., Mechanical extractor/ rotary feeder, Belt Feeder (Enclosed type), Fire detection and alarm system, Fire Protection System, Dust Extraction System, Truck Tippler, Weigh Bridge, Bulk Reception Unit, Bucket elevator with Accessories and Supporting structures, Chute for conveyor for feeding biomass at coal belt, AC & Ventilation System, Belt Conveyor System, All applicable CBI and Electrical system/ Drives/ Illumination, Civil, Structural and architectural works including underground facilities like drainage, sewerage, trenches, earthing mat/grounding for structures and foundations of associated with weigh bridge, truck tippler, platform and ramp, bulk reception unit, bucket elevator, biomass pellet silo, conveyor, pipe/cable galleries and pipe/cable trenches, duct banks, pedestals, pre-fabricated containers for housing CBI and electrical items, Civil works associated with air-conditioning and ventilation system, general paving to make approach, etc.</p> <p>Accordingly, proportionate projected capital expenditure based on Instant Station's capacity (1000 MW), has been claimed for the Instant Station. Hon'ble Commission may be pleased to allow the same.</p>	
	Sub-total A2	1723.36	0.00	1723.36	0.00			
	Total Add Cap (A1+A2)	2077.36	0.00	2077.36	0.00			

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner : NTPC Ltd
Name of the Generating Station : Mauda-I
COD : 30.03.2014
For Financial Year : 2027-28

Sl. No.	Head of Work / Equipment	ACE (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
A1	For assets eligible for Normal ROE							
1	Upgradation of 24VDC charger of DCS Controllor.	77.00		77.00		25(2)(c)	Pl refer justification provided for this item in Form-9 for FY 26-27.	
2	Upgradation of 'Schneider' make DCS Controllars	220.00		220.00		25(2)(c)	Pl refer justification provided for this item in Form-9 for FY 25-26.	
	Sub total A1	297.00	0.00	297.00	0.00			
A2	For assets eligible for RoE @ MCLR plus 350 basis points							
	Sub-total A2	0.00	0.00	0.00	0.00			
	Total Add Csp (A1+A2)	297.00	0.00	297.00	0.00			

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner : NTPC Ltd
Name of the Generating Station : Maude-I
COD : 30.03.2014
For Financial Year : 2028-29

Sl. No.	Head of Work / Equipment	ACE (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5=(3-4)	6	7	8	9
A1	For assets eligible for Normal ROE							
1	Upgradation of 'Schneider' make DCS Controllers	220.00		220.00		25(2)(c)	Pl refer justification provided for this item in Form-9 for FY 25-26.	
2	Upgradation of TG End Winding Vibration Monitoring System	218.00		218.00		25(2)(c), 26(1)(d)	Pl refer justification provided for this item in Form-9 for FY 25-26.	
	Sub total A1	438.00	0.00	438.00				
A2	For assets eligible for RoE @ MCLR plus 350 basis points							
	Sub-total A2	0.00	0.00	0.00	0.00			
	Total Add Cap (A1+A2)	438.00	0.00	438.00	0.00			

PART-I
FORM- 10

Name of the Petitioner	NTPC Limited
Name of the Generating Station	Mauda-I
Date of Commercial Operation	30-03-2014

Amount in Rs Lakh

Financial Year (Starting from COD)1	Projected				
	2024-25	2025-26	2026-27	2027-28	2028-29
1		3	4	5	6

Amount capitalised in Work/ Equipment

Financing Details	Add cap is proposed to be financed in Debt:Equity ratio of 70:30
Loan-1	
Loan-2	
Loan-3 and so on	
Total Loan2	
Equity	
Internal Resources	
Others (Pl. specify)	
Total	

Calculation of Depreciation

Name of the Petitioner : NTPC Ltd
Name of the Power Station : Mauda-I

Sl.No.	Name of the Assets	Depreciation Rates as per CERC's Depreciation Rate Schedule	Gross Block as on 01.04.2024 (Rs Lakh)	Depreciation as on 01.04.2024
1	Freehold Land	0.00%	0.00	0.00
2	Leasehold Land	3.34%	26383.54	881.21
3	Land - Right of use	3.34%	1239.56	41.40
4	Roads, bridges, culverts & helipads	3.34%	17256.99	576.38
5	Main Plant Buildings	3.34%	7467.93	249.43
6	Other Buildings	3.34%	25435.18	849.53
7	Temporary erection	100.00%	126.05	126.05
8	Water supply, drainage & sewerage	5.28%	6529.76	344.77
9	Railway siding	5.28%	20888.99	1102.94
10	Earth dam reservoir	5.28%	560.02	29.57
11	Plant and machinery	5.28%	596496.15	31495.00
12	Furniture and fixtures	6.33%	3431.50	217.21
13	Other Office Equipments	6.33%	226.89	14.36
14	EDP, WP machines & SATCOM equipr	15.00%	82.44	12.37
15	Vehicles including speedboats	9.50%	1.72	0.16
16	Construction equipment	5.28%	1500.00	79.20
17	Electrical installations	5.28%	12779.98	674.78
18	Communication equipment	6.33%	193.20	12.23
19	Hospital equipment	5.28%	44.66	2.36
20	Laboratory and workshop equipment	5.28%	502.12	26.51
21	Software	15.00%	19.97	3.00
	Total		721166.64	36738.47
	Rate of Depreciation			5.0943%

Statement of Depreciation

Name of the Company : NTPC Limited

Name of the Power Station : Mauda-I

(Amount in Rs Lakh)

S. No.	Particulars	Existing 2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7	8
1	Opening Capital Cost	6,67,769.12	6,72,272.15	6,74,404.39	6,77,184.39	6,79,261.75	6,79,558.75
2	Closing Capital Cost	6,72,272.15	6,74,404.39	6,77,184.39	6,79,261.75	6,79,558.75	6,79,996.75
3	Average Capital Cost	6,70,020.63	6,73,338.27	6,75,794.39	6,78,223.07	6,79,410.25	6,79,777.75
3a	Opening capital cost of IT/ Software	102.40	102.40	102.40	102.40	102.40	102.40
3b	Addition in capital cost of IT/ Software*	0.00	0.00	0.00	0.00	0.00	0.00
3c	Closing capital cost of IT/ Software	102.40	102.40	102.40	102.40	102.40	102.40
3d	Average Cost of IT Equipments & Software	102.40	102.40	102.40	102.40	102.40	102.40
4	Freehold land	-	-	-	-	-	-
5	Rate of depreciation	5.0936%	5.0943%	5.0943%	2.2903%	2.3000%	2.3034%
6	Aggregate Depreciable value	6,03,028.81	6,06,014.68	6,08,225.19	6,10,411.00	6,11,479.46	6,11,810.21
7	Remaining Aggregate Depreciable Value at the beginning of the period	2,88,936.13	2,58,030.20	2,25,938.76	1,93,697.51	1,79,232.89	1,63,937.41
8	Balance useful life at the beginning of the period	15.47	14.47	13.47	12.47	11.47	10.47
9	Depreciation (for the period)	34,128.04	34,301.94	34,427.07	15,533.08	15,626.23	15,657.82
10	Depreciation (annualised)	34,128.04	34,301.94	34,427.07	15,533.08	15,626.23	15,657.82
11	Cumulative depreciation at the end of the period	3,48,220.71	3,82,286.43	4,16,713.49	4,32,246.57	4,47,872.80	4,63,530.63
12	Add: Cumulative depreciation adjustment of discharges/ reversals corresponding to un-discharged liabilities deducted as on 1.4.2009	-	-	-	-	-	-
13	Less: Cumulative depreciation adjustment on account of de-capitalisation	236.23	-	-	-	-	-
14	Net Cumulative depreciation at the end of the period after adjustments	3,47,984.48	3,82,286.43	4,16,713.49	4,32,246.57	4,47,872.80	4,63,530.63

* Shall be provided at triung-up

(Petitioner)

Calculation of Interest on Actual Loans		Form-13				
Name of the Company		NTPC				
Name of the Power Station		Mauda-I				
(Amount in lacs)						
Sl. no.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
1	4.25% Fixed Rate Notes due 2026					
	Gross loan - Opening	1118.67	1118.67	1118.67	1118.67	1118.67
	Cumulative repayments of Loans upto previous period	0.00	0.00	1118.67	1118.67	1118.67
	Net loan - Opening	1118.67	1118.67	0.00	0.00	0.00
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	1118.67	1118.67	0.00	0.00	0.00
	Repayments of Loans during the period	0.00	1118.67	0.00	0.00	0.00
	Net loan - Closing	1118.67	0.00	0.00	0.00	0.00
	Average Net Loan	1118.67	559.33	0.00	0.00	0.00
	Rate of Interest on Loan	4.4955%	4.4955%	4.4955%	4.4955%	4.4955%
	Interest on Loan Annualised	50.29	25.14	0.00	0.00	0.00
2	USD 750 Million Drawl III (Refinancing Euro Bonds)					
	Gross loan - Opening	8216.95	8216.95	8216.95	8216.95	8216.95
	Cumulative repayments of Loans upto previous period	0.00	0.00	0.00	1173.85	2347.70
	Net loan - Opening	8216.95	8216.95	8216.95	7043.10	5869.25
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	8216.95	8216.95	8216.95	7043.10	5869.25
	Repayments of Loans during the period	0.00	0.00	1173.85	1173.85	1173.85
	Net loan - Closing	8216.95	8216.95	7043.10	5869.25	4695.40
	Average Net Loan	8216.95	8216.95	7630.03	6456.18	5282.33
	Rate of Interest on Loan	7.0478%	7.0478%	7.0478%	7.0478%	7.0478%
	Interest on Loan Annualised	579.11	579.11	537.75	455.02	372.29
3	Union Bank of India II Repayment from 01.02.2017					
	Gross loan - Opening	2500.00	2500.00	2500.00	2500.00	2500.00
	Cumulative repayments of Loans upto previous period	1875.00	2125.00	2375.00	2500.00	2500.00
	Net loan - Opening	625.00	375.00	125.00	0.00	0.00
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	625.00	375.00	125.00	0.00	0.00
	Repayments of Loans during the period	250.00	250.00	125.00	0.00	0.00
	Net loan - Closing	375.00	125.00	0.00	0.00	0.00
	Average Net Loan	500.00	250.00	62.50	0.00	0.00
	Rate of Interest on Loan	8.1000%	8.1000%	8.1000%	8.1000%	8.1000%
	Interest on Loan Annualised	40.50	20.25	5.06	0.00	0.00
4	Corporation Bank-IV D1 Repayment from 11.01.2023 (ICICI V Loan refinanced)					
	Gross loan - Opening	10544.64	10544.64	10544.64	10544.64	10544.64
	Cumulative repayments of Loans upto previous period	2343.25	3514.88	4686.51	5858.13	7029.76
	Net loan - Opening	8201.39	7029.76	5858.13	4686.51	3514.88
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	8201.39	7029.76	5858.13	4686.51	3514.88
	Repayments of Loans during the period	1171.63	1171.63	1171.63	1171.63	1171.63
	Net loan - Closing	7029.76	5858.13	4686.51	3514.88	2343.25
	Average Net Loan	7615.58	6443.95	5272.32	4100.69	2929.07
	Rate of Interest on Loan	8.2333%	8.2333%	8.2333%	8.2333%	8.2333%
	Interest on Loan Annualised	627.02	530.55	434.09	337.62	241.16
5	HDFC Bank Ltd.-IV D1 Repayment from 17.04.2021					
	Gross loan - Opening	5000.00	5000.00	5000.00	5000.00	5000.00
	Cumulative repayments of Loans upto previous period	1666.67	2222.22	2777.78	3333.33	3888.89
	Net loan - Opening	3333.33	2777.78	2222.22	1666.67	1111.11
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	3333.33	2777.78	2222.22	1666.67	1111.11
	Repayments of Loans during the period	555.56	555.56	555.56	555.56	555.56
	Net loan - Closing	2777.78	2222.22	1666.67	1111.11	555.56
	Average Net Loan	3055.56	2500.00	1944.44	1388.89	833.33
	Rate of Interest on Loan	7.9500%	7.9500%	7.9500%	7.9500%	7.9500%
	Interest on Loan Annualised	242.92	198.75	154.58	110.42	66.25
6	HDFC Bank Ltd.-V D1 Repayment from 25.09.2024					
	Gross loan - Opening	353.00	353.00	353.00	353.00	353.00
	Cumulative repayments of Loans upto previous period	0.00	39.22	78.44	117.67	156.89
	Net loan - Opening	353.00	313.78	274.56	235.33	196.11
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	353.00	313.78	274.56	235.33	196.11
	Repayments of Loans during the period	39.22	39.22	39.22	39.22	39.22
	Net loan - Closing	313.78	274.56	235.33	196.11	156.89
	Average Net Loan	333.39	294.17	254.94	215.72	176.50
	Rate of Interest on Loan	7.9500%	7.9500%	7.9500%	7.9500%	7.9500%

Calculation of Interest on Actual Loans		Form-13				
Name of the Company Name of the Power Station		NTPC Mauda-I				
(Amount in lacs)						
Sl. no.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
	Interest on Loan Annualised	26.50	23.39	20.27	17.15	14.03
7	SBI-VIII					
	Gross loan - Opening	3900.00	3900.00	3900.00	3900.00	3900.00
	Cumulative repayments of Loans upto previous period	1300.00	1733.33	2166.67	2600.00	3033.33
	Net loan - Opening	2600.00	2166.67	1733.33	1300.00	866.67
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	2600.00	2166.67	1733.33	1300.00	866.67
	Repayments of Loans during the period	433.33	433.33	433.33	433.33	433.33
	Net loan - Closing	2166.67	1733.33	1300.00	866.67	433.33
	Average Net Loan	2383.33	1950.00	1516.67	1083.33	650.00
	Rate of Interest on Loan	8.2000%	8.2000%	8.2000%	8.2000%	8.2000%
	Interest on Loan Annualised	195.43	159.90	124.37	88.83	53.30
8	SBI-VIII D24 Repayment from 31.01.2022 (Punjab & Sind Bank-I prepayment loan)					
	Gross loan - Opening	4071.43	4071.43	4071.43	4071.43	4071.43
	Cumulative repayments of Loans upto previous period	1357.14	1809.52	2261.90	2714.29	3166.67
	Net loan - Opening	2714.29	2261.90	1809.52	1357.14	904.76
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	2714.29	2261.90	1809.52	1357.14	904.76
	Repayments of Loans during the period	452.38	452.38	452.38	452.38	452.38
	Net loan - Closing	2261.90	1809.52	1357.14	904.76	452.38
	Average Net Loan	2488.10	2035.71	1583.33	1130.95	678.57
	Rate of Interest on Loan	8.7333%	8.7333%	8.7333%	8.7333%	8.7333%
	Interest on Loan Annualised	217.29	177.79	138.28	96.77	59.26
9	SBI-XII D2 Repayment from 31.03.2026 (IDFC Bank-II prepayment loan)					
	Gross loan - Opening	2100.00	2100.00	2100.00	2100.00	2100.00
	Cumulative repayments of Loans upto previous period	0.00	0.00	233.33	466.67	700.00
	Net loan - Opening	2100.00	2100.00	1866.67	1633.33	1400.00
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	2100.00	2100.00	1866.67	1633.33	1400.00
	Repayments of Loans during the period	0.00	233.33	233.33	233.33	233.33
	Net loan - Closing	2100.00	1866.67	1633.33	1400.00	1166.67
	Average Net Loan	2100.00	1983.33	1750.00	1516.67	1283.33
	Rate of Interest on Loan	8.3000%	8.3000%	8.3000%	8.3000%	8.3000%
	Interest on Loan Annualised	174.30	164.62	145.25	125.88	106.52
10	HDFC-III D7 Repayment from 04.12.2021					
	Gross loan - Opening	3500.00	3500.00	3500.00	3500.00	3500.00
	Cumulative repayments of Loans upto previous period	1166.67	1555.56	1944.44	2333.33	2722.22
	Net loan - Opening	2333.33	1944.44	1555.56	1166.67	777.78
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	2333.33	1944.44	1555.56	1166.67	777.78
	Repayments of Loans during the period	388.89	388.89	388.89	388.89	388.89
	Net loan - Closing	1944.44	1555.56	1166.67	777.78	388.89
	Average Net Loan	2138.89	1750.00	1361.11	972.22	583.33
	Rate of Interest on Loan	7.9500%	7.9500%	7.9500%	7.9500%	7.9500%
	Interest on Loan Annualised	170.04	139.13	108.21	77.29	46.38
11	HDFC-IX (Refinancing of HUDCO)					
	Gross loan - Opening	1589.00	1589.00	1589.00	1589.00	1589.00
	Cumulative repayments of Loans upto previous period	0.00	132.42	264.83	397.25	529.67
	Net loan - Opening	1589.00	1456.58	1324.17	1191.75	1059.33
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	1589.00	1456.58	1324.17	1191.75	1059.33
	Repayments of Loans during the period	132.42	132.42	132.42	132.42	132.42
	Net loan - Closing	1456.58	1324.17	1191.75	1059.33	926.92
	Average Net Loan	1522.79	1390.38	1257.96	1125.54	993.13
	Rate of Interest on Loan	8.3000%	8.3000%	8.3000%	8.3000%	8.3000%
	Interest on Loan Annualised	126.39	115.40	104.41	93.42	82.43
12	HDFC-IX (Refinancing of Vijaya Bank-IV)					
	Gross loan - Opening	357.39	357.39	357.39	357.39	357.39
	Cumulative repayments of Loans upto previous period	0.00	29.78	59.56	89.35	119.13
	Net loan - Opening	357.39	327.61	297.82	268.04	238.26
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	357.39	327.61	297.82	268.04	238.26
	Repayments of Loans during the period	29.78	29.78	29.78	29.78	29.78
	Net loan - Closing	327.61	297.82	268.04	238.26	208.48
	Average Net Loan	342.50	312.71	282.93	253.15	223.37

Calculation of Interest on Actual Loans		Form-13				
Name of the Company Name of the Power Station		NTPC Mauda-I				
(Amount in lacs)						
Sl. no.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
	Rate of Interest on Loan	8.3750%	8.3750%	8.3750%	8.3750%	8.3750%
	Interest on Loan Annualised	28.68	26.19	23.70	21.20	18.71
13	HDFC-IX (Refinancing of Syndicate Bank-III)					
	Gross loan - Opening	5000.00	5000.00	5000.00	5000.00	5000.00
	Cumulative repayments of Loans upto previous period	0.00	416.67	833.33	1250.00	1666.67
	Net loan - Opening	5000.00	4583.33	4166.67	3750.00	3333.33
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	5000.00	4583.33	4166.67	3750.00	3333.33
	Repayments of Loans during the period	416.67	416.67	416.67	416.67	416.67
	Net loan - Closing	4583.33	4166.67	3750.00	3333.33	2916.67
	Average Net Loan	4791.67	4375.00	3958.33	3541.67	3125.00
	Rate of Interest on Loan	8.4000%	8.4000%	8.4000%	8.4000%	8.4000%
	Interest on Loan Annualised	402.50	367.50	332.50	297.50	262.50
14	Bonds XLII Series- repayment from 25.01.2023					
	Gross loan - Opening	2400.00	2400.00	2400.00	2400.00	2400.00
	Cumulative repayments of Loans upto previous period	960.00	1440.00	1920.00	2400.00	2400.00
	Net loan - Opening	1440.00	960.00	480.00	0.00	0.00
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	1440.00	960.00	480.00	0.00	0.00
	Repayments of Loans during the period	480.00	480.00	480.00	0.00	0.00
	Net loan - Closing	960.00	480.00	0.00	0.00	0.00
	Average Net Loan	1200.00	720.00	240.00	0.00	0.00
	Rate of Interest on Loan	9.0300%	9.0300%	9.0300%	9.0300%	9.0300%
	Interest on Loan Annualised	108.36	65.02	21.67	0.00	0.00
15	Bonds XLIV Series- repayment from 04.05.2023					
	Gross loan - Opening	5000.00	5000.00	5000.00	5000.00	5000.00
	Cumulative repayments of Loans upto previous period	1000.00	2000.00	3000.00	4000.00	5000.00
	Net loan - Opening	4000.00	3000.00	2000.00	1000.00	0.00
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	4000.00	3000.00	2000.00	1000.00	0.00
	Repayments of Loans during the period	1000.00	1000.00	1000.00	1000.00	0.00
	Net loan - Closing	3000.00	2000.00	1000.00	0.00	0.00
	Average Net Loan	3500.00	2500.00	1500.00	500.00	0.00
	Rate of Interest on Loan	9.2800%	9.2800%	9.2800%	9.2800%	9.2800%
	Interest on Loan Annualised	324.80	232.00	139.20	46.40	0.00
16	Bonds L2A Series- bullet repayment on 16.12.2028					
	Gross loan - Opening	1456.83	1456.83	1456.83	1456.83	1456.83
	Cumulative repayments of Loans upto previous period	0.00	0.00	0.00	0.00	0.00
	Net loan - Opening	1456.83	1456.83	1456.83	1456.83	1456.83
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	1456.83	1456.83	1456.83	1456.83	1456.83
	Repayments of Loans during the period	0.00	0.00	0.00	0.00	1456.83
	Net loan - Closing	1456.83	1456.83	1456.83	1456.83	0.00
	Average Net Loan	1456.83	1456.83	1456.83	1456.83	728.42
	Rate of Interest on Loan	8.5100%	8.5100%	8.5100%	8.5100%	8.5100%
	Interest on Loan Annualised	123.98	123.98	123.98	123.98	61.99
17	Bonds L3A Series- bullet repayment on 16.12.2033					
	Gross loan - Opening	1818.68	1818.68	1818.68	1818.68	1818.68
	Cumulative repayments of Loans upto previous period	0.00	0.00	0.00	0.00	0.00
	Net loan - Opening	1818.68	1818.68	1818.68	1818.68	1818.68
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	1818.68	1818.68	1818.68	1818.68	1818.68
	Repayments of Loans during the period	0.00	0.00	0.00	0.00	0.00
	Net loan - Closing	1818.68	1818.68	1818.68	1818.68	1818.68
	Average Net Loan	1818.68	1818.68	1818.68	1818.68	1818.68
	Rate of Interest on Loan	8.6900%	8.6900%	8.6900%	8.6900%	8.6900%
	Interest on Loan Annualised	158.04	158.04	158.04	158.04	158.04
18	Bonds L2B Series- bullet repayment on 16.12.2028					
	Gross loan - Opening	532.69	532.69	532.69	532.69	532.69
	Cumulative repayments of Loans upto previous period	0.00	0.00	0.00	0.00	0.00
	Net loan - Opening	532.69	532.69	532.69	532.69	532.69
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	532.69	532.69	532.69	532.69	532.69
	Repayments of Loans during the period	0.00	0.00	0.00	0.00	532.69
	Net loan - Closing	532.69	532.69	532.69	532.69	0.00
	Average Net Loan	532.69	532.69	532.69	532.69	266.35
	Rate of Interest on Loan	8.7600%	8.7600%	8.7600%	8.7600%	8.7600%

Calculation of Interest on Actual Loans		Form-13				
Name of the Company Name of the Power Station		NTPC Mauda-I				
		(Amount in lacs)				
Sl. no.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
	Interest on Loan Annualised	46.66	46.66	46.66	46.66	23.33
19	Bonds L3B Series- bullet repayment on 16.12.2033					
	Gross loan - Opening	2331.24	2331.24	2331.24	2331.24	2331.24
	Cumulative repayments of Loans upto previous period	0.00	0.00	0.00	0.00	0.00
	Net loan - Opening	2331.24	2331.24	2331.24	2331.24	2331.24
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	2331.24	2331.24	2331.24	2331.24	2331.24
	Repayments of Loans during the period	0.00	0.00	0.00	0.00	0.00
	Net loan - Closing	2331.24	2331.24	2331.24	2331.24	2331.24
	Average Net Loan	2331.24	2331.24	2331.24	2331.24	2331.24
	Rate of Interest on Loan	8.9400%	8.9400%	8.9400%	8.9400%	8.9400%
	Interest on Loan Annualised	208.41	208.41	208.41	208.41	208.41
20	Bonds L1C Series- bullet repayment on 04.03.2034					
	Gross loan - Opening	9700.00	9700.00	9700.00	9700.00	9700.00
	Cumulative repayments of Loans upto previous period	0.00	0.00	0.00	0.00	0.00
	Net loan - Opening	9700.00	9700.00	9700.00	9700.00	9700.00
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	9700.00	9700.00	9700.00	9700.00	9700.00
	Repayments of Loans during the period	0.00	0.00	0.00	0.00	0.00
	Net loan - Closing	9700.00	9700.00	9700.00	9700.00	9700.00
	Average Net Loan	9700.00	9700.00	9700.00	9700.00	9700.00
	Rate of Interest on Loan	8.6400%	8.6400%	8.6400%	8.6400%	8.6400%
	Interest on Loan Annualised	838.08	838.08	838.08	838.08	838.08
21	Bonds 54 Series					
	Gross loan - Opening	21900.00	21900.00	21900.00	21900.00	21900.00
	Cumulative repayments of Loans upto previous period	13140.00	21900.00	21900.00	21900.00	21900.00
	Net loan - Opening	8760.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	8760.00	0.00	0.00	0.00	0.00
	Repayments of Loans during the period	8760.00	0.00	0.00	0.00	0.00
	Net loan - Closing	0.00	0.00	0.00	0.00	0.00
	Average Net Loan	4380.00	0.00	0.00	0.00	0.00
	Rate of Interest on Loan	8.5200%	8.5200%	8.5200%	8.5200%	8.5200%
	Interest on Loan Annualised	373.18	0.00	0.00	0.00	0.00
22	Bonds 66 Series					
	Gross loan - Opening	3200.00	3200.00	3200.00	3200.00	3200.00
	Cumulative repayments of Loans upto previous period	0.00	0.00	0.00	0.00	0.00
	Net loan - Opening	3200.00	3200.00	3200.00	3200.00	3200.00
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	3200.00	3200.00	3200.00	3200.00	3200.00
	Repayments of Loans during the period	0.00	0.00	0.00	0.00	0.00
	Net loan - Closing	3200.00	3200.00	3200.00	3200.00	3200.00
	Average Net Loan	3200.00	3200.00	3200.00	3200.00	3200.00
	Rate of Interest on Loan	7.4000%	7.4000%	7.4000%	7.4000%	7.4000%
	Interest on Loan Annualised	236.80	236.80	236.80	236.80	236.80
23	Bonds 67 Series (ICICI VI Loan refinanced)					
	Gross loan - Opening	715.00	715.00	715.00	715.00	715.00
	Cumulative repayments of Loans upto previous period	0.00	0.00	0.00	0.00	0.00
	Net loan - Opening	715.00	715.00	715.00	715.00	715.00
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	715.00	715.00	715.00	715.00	715.00
	Repayments of Loans during the period	0.00	0.00	0.00	0.00	715.00
	Net loan - Closing	715.00	715.00	715.00	715.00	0.00
	Average Net Loan	715.00	715.00	715.00	715.00	357.50
	Rate of Interest on Loan	8.4300%	8.4300%	8.4300%	8.4300%	8.4300%
	Interest on Loan Annualised	60.27	60.27	60.27	60.27	30.14
24	Bonds 69 Series (Refinancing of Indian Bank III)					
	Gross loan - Opening	2343.75	2343.75	2343.75	2343.75	2343.75
	Cumulative repayments of Loans upto previous period	0.00	0.00	0.00	0.00	0.00
	Net loan - Opening	2343.75	2343.75	2343.75	2343.75	2343.75
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	2343.75	2343.75	2343.75	2343.75	2343.75
	Repayments of Loans during the period	0.00	0.00	0.00	0.00	0.00
	Net loan - Closing	2343.75	2343.75	2343.75	2343.75	2343.75
	Average Net Loan	2343.75	2343.75	2343.75	2343.75	2343.75
	Rate of Interest on Loan	7.7150%	7.7150%	7.7150%	7.7150%	7.7150%
	Interest on Loan Annualised	180.82	180.82	180.82	180.82	180.82

Calculation of Interest on Actual Loans		Form-13				
Name of the Company Name of the Power Station		NTPC Mauda-I				
						(Amount in lacs)
Sl. no.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
25	Bonds 69 Series (Refinancing of United Bank of India IV)					
	Gross loan - Opening	3656.25	3656.25	3656.25	3656.25	3656.25
	Cumulative repayments of Loans upto previous period	0.00	0.00	0.00	0.00	0.00
	Net loan - Opening	3656.25	3656.25	3656.25	3656.25	3656.25
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	3656.25	3656.25	3656.25	3656.25	3656.25
	Repayments of Loans during the period	0.00	0.00	0.00	0.00	0.00
	Net loan - Closing	3656.25	3656.25	3656.25	3656.25	3656.25
	Average Net Loan	3656.25	3656.25	3656.25	3656.25	3656.25
	Rate of Interest on Loan	7.7650%	7.7650%	7.7650%	7.7650%	7.7650%
	Interest on Loan Annualised	283.91	283.91	283.91	283.91	283.91
26	Bonds 72 Series (Others)					
	Gross loan - Opening	14614.58	14614.58	14614.58	14614.58	14614.58
	Cumulative repayments of Loans upto previous period	0.00	0.00	14614.58	14614.58	14614.58
	Net loan - Opening	14614.58	14614.58	0.00	0.00	0.00
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	14614.58	14614.58	0.00	0.00	0.00
	Repayments of Loans during the period	0.00	14614.58	0.00	0.00	0.00
	Net loan - Closing	14614.58	0.00	0.00	0.00	0.00
	Average Net Loan	14614.58	7307.29	0.00	0.00	0.00
	Rate of Interest on Loan	5.4800%	5.4800%	5.4800%	5.4800%	5.4800%
	Interest on Loan Annualised	800.88	400.44	0.00	0.00	0.00
27	Bonds 72 Series (Refinancing PFC V)					
	Gross loan - Opening	2447.92	2447.92	2447.92	2447.92	2447.92
	Cumulative repayments of Loans upto previous period	0.00	0.00	2447.92	2447.92	2447.92
	Net loan - Opening	2447.92	2447.92	0.00	0.00	0.00
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	2447.92	2447.92	0.00	0.00	0.00
	Repayments of Loans during the period	0.00	2447.92	0.00	0.00	0.00
	Net loan - Closing	2447.92	0.00	0.00	0.00	0.00
	Average Net Loan	2447.92	1223.96	0.00	0.00	0.00
	Rate of Interest on Loan	6.6700%	6.6700%	6.6700%	6.6700%	6.6700%
	Interest on Loan Annualised	163.28	81.64	0.00	0.00	0.00
28	Bonds 72 Series (Refinancing PFC V)					
	Gross loan - Opening	5364.58	5364.58	5364.58	5364.58	5364.58
	Cumulative repayments of Loans upto previous period	0.00	0.00	5364.58	5364.58	5364.58
	Net loan - Opening	5364.58	5364.58	0.00	0.00	0.00
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	5364.58	5364.58	0.00	0.00	0.00
	Repayments of Loans during the period	0.00	5364.58	0.00	0.00	0.00
	Net loan - Closing	5364.58	0.00	0.00	0.00	0.00
	Average Net Loan	5364.58	2682.29	0.00	0.00	0.00
	Rate of Interest on Loan	6.8400%	6.8400%	6.8400%	6.8400%	6.8400%
	Interest on Loan Annualised	366.94	183.47	0.00	0.00	0.00
29	Bonds 72 Series (Refinancing PFC V)					
	Gross loan - Opening	1822.92	1822.92	1822.92	1822.92	1822.92
	Cumulative repayments of Loans upto previous period	0.00	0.00	1822.92	1822.92	1822.92
	Net loan - Opening	1822.92	1822.92	0.00	0.00	0.00
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	1822.92	1822.92	0.00	0.00	0.00
	Repayments of Loans during the period	0.00	1822.92	0.00	0.00	0.00
	Net loan - Closing	1822.92	0.00	0.00	0.00	0.00
	Average Net Loan	1822.92	911.46	0.00	0.00	0.00
	Rate of Interest on Loan	6.9050%	6.9050%	6.9050%	6.9050%	6.9050%
	Interest on Loan Annualised	125.87	62.94	0.00	0.00	0.00
30	Bonds 72 Series (Refinancing PFC V)					
	Gross loan - Opening	6250.00	6250.00	6250.00	6250.00	6250.00
	Cumulative repayments of Loans upto previous period	0.00	0.00	6250.00	6250.00	6250.00
	Net loan - Opening	6250.00	6250.00	0.00	0.00	0.00
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	6250.00	6250.00	0.00	0.00	0.00
	Repayments of Loans during the period	0.00	6250.00	0.00	0.00	0.00
	Net loan - Closing	6250.00	0.00	0.00	0.00	0.00
	Average Net Loan	6250.00	3125.00	0.00	0.00	0.00
	Rate of Interest on Loan	6.8800%	6.8800%	6.8800%	6.8800%	6.8800%
	Interest on Loan Annualised	430.00	215.00	0.00	0.00	0.00
31	Bonds 74 Series					
	Gross loan - Opening	500.00	500.00	500.00	500.00	500.00

Calculation of Interest on Actual Loans		Form-13				
Name of the Company		NTPC				
Name of the Power Station		Mauda-I				
(Amount in lacs)						
Sl. no.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
	Cumulative repayments of Loans upto previous period	0.00	0.00	0.00	0.00	0.00
	Net loan - Opening	500.00	500.00	500.00	500.00	500.00
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	500.00	500.00	500.00	500.00	500.00
	Repayments of Loans during the period	0.00	0.00	0.00	0.00	0.00
	Net loan - Closing	500.00	500.00	500.00	500.00	500.00
	Average Net Loan	500.00	500.00	500.00	500.00	500.00
	Rate of Interest on Loan	6.9000%	6.9000%	6.9000%	6.9000%	6.9000%
	Interest on Loan Annualised	34.50	34.50	34.50	34.50	34.50
	TOTAL LOAN					
	Gross loan - Opening	134306	134306	134306	134306	134306
	Cumulative repayments of Loans upto previous period	24809	38919	76120	82753	88780
	Net loan - Opening	109497	95387	58185	51553	45526
	Increase/ Decrease due to FERV	0	0	0	0	0
	Increase/ Decrease due to ACE/Drawl during the period	0	0	0	0	0
	Total	109497	95387	58185	51553	45526
	Repayments of Loans during the period	14110	37202	6632	6027	7732
	Net loan - Closing	95387	58185	51553	45526	37794
	Average Net Loan	102442	76786	54869	48539	41660
	Rate of Interest on Loan	7.5611%	7.7354%	8.1299%	8.1191%	8.1105%
	Interest on Loan Annualised	7746	5940	4461	3941	3379
	SBI-VIII D12 Repayment from 31.01.2022					
	Gross loan - Opening	2000.00	2000.00	2000.00	2000.00	2000.00
	Cumulative repayments of Loans upto previous period	666.67	888.89	1111.11	1333.33	1555.56
	Net loan - Opening	1333.33	1111.11	888.89	666.67	444.44
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	1333.33	1111.11	888.89	666.67	444.44
	Repayments of Loans during the period	222.22	222.22	222.22	222.22	222.22
	Net loan - Closing	1111.11	888.89	666.67	444.44	222.22
	Average Net Loan	1222.22	1000.00	777.78	555.56	333.33
	Rate of Interest on Loan	8.2000%	8.2000%	8.2000%	8.2000%	8.2000%
	Interest on Loan Annualised	100.22	82.00	63.78	45.56	27.33
	SBI-VIII D13 Repayment from 31.01.2022					
	Gross loan - Opening	1200.00	1200.00	1200.00	1200.00	1200.00
	Cumulative repayments of Loans upto previous period	400.00	533.33	666.67	800.00	933.33
	Net loan - Opening	800.00	666.67	533.33	400.00	266.67
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	800.00	666.67	533.33	400.00	266.67
	Repayments of Loans during the period	133.33	133.33	133.33	133.33	133.33
	Net loan - Closing	666.67	533.33	400.00	266.67	133.33
	Average Net Loan	733.33	600.00	466.67	333.33	200.00
	Rate of Interest on Loan	8.2000%	8.2000%	8.2000%	8.2000%	8.2000%
	Interest on Loan Annualised	60.13	49.20	38.27	27.33	16.40
	SBI-VIII D21 Repayment from 31.01.2022					
	Gross loan - Opening	700.00	700.00	700.00	700.00	700.00
	Cumulative repayments of Loans upto previous period	233.33	311.11	388.89	466.67	544.44
	Net loan - Opening	466.67	388.89	311.11	233.33	155.56
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	466.67	388.89	311.11	233.33	155.56
	Repayments of Loans during the period	77.78	77.78	77.78	77.78	77.78
	Net loan - Closing	388.89	311.11	233.33	155.56	77.78
	Average Net Loan	427.78	350.00	272.22	194.44	116.67
	Rate of Interest on Loan	8.2000%	8.2000%	8.2000%	8.2000%	8.2000%
	Interest on Loan Annualised	35.08	28.70	22.32	15.94	9.57
	SBI-VIII Total					
	Gross loan - Opening	3900.00	3900.00	3900.00	3900.00	3900.00
	Cumulative repayments of Loans upto previous period	1300.00	1733.33	2166.67	2600.00	3033.33
	Net loan - Opening	2600.00	2166.67	1733.33	1300.00	866.67
	Increase/ Decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/ Decrease due to ACE/Drawl during the period	0.00	0.00	0.00	0.00	0.00
	Total	2600.00	2166.67	1733.33	1300.00	866.67
	Repayments of Loans during the period	433.33	433.33	433.33	433.33	433.33
	Net loan - Closing	2166.67	1733.33	1300.00	866.67	433.33
	Average Net Loan	2383.33	1950.00	1516.67	1083.33	650.00
	Rate of Interest on Loan	8.2000%	8.2000%	8.2000%	8.2000%	8.2000%
	Interest on Loan Annualised	195.43	159.90	124.37	88.83	53.30

S.NO	BANK	RATE OF INTEREST	From	To
	Union Bank-II	8.10%	11-Jan-24	31-Mar-24
	Corporation Bank-IV	8.10%	11-Jan-24	31-Mar-24
	HDFC Bank Limited-IV	7.95%	01-Jun-23	31-Mar-24
	HDFC Bank Limited-V	7.95%	01-Jun-23	31-Mar-24
	State Bank of India - VIII	8.20%	14-Feb-24	31-Mar-24
	State Bank of India - XII	8.20%	11-Jan-24	31-Mar-24
	HDFC Bank Limited-III	7.95%	01-Jun-23	31-Mar-24
	HDFC-IX	7.95%	01-Jun-23	31-Mar-24



From 31-03-2024
To 31-03-2024

Name of the Loan	From	To	Floating Rate of interest	Withholding Tax (WHT)	Applicability of Withholding Tax	Interest Basis	Financial year	Interest rate (incl WHT)	Loan Proportion	No of days	Product	WAVG rate
USD 750 Million Drawl III	28-09-2022	24-10-2022	4.41820%	0		Act/360	2022-23	4.418200%	87%	0	0	
USD 750 Million Drawl III	25-10-2022	31-03-2023	5.67396%	0		Act/360	2022-23	5.673960%	87%	0	0	
USD 750 Million Drawl III	01-04-2023	24-04-2023	5.67396%	0		Act/360	2023-24	5.673960%	87%	0	0	
USD 750 Million Drawl III	25-04-2023	24-10-2023	6.26834%	0		Act/360	2023-24	6.268340%	87%	0	0	
USD 750 Million Drawl III	25-10-2023	31-03-2024	6.61909%	0		Act/360	2023-24	6.619090%	87%	1	0.05832156	
USD 750 Million Drawl III	28-09-2022	24-10-2022	4.06820%	5.46000%	100.00000%	Act/360	2022-23	4.303152%	13%	0	0	
USD 750 Million Drawl III	25-10-2022	31-03-2023	5.59396%	5.46000%	100.00000%	Act/360	2022-23	5.917030%	13%	0	0	
USD 750 Million Drawl III	01-04-2023	24-04-2023	5.59396%	5.46000%	100.00000%	Act/360	2023-24	5.917030%	13%	0	0	
USD 750 Million Drawl III	25-04-2023	24-10-2023	6.26834%	5.46000%	100.00000%	Act/360	2023-24	6.630358%	13%	0	0	
USD 750 Million Drawl III	25-10-2023	31-03-2024	6.53909%	5.46000%	100.00000%	Act/360	2023-24	6.916744%	13%	1	0.009376078	
USD 750 Million Drawl III Weighted Average rate												6.76980%

Sr. No.	Bank	ROI on prepayment date	Date of Prepayment	Replaced with Bank	ROI of replaced Loan	Prepayment Amount	Benefit(%)	Benefit(%) retained with NTPC
Prepayment of Loans in 2019-20								
1	United Bank of India-IV	8.1500%	23-Dec-19	Bond 69	7.3200%	3656.25	0.83%	0.4150%
2	Indian Bank-III	8.0500%	23-Dec-19	Bond 69	7.3200%	2343.75	0.73%	0.3650%
						6000.00		
Prepayment of Loans during 2020-21								
1	HUDCO-I	7.0000%	24-Aug-20	HDFC-IX	6.3000%	1,589.00	0.70%	0.3500%
2	Syndicate Bank-III	7.2000%	24-Aug-20	HDFC-IX	6.3000%	5,000.00	0.90%	0.4500%
3	Vijaya Bank-IV	7.1500%	24-Aug-20	HDFC-IX	6.3000%	357.39	0.85%	0.4250%
4	PFC T1 D-33 repayment f	7.8300%	15-Oct-20	Bond 72	5.4500%	2,447.92	2.38%	1.1900%
5	PFC T1 D-34 repayment f	8.1700%	15-Oct-20	Bond 72	5.4500%	5,364.58	2.72%	1.3600%
6	PFC T1 D-36 repayment f	8.3000%	15-Oct-20	Bond 72	5.4500%	1,822.92	2.85%	1.4250%
7	PFC T1 D-37 repayment f	8.2500%	15-Oct-20	Bond 72	5.4500%	6,250.00	2.80%	1.4000%
						22831.80		
Prepayment of Loans during 2022-23								
1	Euro Bonds 2022	5.0200%	30-Sep-22	USD 750 Million Drawl III	4.4640%	8,217	0.56%	0.2780%
						8217.00		

USD 750 Million Drawl III

Name of the Loan	From	To	Floating Rate of interest	Withholding Tax (WHT)	Applicability of Withholding Tax	Interest Basis	Financial year	Interest rate (incl WHT)	Loan Proportion	No of days	Product	WAVG rate
USD 750	28-09-2022	28-09-2022	4.4182%	0.00%		Act/360	2022-23	4.4182%	86.67%	1	0.03882	
USD 750	28-09-2022	28-09-2022	4.0682%	5.46%	100%	Act/360	2022-23	4.3032%	13.33%	1	0.00582	
												4.4640%

4.4640%

Year wise Prepayment of Loans

Sr. No.	Bank	ROI on prepayment date	Date of Prepayment	Replaced with Bank	ROI of replaced Loan	Prepayment Amount	Benefit(%)	Benefit(%) retained with NTPC
Prepayment of Loans in 2016-17								
1	Punjab & Sindh Bank-I	9.60%	14-Feb-17	SBI VIII	8.00%	4071.43	1.60%	0.53%
Prepayment of Loans during 2018-19								
1	ICICI Bank-V	8.60%	11-Jan-19	Corporation Bank -IV	8.20%	10544.64	0.40%	0.13%
2	ICICI Bank VI	8.60%	15-Jan-19	Bond 67	8.30%	715.00	0.30%	0.10%
3	IDFC Bank II	8.65%	18-Feb-19	SBI-XII	8.35%	2100.00	0.30%	0.10%
						13359.64		

Part-I
Form-15
Details of Sourcewise fuel for computation of Energy Charges

		NTPC MOUDA STAGE I JUNE 23						NTPC MOUDA STAGE I JULY 23						
Sl	Particulars	Unit	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A)	OPENING QUANTITY													
1	Opening Stock of coal	(MT)	226471.38	242458.88	8755.18	0.00	107548.88	0.00	154832.33	272921.88	23592.88	0.00	46177.71	0.00
2	Value of Stock	Rs	1018347047.48	1113316562.08	30902751.28	0.00	1327597718.88	0.00	356194268.50	1335495238.18	121156231.48	0.00	861140629.24	0.00
B)	QUANTITY													
3	Quantity of Coal/Lignite supplied by Coal / Lignite Company Adjustment (+/-) in quantity supplied made by Coal / Lignite Company	(MT)	308558.48	274957.17	18957.40	0.00	58828.80	272.94	413244.09	267418.52	0.00	0.00	975.50	277.49
4	Coal supplied by Coal/Lignite Company (3+4)	(MT)	308558.48	274957.17	18957.40	0.00	58828.80	272.94	413244.09	267418.52	0.00	0.00	975.50	277.49
5	Normative transit & Handling losses (for Coal/Lignite based projects)	(MT)	3482.48	2199.88	151.90	0.00	113.38	0.00	3328.28	2139.58	0.00	0.00	1.98	0.00
6	Not Coal / Lignite supplied (5 - 5)	(MT)	304104.02	272757.29	18805.50	0.00	58615.42	272.94	409915.81	265278.94	0.00	0.00	973.52	277.49
C)	PRICE													
7	Amount charged by the Coal / Lignite Company Adjustment (+ / -) in amount charged by coal / Lignite Company	Rs	626786956.00	120458950.00	5362610.00	0.00	81359027.10	237997.58	861750521.50	1278885484.00	0.00	0.00	106632.48	2354487.83
8	Handling, Sampling and such other similar charges	Rs	-159522044.08	-173596368.18	1443942.24		-17784331.00		5146294.22	1813139.44	0.00		-11505748.83	
9	Total Amount charged (8 + 9+10)	Rs	467264912.00	1029400881.82	6806552.24	0.00	795771986.08	237997.58	866907615.72	1276478603.44	0.00	0.00	-11192114.35	2354487.83
D)	TRANSPORTATION													
11	Transportation charges by Rail / Ship / Road Transport By Rail	Rs	376214492.72	306561451.60	3047218.78		548655.88	89871.38	48013084.48	200467178.00			1342.00	
	By Road	Rs												
	By Ship	Rs												
	Adjustment (+/-) in amount charged by railways / transport company	Rs												
14	Demurrage charges, if any Cost of diesel in transporting Coal through MGR system, if applicable	Rs	2829547.72	3854239.62	183290.76		548655.88		47897.00	518121.00			1342.00	
16	Total transportation charges (14+/- 15 - 14 + 15)	Rs	379043940.00	306947212.00	4880509.00	0.00	0.00	89871.38	49691157.49	200184055.00	0.00	0.00	0.00	0.00
17	Total amount charged for Coal / Lignite supplied including transportation (11 + 16)	Rs	807208852.00	1134967893.82	9019040.24	0.00	795771986.08	246878.76	1348547919.21	1478662658.44	0.00	0.00	-11192114.35	2354487.83
E)	TOTAL COST													
18	Landed Cost of Coal/Lignite (17+17) / (14+17)	Rs/MT	3025.40	4849.93	4733.61		14138.09	9048.90	3204.18	8255.59	4733.61		15426.90	8454.87
19	Blending Ratio (Domestic/Imported)		0.71	0.13	0.00	0.00	0.28	0.00	0.58	0.26	0.00	0.00	0.08	0.00
20	Weighted average cost of Coal/Lignite (including biomass)	Rs/MT	3031.84						4779.70					
F)	QUALITY													
20a	Weighted average cost of Coal/Lignite (excluding biomass)	Rs/MT	3032.14						4772.45					
21	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)	3230.64	4859.47	4750.00				4118.88	4878.57	4750.00			
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	4832.00	4858.00	4750.00			3382.00	4242.00	4722.00	0.00			3277.00
23	GCV of imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)					5083.43						5110.59	
24	GCV of imported coal supplied as per bill of coal company	(Kcal/Kg)					5200.00						5000.00	
25	Weighted average GCV of Coal/Lignite as billed (including biomass)	(Kcal/Kg)	4548.23						4454.55					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)	3336.30	3277.81	3358.00				3435.90	3419.13	3574.27			
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	3333.00	3345.00	3358.00			3382.00	3188.00	3257.00				3277.00
28	GCV of imported coal of the Opening stock as received at station	(Kcal/Kg)					5143.23						5150.57	
29	GCV of imported coal supplied as received at station	(Kcal/Kg)					5164.00						5155.00	
30a	Weighted average GCV of coal/ Lignite as Received (on the basis of consumption of domestic & imported coal)	(Kcal/Kg)	3709.00						3448.00					
30b	Adjustment of GCV (28A-30)	(Kcal/Kg)	3610.00						3381.00					
30c	Weighted average GCV of coal/ Lignite as Received and Bio mass (on the basis of total consumption of coal & biomass)	(Kcal/Kg)	3610.00						3381.00					
30	Weighted average GCV of coal/ Lignite as Received (including biomass)	(Kcal/Kg)	3709.00						3448.00					

Part-I
Form-15
Details of Sourcewise fuel for computation of Energy Charges

Company Name of the generating Station Month		NTPC MOUDA STAGE I AUGUST 23						NTPC MOUDA STAGE I SEPTEMBER 23						
		Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass	
A)	OPENING QUANTITY													
1	Opening Stock of coal	(MT)	394619.50	35595.35	23350.85	0.00	9161.45	0.00	111940.38	1856.03	5088.55	0.00	0.00	
2	Value of Stock	Rs	944008271.12	133591335.59	121138121.49	0.00	125009405.45	0.00	494896972.45	12650141.01	23558097.84	0.00	0.00	
B)	QUANTITY													
3	Quantity of Coal/Lignite supplied by Coal/Lignite Company	(MT)	804150.38	171995.60	35985.25		571.20	492.27	719509.55	110665.57	22288.47	0.00	85456.55	
4	Adjustment (+/-) in quantity supplied made by Coal/Lignite Company	(MT)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5	Coal supplied by Coal/Lignite Company (3+4)	(MT)	804150.38	171995.60	35985.25	0.00	571.20	492.27	719509.55	110665.57	22288.47	0.00	85456.55	
6	Normalative transit & Handling losses (for Coal/Lignite based projects)	(MT)	4833.20	1875.57	287.75	0.00	1.34	0.00	3834.48	825.55	175.29	0.00	150.97	
7	Net Coal/Lignite supplied (5-6)	(MT)	809983.58	170120.04	35697.50	0.00	570.08	492.27	715675.07	110740.02	22113.18	0.00	85305.58	
C)	PRICE													
8	Amount charged by the Coal/Lignite Company	Rs	1155692525.32	88046665.81	161103543.00	0.00	8596656.75	3265716.44	1594423259.00	526580542.00	39458062.73	0.00	721881657.12	
9	Adjustment (+/-) in amount charged by coal/Lignite Company	Rs												
10	Handling, Sampling and such other similar charges	Rs	12516505.47	484362.27	91057.92		13250.83		50143978.34	7952859.81	1533193.81		620791.55	
11	Total Amount charged (8+9+10)	Rs	1268208030.79	88531028.08	162114600.92	0.00	8569907.57	3265716.44	1644567137.34	534513401.81	40790056.54	0.00	727691448.67	
D)	TRANSPORTATION													
12	Transportation charges by Rail/Ship/Road Transport													
12a	By Rail	Rs	75595590.40	117939202.65	40010.00		655.00		34542745.87	54469725.00	38525405.00		605629.00	
12b	By Road	Rs												
12c	By Ship	Rs												
13	Adjustment (+/-) in amount charged by railways/transport company	Rs												
14	Demurrage charges, if any	Rs	872075.00	191552.00	40010.00		655.00		7801891.00	1168055.00	129124.00		605629.00	
15	Cost of diesel in transporting Coal through MGR system, if applicable	Rs												
16	Total transportation charges (12a+12b+12c+14+15)	Rs	75595590.40	127747802.65	40010.00	0.00	0.00	0.00	35812662.87	6611854.00	38606279.00	0.00	0.00	
17	Total amount charged for Coal/Lignite supplied including transportation (11+16)	Rs	1266523481.70	1112348201.58	162114580.92	0.00	8569907.57	3265716.44	1642700480.21	531735255.81	40790056.54	0.00	727691448.67	
E)	TOTAL COST													
18	Landed Cost of Coal/Lignite (17+17)/(17+18)	Rs/MT	3156.54	3304.89	4623.05		15520.92	8096.81	3915.25	5597.75	4482.50		11312.34	
19	Blending Ratio (Domestic/Imported)		0.81	0.15	0.04	0.00	0.02	0.00	0.95	0.00	0.00	0.00	0.04	
20	Weighted average cost of Coal/Lignite (including biomass)	Rs/MT	3925.77						3792.55					
F)	QUALITY													
20a	Weighted average cost of Coal/Lignite (excluding biomass)	Rs/MT	3923.66						3788.53					
21	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)	4204.37	4700.37	4750.00				4347.00	4717.00	4750.00			
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	4119.00	4720.00	4750.00			3117.00	3698.00	4775.00	4407.00		3397.00	
23	GCV of imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)					5106.30					5102.00		
24	GCV of imported coal supplied as per bill of coal company	(Kcal/Kg)					5000.00					5000.00		
25	Weighted average GCV of Coal/Lignite as billed (including biomass)	(Kcal/Kg)	4263.05						4096.30					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)	3265.88	3340.23	3374.37				3511.00	3429.00	3503.00			
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	3534.00	3447.00	3251.00			3117.00	3240.00	3375.00	3480.00		3397.00	
28	GCV of imported coal of the Opening stock as received at station	(Kcal/Kg)					3150.47					3158.00		
29	GCV of imported coal supplied as received at station	(Kcal/Kg)					3253.00					3083.00		
30a	Weighted average GCV of coal/Lignite as Received (on the basis of consumption of domestic & imported coal)	(Kcal/Kg)	3366.00						3338.00					
30b	Adjustment of GCV (28a-30)	(Kcal/Kg)	3281.00						3241.00					
30c	Weighted average GCV of coal/Lignite as Received and Bio mass (on the basis of total consumption of coal & biomass)	(Kcal/Kg)	3281.00						3241.00					
30	Weighted average GCV of coal/Lignite as Received (including biomass)	(Kcal/Kg)	3281.00						3241.00					

Part-I
Form-15
Details of Sourcewise fuel for computation of Energy Charges

Sl.	Particulars	Unit	NTPC MOUDA STAGE I OCTOBER 23						NTPC MOUDA STAGE I NOVEMBER 23					
			Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A)	OPENING QUANTITY													
1	Opening Stock of coal	(MT)	94971.23	5283.01	15530.31	0.00	50470.28	0.00	58570.58	17380.91	508.32	0.00	14321.48	613.29
2	Value of Stock	Rs	35380630.79	26516664.13	89148645.46	0.00	585354634.94	0.00	276280678.37	87174819.34	1359443.28	0.00	135431504.90	8609830.44
B)	QUANTITY													
3	Quantity of Coal/Lignite supplied by Coal / Lignite Company	(MT)	821628.78	82789.55	0.00	0.00	83041.80	1410.19	687613.50	221991.87	0.00	0.00	58059.40	0.00
4	Adjustment (+/-) in quantity supplied made by Coal / Lignite Company	(MT)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Coal supplied by Coal/Lignite Company (3+4)	(MT)	821628.78	82789.55	0.00	0.00	83041.80	1410.19	687613.50	221991.87	0.00	0.00	58059.40	0.00
6	Normative transit & Handling losses (for Coal/Lignite based projects)	(MT)	4974.81	742.82	0.00	0.00	70.08	0.00	3340.91	1775.95	0.00	0.00	72.08	0.00
7	Net Coal / Lignite supplied (5 - 6)	(MT)	816653.97	82046.73	0.00	0.00	82971.72	1410.19	684272.59	220215.92	0.00	0.00	57987.32	0.00
C)	PRICE													
8	Amount charged by the Coal / Lignite Company	Rs	1089759155.00	394534722.00	0.00	0.00	399797830.83	13382970.53	1555929163.11	1158912512.96	0.00	0.00	48327678.33	0.00
9	Adjustment (+ / -) in amount charged by coal / Lignite Company	Rs												
10	Handling, Sampling and such other similar charges	Rs	10858001.80	-4815247.43	0.00	0.00	83370.79	2457348.40	4654965.09	1557833.77	0.00	0.00	11215378.07	
11	Total Amount charged (8 + 10)	Rs	1100417156.80	389718474.57	0.00	0.00	400099501.62	14830318.93	1562484828.20	1158470346.73	0.00	0.00	444492356.80	0.00
D)	TRANSPORTATION													
12	Transportation charges by Rail / Ship / Road Transport													
13	By Rail	Rs	780181188.00	70285890.00	0.00	0.00	95821.00	345876.88	787094849.18	189650995.85	0.00	0.00	73711.00	0.00
14	By Road	Rs												
15	By Ship	Rs												
16	Adjustment (+/-) in amount charged by railways / transport company	Rs												
17	Demurrage charges, if any	Rs	1700402.00	258798.00			95821.00		1885480.00	484087.00			73711.00	
18	Cost of diesel in transporting Coal through MGR system, if applicable	Rs												
19	Total transportation charges (12+ 13 + 14 + 15)	Rs	778483790.00	80313878.00	0.00	0.00	345876.88	787129189.18	181196985.85	0.00	0.00	0.00	0.00	0.00
20	Total amount charged for Coal / Lignite supplied including transportation (11 + 18)	Rs	1878900946.80	469642352.57	0.00	0.00	400099501.62	15198198.48	2148034814.05	1538667291.18	0.00	0.00	444492356.80	0.00
E)	TOTAL COST													
21	Landed Cost of Coal/Lignite (20+17) / (14+7)	Rs/MT	3108.58	5015.93	4452.80		11509.34	10775.99	3334.78	6930.80	4482.50		12093.18	10775.99
22	Blending Ratio (Domestic/Imported)		0.87	0.00	0.08		0.00	0.30	0.00	0.94	0.01		0.00	0.05
23	Weighted average cost of Coal/Lignite (including biomass)	Rs/MT			3275.48						3891.55			
24	Weighted average cost of Coal/Lignite (excluding biomass)	Rs/MT			3273.04						3667.24			
F)	QUALITY													
25	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)	4022.00	4774.00	4471.00				4018.00	4838.00	4471.00			3997.00
26	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	4014.00	4848.00				3997.00	4113.00	4491.00				
27	GCV of imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)					5000.00						5000.00	
28	GCV of imported coal supplied as per bill of coal company	(Kcal/Kg)					5000.00						5000.00	
29	Weighted average GCV of Coal/Lignite as billed (including biomass)	(Kcal/Kg)			4127.22						4159.22			
30	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)	3281.00	3378.00	3431.00				3248.00	3684.00	3451.00			3597.00
31	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	3247.00	3575.00				3597.00	3015.00	3488.00				
32	GCV of imported coal of the Opening stock as received at station	(Kcal/Kg)					5063.00						5120.00	
33	GCV of imported coal supplied as received at station	(Kcal/Kg)					5174.00						5235.00	
34	Weighted average GCV of coal/ Lignite as Received (on the basis of consumption of domestic & imported coal)	(Kcal/Kg)			3442.00						3194.00			
35	Adjustment of GCV (29A-33)	(Kcal/Kg)			3337.00						3089.00			
36	Weighted average GCV of coal/ Lignite as Received and Bio mass (on the basis of total consumption of coal & biomass)	(Kcal/Kg)			3337.00						3087.00			
37	Weighted average GCV of coal/ Lignite as Received (including biomass)	(Kcal/Kg)			3442.00						3192.00			

Part-I
Form-15
Details of Sourcewise fuel for computation of Energy Charges

		NTPC MOUDA STAGE I DECEMBER 23						NTPC MOUDA STAGE I JANUARY 24						
Sl	Particulars	Unit	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A)	OPENING QUANTITY													
1	Opening Stock of coal	(MT)	55700.55	151795.33	505.32	0.00	24075.42	47.39	41137.55	592475.54	505.32	0.00	47425.45	0.00
2	Value of Stock	Rs	256040739.42	1051540955.59	1359445.95	0.00	255679756.71	510674.24	135455955.71	2285195970.75	1359445.59	0.00	570211505.15	0.00
B)	QUANTITY													
3	Quantity of Coal/Lignite supplied by Coal / Lignite Company	(MT)	84005.40	255355.79	0.00	0.00	49375.20	0.00	575573.05	255355.52	0.00	0.00	145735.10	1017.97
4	Adjustment (+/-) in quantity supplied made by Coal / Lignite Company	(MT)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Coal supplied by Coal/Lignite Company (3+4)	(MT)	84005.40	255355.79	0.00	0.00	49375.20	0.00	575573.05	255355.52	0.00	0.00	145735.10	1017.97
6	Normative transit & Handling losses (for Coal/Lignite based projects)	(MT)	5130.45	2310.71	0.00	0.00	55.75	0.00	3405.35	2132.45	0.00	0.00	292.45	0.00
7	Net Coal / Lignite supplied (5 - 6)	(MT)	78495.27	252825.05	0.00	0.00	48819.45	0.00	572167.70	253223.07	0.00	0.00	145442.65	1017.97
C)	PRICE													
8	Amount charged by the Coal / Lignite Company	Rs	1295524149.55	1479551394.74	0.00	0.00	59151253.00	0.00	1595255554.52	1237749255.00	0.00	0.00	120055555.55	740527.10
9	Adjustment (+ / -) in amount charged by coal / Lignite Company	Rs												
10	Handling, Sampling and such other similar charges	Rs	55277042.45	-7557357.55	0.00	0.00	75273.17	0.00	5410327.44	2134571.55	0.00	0.00	1159551.55	0.00
11	Total Amount charged (8 + 9 + 10)	Rs	1350791192.17	1401977937.19	0.00	0.00	592245254.17	0.00	1600859021.75	1239883826.55	0.00	0.00	1201705557.14	740527.10
D)	TRANSPORTATION													
12	Transportation charges by Rail / Ship / Road Transport													
12a	By Rail	Rs	755555590.55	347559745.47	0.00	0.00	357255.00	0.00	544457052.45	252505112.55	0.00	0.00	554550.00	0.00
12b	By Road	Rs												
12c	By Ship	Rs												
13	Adjustment (+/-) in amount charged by railways / transport company	Rs												
14	Demurrage charges, if any	Rs	455551.00	3559774.00	0.00	0.00	357255.00	0.00	3559755.55	1177155.55	0.00	0.00	554550.00	0.00
15	Cost of diesel in transporting Coal through MGR system, if applicable	Rs												
16	Total transportation charges (12a- 12c + 14 + 15)	Rs	755555590.55	345599745.47	0.00	0.00	0.00	0.00	544457052.45	252505112.55	0.00	0.00	0.00	0.00
17	Total amount charged for Coal / Lignite supplied including transportation (11 + 16)	Rs	1350335742.12	1401622161.66	0.00	0.00	592245254.17	0.00	1600411969.30	1241638939.10	0.00	0.00	1201705557.14	740527.10
E)	TOTAL COST													
18	Landed Cost of Coal/Lignite (11+17) / (14+7)	Rs/MT	3255.51	5550.12	4452.50	0.00	12022.55	10775.99	3545.45	5754.22	4452.50	0.00	12045.52	7275.45
19	Blending Ratio (Domestic/Imported)		0.25	0.00	0.00	0.00	0.05	0.00	0.51	0.05	0.00	0.00	0.14	0.00
20	Weighted average cost of Coal/Lignite (including biomass)	Rs/MT	3554.45						4571.55					
F)	QUALITY													
20a	Weighted average cost of Coal/Lignite (excluding biomass)	Rs/MT	3554.05						4559.52					
21	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)	4112.00	4505.00	4471.00			3527.00	4050.00	4507.00	4471.00			
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	4015.00	4509.00					3552.00	4425.00				5105.00
23	GCV of imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)					5000.00						5000.00	
24	GCV of imported coal supplied as per bill of coal company	(Kcal/Kg)					5000.00						5157.00	
25	Weighted average GCV of Coal/Lignite as billed (including biomass)	(Kcal/Kg)	4052.55						4344.75					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)	5045.00	5444.00	5451.00			3527.00	3157.00	3575.00	5451.00			
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	5115.00	5525.00					3204.00	5191.00				5105.00
28	GCV of imported coal of the Opening stock as received at station	(Kcal/Kg)					5195.00						5270.00	
29	GCV of imported coal supplied as received at station	(Kcal/Kg)					5305.00						5391.00	
30a	Weighted average GCV of coal/ Lignite as Received (on the basis of consumption of domestic & imported coal)	(Kcal/Kg)	3509.00						3505.00					
30b	Adjustment of GCV (25A-30)	(Kcal/Kg)	3234.00						5430.00					
30c	Weighted average GCV of coal/ Lignite as Received and Bio mass (on the basis of total consumption of coal & biomass)	(Kcal/Kg)	3234.00						5430.00					
30	Weighted average GCV of coal/ Lignite as Received (including biomass)	(Kcal/Kg)	3509.00						3505.00					

Part-I
Form-15
Details of Sourcewise fuel for computation of Energy Charges

		NTPC MOUDA STAGE I FEBRUARY 24						NTPC MOUDA STAGE I MARCH 24						
Sl	Particulars	Unit	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A) OPENING QUANTITY														
1	Opening Stock of coal	(MT)	0.00	475364.83	309.32	0.00	79924.25	228.21	1348.51	382970.73	0.00	0.00	95467.55	0.00
2	Value of Stock	Rs	0.00	272699506.55	1359443.95	0.00	260190159.56	1860356.53	4748614.53	2215106186.11	0.00	0.00	1229705105.55	0.00
B) QUANTITY														
3	Quantity of Coal/Lignite supplied by Coal/Lignite Company Adjustment (+/-) in quantity supplied made by Coal/Lignite Company	(MT)	301090.13	248359.59	0.00	0.00	113982.20	692.38	539539.44	237624.82	19823.06	0.00	167335.50	928.65
4	Coal supplied by Coal/Lignite Company (3+4)	(MT)	301090.13	248359.59	0.00	0.00	113982.20	692.38	539539.44	237624.82	19823.06	0.00	167335.50	928.65
5	Normalative transit & Handling losses (for Coal/Lignite based projects)	(MT)	4008.72	3962.72	0.00	0.00	227.52	0.00	4317.12	2581.00	156.58	0.00	359.67	0.00
6	Net Coal/Lignite supplied (3-5)	(MT)	497081.41	244396.87	0.00	0.00	113454.68	692.38	535222.32	235043.82	19666.48	0.00	167500.13	928.65
C) PW/Ce														
7	Amount charged by the Coal/Lignite Company Adjustment (+/-) in amount charged by coal/Lignite Company	Rs	128627332.67	122198026.00			140958022.58	486377.23	1506916459.35	1696037678.77	81048731.00	0.00	207741235.67	5971721.94
8	Handling, Sampling and such other similar charges	Rs	2743145.31	4771358.59			2114731.94		24045118.08	21187971.91	574951.85	0.00	2784633.54	210978.91
9	Total Amount charged (8+9+10)	Rs	129370477.98	126969384.59	0.00	0.00	141197304.50	4868177.23	1532961707.39	1700228450.68	81623642.85	0.00	2080506059.51	6182200.85
D) TRANSPORTATION														
11	Transportation charges by Rail/Ship/Road Transport	Rs												
12	By Rail	Rs	46181093.00	19793461.00			1392116.00		473350268.50	23040808.35	19550.00	0.00	1693191.00	-3312346.03
13	By Road	Rs												
14	By Ship	Rs												
15	Adjustment (+/-) in amount charged by railways/transport company	Rs												
16	Demurrage charges, if any	Rs	3982934.00	3916543.00			1592118.00		5480167.00	3011430.00	198850.00	0.00	1693191.00	0.00
17	Cost of diesel in transporting Coal through MGR system, if applicable	Rs												
18	Total transportation charges (12+13+14+15)	Rs	48564127.00	19463843.00	0.00	0.00	0.00	0.00	467601151.50	237396643.35	0.00	0.00	0.00	-3312346.03
19	Total amount charged for Coal/Lignite supplied including transportation (11+16)	Rs	175188405.98	143137333.59	0.00	0.00	141197304.50	4868177.23	1500651859.19	1947612094.03	81621642.85	0.00	2080506059.51	2670046.53
E) TOTAL COST														
10	Landed Cost of Coal/Lignite (19+17)/(14+7)	Rs/MT	3524.34	5794.01	4452.50		12282.75	6871.41	3364.45	8157.75	4706.73		12369.78	8100.55
11	Blending Ratio (Domestic/Imported)		0.55	0.21	0.00	0.00	0.00	0.00	0.80	0.29	0.00	0.00	0.11	0.00
20	Weighted average cost of Coal/Lignite (including biomass)	Rs/MT	5069.13						5114.07					
20a	Weighted average cost of Coal/Lignite (excluding biomass)	Rs/MT	5067.55						5113.11					
F) QUALITY														
21	GCV of Domestic coal of the opening coal stocks as per bill of coal company	(Kcal/Kg)	4474.00	4471.00				3105.00	3472.00	4841.00				
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	5472.00	4673.00				3335.00	3511.00	4842.00	4396.00			5411.00
23	GCV of imported coal of the opening coal stocks as per bill of coal company	(Kcal/Kg)					5127.00						5052.00	
24	GCV of imported coal supplied as per bill of coal company	(Kcal/Kg)					5000.00						5200.00	
25	Weighted average GCV of Coal/Lignite as billed (including biomass)	(Kcal/Kg)	3960.46						4161.77					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)		3300.00	3431.00			3105.00	3369.00	5279.00				
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	5156.00	5257.00				3335.00	3155.00	5285.00	5472.00			5411.00
28	GCV of imported coal of the Opening stock as received at station	(Kcal/Kg)					3361.00						5257.00	
29	GCV of imported coal supplied as received at station	(Kcal/Kg)					3133.00						5156.00	
30	Weighted average GCV of coal/Lignite as Received (on the basis of consumption of domestic & imported coal)	(Kcal/Kg)	3401.00						3430.00					
31	Adjustment of GCV (25A-30)	(Kcal/Kg)	3014.00						3329.00					
32	Weighted average GCV of coal/Lignite as Received and Bio mass (on the basis of total consumption of coal & biomass)	(Kcal/Kg)	3316.00						3335.00					
33	Weighted average GCV of coal/Lignite as Received (including biomass)	(Kcal/Kg)	3401.00						3430.00					

Details of Source-wise fuel for computation of Energy Charges

Company	Name of the generating Station	Unit	NTPC	NTPC	NTPC	NTPC	NTPC	NTPC	NTPC	NTPC	NTPC	NTPC	NTPC	
			MOURA STAGE	MOURA STAGE	MOURA STAGE	MOURA STAGE	MOURA STAGE	MOURA STAGE	MOURA STAGE	MOURA STAGE	MOURA STAGE	MOURA STAGE	MOURA STAGE	MOURA STAGE
Month			APRIL 23	MAY 23	JUNE 23	JULY 23	AUG 23	SEP 23	OCT 23	NOV 23	DEC 23	JAN 24	FEB 24	MAR 24
SL Particulars			LD0	LD0	LD0	LD0	LD0	LD0	LD0	LD0	LD0	LD0	LD0	LD0
A) OPENING QUANTITY														
1	Opening Stock of Oil	KL	3707.80	3365.85	3010.88	4425.85	4089.85	3874.85	3447.85	3155.78	4945.78	5417.78	5017.78	3824.78
2	Value of Stock	Rs	306782636.07	410594914.55	363378246.61	358919825.55	311378866.72	281133561.23	287273655.59	421324560.09	404385182.05	279266437.61	246532250.95	288714735.90
B) QUANTITY														
3	Quantity of LDO/HFO supplied by Oil Company	KL	3032.55	0.00	0.00	0.00	0.00	0.00	3091.11	0.00	0.00	0.00	0.00	3029.85
4	Adjustment (+/-) in quantity supplied made by Oil Company	KL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	LDO/HFO supplied by Oil Company (3+4)	KL	3032.55	0.00	0.00	0.00	0.00	0.00	3091.11	0.00	0.00	0.00	0.00	3029.85
6	Normative transit & handling losses	KL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7	Net Oil supplied (5-6)	KL	3032.55	0.00	0.00	0.00	0.00	0.00	3091.11	0.00	0.00	0.00	0.00	3029.85
C) PRICE														
8	Amount charged by the Oil Company	Rs	330594429.00	0.00	0.00	0.00	0.00	0.00	285877062.00	0.00	0.00	0.00	0.00	20511555.80
9	Adjustment (+/-) in amount charged by Oil Company	Rs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	Handling, Demurrage and such other similar charges	Rs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	Total Amount charged (8+9+10)	Rs	330594429.00	0.00	0.00	0.00	0.00	0.00	285877062.00	0.00	0.00	0.00	0.00	20511555.80
D) TRANSPORTATION														
12	Transportation charges by Rail / Ship / Road Transport													
	By Rail	Rs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	By Road	Rs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	By Ship	Rs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	Adjustment (+/-) in amount charged by railways / transport company	Rs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	Demurrage charges, if any	Rs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	Cost of diesel in transporting LDO/HFO through MGR system, if applicable	Rs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	Total transportation charges (12+13+14+15)	Rs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	Total amount charged for Oil supplied including transportation (11+16)	Rs	330594429.00	0.00	0.00	0.00	0.00	0.00	285877062.00	0.00	0.00	0.00	0.00	20511555.80
E) TOTAL COST														
18	Landed Cost of Oil (HFO/LDO) (3+7) / (3+7)	Rs/KL	78551.25	78551.74	78551.74	78551.74	78551.74	78551.74	81775.42	81730.47	81730.47	81730.47	81730.47	74555.83
19	Blending Ratio		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
20	Weighted average cost of Oil		78551.25	78551.74	78551.74	78551.74	78551.74	78551.74	81775.42	81730.47	81730.47	81730.47	81730.47	74555.83
F) QUALITY														
21	SCV of Oil of the opening stock as per bill of Oil company	(Kcal/Ltr)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
22	SCV of oil supplied as per bill of oil company	(Kcal/Ltr)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
23	SCV of imported coal of the opening coal stock as per bill of coal company	(Kcal/Ltr)												
24	SCV of imported coal supplied as per bill of coal company	(Kcal/Ltr)												
25	Weighted average SCV of Oil as billed	(Kcal/Ltr)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
26	SCV of Oil of the Opening stock as received at station	(Kcal/Ltr)												
27	SCV of Oil supplied (HFO/LDO)	(Kcal/Ltr)	9447.00	9455.00	9455.00	9455.00	9455.00	9455.00	9455.00	9455.00	9455.00	9455.00	9455.00	9455.00
28	SCV of imported coal of the Opening stock as received at station	(Kcal/Ltr)	9450.00	NA	NA	NA	NA	NA	9455.00	NA	NA	NA	NA	9450.00
29	SCV of imported coal supplied as received at station	(Kcal/Ltr)												
30	Weighted average SCV of Oil (HFO/LDO)	(Kcal/Ltr)	9455.00	9455.00	9455.00	9455.00	9455.00	9455.00	9455.00	9455.00	9455.00	9455.00	9455.00	9450.00

Statement of Capital cost

Name of the Petitioner	NTPC Limited
Name of the Generating Station	Mauda-I
COD	30-03-2014

Amount in Rs Lakh

Sl. No.	Particulars	2024-25		
		Accrual Basis	Un-discharged Liabilities	Cash Basis
A	a) Opening Gross Block Amount as per books	7,21,166.65	4,650.14	7,16,516.50
	b) Amount of IDC In A(a) above	77,539.01	0.00	77,539.01
	c) Amount of FC In A(a) above	0.00	0.00	0.00
	d) Amount of FERV In A(a) above	63,692.41	0.00	63,692.41
	e) Amount of Hedging Cost In A(a) above	0.00	0.00	0.00
	f) Amount of IEDC In A(a) above	36,517.00	0.00	36,517.00
B	a) Addition In Gross Block Amount during the period (Direct purchases)			
	b) Amount of IDC In B(a) above			
	c) Amount of FC In B(a) above			
	d) Amount of FERV In B(a) above			
	e) Amount of Hedging Cost In B(a) above			
	f) Amount of IEDC In B(a) above			
C	a) Addition In Gross Block Amount during the period (Transferred from CWIP)			
	b) Amount of IDC In C(a) above			
	c) Amount of FC In C(a) above			
	d) Amount of FERV In C(a) above			
	e) Amount of Hedging Cost In C(a) above			
	f) Amount of IEDC In C(a) above			
D	a) Deletion In Gross Block Amount during the period			
	b) Amount of IDC In D(a) above			
	c) Amount of FC In D(a) above			
	d) Amount of FERV In D(a) above			
	e) Amount of Hedging Cost In D(a) above			
	f) Amount of IEDC In D(a) above			
E	a) Closing Gross Block Amount as per books			
	b) Amount of IDC In E(a) above			
	c) Amount of FC In E(a) above			
	d) Amount of FERV In E(a) above			
	e) Amount of Hedging Cost In E(a) above			
	f) Amount of IEDC In E(a) above			

Shall be provided at truing-up for 2024-29 for subsequent periods

Statement of Capital Works in Progress

Name of the Petitioner	NTPC Limited
Name of the Generating Station	Mauda-I
COD	30-03-2014

(Amount in Rs Lakh)

Sl. No.	Particulars	2024-25		
		Accrual Basis	Un-discharged Liabilities	Cash Basis
A	a) Opening CWIP as per books	689.13	565.11	124.02
	b) Amount of IDC in A(a) above	154.56	-	154.56
	c) Amount of FC in A(a) above	-	-	-
	d) Amount of FERV in A(a) above	-	-	-
	e) Amount of Hedging Cost in A(a) above	-	-	-
	f) Amount of IEDC in A(a) above	-	-	-
B	a) Addition in CWIP during the period			
	b) Amount of IDC in B(a) above			
	c) Amount of FC in B(a) above			
	d) Amount of FERV in B(a) above			
	e) Amount of Hedging Cost in B(a) above			
	f) Amount of IEDC in B(a) above			
C	a) Transferred to Gross Block Amount during the period			
	b) Amount of IDC in C(a) above			
	c) Amount of FC in C(a) above			
	d) Amount of FERV in C(a) above			
	e) Amount of Hedging Cost in C(a) above			
	f) Amount of IEDC in C(a) above			
D	a) Deletion in CWIP during the period			
	b) Amount of IDC in D(a) above			
	c) Amount of FC in D(a) above			
	d) Amount of FERV in D(a) above			
	e) Amount of Hedging Cost in D(a) above			
	f) Amount of IEDC in D(a) above			
E	a) Closing CWIP as per books			
	b) Amount of IDC in E(a) above			
	c) Amount of FC in E(a) above			
	d) Amount of FERV in E(a) above			
	e) Amount of Hedging Cost in E(a) above			
	f) Amount of IEDC in E(a) above			

Shall be provided at truing-up for 2024-29 for subsequent periods

Calculation of Interest on Normative Loan

Name of the Company :	NTPC Limited
Name of the Power Station :	Mauda-I

(Amount in Rs Lakh)

S. No.	Particulars	Existing 2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7	8
1	Gross Normative loan – Opening	4,68,944.95	4,72,097.08	4,73,589.64	4,75,535.64	4,76,989.80	4,77,197.70
2	Cumulative repayment of Normative loan up to previous year	3,14,092.67	3,47,984.48	3,82,286.43	4,16,713.49	4,32,246.57	4,47,872.80
3	Net Normative loan – Opening	1,54,852.28	1,24,112.59	91,303.22	58,822.15	44,743.22	29,324.89
4	Add: Increase due to addition during the year / period	1487.46	1492.57	1946.00	1454.15	207.90	306.60
5	Less: Decrease due to de-capitalisation during the year / period	337.47	0.00	0.00	0.00	0.00	0.00
6	Less: Decrease due to reversal during the year / period						
7	Add: Increase due to discharges during the year / period	2002.13	0.00	0.00	0.00	0.00	0.00
8	Repayment during the year	34128.04	34301.94	34427.07	15533.08	15626.23	15657.82
9	Repayment adj on account of Decap	236.23	0.00	0.00	0.00	0.00	0.00
10	Repayment adj for discharges upto 01.04.09	0.00	0.00	0.00	0.00	0.00	0.00
11	Less: Net repayment of loan	33891.81	34301.94	34427.07	15533.08	15626.23	15657.82
12	Net Normative loan - Closing	1,24,112.59	91,303.22	58,822.15	44,743.22	29,324.89	13,973.67
13	Average Normative loan	1,39,482.44	1,07,707.91	75,062.68	51,782.69	37,034.06	21,649.28
14	Weighted average rate of interest (%)	7.6719	7.5611	7.7354	8.1299	8.1191	8.1105
15	Interest on Loan	10700.89	8143.94	5806.39	4209.89	3006.85	1755.86

(Petitioner)

Name of Petitioner: NTPC Ltd
Name of Station: Mauda-I

Computation of Energy Charges

Parameter	Unit	2024-25	2025-26	2026-27	2027-28	2028-29
Station Capacity		1000	1000	1000	1000	1000
No of Days in the year	Days	365	365	365	366	365
Sp. Oil consumption	ml/kWh	0.50	0.50	0.50	0.50	0.50
Auxiliary consumption	%	5.75	5.75	5.75	5.75	5.75
Heat Rate	kCal/kWh	2400.64	2400.64	2400.64	2400.64	2400.64
Coal & Oil Parameters						
Wtd. Avg. Price of Coal	Rs./MT	4595.51	4595.51	4595.51	4595.51	4595.51
Wtd. Avg. GCV of Coal as received	kCal/kg	3455.83	3455.83	3455.83	3455.83	3455.83
Wtd. Avg. GCV of Coal as received after adj of 85 kcal/kg	kCal/kg	3370.83	3370.83	3370.83	3370.83	3370.83
Wtd. Avg. Price of Secondary Fuel	Rs/KL	78522.42	78522.42	78522.42	78522.42	78522.42
Wtd. Avg. GCV of Secondary Fuel	kCal/L	9439.83	9439.83	9439.83	9439.83	9439.83
Computation of Variable Charges						
Heat Contribution from SFO/ Alternate Fuel	kCal/kWh	4.72	4.72	4.72	4.72	4.72
Heat Contribution from coal	kCal/kWh	2,395.92	2,395.92	2,395.92	2,395.92	2,395.92
Specific Primary Fuel Consumption	kg/kWh	0.711	0.711	0.711	0.711	0.711
Variable Charge (Coal)	paaise/kWh	346.568	346.568	346.568	346.568	346.568
Variable Charge (Oil)	paaise/kWh	4.166	4.166	4.166	4.166	4.166
Total Variable Charges	paaise/kWh	350.733	350.733	350.733	350.733	350.733
Computation of Fuel Expenses for Calculation of IOWC:						
ESO in a year	(MUs)	7017.86	7017.86	7017.86	7037.08	7017.86
ESO for 50 days	(MUs)	961.350	961.350	961.350	961.350	961.350
ESO for 45 days	(MUs)	865.215	865.215	865.215	865.215	865.215
Cost of coal for 50 Days	(Rs. Lakh)	33317.281	33317.281	33317.281	33317.281	33317.281
Cost of oil for 2 months	(Rs. Lakh)	487.23	487.23	487.23	488.57	487.23
Energy Expenses for 45 days	(Rs. Lakh)	30345.97	30345.97	30345.97	30345.97	30345.97

PETITIONER

Calculation of Interest on Working Capital

Name of the Company :		NTPC Limited					
Name of the Power Station :		Mauda-I					
(Amount in Rs Lakh)							
S. No.	Particulars	Existing 2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7	8
1	Cost of Coal/Lignite	38,263.43	33317.28	33317.28	33317.28	33317.28	33317.28
2	Cost of Main Secondary Fuel Oil	475.92	487.23	487.23	487.23	488.57	487.23
3	Fuel Cost						
4	Liquid Fuel Stock						
5	O & M Expenses	2,591.74	3079.52	3259.10	3444.84	3642.15	3851.25
6	Maintenance Spares	6,220.18	7390.84	7821.84	8267.63	8741.15	9243.01
7	Receivables	50,172.61	46103.62	46122.44	43862.28	43998.76	44211.27
8	Total Working Capital	97723.89	90378.49	91007.89	89379.27	90187.90	91110.04
9	Rate of Interest (%)	12.00	11.90	11.90	11.90	11.90	11.90
10	Interest on Working Capital	11726.87	10755.04	10829.94	10636.13	10732.36	10842.10
Petitioner							

Summary of issue involved in the petition

Name of the Company :		NTPC Limited	
Name of the Power Station :		Mauda STPS Stage-I	
1	Petitioner:	NTPC Limited	
2	Subject	APPROVAL OF TARIFF FOR THE PERIOD 2024-29	
3	i) Approve tariff of Mauda-I STPS for the tariff period 01.04.2024 to 31.03.2029. ii) Allow the recovery of filing fees as & when paid to the Hon'ble Commission and publication expenses from the beneficiaries. iii) Allow reimbursement of Ash Utilization Charges directly from the beneficiaries on monthly basis, subject to true up. iv) Allow the recovery of pay/wage revision as additional O&M over and above the normative O&M. v) Consider station heat rate based on design heat rate with applicable operating margin. vi) Pass any other order as it may deem fit in the circumstances mentioned above.		
4	Respondents: 6		
Name of Respondents			
1. Madhya Pradesh Power Management Company Limited Shakti Bhawan, Vidyut Nagar, Rampur, Jabalpur – 110003		2. Maharashtra State Electricity Distribution Company Limited Prakashgad, Bandra (East), Mumbai – 400051.	
3. Gujarat Urja Vikas Nigam Limited 2nd Floor, Sardar Patel Vidyut Bhawan, Race Course, Vadodara – 390007.		4. Chattisgarh State Power Distribution Co. Ltd., P.O. Sundar Nagar, Danganiya, Raipur – 492013	
5. Electricity Department Government of Goa, 3rd Floor, Vidyut Bhawan, Panaji, Goa – 403001.		6. Dadra and Nagar haveli and Daman and Diu Power Distribution Corporation Limited (DNHDDPDCL) 1st & 2nd floor, Vidyut Bhawan, 66 kV Road Dadra and Nagar haveli and Daman and Diu - 396230	
6	Project Scope	2x500 MW Coal based Station	
7	COD	30.03.2014	
8	Claim: Add Cap	(Rs Lakh)	
	2024-25		2,132.24
	2025-26		2,780.00
	2026-27		2,077.36
	2027-28		297.00
	2028-29		438.00
9	AFC (2028-29)	1,12,463.00	
10	Capital cost as on 31.03.29	6,79,996.75	
11	NAPAF (Gen)	85%	
12	Any Specific	-	

Appendix-I (a)

SUPPLEMENTARY TARIFF FILING FORMS (THERMAL)

**FOR DETERMINATION OF SUPPLEMENTARY TARIFF FOR
COMBUSTION MODIFICATION (CM) SYSTEM OF**

Mauda-I (2x500 MW)

(From 01.04.2024 TO 31.03.2029)

Summary of Supplementary Tariff

Name of the Company :		NTPC Ltd					
Name of the Power Station :		Mauda-I					
Name of the ECS:		Combustion Modification (CM)					
							Amount in Rs. Lakh
S. No.	Particulars	Unit	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7	8
1.1	Depreciation	Rs Lakh	82.85	82.85	82.85	82.85	82.85
1.2	Interest on Loan	Rs Lakh	64.11	59.18	55.47	48.67	41.90
1.3	Return on Equity	Rs Lakh	69.30	69.30	69.30	69.30	69.30
1.4	Interest on Working Capital	Rs Lakh	4.93	4.95	4.99	4.97	4.99
1.5	O&M Expenses	Rs Lakh	36.09	37.99	39.98	42.08	44.29
	Total	Rs Lakh	257.28	254.26	252.58	247.87	243.32
2.1	Landed Cost of Reagent	Rs/MT					
2.2	Supplementary ECR ex-bus	Rs/ kWh					

(Petitioner)

Statement showing claimed capital cost

Name of the Company :		NTPC Ltd				
Name of the Power Station :		Mauda-I				
Name of the ECS:		Combustion Modification (CM)				
						Amount in Rs. Lakh
S. No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
1	Opening Capital Cost	1569.06	1569.06	1569.06	1569.06	1569.06
2	Add: Addition during the year / period	-	-	-	-	-
3	Less: De-capitalisation during the year / period	-	-	-	-	-
4	Less: Reversal during the year / period	-	-	-	-	-
5	Add: Discharges during the year / period	-	-	-	-	-
6	Closing Capital Cost	1569.06	1569.06	1569.06	1569.06	1569.06
7	Average Capital Cost	1569.06	1569.06	1569.06	1569.06	1569.06

(Petitioner)

Statement showing Return on Equity

Name of the Company : NTPC Ltd

Name of the Power Station : Mauda-I

Name of the ECS: Combustion Modification (CM)

Amount in Rs. Lakh

S. No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7
	Return on Equity					
1	Gross Opening Equity (Normal)	470.72	470.72	470.72	470.72	470.72
2	Less: Adjustment in Opening Equity	0	0	0	0	0
3	Adjustment during the year	0.00	0.00	0.00	0.00	0.00
4	Net Opening Equity (Normal)	470.72	470.72	470.72	470.72	470.72
5	Add: Increase in equity due to addition during the year / period	-				
7	Less: Decrease due to De-capitalisation during the year / period	-				
8	Less: Decrease due to reversal during the year / period	-				
9	Add: Increase due to discharges during the year / period	-				
10	Net closing Equity (Normal)	470.72	470.72	470.72	470.72	470.72
11	Average Equity (Normal)	470.72	470.72	470.72	470.72	470.72
12	Rate of ROE - pre tax (%)	14.72	14.72	14.72	14.72	14.72
13	Total ROE	69.30	69.30	69.30	69.30	69.30

		PART-1
		FORM-2
Name of the Company	NTPC LTD	
Name of the Power Station	Mauda-1	
ECS Characteristics		
Name of the Petitioner	NTPC LTD	
Name of the Generating Station	Mauda STPS Stage-I	
Unit(s)/Block(s)/Parameters	Stage-I (2x500 MW)	
Installed Capacity (MW)-Coal Based	1000 MW	
Actual COD	Unit-1: 31.03.2021, Unit-2: 23.12.2021	
Type of System	Combustion Modification (CM) System	
Name of CM Manufacturer	M/s GE Power India Limited	
Special Technological Features		
Any other special features	Low NOX concentric firing system (LNCFS) with Bypass Over Fire Air (BOFA) dampers	
Nox Control (Combustion Modification System)	Less than 400mg/Nm ³ @6% O ₂ dry basis at ID Fan outlet.	
		PETITIONER

Normative parameters considered for supplementary tariff computations

Name of the Company : NTPC Ltd

Name of the Power Station : Mauda-I

Name of the ECS: Combustion Modification (CM)

Particulars	Unit	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7
Base Rate of Return on Equity	%	12.15	12.15	12.15	12.15	12.15
Effective Tax Rate	%	17.472	17.472	17.472	17.472	17.472
Rate of ROE - pre tax	%	14.722	14.722	14.722	14.722	14.722
Target Availability (Peak/ Off-peak hours)	%	85.000	85.000	85.000	85.000	85.000
Auxiliary Energy Consumption of the generating station	%	5.75	5.75	5.75	5.75	5.75
Auxiliary Energy Consumption for CM (Design)	%	-	-	-	-	-
Rate of Interest on Working Capital	%	11.90	11.90	11.90	11.90	11.90
O&M Expenses	% of Capital Cost	2				
Maintenance Spares for WC	% of O&M	20.00	20.00	20.00	20.00	20.00
Receivables for WC	in Days	45	45	45	45	45

(Petitioner)

Calculation of O&M Expenses

Name of the Company :	NTPC Ltd
Name of the Power Station :	Mauda-I
Name of the ECS:	Combustion Modification (CM)

Amount in Rs. Lakh

S.No	Particulars	Existing 2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
1	O&M expenses under Reg.36(1)(9)						
1a	Normative O&M expenses- ECS	34.29	36.09	37.99	39.98	42.08	44.29
2	O&M expenses under Reg.36(1)(6)						
2a	Water Charges						
2b	Security expenses						
2c	Capital Spares						
	Total O&M Expenses	34.29	36.09	37.99	39.98	42.08	44.29

(Petitioner)

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner	NTPC LTD
Name of the Generating Station	Mauda-I
For Financial Year	01.04.2024 to 31.03.2029 (Summary)
Amount in Rs Lakh	

ACE (Projected)

Sl. No.	Head of Work /Equipment	2024-25	2025-26	2026-27	2027-28	2028-29
1	Claimed Items	-	-	-	-	-
Total Add Cap Projected		-	-	-	-	-

(Petitioner)

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner		NTPC LTD						
Name of the Generating Station		Mauda-I						
COD of ECS (Combustion Modification)		23.12.2021						
For Financial Year		2024-25						
								Amount in Lakh
Sl. No.	Head of Work /Equipment	ACE Claimed (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
1								
	Total	-	-	-	-			
								(Petitioner)

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner		NTPC LTD						
Name of the Generating Station		Mauda-I						
COD of ECS (Combustion Modification)		23.12.2021						
For Financial Year		2025-26						
								Amount in Lakh
Sl. No.	Head of Work /Equipment	ACE Claimed (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
1								
	Total	-	-	-	-			
								(Petitioner)

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner		NTPC LTD						
Name of the Generating Station		Mauda-I						
COD of ECS (Combustion Modification)		23.12.2021						
For Financial Year		2026-27						
								Amount in Lakh
Sl. No.	Head of Work /Equipment	ACE Claimed (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
1								
	Total	-	-	-	-			
								(Petitioner)

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner		NTPC LTD						
Name of the Generating Station		Mauda-I						
COD of ECS (Combustion Modification)		23.12.2021						
For Financial Year		2027-28						
								Amount in Lakh
Sl. No.	Head of Work /Equipment	ACE Claimed (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
1								
	Total	-	-	-	-			
								(Petitioner)

Year wise Statement of Additional Capitalisation after COD

Name of the Petitioner		NTPC LTD						
Name of the Generating Station		Mauda-I						
COD of ECS (Combustion Modification)		23.12.2021						
For Financial Year		2028-29						
								Amount in Lakh
Sl. No.	Head of Work /Equipment	ACE Claimed (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis as per IGAAP	Un-discharged Liability included in col. 3	Cash basis	IDC included in col. 3			
1	2	3	4	5= (3-4)	6	7	8	9
1								
	Total	-	-	-	-			
								(Petitioner)

Calculation of Depreciation

Name of the Company :		NTPC LTD			
Name of the Power Station :		Mauda-I			
Name of the ECS:		Combustion Modification (CM) System			
(Amount in Rs Lakh)					
Sl. No.	Name of the Assets	CERC Dep. Rate	GB as on 31.03.2024	Depreciation Amount as on 31.03.2024	
1	2	3	4	5	6
1	Plant & Machinery	5.28%	1,576.97	83.26	
TOTAL			1,576.97	83.26	
Weighted Average Rate of Depreciation (%)				5.28%	
(Petitioner)					

Statement of Depreciation

Name of the Company :		NTPC LTD					
Name of the Power Station :		Mauda-I					
Name of the ECS :		Combustion Modification (CM) System					
		(Amount in Rs Lakh)					
S. No.	Particulars	Existing 2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7	8
1	Opening Capital Cost	1,505.73	1,569.06	1,569.06	1,569.06	1,569.06	1,569.06
2	Closing Capital Cost	1,569.06	1,569.06	1,569.06	1,569.06	1,569.06	1,569.06
3	Average Capital Cost	1,537.40	1,569.06	1,569.06	1,569.06	1,569.06	1,569.06
4	Freehold land	-	-				
5	Rate of depreciation (%)	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%
6	Depreciable value	1,383.66	1,412.16	1,412.16	1,412.16	1,412.16	1,412.16
7	No. of years for which generating station is in operation as on date of operation of CM system	8.26					
8	Balance depreciable years for CM at the beginning of the period	23.36	22.36	21.36	20.36	19.36	18.36
9	Remaining depreciable value at the beginning of the period	1,383.66	1,203.18	1,120.33	1,037.49	954.64	871.79
10	Depreciation (for the period)	81.17	82.85	82.85	82.85	82.85	82.85
11	Depreciation (annualised)	81.17	82.85	82.85	82.85	82.85	82.85
12	Cumulative depreciation at the end of the period	208.98	291.82	374.67	457.52	540.36	623.21
13	Adjustments if any	-	-	-	-	-	-
14	Net Cumulative depreciation at the end of the period after adjustments	208.98	291.82	374.67	457.52	540.36	623.21

(Petitioner)

Name of the Petitioner: NTPC LTD
Name of the Generating Station: Mauda-1

Statement of Capital cost (Combustion Modification System in Mauda-1)

Rs. Lakh

S. No.	Particulars	FY 2024-25		
		Accrual Basis	Un-discharged Liabilities	Cash Basis
A	a) Opening Gross Block Amount as per books	1,576.97	7.90	1,569.06
	b) Amount of IDC in A(a) above	0	0	-
	c) Amount of FC in A(a) above	0	0	-
	d) Amount of FERV in A(a) above	0	0	-
	e) Amount of Hedging Cost in A(a) above	0	0	-
	f) Amount of IEDC in A(a) above	0	0	-
B	a) Addition in Gross Block Amount during the period (Direct purchases)			
	b) Amount of IDC in B(a) above			
	c) Amount of FC in B(a) above			
	d) Amount of FERV in B(a) above			
	e) Amount of Hedging Cost in B(a) above			
	f) Amount of IEDC in B(a) above			
C	a) Addition in Gross Block Amount during the period (Transferred from CWIP)			
	b) Amount of IDC in C(a) above			
	c) Amount of FC in C(a) above			
	d) Amount of FERV in C(a) above			
	e) Amount of Hedging Cost in C(a) above			
	f) Amount of IEDC in C(a) above			
D	a) Deletion in Gross Block Amount during the period			
	b) Amount of IDC in D(a) above			
	c) Amount of FC in D(a) above			
	d) Amount of FERV in D(a) above			
	e) Amount of Hedging Cost in D(a) above			
	f) Amount of IEDC in D(a) above			
E	a) Closing Gross Block Amount as per books			
	b) Amount of IDC in E(a) above			
	c) Amount of FC in E(a) above			
	d) Amount of FERV in E(a) above			
	e) Amount of Hedging Cost in E(a) above			
	f) Amount of IEDC in E(a) above			

Shall be provided on triung-up for subsequent period

Calculation of Interest on Normative Loan

Name of the Company : NTPC Ltd

Name of the Power Station : Mauda-I

Name of the ECS: Combustion Modification (CM)

(Amount in Rs Lakh)

S. No.	Particulars	Existing 2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
1	Gross Normative loan – Opening	1,054.01	1,098.34	1,098.34	1,098.34	1,098.34	1,098.34
2	Cumulative repayment of Normative loan up to previous year	127.80	208.98	291.82	374.67	457.52	540.36
3	Net Normative loan – Opening	926.21	889.37	806.52	723.67	640.83	557.98
4	Add: Increase due to addition during the year / period	-	-	-	-	-	-
5	Less: Decrease due to de-capitalisation during the year / period	-	-	-	-	-	-
6	Less: Decrease due to reversal during the year / period	-	-	-	-	-	-
7	Add: Increase due to discharges during the year / period	44.33	-	-	-	-	-
8	Less: Repayment of Loan	81.17	82.85	82.85	82.85	82.85	82.85
9	Net Normative loan - Closing	889.37	806.52	723.67	640.83	557.98	475.13
10	Average Normative loan	907.79	847.94	765.10	682.25	599.40	516.56
11	Weighted average rate of interest (%)	7.672	7.561	7.735	8.130	8.119	8.110
12	Interest on Loan	69.64	64.11	59.18	55.47	48.67	41.90

(Petitioner)

Calculation of Interest on Working Capital

Name of the Company :	NTPC LTD
Name of the Power Station :	Mauda-I
Name of the ECS:	Combustion Modification (CM) System

(Amount in Rs Lakh)

S. No.	Particulars		2024-25	2025-26	2026-27	2027-28	2028-29
1	2		3	9			10
	No of days		365	365	365	366	365
1	Cost of Limestone/Reagent Stock	20 days					
	Cost of Limestone/Reagent Advance Payment	30 Days					
2	Receivables	45 days	31.72	31.35	31.14	30.48	30.00
3	O & M Expenses	1 month	2.86	3.01	3.17	3.33	3.51
4	Maintenance Spares	@20%	6.86	7.22	7.60	8.00	8.42
5	Total Working Capital		41.44	41.57	41.90	41.80	41.92
6	Rate of Interest	%	11.90	11.90	11.90	11.90	11.90
7	Interest on Working Capital		4.93	4.95	4.99	4.97	4.99

(Petitioner)

Summary of issues involved in the petition

Name of the Company :		NTPC LTD
Name of the Power Station :		Mauda-I
1	Petitioner:	NTPC LTD
2	Subject	Determination of Supplementary Tariff for Combustion Modification (CM) System for the period from 01.04.2024 to 31.03.2029
3	Prayers: i) Determine Supplementary Tariff for Combustion Modification (CM) System of Mauda-I for the tariff period from 01.04.2024 to 31.03.2029. ii) Pass any other order as it may deem fit in the circumstances mentioned above.	
4	Respondents: 6	
	Names of Respondents	
	Madhya Pradesh Power Management Company Limited (MPPMCL)	
	Maharashtra State Electricity Distribution Co Ltd. (MSEDCL)	
	Chattisgarh State Power Distribution Co. Ltd. (CSPDCL)	
	Gujarat Urja Vikas Nigam Limited (GUVNL)	
	Electricity Department, Govt of Goa	
	DNHDDPDCL	



ಭಾರತ್ ಹೆವಿ ಎಲೆಕ್ಟ್ರಿಕಲ್ಸ್ ಲಿಮಿಟೆಡ್
 भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited

(A Government of India Undertaking)
 ELECTRONICS DIVISION

P.B.No 2606, Mysore Road, Bangalore - 560 026

PHONE : 080-26998281

MOBILE : 9845696568

E-MAIL : prakashdevadas@bhel.in

Ref: GM-NTPC/404/CE-HMI-02

Dated 21/09/2022

Sub: Recommendation for HMI Upgrade

The Windows XP/ Windows 7 based workstation hardware and Microsoft Operating System available at sites (projects listed in annexure-1) is out of mainstream support from OEM and Microsoft respectively. Also the support for Symantec Antivirus version 10.0 has been withdrawn by the OEM and no more security updates / virus definitions are available for that version. Hence the HMIs-maxStations are prone to vulnerabilities which can tamper the operation of plant.

HMI Upgrade for the projects mentioned in Annexure-1 is proposed due to various obsolescence in the DCS components as detailed below.

DCS Component		Existing version / model / Specification	Obsolescence
Workstation / Engineering server / Historian server	Hardware	Workstation: Intel Core 2 Duo processor, 1GB RAM, 146 GB SAS disk, 10 Mbps Ethernet port. Server: Intel Xeon dual core processor, 2 GB RAM, 3x76GB HDD, 10 Mbps Ethernet port.	Lower Processor cores and speed, lower HDD capacity and RAM requirements incompatible for latest software requirements; Lower network bandwidth of 10Mbps restricting communication speed capability of latest DCS components and attributing to latency.
	Operating System	Windows 7 SP1 / Windows XP / Windows Server 2008 R2	Operating Systems were declared End of Support by the OEM-Microsoft as mentioned below: Windows XP - April' 2014 Windows 7 - Jan' 2020 Windows Server 2008 R2 - Jan' 2020
	maxDNA software	maxDNA 4.2.1 / 4.5 / 4.5.1 / 6.0.x	These versions are not compatible with latest Operating Systems; more improved version of maxDNA- release 7.x is available suiting the latest OS.
	Antivirus Software	Symantec 10.x / Symantec 11.x / Symantec 12.x	Declared obsolete by the OEM-Broadcom and no longer updates or virus definitions are available.



ಭಾರತ್ ಹೆವಿ ಎಲೆಕ್ಟ್ರಿಕಲ್ಸ್ ಲಿಮಿಟೆಡ್
भारत हेवी इलेक्ट्रिकल्स लिमिटेड

Bharat Heavy Electricals Limited

(A Government of India Undertaking)
ELECTRONICS DIVISION

P.B.No 2606, Mysore Road, Bangalore - 560 026

PHONE : 080-26998281

MOBILE : 9845696568

E-MAIL : prakashdevadas@bhel.in

Network	Switch	10 Mbps backbone	Lower network bandwidth of 10Mbps restricting communication speed capability of latest DCS components.
	Network Hardening settings	No validated Network hardening settings	Not suitable for latest network requirements with hardening features.


Digitally signed by Prakash Devadas
DN: cn=Prakash Devadas, o=BHEL,
ou=EEDE,
email=prakashdevadas@bhel.in, c=IN
Date: 2022.09.23 17:12:57 +05'30'

Prakash D
AGM (CE-Engg-I)

Annexure-1 List of upgrade projects	
Sl No	Project Name
1	Barauni_Stage-2
2	Bongaigaon_Stage-1
3	Dadri-Thermal_Stage-1
4	Dadri-Thermal_Stage-2
5	Darlipalli_Stage-1
6	Farakka_Stage-2
7	Farakka_Stage-3
8	Gadarwara_Stage-1
9	KoldamHydro
10	Korba_Stage-1
11	Korba_Stage-3
12	Mauda_Stage-1
13	Mauda_Stage-2
14	NorthKaranpura_Stage-1
15	Rihand_Stage-2
16	Rihand_Stage-3
17	Simhadri_Stage-2
18	TANDA_Stage-1
19	TANDA_Stage-2
20	Unchahar_Stage-4
21	Vindhyachal_Stage-4
22	Vindhyachal_Stage-5
23	BRBCL Stage-I
24	Jhajjar Stage-I
25	KBUNL Stage-I
26	KBUNL Stage-II
27	NPGCL Stage-I
28	NSPCL Bhilai Stage-I
29	NTECL Stage-I

NTPC Ltd

13TH May 2022

Engineering Office Sector 24 Noida

Uttar Pradesh.

Subject: End of life cycle of Existing Works Station with HMI, Network Switches at NTPC Three Sites

Dear Sir

We wish to inform that Microsoft XP based system are obsolete and not available. The hard wares used in control system like workstations/servers /switches are obsolete and not available in the market. As a result supplied Workstations /Servers with XP based operating system at NTPC Rihand, Mouda, Vindhyachal sites are obsolete . Application software runs on Windows XP are also obsolete. The currently installed workstations / servers needs to be upgraded with latest hardware and operating system, to meet the compatibility with latest our application softwares.

The existing network switches installed at NTPC sites have also entered end of life cycle phase. We propose NTPC to migrate end of life phase switches to latest X-Series network switches during upgradation of HMI.

We confirm that in case of placement of order by NTPC on M/s Schneider Electric, we shall continue to support NTPC in maintenance support and spare part for a period of 10 years from the date of delivery of material at site.

Yours Truly

For Schneider Electric Systems India Pvt Ltd


Kuldip Pahuja

DGM -Sales

Mobile 9810661828,

kuldip.pahuja@se.com

Schneider Electric Systems India Private Limited
2nd Floor, Venus Building, Plot No. 8A1/2B,
TTC Industrial Area, Opp. Digha Talav, Digha,
Thane Belapur Road, Navi Mumbai- 400708

Windows XP

Windows XP follows the [Fixed Lifecycle Policy](#).


This applies to the following editions: Home, Professional, Professional for Embedded Systems, Professional x64, Starter

📌 Important

Support for this product has ended. See migration guidance below.


Support dates are shown in the Pacific Time Zone (PT) - Redmond, WA, USA.

Support Dates

 Expand table

Listing	Start Date	Mainstream End Date	Extended End Date
Windows XP	Dec 31, 2001	Apr 14, 2009	Apr 8, 2014

Releases

 Expand table

Version	Start Date	End Date
Service Pack 3	Apr 21, 2008	Apr 8, 2014
Service Pack 2	Sep 17, 2004	Jul 13, 2010
Service Pack 1a	Feb 3, 2003	Oct 10, 2006
Service Pack 1	Aug 30, 2002	Oct 10, 2006

Version	Start Date	End Date
Original Release	Dec 31, 2001	Aug 30, 2005

Links

- [Migration guidance](#)
- [Service pack policy](#)

📘 Note

The start date for Microsoft Windows XP Professional x64 Edition was April 24, 2005.

Editions

- Home
- Professional
- Professional for Embedded Systems
- Professional x64
- Starter

Windows 7

Windows 7 follows the [Fixed Lifecycle Policy](#).

This applies to the following editions: Enterprise, Enterprise N, Home Basic, Home Premium, Home Premium N, Professional, Professional for Embedded Systems, Professional N, Starter, Starter N, Ultimate, Ultimate for Embedded Systems, Ultimate N

📌 Important

Support for this product has ended. See migration guidance below.

Support dates are shown in the Pacific Time Zone (PT) - Redmond, WA, USA.

Support Dates

 Expand table

Listing	Start Date	Mainstream End Date	Extended End Date
Windows 7	Oct 22, 2009	Jan 13, 2015	Jan 14, 2020

Releases

 Expand table

Version	Start Date	End Date
Extended Security Update Year 3*	Jan 12, 2022	Jan 10, 2023
Extended Security Update Year 2*	Jan 13, 2021	Jan 11, 2022
Extended Security Update Year 1*	Jan 15, 2020	Jan 12, 2021

Version	Start Date	End Date
Service Pack 1	Feb 22, 2011	Jan 14, 2020
Original Release	Oct 22, 2009	Apr 9, 2013

Tip

- Extended Security Updates (ESU) are available through specific volume licensing programs for Windows 7 Professional, Enterprise, and Professional for Embedded Systems editions of this product, for up to an additional three years past the end of support. Contact your Microsoft partner or account team to learn more.

Links

- [Migration guidance](#)
- [Upgrading from Windows 7 to Windows 10](#)
- [Extended Security Update Program \(ESU\)](#)
- [Service pack policy](#)

Note

Microsoft Edge version 109, releasing the week of January 12, will be the last browser version to support Windows 7 and Windows 8.1. Version 109 will be supported until version 110 is released in February 2023, at which time Windows 10 or later will be required to continue using a supported version of Microsoft Edge. Please go [here](#) to learn more.

Editions

- Enterprise
- Enterprise N
- Home Basic
- Home Premium
- Home Premium N
- Professional

- Professional for Embedded Systems
- Professional N
- Starter
- Starter N
- Ultimate
- Ultimate for Embedded Systems
- Ultimate N



भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
सूचना प्रौद्योगिकी एवं साइबर सुरक्षा प्रभाग
Information Technology & Cyber Security Division

विषय : CEA (Cyber Security in Power Sector) Guidelines, 2021.

CEA is mandated to prepare 'Guidelines on Cyber Security' in Power Sector under the provision of regulation (10) of the Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019. Guidelines on Cyber Security in Power Sector incorporating the cardinal principles has been prepared by CEA. In compliance to the provision of the above regulation, CEA (Cyber Security in Power Sector) Guidelines, 2021 are issued for compliance by all entities listed in the clause 2.3 (Applicability of the Guidelines) of the guidelines.

Encl: Guidelines on Cyber Security


07/10/21
(V.K Mishra)
Secretary CEA

CEA (Cyber Security in Power Sector) Guidelines, 2021

1.0 Background

- 1.1 Cyber intrusion attempts and Cyber-attacks in any critical sector are carried out with a malicious intent. In Power Sector it's either to compromise the Power Supply System or to render the grid operation in-secure. Any such compromise, may result in mal-operations of equipments, equipment damages or even in a cascading grid brownout/blackout. The much hyped air gap myth between IT and OT Systems now stands shattered. The artificial air gap created by deploying firewalls between any IT and OT System can be jumped by any insider or an outsider through social engineering. Cyber-attacks are staged through tactics & techniques of Initial Access, Execution, Persistence, Privilege Escalation, Defence Evasion, Command and Control, Exfiltration. After gaining the entry inside the system through privilege escalation, the control of IT network and operations of OT systems can be taken over even remotely by any cyber adversary. The gain of sensitive operational data through such intrusions may help the Nation/State sponsored or non-sponsored adversaries and cyber attackers to design more sinister and advanced cyber-attacks.
- 1.2 Government of India has set up the Indian Computer Emergency Response Team (CERT-In) for Early Warning and Response to cyber security incidents and to have collaboration at National and International level for information sharing on mitigation of cyber threats. CERT-In regularly issues advisories on safeguarding computer systems and publishes Security Guidelines which are widely circulated for compliances. All Central Government Ministries/ Departments and State/Union Territory Governments have been advised to conduct cyber security audit of their entire Cyber Infrastructure including websites at regular interval through CERT-In empanelled Auditors so as to identify gaps and appropriate corrective actions to be taken in cyber security practices. CERT-In extends supports to enable Responsible Entity in conducting cyber security mock drills and in assessment of their preparation to withstand cyber-attacks. The Responsible Entity must submit Reports of Cyber Audit of cyber security controls, architecture, vulnerability management, network security and periodic cyber security drills to sectoral CERT as well as CERT-In. Team of experts shall review these reports and shortcomings if any in the compliances shall be flagged by them. CERT-In on regular basis also conducts workshops and training programs to enhance Cyber awareness of all Stakeholders.
- 1.3 Ministry of Power has created 6(six) sectoral CERTs namely Thermal, Hydro, Transmission, Grid Operation, RE and Distribution for ensuring cyber security in Indian Power Sector. Each Sectoral CERT has prepared their sub-sector specific model Cyber Crisis Management Plan(C-CMP) for countering cyber-attacks and cyber terrorism. Each Sectoral CERT has circulated their model C-CMPs for preparation and implementation of organization specific C-CMP by each of their Constituent Utility.
- 1.4 All Responsible Entities, Service Providers, Equipment Suppliers/Vendors and Consultants engaged in Power Sector are equally responsible for ensuring cyber security of the Indian Power Supply System. They are to act timely upon each threat intelligence,

advisories and other inputs received from authenticated sources, for continuous improvement in their cyber security posture.

- 1.5 In the current Indian scenario though many cyber security directives and guidelines exists, but none of them are power sector specific. Ministry of Power has directed CEA to prepare Regulation on Cyber Security in Power Sector. And as an interim measures CEA has been directed to issue Guideline on Cyber Security in Power Sector, under the provision of Regulation 10 on Cyber Security in the “Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019”.
- 1.6 The Guidelines on Cyber Security, in the form of Articles written below, requires mandatory Compliance by all Responsible Entities. The Guidelines shall come into effect from the date of issue by Central Electricity Authority, New Delhi.
- 2.0 Hereby the Guidelines on Cyber Security are drawn in the form of Articles for compliance by the Requester as well as User under the following provision of Regulation 10 on Cyber Security, in the “Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019”.

“The requester and the user shall comply with cyber security guidelines issued by the Central Government, from time to time, and the technical standards for communication system in Power Sector laid down by the Authority.”

2.1 **Objective of issuing Guideline:**

- a) Creating cyber security awareness
- b) Creating a secure cyber ecosystem,
- c) Creating a cyber-assurance framework,
- d) Strengthening the regulatory framework,
- e) Creating mechanisms for security threat early warning, vulnerability management and response to security threats,
- f) Securing remote operations and services,
- g) Protection and resilience of critical information infrastructure,
- h) Reducing cyber supply chain risks,
- i) Encouraging use of open standards,
- j) Promotion of research and development in cyber security,
- k) Human resource development in the domain of Cyber Security,
- l) Developing effective public private partnerships,
- m) Information sharing and cooperation
- n) Operationalization of the National Cyber Security Policy

2.2 Within the text of these Articles, ‘**Responsible Entity**’ shall mean all:

- a) Transmission Utilities as well as Transmission Licensees,
- b) Load despatch centres (State, Regional and National),
- c) Generation utilities (Hydro, Thermal, Nuclear, RE),
- d) Distribution Utilities
- e) Generation Aggregators,
- f) Trading Exchanges,
- g) Regional Power Committees, and
- h) Regulatory Commissions.

2.3 Applicability:

All Responsible Entities as well as System Integrators, Equipment Manufacturers, Suppliers/Vendors, Service Providers, IT Hardware and Software OEMs engaged in the Indian Power Supply System.

2.4 Scope:

2.4.1 Control Systems for System Operation and Operation Management.

- a) Grid Control and Management Systems,
- b) Power Plant Control Systems,
- c) Central Systems used to monitor and control of distributed generation and loads e.g. virtual power plants, storage management, central control rooms for hydroelectric plants, photovoltaic/wind power installations,
- d) Systems for fault management and work force management,
- e) Metering and measurement management systems,
- f) Data archiving systems,
- g) Parameterisation, configuration and programming systems,
- h) Supporting systems required for operation of the above mentioned systems,

2.4.2 Communication System.

- a) Routers switches and firewalls,
- b) Communication technology-related network components,
- c) Wireless digital systems.
- d) Control Centre to Control Centre Communications for data exchange on ICCP. (IEC 61850/60850-5/TASE.2/)

2.4.3 Secondary, Automation and Tele control technologies

- a) Control and Automation components,
- b) Control and field devices,
- c) Tele control devices,
- d) Programmable logic controllers / Remote Terminal Units, including digital sensor and actuators elements,
- e) Protection devices,
- f) Safety components,
- g) Digital measurement and metering installations,
- h) Synchronisation devices,
- i) Excitation Systems,

3.0 Definition of Terms:

1. **Access Management:** shall mean set of policies and procedures of the Responsible Entity for allowing Personnel, devices and IoT to securely perform a broad range of operational, maintenance, and asset management tasks either on site or remotely as laid down in Clause 5.2.5 of IS 16335.
2. **Accreditation:** shall mean the process of verifying that an organisation is capable of conducting the tests and assessments against a product/process that are required to be certified.

3. **Accreditation Body:** shall mean an organisation that has been accredited to verify the credentials and capabilities of the organisations that wish to become a certification body.
4. **Act:** shall mean the Information Technology Act, 2000 (21 of 2000)
5. **Asset:** shall mean anything that has value to the organization.
6. **Certification:** shall mean the process of verifying that a product has been manufactured in conformance with a set of predefined standards and/or regulations by an organisation, that is accredited to conduct the certification process
7. **Certification Body:** shall mean an organisation that has been accredited by an accreditation body to certify products / process against a certification scheme.
8. **Certification Scheme:** shall mean the processes, paperwork, tools, and documentation that define how a product or manufacturer is certified
9. **Chief Information Security Officer:** shall mean the designated employee of Senior management level directly reporting to Managing Director/Chief Executive Officer/Secretary of the Responsible Entity, having knowledge of Information Security and related issues, responsible for cyber security efforts and initiatives including planning, developing, maintaining, reviewing and implementation of Information Security Policies
10. **Critical Assets:** shall mean the facilities, systems and equipment which, if destroyed, degraded or otherwise declared unavailable, would affect the reliability or operability of the Power Supply System.
11. **Critical System:** shall mean cyber assets essential to the reliable operation of critical asset. Critical System consists of those cyber assets that have at least one of the following characteristics:
 - a) The cyber asset uses a routable protocol to communicate outside the electronic security perimeter.
 - b) The cyber asset uses a routable protocol within a control centre.
 - c) The cyber asset is dial-up accessible.
12. **Critical Information Infrastructure:** shall mean Critical Information Infrastructure as defined in explanation of sub-section (1) of Section 70 of the Act.
13. **Cyber Assets:** shall mean the programmable electronic devices, including the hardware, software and data in those devices that are connected over a network, such as LAN, WAN and HAN.
14. **Cyber Crisis Management Plan:** shall mean a framework for dealing with cyber related incidents for a coordinated, multi-disciplinary and broad-based approach for rapid identification, information exchange, swift response and remedial actions to mitigate and recover from malicious cyber related incidents impacting critical processes.
15. **Cyber Security Breach:** shall mean any cyber incident or cyber security violation that results in unauthorized or illegitimate access or use by a person as well as an entity, of data, applications, services, networks and/or devices through bypass of the underlying cyber security protocols, policies and mechanisms resulting in the compromise of the confidentiality, integrity or availability of data/information maintained in a computer resource or cyber asset.
16. **Cyber Security Incident:** shall mean any real or suspected adverse cyber security event that violates, explicitly or implicitly, cyber security policy of Responsible Entity resulting in unauthorized access, denial of service or disruption, unauthorized use of computer resource for processing or storage of information or changes to data or information

without authorization, leading to harm to the power grid or its critical sub-sectoral elements Generation, Transmission and Distribution.

17. **Cyber Security Policy:** shall mean documented set of business rules and processes for protecting information, computer resources, networks, devices, Industrial Control Systems and other OT resources.
18. **Electronic Security Perimeter:** shall mean the logical border surrounding a network to which the Cyber Systems of Power Supply System are connected using a routable protocol.
19. **Information Security Division:** shall mean a division accountable for cyber security and protection of the Critical System of the Responsible Entity.
20. **Protected System:** shall mean any computer, computer system or computer network of the Responsible Entity notified under section 70 of the Act, in the official gazette by appropriate Government.
21. **Security Architecture:** shall mean a framework and guidance to implement and operate a system using the appropriate security controls with the goal to maintain the system's quality attributes like confidentiality, integrity, availability, accountability and assurance.
22. **Vulnerability:** shall mean intrinsic properties of something resulting in susceptibility to a risk source that can lead to an event with a consequence
23. **Vulnerability Assessment:** shall mean a process of identifying and quantifying vulnerabilities

4.0 Standards

Reference	Description
ISO/IEC 15408	Common Criteria Certification Standard
ISO/IEC 17011	General requirements for accreditation bodies accrediting conformity assessment bodies
ISO/IEC 17025	General requirements for the competence of testing and calibration laboratories
ISO/IEC 21827	Systems Security Engineering - Capability Maturity Model (SSE-CMM)
ISO/IEC 24748-1	Systems and software engineering — Life cycle management — Part 1: Guidelines for life cycle management.
ISO 27001/2	Information Security Management
ISO/ IEC 27019	Information technology — Security techniques — Information Security controls for the energy utility industry
ISO/IEC 61508	Functional Safety of Electrical / Electronic / Programmable Electronic Safety-related Systems
IEC 61850	Communication networks and systems for power utility automation
IEC 62351	Standards for Securing Power System Communications
IEC 62443	Cyber Security for Industrial Control Systems
IS 16335	Power Control Systems – Security Requirements.

5.0 Abbreviations

Abbreviations	Description
a) BES	Bulk Electric System

b)	CDAC	Centre for Development of Advanced Computing
c)	CEA	Central Electricity Authority
d)	CERC	Central Electricity Regulatory Commission
e)	CERT	Computer Emergency Response Team
f)	CERT-In	Indian Computer Emergency Response Team
g)	CII	Critical Information Infrastructure
h)	CISO	Chief Information Security Officer
i)	CSK	Cyber Swachhta Kendra
j)	COTS	Commercial off-the Shelf
k)	ESP	Electronic Security perimeter
l)	ICS	Industrial Control Systems
m)	ICT	Information and Communications Technology
n)	IEC	International Electro Technical Commission
o)	ISAC	Information Sharing and Analysis Centre
p)	ISD	Information Security Division
q)	ISO	International Organization for Standardization
r)	ISMS	Information Security Management System
s)	IT	Information Technology
t)	FAT	Factory Acceptance Test
u)	NABL	National Accreditation Board for Testing and Calibration Laboratories
v)	NCIIPC	National Critical Information Infrastructure Protection Centre
w)	NLDC	National Load Dispatch Centre
x)	NPTI	National Power Training Institute
y)	NSCS	National Security Council Secretariat
z)	OEM	Original Equipment Manufacturer
aa)	OT	Operational Technology
bb)	RLDC	Regional Load Dispatch Centres
cc)	SAT	Site Acceptance Test
dd)	SERC	State Electricity Regulatory Commission
ee)	SCADA	Supervisory Control and Data Acquisition Systems
ff)	SIEM	Security Information and Event Management
gg)	SLA	Service Level Agreement
hh)	SLDC	State Load Dispatch Centre
ii)	QCI	Quality Council of India

CEA (Cyber Security in Power Sector) Guidelines, 2021

Article 1. Cyber Security Policy.

a. Cardinal Principles: The Responsible entity will strictly adhere to following cardinal principles while framing cyber security policy:

- i. There is hard isolation of their OT Systems from any internet facing IT system.
 - ii. May keep only one of their IT systems with internet facing at any of their site/location if required which is isolated from all OT zones and kept in a separate room under the security and control of CISO.
 - iii. Downloading/Uploading of any data/information from their internet facing IT system is done only through an identifiable whitelisted device followed by scanning of both for any vulnerability/malware as per the SOP laid down and for all such activities digital logs are maintained and retained under the custody of CISO for at least 6 months. The log shall be readily to carry out the forensic analysis if asked by investigation agency.
 - iv. List of whitelisted IP addresses for each firewall is maintained by CISO and each firewall is configured for allowing communication with the whitelisted IP addresses only.
 - v. Communication between OT equipment/systems is done through the secure channel preferably of POWERTEL through the fibre optic cable. Security configuration of the communication channel is also to be ensured.
 - vi. All ICT based equipment/system deployed in infrastructure/system mandatorily CII are sourced from the list of the "Trusted Sources" as and when drawn by MoP/CEA.
- b. The Responsible Entity shall be ISO/IEC 27001 certified (including sector specific controls as per ISO/IEC 27019).
 - c. The Responsible Entity shall have a Cyber Security Policy drawn upon the guidelines issued by NCIIPC.
 - d. The Responsible Entity shall ensure annual review of their Cyber Security Policy by subject matter expert and changes shall be made therein only after obtaining the due approval from Board of Directors.
 - e. The process of Access Management for all Cyber Assets owned or under control of the Responsible Entity shall be detailed in the Cyber Security Policy.
 - f. The Cyber Security Policy shall leverage state-of-art cyber security technologies and relevant processes at multiple layers to mitigate the cyber security risks.
 - g. The Responsible Entity shall be solely responsible to get Cyber Security Policy implemented through its Information Security Division (ISD).
 - h. The CISO shall record the reason(s) for exemption required, if any, in case, unable to comply with any of the provision(s) of the Cyber Security Policy. Any exception shall be allowed only after an approval of provisions of compensatory control(s) to mitigate residual cyber security risks.

- i. The CISO shall record the exemptions sought in statement of applicability controls, while getting the ISO 27001 certified. All exemptions and its justification need to be in conformance with Cyber Security Policy of the Responsible Entity.
- j. The Responsible Entity shall allocate sufficient Annual budget for enhancing cyber security posture, enhanced year over year.
- k. The Responsible Entity shall work in collaboration with other Industry Stakeholders as well as Academia to promote R&D activity in the domain of cyber security.
- l. The Responsible Entity shall ensure that cyber security issues are taken up as agenda items in their Board meetings once in every three months.

Article 2 Appointment of CISO.

- a) The Responsible Entity shall mandatorily appoint a CISO and shall confirm to qualification, if any, laid by Quality Council of India (QCI). In absence, the work of CISO shall be looked upon by Alternate CISO. In case qualification for appointment of Alternate CISO has been relaxed for reasons recorded thereof, Alternate CISO has to mandatorily acquire the minimum required cyber security skill sets within six months from the date of his appointment.
- b) The Responsible Entity shall regularly update details of CISO and Alternate CISO, with the Sectoral CERT, as well as on ISAC-Power Portal.
- c) Roles and Responsibility of CISOs shall be as laid by CERT-In and ring-fenced to ensure cyber security of the Cyber Assets of the Responsible Entity.

Article 3: Identification of Critical Information Infrastructure (CII).

- a) The Responsible Entity shall submit to NCIIPC through Sectoral CERT, details of Cyber Assets which uses a routable protocol to communicate outside the Electronic Security Perimeter drawn by the Responsible Entity or a routable protocol within a control centre and dial-up accessible Cyber Assets, within 30 days from the date of their commissioning in the System.
- b) The Responsible Entity shall submit details of Critical Business Processes and underlying information infrastructure along with mapped impact and Risk Profile to NCIIPC and shall get their CIIs identified in consultation with NCIIPC. The process of the notification/declaration by Appropriate Government shall follow thereafter.
- c) The Responsible Entity shall review their declared/notified CIIs at least once a year to examine changes if any in the functional dependencies, protocols and technologies or upon any change in security architecture. The Responsible Entity shall review their declared/notified CIIs once in every 6 months, in case if NCIIPC has directed them to constitute an Information Security Steering Committee.
- d) The Responsible Entity shall ensure that all cyber assets of their identified/notified CIIs are recorded in the asset register and considered for risk assessment as well as for finalization of controls in statement of applicability.

Article 4. Electronic Security Perimeter

- a) The Responsible Entity shall identify and document the Electronic Security Perimeter(s) and all Access Points to the perimeter(s).

- b) The Responsible Entity shall follow procedure of identifying “Electronic Security Perimeter” in case of distributed and/or hybrid information infrastructure, as per IEC 62443 / IS16335 (as amended from time to time).
- c) The Responsible Entity shall ensure that every Critical System resides within an Electronic Security Perimeter.
- d) The Responsible Entity shall perform a cyber-Vulnerability Assessment of each electronic Access Points to the Electronic Security Perimeter(s) at least once in every 6 (six) months and/or after any change in Security Architecture.
- e) The Responsible Entity shall ensure that all critical, high and medium vulnerabilities identified as a result of cyber Vulnerability Assessment shall be closed and verified for the effective closure.

Article 5. Cyber Security Requirements

- a) The Responsible Entity shall have an Information Security Division (ISD), headed by CISO.
- b) The Responsible Entity shall ensure that the ISD must be functional on 24x7x365 basis and is manned by sufficient numbers of Engineers having valid certificate of successful completion of course on cyber security of Power Sector from the Training Institutes designated by CEA.
- c) The Responsible Entity shall ensure that ISD
 - 1) has on-boarded Cyber Swachhta Kendra(CSK) of CERT-In, if they have public IPs.
 - 2) has timely acted upon the advisories, guidelines and directive of NCIIPC, CSK, CERT-In and Sectoral CERTs,
 - 3) has deployed an Intrusion Detection System and Intrusion Prevention System capable of identifying behavioural anomaly in both IT as well as OT Systems.
 - 4) shares reports on incident response and targeted malware samples with CERT-In,
 - 5) updates the firmware/software with the digitally signed OEM validated patches only.
 - 6) enables only those ports and services that are required for normal operations. In case of any emergency the procedure as laid in Access management be followed.
 - 7) maintains firewall logs for the last 6 months duration. Firewall logs shall be analysed and all critical and high severity comments shall be addressed for effective closure.
 - 8) retains document of FAT, SAT test results and report/ certificate of cyber tests carried out for compliance of Government Orders and Cyber Security Audit.*
 - 9) maintains all cyber logs and cyber forensic records of any incident for at least** 90 days.
 - * FAT, SAT must include comprehensive cyber security tests of the component/equipment/system to be delivered/delivered at site.
 - ** 90 days from date of the commissioning of the system/recovery from any incident, whichever is later.
- d) The Responsible Entity shall routinely audit and test security properties of the Critical System and must act upon, in case if any new vulnerabilities is identified through testing or by the equipment manufacturer.

- e) The Responsible Entity shall design a secure architecture for control system appropriate for their process control environment*.
- f) All State Load Dispatch Centres(SLDCs) shall comply with the directions issued by the National Load Dispatch Centre(NLDC) as well as Regional Load Dispatch Centres(RLDCs) U/s 29 (1) of the Electricity Act, 2003 to ensure stability and cyber security of grid operation and achieve efficiency in the grid operation. In case of any non-compliance, the Head of SLDC shall be responsible and shall be liable for Penalty as per the provision of CERC/SERC.

*There are so many different types of systems in existence and so many possible solutions, it is important that the selection process ensures that the level of protection is commensurate with the business risk and the Responsible Entity shall not rely on one single security measure for its defence. (Reference IEC/TR62351-10 Edition1.0 2012-10 *Power systems management and associated information exchange –Data and communications security – Part 10: Security architecture guidelines*).

Article 6 Cyber Risk Assessment and Mitigation Plan

- a) The Responsible Entity shall document in their Cyber Security Policy a Cyber Risk Assessment and Mitigation Plans drawn upon the best practises being followed in the Power Sector, and the same shall be approved by Board of Directors.
- b) The Cyber Risk Assessment and Mitigation Plans shall clearly define the matrix for assessing the cyber risk of both IT and OT environment and risk acceptance criteria.
- c) The Cyber Risk Assessment Plan shall be capable to demonstrate that repeated cyber security risk assessment delivers consistent, valid and comparable results.
- d) The review of cyber risk assessment shall be carried out at least once in a Quarter. The actionable of risk treatment and mitigation shall be tracked in this review for their effectiveness.
- e) The CISO shall be responsible for implementation and regular review, on the basis of internal and external feedbacks, of the Cyber Risk Assessment and Mitigation Plans.

Article 7 Phasing out of Legacy System

- a) As the life cycle of the Power System Equipment/System is longer than that of IT Systems deployed therein, the Responsible Entity shall ensure that all IT technologies in the Power System Equipment/System should have the ability to be upgraded.
- b) The Responsible Entity shall ensure that the Information Security Division shall draw the list of all communicable equipments/systems nearing end life or are left without support from OEM. Thereafter CISO shall identify equipment/systems to be phased out from the list drawn, firm up their replacement plan and put up the replacement plan for approval before the Board of Directors.
- c) The CISO shall ensure that till equipments/systems nearing end life or left without support from OEM are not replaced, their cyber security is hardened and ensured through additional controls provisioned in consultation with the OEM or alternate Supplier(s)*.
*e.g. Use of CDAC developed AppSamvid and whitelisting of applications installed may be explored across all legacy systems.
- d) The Responsible Entity shall document in their Cyber Security Policy a Standard Operating Procedure for safe and secure disposal of outlived or legacy devices.

Article 8. Cyber Security Training

- a) The Responsible Entity shall establish, document, implement, and maintain an annual cyber security training program for personnel having authorized cyber or authorized physical access (unescorted or escorted) to their Critical Systems.
- b) The Responsible Entity shall review annually their cyber security training program and shall update it whenever necessary. Annual Review shall record evaluation of the effectiveness of the trainings held.
- c) The Responsible Entity shall ensure that Cyber Security training program designed for their IT as well as OT O&M Personnel must include following topics and as per their functional requirements and security concerns additional topics shall be added:
 - 1) User authentication and authorization.
 - 2) Cyber Security and Protection mechanisms of IT/OT/ICS Systems.
 - 3) Introduction to various standards i.e. ISO/IEC:15408, ISO/IEC:24748-1, ISO: 27001, ISO: 27002, ISO 27019, IS 16335, IEC/ISO:62443.
 - 4) Training on implementation of ISO/IEC 27001 and awareness on IEC 62443.
 - 5) Vulnerability Assessment in the Critical System.
 - 6) Monitoring and preserving of electronic logs of access of Critical Assets.
 - 7) Detecting cyber-attacks on SCADA and ICS systems
 - 8) The handling of Critical System during cyber crisis.
 - 9) Action plans and procedures to recover or re-establish normal functioning of Critical Assets and access thereto following a Cyber Security Incident.
 - 10) Hands on SCADA operation at any of the Regional Load Dispatch Centre.
 - 11) Handling of risks involved in the procurement of COTS Products.
- d) All Personnel engaged in O&M of IT & OT Systems shall mandatorily undergo courses on cyber security of Power Sector from any of the training institute designated by CEA, immediately within 90 days from the notification of CEA Guidelines on Cyber Security in Power Sector.
- e) The Responsible Entity shall ensure that none of their newly hired or the current Personnel have access to the Critical System, prior to the satisfactory completion of cyber security training programme from the Training Institutes designated in India, except in specified circumstances such as cyber crisis or an emergency.
- f) NPTI in consultation with CEA shall identify and design domain specific courses on Cyber Security for different target groups. The "Governing Board for PSO Training and Certification" shall approve the content, duration etc of these courses and shall review it Annually. NPTI shall conduct these courses at all of their branches on regular basis and shall maintain the list of the Participants successfully completing the course.

Article 9 Cyber Supply Chain Risk Management

- a) The Responsible Entity shall ensure that, as and when Ministry of Power, Government of India notifies the Model Contractual Clauses on cyber security, these clauses are included in their every Bid invited for procurement of any ICT based components/equipments/System to be used for Power System.
- b) The Responsible Entity shall ensure that all the Communicable Intelligent Equipments and the Service Level Agreements (SLAs) for their Critical Systems shall be sourced from the list of the "Trusted Sources" as and when drawn by MoP/CEA.

- c) The Responsible Entity shall ensure that, in case, for the any Communicable Intelligent Devices, if no Trusted Source has been identified, then the successful bidder in compliance with the provisions made in MoP order dated 2.7.2020 and any other relevant MoP order has got the product cyber tested for any kind of embedded malware/Trojan/cyber threat and for adherence to Indian Standards at the designated lab.
 - d) The Responsible Entity shall ensure that the essential cyber security tests are carried out successfully during FAT, SAT as detailed in **Annexure A**. The equipment/System besides for functionality shall also be tested in the factory for vulnerabilities, design flaws, parts being counterfeit or tainted, so as to minimize problems during on-site-testing and installation. Cyber Security Conformance Testing are to be carried out in the designated Lab as listed in **Annexure-I of MoP Order No. 12/13/2020-T&R dt. 8th June, 2021(Order at Annexure-B)**.
 - e) The Responsible Entity shall ensure that the Equipment/System supplied by the successful bidder shall accompany with a certificate[§] # obtained by OEM from a certification body accredited to assess devices and process for conformance to IEC 62443-4 standards during design and manufacture. The Responsible Entity shall accept the certificate submitted along with the supplied Equipment/System only if it's in line with the Testing Protocol as notified by Ministry of Power, Government of India, from time to time.
 - f) The Responsible Entity in compliance to the requirement of Article 9(e) shall also accept, till the setting up of an adequate certification facility in the India, a digitally signed self-declaration of conformance to the IEC 62443-4 standards during design and manufacture of the equipment/system, if submitted by the OEM.
 - g) The Responsible Entity shall dispose all unserviceable or obsolete Communicable Intelligent Devices as per the procedure laid in their Cyber Risk Assessment and Mitigation Plans which shall be in line with the prevailing best practices.
- § The National & International certification may be specified in the tender for critical systems/sub-systems being procured by the Responsible Entity.

Certification Schemes:

Embedded Device Security Assurance Certification is for an individual product,
System Security Assurance Certification is for a set of products in a system (possibly from different vendors)
Security Development Lifecycle Assurance Certification is for the development processes that a manufacturer uses for developing products.

Article 10 Cyber Security Incident Report and Response Plan

- a) The CISO of the Responsible Entity shall report in the formats prescribed by CERT-In, all Cyber Security Incidents, classified as reportable events.
- b) Root cause analysis for all reportable events shall be carried out and corrective action taken, so as to ensure that any re-occurrence of such event can be managed with ease.
- c) The Responsible Entity shall mandatorily define in their Cyber Security Policy, criteria(s) identified on the basis of impact analysis, for declaring the occurrence of

Cyber Security Incident(s) as a Cyber Crisis in the System owned or controlled by them.

- d) The Responsible Entity shall mandatorily designate an Officer along with his/her standby by name and designation and empower them to declare an occurrence of the incident(s) as "Cyber Crisis". The contact details of these Officers shall be updated in the C-CMP within 15 days of changes if any due to transfer or superannuation etc.
- e) The CISO shall ensure that during any Cyber Security Incident, ISD monitors and minutely records every details of cyber security events and incidents in both IT as well as the OT System owned or controlled by the Responsible Entity.
- f) The CISO shall ensure that each cyber incident is handled strictly as per Cyber Security Incident Response Plan detailed in the latest C-CMP approved by the Board of Directors.
- g) The Responsible Entity shall ensure that the efficacy of the Cyber Security Incident Response Plan is tested annually through mock drill(s) carried out, if feasible, as simulation exercise(s) or as table top exercise(s) with wider participation of their employees, in consultation with CERT-In and sectoral CERT. In case if any shortcoming is observed in the Cyber Security Incident Response Plan suitable changes shall be made in it.
- h) The Responsible Entity shall ensure that the CISO compiles details of incident detection, incident handling, learnings from each incident and damage claims made if any and shall report to CERT-In as well as upload information on ISAC-Power Portal.

Article 11 Cyber Crisis Management Plan(C-CMP)

- a) The Responsible Entity shall prepare a Cyber Crisis Management Plan and submit to their sectoral-CERT for review with intimation to Ministry of Power/CISO-MoP. Responsible Entity shall update their C-CMP on the basis of comments made by sectoral-CERT and then submit for vetting to CERT-In. The C-CMP shall be updated once again to include the observations made by CERT-In before seeking approval of Board of Directors for implementation of C-CMP.
- b) The Responsible Entity shall ensure that the C-CMP is reviewed at least annually. The CISO shall ensure that all changes are made in C-CMP only with the due approval of Board of Directors and the changes made in C-CMP have been communicated through a verifiable means to all the concerned Personnel of the Responsible Entity.
- c) The CISOs shall be the custodian of all the cyber security related documents including Cyber Crisis Management Plan, Risk Treatment Plan, Statement of Applicability of controls, and compliance to regulator's requirement.
- d) The CISO shall be accountable for ensuring enforcement of C-CMP by Information Security Division of the Responsible Entity, during a cyber-crisis, as and when declared by the designated Officer. (refer Article 10(d))

Article 12: Sabotage Reporting%

- a) The Responsible Entity shall incorporate procedure for identifying and reporting of sabotage in their Cyber Security Policy within 30 days from issue of the Guidelines, or grant of licence under the appropriate legal provisions to the Responsible Entity.
- b) The CISO shall be held liable for non-reporting of identified sabotage(s) as per procedure laid for identifying and reporting of sabotage in the Cyber Security Policy of the Responsible Entity.

- c) The CISO shall prepare a detailed report on disturbances or unusual occurrences, identified, suspected or determined to be caused by sabotage in the Critical System of the Responsible Entity, and shall submit the report to the Sectoral CERT as well as to CERT-In within 24 hours of its occurrence.
- d) The CISO shall submit to NCIIPC within 24 hours of occurrence the report on every sabotage classified as cyber incidents(s) on "Protected System".
- e) The CISO upon occurrence on every sabotage shall take custody of all log records as well as digital forensic records of affected Cyber Assets, Intrusion Detection System, Intrusion Protection System, SIEM and shall preserve them for at least 90 days and shall make them available as and when called upon for investigation by the concerned Agencies.

%Disturbances or unusual occurrences, suspected or determined to be caused by sabotage.

Sabotage e.g. can be a forced intrusion in un-manned/manned facility and taking control of operation of Critical System through a communicating device.

Article 13 Security and Testing of Cyber Assets

- a) The Responsible Entity shall ensure security of all in-service phase as well as standby Cyber Assets through regular firmware/Software updates and patching, Vulnerability management, Penetration testing (of combined installations), securing configuration, supplementing security controls. CISO shall maintain details of update version of each firmware and software and their certification if received from OEMs.
- b) The Responsible Entity shall carry out regularly Vulnerability Assessment of all Cyber Assets owned or under their control. If a Cyber Asset is found vulnerable to any exploits or upon any patch updates or major configuration changes, then further Penetration Testing may be carried out offline or in a suitably configured laboratory test-bed to determine other vulnerabilities that may have not been identified so far.
- c) The Responsible Entity shall specify security requirement and evaluation criteria during each phase of their procurement Process.
- d) The Responsible Entity shall ensure that all Cyber Assets being procured shall conform to the type tests as mentioned in the specification for type testing listed in the bid document. Type test reports of tests conducted in NABL accredited Labs or internationally accredited labs (with in last 5 years from the date of bid opening) shall be mandated to be submitted along with bid. In case, the submitted Type Test reports are not as per specification, the re-tests shall be conducted without any cost implication to the Responsible Entity.
- e) The Responsible Entity shall ensure that all Communicable devices are tested for communication protocol as per the ISO/IEC/IS standards listed in **MoP Order No. 12/13/2020-T&R dated 8th June, 2021(Annexure-B)**.
- f) The Responsible Entity shall ensure that all Critical Systems designed with Open Source Software are adequately cyber secured.
- g) The Responsible Entity as a best practise upon any incidence of Cyber Security Breach shall carry out cyber security tests at any lab designated for cyber testing by Ministry of Power. These tests shall be similar to Pre Commissioning Security Test and those essential for carrying out Post Incident Forensics Analysis.

Article 14 Cyber Security Audit

- a) The Responsible Entity shall implement Information Security Management System (ISMS) covering all its Critical Systems.
- b) The Responsible Entity shall through a CERT-In Empanelled Cyber Security OT Auditor shall get their IT as well as OT System audited at least once in every 6 (six) months and shall close all critical and high vulnerabilities within a period of one month and medium as well as low non-conformity before the next audit. Effective closure of all non-conformities shall be verified during the next audit.
- c) The Cyber Security Audit shall be as per ISO/IEC 27001 along with sector specific standard ISO/IEC 27019, IS 16335 and other guidelines issued by appropriate Authority if any. These mentioned standards shall be current with all amendments if any and in case if any standard is superseded, the new standard shall be applicable. CISO shall ensure immediate closure of non-conformance, based on the criticality and by means all non-conformances are to be closed before the next audit.
- d) The Responsible Entity shall ensure that CISO has all the required systems and documents in place, as mandated by NSCS for base line cyber security audit.

FAT & SAT

1. During FAT stage, the customer has to verify all types test reports / certificates including Communication protocol and security conformance tests of the devices offered for FAT.
2. FAT of SCADA involves testing as a whole system in the integrated scale down set up. For SCADA, Indian standard IS 15953: 2011 “SCADA System for Power System Applications” provides definition and guidelines for the specification, performance analysis and application of SCADA systems for use in electrical utilities (for transmission & Distribution) including guidance on Tests and inspections.
3. The SAT will be done at customer site as per the SAT document mutually agreed by buyer and supplier. For SAT also, guidance from IS 15953: 2011 need to be applied.
4. IEC 61850-10-3 Communication Networks and Systems For Power Utility Automation- Functional testing of IEC 61850 systems (in draft stage - CDTR) covers testing of applications within substations covering
 - a. A methodical approach to the verification and validation of a substation solution
 - b. The use of IEC 61850 resources for testing in Edition 2.1
 - c. Recommended testing practices for different use cases
 - d. Definition of the process for testing of IEC 61850 based devices and systems using communications instead of hard wired system interfaces (ex. GOOSE and SV instead of hardwired interfaces)
 - e. Use cases related to protection and control functions verification and testing.

This standard may be used as a guidelines for FAT & SAT for Substation Automation System (SAS) based on IEC 61850.

List of designated laboratories for cyber security conformance testing

Table -A. Field Equipment /Operational Technology (OT)

Sl. No.	Equipment	Communication Protocol Conformance Standards	Protocol Security Conformance Standards	Designated Laboratories
1	Remote Terminal Units (RTUs) & PLCs with IEC communications protocols	IEC 60870-5 -101 / IEC 60870-5 -104 (Test Details Annexure 2)	IEC 60870-5- 7 Security extension & IEC 62351 series (specifically IEC 62351-100 parts 1 & 3) (Test Details Annexure-2	Central Power Research Institute (CPRI), Prof Sir C V Raman Road, Sadashivanagar P O, Bengaluru – 560080, Karnataka
2	Intelligent Electronic Equipment / Numerical Protection Relays / Bay Control Units / Bay Protection Units, Gateways, Transformer Tap controller/ changer, etc. with IEC 61850 communication protocol	IEC 61850 – 5 to IEC 61850 – 10 (Test Details Annexure 2)		CPRI
3	Smart meters with IEC 62056 communication protocols	IEC 62056 series / DLMS & IS 15959 series and IS 16444 series (Test details Annexure 2)	IEC 62056 series / DLMS & IS 15959 series and IS 16444 series (Test Details Annexure 2)	1. CPRI 2. Electrical Research and Development Association (ERDA), ERDA Road, GIDC, Makarpura, Vadodara - 390 010 Gujarat 3. Yadav Measurements Pvt. Ltd. (YMPL) 373-375, RIICO Bhamashah Industrial Area Kaladwas 313003 Udaipur – Rajasthan

Information Technology (IT) Equipment (Main / Backup / Disaster recovery (DR) Control Centre / Substation control centre IT equipment)

All IT products procured /supplied shall have a valid Certificate of Common Criteria as per ISO/IEC 15408 issued by signatories of the Common Criteria Recognition Agreement (CCRA) (www.commoncriteriaportal.org).

Import/procurement/supplied from vendors sourcing from prior reference countries, the Certificate for Common Criteria shall be from Government Laboratories in India according to the IC3S scheme operated by Ministry of Electronics and Information Technology, which is a signatory to CCRA.

<https://www.commoncriteria-india.gov.in/>

Details of tests for various identified products**Remote Terminal Units (RTUs) (Sl. No. 1 of Table – A of Annexure – 1)****Test protocol:**

Utilities / manufacturers will submit the sample along with all the required technical documentation for taking up testing to the designated laboratory.

Reference standards

- 1) IEC 60870-5-101 & IEC 60870-5-104 as applicable
- 2) IEC 60870-5-7 Telecontrol equipment and systems - Part 5-7: Transmission protocols - Security extensions to IEC 60870-5-101 and IEC 60870-5-104 protocols (applying IEC 62351)
- 3) IEC 62351-100-1 & IEC 62351-100-3 and other cross referenced standards.

Test cases**Extract from standard (IEC 62351-100-1)**

The conformance test cases are divided into four clauses:

- Clause 5: Verification of configuration parameters. This clause contains the configuration parameters affecting the message contents and/or the protocol behaviour.
- Clause 6: Verification of communication. The goal of this clause is to verify that Device Under Test (DUT) is able to implement the security extension messages as described in IEC TS 60870-5-7.
- Clause 7: Verification of procedures. The goal of this clause is to verify that DUT is able to execute the security extension procedures as described in IEC TS 62351-5.
- Clause 8: Test result chart. This clause contains the results of the test cases listed in Clauses 6 and 7 for each supported value of the configuration parameters listed in Clause 5.

The test cases are organized in tables. They are numbered; their numbering syntax is: Subclause number (where the Table is located) + test case number.

In the column 'reference' each test case has a direct reference to IEC TS 62351-5 or IEC TS 60870-5-7 where the clause under test is defined.

Test cases are mandatory depending on the description in the column 'Required'. The following situations are possible:

M= Mandatory test case. The test is referencing a clause that is mandatory in IEC TS 62351-5 or IEC TS 60870-5-7.

Protocol Information Conformance Statement (PICS) x, x = Mandatory test case if the functionality is enabled in the PICS (by marking the applicable check box), with a reference to the section number of the PICS (x.x).

Conformance testing of security extension procedures

The security extension procedures can be summarized as follows:

- User management
- Update key maintenance
- Session key maintenance
- Challenge/Reply authentication
- Aggressive Mode authentication

Extract from standard (IEC 62351-100-3)

IEC 62351-3 defines the requirements related to the authentication/encryption protocol, procedures and methods to be implemented at TCP/IP (transport) level.

The conformance test cases are divided into three clauses:

- Clause 5: Verification of configuration parameters. This clause contains the parameters specified by the standards referencing IEC 62351-3 (see IEC 62351-3:2014/AMD1:2018, Clause 7) and affecting the protocol behaviour.
- Clause 6: Verification of IEC 62351-3 requirements. The goal of this clause is to verify that DUT is conformant to the requirements of the IEC 62351-3.
- Clause 7: Test result chart. This clause contains the results of the test cases listed in Clause 6 for each supported value of the configuration parameters listed in Clause 5.

The test cases are organized in tables. They are numbered, their numbering syntax is: Subclause number (where the table is located) + test case number.

In the column 'Reference' each test case has a direct reference to IEC 62351-3 where the clause under test is defined. PICS or Protocol Implementation eXtra Information for Testing (PIXIT) could be found in the "Reference" column for some test cases whenever the execution of the test case shall take into account specific parameter values declared in the PICS or PIXIT of the DUT.

Test cases are mandatory depending on the description in the column 'Required'. The following situations are possible:

M = Mandatory test case. The test is referencing to a clause that is mandatory in IEC 62351-3.

PICS

or

PIXIT = Mandatory test case if the functionality is enabled in the PICS or PIXIT by marking the applicable check box or declaring the applicable value.

Intelligent Electronic Devices (IEDs) (Sl. No. 2 of Table – A of Annexure – 1)

Utilities / manufacturers will submit the sample along with all the required technical documentation for taking up testing to the designated laboratory.

Reference standards

IEC 61850 series

Specifically IEC 61850-5, IEC 61850-6, IEC 61850-7, IEC 61850-8, IEC 61850-9 and IEC 61850-10

Test cases

Communication protocol conformance as per IEC 61850 -10. This part of standard defines methods and abstract test cases for conformance testing of client, server and sampled values devices used in power utility automation systems, the methods and abstract test cases for conformance testing of engineering tools used in power utility automation systems, and the metrics to be measured within devices according to the requirements defined in IEC 61850-5. Further this part of standard specifies standard techniques for testing of conformance of client, server and sampled value devices and engineering tools, as well as specific measurement techniques to be applied when declaring performance parameters. The use of these techniques will enhance the ability of the system integrator to integrate IEDs easily, operate IEDs correctly, and support the applications as intended.

Smart Meters (Sl. No. 3 of Table – A of Annexure – 1)

Utilities / manufacturers will submit the sample along with all the required technical documentation for taking up testing to the designated laboratory.

IEC 62056 series of standards (Electricity metering data exchange – The DLMS/COSEM suite) specifies details of communication protocol requirements, conformance testing and security requirements. The Part 5-3 (DLMS/COSEM application layer) specifies the DLMS/COSEM application layer in terms of structure, services and protocols for DLMS/COSEM clients and servers, and defines rules to specify the DLMS/COSEM communication profiles. It defines services for establishing and releasing application associations, and data communication services for accessing the methods and attributes of COSEM interface objects, defined in IEC 62056-6-2 using either logical name (LN) or short name (SN) referencing.

Clause 5 and sub clauses specifies security requirements. It cover security concepts, Identification and authentication, Cryptographic algorithms, Cryptographic keys – overview, Key used with symmetric key algorithms, Keys used with public key algorithms and Applying cryptographic protection.

Note: All above referred standards shall be latest with amendments if any at the time of submission of sample(s) for testing.

Testing Criteria

1) Supply from Trusted Sources

The sample size shall be as specified by CEA as per the approved criteria for Trusted Vendors

2) Supply from other than trusted vendors

The sample size shall be shall be 5% of the supply lot / ordered quantity (minimum one). The manufacturer shall submit request to the Nodal agency along with vendor's / manufacturer's certifications for supply chain management system practices and secure product development process implementations based on any one or more of standards ISO / IEC 27036, ISO / IEC 20243, IEC 62443 for verification.

After scrutiny of vendor's / manufacturer's certifications the supplier / utilities shall be asked to submit product to the designated laboratory for communication and cyber security conformance testing.

The supply lot shall stand rejected on failure to comply with the test requirements.

3) Supply from prior reference countries

The utility shall obtain prior permission from the Government of India for importing the product / system from prior reference countries.

The sample size shall be shall be 10 % of the supply lot / ordered quantity (minimum one). The manufacturer shall submit request to the Nodal agency along with vendor's / manufacturer's certifications for supply chain management system practices and secure product development process implementations based on any one or more of standards ISO / IEC 27036, ISO / IEC 20243, IEC 62443 for verification.

After scrutiny of vendor's / manufacturer's certifications the supplier / utilities shall be asked to submit product to the designated Government / Government controlled Autonomous laboratory for type tests (Annexure – 4) and communication & cyber security conformance testing.

The supply lot shall stand rejected on failure to comply with the test requirements.

Type Tests

Products imported from prior reference countries shall also undergo type testing as per following standards in addition to communication protocol and security conformance testing at the designated Government / Government controlled Autonomous laboratory:

Type test standards for RTUs

1. IEC 60870-1-2:1989 Telecontrol equipment and systems. Part 1: General considerations. Section Two: Guide for specifications.
2. IEC 60870-2-1:1995 Telecontrol equipment and systems - Part 2: Operating conditions - Section 1: Power supply and electromagnetic compatibility.
3. EC 60870-2-2:1996 Telecontrol equipment and systems - Part 2: Operating conditions -Section 2: Environmental conditions (climatic, mechanical and other non-electrical influences).
4. IEC 60870-3:1989 Telecontrol equipment and systems. Part 3: Interfaces (electrical characteristics)

Type test standard for IEDs / Numerical Protection Relays / Bay controls units

1. IEC 61850-3: 2013, Ed. 2 Communication networks and systems for power utility automation –Part 3: General requirements.

Type test standards for Smart meters

1. IS 16444: 2015 AC static direct connected watthour smart meter class 1 and 2 – Specification.
2. IS 16444 Part 2: 2017 AC static transformer operated watthour and var - Hour smart meters, class 0.2 S, 0.5 S and 1.0 S: Part 2 specification transformer operated smart meters.

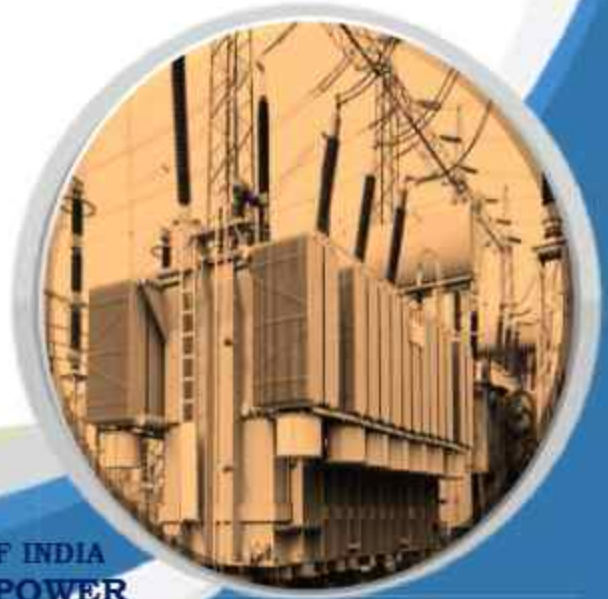
Note:

1. All above referred standards shall be latest with amendments if any at the time of submission of sample(s) for testing.
2. Type tests generally covers functionality, environmental, mechanical, EMI/ EMC and electrical safety related tests.



सत्यमेव जयते

**STANDARD SPECIFICATIONS
AND TECHNICAL PARAMETERS
FOR TRANSFORMERS AND
REACTORS (66 kV & ABOVE
VOLTAGE CLASS)**



**GOVERNMENT OF INDIA
MINISTRY OF POWER
CENTRAL ELECTRICITY AUTHORITY**



भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत प्रणाली अभियांत्रिकी एवं प्रौद्योगिकी विकास प्रभाग
Power System Engineering & Technology Development Division
3rd Floor, Sewa Bhawan, R.K. Puram, New Delhi – 66,

सेवा में,
As per attached List

विषय: Amendment No. 1 to “Standard Specifications and technical Parameters for Transformers and Reactors (66 kV & above voltage class)”-reg.

As you are aware that “Standard Specifications and technical Parameters for Transformers and Reactors (66 kV & above voltage class)” duly approved by Hon’ble Minister of Power and New and Renewable Energy was circulated by this office vide letter dated 29.04.2021 to all the concerned utilities. Further, the document also empowers the committee under Chairmanship of Member (Power System) with representation from stakeholders (IEEMA, EPTA, CPRI, POWERGRID, NTPC, NHPC, Two STUs) as members and CE (PSETD) as Member Secretary of the committee to carry out updation of the document every two years and any amendment, if there is an urgency. Clause No. 7 of Chapter 2 of the above mentioned document mandates the requirement of Dynamic Short Circuit Test for Transformers.

Representation has been received from multiple organizations citing that presently none of the Transformer manufacturer has got their design of 765 kV class and 500 MVA, 400 kV class transformer tested for dynamic short circuit withstand capability and process of getting the design tested would take approximately 15-18 months and only after successful testing subsequent units can be manufactured which will further take few months depending upon availability of material and capacity in the works. Manufacturers are in no position to deliver the transformer of tested design within next 24 Months. This scenario could delay the completion schedule of many transmission projects, specially associated with the evacuation of renewable generation.

To deliberate the issue of DSC requirement for the above mentioned transformers, a meeting of the committee under Chairmanship of Member (Power System) was held on 28.08.2021. After detailed deliberations

following amendment in clause 7 of Chapter 2 of "Standard Specification and Technical Parameters for Transformers and Reactors (66 kV and above)" was finalized:

Existing Provision	Amended Provision
<p>7.0 DYNAMIC SHORT CIRCUIT TEST REQUIREMENT AND VALIDITY The transformer, the design of which is similar to the offered transformer, should have been successfully tested for short circuit withstand capability as per IS 2026 Part-5 in line with the requirement of CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations. The criteria for similar transformer is specified in Annexure-J. The relevant Test Report/certificate shall be enclosed along with bid. Further, design review of offered transformer shall be carried out based on the design of reference transformer, which has already been subjected to Short circuit tests in lieu of repetition of Short circuit tests. In case, manufacturer has not conducted short circuit test earlier, the same shall be carried out on offered transformer.</p> <p>A format (forms part of Annexure-J) filled with data of a typical sample case has been prepared for reference and guidance of utility to compare a Short Circuit tested transformer with the offered transformer in order to verify the similarity criteria as per Annexure J.</p>	<p>7.0 DYNAMIC SHORT CIRCUIT TEST REQUIREMENT AND VALIDITY The transformer the design of which is similar to the offered transformer, should have been successfully tested for short circuit withstand capability as per IS 2026 Part-5 within last 5 years. The criteria for similar transformer is specified in Annexure-J. The relevant Test Report/certificate shall be enclosed along with bid. Further, design review of offered transformer shall be carried out based on the design of reference transformer, which has already been subjected to Short circuit tests in lieu of repetition of Short circuit tests. In case, manufacturer has not conducted short circuit test earlier, the same shall be carried out on offered transformer.</p> <p>However, considering the fact that dynamic short circuit tested design is not available for 765 kV voltage class Auto Transformer & 500 MVA, 400 kV voltage class Auto Transformer and testing of these transformers would require some more time, the above requirement of Dynamic short circuit (DSC) withstand test for these transformers shall be applicable for the projects for which bid invitation date is after 31st August 2023. For these transformers, theoretical evaluation of the ability to withstand the dynamic effects of short circuit, based on calculation and consideration of the design characteristics and manufacturing practices, shall be carried out as per IS 2026-5/IEC 60076-5.</p> <p>A format (forms part of Annexure-J) filled with data of a typical sample case</p>

CONTENTS

DESCRIPTION		PAGE NO.
CHAPTER-1 : INTRODUCTION		I-1 TO I-14
CHAPTER-2 : TECHNICAL SPECIFICATIONS FOR TRANSFORMERS & REACTORS		II-1 TO II-73
1.0	General	II-1
2.0	Specific technical requirements	II-1
3.0	Guaranteed and other technical particulars	II-1
4.0	Standard ratings of transformer and reactor	II-2
5.0	Performance	II-2
6.0	Maximum losses	II-6
7.0	Dynamic short circuit test requirement and validity	II-7
8.0	Type tests requirement and validity	II-7
9.0	Design review	II-8
10.0	Service condition	II-8
11.0	Construction details	II-9
12.0	Paint system and procedures	II-26
13.0	Insulating oil	II-26
14.0	Connection arrangement for bringing spare unit into service for replacement of one of the single phase transformer/reactor units of a three phase bank	II-27

15.0	Bushings	II-27
16.0	Layout arrangement and connection of generator transformer in hydro power plants	II-30
17.0	Neutral formation and earthing arrangement	II-32
18.0	Delta formation (applicable for 1-Phase Transformer)	II-32
19.0	Cooling equipment and its control	II-33
20.0	Valves	II-40
21.0	Cabling	II-43
22.0	Tap changing equipment	II-43
23.0	SCADA integration	II-53
24.0	Constructional features of Cooler Control Cabinet/Individual Marshalling Box/Common Marshalling Box/ outdoor cubicle/digital RTCC panel	II-54
25.0	Auxiliary power supply for OLTC, cooler control and power circuit	II-55
26.0	Bushing current transformer and neutral current transformer	II-57
27.0	Tools & tackles	II-58
28.0	Fittings & accessories	II-58
29.0	Inspection and testing	II-62
30.0	Drawings/documents/calculations	II-62
31.0	Rating & diagram plate	II-63
32.0	Responsibilities of manufacturer and utility/user during warranty period of transformer/reactor	II-69
33.0	Physical interchangeability of transformer/reactor of different make	II-72

34.0	List of codes/standards/regulations/publications	II-73
CHAPTER-3: DESIGN REVIEW		III-1 TO III-7
1.0	Introduction	III-1
2.0	Stages of design review	III-2
3.0	Mode of design review	III-3
4.0	Calculation of losses, weight of core and current density of winding conductor	III-5
5.0	References	III-7
CHAPTER-4 : QUALITY ASSURANCE PROGRAM		IV-1 TO IV-18
1.0	Introduction	IV-1
2.0	General requirements - quality assurance	IV-2
3.0	Quality assurance documents	IV-6
4.0	Quality during inspection & testing (including virtual inspection) and inspection certificates	IV-7
5.0	Inspection and testing 5.1 Factory test 5.2 Stage inspection 5.3 Type tests on fittings	IV-14
6.0	Pre-shipment checks at manufacturer's works	IV-17
CHAPTER-5 : TRANSPORTATION, ERECTION, TESTING & COMMISSIONING		V-1 TO V-32

1.0	Transportation	V-1
2.0	Points to be checked after receipt of Transformer/ Reactor at site in presence of manufacturer's and purchaser's representative	V-2
3.0	Storage of the main unit and the accessories at site	V-4
4.0	Insulating oil	V-9
5.0	Internal inspection	V-10
6.0	Precautions during erection	V-11
7.0	Drying of wet winding of transformer/ reactor by application of vacuum, Dry nitrogen gas filling and heating	V-14
8.0	Oil filling	V-17
9.0	Hot oil circulation using high vacuum oil filter machine	V-20
10.0	Safety measures and precautions	V-22
11.0	Inspection and testing at site	V-22
12.0	Pre-Commissioning checks and tests for transformers and reactors	V-23
13.0	Final commissioning checks	V-25
14.0	Energization of transformer/reactor	V-27
15.0	Significance of tests/checks	V-27
16.0	Flow chart for erection activities	V-31
CHAPTER-6: CONDITION MONITORING AND LIFE CYCLE MANAGEMENT		V-1 TO V-51
1.0	Introduction	VI-1
2.0	Conventional tests for condition monitoring	VI-3

	2.1 Winding Resistance Measurement	VI-3
	2.2 Voltage Ratio Test (only for transformers)	VI-5
	2.3 Excitation/Magnetization Current Measurement	VI-6
	2.4 Insulation Resistance	VI-7
	2.5 Polarization Index Test	VI-9
	2.6 Capacitance and Tan delta of Windings	VI-10
	2.7 Capacitance and Tan delta of Bushings	VI-12
	2.8 Short Circuit Impedance (only for transformers)	VI-14
	2.9 Operational checks and Inspection of OLTC (only for transformers)	VI-14
	2.10 Measurement of Oil Parameters	VI-16
	2.11 Dissolved Gas Analysis (DGA) and Interpretation	VI-16
	2.12 Frequency Response Analysis (FRA)	VI-27
	2.13 Frequency Domain Spectrometry of Bushings	VI-34
	2.14 Partial Discharge (PD) Measurement	VI-35
	2.15 Moisture Measurement & Control	VI-37
	2.16 Thermo Vision Scanning	VI-37
3.0	Remnant Life measurement of Paper insulation	VI-38
4.0	Monitoring of leakage of oil from transformer/reactor and other maintenance checks	VI-40
5.0	Transformer Assessment Indices (TAI)	VI-41
6.0	Recommended, as-needed, and optional maintenance tests as per IEEE Std. C57.152-2013	VI-41
7.0	Life Cycle Management of Transformer/Reactor	VI-43

Appendix	Condition Monitoring Tests, its frequency and acceptable values for Transformers and Reactors	VI-46
<i>Annexure–A: Specific Technical Requirement</i>		
<i>Annexure–B: Technical Parameters of Bushing Current Transformers & Neutral Current Transformers</i>		
<i>Annexure–C: Guaranteed & Other Technical Particulars</i>		
<i>Annexure–D: Test Plan and Procedures</i>		
<i>Annexure–E: Standard Manufacturing Quality Plan</i>		
<i>Annexure–F: Typical Example for Calculation of Flux Density, Core Quantity, No-Load Loss and Weight of Copper</i>		
<i>Annexure–G: Basic Manufacturing Facility & Manufacturing Environment</i>		
<i>Annexure–H: List of Drawings/Documents to be submitted by the manufacturer</i>		
<i>Annexure–I: Scope of Design Review</i>		
<i>Annexure–J: Criteria for selection of similar reference transformer for dynamic short circuit withstand test</i>		
<i>Annexure–K: Painting Procedure</i>		
<i>Annexure–L: Unused Inhibited/Uninhibited Insulating Oil Parameters</i>		
<i>Annexure–M: Standard Dimensions for Lower Portion of Condenser Bushings</i>		
<i>Annexure–N: Connection Arrangement for Bringing Spare Unit into Service for Replacement of One of the Single Phase Transformer/Reactor Units of a Three Phase Bank</i>		

<i>Annexure-O: Typical Arrangement for Neutral Formation for Single Phase Units</i>
<i>Annexure-P: Physical Interchangeability of Transformers and Reactors of Different Makes</i>
<i>Annexure-Q: Standard GA Drawings and Limits of Supply Between Suppliers of Transformer and Dry-Type Cable/GIS Termination for Hydro Plants</i>
<i>Annexure-R: 1100 V Grade Power and Control Cable</i>
<i>Annexure-S: Specification for Oil Storage Tank</i>
<i>Annexure-T: Specification for BDV Test Set & Portable DGA Kit</i>
<i>Annexure-U: Specification for On-line Insulating Oil Drying System (Cartridge type)</i>
<i>Annexure-V: Specification for Oil Sampling Bottles & Oil Syringe</i>
<i>Annexure-W: List of Codes/Standards/Regulations/Publications</i>

shall be ensured so that only one tap change from each tap changing pulse shall be effected. If the command remains in the "operate" position, lock-out of the mechanism is to be ensured.

- 22.2.4.17 The relay shall incorporate an under voltage / over voltage blocking facility which shall make the control inoperative if voltage falls/ rises by percentage value of set point value with automatic restoration of control when nominal voltage rises / falls to value.
- 22.2.4.18 The relay shall have facility to monitor operating hours of tap changer and register the tap changer statistics. In the statistics mode, the relay shall display the no. of tap changing operations occurred on each tap.
- 22.2.4.19 The relay shall have self-check of power on and shall continually monitor all functions and the validity of all input values to make sure the control system is in a healthy condition. Any monitoring system problem shall initiate the alarm.
- 22.2.4.20 Following minimum indications/alarms shall be provided in Digital RTCC relay either through relay display panel or through relay LEDs:
- (a) INCOMPLETE STEP alarm
 - (b) OLTC motor overload protection alarm
 - (c) Supply to DM Motor fail alarm
 - (d) OLTC IN PROGRESS alarm
 - (e) Local / Remote Selector switch positions in DM Box
 - (f) OLTC upper/lower limits reached alarm
 - (g) OLTC Tap position indications for transformer units
 - (h) Independent-combined-remote selector switch positions of CMB (in case of single phase transformer)
 - (i) 415V, AC Main Supply Fail.
 - (j) 415V, AC Standby Supply Fail
- 22.2.4.21 In case of parallel operation or 1-Phase Transformer unit banks, OLTC out of step alarm shall be generated in the digital RTCC relay for discrepancy in the tap positions.

23.0 SCADA INTEGRATION (if applicable)

All the online monitoring equipment i.e. Optical Temperature Sensors & Measuring Unit, Online Dissolved Gas (Multi-gas) and Moisture Analyzer, On-line insulating oil drying system (Cartridge type) etc. provided for individual transformer/reactor unit including spare unit (if any), shall be IS/IEC 61850 compliant (either directly or through a Gateway). These monitoring equipment are required to be integrated

with SAS through managed Ethernet switch conforming to IS/IEC 61850. This Ethernet switch shall be provided in IMB (for 3-Ph unit) / CMB (for 1-Ph unit). The switch shall be powered by redundant DC supply (as per available Station DC supply). Ethernet switch shall be suitable for operation at ambient temperature of 50 Deg C. All required power & control cables including optical cable, patch chord (if any) upto IMB (for 3-Ph unit) / CMB (for 1-Ph unit), all the cables from RTCC to DM and any special cable between IMB (for 3-Ph unit) / CMB (for 1-Ph unit) to switchyard panel room/control room shall be in the scope.

However, fiber optic cable, power cable, control cables, as applicable, between IMB (for 3-Ph unit) / CMB (for 1-Ph unit) to switchyard panel room/control room and power supply (AC & DC) to MB and integration of above said IS/IEC-61850 compliant equipment with Substation Automation System may be a part of sub-station contract.

Cooling and OLTC of transformers shall also be monitored and controlled from SCADA. List of Signal exchange between Transformer and SCADA may be mutually agreed between the owner and manufacturer. Owner/contractor, as applicable, shall ensure provision of adequate number of redundant Bay control Units (BCUs).

24.0 CONSTRUCTIONAL FEATURES OF COOLER CONTROL CABINET/ INDIVIDUAL MARSHALLING BOX/ COMMON MARSHALLING BOX/ OUTDOOR CUBICLE/DIGITAL RTCC PANEL

- 24.1 Each transformer unit shall be provided with local OCTC/OLTC Drive Mechanism Box (DMB), Cooler Control Cabinet/Individual Marshalling Box, **Digital RTCC panel** (as applicable) and Common Marshalling Box (for a bank of three 1-phase units). Each reactor unit shall be provided with Individual Marshalling Box and Common Marshalling Box (for a bank of three single phase unit).
- 24.2 Common marshalling box (for single phase unit) shall be of size not less than 1600mm (front) X 650mm (depth) X 1800mm (height). Individual **Marshalling Box (IMB) and Cooler Control Box** shall be **tank mounted** or ground mounted. All cabinets except CMB & Digital RTCC panel shall be tank mounted. All separately mounted cabinets and panels shall be free standing floor mounted type and have domed or sloping roof for outdoor application. The gland plate shall be at least 450 mm above ground level.
- 24.3 The Cooler Control Cabinet (CCC)/Individual Marshalling Box (IMB), Common Marshalling Box (CMB), and **all other outdoor cubicles**

- Mechanical block integrity
- Proper operation of hand-crank and its interlock switch
- Physical condition of tap selector
- Freedom of movement of external shaft assembly
- Extent of arc erosion on stationary and movable arcing contacts
- Inspect barrier board for tracking and cracking
- After filling with oil, manually crank throughout entire range
- Oil BDV and Moisture content (PPM) to be measured and recorded

Finally, the tap selector compartment should be flushed with clean transformer oil and all carbonization which may have been deposited should be removed. Minimum BDV should be 50 kV and Moisture content should be less than 20 PPM.

2.10 Measurement of Oil Parameters

Following parameters of oil shall be checked and measured by testing:

- a. Visual Inspection/Color
- b. Dielectric Strength (BDV)
- c. Moisture Content (PPM)
- d. Dielectric Loss/Power factor/Dissipation factor (Tan Delta)
- e. Inter facial Tension (IFT)
- f. Acidity (Neutralization No.)
- g. Oxidation Stability/Ageing test
- h. Particle Count (For 400 kV and above transformer & reactor)

Values of these parameters shall be as per specification (Chapter-2 and Annexure-L).

Inhibitor concentration for inhibited oil in service needs to be monitored and eventually maintained. For this purpose IEC 60422 may be referred.

2.11 Dissolved Gas Analysis (DGA) and Interpretation

DGA is one of the most widely used diagnostic tools for detecting and evaluating faults in transformer / reactors. The fundamental purpose of DGA is to discriminate between normal and abnormal condition. Oil and oil-immersed electrical insulating materials decompose under the influence of thermal and electrical stresses and generate gaseous decomposition products of varying composition which dissolve in the

oil. The nature, amount and rate of generation of the individual component gases that are detected are indicative of the type and degree of the abnormality responsible for the gas generation.

The purpose of DGA is to detect the internal faults within the oil-filled electrical equipment at an early stage and also to find incipient faults such as partial discharge, over-heating, arcing etc. The data obtained from this test is applied to various DGA techniques available in IEEE, IEC standards etc. such as IEEE.C57.104, IEC-60599 etc. for the interpretation of the test results that may give the type, severity and sometimes location of the fault.

The transformer/reactor undergoes electrical, mechanical, chemical and thermal stresses during its service life which may result in slow evolving incipient faults inside the transformer. The gases generated under abnormal electrical or thermal stresses are hydrogen(H_2), methane(CH_4), ethane(C_2H_6), ethylene(C_2H_4), acetylene(C_2H_2), carbon monoxide(CO), carbon dioxide(CO_2), nitrogen(N_2) and oxygen(O_2) which get dissolved in oil. Collectively these gases are known as FAULT GASES, which are routinely detected and quantified at extremely low level, typically in parts per million (ppm) in Dissolved Gas Analysis (DGA). CO & CO_2 formation increases not only with temperature but also with oxygen content of oil and the moisture content of paper. Large quantity of CO & CO_2 are evolved from overheating of cellulose. Most commonly used method to determine the content of these gases in oil is by Headspace extraction and Gas Chromatograph.

Interpretation of DGA Results:

The interpretation of DGA results is often complex. The interpretation of DGA data begins with the detection of an abnormal condition. There is no direct/definite interpretation method to indicate exact location & type of fault and to evaluate the condition of a transformer. There are several possibilities wherein DGA status can be very different from the actual condition of the transformer. Some cause of gas generation are related to fault conditions (e.g. arcing, overheating, PD). At times, gases generation may be related to more benign conditions like stray gassing (a non-damage fault), contamination, previous fault now inactive, and mild core overheating, rusting or other chemical reactions involving steel, uncoated surfaces or protective paints etc. Additionally, some pre-failure conditions especially mechanical or insulating system weakness will not generate

gas. Some normal conditions also generate gases, for example, normal ageing, and insulating liquid oxidation.

Detection of gas does not give any conclusive status of health by itself. Prior DGA results should be used for characterization of increments and rates. If abnormal DGA results are found, any available supplementary information, such as test and maintenance records, loading pattern, environmental conditions, etc., should be consulted for possible clues as to the origin and nature of the abnormalities. Comparison of DGA data from sister units is also useful in absence of such information.

The different interpretation methods only provide guidelines to take an engineering judgment about the equipment.

Some important extract of IEEE.C57.104-2019 and IEC-60599-2015 method of evaluation Dissolved Gas is given below for guidance only.

IEC 60599 method for Gas Analysis:

This method is applicable only when the fault gas results are ten times the sensitivity limit of the Gas Chromatograph (GC). As per IEC 60567 the sensitivity limit for the GC should be 1 ppm for all the hydrocarbons and 5 ppm for Hydrogen. In this method three ratios viz. C_2H_2/C_2H_4 , CH_4/H_2 & C_2H_4/C_2H_6 are used for interpretation. Each ratio is assigned a code depending upon the range of values of ratios. These codes in different combinations are then used for diagnosis of type of fault such as Partial Discharge (PD), low energy discharge (D1), High energy discharge (D2), thermal faults of various temperatures ($T_1 < 300^\circ C$, $300^\circ C < T_2 < 700^\circ C$ & $T_3 > 700^\circ C$).

Fault often start as incipient faults of low energy, which may develop into more serious ones of higher energies, leading to possible gas alarms, breakdowns & failures.

Typical faults in Power Transformers

Type	Fault	Examples
PD	Partial discharges	Discharges in gas-filled cavities resulting from incomplete impregnation, high-humidity in paper, Oil super saturation or cavitation, and leading to X-wax formation.
D1	Discharges of	• Sparking or arcing between bad

Type	Fault	Examples
	low energy	connections of different or floating potential, from shielding rings, toroids, adjacent disks or conductors of winding, broken brazing or closed loops in the core. <ul style="list-style-type: none"> • Discharges between clamping parts, bushing and tank, high voltage and ground within windings, on tank walls. • Tracking in wooden blocks, glue of insulating beam, winding spacers, Breakdown of oil, selector breaking current.
D2	Discharges high energy	<ul style="list-style-type: none"> • Flashover, tracking, or arcing or high local energy or with power follow-through • Short circuits between low voltage and ground, connectors, windings, bushings and tank, copper bus and tank, windings and core, in oil duct, turret. Closed loops between two adjacent conductors around the main magnetic flux, insulated bolts of core, metal rings holding core legs.
T1	Thermal fault $t < 300\text{ }^{\circ}\text{C}$	<ul style="list-style-type: none"> • Overloading of the transformer in emergency situations • Blocked item restricting oil flow in windings • Stray flux in damping beams of yokes
T2	Thermal fault $300\text{ }^{\circ}\text{C} < t < 700\text{ }^{\circ}\text{C}$	<ul style="list-style-type: none"> • Defective contacts between bolted connections, gliding contacts, contacts within selector switch (pyrolytic carbon formation), connections from cable and draw-rod of bushings. • Circulating currents between yoke clamps and bolts, clamps and laminations. In ground wiring, defective welds or clamps in magnetic shields. • Abraded insulation between adjacent parallel conductors in windings.
T3	Thermal fault $t > 700\text{ }^{\circ}\text{C}$	Large circulating currents in tank and core Minor currents in tank walls created by a high uncompensated magnetic field Shorting links in core steel laminations.

Following DGA Interpretation Table applies directly to all transformer sub-types, except those equipped with a communicating OLTC.

DGA Interpretation Table

Case	Characteristic Fault	$\frac{C_2H_2}{C_2H_4}$	$\frac{CH_4}{H_2}$	$\frac{C_2H_4}{C_2H_6}$
		PD	Partial discharges	NS ^a
D1	Discharges of low energy	>1	0.1 – 0.5	>1
D2	Discharges of high energy	0.6 – 2.5	0.1 -1	>2
T1	Thermal fault T < 300°C	NS ^a	>1 but NS ^a	<1
T2	Thermal fault 300°C < T < 700°C	<0.1	>1	1-4
T3	Thermal fault > 700°C	<0.2 ^b	>1	>4

NOTE 1 – In some countries, the ratio C_2H_2/C_2H_6 is used, rather than the ratio CH_4/H_2 . Also in some countries, slightly different ratio limits are used.

NOTE 2 – The above ratios are significant and should be calculated only if at least one of the gases is at a concentration and a rate of gas increase above typical values.

NOTE 3 – $CH_4/H_2 < 0.2$ for partial discharges in instrument transformers.

$CH_4/H_2 < 0.007$ for partial discharges in bushings.

NOTE 4 – Gas decomposition patterns similar to partial discharges have been reported as a result of stray gassing of oil.

a. NS = Non- significant whatever the value
b. An increasing value of the amount of C_2H_2 may indicate that the hot spot temperature is higher than 1000°C

IEEE C57.104 Method of Evaluation:**DGA status:**

The classification process and recommendations given below are based on gas levels and level variation norms obtained from a statistical analysis of a large population of DGA results (90th and 95th percentiles). This procedure is a guideline only.

DGA Status 1	Considered as probably normal	Normal transformer operation can be continued.
DGA Status 2	Considered as possibly suspicious	<p>Warrant additional investigation. If the fault diagnosis reveals an issue of Partial Discharges (PD), low temperature fault (T1), or stray gassing (S), this would be treated as a less urgent issue, but still may affect future life of the insulation system. Otherwise, increased sampling frequency should be maintained or started.</p> <p>Transformers having a DGA Status 2 due only to Gas levels exceeding the values in Table 1 (especially if the only high levels are for carbon oxides), could be reassigned to routine sampling if there is no sign of active gassing during a year or more of increased sampling frequency (all samples below Table 3 and Table 4).</p>
DGA Status 3	Considered as probably suspicious	<p>The transformer should be placed under increased surveillance and additional transformer testing is recommended. Consultation with the transformer manufacturer or a transformer expert is also recommended. If after complete review of the available information, the transformer condition is deemed acceptable for continuous operation, then it is suggested to simply maintain surveillance typical of a lower DGA status. An example of this would be a transformer having a DGA Status 3 due only to gas levels exceeding the values in Table 2 (especially if the only high levels are for carbon oxides) when several samples taken over a year or more indicate no sign of active gassing (all samples below Table 3 and Table 4).</p>
Extreme DGA	Active faults generate gases at such a high	Gas levels or changes that are much larger than those provided in Table 2 and Table 3 warrant immediate extra

results	rate that detection and assessment do not require finesse, or significant work.	investigation, which may include additional oil analysis and physical or electrical testing. Internal inspection might be considered
---------	---	--

The transformer with DGA Status 2 or Status 3 (i.e., being above statistical norms) is not necessarily faulty. It can only be concluded that its behavior is somewhat unusual and warrants additional investigation and/or precautions to be implemented, either simple or extensive, as evaluated by the DGA expert.

DGA Status Norms:

DGA status norms are shown in Table 1 through Table 4:

Table 1- 90th percentile gas concentrations as a function of O₂/N₂ ratio and age in μL/L (ppm)

		O ₂ /N ₂ Ratio < 0.2				O ₂ /N ₂ Ratio > 0.2			
		Transformer Age in Years				Transformer Age in Years			
		Unknown	1-9	10-30	>30	Unknown	1-9	10-30	>30
Gas	Hydrogen (H ₂)	80	75		100	40	40		
	Methane (CH ₄)	90	45	90	110	20	20		
	Ethane (C ₂ H ₆)	90	30	90	150	15	15		
	Ethylene (C ₂ H ₄)	50	20	50	90	50	25	60	
	Acetylene (C ₂ H ₂)	1	1			2	2		
	Carbon monoxide (CO)	900	900			500	500		
	Carbon dioxide (CO ₂)	9000	5000	10000		5000	3500	5500	

Note:- During the data analysis, it was determined that voltage class, MVA, and volume of mineral oil in the unit did not contribute in significant way to the determination of values provided in Table 1.

Table 2- 95th percentile gas concentrations as a function of O₂/N₂ ratio and age in $\mu\text{L/L}$ (ppm)

		O ₂ /N ₂ Ratio < 0.2				O ₂ /N ₂ Ratio > 0.2			
		Transformer Age in Years				Transformer Age in Years			
		Unknown	1-9	10-30	>30	Unknown	1-9	10-30	>30
Gas	Hydrogen (H ₂)	200	200			90	90		
	Methane (CH ₄)	150	100	150	200	50	60	30	
	Ethane (C ₂ H ₆)	175	70	175	250	40	30	40	
	Ethylene (C ₂ H ₄)	100	40	95	175	100	80	125	
	Acetylene (C ₂ H ₂)	2	2	4	7	7	7		
	Carbon monoxide (CO)	1100	1100			600	600		
	Carbon dioxide (CO ₂)	125000	7000	14000	7000	5000	8000		

Note:- During the data analysis, it was determined that voltage class, MVA, and volume of mineral oil in the unit did not contribute in significant way to the determination of values provided in Table 2

Table 3- 95th percentile values for absolute level change between successive laboratory DGA samples in $\mu\text{L/L}$ (ppm)

		Maximum $\mu\text{L/L}$ (ppm) variation between consecutive laboratory DGA samples	
		O ₂ /N ₂ Ratio < 0.2	O ₂ /N ₂ Ratio > 0.2
		Gas	Hydrogen (H ₂)
Methane (CH ₄)	30		10
Ethane (C ₂ H ₆)	25		7
Ethylene (C ₂ H ₄)	20		
Acetylene (C ₂ H ₂)	Any Increase		
Carbon monoxide (CO)	250		175
Carbon dioxide (CO ₂)	2500		1750

Note:- Contribution of voltage class, MVA, and volume of mineral oil in the unit was not studied for Table 3 as they have not been retained for Table 1 and Table 2. Data was insufficient to study age influence.

Table 4- 95th percentile values from multi-points (3-6 points) rate analysis of laboratory DGA samples with all gas levels below Table 1 values, in $\mu\text{L}/\text{L}/\text{year}$ (ppm/year)

		Maximum $\mu\text{L}/\text{L}/\text{year}$ (ppm/year) rate in function of the period between first and last point of the laboratory DGA series (3 to 6 samples)			
		O_2/N_2 Ratio ≤ 0.2		O_2/N_2 Ratio > 0.2	
		Period between first and last point of the series			
		4-9 Months	10-24 Months	4-9 Months	10-24 Months
Gas	Hydrogen (H_2)	50	20	25	10
	Methane (CH_4)	15	10	4	3
	Ethane (C_2H_6)	15	9	3	2
	Ethylene (C_2H_4)	10	7	7	5
	Acetylene (C_2H_2)	Any increasing rate		Any increasing rate	
	Carbon monoxide (CO)	200	100	100	80
	Carbon dioxide (CO_2)	1750	1000	1000	800

Note:- Contribution of voltage class, MVA, and volume of mineral oil in the unit was not studied for Table 4 as they have not been retained for Table 1 and Table 2. Data was insufficient to study age influence.

Methods using Ratio of the Gases

The associated faults for the different evolved gases can be correlated as follows:

- Hydrogen (H_2) is created primarily from corona partial discharge and stray gassing of oil, also from sparking discharges and arcs.
- Methane (CH_4), Ethane (C_2H_6), and Ethylene (C_2H_4) are created from heating of oil or paper.
- Acetylene (C_2H_2) is created from arcing in oil or paper at very high temperatures above 1000°C .
- Carbon Monoxide (CO) and Carbon Dioxide (CO_2) are created from heating of cellulose or insulating liquid.

(a) Duval Triangle 1 method uses three gases corresponding to the increasing energy content or temperature of faults: methane (CH_4) for low energy/ temperature faults, ethylene (C_2H_4) for high temperature faults, and acetylene (C_2H_2) for very high temperature/energy/arcing

faults. On each side of the triangle are plotted the relative percentages of these three gases.

The percentage of each individual gas is calculated from the accumulated total of these three fault gases. The same is then traced on the Duval triangle and the intersection indicates possible problems within the transformer/reactor.

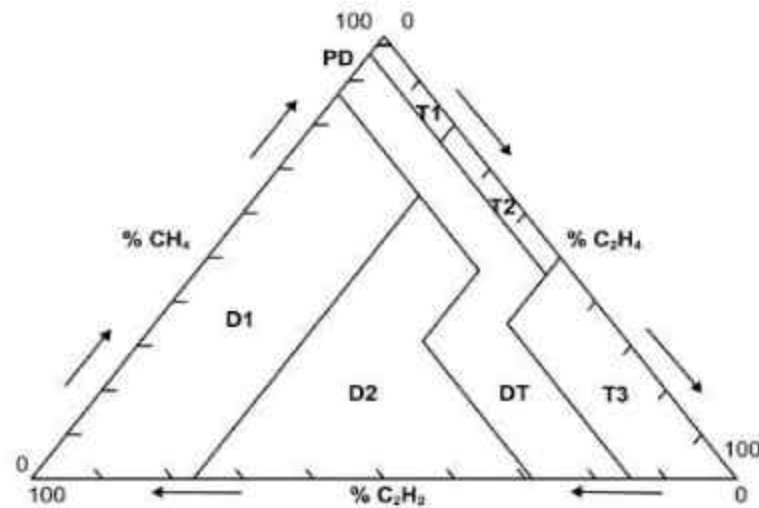


Fig.: Duval Triangle 1 Method

The Table below gives the numerical values for fault zone boundaries of Duval Triangle 1 Method expressed in (%CH₄), (%C₂H₄), and (%C₂H₂).

Gas% / Fault	% CH ₄	% C ₂ H ₄	% C ₂ H ₂
PD	≥ 98	-	-
T1	< 98	< 20	< 4
T2	-	≥ 20 and <50	< 4
T3	-	≥ 50	< 15
DT	-	< 50	≥ 4 and <13
	-	≥ 40 and <50	≥ 13 and <29
	-	≥ 50	≥ 15 and <29
D1	-	< 23	≥ 13
D2	-	≥ 23	≥ 29
	-	≥ 23 and <40	≥ 13 and <29

(b) The Rogers Ratio method is a more comprehensive scheme using only three ratios viz. CH₄/H₂, C₂H₂/C₂H₄ & C₂H₄/C₂H₆, which details temperature ranges for overheating conditions based on Halstead's

research and some distinction of the severity of incipient electrical fault conditions.

Case	R2 (C₂H₂/C₂H₄)	R1 (CH₄/H₂)	R5 (C₂H₄/C₂H₆)	Suggested Fault Diagnosis
0	<0.1	0.1 – 1.0	<0.1	Unit normal
1	<0.1	<0.1	<0.1	Low-energy density arcing –PD (See Note)
2	0.1- 3.0	0.1 to 1.0	>3.0	Arcing – High energy discharge
3	<0.1	0.1 to 1.0<1.0	1.0 to 3.0	Low temperature thermal
4	<0.1	>1.0	1.0 to 3.0	Thermal <700°C
5	<0.1	>1.0	>3.0	Thermal >700°C

Note: There is tendency for the ratio C₂H₂/C₂H₄ and C₂H₄/C₂H₆ to increase to a ratio above 3 as the discharge develops in intensity.

The limitation of the Rogers Ratios Method is that it cannot identify faults in a relatively large number of DGA results (typically 35%), because they do not correspond to any of the cases in column 1 of Table above even when µL/L (ppm) values are high and there is obviously a fault.

The Rogers Ratio Method and Duval Triangle 1 Method should not be used on samples with very low gas levels, which can be unreliable and inaccurate.

The DGA interpretation is still more of an art than a science. It is generally recognized by experts that increasing gas levels (i.e. gas generation rate) are more of concern than the levels themselves.

It is emphasized that DGA shall give misleading results unless certain precautions are taken. These are proper sampling procedure, Type of sampling bottle, cleanliness of bottle, duration of storage, method of gas extraction, good testing equipment and skilled manpower. Sampling of transformer insulating liquid for DGA by trained & experiences person and the consultation of a transformer expert with DGA interpretation experience is strongly recommended.

Specific information to be added to the DGA reports

Specific information to be added to the DGA reports is as follows:

- Date of commissioning
- Voltage class/ Voltage ratio, Power rating
- Oil Volume
- Oil Temperature
- Type of cooling system: ONAN, OFAF etc.
- Oil & gas sampling date
- Oil & gas sampling location
- Type of OLTC and whether it is communicating with main tank or not
- No. of OLTC operation,
- Load since last DGA
- Previous DGA done
- Special operation or incidences just before the oil or gas sampling such as tripping, gas alarm, degassing, repair, outage etc.

2.12 Frequency Response Analysis (FRA)

The frequency response analysis (FRA) is a technique that is used to diagnose the condition, or more importantly the change of mechanical condition, of a transformer by analyzing the transformer winding's frequency characteristics. FRA provides internal diagnostic information using nonintrusive procedures. The primary objective of FRA is to determine how the impedance of a test specimen behaves over a specified range of frequencies. The Short circuit forces can cause winding movement and changes in winding inductance or capacitance in Power Transformers. Recording the frequency response with these changes gives information regarding the internal condition of the equipment. Frequency Response Analysis (FRA) has proved to be an effective tool to detect such changes.

The measured response is usually shown graphically by plotting the logarithmic amplitude ratio of the output voltage to input voltage in dB (y-axis) against the frequency (x-axis). (The logarithmic often shows the complete frequency range more clearly. The linear scale is useful for looking at discrete frequency bands and to compare small differences at particular frequencies). The Frequency Response of a transformer winding (often called the FRA response curve) is quite complex and consists of decreasing and increasing magnitude (in dB) with respect to frequency. The various resonances (maxima) and anti-



**Government of India
Ministry of Railways
(Railway Board)**



RBA.No 92 /2022

No. 2022/ACII/2/1

New Delhi, Dated

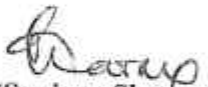
6. 6.2022.

1. General Managers/ PFA etc (As per Standard list I).
2. All Attached Offices/ Subordinate Offices (As per standard list II)

Sub: Revised Codal life of Assets.

Kindly refer to para 219 of Indian Railway Finance Code, Vol-1, detailing the normal life of various assets. In this regard Electrical, Mechanical and Signalling Directorates have proposed revision of codal life of certain assets. The same have been examined by the multidisciplinary Executive Directors' Committee set up in Railway Board. Their recommendations have been accepted by Board. Accordingly, Advance Correction Slip No. 92 amending Para 219, Indian Railway Finance Code Vol-I is enclosed for information and necessary action.

Encl: As above.


(Sanjeev Sharma)
OSD/Accounts
Railway Board

Copy to :

1. DyC&AG of India (Railways), Room No. 224, Rail Bhawan, New Delhi (with 45 spare copies).
2. GM/ Const/NFR, CAO/CE (Const)/All Indian Railways.
3. PED/A, PED/CE/Planning, PED/EE (Development), EDME/Freight and ED/Signal
4. ACI(Comp), ACIII (6 copies), ACI V, Code revision, Accounts Inspection, Accounts Appropriation, Finance (Budget).
- 5 Advisor/MR, OSD/MR, OSD/Co-ord/MR, Additional PS/MR

Room No. 419 A, Rail Bhawan, Raisina Road, New Delhi- 110001

Advance Correction slip No.92
Indian Railway Finance Code —Volume -I (1998) Para 219:

1. Replace the existing class of assets and their average life in the table given under Para 219 Indian Railway Finance Code —Volume -I (1998) as under.
2. Codal life of other items not covered in the ACS will remain as per extant instructions for those items

(iii) ELECTRICAL ASSETS

S.No	Class of Assets	Average life	Remarks
14	Water Cooler, Refrigeration, Air Conditioner, hospital and domestic appliance	10	Actual replacement shall be based on condition of the asset
15	Internal wiring of building	a) Coastal area	Actual replacement shall be based on condition of the asset
		b) Non-coastal area	Actual replacement shall be based on condition of the asset
18	Electric Pumps	20	Actual replacement shall be based on condition of the asset

B) Equipments required for replacement through DRF/ Sinking Fund.

11) TRD Equipments					
iii)	Lightning Arrestor (Gapless Type)				
	(a) (42kV)	15	Actual replacement shall be based on condition of the asset		
	(b) (96kV/120kV/ 198kV)	20	Actual replacement shall be based on condition of the asset		
vi)	Battery Charger	20	Actual replacement shall be based on condition of the asset		
xii)	OHE conductors & components – For Normal Zone				
	b) Other than fixed structures				
	i)	a) Cantilevers assembly	45	Actual replacement shall be based on condition of the asset	
	i)	b) All type of insulators	(a) Porcelain	40	Actual replacement shall be based on condition of the asset
			(b) Composite	25	Actual replacement shall be based on condition of the asset

Harap 2

ii)	Isolators/ATD	(a) Isolators	30	Actual replacement shall be based on condition of the asset
		(b) ATD	32	Actual replacement shall be based on condition of the asset
c)	Wires			
ii)	Contact Wire		45	Actual replacement shall be based on condition of the asset
xiii)	OHE conductors & components – For Polluted Zone** <i>** Definition of Polluted Zone for item xiii under OHE Conductors & components (for polluted zone)- Zones having ESDD (Equivalent Salt Deposit Density) >0.3 should be considered as polluted zone.</i>			
i	Cantilever assembly and All type of insulators	Cantilever assembly	45	Actual replacement shall be based on condition of the asset
		Insulators:		
		Composite	25	Actual replacement shall be based on condition of the asset
ii	ATD		24	Actual replacement shall be based on condition of the asset
iii	Contact Wire	(a) Silver brazed / ERBW	40 years / on the basis of condemning dia. whichever is earlier	Actual replacement shall be based on condition of the asset
		(b) Continuous Cast (CC) type	45years/on the basis of condemning dia. whichever is earlier	
xiv)	PSI Equipments			
(a)	Substation's Equipments			
iii)	Fixed capacitor bank		20	Actual replacement shall be based on condition of the asset

framp

(IV) MECHANICAL ASSET

S.No.	Class of Assets	Average life in years	Remarks
1	Machine tools like lathes, Planners, Drilling, Boring and Milling machines etc.	20	Actual replacement shall be based on condition of the asset
2	High Precision and special purpose machines like Wheels lathes	20	Actual replacement shall be based on condition of the asset
3	Tool room and testing Laboratory equipment	15	Actual replacement shall be based on condition of the asset
4	Foundry and Forge Equipment	20	Actual replacement shall be based on condition of the asset
5	Heat Treatment equipment	20	Actual replacement shall be based on condition of the asset
6	EOT Cranes	36	Actual replacement shall be based on condition of the asset
7	Power Generation Machinery & Switches	Deleted	
8	General purpose light machinery e.g. band saw, floor grinder etc.	15	Actual replacement shall be based on condition of the asset
9	Air compressors	20	Actual replacement shall be based on condition of the asset
10	Other miscellaneous machines e.g. light cleaning machines, test equipment in loco sheds, workshops, depot & sick lines	Deleted	
11.	(i) Construction Machinery equipment	Deleted	
	(ii) Track maintenance Equipment		
	(a) Tamping, Ballast cleaning & handling, DTS and relaying machines	20	Actual replacement shall be based on condition of the asset
	(b) Material handling machines	25	Actual replacement shall be based on condition of the asset
	(c) Rail Grinding Machines	15	Actual replacement shall be based on condition of the asset

[Handwritten signature]

S.No.	Class of Assets	Average life in years	Remarks
13	Miscellaneous machinery and equipment for hospital, offices etc.	10	Actual replacement shall be based on condition of the asset
14	Mechanical Weigh Bridges	Deleted	
15	Electronic in motion weigh Bridges	12	Actual replacement shall be based on condition of the asset
16	Wheel impact Load detector(WILD)	12	Actual replacement shall be based on condition of the asset
17	Diesel pumps	15	Actual replacement shall be based on condition of the asset
18	Welding equipments	10	Actual replacement shall be based on condition of the asset
19	Diesel Refrigeration equipment	Deleted	
20	Material Handling equipment like FLT, Lister trucks etc.	10	Actual replacement shall be based on condition of the asset
21	Traversers	25	Actual replacement shall be based on condition of the asset
22	Fuel Station Dispensation Equipment	10	Actual replacement shall be based on condition of the asset
23	(i) Bulldozers and	20	Actual replacement shall be based on condition of the asset
	(ii) other earth moving equipment	Deleted.	
24	Motor Boats	15	Actual replacement shall be based on condition of the asset
25	Hydraulic Re-railing Equipment	16	Actual replacement shall be based on condition of the asset
ROAD VEHICLES			
26	Staff cars including Jeeps	7	Actual replacement shall be based on condition of the asset

Signature

S.No.	Class of Assets	Average life in years	Remarks
27	Light motor vehicles	10 years for Diesel	Actual replacement shall be based on condition of the asset
28	Heavy Motor vehicles	and 15 years for Petrol as per norms.	Actual replacement shall be based on condition of the asset
29	Tractors		Actual replacement shall be based on condition of the asset

Aravind

(IV) MECHANICAL ASSET**ROLLING STOCK**

S.No	Class of Assets	Average life in years	Remarks
40	Open Bogie wagons with air brakes and casnub bogies		
a)	BOXN, BOY, BOBRN, BOBSN	35 years (subject to outcome of structural and financial justification to be conducted for extension beyond 30 years).	Actual replacement shall be based on condition of the asset
b)	BOBYN	38.	Actual replacement shall be based on condition of the asset
c)	Other open wagons	30	Actual replacement shall be based on condition of the asset
41	Bogie tank wagons with air brakes and Casnub bogies		
a)	BTPN	45 years (subject to outcome of structural audit to be conducted for extension beyond 40 years).	Actual replacement shall be based on condition of the asset
b)	Other tank wagons	40	Actual replacement shall be based on condition of the asset
42	All other types of Bogie wagons with air brakes and Casnub bogies		
a)	BCN	40 years (subject to outcome of structural audit and financial justification to be conducted for extension beyond 35 years).	Actual replacement shall be based on condition of the asset
b)	All other wagons	35	Actual replacement shall be based on condition of the asset
43	Open Wagons with vacuum brakes and UIC bogies	Deleted	
44	Other Wagons with vacuum brakes and UIC bogies	Deleted	
45	4-wheeler wagons (open and covered)	Deleted	
46	4-wheeler tank Wagons (with plain bearings)	Deleted	
47	4-wheeler tank wagons (with roller bearings)	Deleted	



(V) SIGNAL & TELECOMMUNICATION ASSETS

(A) SIGNALLING SYSTEM

S.No.	Class of Assets	Average life in years	Remarks
3	(i) Electronic Signalling system like Axle Counter, AFTC, IPS etc	20 years/based on obsolescence	Actual replacement shall be based on condition of the asset
	(ii) Kavach (Automatic Train Protection-ATP)	15	Actual replacement shall be based on condition of the asset

(Authority Board's letter no. 2022/AC II/2/1 dated 6..6.2022)



RE: Foxboro Evo - I/A Series Customer Notification 2017011abi (NOT359): Field Control Processor 270 (FCP270) Product Withdrawal from Sales

Kuldip Pahuja <Kuldip.Pahuja@se.com>

Wed 1/10/2024 1:47 PM

To: rahul bavaskar <RAHULBAVASKAR@NTPC.CO.IN>

Cc: Seema Deo <SEEMADEO@NTPC.CO.IN>; Ajay Karanwal <ajay.karanwal@se.com>

You don't often get email from kuldip.pahuja@se.com. [Learn why this is important](#)

CAUTION: This Email has been sent from outside the Organization. Unless you trust the sender, Don't click links or open attachments as it may be a Phishing email, which can steal your Information and compromise your Computer.

Dear Sir

AS mentioned in below notification FCP 270 was under stop sale from 1st OCT 2017. As company policy we have to support this product for next five years from date of obsolescence which we had already taken care. Presently FCP 270 is obsolete and not available for sale. Technical Equivalent model available is FCP 280.

Regards

Kuldip Pahuja

Industry Business
Schneider Electric

M +919810661828
E kuldip.pahuja@se.com

From: rahul bavaskar <RAHULBAVASKAR@NTPC.CO.IN>

Sent: 10 January 2024 13:15

To: Kuldip Pahuja <Kuldip.Pahuja@se.com>

Cc: Seema Deo <SEEMADEO@NTPC.CO.IN>

Subject: Re: Foxboro Evo - I/A Series Customer Notification 2017011abi (NOT359): Field Control Processor 270 (FCP270) Product Withdrawal from Sales

[External email: Use caution with links and attachments]

Sir,

Kindly give the date of obsolescence for FCP-270 controller.

Get [Outlook for Android](#)

From: Kuldip Pahuja <Kuldip.Pahuja@se.com>

Sent: Wednesday, January 10, 2024 12:31:24 PM

To: rahul bavaskar <RAHULBAVASKAR@NTPC.CO.IN>

Subject: FW: Foxboro Evo - I/A Series Customer Notification 2017011abi (NOT359): Field Control Processor 270 (FCP270) Product Withdrawal from Sales

You don't often get email from kuldip.pahuja@se.com. [Learn why this is important](#)

CAUTION: This Email has been sent from outside the Organization. Unless you trust the sender, Don't click links or open attachments as it may be a Phishing email, which can steal your Information and compromise your Computer.

From: Kuldip Pahuja
Sent: 25 January 2023 16:48
To: rahul bavaskar <RAHULBAVASKAR@NTPC.CO.IN>
Subject: FW: Foxboro Evo - I/A Series Customer Notification 2017011abi (NOT359): Field Control Processor 270 (FCP270) Product Withdrawal from Sales

Dear Sir

Please find notification.

Regards

Kuldip Pahuja

Industry Business
Schneider Electric

M +919810661828
E kuldip.pahuja@se.com

Internal

From: Systems GCS Webmaster <GCSmaster@schneider-electric.com>
Sent: 23 June 2017 00:41
To: Systems GCS Webmaster <GCSmaster@schneider-electric.com>
Cc: Systems GCS Webmaster <GCSmaster@schneider-electric.com>
Subject: Foxboro Evo - I/A Series Customer Notification 2017011abi (NOT359): Field Control Processor 270 (FCP270) Product Withdrawal from Sales

The following customer notification will be sent to all registered users on the GCS website, that have selected Foxboro Evo and/or I/A series as Interested product families on Monday June 26, 2017.

=====

Customer Notification

Field Control Processor 270 (FCP270) Product Withdrawal from Sales

June 26, 2017

Schneider Electric is committed to ensuring that our customers and employees are kept current on issues that might affect or improve product, system or process operation. We are dedicated to providing product and application reliability, and exceptional client service.

Customer Notifications are intended to inform you of the availability of new hardware, software, and special programs, product release information, training opportunities, and service-related information of a non-technical nature.

The purpose of this notification is to inform you that the Schneider Electric Foxboro Model P0917YZ , FCP270 Control Processor is approaching the end of its availability for sales.

The FCP270 was released for sale in February 2005, then moved to the Available phase of its product lifecycle in June 2014, when its replacement, FCP280, became the Preferred product. After more than 12 years of commercialization, the FCP270 will enter the Mature phase and will no longer be available in Buyautomation.com effective on October 1st , 2017.

The Mature Phase begins when the product is withdrawn from sale and no more enhancements are provided. Before the product is withdrawn, we are committed to ensure that a comprehensive, clearly defined support program is firmly in place. The length of time that a Standard Product remains in this phase varies, based on product type, and is directly related to the degree of disruption to our Customers' processes – the more difficult it is to remove, the longer the duration. According to our product lifecycle policy, Controllers are supported in the Mature Phase for **five years**.

FOR INFORMATION

If you have any questions regarding this article, please contact your local Service Representative or a Schneider Electric Support Center at:

GCS Center	America's GCS	Asia Pacific GCS	EMEA GCS
Location	Foxboro MA USA	Shanghai	Baarn NL
Phone	+1-866-746-6477	+86 21 37180086	+31-3554-84125
Internationally	+1-508-549-2424		
Fax	+1-508-549-4999	+86 21 37180196	+31-3554-84230
Email	America's GCS	Asia Pacific GCS	EMEA GCS

Regards,

John Petty
Director,
Global Customer Support

Distribution to Schneider Electric Customers and Internal Personnel Only
DO NOT REPRODUCE.

All trademarks are registered to their respective owners.
All brand names are property of their respective owners.

Notification# 2017011abi

© Schneider Electric. All rights reserved



No. 20(3)/2022-CERT-In
Government of India
Ministry of Electronics and Information Technology (MeitY)
Indian Computer Emergency Response Team (CERT-In)

Electronics Niketan,
6 CGO Complex,
New Delhi-110003

Dated: 28 April, 2022

Subject: Directions under sub-section (6) of section 70B of the Information Technology Act, 2000 relating to information security practices, procedure, prevention, response and reporting of cyber incidents for Safe & Trusted Internet.

Whereas, the Central Government in terms of the provisions of sub-section (1) of section 70B of Information Technology (IT) Act, 2000 (IT Act, 2000) has appointed "Indian Computer Emergency Response Team (CERT-In)" vide notification dated 27th October 2009 published in the official Gazette and as per provisions of sub-section (4) of section 70B of IT Act, 2000 The Indian Computer Emergency Response Team shall serve as the national agency for performing the following functions in the area of cyber security:-

- a) collection, analysis and dissemination of information on cyber incidents;
- b) forecast and alerts of cyber security incidents;
- c) emergency measures for handling cyber security incidents;
- d) coordination of cyber incidents response activities;
- e) issue guidelines, advisories, vulnerability notes and whitepapers relating to information security practices, procedures, prevention, response and reporting of cyber incidents;
- f) such other functions relating to cyber security as may be prescribed.

And whereas, "The Information Technology (The Indian Computer Emergency Response Team and Manner of performing functions and duties) Rules, 2013" were notified and published vide notification dated 16.01.2014 by the Central Government in exercise of the powers conferred by clause (zf) of sub-section (2) of section 87 read with sub-section (5) of section 70B of the IT Act, 2000.

And whereas, as per provisions of sub-section (6) of section 70B of the IT Act, 2000, CERT-In is empowered and competent to call for information and give directions to the service providers, intermediaries, data centres, body corporate and any other person for carrying out the activities enshrined in sub-section (4) of section 70B of the IT Act, 2000.

And whereas, various instances of cyber incidents and cyber security incidents have been and continue to be reported from time to time and in order to coordinate response activities as well as emergency measures with respect to cyber security incidents, the requisite information is either sometime not found available or readily not available with service providers/data centres/body corporate and the said primary information is essential to carry out the analysis, investigation and coordination as per the process of law.

And whereas, it is considered expedient in the interest of the sovereignty or integrity of India, defence of India, security of the state, friendly relations with foreign states or public order or for preventing incitement to the commission of any cognizable offence using computer resource or for handling of any cyber incident, that following directions are issued to augment and strengthen the cyber security in the country:

- (i) All service providers, intermediaries, data centres, body corporate and Government organisations shall connect to the Network Time Protocol (NTP) Server of National Informatics Centre (NIC) or National Physical Laboratory (NPL) or with NTP servers traceable to these NTP servers, for synchronisation of all their ICT systems clocks. Entities having ICT infrastructure spanning multiple geographies may also use accurate and standard time source other than NPL and NIC, however it is to be ensured that their time source shall not deviate from NPL and NIC.
- (ii) Any service provider, intermediary, data centre, body corporate and Government organisation shall mandatorily report cyber incidents as mentioned in Annexure I to CERT-In within 6 hours of noticing such incidents or being brought to notice about such incidents. The incidents can be reported to CERT-In via email (incident@cert-in.org.in), Phone (1800-11-4949) and Fax (1800-11-6969). The details regarding methods and formats of reporting cyber security incidents is also published on the website of CERT-In www.cert-in.org.in and will be updated from time to time.

- (iii) When required by order/direction of CERT-In, for the purposes of cyber incident response, protective and preventive actions related to cyber incidents, the service provider/intermediary/data centre/body corporate is mandated to take action or provide information or any such assistance to CERT-In, which may contribute towards cyber security mitigation actions and enhanced cyber security situational awareness. The order / direction may include the format of the information that is required (up to and including near real-time), and a specified timeframe in which it is required, which should be adhered to and compliance provided to CERT-In, else it would be treated as non-compliance of this direction. The service providers, intermediaries, data centres, body corporate and Government organisations shall designate a Point of Contact to interface with CERT-In. The Information relating to a Point of Contact shall be sent to CERT-In in the format specified at Annexure II and shall be updated from time to time. All communications from CERT-In seeking information and providing directions for compliance shall be sent to the said Point of Contact.
- (iv) All service providers, intermediaries, data centres, body corporate and Government organisations shall mandatorily enable logs of all their ICT systems and maintain them securely for a rolling period of 180 days and the same shall be maintained within the Indian jurisdiction. These should be provided to CERT-In along with reporting of any incident or when ordered / directed by CERT-In.
- (v) Data Centres, Virtual Private Server (VPS) providers, Cloud Service providers and Virtual Private Network Service (VPN Service) providers, shall be required to register the following accurate information which must be maintained by them for a period of 5 years or longer duration as mandated by the law after any cancellation or withdrawal of the registration as the case may be:
- a. Validated names of subscribers/customers hiring the services
 - b. Period of hire including dates
 - c. IPs allotted to / being used by the members
 - d. Email address and IP address and time stamp used at the time of registration / on-boarding
 - e. Purpose for hiring services
 - f. Validated address and contact numbers
 - g. Ownership pattern of the subscribers / customers hiring services

- (vi) The virtual asset service providers, virtual asset exchange providers and custodian wallet providers (as defined by Ministry of Finance from time to time) shall mandatorily maintain all information obtained as part of Know Your Customer (KYC) and records of financial transactions for a period of five years so as to ensure cyber security in the area of payments and financial markets for citizens while protecting their data, fundamental rights and economic freedom in view of the growth of virtual assets.

For the purpose of KYC, the Reserve Bank of India (RBI) Directions 2016 / Securities and Exchange Board of India (SEBI) circular dated April 24, 2020 / Department of Telecom (DoT) notice September 21, 2021 mandated procedures as amended from time to time may be referred to as per Annexure III.

With respect to transaction records, accurate information shall be maintained in such a way that individual transaction can be reconstructed along with the relevant elements comprising of, but not limited to, information relating to the identification of the relevant parties including IP addresses along with timestamps and time zones, transaction ID, the public keys (or equivalent identifiers), addresses or accounts involved (or equivalent identifiers), the nature and date of the transaction, and the amount transferred.

And whereas, the meaning to the terms ‘cyber incident’ or ‘cyber security incident’ or ‘computer resource’ or other terms may be ascribed as defined in the IT Act, 2000 or “The Information Technology (The Indian Computer Emergency Response Team and Manner of performing functions and duties) Rules, 2013” as the case may be.

And whereas, in case of any incident, the above-referred entities must furnish the details as called for by CERT-In. The failure to furnish the information or non-compliance with the *ibid.* directions, may invite punitive action under sub-section (7) of the section 70B of the IT Act, 2000 and other laws as applicable.

This direction will become effective after 60 days from the date on which it is issued.

Types of cyber security incidents mandatorily to be reported by service providers, intermediaries, data centres, body corporate and Government organisations to CERT-In:

[Refer Rule 12(1)(a) of The Information Technology (The Indian Computer Emergency Response Team and Manner of Performing Functions and Duties) Rules, 2013]

- i. Targeted scanning/probing of critical networks/systems
- ii. Compromise of critical systems/information
- iii. Unauthorised access of IT systems/data
- iv. Defacement of website or intrusion into a website and unauthorised changes such as inserting malicious code, links to external websites etc.
- v. Malicious code attacks such as spreading of virus/worm/Trojan/Bots/Spyware/Ransomware/Cryptominers
- vi. Attack on servers such as Database, Mail and DNS and network devices such as Routers
- vii. Identity Theft, spoofing and phishing attacks
- viii. Denial of Service (DoS) and Distributed Denial of Service (DDoS) attacks
- ix. Attacks on Critical infrastructure, SCADA and operational technology systems and Wireless networks
- x. Attacks on Application such as E-Governance, E-Commerce etc.
- xi. Data Breach
- xii. Data Leak
- xiii. Attacks on Internet of Things (IoT) devices and associated systems, networks, software, servers
- xiv. Attacks or incident affecting Digital Payment systems
- xv. Attacks through Malicious mobile Apps
- xvi. Fake mobile Apps
- xvii. Unauthorised access to social media accounts
- xviii. Attacks or malicious/ suspicious activities affecting Cloud computing systems/servers/software/applications
- xix. Attacks or malicious/suspicious activities affecting systems/ servers/ networks/ software/ applications related to Big Data, Block chain, virtual assets, virtual asset exchanges, custodian wallets, Robotics, 3D and 4D Printing, additive manufacturing, Drones

xx. Attacks or malicious/ suspicious activities affecting systems/
servers/software/ applications related to Artificial Intelligence and Machine
Learning

The incidents can be reported to CERT-In via email (incident@cert-in.org.in),
Phone (1800-11-4949) and Fax (1800-11-6969). The details regarding methods and
formats of reporting cyber security incidents is also published on the website of
CERT-In www.cert-in.org.in and will be updated from time to time.

Annexure II

Format for providing Point of Contact (PoC) information by Service providers, intermediaries, data centres, body corporate and Government organisations to CERT-In

The Information relating to the Point of Contact shall be sent to CERT-In via email (info@cert-in.org.in) in the format specified below and shall be updated from time to time:

Name	
Designation	
Organisation Name	
Office Address	
Email ID	
Mobile No.	
Office Phone	
Office Fax	

KYC Requirements

For the purpose of KYC, any of following Officially Valid Document (OVD) as a measure of identification procedure prescribed by the Reserve Bank of India (Know Your Customer (KYC)) Directions, 2016/ Securities and Exchange Board of India Clarification on Know Your Client (KYC) Process and Use of Technology for KYC vide Circular SEBI/HO/MIRSD/DOP/CIR/P/2020/73 dated April 24, 2020 / The Department of Telecom File No: 800-12/2021- AS.II dated September 21, 2021 on Self-KYC (S-KYC) as an alternate process for issuing of new mobile connections to Local and Outstation category customers, shall be used and maintained:

- a. The passport,
- b. The driving license,
- c. Proof of possession of Aadhaar number,
- d. The Voter's Identity Card issued by the Election Commission of India,
- e. Job card issued by NREGA duly signed by an officer of the State Government and
- f. Letter issued by the National Population Register containing details of name and address.
- g. Validated phone number
- h. Trading account number and details, Bank account number and bank details

For the purpose of KYC for business entities (B2B), documents mentioned in the Customer Due Diligence (CDD) process prescribed in Reserve Bank of India Master Direction - Know Your Customer (KYC) Direction, 2016 as updated from time to time shall be used and maintained.

**GOVERNMENT OF INDIA
CENTRAL ELECTRICITY AUTHORITY
(MINISTRY OF POWER)**

**Sewa Bhawan (North Wing), Room No. 622, 6th Floor,
R. K. Puram, New Delhi-110066
Tel. Fax -011-26103246, email: celegal-cea@gov.in
Website: www.cea.nic.in**

PUBLIC NOTICE

In accordance with the Section 177 of the Electricity Act, 2003, the Central Electricity Authority (CEA), proposes to notify the **draft Central Electricity Authority (Cyber Security in Power Sector) Regulations, 2024**. The proposed draft regulations are available on the CEA Website www.cea.nic.in for inviting public comments. The Regulations can also be inspected in the office of Chief Engineer (Legal), Sewa Bhawan (North Wing), Room No. 622, 6th Floor, R. K. Puram, New Delhi-110066 on any working day till **10th September, 2024** between 1100 hrs to 1600 hrs.

2. All the Stakeholders including the public are requested to send their comments on the draft regulations to Chief Engineer (Legal), Sewa Bhawan (North Wing), Room No. 622, 6th Floor, R. K. Puram, New Delhi-110066 by post or through e-mail (celegal-cea@gov.in) latest by **10th September, 2024**.

**(Rakesh Kumar)
Secretary, CEA**

NOTIFICATION

No. ----- In exercise of the powers conferred by sub-section (1) of 177 of the Electricity Act, 2003 (36 of 2003), the Central Electricity Authority hereby makes the following regulations for Measures relating to Cyber Security in Power Sector, namely: -

Chapter-I

1. **Short title and Commencement.** - (1) These regulations may be called the Central Electricity Authority (Cyber Security in Power Sector) Regulations, 2024.
 - (2) They shall come into force six calendar months, from the date of their publication in the Official Gazette, except for the Regulations 7(4), 8(2), 8(3), 7(11)(b), 8(5), 9 which may come in to force on such date as the Authority may notify. These regulations shall come into force on such date as the Authority may notify. Provided that different dates may be appointed for commencement of different regulations.
 - (3) **Scope and Extend of Applicability:** These regulations shall apply to all Responsible Entities, Regional Power Committees, Appropriate Commission, Appropriate Government and Associated Power Sector Government Organizations, Training Institutes recognized by the Authority, Authority and Vendors.
2. **Definitions.** - (a) In these regulations, unless the context otherwise requires, -
 - (1) Accreditation: shall mean the process of verifying that an organization is capable of conducting the tests and assessments against a product/process that are required to be certified.
 - (2) Accreditation Body: shall mean an organization that has been accredited to verify the credentials and capabilities of the organizations that wish to become a certification body.
 - (3) Asset: shall mean anything that has value to the organization.
 - (4) Attestation: issue of a statement, based on a decision, that fulfilment of specified requirements has been demonstrated
 - (5) Certification: third-party attestation related to an object of conformity assessment, with the exception of accreditation.
 - (6) Certification Body: shall mean an organization that has been accredited by an accreditation body to certify products/ process against a certification scheme.
 - (7) Certification Scheme: certification scheme is a conformity assessment scheme that includes selection, determination, review, decision and finally certification as the attestation activity.
 - (8) Chief Information Security Officer: means the designated employee of Senior management, directly reporting to Managing Director /Chief Executive Officer Secretary of the organization, having knowledge of information security and related issues, responsible for cyber security efforts and initiatives including planning, developing, maintaining, reviewing and implementation of Information Security Policies

- (9) Critical Assets: shall mean the facilities, systems and equipment which, if destroyed, degraded or otherwise declared unavailable, would affect the reliability or operability of the Power System.
- (10) Critical Cyber Assets: shall mean cyber assets essential to the reliable operation of critical asset.
- (11) Critical Systems: a group of critical Assets and/or Critical Cyber Assets or parts that work together.
- (12) Critical Information Infrastructure: shall mean Critical Information Infrastructure as defined in explanation of sub-section (1) of Section 70 of the Act.
- (13) Cyber Assets: shall mean the programmable electronic devices, including the hardware, software and data in those devices that are connected over a network, such as LAN, WAN and HAN.
- (14) Cyber Crisis Management Plan: shall mean a framework for dealing with cyber related incidents for a coordinated, multi-disciplinary and broad-based approach for rapid identification, information exchange, swift response and remedial actions to mitigate and recover from malicious cyber related incidents impacting critical processes.
- (15) Cyber Resilience: The ability to anticipate, withstand, recover from, and adapt to adverse conditions, stresses, attacks, or compromises on systems that use or are enabled by cyber resources. Cyber resiliency is intended to enable mission or business objectives that depend on cyber resources to be achieved in a contested cyber environment.
- (16) Cyber Security Breach: shall mean any cyber incident or cyber security violation that results in unauthorized or illegitimate accessor use by a person as well as an entity, of data, applications, services, networks and/or devices through bypass of the underlying cyber security protocols, policies and mechanisms resulting in the compromise of the confidentiality, integrity or availability of data/information maintained in a computer resource or cyber asset.
- (17) Cyber Security Incident: shall mean means any real or suspected adverse event in relation to cyber security that violates an explicitly or implicitly applicable security policy resulting in unauthorized access, denial of service or disruption, unauthorized use of a computer resource for processing or storage of information or changes to data, information without authorization.
- (18) Cyber Security Policy: shall mean documented set of business rules and processes for protecting information, computer resources, networks, devices, Industrial Control Systems and other OT resources.
- (19) Electronic Security Perimeter: shall mean the logical border surrounding a network to which the Cyber Systems of Power System are connected using a routable protocol.
- (20) Information Security Division: shall mean a division accountable for cyber security and protection of the Critical System of the Responsible Entity.
- (21) Internet: The single interconnected world-wide system of commercial, government, educational, and other computer networks that share the set of protocols specified by the Internet Architecture Board (IAB) and the name and address spaces managed by the Internet Corporation for Assigned Names and Numbers (ICANN).
- (22) IT System: a collection of computing and/or communications components and other resources that support one or more functional objectives of an organization. IT system resources include any IT component plus associated manual procedures and physical facilities that are used in the acquisition, storage,

manipulation, display, and/or movement of data or to direct or monitor operating procedures. An IT system may consist of one or more computers and their related resources of any size. The resources that comprise a system do not have to be physically connected.

(23) Operational Technology (OT): Programmable systems or devices that interact with the physical environment (or manage devices that interact with the physical environment). These systems/devices detect or cause a direct change through the monitoring and/or control of devices, processes, and events. Examples include industrial control systems, building management systems, fire control systems, and physical access control mechanisms.

(24) Protected System: shall mean any computer, computer system or computer network of any organization notified under section 70 of the Act, in the official gazette by appropriate Government.

(25) Responsible Entities: shall mean power sector entities deploying Operational Technologies with or without IT systems, including Generating companies including the captive plants, Renewable Energy Sources, Energy Storage System, Transmission Licensees including deemed transmission licensee, Distribution Licensees, National Load Dispatch Centre, Regional Load Dispatch Centers, State Load Dispatch Centers, Control Centers of distribution licensee, Central Transmission Utility, State Transmission Utilities, and Renewable Energy Management Centers, forecasting service provider, Traders, Power Exchanges, Qualified Coordinating Agencies.

(26) Software Bill of Materials: a formal record containing the details and supply chain relationships of various components used in building software. Software developers and vendors often create products by assembling existing open source and commercial software components. The SBOM enumerates these components in a product.

(27) Vulnerability: weakness of an asset or control that can be exploited by one or more threats.

(28) Vulnerability Assessment: shall mean a process of identifying and quantifying vulnerabilities.

(29) Vendors: Vendor includes Original Equipment Manufacturer, Original Equipment Suppliers, System Integrator, Associated Hardware/ Software Component Suppliers, and Service Providers.

2 (b) Words and expressions used and not defined in these regulations but defined in the Information Technology Act, 2000 and the Electricity Act, 2003 shall have their respective meanings assigned to them in the respective Acts.

Chapter-II

CSIRT-Power

3. Computer Security Incident Response Team (CSIRT)-Power as may be established under CEA, shall collect traffic data, generated, transmitted, or stored in computer resources of all Responsible Entities in power sector, to enhance cyber security and for identification, analysis and prevention of cyber intrusion or spread of computer contaminant or any other work, as directed by the Authority through a separate order.
4. CSIRT-Power shall have roles and responsibilities including the followings-(1)

- laying down the Cyber Security framework and protocol for the Power Sector.
- (2) serve as a Point of Contact and Responsible Agency of the Power Sector for responding to and prevention of cyber security incidents in the Power Sector.
 - (3) reviewing the Cyber Security arrangements in the different wings from time to time and strengthening such arrangements.
 - (4) Coordinate, share, collect, analyse cyber threats related to Power Sector.
 - (5) Create/develop Standard Operating Procedures (SOPs), security policies, best practices for incident Response activities in consultation with CERT-In and NCIIPC.
 - (6) Issue, Analysis, follow-up action on Alert and Advisories in coordination with NCIIPC, CERT-In and MHA.
 - (7) Implement Cyber Crisis Management Plan for the Power Sector in coordination with CERT-In
 - (8) Collaboration with CERT-In and NCIIPC to resolve the Cyber Security incidents.
 - (9) Proactive measures to increase the cyber security awareness and improving the cyber security posture of the Power Sector including audits, assessments and exercises.
 - (10) Work closely with CERT-In and active participation in all cyber security related activities & initiatives suitable to the Power Sector
 - (11) Facilitate and promote research & development in relevant subject domain pertaining to cyber security in collaboration with Research Institutes and Academia.
 - (12) Implementation of Scheme of Trusted Vendor System for Power Sector as and when notified.
 - (13) Security Control Selection & Tailoring Process for Power Sector
 - (14) Any other functions related to cyber security issues as directed by Ministry of Power, the Authority, CERT-In and NCIIPC.
5. The Authority may also designate sub sectoral CERTS in Power Sector for Generation, Transmission, Distribution, Grid Operation to assist CSIRT-Power in hierarchical structure and shall carry out functions, as directed by the Authority through a separate order.
 6. The directions of CSIRT-Power shall be complied with, and if asked for, documents related to Cyber Security shall be submitted.

Chapter-III

General Cyber Security Requirements

Applicable to all Entities listed under Regulation 1(3).

7. The Entity shall
 - (1) designate regular employees of the senior management level as CISO and alternate CISO who shall be Indian nationals (by birth) and define their roles and responsibilities, ensuring that the role of the CISO is ring fenced to tasks of Cyber Security. The designated CISO shall report to the CEO/Head of the Responsible Entity. In absence of CISO, the roles and responsibilities of CISO shall be executed by Alternate CISO.

Provided that both the posts of CISO and Alternate CISO do not remain vacant at

the same time.

(2) have a defined, documented and maintained Cyber Security Policy which is approved by the Board or Head of the entity as a case may be.

(3) Have a Cyber Crisis Management Plan (CCMP) which is approved by the Board or Head of the entity as a case may be.

(4) ensure deployment of all required security devices, such as appropriate firewalls, intrusion detection systems (IDS), intrusion prevention systems (IPS) capable of identifying behavioural anomaly, including deployment of Web Application Firewall for the protection of critical web-based applications.

(5) ensure that all websites, web portals, applications, and web services as well as any update undergo and successfully pass a cyber security audit before being hosted on the Internet.

(6) ensure that a comprehensive cyber risk assessment is conducted, and effective measures for identified cyber risks are implemented before grant of approval for remote access to cyber assets.

Provided that, such remote access shall be limited to the minimum necessary duration, with least privilege, ensuring multi-factor authentication to verify the identity of remote users.

(7) conduct periodically, Cyber Security awareness program and Cyber Security exercises including mock drills and Tabletop exercises.

(8) ensure that all engaged personnel sign an undertaking, including a non-disclosure agreement, to protect the confidentiality, integrity, and availability of sensitive information and implement an enquiry process to investigate an event of Cyber Security breach.

Provided that disciplinary process shall be implemented to act against personnel committing a Cyber Security breach.

(9) report Cyber Security incidents within prescribed time limits to CSIRT-Power along with CERT-In and NCIIPC.

(10) ensure online and offline backups of all critical and other required systems as stated in their Cyber Security policy, in separate and secure environments.

(11) facilitate a comprehensive Cyber Security audit

(A) for the IT system twice a year, the first audit period between April and September, and the second audit period between October and March with a gap of at least four months between these two audits.

(B) once a year for the OT system, as applicable.

Chapter-IV

Roles and Responsibilities of Responsible Entities

8. Responsible Entities shall (1) establish an Information Security Division (ISD) dedicated to ensuring Cyber Security, headed by the CISO and remain operational round the clock. Sufficient workforce and infrastructure support shall be ensured for ISD.

(2) acquire ISO/IEC 27001 certificate by certification bodies, preferably accredited by the Indian Accreditation Body or acquire Basic Technical Criteria certificate as and when issued by the Authority through a separate order.

(3) ensure that all personnel engaged in the operation and maintenance of IT & OT systems, including personnel from Contractors and Vendors, have mandatorily undergone designated Cyber Security courses from training

institutes as directed by the Authority through a separate order.

Provided that CISO and members of the ISD shall attend CyberSecurity training program for at least ten person-days per year or as may be directed by separate order by the authority to upgrade the necessary competencies.

(4) ensure the availability of essential communications with required internal & external stakeholders for management of crisis, natural disasters, or other emergencies.

(5) ensure deployment of all required security devices, such as appropriate firewalls, IDS, IPS capable of identifying behavioural anomaly in both IT and OT environment as applicable, including deployment of Web Application Firewall for the protection of critical web-based applications.

Provided that Responsible Entity shall ensure deployment of suitable perimeter Cyber Security devices such as appropriate Firewall with hardened configuration at their point of connection with power system.

(6) ensure that control and operation of power system elements are prohibited over Internet.

Provided that power system elements are controlled and managed from within national boundaries only, and real-time data of grid operations and status information is not transferred across the border.

(7) ensure that its Critical Information Infrastructure is not discoverable on public platforms unless permissible in Cyber Security policy case to case basis.

(8) ensure physical isolation of critical OT system from Internet.

(9) ensure physical separation between critical OT system and enterprise IT system. In case, physical separation is not possible, suitably hardened logical separation shall be ensured.

Provided that Enterprise IT networks having identified Critical Information Infrastructure shall be separated from other rest of IT networks.

(10) in case remote operation is required, ensure the implementation of a secure architecture that includes deployment of next-generation firewalls with hardened configurations, and having IDS/IPS, to protect against unauthorized operations. Provided that, these systems are connected with secure, encrypted, and dedicated communication channels isolated from internet traffic and shall be monitored continuously.

(11) ensure that no equipment, component, software or application is deployed in the production environment without successful testing and is verified before being used in the power system. Provided that the Responsible Entity shall ensure the testing of all equipment, components, and parts imported for use in the Power Supply System and Network for any kind of embedded malware, Trojan, or cyber threat and for adherence to Indian Standards in compliance with the orders issued by the Ministry of Power from time to time in this regard.

(12) ensure that as and when Ministry of Power, Government of India stipulates the Model Contractual Clauses on cyber security, the applicable clauses are included in their procurement bid invited for of all ICT based components/equipment/systems as well as services

(13) ensure that as and when Ministry of Power, Government of India stipulates the Scheme of Trusted Sources in power sector, all the designated ICT based Equipment and Services are sourced from listed Trusted Sources only.

Chapter –V

Functions and Responsibilities of Information Security Division (ISD)

9. ISD shall be manned by sufficient numbers of officers, having valid certificate of successful completion of domain specific Cyber Security courses.
The indicative minimum manpower of ISD is given in Part-I of the Schedule I.
10. ISD shall carry out the Functions of including the following
 - (1) to implement measures for Cyber Security of the Critical Information Infrastructures (CIIs) as identified by NCIIPC and the notified Protected Systems by appropriate Government as per IT Act, 2000.
 - (2) to review the Cyber Security Policy of the Responsible Entity annually and its compliance measures on a quarterly basis.
Provided that such a review shall include items as given in Part-II of Schedule I.
 - (3) to test randomly, the day-to-day operations of Critical System for being in conformance with Cyber Security Policy and advisories, guidelines and directive issued by NCIIPC, CERT-In, CSIRT-Power and take required actions.
 - (4) to act upon the directive, guidelines, and advisories issued by NCIIPC, CERT-In, CSIRT-Power and the Authority.
 - (5) to share the details of the detected cyber security incidents, Action Taken Reports, Root Cause Analysis and other incident related reports with CSIRT-Power along with CERT-In and NCIIPC.
 - (6) to gather cyber threat intelligence, identification of threat vectors and evaluation for Cyber Security risks including internal risks and external risks by analyzing Cyber Security logs, alerts and events.
 - (7) to maintain an updated inventory of all IT and OT assets, including hardware assets, software assets, and other associated assets, and a record of documented network architecture depicting data flows.
 - (8) to identify and select Cyber Security control measures that commensurate with the criticality of Cyber Security risks.
 - (9) to implement process to receive, analyze and respond to disclosed vulnerabilities from internal and external sources.
 - (10) to implement mechanism for timely identifying, assessing and managing Cyber Security threat and vulnerabilities.
 - (11) to retain Cyber Security documents like certificates of Cyber Security tests, FAT, SAT results, and Cyber Security Audit reports for the period as directed by the Authority through a separate order.
 - (12) to report cyber sabotage in the Critical System to CSIRT-Power within 24 hours of detection or within period as directed by the Authority through separate order.
11. ISD shall ensure the followings, across its Responsible Entity: -
 - (1) the updation of the firmware/software with the digitally signed OEM validated patches only.
 - (2) cyber security hardening of deployed security devices, network devices,

host devices etc.,

- (3) the enforcement of strict and approved protocol for grant of remote access as laid in their Cyber Security Policy.
- (4) the storage of logs of all of their ICT systems for a rolling period of 180 days or for a period as directed by the Authority through a separate order.
- (5) secured preservation of logs and forensic records pertaining to Cyber Security incidents for at least 180 days or for a period as directed by the Authority through a separate order.
- (6) identification and documentation of cyber asset wise vulnerabilities, as and when known, discovered, or disclosed publicly by the OEM/third party.
- (7) that the Cyber Security requirements are included in the FAT and SAT requirements during the procurement of equipment/ components/ parts.
- (8) updated record of Configuration details of Critical System is maintained.
- (9) that the clocks of all relevant information processing systems within IT and OT systems are synchronized to a reference time source.
- (10) inclusion of Cyber Security requirements in Service Level Agreement (SLA) with Cloud Service Provider following applicable government guidelines, rules, and regulations and inclusion of with the approved.
- (11) storage of Cyber Security-related documents and records in secure and controlled environments, with access restricted to authorized personnel only.
- (12) on-boarding of required information including allocated, used and unused public IPs with Threat Detection Portals of cyber security agencies.
- (13) that all OT equipment/systems supplied by the successful bidder are accompanied by a certificate obtained by the vendor from a certification body for conformance to IEC 62443-4 standards.

Chapter-VI

Chief information Security Officer (CISO) and Alternate CISO

12. CISO & Alternate CISO shall possess a degree in Engineering with at least fifteen years of experience in power sector domain or 10 years of experience in IT/Cyber Security.

Provided that they conform to other required qualifications, as and when, issued by the Authority through a separate order. The CISOs shall acquire these qualifications within six months of their issuance or within a period as may be directed by the Authority through a separate order.

13. The CISO shall be the nodal officer for all cyber security related issues, coordination with the authorities/ agencies handling Cyber Security subject matters including handling of all communications related to CCMP.
14. The details of the CISO and alternate CISO shall be communicated to CSIRT-Power and to all internal and external stakeholders of organizations, including publication on the website.
15. The CISO shall be the custodian of all the cyber security related documents as specified in IS 16335.

Chapter-VII

Cyber Security Policy

16. Cyber Security Policy shall include

(1) defined Purpose, Scope, roles and responsibilities of their internal and external stakeholders. It shall contain applicable compliance and legal requirements including review schedule, Monitoring mechanisms and reporting metrics.

(2) asset management processes including asset identification and classification process.

(3) defined Cyber Risk Assessment and Risk Treatment Plan, with an approved risk matrix and risk acceptance criteria for both IT and OT environment. The same shall be approved by the Board of Directors of the Entity.

Provided that Cyber risk assessment shall be conducted annually and shall consider but not limited to, all cyber assets identified/notified as Critical Information Infrastructure/Protected Systems, critical and high-risk cyber assets as identified in the Cyber Security risk assessment and risk treatment plan.

(4) defined policy for Personnel Risk Assessment, which shall include the process and controls to mitigate risks from Personnel after their termination from employment or upon change of their job responsibilities

(5) Vulnerability Management Process for periodic identification and closure of vulnerabilities,

(6) defined Access Control for user Access Management including Authentication and Authorization for granting access.

(7) defined physical Access controls defining rules for physical access to critical cyber assets and mechanisms for protecting against environmental threats.

(8) designed and documented annual cyber security training program for personnel having authorized cyber or authorized physical access to their Critical Systems.

(9) defined and documented Change Management process to ensure that all changes in software and/or update shall be version controlled with roll-back provision.

Provided that, there shall be defined and documented patch management procedures that shall include the identification, categorization, and prioritization of security patches, and the time frame for application and process to check and verify the authenticity, integrity, and compatibility of security patches and system updates shall be defined.

(10) defined backup policy to ensure that all backup data is being retained at least for the period of one calendar year or as directed by the Authority through a separate order. Backup policy shall have mechanism for verification and testing of the integrity of all the backup data as well as the restoration processes.

Provided that Backup of all sensitive data shall be encrypted during both transmission as well as storage. Access of such backup data shall be secured and restricted to authorized personnel only.

(11) defined and documented, risk-based Cyber Security Incident Response and Recovery Plan for effective response and the timely restoration of systems.

(12) defined and documented digital Data Protection and Privacy Policy in line with notified Government Rules and Regulations, which shall include encryption for sensitive data when data is at rest on the device or on a removable media or in

transit.

Provided that sensitive data, such as Personally Identifiable Information (PII), stored on or sent to or transmitted from telecommuting devices shall be protected from unauthorized access or corruption.

(13) provisions for secured use of external removable and mobile devices including restriction on the use of Bring Your own Device (BYOD) within critical & associated networks.

(14) defined and documented Internet Access Policy to monitor and regulate the use of internet.

(15) management and phase out plan for obsolete cyber asset, that are already outlived their useful life or nearing the end of their useful life.

Provided that documented Standard Operating Procedure (SOP) for the safe and secure disposal of obsolete system shall be in place.

(16) Process for vulnerability scanning and penetration testing prior to the commissioning of any system in case of replacement obsolete system.

(17) password Policy that includes strong Password controls for authorized access to systems, applications, networks and databases.

(18) plan for collaboration with other industry stakeholders and academia to promote R&D activities in the domain of Cyber Security.

(19) plan for Cyber Supply Chain Risk Management that includes provision of Cyber Security requirements in outsourcing and Non-Disclosure Agreement in the Service Level Agreement.

(20) procedure for identifying and reporting of sabotage in Critical System.

Chapter-VIII

Cyber Crisis Management Plan (CCMP)

17. CCMP shall include cyber event categorization, criteria(s) for identifying event as crisis, identified stakeholders and their responsibilities, Standard Operating Procedure to manage the cyber crisis and Communication methodologies during crisis with impacted parties, internal/ external stakeholders, and key users.
18. CCMP shall be prepared in consultation with concerned Sectoral- CERTS and vetted by CERT-In, the vetted CCMP shall be approved by their Board of Directors and reviewed annually, or after any major change, whichever is earlier.
19. In the CCMP, Recovery Plan(s) for every Critical System shall be defined and documented and same shall be communicated to all concerned Personnel.
20. CISO shall be responsible for ensuring implementation of CCMP.

Chapter-IX

Additional Cybersecurity Requirements for Vendor

21. The vendor shall provide documented and tested procedures and recovery plan for restoration of the system from potential cyber crisis scenarios.
22. The vendor shall ensure that the security patches and updates are made available for all system components, supplied by them throughout the entire contractually stipulated operating time.

Provided that, where the vendor has not provided entire systems, it shall indicate the necessary requirements and process to install security patches and other

updates on the third-party components, if integrated in the system.

23. The vendor shall inform the End of Support/ End of life of all hardware/ software/ system, including those of third parties, supplied by them.
24. The vendor shall provide Software Bill of Materials stating detailed list of used software components in case of Critical Applications, supplied by them.

Chapter-X

Cyber Security Audit

25. The Cyber Security audit shall be conducted through a CERT-In empaneled Cyber Security Auditor or cyber security auditor as per NCIIPC scheme as and when the same comes into existence. These Cyber Security audits shall be carried out as per ISO/IEC 27001 along with sector specific standard ISO/IEC 27019, IS 16335, ISO/IEC 27017 and any other Cyber Security audit directions issued by the Authority.
26. The Cyber Security audit and their compliance report shall be reviewed by CISO. Critical vulnerabilities and major non-compliances identified in critical information infrastructure during internal and external cyber audits shall be presented to the Board of Directors.
27. The audit report shall be submitted within 6 weeks of its commencement and within the same audit period.

Provided that all critical and high-risk vulnerabilities shall be addressed within a period of one month and medium & low risks vulnerabilities before the commencement of the next audit.

Further, provided that effective closure of all identified vulnerabilities shall be verified during the conduct of next audit.

28. No three consecutive Cyber Security audits shall be done by the same Auditing Agency and in the case of certification audit, the third audit shall be done by a different group of Auditors.

Chapter-XI

Physical Security

29. All cyber and non-cyber critical assets shall be identified and protected and all access points to the Critical System shall be secured physically and monitored by employing physical, human, and procedural controls such as the use of Security Guards, CCTVs, Biometric, card access systems, mantraps, bollards, etc. whichever appropriate.
30. Physical access to OT and Industrial Control System (ICS) Systems shall be restricted.

Provided that the grant of physical access to the Critical Systems shall be revoked in case of a perceptible threat of physical damage.

31. The Systems, Networks, Applications used for ensuring effective physical security shall be kept separated from the network of critical systems.

Chapter-XII

Critical Information Infrastructure (CIIs) Identification

32. For the identification of CIIs, all information required by NCIIPC shall be provided.

Provided that Upon receipt of the communication regarding declaration of CIIs from NCIIPC, the organization shall, within 15 calendar days, approach the appropriate government for notification of their declared CIIs as "Protected Systems" in the Official Gazette, in accordance with the provisions of Section 70 of ITAA 2008.

33. Details of new cyber assets shall be submitted to NCIIPC, within 30 days of their commissioning.

Chapter-XIII

Miscellaneous

34. **Monitoring and Compliance**

- (1) Assessment of Compliances

The performance of all organizations with respect to compliance with these regulations shall be assessed periodically.

- (2) Monitoring of Compliance

- (1) In order to ensure compliance, two methodologies shall be followed:

- (a) Self-Audit
- (b) Compliance Audit

- (2) Self Audit:

- (a) All organizations shall conduct annual self-audits to review compliance of these regulations and submit the reports by 31st March of every year.
- (b) The self-audit report shall inter alia contain the following information with respect to non-compliance:
 - (i) Sufficient information to understand how and why the non-compliance occurred.
 - (ii) Extent of damage caused by such non-compliance.
 - (iii) Steps and timeline planned to rectify the same.
 - (iv) Steps taken to mitigate any future recurrence.

(c) The self-audit reports by all Responsible Entity, associated Government Organizations (CPRI, PFC, REC, BEE, Training Institutes), and Vendors shall be submitted to the CISO-MoP and CSIRT-Power.

(d) The self-audit reports of Power Sector IT Infrastructure of Appropriate Government, RPCs, Appropriate Commissions shall be submitted to CISO, MoP.

(e) The deficiencies shall be rectified in a time-bound manner within a reasonable time.

(f) CISO, MoP shall continuously monitor the instances of non-compliance of the provisions of these regulations and endeavor to sort out all operational issues and deliberate on the ways in which such cases of non-compliance shall be prevented in future.

(g) CISO, MoP may initiate appropriate proceedings upon receipt of the report under sub-clauses (e) of this clause.

Provided that CISO, MoP may report the non-compliance of any regulations to CERT-In and NCIIPC for appropriate action under IT Act 2000 and Amendment thereof.

Furthermore, provided that CISO, MoP may initiate action for non-compliance of these regulations under section 146 of the Electricity Act, 2003.

(h) In case of non-compliance with any provisions of these regulations, the matter may be reported by any person to the CISO-MoP or the Authority.

(3) Independent Third-Party Compliance Audit:

CISO, MoP or the Authority may order independent third-party compliance audit for any organization as deemed necessary based on the facts brought to the knowledge of CISO, MoP or the Authority.

35. **Power to Relax**

The Authority through an order, for reasons to be recorded in writing, may relax any of the provisions of these regulations on its own motion or on an application made before it by an affected person to remove the hardship arising out of the operation of any of these regulations, applicable to a class of persons.

36. **Power to Remove Difficulty**

If any difficulty arises in giving effect to the provisions of these regulations, the Authority may, on its own motion or on an application made before it by the affected person, by order, make such provisions not inconsistent with the provisions of the Act or provisions of other regulations specified by the Authority, as may appear to be necessary for removing the difficulty in giving effect to the objectives of these regulations.

Schedule-I

Part-I: Indicative minimum required officers/officials in ISD.

1. Minimum Work Force required for setting up an ISD:
 - a. 04 (Four) officers including CISO and 04 officers/officials for shift operations.
 - b. Besides these indicated officers/officials additional officers/officials can be placed exclusively for cyber security task like conducting Internal Cyber Security Audit, Mock-Drills/ Exercise, VAPT, coordination, and execution of tasks related to compliance of cyber security Guidelines, Regulations, advisory and alerts etc. The officers/officials deployed in the ISD shall have valid certificate of successful completion of Cyber Security courses as issued by the Authority through a separate order. The officers/officials shall acquire these certificates within six months of their issuance or within a period as may be directed by the Authority through a separate order.

Part II - The review of the Cyber Security policy implementation must include:

- i. Review of current cyber security capabilities including capabilities of cyber security deployed Cyber Security tools and implemented Cyber Security processes and procedures.
- ii. To Review the efficacy of cyber security preparedness.
- iii. Review of goals set for a targeted level of cyber resilience.
- iv. Review of Incident response plan to improve upon cyber resilience level and strengthening of cyber security incident handling capabilities.
- v. Review of measures for improvement in Cyber Security posture.

Part III - Guidance on Awareness Programs:

Personnel having authorized cyber or physical (escorted or unescorted) access, must receive on-going reinforcement on cyber security best practices. The cyber security best practices dissemination may be done through mechanisms such as:

- i. Direct communications (e.g., emails, memos, computer-based training, etc.).
- ii. Indirect communications (e.g., posters, intranet, brochures, etc.).
- iii. Management support and reinforcement (e.g., presentations, meetings, etc.).



भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
सूचना प्रौद्योगिकी एवं साइबर सुरक्षा प्रभाग
Information Technology & Cyber Security Division

विषय : CEA (Cyber Security in Power Sector) Guidelines, 2021.

CEA is mandated to prepare 'Guidelines on Cyber Security' in Power Sector under the provision of regulation (10) of the Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019. Guidelines on Cyber Security in Power Sector incorporating the cardinal principles has been prepared by CEA. In compliance to the provision of the above regulation, CEA (Cyber Security in Power Sector) Guidelines, 2021 are issued for compliance by all entities listed in the clause 2.3 (Applicability of the Guidelines) of the guidelines.

Encl: Guidelines on Cyber Security


व.क. मिश्रा
(V.K Mishra)
Secretary CEA

CEA (Cyber Security in Power Sector) Guidelines, 2021

1.0 Background

- 1.1 Cyber intrusion attempts and Cyber-attacks in any critical sector are carried out with a malicious intent. In Power Sector it's either to compromise the Power Supply System or to render the grid operation in-secure. Any such compromise, may result in mal-operations of equipments, equipment damages or even in a cascading grid brownout/blackout. The much hyped air gap myth between IT and OT Systems now stands shattered. The artificial air gap created by deploying firewalls between any IT and OT System can be jumped by any insider or an outsider through social engineering. Cyber-attacks are staged through tactics & techniques of Initial Access, Execution, Persistence, Privilege Escalation, Defence Evasion, Command and Control, Exfiltration. After gaining the entry inside the system through privilege escalation, the control of IT network and operations of OT systems can be taken over even remotely by any cyber adversary. The gain of sensitive operational data through such intrusions may help the Nation/State sponsored or non-sponsored adversaries and cyber attackers to design more sinister and advanced cyber-attacks.
- 1.2 Government of India has set up the Indian Computer Emergency Response Team (CERT-In) for Early Warning and Response to cyber security incidents and to have collaboration at National and International level for information sharing on mitigation of cyber threats. CERT-In regularly issues advisories on safeguarding computer systems and publishes Security Guidelines which are widely circulated for compliances. All Central Government Ministries/ Departments and State/Union Territory Governments have been advised to conduct cyber security audit of their entire Cyber Infrastructure including websites at regular interval through CERT-In empanelled Auditors so as to identify gaps and appropriate corrective actions to be taken in cyber security practices. CERT-In extends supports to enable Responsible Entity in conducting cyber security mock drills and in assessment of their preparation to withstand cyber-attacks. The Responsible Entity must submit Reports of Cyber Audit of cyber security controls, architecture, vulnerability management, network security and periodic cyber security drills to sectoral CERT as well as CERT-In. Team of experts shall review these reports and shortcomings if any in the compliances shall be flagged by them. CERT-In on regular basis also conducts workshops and training programs to enhance Cyber awareness of all Stakeholders.
- 1.3 Ministry of Power has created 6(six) sectoral CERTs namely Thermal, Hydro, Transmission, Grid Operation, RE and Distribution for ensuring cyber security in Indian Power Sector. Each Sectoral CERT has prepared their sub-sector specific model Cyber Crisis Management Plan(C-CMP) for countering cyber-attacks and cyber terrorism. Each Sectoral CERT has circulated their model C-CMPs for preparation and implementation of organization specific C-CMP by each of their Constituent Utility.
- 1.4 All Responsible Entities, Service Providers, Equipment Suppliers/Vendors and Consultants engaged in Power Sector are equally responsible for ensuring cyber security of the Indian Power Supply System. They are to act timely upon each threat intelligence.

advisories and other inputs received from authenticated sources, for continuous improvement in their cyber security posture.

- 1.5 In the current Indian scenario though many cyber security directives and guidelines exists, but none of them are power sector specific. Ministry of Power has directed CEA to prepare Regulation on Cyber Security in Power Sector. And as an interim measures CEA has been directed to issue Guideline on Cyber Security in Power Sector, under the provision of Regulation 10 on Cyber Security in the “Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019”.
- 1.6 The Guidelines on Cyber Security, in the form of Articles written below, requires mandatory Compliance by all Responsible Entities. The Guidelines shall come into effect from the date of issue by Central Electricity Authority, New Delhi.
- 2.0 Hereby the Guidelines on Cyber Security are drawn in the form of Articles for compliance by the Requester as well as User under the following provision of Regulation 10 on Cyber Security, in the “Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019”.

“The requester and the user shall comply with cyber security guidelines issued by the Central Government, from time to time, and the technical standards for communication system in Power Sector laid down by the Authority.”

- 2.1 **Objective of issuing Guideline:**
 - a) Creating cyber security awareness
 - b) Creating a secure cyber ecosystem,
 - c) Creating a cyber-assurance framework,
 - d) Strengthening the regulatory framework,
 - e) Creating mechanisms for security threat early warning, vulnerability management and response to security threats,
 - f) Securing remote operations and services,
 - g) Protection and resilience of critical information infrastructure,
 - h) Reducing cyber supply chain risks,
 - i) Encouraging use of open standards,
 - j) Promotion of research and development in cyber security,
 - k) Human resource development in the domain of Cyber Security,
 - l) Developing effective public private partnerships,
 - m) Information sharing and cooperation
 - n) Operationalization of the National Cyber Security Policy
- 2.2 Within the text of these Articles, ‘**Responsible Entity**’ shall mean all:
 - a) Transmission Utilities as well as Transmission Licensees,
 - b) Load despatch centres (State, Regional and National),
 - c) Generation utilities (Hydro, Thermal, Nuclear, RE),
 - d) Distribution Utilities
 - e) Generation Aggregators,
 - f) Trading Exchanges,
 - g) Regional Power Committees, and
 - h) Regulatory Commissions.

2.3 **Applicability:**

All Responsible Entities as well as System Integrators, Equipment Manufacturers, Suppliers/Vendors, Service Providers, IT Hardware and Software OEMs engaged in the Indian Power Supply System.

2.4 **Scope:**

2.4.1 **Control Systems for System Operation and Operation Management.**

- a) Grid Control and Management Systems,
- b) Power Plant Control Systems,
- c) Central Systems used to monitor and control of distributed generation and loads e.g. virtual power plants, storage management, central control rooms for hydroelectric plants, photovoltaic/wind power installations,
- d) Systems for fault management and work force management,
- e) Metering and measurement management systems,
- f) Data archiving systems,
- g) Parameterisation, configuration and programming systems,
- h) Supporting systems required for operation of the above mentioned systems,

2.4.2 **Communication System.**

- a) Routers switches and firewalls,
- b) Communication technology-related network components,
- c) Wireless digital systems.
- d) Control Centre to Control Centre Communications for data exchange on ICCP. (IEC 61850/60850-5/TASE.2/)

2.4.3 **Secondary, Automation and Tele control technologies**

- a) Control and Automation components,
- b) Control and field devices,
- c) Tele control devices,
- d) Programmable logic controllers / Remote Terminal Units, including digital sensor and actuators elements,
- e) Protection devices,
- f) Safety components,
- g) Digital measurement and metering installations.
- h) Synchronisation devices,
- i) Excitation Systems,

3.0 **Definition of Terms:**

1. **Access Management:** shall mean set of policies and procedures of the Responsible Entity for allowing Personnel, devices and IoT to securely perform a broad range of operational, maintenance, and asset management tasks either on site or remotely as laid down in Clause 5.2.5 of IS 16335.
2. **Accreditation:** shall mean the process of verifying that an organisation is capable of conducting the tests and assessments against a product/process that are required to be certified.

3. **Accreditation Body:** shall mean an organisation that has been accredited to verify the credentials and capabilities of the organisations that wish to become a certification body.
4. **Act:** shall mean the Information Technology Act, 2000 (21 of 2000)
5. **Asset:** shall mean anything that has value to the organization.
6. **Certification:** shall mean the process of verifying that a product has been manufactured in conformance with a set of predefined standards and/or regulations by an organisation, that is accredited to conduct the certification process
7. **Certification Body:** shall mean an organisation that has been accredited by an accreditation body to certify products / process against a certification scheme.
8. **Certification Scheme:** shall mean the processes, paperwork, tools, and documentation that define how a product or manufacturer is certified
9. **Chief Information Security Officer:** shall mean the designated employee of Senior management level directly reporting to Managing Director/Chief Executive Officer/Secretary of the Responsible Entity, having knowledge of Information Security and related issues, responsible for cyber security efforts and initiatives including planning, developing, maintaining, reviewing and implementation of Information Security Policies
10. **Critical Assets:** shall mean the facilities, systems and equipment which, if destroyed, degraded or otherwise declared unavailable, would affect the reliability or operability of the Power Supply System.
11. **Critical System:** shall mean cyber assets essential to the reliable operation of critical asset. Critical System consists of those cyber assets that have at least one of the following characteristics:
 - a) The cyber asset uses a routable protocol to communicate outside the electronic security perimeter.
 - b) The cyber asset uses a routable protocol within a control centre.
 - c) The cyber asset is dial-up accessible.
12. **Critical Information Infrastructure:** shall mean Critical Information Infrastructure as defined in explanation of sub-section (1) of Section 70 of the Act.
13. **Cyber Assets:** shall mean the programmable electronic devices, including the hardware, software and data in those devices that are connected over a network, such as LAN, WAN and HAN.
14. **Cyber Crisis Management Plan:** shall mean a framework for dealing with cyber related incidents for a coordinated, multi-disciplinary and broad-based approach for rapid identification, information exchange, swift response and remedial actions to mitigate and recover from malicious cyber related incidents impacting critical processes.
15. **Cyber Security Breach:** shall mean any cyber incident or cyber security violation that results in unauthorized or illegitimate access or use by a person as well as an entity, of data, applications, services, networks and/or devices through bypass of the underlying cyber security protocols, policies and mechanisms resulting in the compromise of the confidentiality, integrity or availability of data/information maintained in a computer resource or cyber asset.
16. **Cyber Security Incident:** shall mean any real or suspected adverse cyber security event that violates, explicitly or implicitly, cyber security policy of Responsible Entity resulting in unauthorized access, denial of service or disruption, unauthorized use of computer resource for processing or storage of information or changes to data or information

without authorization, leading to harm to the power grid or its critical sub-sectoral elements Generation, Transmission and Distribution.

17. **Cyber Security Policy:** shall mean documented set of business rules and processes for protecting information, computer resources, networks, devices, Industrial Control Systems and other OT resources.
18. **Electronic Security Perimeter:** shall mean the logical border surrounding a network to which the Cyber Systems of Power Supply System are connected using a routable protocol.
19. **Information Security Division:** shall mean a division accountable for cyber security and protection of the Critical System of the Responsible Entity.
20. **Protected System:** shall mean any computer, computer system or computer network of the Responsible Entity notified under section 70 of the Act, in the official gazette by appropriate Government.
21. **Security Architecture:** shall mean a framework and guidance to implement and operate a system using the appropriate security controls with the goal to maintain the system's quality attributes like confidentiality, integrity, availability, accountability and assurance.
22. **Vulnerability:** shall mean intrinsic properties of something resulting in susceptibility to a risk source that can lead to an event with a consequence
23. **Vulnerability Assessment:** shall mean a process of identifying and quantifying vulnerabilities

4.0 Standards

Reference	Description
ISO/IEC 15408	Common Criteria Certification Standard
ISO/IEC 17011	General requirements for accreditation bodies accrediting conformity assessment bodies
ISO/IEC 17025	General requirements for the competence of testing and calibration laboratories
ISO/IEC 21827	Systems Security Engineering - Capability Maturity Model (SSE-CMM)
ISO/IEC 24748-1	Systems and software engineering — Life cycle management — Part 1: Guidelines for life cycle management.
ISO 27001/2	Information Security Management
ISO/ IEC 27019	Information technology — Security techniques — Information Security controls for the energy utility industry
ISO/IEC 61508	Functional Safety of Electrical / Electronic / Programmable Electronic Safety-related Systems
IEC 61850	Communication networks and systems for power utility automation
IEC 62351	Standards for Securing Power System Communications
IEC 62443	Cyber Security for Industrial Control Systems
IS 16335	Power Control Systems – Security Requirements.

5.0 Abbreviations

Abbreviations	Description
a) BES	Bulk Electric System

b)	CDAC	Centre for Development of Advanced Computing
c)	CEA	Central Electricity Authority
d)	CERC	Central Electricity Regulatory Commission
e)	CERT	Computer Emergency Response Team
f)	CERT-In	Indian Computer Emergency Response Team
g)	CII	Critical Information Infrastructure
h)	CISO	Chief Information Security Officer
i)	CSK	Cyber Swachhta Kendra
j)	COTS	Commercial off-the Shelf
k)	ESP	Electronic Security perimeter
l)	ICS	Industrial Control Systems
m)	ICT	Information and Communications Technology
n)	IEC	International Electro Technical Commission
o)	ISAC	Information Sharing and Analysis Centre
p)	ISD	Information Security Division
q)	ISO	International Organization for Standardization
r)	ISMS	Information Security Management System
s)	IT	Information Technology
t)	FAT	Factory Acceptance Test
u)	NABL	National Accreditation Board for Testing and Calibration Laboratories
v)	NCIIPC	National Critical Information Infrastructure Protection Centre
w)	NLDC	National Load Dispatch Centre
x)	NPTI	National Power Training Institute
y)	NSCS	National Security Council Secretariat
z)	OEM	Original Equipment Manufacturer
aa)	OT	Operational Technology
bb)	RLDC	Regional Load Dispatch Centres
cc)	SAT	Site Acceptance Test
dd)	SERC	State Electricity Regulatory Commission
ee)	SCADA	Supervisory Control and Data Acquisition Systems
ff)	SIEM	Security Information and Event Management
gg)	SLA	Service Level Agreement
hh)	SLDC	State Load Dispatch Centre
ii)	QCI	Quality Council of India

CEA (Cyber Security in Power Sector) Guidelines, 2021

Article 1. Cyber Security Policy.

a. Cardinal Principles: The Responsible entity will strictly adhere to following cardinal principles while framing cyber security policy:

- i. There is hard isolation of their OT Systems from any internet facing IT system.
 - ii. May keep only one of their IT systems with internet facing at any of their site/location if required which is isolated from all OT zones and kept in a separate room under the security and control of CISO.
 - iii. Downloading/Uploading of any data/information from their internet facing IT system is done only through an identifiable whitelisted device followed by scanning of both for any vulnerability/malware as per the SOP laid down and for all such activities digital logs are maintained and retained under the custody of CISO for at least 6 months. The log shall be readily to carry out the forensic analysis if asked by investigation agency.
 - iv. List of whitelisted IP addresses for each firewall is maintained by CISO and each firewall is configured for allowing communication with the whitelisted IP addresses only.
 - v. Communication between OT equipment/systems is done through the secure channel preferably of POWERTEL through the fibre optic cable. Security configuration of the communication channel is also to be ensured.
 - vi. All ICT based equipment/system deployed in infrastructure/system mandatorily CII are sourced from the list of the "Trusted Sources" as and when drawn by MoP/CEA.
- b. The Responsible Entity shall be ISO/IEC 27001 certified (including sector specific controls as per ISO/IEC 27019).
 - c. The Responsible Entity shall have a Cyber Security Policy drawn upon the guidelines issued by NCIIPC.
 - d. The Responsible Entity shall ensure annual review of their Cyber Security Policy by subject matter expert and changes shall be made therein only after obtaining the due approval from Board of Directors.
 - e. The process of Access Management for all Cyber Assets owned or under control of the Responsible Entity shall be detailed in the Cyber Security Policy.
 - f. The Cyber Security Policy shall leverage state-of-art cyber security technologies and relevant processes at multiple layers to mitigate the cyber security risks.
 - g. The Responsible Entity shall be solely responsible to get Cyber Security Policy implemented through its Information Security Division (ISD).
 - h. The CISO shall record the reason(s) for exemption required, if any, in case, unable to comply with any of the provision(s) of the Cyber Security Policy. Any exception shall be allowed only after an approval of provisions of compensatory control(s) to mitigate residual cyber security risks.

- i. The CISO shall record the exemptions sought in statement of applicability controls, while getting the ISO 27001 certified. All exemptions and its justification need to be in conformance with Cyber Security Policy of the Responsible Entity.
- j. The Responsible Entity shall allocate sufficient Annual budget for enhancing cyber security posture, enhanced year over year.
- k. The Responsible Entity shall work in collaboration with other Industry Stakeholders as well as Academia to promote R&D activity in the domain of cyber security.
- l. The Responsible Entity shall ensure that cyber security issues are taken up as agenda items in their Board meetings once in every three months.

Article 2 Appointment of CISO.

- a) The Responsible Entity shall mandatorily appoint a CISO and shall confirm to qualification, if any, laid by Quality Council of India (QCI). In absence, the work of CISO shall be looked upon by Alternate CISO. In case qualification for appointment of Alternate CISO has been relaxed for reasons recorded thereof, Alternate CISO has to mandatorily acquire the minimum required cyber security skill sets within six months from the date of his appointment.
- b) The Responsible Entity shall regularly update details of CISO and Alternate CISO, with the Sectoral CERT, as well as on ISAC-Power Portal.
- c) Roles and Responsibility of CISOs shall be as laid by CERT-In and ring-fenced to ensure cyber security of the Cyber Assets of the Responsible Entity.

Article 3: Identification of Critical Information Infrastructure (CII).

- a) The Responsible Entity shall submit to NCIIPC through Sectoral CERT, details of Cyber Assets which uses a routable protocol to communicate outside the Electronic Security Perimeter drawn by the Responsible Entity or a routable protocol within a control centre and dial-up accessible Cyber Assets, within 30 days from the date of their commissioning in the System.
- b) The Responsible Entity shall submit details of Critical Business Processes and underlying information infrastructure along with mapped impact and Risk Profile to NCIIPC and shall get their CIIs identified in consultation with NCIIPC. The process of the notification/declaration by Appropriate Government shall follow thereafter.
- c) The Responsible Entity shall review their declared/notified CIIs at least once a year to examine changes if any in the functional dependencies, protocols and technologies or upon any change in security architecture. The Responsible Entity shall review their declared/notified CIIs once in every 6 months, in case if NCIIPC has directed them to constitute an Information Security Steering Committee.
- d) The Responsible Entity shall ensure that all cyber assets of their identified/notified CIIs are recorded in the asset register and considered for risk assessment as well as for finalization of controls in statement of applicability.

Article 4. Electronic Security Perimeter

- a) The Responsible Entity shall identify and document the Electronic Security Perimeter(s) and all Access Points to the perimeter(s).

- b) The Responsible Entity shall follow procedure of identifying “Electronic Security Perimeter” in case of distributed and/or hybrid information infrastructure, as per IEC 62443 / IS16335 (as amended from time to time).
- c) The Responsible Entity shall ensure that every Critical System resides within an Electronic Security Perimeter.
- d) The Responsible Entity shall perform a cyber-Vulnerability Assessment of each electronic Access Points to the Electronic Security Perimeter(s) at least once in every 6 (six) months and/or after any change in Security Architecture.
- e) The Responsible Entity shall ensure that all critical, high and medium vulnerabilities identified as a result of cyber Vulnerability Assessment shall be closed and verified for the effective closure.

Article 5. Cyber Security Requirements

- a) The Responsible Entity shall have an Information Security Division (ISD), headed by CISO.
- b) The Responsible Entity shall ensure that the ISD must be functional on 24x7x365 basis and is manned by sufficient numbers of Engineers having valid certificate of successful completion of course on cyber security of Power Sector from the Training Institutes designated by CEA.
- c) The Responsible Entity shall ensure that ISD
 - 1) has on-boarded Cyber Swachhta Kendra(CSK) of CERT-In, if they have public IPs.
 - 2) has timely acted upon the advisories, guidelines and directive of NCIIPC, CSK, CERT-In and Sectoral CERTs,
 - 3) has deployed an Intrusion Detection System and Intrusion Prevention System capable of identifying behavioural anomaly in both IT as well as OT Systems.
 - 4) shares reports on incident response and targeted malware samples with CERT-In,
 - 5) updates the firmware/software with the digitally signed OEM validated patches only.
 - 6) enables only those ports and services that are required for normal operations. In case of any emergency the procedure as laid in Access management be followed.
 - 7) maintains firewall logs for the last 6 months duration. Firewall logs shall be analysed and all critical and high severity comments shall be addressed for effective closure.
 - 8) retains document of FAT, SAT test results and report/ certificate of cyber tests carried out for compliance of Government Orders and Cyber Security Audit.*
 - 9) maintains all cyber logs and cyber forensic records of any incident for at least** 90 days.
 - * FAT, SAT must include comprehensive cyber security tests of the component/equipment/system to be delivered/delivered at site.
 - ** 90 days from date of the commissioning of the system/recovery from any incident, whichever is later.
- d) The Responsible Entity shall routinely audit and test security properties of the Critical System and must act upon, in case if any new vulnerabilities is identified through testing or by the equipment manufacturer.

- e) The Responsible Entity shall design a secure architecture for control system appropriate for their process control environment*.
- f) All State Load Dispatch Centres(SLDCs) shall comply with the directions issued by the National Load Dispatch Centre(NLDC) as well as Regional Load Dispatch Centres(RLDCs) U/s 29 (1) of the Electricity Act, 2003 to ensure stability and cyber security of grid operation and achieve efficiency in the grid operation. In case of any non-compliance, the Head of SLDC shall be responsible and shall be liable for Penalty as per the provision of CERC/SERC.

*There are so many different types of systems in existence and so many possible solutions, it is important that the selection process ensures that the level of protection is commensurate with the business risk and the Responsible Entity shall not rely on one single security measure for its defence. (Reference IEC/TR62351-10 Edition1.0 2012-10 *Power systems management and associated information exchange –Data and communications security – Part 10: Security architecture guidelines*).

Article 6 Cyber Risk Assessment and Mitigation Plan

- a) The Responsible Entity shall document in their Cyber Security Policy a Cyber Risk Assessment and Mitigation Plans drawn upon the best practises being followed in the Power Sector, and the same shall be approved by Board of Directors.
- b) The Cyber Risk Assessment and Mitigation Plans shall clearly define the matrix for assessing the cyber risk of both IT and OT environment and risk acceptance criteria.
- c) The Cyber Risk Assessment Plan shall be capable to demonstrate that repeated cyber security risk assessment delivers consistent, valid and comparable results.
- d) The review of cyber risk assessment shall be carried out at least once in a Quarter. The actionability of risk treatment and mitigation shall be tracked in this review for their effectiveness.
- e) The CISO shall be responsible for implementation and regular review, on the basis of internal and external feedbacks, of the Cyber Risk Assessment and Mitigation Plans.

Article 7 Phasing out of Legacy System

- a) As the life cycle of the Power System Equipment/System is longer than that of IT Systems deployed therein, the Responsible Entity shall ensure that all IT technologies in the Power System Equipment/System should have the ability to be upgraded.
- b) The Responsible Entity shall ensure that the Information Security Division shall draw the list of all communicable equipments/systems nearing end life or are left without support from OEM. Thereafter CISO shall identify equipment/systems to be phased out from the list drawn, firm up their replacement plan and put up the replacement plan for approval before the Board of Directors.
- c) The CISO shall ensure that till equipments/systems nearing end life or left without support from OEM are not replaced, their cyber security is hardened and ensured through additional controls provisioned in consultation with the OEM or alternate Supplier(s)*.

*e.g. Use of CDAC developed AppSamvid and whitelisting of applications installed may be explored across all legacy systems.

- d) The Responsible Entity shall document in their Cyber Security Policy a Standard Operating Procedure for safe and secure disposal of outlived or legacy devices.

Article 8. Cyber Security Training.

- a) The Responsible Entity shall establish, document, implement, and maintain an annual cyber security training program for personnel having authorized cyber or authorized physical access (unescorted or escorted) to their Critical Systems.
- b) The Responsible Entity shall review annually their cyber security training program and shall update it whenever necessary. Annual Review shall record evaluation of the effectiveness of the trainings held.
- c) The Responsible Entity shall ensure that Cyber Security training program designed for their IT as well as OT O&M Personnel must include following topics and as per their functional requirements and security concerns additional topics shall be added:
 - 1) User authentication and authorization.
 - 2) Cyber Security and Protection mechanisms of IT/OT/ICS Systems.
 - 3) Introduction to various standards i.e. ISO/IEC:15408, ISO/IEC:24748-1, ISO: 27001, ISO: 27002, ISO 27019, IS 16335, IEC/ISO:62443.
 - 4) Training on implementation of ISO/IEC 27001 and awareness on IEC 62443.
 - 5) Vulnerability Assessment in the Critical System.
 - 6) Monitoring and preserving of electronic logs of access of Critical Assets.
 - 7) Detecting cyber-attacks on SCADA and ICS systems
 - 8) The handling of Critical System during cyber crisis.
 - 9) Action plans and procedures to recover or re-establish normal functioning of Critical Assets and access thereto following a Cyber Security Incident.
 - 10) Hands on SCADA operation at any of the Regional Load Dispatch Centre.
 - 11) Handling of risks involved in the procurement of COTS Products.
- d) All Personnel engaged in O&M of IT & OT Systems shall mandatorily undergo courses on cyber security of Power Sector from any of the training institute designated by CEA, immediately within 90 days from the notification of CEA Guidelines on Cyber Security in Power Sector.
- e) The Responsible Entity shall ensure that none of their newly hired or the current Personnel have access to the Critical System, prior to the satisfactory completion of cyber security training programme from the Training Institutes designated in India, except in specified circumstances such as cyber crisis or an emergency.
- f) NPTI in consultation with CEA shall identify and design domain specific courses on Cyber Security for different target groups. The "Governing Board for PSO Training and Certification" shall approve the content, duration etc of these courses and shall review it Annually. NPTI shall conduct these courses at all of their branches on regular basis and shall maintain the list of the Participants successfully completing the course.

Article 9 Cyber Supply Chain Risk Management

- a) The Responsible Entity shall ensure that, as and when Ministry of Power, Government of India notifies the Model Contractual Clauses on cyber security, these clauses are included in their every Bid invited for procurement of any ICT based components/equipments/System to be used for Power System.
- b) The Responsible Entity shall ensure that all the Communicable Intelligent Equipments and the Service Level Agreements (SLAs) for their Critical Systems shall be sourced from the list of the "Trusted Sources" as and when drawn by MoP/CEA.

- c) The Responsible Entity shall ensure that, in case, for the any Communicable Intelligent Devices, if no Trusted Source has been identified, then the successful bidder in compliance with the provisions made in MoP order dated 2.7.2020 and any other relevant MoP order has got the product cyber tested for any kind of embedded malware/Trojan/cyber threat and for adherence to Indian Standards at the designated lab.
- d) The Responsible Entity shall ensure that the essential cyber security tests are carried out successfully during FAT, SAT as detailed in **Annexure A**. The equipment/System besides for functionality shall also be tested in the factory for vulnerabilities, design flaws, parts being counterfeit or tainted, so as to minimize problems during on-site-testing and installation. Cyber Security Conformance Testing are to be carried out in the designated Lab as listed in **Annexure-I of MoP Order No. 12/13/2020-T&R dt. 8th June, 2021(Order at Annexure-B)**.
- e) The Responsible Entity shall ensure that the Equipment/System supplied by the successful bidder shall accompany with a certificate[§] # obtained by OEM from a certification body accredited to assess devices and process for conformance to IEC 62443-4 standards during design and manufacture. The Responsible Entity shall accept the certificate submitted along with the supplied Equipment/System only if it's in line with the Testing Protocol as notified by Ministry of Power, Government of India, from time to time.
- f) The Responsible Entity in compliance to the requirement of Article 9(e) shall also accept, till the setting up of an adequate certification facility in the India, a digitally signed self-declaration of conformance to the IEC 62443-4 standards during design and manufacture of the equipment/system, if submitted by the OEM.
- g) The Responsible Entity shall dispose all unserviceable or obsolete Communicable Intelligent Devices as per the procedure laid in their Cyber Risk Assessment and Mitigation Plans which shall be in line with the prevailing best practices.

§ The National & International certification may be specified in the tender for critical systems/sub-systems being procured by the Responsible Entity.

Certification Schemes:

Embedded Device Security Assurance Certification is for an individual product,
System Security Assurance Certification is for a set of products in a system (possibly from different vendors)

Security Development Lifecycle Assurance Certification is for the development processes that a manufacturer uses for developing products.

Article 10 Cyber Security Incident Report and Response Plan

- a) The CISO of the Responsible Entity shall report in the formats prescribed by CERT-In, all Cyber Security Incidents, classified as reportable events.
- b) Root cause analysis for all reportable events shall be carried out and corrective action taken, so as to ensure that any re-occurrence of such event can be managed with ease.
- c) The Responsible Entity shall mandatorily define in their Cyber Security Policy, criteria(s) identified on the basis of impact analysis, for declaring the occurrence of

Cyber Security Incident(s) as a Cyber Crisis in the System owned or controlled by them.

- d) The Responsible Entity shall mandatorily designate an Officer along with his/her standby by name and designation and empower them to declare an occurrence of the incident(s) as "Cyber Crisis". The contact details of these Officers shall be updated in the C-CMP within 15 days of changes if any due to transfer or superannuation etc.
- e) The CISO shall ensure that during any Cyber Security Incident, ISD monitors and minutely records every details of cyber security events and incidents in both IT as well as the OT System owned or controlled by the Responsible Entity.
- f) The CISO shall ensure that each cyber incident is handled strictly as per Cyber Security Incident Response Plan detailed in the latest C-CMP approved by the Board of Directors.
- g) The Responsible Entity shall ensure that the efficacy of the Cyber Security Incident Response Plan is tested annually through mock drill(s) carried out, if feasible, as simulation exercise(s) or as table top exercise(s) with wider participation of their employees, in consultation with CERT-In and sectoral CERT. In case if any shortcoming is observed in the Cyber Security Incident Response Plan suitable changes shall be made in it.
- h) The Responsible Entity shall ensure that the CISO compiles details of incident detection, incident handling, learnings from each incident and damage claims made if any and shall report to CERT-In as well as upload information on ISAC-Power Portal.

Article 11 Cyber Crisis Management Plan(C-CMP)

- a) The Responsible Entity shall prepare a Cyber Crisis Management Plan and submit to their sectoral-CERT for review with intimation to Ministry of Power/CISO-MoP. Responsible Entity shall update their C-CMP on the basis of comments made by sectoral-CERT and then submit for vetting to CERT-In. The C-CMP shall be updated once again to include the observations made by CERT-In before seeking approval of Board of Directors for implementation of C-CMP.
- b) The Responsible Entity shall ensure that the C-CMP is reviewed at least annually. The CISO shall ensure that all changes are made in C-CMP only with the due approval of Board of Directors and the changes made in C-CMP have been communicated through a verifiable means to all the concerned Personnel of the Responsible Entity.
- c) The CISOs shall be the custodian of all the cyber security related documents including Cyber Crisis Management Plan, Risk Treatment Plan, Statement of Applicability of controls, and compliance to regulator's requirement.
- d) The CISO shall be accountable for ensuring enforcement of C-CMP by Information Security Division of the Responsible Entity, during a cyber-crisis, as and when declared by the designated Officer. (refer Article 10(d))

Article 12: Sabotage Reporting%

- a) The Responsible Entity shall incorporate procedure for identifying and reporting of sabotage in their Cyber Security Policy within 30 days from issue of the Guidelines, or grant of licence under the appropriate legal provisions to the Responsible Entity.
- b) The CISO shall be held liable for non-reporting of identified sabotage(s) as per procedure laid for identifying and reporting of sabotage in the Cyber Security Policy of the Responsible Entity.

- c) The CISO shall prepare a detailed report on disturbances or unusual occurrences, identified, suspected or determined to be caused by sabotage in the Critical System of the Responsible Entity, and shall submit the report to the Sectoral CERT as well as to CERT-In within 24 hours of its occurrence.
- d) The CISO shall submit to NCIIPC within 24 hours of occurrence the report on every sabotage classified as cyber incidents(s) on "Protected System".
- e) The CISO upon occurrence on every sabotage shall take custody of all log records as well as digital forensic records of affected Cyber Assets, Intrusion Detection System, Intrusion Protection System, SIEM and shall preserve them for at least 90 days and shall make them available as and when called upon for investigation by the concerned Agencies.

**Disturbances or unusual occurrences, suspected or determined to be caused by sabotage.*

Sabotage e.g. can be a forced intrusion in un-manned/manned facility and taking control of operation of Critical System through a communicating device.

Article 13 Security and Testing of Cyber Assets

- a) The Responsible Entity shall ensure security of all in-service phase as well as standby Cyber Assets through regular firmware/Software updates and patching, Vulnerability management, Penetration testing (of combined installations), securing configuration, supplementing security controls. CISO shall maintain details of update version of each firmware and software and their certification if received from OEMs.
- b) The Responsible Entity shall carry out regularly Vulnerability Assessment of all Cyber Assets owned or under their control. If a Cyber Asset is found vulnerable to any exploits or upon any patch updates or major configuration changes, then further Penetration Testing may be carried out offline or in a suitably configured laboratory test-bed to determine other vulnerabilities that may have not been identified so far.
- c) The Responsible Entity shall specify security requirement and evaluation criteria during each phase of their procurement Process.
- d) The Responsible Entity shall ensure that all Cyber Assets being procured shall conform to the type tests as mentioned in the specification for type testing listed in the bid document. Type test reports of tests conducted in NABL accredited Labs or internationally accredited labs (with in last 5 years from the date of bid opening) shall be mandated to be submitted along with bid. In case, the submitted Type Test reports are not as per specification, the re-tests shall be conducted without any cost implication to the Responsible Entity.
- e) The Responsible Entity shall ensure that all Communicable devices are tested for communication protocol as per the ISO/IEC/IS standards listed in **MoP Order No. 12/13/2020-T&R dated 8th June, 2021(Annexure-B)**.
- f) The Responsible Entity shall ensure that all Critical Systems designed with Open Source Software are adequately cyber secured.
- g) The Responsible Entity as a best practise upon any incidence of Cyber Security Breach shall carry out cyber security tests at any lab designated for cyber testing by Ministry of Power. These tests shall be similar to Pre Commissioning Security Test and those essential for carrying out Post Incident Forensics Analysis.

Article 14 Cyber Security Audit

- a) The Responsible Entity shall implement Information Security Management System (ISMS) covering all its Critical Systems.
- b) The Responsible Entity shall through a CERT-In Empanelled Cyber Security OT Auditor shall get their IT as well as OT System audited at least once in every 6 (six) months and shall close all critical and high vulnerabilities within a period of one month and medium as well as low non-conformity before the next audit. Effective closure of all non-conformities shall be verified during the next audit.
- c) The Cyber Security Audit shall be as per ISO/IEC 27001 along with sector specific standard ISO/IEC 27019, IS 16335 and other guidelines issued by appropriate Authority if any. These mentioned standards shall be current with all amendments if any and in case if any standard is superseded, the new standard shall be applicable. CISO shall ensure immediate closure of non-conformance, based on the criticality and by means all non-conformances are to be closed before the next audit.
- d) The Responsible Entity shall ensure that CISO has all the required systems and documents in place, as mandated by NSCS for base line cyber security audit.

FAT & SAT

1. During FAT stage, the customer has to verify all types test reports / certificates including Communication protocol and security conformance tests of the devices offered for FAT.
2. FAT of SCADA involves testing as a whole system in the integrated scale down set up. For SCADA, Indian standard IS 15953: 2011 “SCADA System for Power System Applications” provides definition and guidelines for the specification, performance analysis and application of SCADA systems for use in electrical utilities (for transmission & Distribution) including guidance on Tests and inspections.
3. The SAT will be done at customer site as per the SAT document mutually agreed by buyer and supplier. For SAT also, guidance from IS 15953: 2011 need to be applied.
4. IEC 61850-10-3 Communication Networks and Systems For Power Utility Automation- Functional testing of IEC 61850 systems (in draft stage - CDTR) covers testing of applications within substations covering
 - a. A methodical approach to the verification and validation of a substation solution
 - b. The use of IEC 61850 resources for testing in Edition 2.1
 - c. Recommended testing practices for different use cases
 - d. Definition of the process for testing of IEC 61850 based devices and systems using communications instead of hard wired system interfaces (ex. GOOSE and SV instead of hardwired interfaces)
 - e. Use cases related to protection and control functions verification and testing.

This standard may be used as a guidelines for FAT & SAT for Substation Automation System (SAS) based on IEC 61850.

Annexure - B

Annexure – 1

List of designated laboratories for cyber security conformance testing

Table -A. Field Equipment /Operational Technology (OT)

Sl. No.	Equipment	Communication Protocol Conformance Standards	Protocol Security Conformance Standards	Designated Laboratories
1	Remote Terminal Units (RTUs) & PLCs with IEC communications protocols	IEC 60870-5 -101 / IEC 60870-5 -104 (Test Details Annexure 2)	IEC 60870-5- 7 Security extension & IEC 62351 series (specifically IEC 62351-100 parts 1 & 3) (Test Details Annexure-2	Central Power Research Institute (CPRI), Prof Sir C V Raman Road, Sadashivanagar P O. Bengaluru – 560080. Karnataka
2	Intelligent Electronic Equipment / Numerical Protection Relays / Bay Control Units / Bay Protection Units, Gateways, Transformer Tap controller/ changer, etc. with IEC 61850 communication protocol	IEC 61850 – 5 to IEC 61850 – 10 (Test Details Annexure 2)		CPRI
3	Smart meters with IEC 62056 communication protocols	IEC 62056 series / DLMS & IS 15959 series and IS 16444 series (Test details Annexure 2)	IEC 62056 series / DLMS & IS 15959 series and IS 16444 series (Test Details Annexure 2)	1. CPRI 2. Electrical Research and Development Association (ERDA). ERDA Road, GIDC, Makarpura, Vadodara - 390 010 Gujarat 3. Yadav Measurements Pvt. Ltd. (YMPL) 373-375. RIICO Bhamashah Industrial Area Kaladwas 313003 Udaipur – Rajasthan

Information Technology (IT) Equipment (Main / Backup / Disaster recovery (DR) Control Centre / Substation control centre IT equipment)

All IT products procured /supplied shall have a valid Certificate of Common Criteria as per ISO/IEC 15408 issued by signatories of the Common Criteria Recognition Agreement (CCRA) (www.commoncriteriaportal.org).

Import/procurement/supplied from vendors sourcing from prior reference countries, the Certificate for Common Criteria shall be from Government Laboratories in India according to the IC3S scheme operated by Ministry of Electronics and Information Technology, which is a signatory to CCRA.

<https://www.commoncriteria-india.gov.in/>

Details of tests for various identified products**Remote Terminal Units (RTUs) (Sl. No. 1 of Table – A of Annexure – 1)****Test protocol:**

Utilities / manufacturers will submit the sample along with all the required technical documentation for taking up testing to the designated laboratory.

Reference standards

- 1) IEC 60870-5-101 & IEC 60870-5-104 as applicable
- 2) IEC 60870-5-7 Telecontrol equipment and systems - Part 5-7: Transmission protocols - Security extensions to IEC 60870-5-101 and IEC 60870-5-104 protocols (applying IEC 62351)
- 3) IEC 62351-100-1 & IEC 62351-100-3 and other cross referenced standards.

Test cases**Extract from standard (IEC 62351-100-1)**

The conformance test cases are divided into four clauses:

- Clause 5: Verification of configuration parameters. This clause contains the configuration parameters affecting the message contents and/or the protocol behaviour.
- Clause 6: Verification of communication. The goal of this clause is to verify that Device Under Test (DUT) is able to implement the security extension messages as described in IEC TS 60870-5-7.
- Clause 7: Verification of procedures. The goal of this clause is to verify that DUT is able to execute the security extension procedures as described in IEC TS 62351-5.
- Clause 8: Test result chart. This clause contains the results of the test cases listed in Clauses 6 and 7 for each supported value of the configuration parameters listed in Clause 5.

The test cases are organized in tables. They are numbered; their numbering syntax is: Subclause number (where the Table is located) + test case number.

In the column 'reference' each test case has a direct reference to IEC TS 62351-5 or IEC TS 60870-5-7 where the clause under test is defined.

Test cases are mandatory depending on the description in the column 'Required'. The following situations are possible:

M= Mandatory test case. The test is referencing a clause that is mandatory in IEC TS 62351-5 or IEC TS 60870-5-7.

Protocol Information Conformance Statement (PICS) x, x = Mandatory test case if the functionality is enabled in the PICS (by marking the applicable check box), with a reference to the section number of the PICS (x.x).

Conformance testing of security extension procedures

The security extension procedures can be summarized as follows:

- User management
- Update key maintenance
- Session key maintenance
- Challenge/Reply authentication
- Aggressive Mode authentication

Extract from standard (IEC 62351-100-3)

IEC 62351-3 defines the requirements related to the authentication/encryption protocol, procedures and methods to be implemented at TCP/IP (transport) level.

The conformance test cases are divided into three clauses:

- Clause 5: Verification of configuration parameters. This clause contains the parameters specified by the standards referencing IEC 62351-3 (see IEC 62351-3:2014/AMD1:2018, Clause 7) and affecting the protocol behaviour.
- Clause 6: Verification of IEC 62351-3 requirements. The goal of this clause is to verify that DUT is conformant to the requirements of the IEC 62351-3.
- Clause 7: Test result chart. This clause contains the results of the test cases listed in Clause 6 for each supported value of the configuration parameters listed in Clause 5.

The test cases are organized in tables. They are numbered, their numbering syntax is: Subclause number (where the table is located) + test case number.

In the column 'Reference' each test case has a direct reference to IEC 62351-3 where the clause under test is defined. PICS or Protocol Implementation eXtra Information for Testing (PIXIT) could be found in the "Reference" column for some test cases whenever the execution of the test case shall take into account specific parameter values declared in the PICS or PIXIT of the DUT.

Test cases are mandatory depending on the description in the column 'Required'. The following situations are possible:

M = Mandatory test case. The test is referencing to a clause that is mandatory in IEC 62351-3.

PICS

or

PIXIT = Mandatory test case if the functionality is enabled in the PICS or PIXIT by marking the applicable check box or declaring the applicable value.

Intelligent Electronic Devices (IEDs) (Sl. No. 2 of Table – A of Annexure – 1)

Utilities / manufacturers will submit the sample along with all the required technical documentation for taking up testing to the designated laboratory.

Reference standards

IEC 61850 series

Specifically IEC 61850-5, IEC 61850-6, IEC 61850-7, IEC 61850-8, IEC 61850-9 and IEC 61850-10

Test cases

Communication protocol conformance as per IEC 61850 -10. This part of standard defines methods and abstract test cases for conformance testing of client, server and sampled values devices used in power utility automation systems, the methods and abstract test cases for conformance testing of engineering tools used in power utility automation systems, and the metrics to be measured within devices according to the requirements defined in IEC 61850-5. Further this part of standard specifies standard techniques for testing of conformance of client, server and sampled value devices and engineering tools, as well as specific measurement techniques to be applied when declaring performance parameters. The use of these techniques will enhance the ability of the system integrator to integrate IEDs easily, operate IEDs correctly, and support the applications as intended.

Smart Meters (Sl. No. 3 of Table – A of Annexure – 1)

Utilities / manufacturers will submit the sample along with all the required technical documentation for taking up testing to the designated laboratory.

IEC 62056 series of standards (Electricity metering data exchange – The DLMS/COSEM suite) specifies details of communication protocol requirements, conformance testing and security requirements. The Part 5-3 (DLMS/COSEM application layer) specifies the DLMS/COSEM application layer in terms of structure, services and protocols for DLMS/COSEM clients and servers, and defines rules to specify the DLMS/COSEM communication profiles. It defines services for establishing and releasing application associations, and data communication services for accessing the methods and attributes of COSEM interface objects, defined in IEC 62056-6-2 using either logical name (LN) or short name (SN) referencing.

Clause 5 and sub clauses specifies security requirements. It cover security concepts, Identification and authentication, Cryptographic algorithms, Cryptographic keys – overview, Key used with symmetric key algorithms, Keys used with public key algorithms and Applying cryptographic protection.

Note: All above referred standards shall be latest with amendments if any at the time of submission of sample(s) for testing.

Testing Criteria

1) Supply from Trusted Sources

The sample size shall be as specified by CEA as per the approved criteria for Trusted Vendors

2) Supply from other than trusted vendors

The sample size shall be 5% of the supply lot / ordered quantity (minimum one). The manufacturer shall submit request to the Nodal agency along with vendor's / manufacturer's certifications for supply chain management system practices and secure product development process implementations based on any one or more of standards ISO / IEC 27036, ISO / IEC 20243, IEC 62443 for verification.

After scrutiny of vendor's / manufacturer's certifications the supplier / utilities shall be asked to submit product to the designated laboratory for communication and cyber security conformance testing.

The supply lot shall stand rejected on failure to comply with the test requirements.

3) Supply from prior reference countries

The utility shall obtain prior permission from the Government of India for importing the product / system from prior reference countries.

The sample size shall be 10 % of the supply lot / ordered quantity (minimum one). The manufacturer shall submit request to the Nodal agency along with vendor's / manufacturer's certifications for supply chain management system practices and secure product development process implementations based on any one or more of standards ISO / IEC 27036, ISO / IEC 20243, IEC 62443 for verification.

After scrutiny of vendor's / manufacturer's certifications the supplier / utilities shall be asked to submit product to the designated Government / Government controlled Autonomous laboratory for type tests (Annexure – 4) and communication & cyber security conformance testing.

The supply lot shall stand rejected on failure to comply with the test requirements.

Type Tests

Products imported from prior reference countries shall also undergo type testing as per following standards in addition to communication protocol and security conformance testing at the designated Government / Government controlled Autonomous laboratory:

Type test standards for RTUs

1. IEC 60870-1-2:1989 Telecontrol equipment and systems. Part 1: General considerations. Section Two: Guide for specifications.
2. IEC 60870-2-1:1995 Telecontrol equipment and systems - Part 2: Operating conditions - Section 1: Power supply and electromagnetic compatibility.
3. IEC 60870-2-2:1996 Telecontrol equipment and systems - Part 2: Operating conditions -Section 2: Environmental conditions (climatic, mechanical and other non-electrical influences).
4. IEC 60870-3:1989 Telecontrol equipment and systems. Part 3: Interfaces (electrical characteristics)

Type test standard for IEDs / Numerical Protection Relays / Bay controls units

1. IEC 61850-3: 2013, Ed. 2 Communication networks and systems for power utility automation – Part 3: General requirements.

Type test standards for Smart meters

1. IS 16444: 2015 AC static direct connected watthour smart meter class 1 and 2 – Specification.
2. IS 16444 Part 2: 2017 AC static transformer operated watthour and var - Hour smart meters, class 0.2 S, 0.5 S and 1.0 S: Part 2 specification transformer operated smart meters.

Note:

1. All above referred standards shall be latest with amendments if any at the time of submission of sample(s) for testing.
2. Type tests generally covers functionality, environmental, mechanical, EMI/ EMC and electrical safety related tests.

To,
 NTPC Mouda
 Nagpur-441104

Dt: 16/11/2024

Sub: Upgradation of obsolete window OS will reduce the risk of Cyber security issues.

Dear Sir,

With reference to above mentioned subject and our telephonic discussion for Upgradation of ABB make MicroSCADA System at your station which is presently working on obsoleted Microsoft window.

We would like to bring to your kind notice that as per latest Notice issued by Ministry of power dated 02-07-2020, regarding Security, Integrity and reliability of the strategically important and critical power supply system and network mainly arises due to cyber threat.

You may download copy from attached Link below.

(<https://powermin.nic.in/sites/default/files/webform/notices/ORDER.pdf>)

As you know, window OS XP & 7 are declared obsolete by Microsoft and they are not releasing patches to fix vulnerabilities for these OS which will lead to systems are not fully secured toward latest cyber security requirements and are vulnerable to cyber-attacks through malware / Trojans etc., This issue need to be addressed by PowerGrid as notified in the order from Ministry of Power.

Older versions of MicroSCADA are built on some of the technologies such as dot-net framework based on Windows XP/7 platforms. These older versions of MicroSCADA are already now in "Limited" phase of their life cycle meaning; only limited support is available from ABB for such versions. In view of this, we strongly recommend upgrading MicroSCADA to the latest version i.e., MicroSCADA 10 which complies to Cyber security requirements.

Apart from exposing your valuable assets to unnecessary high cyber security risk, the impact of not upgrading Windows XP/7 would also heavily decrease the system availability for the following main reasons:

1. Issues with replacement of defective hardware parts: Compatible Device drivers for new hardware (example: new Network Interface Card that are available in market today) will not be available in older Windows XP/7 PC.
2. Availability of compatible hardware spares parts for old PCs may be scarce e.g., DDR2 memory.
3. In the event of Windows OS crash, activation of outdated Windows OS after re-installation is not supported by Microsoft.
4. No support for fixing issues in other software running on Windows XP/7 PCs such as NMS, SNMP-DPC, MS Office, IED tools, etc.,

Hence once aging we request you kindly review the above notification and do necessary action on the same.

For Hitachi Energy India Limited

Digitally signed by pandurang.narute@hitachienergy.com
 DN: cn=pandurang.narute@hitachienergy.com, o=Hitachi Energy Ltd, ou=Hitachi Energy Ltd
 Date: 2024.11.16 17:15:28 +05'30'

Mr. Pandurang Narute,
 Service Sales Specialist – Grid Automation

Hitachi Energy India Limited

Registered and Corporate Office:
 8th Floor, Brigade Opus, 70/401,
 Kodigehalli Main Road, Bengaluru - 560 092
 Phone: 080 68473700, 080 22041800

Local Address:
 5B-106 & 103, 5th Floor, WeWork Raheja Platinum, Sag
 Baug Road, Off Andheri-Kurla Road, Marol, Andheri (E),
 400059 Mumbai

CIN: L31904KA2019PLC121597
www.hitachienergy.com/in

MicroSCADA 9.3/9.4 upgrade to MicroSCADA 10.x - List of features/benefits:

(please correlate with existing license, version, configuration for applicability of any features)



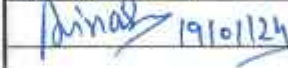
- 1. Support for latest Windows:** Latest version of MicroSCADA enhances the life of the Substation Automation system by supporting Microsoft Windows 10 & Windows Server 2019 operating systems.
- 2. IEC 61850 Ed2 Support:** Latest version of MicroSCADA is IEC 61850 Ed. 2 & 2.1 compliant. With this latest version it is possible to integrate existing Ed.1 IEDs/devices and future Ed.2 IEDs/devices.
MicroSCADA now supports setting substituted values in the IEDs. If the IED supports substitution, the object's Control Dialog will have a new tab for setting substituted values (This needs configuration in MicroSCADA). The Control Dialogs for switching devices now also recognize objects in the test mode and in this mode, test commands can also be issued. MicroSCADA can now also recognize control commands originating from another IEC 61850 client and present these in the event list. This feature is based on the Service Tracking events from the IED in question.
- 3. IEC 60870-5-101/104 Security extensions:** The IEC 60870-5-101/104 communication protocols have been extended with security features according to IEC60870-5-7 which in turn is based on IEC62351. The support includes secure authentication according to IEC62351-5 as well as communication encryption based on IEC62351-3. The encryption is applicable only for IEC60870-5-104.
The new security features are available both for master and slave variants of the protocols.
- 4. SNMP support:** SNMP is included within MicroSCADA as an option for device supervision. Devices supporting SNMP like Ethernet switch, GPS etc., can be monitored from MicroSCADA.
- 5. Workplace session restoration after HSB switchover:** The workplace handling at Hot Stand-by switch-over is improved so that the workplaces can be fully automatically restored to correct displays and layouts. This functionality can be achieved using Remote Desktop Services (previously Terminal Services) and the OpenRemoteDesktop facility.
- 6. Measurement Reports and Trends Display -Graphical View:** Curve highlighting: Curves and their associated Y-axis can be highlighted (inversed color blinking) for a short time when the object is selected in the legend. This helps to locate the selected curve in the graph. Also, if a curve is selected in the graphical area the associated legend line will be selected.
- 7. Process Display object highlight:** Clickable objects are now highlighted with a frame when the mouse hovers on top of the object. This function must be activated in the Display Builder. The colors and frame size can be configured.
- 8. Control Panel:** The control panel has been completely revised. The main functionality of Control Panel can be divided to four parts:
 - a. SYS600 service activation and supervision
 - b. Application, process and service monitoring
 - c. Base system configuration

- d. License handling
9. **Backup in Control Panel:** The SYS600 Control Panel now includes a convenient way to take disk backups. The disk backup can be taken during system operation.
 10. **Hot-Standby optimization:** several improvements have been implemented to enhance the functionality and performance of Hot-Standby functionality. The time taken for Standby system to get ready has been substantially reduced.
 11. **Workstation-specific role selection:** Now you can define the user roles per workstation. For example, operator role can only be used at the one control room workstation or the Administrator and Engineering roles can only be used at the other workstation.
 12. **Single login mode for stricter user session policy:** The single login mode means that defined users can only have one active session at a time. If the user with the single login mode activated tries to open several sessions, the system will deny subsequent login attempts after the first one. With this feature, the administrator can enforce a stricter user session policy.
 13. **Area of Responsibility (AoR):** The process can be divided into freely defined areas (i.e. voltage levels, bay or sub-systems) in order to allow operators to have different roles per area. AoR incorporates Exclusive Access Rights, where the system ensures that there is only one operator with control authority at a time for a particular area.
 14. **Windows SSO user mapping:** Now it is possible to map credential of SSO account to MicroSCADA user account. Single Sign-On user account is blocked for local login access.
 15. **Anonymous user:** Logs in an "anonymous" user automatically when the Workplace (Monitor Pro) is started. It has one pre-defined role with configurable access rights. When the anonymous user is logged in, another user can also log in, for instance to perform some control operations.
 16. **Security Compliance Tool:** Easily install Windows security configuration with a graphical user interface. Engineer can select the security features to harden Windows operating system for better control over the settings compared to using scripts.
 17. **Encryption of SYS-SYS Communication:** Now protecting the communication from i.e. sniffing and tampering of the traffic. The secure communication between SYS600 nodes (e.g. Hot-Standby systems) is based on the TLS protocol and public key cryptography-based authentication.
 18. **TLS support in DR collection:** Now new MicroSCADA IEC 61850 Client supports disturbance recording transfer and TLS (Transport Layer Security) up to version 1.3.
 19. **Extended Central User Account Management (UAM):** Besides local now the UAM function works in two modes: local and central. In the new central mode, Central Account Management (CAM) function is used for user authentication, -data management and password policy management, whilst role management, authorization management and authorization are handled by Station level MicroSCADA.

20. **Role Based Access Control:** The revised User Account Management tool supports defining roles and assigning them to the user accounts. Defining roles for the users directly allows a fast and an easy way of maintaining permissions of multiple same level users.
21. **User Activity Logging:** For improved security, user session and user account events management are separated from other types of events. User activity events go now under cyber security events, where they are stored securely and require a dedicated viewer that obliges specific access rights.
22. **Improvements in Security Compliance Manager:** The Security Compliance Manager (SCM) has been enhanced with improved functionality. The SCM can now produce reports both for the baselines (recommended security settings) and for the audit (differences between the recommended and the actual settings). Security Compliance Manager (SCM) now includes security baselines for Windows 10 and Windows Server 2019.
23. **Improved password protection:** User account cannot be modified or deleted without proper access rights.
24. **Enhanced password policy:** Administrator can define password policies for a minimum complexity of the passwords.
25. **Auto-logout after inactivity:** Avoid leaving user sessions open by mistake in Pro Workplace.
26. **Automated registration of username:** The event history registers the username for all operations initiated by the user. The username can be shown in a separate column in the event list.
27. **Alarm Generation from Low Warning and High Warning Limits:** High Warning (HW) and Low Warning (LW) limits can be configured to generate alarms for analog input objects.
28. **Control supervision:** It is possible to activate a control supervision for the Power Process switch devices. This means that when the control supervision is enabled, an event (and alarm) is generated if the switch indication is not received before the timeout is elapsed. The timeout starts to run after the execute command has been sent.

Honeywell

MINUTES OF MEETING HPS SYSTEM

CUSTOMER :- NTPC, MAUDA (2X500MW) END USER :- NTPC, MAUDA (2X500MW)		PROJECT: - NTPC, MAUDA SWITCHGEAR SCADA
PROJECT PO NO.: - 4000323399-046-1035 Date : 29.12.2023		PROJECT INP: -
DURATION: - 18 th JAN 2024 TO 19 th JAN 2024		MOM DATE: - 19 th JAN 2024
MOM LOCATION: - NTPC, MAUDA		WRITTEN BY: - AVINASH SINGH
DOC NO.: - NTPC MAUDA-MOM-01		TOTAL SHEETS : - 6 PAGES
ATTENDENTS		SIGNATURES
1	MR. NARAYAN REDDY – M/s NTPC	 19/01/24
2	Mr. RAHUL KUMAR – M/s NTPC	 19.01.2024
3	Mr. AVINASH SINGH – M/s HAIL	 19/01/24
4		
5		
6		
7		
CC TO: -		REMARKS: -

**MINUTES OF MEETING
HPS SYSTEM**

Sr.No.	DESCRIPTION OF DISCUSSION	ACTION BY	DUE DATE
1	M/s HAIL engineer Mr. Avinash Singh visited NTPC Mouda Site from 18th Jan 2024 to 19 th Jan 2024 for attending SCADA System And Survey For Upgradation of Software of SCADA System.	Info	NA
2	Following activities are completed during this period: 1) Checked the Hardware healthiness of all the 4 Nos. of Data Concentrators 2) Checked the Software healthiness of all the 4 Nos. of Data Concentrators 3) Checked the communication from Data Concentrator to numerical relays. 4) Checked the communication between Data Concentrator and DDCMIS	Info	NA
3	Test Report of the Hardware checks conducted during this visit: a) <u>SERVER CABINET SVR-DC#01:</u> 1) Data concentrator - Not working. 2) Ethernet Switches – Ok. 3) 17" Flip type Monitor – not working. 4) GPS – not working. 5) DI Card – Ok. 6) 24V DC Power Supply – Ok. b) <u>SERVER CABINET SVR-DC#02:</u> 1) Data concentrator - DC not working as per requirements and DVD Drive is not working. 2) Ethernet Switches – Ok. 3) 17" Flip type Monitor – Ok. 4) DI Card –Ok. 5) 24V DC Power Supply – Ok. c) <u>SERVER CABINET SVR-DC#03:</u> 1) Data concentrator – Not working. 2) Ethernet Switches – Ok.	Info	NA

**MINUTES OF MEETING
HPS SYSTEM**

Sr.No.	DESCRIPTION OF DISCUSSION	ACTION BY	DUE DATE
4	<p>3) 17" Flip type Monitor – Not working.</p> <p>4) DI Card – Ok.</p> <p>5) 24V DC Power Supply – Ok.</p> <p>d) <u>SERVER CABINET SVR-DC#04:</u></p> <p>1) Data concentrator - DC not working as per requirements and DVD Drive is not working.</p> <p>2) Ethernet Switches – Ok.</p> <p>3) 17" Flip type Monitor – Ok.</p> <p>4) DI Card – Ok.</p> <p>5) 24V DC Power Supply – Ok.</p> <p>Test Report of the Software checks conducted during this visit:</p> <p>a) <u>SERVER CABINET SVR-DC#01:</u></p> <p>1) Operating System – Not working.</p> <p>2) Experion PKS Software – Not working.</p> <p>3) IEC61850 Communication – Not working.</p> <p>4) Modbus Communication – Not working.</p> <p>5) Microsoft office – Not working.</p> <p>6) Antivirus Software – Outdated</p> <p>b) <u>SERVER CABINET SVR-DC#02:</u></p> <p>1) Operating System – Ok, but too slow.</p> <p>2) Experion PKS Software – Ok, but some time its hang.</p> <p>3) IEC61850 Communication – Ok, but some time its hang.</p> <p>4) Modbus Communication – Ok.</p> <p>5) Microsoft office – Ok.</p> <p>6) Antivirus Software – Outdated</p> <p>c) <u>SERVER CABINET SVR-DC#03:</u></p>	Info	NA

**MINUTES OF MEETING
HPS SYSTEM**

Sr.No.	DESCRIPTION OF DISCUSSION	ACTION BY	DUE DATE
	1) Operating System – Not working. 2) Experion PKS Software – Not working. 3) IEC61850 Communication – Not working. 4) Modbus Communication – Not working. 5) Microsoft office – Not working. 6) Antivirus Software – Outdated d) <u>SERVER CABINET SVR-DC#04:</u> 1) Operating System – Ok, but too slow. 2) Experion PKS Software – Ok, but some time its hang. 3) IEC61850 Communication – Ok, but some time its hang. 4) Modbus Communication – Ok. 5) Microsoft office – Ok. 6) Antivirus Software – Outdated		
5	It was observed that Hard disk capacity for all the data concentrator was full and the system becomes very slow	Info	NA
6	All the relay communication from Data Concentrator to numerical relays tested and the result found that some switch boards relay not pinged up to dc server. Details of switchboards which were not in working condition are:- 1) Ring 1: UB and SA switchboards 2) Ring-2: UA and UB 3) Ring-3: ASP 1 4) Ring-4: SWYD swgr, FO cable cut for st-1 HCSD HAIL requested NTPC to recheck all the numerical relays communication from Data Concentrator panel and take the necessary action to restore the communication if anything (for ex: LAN Cable, Relay LAN port or FO	Info	NA



**MINUTES OF MEETING
HPS SYSTEM**


Sr.No.	DESCRIPTION OF DISCUSSION	ACTION BY	DUE DATE
7	<p align="center">Cable cut) found faulty.</p> <p><u>Honeywell recommendation:</u></p> <p>Software version installed in the present Data Concentrator System is outdated and HAIL recommends for upgrading the system.</p> <p>The hardware and the software, including the operating systems, installed at this site are now obsolete and there is no support from OEM for these because of the obsolescence.</p> <p><u>Following are the advantages of Upgrading the System:</u></p> <ol style="list-style-type: none"> 1.Data Concentrators with new hardware is easy to use. 2.RAM and Hard disk capacity is more in the new System, and it will resolve the problems of hanging of Data communication to DDCMIS permanently. 3.There was no support from the Microsoft for the existing Operating System (Windows Server 2008) provided in the Data Concentrator Server. 4.Upgraded system shall be provided with IEC61850 Edition 2. 5.Data Base creation for the numerical relays will becomes easy in the Upgraded system. 6.Fault finding for the numerical relay communication is easy with the Upgraded system. 7.Preparation of Single line Diagrams and other HMI pages are easy with the Upgraded system. 8.Dynamic linking is easy with the Upgraded system. 9.There is no Technical Assistance Center (TAC) support at Honeywell for the present version of Software installed at this site. So new upgradation of hardware and software will help in providing Technical assistance in case of any problems. 	Info	NA
8	<p>Following Material identified as requirement for the upgradation software and hardware of the Switchgear SCADA System for UNIT-1 & UNIT-2.</p>	Info	NA



**MINUTES OF MEETING
HPS SYSTEM**

Sr.No.	DESCRIPTION OF DISCUSSION				ACTION BY	DUE DATE
	S.No	Description of Material	Qty	Unit		
	1	Data concentrator servers	4	Nos		
	2	Engineering Work Stations (CPU, Monitor, Mouse and KeyBoard)	2	Nos		
	3	Operator Work Stations (CPU, Monitor, Mouse and KeyBoard)	2	Nos		
	4	GPS(GPS Receiver, Antenna and 100meter cable from antenna to GPS receiver)	1	No		
	5	IEC61850 Complied Ethernet Switch with 24Nos 10/100Mbps Cu Port + 2Nos of 1000MBPS SMFO Ports (if necessary)	8	Nos		
	6	Cat6 LAN Cable (1Bundle of 305meters)	1	Nos		
	7	RJ45 LAN Connectors (Compatible to CAT6 Lan Cable)	50	Nos		
9	Offer for upgradation of SCADA system along with new system architecture will be submitted by HAIL to NTPC within one week time.				HAIL	27.01.24
10.	HAIL Engineer left the site on 19 th Jan 2024. M/s Honeywell will charge BOQ for two days.					

1. Reddy 19/01/24
(Gururaj Reddy)

2.  R. Srinivas
Sr. Engineer
M/s NTPC
19.01.2024


M/s HAIL

**MINUTES OF MEETING BETWEEN NTPC AND BHEL REGARDING TG END-WINDING
VIBRATION MONITORING SYSTEM (EWVMS) ON 31.08.2022**

BHEL Haridwar

Mr. Rajesh Ranjan, AGM-ISE, CPL & GRI
 Mr. R.C. Sharma, AGM-EME
 Mr. Anirudh Tijare, AGM-ISE, CPL & GRI
 Mr. Rajnish Gupta, AGM-CIE
 Mr. A.K. Goyal, SDGM-EME
 Mr. Satish Kumar, SDGM-CIE
 Mr. Ajay Kumar Gupta, DGM-EME
 Mr. R.S. Dewangan, Sr. Mgr-EME
 Mr. Minkosh Kumar, Sr. Mgr-ISE
 Mr. Avinash Kumar Akela, Dy. Mgr-GRI

NTPC

Mr. B.K. Singh, Ex ED-NTPC
 Mr. Debabrata Nanda, DGM-NTPC/CC-OS
 Mr. Sumit Bag, Sr. Mgr, NTPC Vindhyachal

NTPC informed the incident of Ramagundam-7, regarding the flashover in the junction box having termination of end winding vibration monitoring cable, during the checking of the interturn protection before synchronisation, in current overhaul in Aug-2022. On investigation, the braiding used for holding the sensor on the bar ends was also found charred. In view of the boxed up condition of the generator, it was decided to remove the charred braiding along with the sensors & to isolate the signal cable from rest of the sensors and go ahead for synchronisation, without End Winding Vibration Monitoring System (EWVMS).

In reference to above, BHEL informed that the charring of the braiding might have occurred due to flashover between bar head and the metallic sensor/signal cable through the braiding. The piezoelectric EWV monitoring system consists of Piezo-electric Accelerometers which are essentially of metallic structure. To make it suitable for the normal operating voltage levels inside the machine, the piezo-electric accelerometers are mounted only on neutral/near neutral locations which have very low voltage. The creepage path for voltage is further increased by introducing sensor mounting on special type of base plate.

Such types of Piezo-electric Accelerometer based End Winding Vibration Measurement System have been running on many power plants across the country satisfactorily in general. However, the system does have certain limitations like:

- No high voltage associated testing during overhauling is possible with the EWVMS probes connected.
- Though the accelerometers are mounted on neutral/near neutral locations which have very low voltage, but during ground fault conditions it may experience higher voltages, which may damage the monitoring system.




As such, it has been decided to use state-of-art Fibre-Optic-Accelerometer (FOA) based end-winding vibration monitoring systems which is now almost universally being used by all major OEMs including Siemens. FOA based system has no metallic parts inside the generator, thus it can be mounted on any location of the stator overhang windings. BHEL has started offering the FOA based EWVMS for new projects, based on project requirements, including NTPC generators like 500MW Vindhyachal stage-V and Unchahar stage-IV. Further, it is confirmed that the FOA based system can also be implemented in the old sets as retrofit solution.

In view of the above, the short term and long term recommendations are as follows:

Short term recommendations:

- To remove the existing piezo-electric system during overhauling and to operate the machine without any measurement of end winding vibrations.

Long term recommendations:

- To go for implementation of installation of FOA based EWVMS System for old sets to replace existing system with Piezo-electric Accelerometer.

(BHEL)

Ranjana
01/09/2022

R Sharma
1.9.22

Goyal
01/09/22
(A.K.Goyal)

(NTPC)

B.K. SINGH
(B.K.SINGH)
D NANDA
01/9/2022
(D NANDA)



भारत का राजपत्र The Gazette of India

सी.जी.-डी.एल.-अ.-01012022-232336
CG-DL-E-01012022-232336

असाधारण

EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (ii)

PART II—Section 3—Sub-section (ii)

प्राधिकार से प्रकाशित

PUBLISHED BY AUTHORITY

सं. 5075]

नई दिल्ली, शुक्रवार, दिसम्बर 31, 2021/पौष 10, 1943

No. 5075]

NEW DELHI, FRIDAY, DECEMBER 31, 2021/PAUSHA 10, 1943

पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय

अधिसूचना

नई दिल्ली, 31 दिसम्बर, 2021

का.आ. 5481(अ).—केन्द्रीय सरकार ने भारत सरकार के तत्कालीन पर्यावरण और वन मंत्रालय की अधिसूचना सं. का.आ. 763 (अ) तारीख 14 सितम्बर, 1999 द्वारा कोयला या लिग्नाइट आधारित ताप विद्युत संयंत्रों से तीन सौ किलोमीटर के विनिर्दिष्ट व्यास के भीतर ईटों के विनिर्माण के लिए उपजाऊ मिट्टी के उत्खनन को प्रतिबंधित करने के लिए और भवन निर्माण सामग्री के विनिर्माण में और संनिर्माण क्रियाकलाप में फ्लाई-राख के उपयोग को बढ़ावा देने के लिए निदेश जारी किए हैं;

और, प्रदूषणकर्ता भुगतान सिद्धांत (पीपीपी) के आधार पर, ऐसा करके कोयला या लिग्नाइट आधारित ताप विद्युत संयंत्रों द्वारा फ्लाई-राख का 100 प्रतिशत उपयोग सुनिश्चित करते हुए और फ्लाई-राख प्रबंधन प्रणाली की संधारणीयता के लिए पूर्वोक्त अधिसूचना को और अधिक प्रभावकारी ढंग से कार्यान्वित करने हेतु, केन्द्रीय सरकार ने मौजूदा अधिसूचना की समीक्षा की;

और प्रदूषणकर्ता भुगतान सिद्धांत के आधार पर पर्यावरणीय प्रतिकर निर्धारित किए जाने की आवश्यकता है;

और, विनिर्माण को बढ़ावा देकर तथा निर्माण कार्य के क्षेत्र में राख आधारित उत्पादों तथा भवन निर्माण सामग्रियों के प्रयोग को अनिवार्य करके उपजाऊ मिट्टी को संरक्षित करने की आवश्यकता है;

	सीमेंट शीट या पाइप या बोर्ड या पैनल): ii. सीमेंट विनिर्माण: iii. रेडी मिक्स कंक्रीट: iv. राख और जीओ-पॉलिमर आधारित निर्माण सामग्री: v. सिंटर्ड या कोल्ड बॉन्डेड राख एग्रीगेट का निर्माण: vi. सड़कों, सड़क और फ्लाई ओवर के पुशतों का निर्माण: vii. बांधों का निर्माण: viii. निम्न भू-क्षेत्र का भराव: ix. खनिज क्षेत्रों का भराव: x. अधिभार वाले डम्पों में उपयोग: xi. कृषि: xii. तटीय जिलों में तटरेखा सुरक्षा संरचनाओं का निर्माण: xiii. अन्य देशों की राख का निर्यात xiv. अन्य (कृपया विनिर्दिष्ट करें):			
20.	सार :			
	ब्यौरा	सृजित मात्रा (एमटीपी)	उपयोग की गई मात्रा (एमटीपी) और (%)	शेष मात्रा (एमटीपी)
	रिपोर्टिंग की अवधि के दौरान राख			
	पुरानी राख			
	कुल			
21.	कोई अन्य सूचना : वार्षिक अनुपालन रिपोर्ट, और विद्युत संयंत्रों और राख कुण्डों की शेष फाइलों की सॉफ्ट कॉपी ई-मेल:- moefcc- coalash@gov.in पर भेजी जाए।			
22.	प्राधिकृत हस्ताक्षरकर्ता के हस्ताक्षर			

**MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE
NOTIFICATION**

New Delhi, the 31st December, 2021

S.O. 5481(E).—Whereas by notification of the Government of India in the erstwhile Ministry of Environment and Forests *vide* S.O.763 (E), dated the 14th September, 1999, as amended from time to time, the Central Government, issued directions for restricting the excavation of top soil for manufacturing of bricks and promoting the utilisation of fly ash in the manufacturing of building materials and in construction activity within a specified radius of three hundred kilometres from the coal or lignite based thermal power plants;

And whereas, to implement the aforesaid notification more effectively based on the polluter pays principle (PPP) thereby ensuring 100 per cent utilisation of fly ash by the coal or lignite based thermal power plants and for the sustainability of the fly ash management system, the Central Government reviewed the existing notification; and whereas environmental compensation needs to be introduced based on the polluter pays principle;

And whereas, there is a need to conserve top soil by promoting manufacture and mandating use of ash based products and building materials in the construction sector;

And whereas, there is a need to conserve top soil and natural resources by promoting utilisation of ash in road laying, road and flyover embankments, shoreline protection measures, low lying areas of approved projects, backfilling of mines, as an alternative for filling of earthen materials;

And whereas, it is necessary to protect the environment and prevent the dumping and disposal of fly ash discharged from coal or lignite based thermal power plants on land;

And whereas, in the said notification the phrase 'ash', has been used which includes both fly ash as well as bottom ash generated from the Coal or Lignite based thermal power plants;

And whereas, the Central Government intends to bring out a comprehensive framework for ash utilisation including system of environmental compensation based on polluter pays principle;

And whereas, a draft notification on ash utilisation by coal or lignite thermal power plants in supersession of the notification of the Government of India, Ministry of Environment and Forests published in the Gazette of India, Extra Ordinary part II, section 3, sub-section (i) *vide* S.O.763 (E), dated the 14th September, 1999, by notification in exercise of the powers conferred under sub-section (1) and clause (v) of sub-section (2) of section 3 of the Environment (Protection) Act, 1986 (29 of 1986) read with clause (d) of sub-rule (3) of rule (5) of the Environment (Protection) Rules, 1986, was published in the Gazette of India, Extraordinary, Part II, section 3, sub-section (i), *vide* G.S.R. 285(E), dated the 22nd April, 2021 inviting objections and suggestions from all persons likely to be affected thereby before the expiry of sixty days from the date on which copies of the Gazette containing the said draft provisions were made available to the public;

And, whereas all the objections and suggestions received from all persons likely to be affected thereby in respect of the said draft notification have been duly considered by the Central Government;

Now, therefore, in exercise of the powers conferred by sub-section (1) and clause (v) of sub-section (2) of section 3 of the Environment (Protection) Act, 1986 (29 of 1986) read with clause (d) of sub-rule (3) of rule (5) of the Environment (Protection) Rules, 1986, and in supersession of the Notification S.O.763 (E), dated the 14th September, 1999 except as respect things done or omitted to be done before such supersession, the Central Government hereby issues the following notification on ash utilisation from coal or lignite thermal power plants which shall come into force on the date of the publication of this notification, namely:-

A. Responsibilities of thermal power plants to dispose fly ash and bottom ash.—

- (1) Every coal or lignite based thermal power plant (including captive or co-generating stations or both) shall be primarily responsible to ensure 100 per cent utilisation of ash (fly ash, and bottom ash) generated by it in an eco-friendly manner as given in sub-paragraph (2);
- (2) The ash generated from coal or lignite based thermal power plants shall be utilised only for the following eco-friendly purposes, namely:-
 - (i) Fly ash based products viz. bricks, blocks, tiles, fibre cement sheets, pipes, boards, panels;
 - (ii) Cement manufacturing, ready mix concrete;
 - (iii) Construction of road and fly over embankment, Ash and Geo-polymer based construction material;
 - (iv) Construction of dam;
 - (v) Filling up of low lying area;
 - (vi) Filling of mine voids;
 - (vii) Manufacturing of sintered or cold bonded ash aggregate;
 - (viii) Agriculture in a controlled manner based on soil testing;
 - (ix) Construction of shoreline protection structures in coastal districts;

- (x) Export of ash to other countries;
- (xi) Any other eco-friendly purpose as notified from time to time.
- (3) A committee shall be constituted under the chairmanship of Chairman, Central Pollution Control Board (CPCB) and having representatives from Ministry of Environment, Forest and Climate Change (MoEFCC), Ministry of Power, Ministry of Mines, Ministry of Coal, Ministry of Road Transport and Highways, Department of Agricultural Research and Education, Institute of Road Congress, National Council for Cement and Building Materials, to examine and review and recommend the eco-friendly ways of utilisation of ash and make inclusion or exclusion or modification in the list of such ways as mentioned in Sub-paragraph (2) based on technological developments and requests received from stakeholders. The committee may invite State Pollution Control Board or Pollution Control Committee, operators of thermal power plants and mines, cement plants and other stakeholders as and when required for this purpose. Based on the recommendations of the Committee, Ministry of Environment, Forest and Climate Change (MoEFCC) may publish such eco-friendly purpose.
- (4) Every coal or lignite based thermal power plant shall be responsible to utilise 100 per cent ash (fly ash and bottom ash) generated during that year, however, in no case shall utilisation fall below 80 per cent in any year, and the thermal power plant shall achieve average ash utilisation of 100 per cent in a three years cycle:

Provided that the three years cycle applicable for the first time is extendable by one year for the thermal power plants where ash utilisation is in the range of 60-80 per cent, and two years where ash utilisation is below 60 per cent and for the purpose of calculation of percentage of ash utilisation, the percentage quantity of utilisation in the year 2021- 2022 shall be taken into account as per the table below:

Utilisation percentages of thermal power plants	First compliance Cycle to meet 100 per cent utilisation	Second compliance cycle onwards, to meet 100 per cent utilisation
>80 per cent	3 years	3 years
60-80 per cent	4 years	3 years
<60 per cent	5 years	3 years

Provided further that the minimum utilisation percentage of 80 per cent shall not be applicable to the first year and first two years of the first compliance cycle for the thermal power plants under the utilisation category of 60-80 per cent and <60 per cent, respectively.

Provided also that 20per cent of ash generated in the final year of compliance cycle may be carried forward to the next cycle which shall be utilised in the next three years cycle along with the ash generated during that cycle.

- (5) The unutilised accumulated ash i.e. legacy ash, which is stored before the publication of this notification, shall be utilised progressively by the thermal power plants in such a manner that the utilization of legacy ash shall be completed fully within ten years from the date of publication of this notification and this will be over and above the utilisation targets prescribed for ash generation through current operations of that particular year:

Provided that the minimum quantity of legacy ash in percentages as mentioned below shall be utilised during the corresponding year and the minimum quantity of legacy ash is to be calculated based on the annual ash generation as per installed capacity of thermal power plant.

Year from date of publication	1 st	2 nd	3 rd -10 th
Utilisation of legacy ash (in percentage of Annual ash)	At least 20 per cent	At least 35 per cent	At least 50 per cent

Provided further that the legacy ash utilisation shall not be required where ash pond or dyke has stabilised and the reclamation has taken place with greenbelt or plantation and the concerned State Pollution Control Board shall certify in this regard. Stabilisation and reclamation of an ash pond or dyke including certification by the Central Pollution Control Board (CPCB) or State Pollution Control Board (SPCB) or Pollution Control Committee (PCC) shall be carried out within a year from the date of publication of this notification. The ash remaining in all other ash ponds or dykes shall be utilised in progressive manner as per the above mentioned timelines.

Note: The obligations under sub-paragraph (4) and (5) above for achieving the ash utilisation targets shall be applicable from 1st April, 2022.

- (6) Any new as well as operational thermal power plant may be permitted an emergency or temporary ash pond with an area of 0.1 hectare per Mega Watt (MW). Technical specifications of ash ponds or dykes shall be as per the guidelines of Central Pollution Control Board (CPCB) made in consultation with Central Electricity Authority (CEA) and these guidelines shall also lay down a procedure for annual certification of the ash pond or dyke on its safety, environmental pollution, available volume, mode of disposal, water consumption or conservation in disposal, ash water recycling and greenbelt, etc., and shall be put in place within three months from the date of publication of this notification.
- (7) Every coal or lignite based thermal power plant shall ensure that loading, unloading, transport, storage and disposal of ash is done in an environmentally sound manner and that all precautions to prevent air and water pollution are taken and status in this regard shall be reported to the concerned State Pollution Control Board (SPCB) or Pollution Control Committee (PCC) in Annexure attached to this notification.
- (8) Every coal or lignite based thermal power plant shall install dedicated silos for storage of dry fly ash silos for at least sixteen hours of ash based on installed capacity and it shall be reported upon to the concerned State Pollution Control Board (SPCB) or Pollution Control Committee (PCC) in the Annexure and shall be inspected by Central Pollution Control Board (CPCB) or State Pollution Control Board (SPCB) or Pollution Control Committee (PCC) from time to time.
- (9) Every coal or lignite based thermal power plant (including captive or co-generating stations or both) shall provide real time data on daily basis of availability of ash with Thermal Power Plant (TPP), by providing link to Central Pollution Control Board's web portal or mobile phone App for the benefit of actual user(s).
- (10) **Statutory obligation of 100 per cent utilisation of ash shall be treated as a change in law, wherever applicable.**

B. For the purpose of utilisation of ash, the subsequent sub-paras shall apply.—

- (1) All agencies (Government, Semi-government and Private) engaged in construction activities such as road laying, road and flyover embankments, shoreline protection structures in coastal districts and dams within 300 kms from the lignite or coal based thermal power plants shall mandatorily utilise ash in these activities:

Provided that it is delivered at the project site free of cost and transportation cost is borne by such coal or lignite based thermal power plants.

Provided further that thermal power plant may charge for ash cost and transportation as per mutually agreed terms, in case thermal power plant is able to dispose the ash through other means and those agencies makes a request for it and the provisions of ash free of cost and free transportation shall be applicable, if thermal power plant serves a notice on the construction agency for the same.

- (2) The utilisation of ash in the said activities shall be carried out in accordance with specifications and guidelines laid down by the Bureau of Indian Standards, Indian Road Congress, Central Building Research Institute, Roorkee, Central Road Research Institute, Delhi, Central Public Works Department, State Public Works Departments and other Central and State Government Agencies.

Fwd: Urgent mail Fwd: Supply of "Eltek make charger spares for SG TG and Offsite area at NTPC Mouda(Enquiry No. 9900217430& GePNIC Tender ID: 2021_NTPC_47839_1)-reg.

RATHORE MANISH <manishrathore@ntpc.co.in>

Thu 4/22/2021 6:40 PM

To:Rahul Mishra राहुल मिश्र <rahulmishra@ntpc.co.in>

1 attachments (204 KB)

ds-241115.205.ds3-1-7-1.pdf;

आदरणीय महोदय/ महोदया,

सादर,

मनीष राथोड़/ Manish Rathore

वरिष्ठ प्रबन्धक (सी एंड आई) / Sr.Manager (C&I)

मौदा सुपर थर्मल पावर स्टेशन/ Mouda Super Thermal Power Station

एनटीपीसी लिमिटेड/ NTPC Limited

मौदा रामटेक रोड/ Mouda Ramtek Road

नागपुर -४४११०४/ Nagpur – 441104

----- Forwarded Message -----

From: "Sunil.Dhyani" <Sunil.Dhyani@deltaww.com>

To: "Jai Kishore Gupta" <jaikishoregupta@ntpc.co.in>

Cc: "Manish Rathore Rathore" <manishrathore@ntpc.co.in>, "Rajib Gupta" <Rajib.Gupta@eltek.com>, "Arvind Gupta" <Arvind.Gupta@eltek.com>, "Amit.Gautam" <Amit.Gautam@deltaww.com>, "Kiran Kumar" <Kiran.Kumar@deltaww.com>

Sent: Wednesday, April 21, 2021 3:48:02 PM

Subject: Urgent mail Fwd: Supply of "Eltek make charger spares for SG TG and Offsite area at NTPC Mouda(Enquiry No. 9900217430& GePNIC Tender ID: 2021_NTPC_47839_1)-reg.

****Security Advisory: This Email has been sent by a Non-NTPC mail ID from Internet. The Actual sender determined by Security Gateway is [Sunil.Dhyani@deltaww.com]. Please do not click links contained in this mail or open attachments unless you recognise the source of this email and know the content is safe. ****
Dear Sir,

This is in reference to your trail mail, this is to inform that Rectifier Module (Rectifier Module FP2 of 24/2000 Ni-Cd) is obsolete however we have alternative Rectifier Module 24V/1800W which is having voltage band till 28.8V only & enclosed is datasheet for your ready reference.

If that will serve the purpose, we can provide the proposal accordingly with separate quote.

So, kindly confirm if the same is ok and serves your requirement so that we may submit the separate quote for this Rectifier Module.

For further clarifications, if any; please feel free to contact.

Thanks & Regards
SUNIL P DHYANI
Dy. Manager - Customer Support
Mob. 09313165188

-----Original Message-----

From: Jai Kishore Gupta <jaikishoregupta@ntpc.co.in>
Sent: Wednesday, April 21, 2021 3:40 PM
To: Sunil.Dhyani <Sunil.Dhyani@deltaww.com>
Cc: Manish Rathore Rathore <manishrathore@ntpc.co.in>; Rajib Gupta <Rajib.Gupta@eltek.com>; Arvind Gupta <Arvind.Gupta@eltek.com>; Amit.Gautam <Amit.Gautam@deltaww.com>; Kiran Kumar <Kiran.Kumar@deltaww.com>
Subject: Re: Urgent mail Fwd: Supply of "Eltek make charger spares for SG TG and Offsite area at NTPC Mouda(Enquiry No. 9900217430& GePNIC Tender ID: 2021_NTPC_47839_1)-reg.

Dear sir,

Please quote for the 100% equivalent and interchangeable alternative.

शुभ कामनाओं के साथ
With Best Regards,

जय किशोर गुप्ता /JAI KISHORE GUPTA
प्रबंधक-नियंत्रण और इंस्ट्रुमेंटेशन/Mgr.O&M-C&I एन. टी. पी. सी. मौदा / NTPC MOUDA

+91 -8275045098 (मो/ Mob).

----- Original Message -----

From: "Sunil.Dhyani" <Sunil.Dhyani@deltaww.com>
To: "Jai Kishore Gupta" <jaikishoregupta@ntpc.co.in>
Cc: "Manish Rathore Rathore" <manishrathore@ntpc.co.in>, "Rajib Gupta" <Rajib.Gupta@eltek.com>, "arvind gupta" <Arvind.Gupta@eltek.com>, "Amit.Gautam" <Amit.Gautam@deltaww.com>, "Kiran Kumar" <Kiran.Kumar@deltaww.com>
Sent: Wednesday, April 21, 2021 2:25:33 PM
Subject: Urgent mail Fwd: Supply of "Eltek make charger spares for SG TG and Offsite area at NTPC Mouda(Enquiry No. 9900217430& GePNIC Tender ID: 2021_NTPC_47839_1)-reg.

****Security Advisory: This Email has been sent by a Non-NTPC mail ID from Internet. The Actual sender determined by Security Gateway is [Sunil.Dhyani@deltaww.com]. Please do not click links contained in this mail or open attachments unless you recognise the source of this email and know the content is safe. ****
Dear sir,

This is with reference to the bid shared by you, we would like to inform you that RECTIFIER MODULE FP2 24V NI-CD has now become obsolete so we shall not be quoting for the same in the bid.

For rest of the items, we are in process and will submit the bid in time i.e. by 23rd April.

We assure you for our best service support and prompt attention, all the time.

For further clarifications, if any, please feel free to contact.

Thanks & Regards
SUNIL P DHYANI
Dy. Manager - Customer Support
Mob. 09313165188

-----Original Message-----

From: Jai Kishore Gupta <jaikishoregupta@ntpc.co.in>
Sent: Saturday, April 17, 2021 12:55 PM
To: Rajib Gupta <Rajib.Gupta@eltek.com>; Arvind Gupta <Arvind.Gupta@eltek.com>; Sunil P Dhyani <SunilP.Dhyani@eltek.com>
Cc: Manish Rathore Rathore <manishrathore@ntpc.co.in>
Subject: Urgent mail Fwd: Supply of "Eltek make charger spares for SG TG and Offsite area at NTPC Mouda(Enquiry No. 9900217430& GePNIC Tender ID: 2021_NTPC_47839_1)-reg.

Dear sir,
please do needful for below mail. Please take necessary action at high priority.

शुभ कामनाओं के साथ
With Best Regards,

जय किशोर गुप्ता /JAI KISHORE GUPTA
प्रबंधक-नियंत्रण और इंस्ट्रुमेंटेशन/Mgr.O&M-C&I एन. टी. पी. सी. मौदा / NTPC MOUDA

+91 -8275045098 (मो/ Mob).

----- Forwarded Message -----

From: "Kailash Kumawat" <kailashkumawat@ntpc.co.in>
To: "rohit dube" <rohit.dube@deltaww.com>
Cc: "Rajib Gupta" <Rajib.Gupta@eltek.com>, "arvind gupta" <Arvind.Gupta@eltek.com>, "Jai Kishore Gupta" <jaikishoregupta@ntpc.co.in>, "Sunil P Dhyani" <SunilP.Dhyani@eltek.com>, "Rajib.Gupta" <Rajib.Gupta@deltaww.com>, "Jai Kishore Gupta" <jaikishoregupta@ntpc.co.in>, "Manish Vasant Sathe मनीष वसंत साठ" <mvsathe@ntpc.co.in>, "chetanaparewa" <chetanaparewa@ntpc.co.in>
Sent: Tuesday, April 13, 2021 3:36:55 PM
Subject: Supply of "Eltek make charger spares for SG TG and Offsite area at NTPC Mouda(Enquiry No. 9900217430& GePNIC Tender ID: 2021_NTPC_47839_1)-reg.

Dear sir,
With reference to subject cited above,Bidder mapping has been done in favour of M/s Delta Electronics India Pvt Ltd(rohit.dube@deltaww.com).
You are requested to submit bid.
Extended Bid submission date is 23.04.2021.

With Best Regards,

Kailash Kumawat,
Sr. Manager(C&M),
SSC WR-1,
NTPC Kawas,Surat.
MO:9413354031

This email message (including any attachments) is confidential and may be privileged. If you have received it by mistake please notify the sender by return e-mail and delete the message and any attachments immediately. Any dissemination, use, printing or copying of this message is strictly prohibited. Please note that e-mails are susceptible to change. Delta Group Companies in India shall not be liable for the improper or incomplete transmission of the information contained in this communication nor for any delay in its receipt or damage to your system. Delta Group Companies in India does not guarantee that this communication has maintained the integrity and is free of viruses, interceptions or interferences. Further Delta Group Companies in India shall not be liable for unauthorized commitments made by the sender unless it is backed by proper legal documentation

This email message (including any attachments) is confidential and may be privileged. If you have received it by mistake please notify the sender by return e-mail and delete the message and any attachments immediately. Any dissemination, use, printing or copying of this message is strictly prohibited. Please note that e-mails are susceptible to change. Delta Group Companies in India shall not be liable for the improper or incomplete transmission of the information contained in this communication nor for any delay in its receipt or damage to your system. Delta Group Companies in India does not guarantee that this communication has maintained the integrity and is free of viruses, interceptions or interferences. Further Delta Group Companies in India shall not be liable for unauthorized commitments made by the sender unless it is backed by proper legal documentation



Customer

NTPC Limited

Name of Work

Recommendation to Upgrade the ABT DSM Online Monitoring System

Document Name

Recommendation

Document Number

CPPSQT040 00 00

Date

Monday, 28 October 2024

Upgradation of ABT Online DSM System at Mauda STPP

The Mauda STPP ABT Online DSM is based on the first release of DSM Regulations by the CERC in 2014. The system was designed in 2014 and commissioned in 2014. Subsequently the five CERC amendments have been implemented on the system successfully (Dec 2014, August 2015, May 2016, January 2019 & May 2019). Subsequently the DSM Regulation 2022 is released vide No. L-1/260/2021/CERC Dated:14th March, 2022 and the same is implemented with subsequent amendments to date i.e CERC No. L-1/260/2021/CERC Gazette CG-DL-E-11092024-257070 September 2024.

The Need for Upgradation of the System comes in the following key aspects that needs to be compiled with at earliest instance.

1. The meters need upgrading as per the CEA & CERC guidelines for SAMAST. The new generation ABT Meters have the following features (a) Auxiliary Power (b) Time Synchronization on NTP (c) Redundant Communication on Ethernet and Serial (c) User configurable blocks for 1min, 5 min, 15 mins (d) Site Configurable CT / PT.
2. Implementation of standalone and dedicated network for ABT meters to comply with the recommendation i.e Data Acquisition, **Network Infrastructure**, Data Concentrator and Head End System. The network infrastructure is in accordance to the Cyber Security recommendations of CEA/CERC and IT polices of NTPC.
3. Upgradation of the existing SW compatible to the current Operating Systems for seamless running and 100% availability. New Operating Systems also calls for upgrading of IT hardware.

Record of Discussions

Additional Notes if Any	Additional Notes if Any

Revision History

Date	Revision
Monday, 28 October 2024	Rev 00
	Rev 01
	Rev 02

For COSPHI Engineering India (P) Limited


 Authorized Signatory



No. 11/86/2017-Th.II
Government of India
Ministry of Power

.....

Shram Shakti Bhawan, Rafi Marg,
New Delhi, dated the 8th October, 2021

To,

1. Principal Secretary/Secretary in charge of Energy/Power
Departments, All States/UTs
2. Chairman, CEA
3. CMDs of all CGSs

Subject: Revised Policy for Biomass Utilisation for Power Generation through Co-firing in Coal based Power Plants

Sir/Madam,

The undersigned is directed to refer to this Ministry's "Policy for Biomass Utilisation for Power Generation through Co-firing in Pulverised Coal Fired Boilers" issued in November, 2017

2. In order to further promote use of biomass pellets in coal based thermal power plants, the above Policy is further modified. A copy of "Revised Policy for Biomass Utilisation for Power Generation through Co-firing in Coal based Power Plants" is enclosed for information and necessary action please.

Yours faithfully

Kumar Saurabh
Deputy Director(Thermal)
Ministry of Power

Encls: As Above

Copy to:

- (i) PS to Hon'ble Minister,
- (ii) PS to Hon'ble MoS for Power,
- (iii) Sr. PPS to Secretary(Power),
- (iv) PPS to AS(SKGR), PPS to AS&FA, PPS to AS(VKD)
- (v) All Joint Secretaries/EA/Chief Engineer, Ministry of Power
- (vi) Incharge, NIC, Ministry of Power - with a request to upload this document on the website of MoP.

REVISED POLICY OF MINISTRY OF POWER FOR BIOMASS UTILIZATION FOR POWER GENERATION THROUGH CO-FIRING IN COAL BASED POWER PLANTS

1. The current availability of biomass in India is estimated at about 750 million metric tonnes per year. The estimated surplus biomass availability is at about 230 million metric tonnes per annum covering agricultural residues.

2. Ministry of Power (MoP) vide its policy dated 17-11-2017 on biomass utilization for power generation had advised that all fluidized bed and pulverized coal units (coal based thermal power plants) except those having ball and tube mill, of power generation utilities, public or private, located in India, to use 5-10% blend of biomass pellets made, primarily, of agro residue along with coal after assessing the technical feasibility, viz. safety aspect etc.

3. In order to further promote use of biomass pellets in coal based thermal power plants, the above Policy is further modified. The modifications in the above Policy are as under:

(i). All coal based thermal power plants of power generation utilities with **bowl mill**, shall on annual basis mandatorily use 5 percent blend of biomass pellets made, primarily, of agro residue along with coal with effect from one year of the date of issue of this guideline. The obligation shall increase to 7 percent with effect from two years after the date of issue of this order and thereafter.

(ii). All coal based thermal power plants of power generation utilities with **ball & race mill**, shall on annual basis mandatorily use 5 % blend of biomass pellets (torrefied only) made, primarily, of agro residue along with coal. This is to be complied within one year starting from this order. Two years from the date of issue of this order and thereafter the obligation will increase to 7 percent.

(iii). All coal based thermal power plants of power generation utilities with **ball & tube mills**, shall on annual basis mandatorily use 5 % blend of torrefied biomass pellets with volatile content below 22%, primarily made of agro residue along with coal. This is to be complied within one year.

(iv). Generating Utilities having certain units under Reserve Shutdown or not being despatched due to MOD (Merit Order Despatch) consideration would ensure to increase the percentage of co-firing up to 10 % in their other operating units/ plants (5 % in plants having ball and tube mills).

(v). Any power plants seeking exemptions / relaxation from co-firing may be considered on case to case basis, based on recommendations of CEA. A Committee headed by Chief Engineer (TE&TD), CEA, including representatives from NTPC, BHEL, CPRI, Ministry of Agriculture and Mission

HS

Directorate shall examine the request of power plants for their exemption/relaxation from mandatory co-firing of biomass, as mentioned at para (i) to (iv) above.

(vi). The policy for co-firing of biomass would be in force for 25 years or till the useful life of the thermal power plant whichever is earlier. The minimum percentage of biomass for co-firing will be reviewed from time to time.

(vii) The minimum contract period for procurement of biomass pellets by generating utilities shall be for 7 years so as to avoid delay in awarding contracts by generating companies every year and also to build up long term supply chain. There may be provision of firm price of biomass pellets for the first year of the contract and yearly rate variation from second year onwards where rates can vary as per terms and conditions of the contract. In order to enable its implementation, a model RfP and contract shall be issued by MOP by 15.11.2021 for adhering to by all generating utilities. However, the ongoing process of contracting for biomass co-firing by generating utilities shall not be affected till issue of Model Contract.

(viii). Provisions related to tariff determination and scheduling shall be as given below:

- a. For projects set up under Section 62 of the Electricity Act 2003, the increase in cost due to co-firing of biomass pellets shall be pass through in Energy Charge Rate (ECR).
- b. For projects set up under Section 63 of the Electricity Act 2003, the increase in ECR due to biomass co-firing can be claimed under Change in Law provisions.
- c. Such additional impact on ECR shall not be considered in deciding Merit Order Despatch (MOD) of the power plant.
- d. Obligated Entities such as Discoms can meet their Renewable Purchase Obligations (RPO) by buying such generation of co-firing.



Details of Sourcewise fuel for computation of Energy Charges

Company		NTPC						
Name of the generating Station		MOUDA STAGE I						
Month		APRIL 23						
Sl	Particulars	Unit	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A)	OPENING QUANTITY							
1	Opening Stock of coal	(MT)	287,395.30	6,494.34	2,073.23	0.00	24,902.26	0.00
2	Value of Stock	Rs	998,334,615.87	34,015,720.54	9,872,432.53	0.00	360,803,048.15	0.00
B)	QUANTITY							
3	Quantity of Coal /Lignite supplied by Coal / Lignite Company	(MT)	450,652.32	387,645.07	23,680.20	0.00	148,108.50	274.07
4	Adjustment (+/-) In quantity supplied made by Coal / Lignite Company	(MT)	0.00	0.00	0.00	0.00	0.00	0.00
5	Coal supplied by Coal/Lignite Company (3+4)	(MT)	450,652.32	387,645.07	23,680.20	0.00	148,108.50	274.07
6	Normative transit & Handling losses (for Coal /Lignite based projects)	(MT)	3,605.22	3,101.16	189.44	0.00	296.22	0.00
7	Net Coal / Lignite supplied (5 - 6)	(MT)	447,047.10	384,543.91	23,490.76	0.00	147,812.28	274.07
C)	PRICE							
8	Amount charged by the Coal / Lignite Company	Rs	985,033,575.06	1,835,287,314.12	106,749,191.00	0.00	2,082,861,656.15	2,404,635.38
9	Adjustment (+ / -) In amount charged by coal / Lignite Company	Rs						
10	Handling, Sampling and such other Similar charges	Rs	25,110,001.98	2,951,311.35	180,287.68		-15,956,382.85	
11	Total Amount charged (8 +9+10)	Rs	1,010,143,577.04	1,838,238,625.47	106,929,478.68	0.00	2,066,905,273.30	2,404,635.38
D)	TRANSPORTATION							
12	Transportation charges by Rail / Ship / Road Transport							
	By Rail	Rs	522,139,423.76	292,057,655.03	229,376.37		524,281.98	143,886.75
	By Road	Rs						
	By Ship	Rs						
13	Adjustment (+/-) In amount charged by railways / transport company	Rs						
14	Demurrage charges, if any	Rs	1,595,241.95	1,372,205.69	83,824.37		524,281.98	
15	Cost of diesel in transporting Coal through MGR system, if applicable.	Rs						
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	520,544,181.81	290,685,449.34	145,552.00	0.00	0.00	143,886.75
	Total amount charged for Coal / Lignite supplied including transportation (11 + 16)	Rs	1,530,687,758.85	2,128,924,074.81	107,075,030.68	0.00	2,066,905,273.30	2,548,522.13
E)	TOTAL COST							
18	Landed Cost of Coal/Lignite (2+17) / (1+7)	Rs/MT	3,443.46	5,531.27	4,574.69		14,056.19	9,298.80
19	Blending Ratio (Domestic/Imported)		0.765000	0.040000	0.000000	0.000000	0.195000	0.000000
20	Weighted average cost of Coal/Lignite (including biomass)	Rs/MT	5,596.46					
20a	Weighted average cost of Coal/Lignite (Excluding biomass)	Rs/MT	5,596.46					
F)	QUALITY							
21	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)	3,933	4,699	4,750			
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	3,924	4,687	4,750			3700
23	GCV of imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)					5,000	
24	GCV of imported coal supplied as per bill of coal company	(Kcal/Kg)					5,000	
25	Weighted average GCV of Coal /Lignite as billed (including biomass)	(Kcal/Kg)	4,167					
25a	Weighted average GCV of Coal /Lignite as billed (Excluding biomass)	(Kcal/Kg)	4,167					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)	3,385	3,378	3,633			
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	3,375	3,369	3,310			3557
28	GCV of imported coal of the Opening stock as received at station	(Kcal/Kg)					5,170	
29	GCV of imported coal supplied as received at station	(Kcal/Kg)					5,145	
30	Weighted average GCV of coal/ Lignite as Received (including biomass)	(Kcal/Kg)	3,724					
30a	Weighted average GCV of coal/ Lignite as Received (Excluding biomass)	(Kcal/Kg)	3,724					

Details of Sourcewise fuel for computation of Energy Charges

Company		NTPC						
Name of the generating Station		MOUDA STAGE I						
Month		MAY 23						
Sl	Particulars	Unit	Domestic Coal-Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A)	OPENING QUANTITY							
1	Opening Stock of coal	(MT)	335,718.20	99,599.98	6,755.15	0.00	61,541.98	0.00
2	Value of Stock	Rs	1,156,031,886.26	550,914,810.11	30,902,751.25	0.00	865,045,724.60	0.00
B)	QUANTITY							
3	Quantity of Coal /Lignite supplied by Coal / Lignite Company	(MT)	377,247.71	427,014.93	0.00	0.00	159,159.20	348.03
4	Adjustment (+/-) in quantity supplied made by Coal / Lignite Company	(MT)	0.00	0.00	0.00	0.00	0.00	0.00
5	Coal supplied by Coal/Lignite Company (3+4)	(MT)	377,247.71	427,014.93	0.00	0.00	159,159.20	348.03
6	Normative transit & Handling losses (for Coal /Lignite based projects)	(MT)	3,017.98	3,416.12	0.00	0.00	318.32	0.00
7	Net Coal / Lignite supplied (5 - 6)	(MT)	374,229.73	423,598.81	0.00	0.00	158,840.88	348.03
C)	PRICE							
8	Amount charged by the Coal / Lignite Company	Rs	793,069,708.93	1,976,003,607.00	0.00	0.00	2,253,765,169.75	3,059,928.71
9	Adjustment (+ / -) in amount charged by coal / Lignite Company	Rs						
10	Handling, Sampling and such other Similar charges	Rs	30,262,325.27	-12,130,875.01	0.00		3,621,272.99	
11	Total Amount charged (8 +9+10)	Rs	823,332,034.20	1,963,872,731.99	0.00	0.00	2,257,386,442.74	3,059,928.71
D)	TRANSPORTATION							
12	Transportation charges by Rail / Ship / Road Transport							
	By Rail	Rs	454,201,471.54	323,517,463.00	0.00			182,715.75
	By Road	Rs						
	By Ship	Rs						
13	Adjustment (+/-) in amount charged by railways / transport company	Rs						
14	Demurrage charges, if any	Rs						
15	Cost of diesel in transporting Coal through MGR system, if applicable.	Rs						
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	454,201,471.54	323,517,463.00	0.00	0.00	0.00	182,715.75
	Total amount charged for Coal / Lignite supplied including transportation (11 + 16)	Rs	1,277,533,505.74	2,287,390,194.99	0.00	0.00	2,257,386,442.74	3,242,644.46
E)	TOTAL COST							
18	Landed Cost of Coal/Lignite (2+17) / (1+7)	Rs/MT	3,427.81	5,424.91	4,574.70		14,168.22	9,317.14
19	Blending Ratio (Domestic/Imported)		0.734544	0.070000	0.000000	0.000000	0.195000	0.000456
20	Weighted average cost of Coal/Lignite (including biomass)	Rs/MT	5,664.67					
20a	Weighted average cost of Coal/Lignite (Excluding biomass)	Rs/MT	5,663.00					
F)	QUALITY							
21	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)	3,928	4,687	4,750			
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	3,933	4,653	4,750			3398
23	GCV of imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)					5,000	
24	GCV of imported coal supplied as per bill of coal company	(Kcal/Kg)					5,088	
25	Weighted average GCV of Coal /Lignite as billed (including biomass)	(Kcal/Kg)	4,202					
25a	Weighted average GCV of Coal /Lignite as billed (Excluding biomass)	(Kcal/Kg)	4,203					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)	3,379	3,369	3,336			
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	3,298	3,256	3,338			3589
28	GCV of imported coal of the Opening stock as received at station	(Kcal/Kg)					5,149	
29	GCV of imported coal supplied as received at station	(Kcal/Kg)					5,141	
30	Weighted average GCV of coal/ Lignite as Received (including biomass)	(Kcal/Kg)	3,684					
30a	Weighted average GCV of coal/ Lignite as Received (Excluding biomass)	(Kcal/Kg)	3,684					

Details of Sourcewise fuel for computation of Energy Charges

Company		NTPC						
Name of the generating Station		MOUDA STAGE I						
Month		JUNE 23						
Sl	Particulars	Unit	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A)	OPENING QUANTITY							
1	Opening Stock of coal	(MT)	296,471.38	242,458.88	6,755.15	0.00	107,846.86	0.00
2	Value of Stock	Rs	1,016,247,047.45	1,315,316,982.08	30,902,751.25	0.00	1,527,997,718.89	0.00
B)	QUANTITY							
3	Quantity of Coal /Lignite supplied by Coal / Lignite Company	(MT)	306,556.48	274,957.17	18,987.40	0.00	56,628.80	272.94
4	Adjustment (+/-) In quantity supplied made by Coal / Lignite Company	(MT)	0.00	0.00	0.00	0.00	0.00	0.00
5	Coal supplied by Coal/Lignite Company (3+4)	(MT)	306,556.48	274,957.17	18,987.40	0.00	56,628.80	272.94
6	Normative transit & Handling losses (for Coal /Lignite based projects)	(MT)	2,452.45	2,199.66	151.90	0.00	113.26	0.00
7	Net Coal / Lignite supplied (5 - 6)	(MT)	304,104.03	272,757.51	18,835.50	0.00	56,515.54	272.94
C)	PRICE							
8	Amount charged by the Coal / Lignite Company	Rs	626,766,936.08	1,202,436,950.00	83,925,610.00	0.00	813,556,297.10	2,379,907.55
9	Adjustment (+ / -) In amount charged by coal / Lignite Company	Rs						
10	Handling, Sampling and such other Similar charges	Rs	-199,322,044.06	-173,396,268.18	1,443,942.24		-17,784,331.02	
11	Total Amount charged (8 +9+10)	Rs	427,444,892.02	1,029,040,681.82	85,369,552.24	0.00	795,771,966.08	2,379,907.55
D)	TRANSPORTATION							
12	Transportation charges by Rail / Ship / Road Transport							
	By Rail	Rs	376,214,493.73	208,581,451.62	5,047,218.76		546,653.88	89,871.36
	By Road	Rs						
	By Ship	Rs						
13	Adjustment (+/-) In amount charged by railways / transport company	Rs						
14	Demurrage charges, if any	Rs	2,923,547.73	2,654,239.62	183,290.76		546,653.88	
15	Cost of diesel in transporting Coal through MGR system, if applicable.	Rs						
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	373,290,946.00	205,927,212.00	4,863,928.00	0.00	0.00	89,871.36
	Total amount charged for Coal / Lignite supplied including transportation (11 + 16)	Rs	800,735,838.02	1,234,967,893.82	90,233,480.24	0.00	795,771,966.08	2,469,778.91
E)	TOTAL COST							
18	Landed Cost of Coal/Lignite (2+17) / (1+7)	Rs/MT	3,025.40	4,949.93	4,733.61		14,138.09	9,048.80
19	Blending Ratio (Domestic/Imported)		0.711627	0.130000	0.000000	0.000000	0.158000	0.000373
20	Weighted average cost of Coal/Lignite (including biomass)	Rs/MT	5,033.64					
20a	Weighted average cost of Coal/Lignite (Excluding biomass)	Rs/MT	5,032.14					
F)	QUALITY							
21	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)	3,931	4,659	4,750			
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	4,302	4,698	4,750			3382
23	GCV of imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)					5,063	
24	GCV of imported coal supplied as per bill of coal company	(Kcal/Kg)					5,200	
25	Weighted average GCV of Coal /Lignite as billed (including biomass)	(Kcal/Kg)	4,348					
25a	Weighted average GCV of Coal /Lignite as billed (Excluding biomass)	(Kcal/Kg)	4,349					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)	3,336	3,278	3,336			
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	3,533	3,545	3,388			3382
28	GCV of imported coal of the Opening stock as received at station	(Kcal/Kg)					5,143	
29	GCV of imported coal supplied as received at station	(Kcal/Kg)					5,164	
30	Weighted average GCV of coal/ Lignite as Received (including biomass)	(Kcal/Kg)	3,705					
30a	Weighted average GCV of coal/ Lignite as Received (Excluding biomass)	(Kcal/Kg)	245					
					3,705			

Details of Sourcewise fuel for computation of Energy Charges

Company		NTPC						
Name of the generating Station		MOUDA STAGE I						
Month		JULY 23						
SL	Particulars	Unit	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A)	OPENING QUANTITY							
1	Opening Stock of coal	(MT)	184,832.93	279,901.66	25,590.65	0.00	48,177.71	0.00
2	Value of Stock	Rs	559,194,166.90	1,385,493,528.19	121,136,231.49	0.00	681,140,629.24	0.00
B)	QUANTITY							
3	Quantity of Coal /Lignite supplied by Coal / Lignite Company	(MT)	413,244.09	267,418.32	0.00	0.00	975.30	277.49
4	Adjustment (+/-) in quantity supplied made by Coal / Lignite Company	(MT)	0.00	0.00	0.00	0.00	0.00	0.00
5	Coal supplied by Coal/Lignite Company (3+4)	(MT)	413,244.09	267,418.32	0.00	0.00	975.30	277.49
6	Normative transit & Handling losses (for Coal /Lignite based projects)	(MT)	3,305.95	2,139.35	0.00	0.00	1.95	0.00
7	Net Coal / Lignite supplied (5 - 6)	(MT)	409,938.14	265,278.97	0.00	0.00	973.35	277.49
C)	PRICE							
8	Amount charged by the Coal / Lignite Company	Rs	891,750,521.50	1,276,665,464.00	0.00	0.00	106,632.45	2,354,467.63
9	Adjustment (+ / -) in amount charged by coal / Lignite Company	Rs						
10	Handling, Sampling and such other Similar charges	Rs	5,146,294.22	1,813,139.44	0.00		-21,305,746.83	
11	Total Amount charged (8 +9+10)	Rs	896,896,815.72	1,278,478,603.44	0.00	0.00	-21,199,114.38	2,354,467.63
D)	TRANSPORTATION	Rs						
12	Transportation charges by Rail / Ship / Road Transport							
	By Rail	Rs	450,130,064.49	200,497,176.00			1,142.00	
	By Road	Rs						
	By Ship	Rs						
13	Adjustment (+/-) in amount charged by railways / transport company	Rs						
14	Demurrage charges, if any	Rs	478,907.00	313,121.00			1,142.00	
15	Cost of diesel in transporting Coal through MGR system, if applicable.	Rs						
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	449,651,157.49	200,184,055.00	0.00	0.00	0.00	0.00
	Total amount charged for Coal / Lignite supplied including transportation (11 + 16)	Rs	1,346,547,973.21	1,478,662,658.44	0.00	0.00	-21,199,114.38	2,354,467.63
E)	TOTAL COST							
18	Landed Cost of Coal/Lignite (2+17) / (1+7)	Rs/MT	3,204.16	5,253.59	4,733.61		13,426.80	8,484.87
19	Blending Ratio (Domestic/Imported)		0.561689	0.355978	0.000000	0.000000	0.081995	0.000338
20	Weighted average cost of Coal/Lignite (including biomass)	Rs/MT	4,773.70					
20a	Weighted average cost of Coal/Lignite (Excluding biomass)	Rs/MT	4,772.45					
F)	QUALITY							
21	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)	4,119	4,680	4,750			
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	4,243	4,722	0			3277
23	GCV of imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)					5,110	
24	GCV of imported coal supplied as per bill of coal company	(Kcal/Kg)					5,000	
25	Weighted average GCV of Coal /Lignite as billed (including biomass)	(Kcal/Kg)	4,454					
25a	Weighted average GCV of Coal /Lignite as billed (Excluding biomass)	(Kcal/Kg)	4,455					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)	3,436	3,419	3,374			
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	3,186	3,257				3277
28	GCV of imported coal of the Opening stock as received at station	(Kcal/Kg)					5,150	
29	GCV of imported coal supplied as received at station	(Kcal/Kg)					5,155	
30	Weighted average GCV of coal/ Lignite as Received (including biomass)	(Kcal/Kg)	3,446					
30a	Weighted average GCV of coal/ Lignite as Received (Excluding biomass)	(Kcal/Kg)	246					
					3,446			

Details of Sourcewise fuel for computation of Energy Charges

Company		NTPC						
Name of the generating Station		MOUDA STAGE I						
Month		AUGUST 23						
Sl	Particulars	Unit	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A)	OPENING QUANTITY							
1	Opening Stock of coal	(MT)	294,619.50	35,395.38	25,590.65	0.00	9,161.48	0.00
2	Value of Stock	Rs	944,008,271.12	185,952,838.69	121,136,231.49	0.00	123,009,408.45	0.00
B)	QUANTITY							
3	Quantity of Coal /Lignite supplied by Coal / Lignite Company	(MT)	604,150.36	171,995.60	35,965.89		571.20	492.27
4	Adjustment (+/-) In quantity supplied made by Coal / Lignite Company	(MT)	0.00	0.00	0.00	0.00	0.00	0.00
5	Coal supplied by Coal/Lignite Company (3+4)	(MT)	604,150.36	171,995.60	35,965.89	0.00	571.20	492.27
6	Normative transit & Handling losses (for Coal /Lignite based projects)	(MT)	4,833.20	1,375.97	287.73	0.00	1,142.00	0.00
7	Net Coal / Lignite supplied (5 - 6)	(MT)	599,317.16	170,619.64	35,678.1630	0.00	570.0580	492.27
C)	PRICE							
8	Amount charged by the Coal / Lignite Company	Rs	1,188,693,628.83	980,846,668.61	161,203,843.00	0.00	8,556,689.75	3,985,716.44
9	Adjustment (+ / -) In amount charged by coal / Lignite Company	Rs						
10	Handling, Sampling and such other Similar charges	Rs	19,316,305.47	4,354,362.27	910,537.92		13,250.62	
11	Total Amount charged (8 +9+10)	Rs	1,208,009,934.30	985,201,030.88	162,114,380.92	0.00	8,569,940.37	3,985,716.44
D)	TRANSPORTATION	Rs						
12	Transportation charges by Rail / Ship / Road Transport							
	By Rail	Rs	758,985,590.40	127,939,202.68	40,010.00		635.00	
	By Road	Rs						
	By Ship	Rs						
13	Adjustment (+/-) In amount charged by railways / transport company	Rs						
14	Demurrage charges, if any	Rs	672,073.00	191,332.00	40,010.00		635.00	
15	Cost of diesel in transporting Coal through MGR system, if applicable.	Rs						
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	758,313,517.40	127,747,870.68	0.00	0.00	0.00	0.00
	Total amount charged for Coal / Lignite supplied including transportation (11 + 16)	Rs	1,966,323,451.70	1,112,948,901.56	162,114,380.92	0.00	8,569,940.37	3,985,716.44
E)	TOTAL COST							
18	Landed Cost of Coal/Lignite (2+17) / (1+7)	Rs/MT	3,255.64	6,304.89	4,623.08		13,520.92	8,096.61
19	Blending Ratio (Domestic/Imported)		0.811591	0.131002	0.035501	0.000000	0.021400	0.000506
20	Weighted average cost of Coal/Lignite (including biomass)	Rs/MT	3,925.77					
20a	Weighted average cost of Coal/Lignite (Excluding biomass)	Rs/MT	3,923.66					
F)	QUALITY							
21	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)	4,204	4,700	4,750			
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	4,119	4,720	4,750			3217
23	GCV of imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)					5,108	
24	GCV of imported coal supplied as per bill of coal company	(Kcal/Kg)					5,000	
25	Weighted average GCV of Coal /Lignite as billed (including biomass)	(Kcal/Kg)	4,263					
25a	Weighted average GCV of Coal /Lignite as billed (Excluding biomass)	(Kcal/Kg)	4,264					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)	3,264	3,340	3,374			
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	3,334	3,447	3,251			3217
28	GCV of imported coal of the Opening stock as received at station	(Kcal/Kg)					5,150	
29	GCV of imported coal supplied as received at station	(Kcal/Kg)					5,253	
30	Weighted average GCV of coal/ Lignite as Received (including biomass)	(Kcal/Kg)	3,366					
30a	Weighted average GCV of coal/ Lignite as Received (Excluding biomass)	(Kcal/Kg)	3,366					

Details of Sourcewise fuel for computation of Energy Charges

Company		NTPC						
Name of the generating Station		MOUDA STAGE I						
Month		SEPTEMBER 23						
Sl	Particulars	Unit	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A)	OPENING QUANTITY							
1	Opening Stock of coal	(MT)	151,950.98	1,686.03	5,058.55	0.00	0.00	0.00
2	Value of Stock	Rs	494,696,972.43	10,630,242.01	23,386,097.64	0.00	0.00	0.00
B)	QUANTITY							
3	Quantity of Coal /Lignite supplied by Coal / Lignite Company	(MT)	729,309.58	115,668.57	22,286.47	0.00	65,486.58	680.34
4	Adjustment (+/-) In quantity supplied made by Coal / Lignite Company	(MT)	0.00	0.00	0.00	0.00	0.00	0.00
5	Coal supplied by Coal/Lignite Company (3+4)	(MT)	729,309.58	115,668.57	22,286.47	0.00	65,486.58	680.34
6	Normative transit & Handling losses (for Coal /Lignite based projects)	(MT)	5,834.48	925.35	178.29	0.00	130.97300	0.00
7	Net Coal / Lignite supplied (5 - 6)	(MT)	723,475.10	114,743.22	22,108.1780	0.00	65,355.6070	680.34
C)	PRICE							
8	Amount charged by the Coal / Lignite Company	Rs	1,594,493,859.00	526,560,842.00	59,436,062.73	0.00	731,861,657.12	5,658,718.10
9	Adjustment (+ / -) In amount charged by coal / Lignite Company	Rs						
10	Handling, Sampling and such other Similar charges	Rs	50,143,978.34	7,952,839.81	1,532,315.31		920,791.35	
11	Total Amount charged (8 +9+10)	Rs	1,644,637,837.34	534,513,681.81	60,968,378.04	0.00	732,782,448.47	5,658,718.10
D)	TRANSPORTATION							
12	Transportation charges by Rail / Ship / Road Transport							
	By Rail	Rs	945,427,243.97	84,469,725.00	36,828,403.00		655,629.00	
	By Road	Rs						
	By Ship	Rs						
13	Adjustment (+/-) In amount charged by railways / transport company	Rs						
14	Demurrage charges, if any	Rs	7,301,591.00	1,158,033.00	223,124.00		655,629.00	
15	Cost of diesel in transporting Coal through MGR system, if applicable.	Rs						
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	938,129,652.97	83,311,692.00	36,605,279.00	0.00	0.00	0.00
	Total amount charged for Coal / Lignite supplied including transportation (11 + 16)	Rs	2,582,763,490.31	617,825,373.81	97,573,657.04	0.00	732,782,448.47	5,658,718.10
E)	TOTAL COST							
18	Landed Cost of Coal/Lignite (2+17) / (1+7)	Rs/MT	3,515.39	5,397.75	4,452.50		11,212.24	8,317.49
19	Blending Ratio (Domestic/Imported)		0.963681	0.000000	0.000000	0.000000	0.035498	0.000821
20	Weighted average cost of Coal/Lignite (including biomass)	Rs/MT	3,792.55					
20a	Weighted average cost of Coal/Lignite (Excluding biomass)	Rs/MT	3,788.83					
F)	QUALITY							
21	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)	4,147	4,717	4,750			
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	3,996	4,775	4,407			3397
23	GCV of imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)					5,102	
24	GCV of imported coal supplied as per bill of coal company	(Kcal/Kg)					5,000	
25	Weighted average GCV of Coal /Lignite as billed (including biomass)	(Kcal/Kg)	4,056					
25a	Weighted average GCV of Coal /Lignite as billed (Excluding biomass)	(Kcal/Kg)	4,057					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)	3,311	3,429	3,302			
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	3,250	3,375	3,460			3397
28	GCV of imported coal of the Opening stock as received at station	(Kcal/Kg)					5,156	
29	GCV of imported coal supplied as received at station	(Kcal/Kg)					5,083	
30	Weighted average GCV of coal/ Lignite as Received (including biomass)	(Kcal/Kg)	3,326					
30a	Weighted average GCV of coal/ Lignite as Received (Excluding biomass)	(Kcal/Kg)	3,326					

Details of Sourcewise fuel for computation of Energy Charges

Company		NTPC						
Name of the generating Station		MOUDA STAGE I						
Month		OCTOBER 23						
Sl	Particulars	Unit	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A)	OPENING QUANTITY							
1	Opening Stock of coal	(MT)	94,971.23	5,283.01	15,530.31	0.00	50,470.28	0.00
2	Value of Stock	Rs	333,860,530.79	28,516,364.12	69,148,645.46	0.00	565,884,624.94	0.00
B)	QUANTITY							
3	Quantity of Coal /Lignite supplied by Coal / Lignite Company	(MT)	621,826.76	92,789.55	0.00	0.00	35,041.30	1,410.19
4	Adjustment (+/-) In quantity supplied made by Coal / Lignite Company	(MT)	0.00	0.00	0.00	0.00	0.00	0.00
5	Coal supplied by Coal/Lignite Company (3+4)	(MT)	621,826.76	92,789.55	0.00	0.00	35,041.30	1,410.19
6	Normative transit & Handling losses (for Coal /Lignite based projects)	(MT)	4,974.61	742.32	0.00	0.00	70.083	0.00
7	Net Coal / Lignite supplied (5 - 6)	(MT)	616,852.15	92,047.23	0.0000	0.00	34,971.2170	1,410.19
C)	PRICE							
8	Amount charged by the Coal / Lignite Company	Rs	1,089,759,155.00	394,334,722.00	0.00	0.00	399,757,830.83	12,362,970.52
9	Adjustment (+ / -) In amount charged by coal / Lignite Company	Rs						
10	Handling, Sampling and such other Similar charges	Rs	10,658,001.60	-4,618,247.43	0.00	0.00	635,670.79	2,487,348.40
11	Total Amount charged (8 +9+10)	Rs	1,100,417,156.60	389,716,474.57	0.00	0.00	400,393,501.62	14,850,318.92
D)	TRANSPORTATION							
12	Transportation charges by Rail / Ship / Road Transport							
	By Rail	Rs	780,184,186.00	70,185,690.00	0.00	0.00	95,821.00	345,876.56
	By Road	Rs						
	By Ship	Rs						
13	Adjustment (+/-) In amount charged by railways / transport company	Rs						
14	Demurrage charges, if any	Rs	1,700,402.00	253,736.00			95,821.00	
15	Cost of diesel in transporting Coal through MGR system, if applicable.	Rs						
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	778,483,784.00	69,931,954.00	0.00	0.00	0.00	345,876.56
	Total amount charged for Coal / Lignite supplied including transportation (11 + 16)	Rs	1,878,900,940.60	459,648,428.57	0.00	0.00	400,393,501.62	15,196,195.48
E)	TOTAL COST							
18	Landed Cost of Coal/Lignite (2+17) / (1+7)	Rs/MT	3,108.58	5,015.55	4,452.50		11,309.24	10,775.99
19	Blending Ratio (Domestic/Imported)		0.866690	0.000000	0.032509	0.000000	0.100001	0.000800
20	Weighted average cost of Coal/Lignite (including biomass)	Rs/MT	3,978.48					
20a	Weighted average cost of Coal/Lignite (Excluding biomass)	Rs/MT	3,973.04					
F)	QUALITY							
21	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)	4,022	4,774	4,471			
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	4,014	4,648				3,597.00
23	GCV of imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)					5,000	
24	GCV of imported coal supplied as per bill of coal company	(Kcal/Kg)					5,000	
25	Weighted average GCV of Coal /Lignite as billed (including biomass)	(Kcal/Kg)	4,128					
25a	Weighted average GCV of Coal /Lignite as billed (Excluding biomass)	(Kcal/Kg)	4,128					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)	3,261	3,376	3,431			
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	3,247	3,575				3,597.00
28	GCV of imported coal of the Opening stock as received at station	(Kcal/Kg)					5,083	
29	GCV of imported coal supplied as received at station	(Kcal/Kg)					5,174	
30	Weighted average GCV of coal/ Lignite as Received (including biomass)	(Kcal/Kg)	3,442					
30a	Weighted average GCV of coal/ Lignite as Received (Excluding biomass)	(Kcal/Kg)	3,442					

Details of Sourcewise fuel for computation of Energy Charges

Company		NTPC						
Name of the generating Station		MOUDA STAGE I						
Month		NOVEMBER 23						
Sl	Particulars	Unit	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A)	OPENING QUANTITY							
1	Opening Stock of coal	(MT)	88,870.38	17,380.91	305.32	0.00	16,221.46	613.39
2	Value of Stock	Rs	276,260,878.57	87,174,819.54	1,359,443.98	0.00	183,452,384.90	6,609,885.44
B)	QUANTITY							
3	Quantity of Coal /Lignite supplied by Coal / Lignite Company	(MT)	667,613.30	221,991.67	0.00	0.00	36,039.40	0.00
4	Adjustment (+/-) in quantity supplied made by Coal / Lignite Company	(MT)	0.00	0.00	0.00	0.00	0.00	0.00
5	Coal supplied by Coal/Lignite Company (3+4)	(MT)	667,613.30	221,991.67	0.00	0.00	36,039.40	0.00
6	Normative transit & Handling losses (for Coal /Lignite based projects)	(MT)	5,340.91	1,775.93	0.00	0.00	72.079	0.00
7	Net Coal / Lignite supplied (5 - 6)	(MT)	662,272.39	220,215.74	0.0000	0.00	35,967.3210	0.00
C)	PRICE							
8	Amount charged by the Coal / Lignite Company	Rs	1,355,595,163.11	1,156,912,512.56	0.00	0.00	433,279,378.53	0.00
9	Adjustment (+ / -) in amount charged by coal / Lignite Company	Rs						
10	Handling, Sampling and such other Similar charges	Rs	4,684,965.09	1,557,822.77	0.00	0.00	11,213,178.07	0.00
11	Total Amount charged (8 +9+10)	Rs	1,360,280,128.20	1,158,470,335.33	0.00	0.00	444,492,556.60	0.00
D)	TRANSPORTATION							
12	Transportation charges by Rail / Ship / Road Transport							
	By Rail	Rs	787,094,649.18	168,650,993.85	0.00	0.00	73,711.00	0.00
	By Road	Rs						
	By Ship	Rs						
13	Adjustment (+/-) in amount charged by railways / transport company	Rs						
14	Demurrage charges, if any	Rs	1,365,460.00	454,037.00			73,711.00	
15	Cost of diesel in transporting Coal through MGR system, if applicable.	Rs						
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	785,729,189.18	168,196,956.85	0.00	0.00	0.00	0.00
	Total amount charged for Coal / Lignite supplied including transportation (11 + 16)	Rs	2,146,009,317.38	1,326,667,292.18	0.00	0.00	444,492,556.60	0.00
E)	TOTAL COST							
18	Landed Cost of Coal/Lignite (2+17) / (1+7)	Rs/MT	3,224.78	5,950.60	4,452.50		12,032.18	10,775.99
19	Blending Ratio (Domestic/Imported)		0.941394	0.008000	0.000000	0.000000	0.050000	0.000606
20	Weighted average cost of Coal/Lignite (including biomass)	Rs/MT	3,691.93					
20a	Weighted average cost of Coal/Lignite (Excluding biomass)	Rs/MT	3,687.24					
F)	QUALITY							
21	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)	4,015	4,655	4,471			3,597
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	4,125	4,491				
23	GCV of imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)					5,000	
24	GCV of imported coal supplied as per bill of coal company	(Kcal/Kg)					5,000	
25	Weighted average GCV of Coal /Lignite as billed (including biomass)	(Kcal/Kg)	4,159					
25a	Weighted average GCV of Coal /Lignite as billed (Excluding biomass)	(Kcal/Kg)	4,160					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)	3,249	3,564	3,431			3,597.00
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	3,015	3,435				
28	GCV of imported coal of the Opening stock as received at station	(Kcal/Kg)					5,120	
29	GCV of imported coal supplied as received at station	(Kcal/Kg)					5,233	
30	Weighted average GCV of coal/ Lignite as Received (including biomass)	(Kcal/Kg)	3,152					
30a	Weighted average GCV of coal/ Lignite as Received (Excluding biomass)	(Kcal/Kg)	250					
					3,154			

Details of Sourcewise fuel for computation of Energy Charges

Company			NTPC					
Name of the generating Station			MOUDA STAGE I					
Month			DECEMBER 23					
Sl	Particulars	Unit	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A)	OPENING QUANTITY							
1	Opening Stock of coal	(MT)	88,700.85	181,753.32	305.32	0.00	24,075.42	47.39
2	Value of Stock	Rs	286,040,739.42	1,081,540,963.59	1,359,443.98	0.00	289,679,766.71	510,674.24
B)	QUANTITY							
3	Quantity of Coal /Lignite supplied by Coal / Lignite Company	(MT)	640,053.40	288,838.79	0.00	0.00	49,379.20	0.00
4	Adjustment (+/-) In quantity supplied made by Coal / Lignite Company	(MT)	0.00	0.00	0.00	0.00	0.00	0.00
5	Coal supplied by Coal/Lignite Company (3+4)	(MT)	640,053.40	288,838.79	0.00	0.00	49,379.20	0.00
6	Normative transit & Handling losses (for Coal /Lignite based projects)	(MT)	5,120.43	2,310.71	0.00	0.00	98.758	0.00
7	Net Coal / Lignite supplied (5 - 6)	(MT)	634,932.97	286,528.08	0.0000	0.00	49,280.4420	0.00
C)	PRICE							
8	Amount charged by the Coal / Lignite Company	Rs	1,299,624,149.68	1,479,851,294.74	0.00	0.00	591,512,932.00	0.00
9	Adjustment (+ / -) in amount charged by coal / Lignite Company	Rs						
10	Handling, Sampling and such other Similar charges	Rs	88,277,042.49	-76,807,387.65	0.00	0.00	732,732.17	
11	Total Amount charged (8 +9+10)	Rs	1,387,901,192.17	1,403,043,907.09	0.00	0.00	592,245,264.17	0.00
D)	TRANSPORTATION							
12	Transportation charges by Rail / Ship / Road Transport							
	By Rail	Rs	766,883,390.95	247,639,748.47	0.00	0.00	357,263.00	0.00
	By Road	Rs						
	By Ship	Rs						
13	Adjustment (+/-) In amount charged by railways / transport company	Rs						
14	Demurrage charges, if any	Rs	4,630,841.00	2,089,774.00			357,263.00	
15	Cost of diesel in transporting Coal through MGR system, if applicable	Rs						
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	762,252,549.95	245,549,974.47	0.00	0.00	0.00	0.00
	Total amount charged for Coal / Lignite supplied including transportation							
17	(11 + 16)	Rs	2,150,153,742.12	1,648,593,881.56	0.00	0.00	592,245,264.17	0.00
E)	TOTAL COST							
18	Landed Cost of Coal/Lignite (2+17) / (1+7)	Rs/MT	3,366.61	5,830.12	4,452.50		12,022.56	10,775.99
19	Blending Ratio (Domestic/Imported)		0.945939	0.000000	0.000000	0.000000	0.054000	0.000061
20	Weighted average cost of Coal /Lignite (Including biomass)	Rs/MT	3,834.49					
20a	Weighted average cost of Coal /Lignite (Excluding biomass)	Rs/MT	3,834.06					
F)	QUALITY							
21	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)	4,112	4,503	4,471			3,597
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	4,018	4,509				
23	GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)					5,000	
24	GCV of Imported coal supplied as per bill of coal company	(Kcal/Kg)					5,000	
25	Weighted average GCV of Coal /Lignite as billed (Including biomass)	(Kcal/Kg)	4,082					
25a	Weighted average GCV of Coal /Lignite as billed (Excluding biomass)	(Kcal/Kg)	4,082					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)	3,043	3,444	3,431			3,597.00
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	3,218	3,328				
28	GCV of Imported coal of the Opening stock as received at station	(Kcal/Kg)					5,198	
29	GCV of Imported coal supplied as received at station	(Kcal/Kg)					5,305	
30	Weighted average GCV of coal/ Lignite as Received (Including biomass)	(Kcal/Kg)	3,309					
30a	Weighted average GCV of coal/ Lignite as Received (Excluding biomass)	(Kcal/Kg)	251					

Details of Sourcewise fuel for computation of Energy Charges

Company			NTPC					
Name of the generating Station			MOUDA STAGE I					
Month			JANUARY 24					
Sl	Particulars	Unit	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A)	OPENING QUANTITY							
1	Opening Stock of coal	(MT)	41,127.36	392,478.64	305.32	0.00	47,428.48	0.00
2	Value of Stock	Rs	138,459,861.71	2,288,195,970.73	1,359,443.98	0.00	570,211,606.18	0.00
B)	QUANTITY							
3	Quantity of Coal /Lignite supplied by Coal / Lignite Company	(MT)	675,673.06	265,303.82	0.00	0.00	149,738.10	1,017.97
4	Adjustment (+/-) In quantity supplied made by Coal / Lignite Company	(MT)	0.00	0.00	0.00	0.00	0.00	0.00
5	Coal supplied by Coal/Lignite Company (3+4)	(MT)	675,673.06	265,303.82	0.00	0.00	149,738.10	1,017.97
6	Normative transit & Handling losses (for Coal /Lignite based projects)	(MT)	5,405.38	2,122.43	0.00	0.00	299.476	0.00
7	Net Coal / Lignite supplied (5 - 6)	(MT)	670,267.68	263,181.389	0.0000	0.00	149,438.6240	1,017.97
C)	PRICE							
8	Amount charged by the Coal / Lignite Company	Rs	1,595,288,694.32	1,237,749,285.00			1,800,566,535.56	7,406,227.10
9	Adjustment (+ / -) in amount charged by coal / Lignite Company	Rs						
10	Handling, Sampling and such other Similar charges	Rs	5,410,327.44	2,124,371.35			1,139,361.58	
11	Total Amount charged (8 +9+10)	Rs	1,600,699,021.76	1,239,873,656.35	0.00	0.00	1,801,705,897.14	7,406,227.10
D)	TRANSPORTATION							
12	Transportation charges by Rail / Ship / Road Transport							
	By Rail	Rs	644,487,032.43	232,808,119.58			664,360.03	
	By Road	Rs						
	By Ship	Rs						
13	Adjustment (+/-) In amount charged by railways / transport company	Rs						
14	Demurrage charges, if any	Rs	2,997,835.39	1,177,103.58			664,360.03	
15	Cost of diesel in transporting Coal through MGR system, if applicable	Rs						
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	644,489,197.04	231,631,016.00	0.00	0.00	0.00	0.00
17	Total amount charged for Coal / Lignite supplied including transportation (11 + 16)	Rs	2,242,188,218.80	1,471,504,672.35	0.00	0.00	1,801,705,897.14	7,406,227.10
E)	TOTAL COST							
18	Landed Cost of Coal/Lignite (2+17) / (1+7)	Rs/MT	3,346.45	5,734.22	4,452.50		12,048.32	7,275.49
19	Blending Ratio (Domestic/Imported)		0.807527	0.054758	0.000000	0.000000	0.136894	0.000821
20	Weighted average cost of Coal /Lignite (Including biomass)	Rs/MT	4,671.66					
20a	Weighted average cost of Coal /Lignite (Excluding biomass)	Rs/MT	4,669.52					
F)	QUALITY							
21	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)	4,030	4,507	4,471			
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	3,952	4,426				3,105.00
23	GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)					5,000	
24	GCV of Imported coal supplied as per bill of coal company	(Kcal/Kg)					5,167	
25	Weighted average GCV of Coal /Lignite as billed (Including biomass)	(Kcal/Kg)	4,145					
25a	Weighted average GCV of Coal /Lignite as billed (Excluding biomass)	(Kcal/Kg)	4,146					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)	3,197	3,373	3,431			
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	3,204	3,191				3,105.00
28	GCV of Imported coal of the Opening stock as received at station	(Kcal/Kg)					5,270	
29	GCV of Imported coal supplied as received at station	(Kcal/Kg)					5,391	
30	Weighted average GCV of coal/ Lignite as Received (Including biomass)	(Kcal/Kg)	3,505					
30a	Weighted average GCV of coal/ Lignite as Received (Excluding biomass)	(Kcal/Kg)	3,505					

Details of Sourcewise fuel for computation of Energy Charges

Company			NTPC					
Name of the generating Station			MOUDA STAGE I					
Month			FEBRUARY 24					
Sl	Particulars	Unit	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A)	OPENING QUANTITY							
1	Opening Stock of coal	(MT)	0.00	475,564.63	305.32	0.00	79,694.95	228.21
2	Value of Stock	Rs	0.00	2,726,993,506.38	1,359,443.98	0.00	960,190,139.66	1,660,338.80
B)	QUANTITY							
3	Quantity of Coal /Lignite supplied by Coal / Lignite Company	(MT)	501,090.13	245,339.59	0.00	0.00	113,662.20	692.36
4	Adjustment (+/-) In quantity supplied made by Coal / Lignite Company	(MT)						
5	Coal supplied by Coal/Lignite Company (3+4)	(MT)	501,090.13	245,339.59	0.00	0.00	113,662.20	692.36
6	Normative transit & Handling losses (for Coal /Lignite based projects)	(MT)	4,008.72	1,962.72	0.00	0.00	227.324	0.00
7	Net Coal / Lignite supplied (5 - 6)	(MT)	497,081.41	243,376.87	0.0000	0.00	113,434.8760	692.36
C)	PRICE							
8	Amount charged by the Coal / Lignite Company	Rs	1,286,297,332.67	1,231,966,056.00			1,409,860,322.86	4,665,277.23
9	Adjustment (+ / -) in amount charged by coal / Lignite Company	Rs						
10	Handling, Sampling and such other Similar charges	Rs	9,745,148.31	4,771,338.59			2,114,731.94	
11	Total Amount charged (8 +9+10)	Rs	1,296,042,480.98	1,236,737,394.59	0.00	0.00	1,411,975,054.80	4,665,277.23
D)	TRANSPORTATION							
12	Transportation charges by Rail / Ship / Road Transport							
	By Rail	Rs	461,803,093.00	197,554,982.00			1,352,118.00	
	By Road	Rs						
	By Ship	Rs						
13	Adjustment (+/-) In amount charged by railways / transport company	Rs						
14	Demurrage charges, if any	Rs	5,960,934.00	2,918,543.00			1,352,118.00	
15	Cost of diesel in transporting Coal through MGR system, if applicable	Rs						
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	455,842,159.00	194,636,439.00	0.00	0.00	0.00	0.00
	Total amount charged for Coal / Lignite supplied including transportation							
17	(11 + 16)	Rs	1,751,884,639.98	1,431,373,833.59	0.00	0.00	1,411,975,054.80	4,665,277.23
E)	TOTAL COST							
18	Landed Cost of Coal/Lignite (2+17) / (1+7)	Rs/MT	3,524.34	5,784.01	4,452.50		12,282.75	6,871.41
19	Blending Ratio (Domestic/Imported)		0.586777	0.317509	0.000709	0.000000	0.094003	0.001004
20	Weighted average cost of Coal /Lignite (Including biomass)	Rs/MT	5,069.13					
20a	Weighted average cost of Coal /Lignite (Excluding biomass)	Rs/MT	5,067.33					
F)	QUALITY							
21	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)		4,474	4,471			3,105
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	3,472	4,673				3,338.00
	GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)						
23	GCV of Imported coal supplied as per bill of coal company	(Kcal/Kg)					5,127	
24	GCV of Imported coal supplied as per bill of coal company	(Kcal/Kg)					5,000	
25	Weighted average GCV of Coal /Lignite as billed (Including biomass)	(Kcal/Kg)	3,960					
25a	Weighted average GCV of Coal /Lignite as billed (Excluding biomass)	(Kcal/Kg)	3,961					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)		3,300	3,431			3,105.00
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	3,169	3,237				3,338.00
28	GCV of Imported coal of the Opening stock as received at station	(Kcal/Kg)					5,362	
29	GCV of Imported coal supplied as received at station	(Kcal/Kg)					5,183	
30	Weighted average GCV of coal/ Lignite as Received (Including biomass)	(Kcal/Kg)	3,401					
30a	Weighted average GCV of coal/ Lignite as Received (Excluding biomass)	(Kcal/Kg)	253					

Details of Sourcewise fuel for computation of Energy Charges

Company			NTPC					
Name of the generating Station			MOUDA STAGE I					
Month			MARCH 24					
Sl	Particulars	Unit	Domestic Coal- Special arrangement	Domestic Coal	Domestic Coal (NTPC Mines)	E-auction coal	Imported coal	Bio Mass
A) OPENING QUANTITY								
1	Opening Stock of coal	(MT)	1,346.81	382,970.78	0.00	0.00	98,487.98	0.00
2	Value of Stock	Rs	4,746,614.85	2,215,108,166.11	0.00	0.00	1,209,703,103.56	0.00
B) QUANTITY								
3	Quantity of Coal /Lignite supplied by Coal / Lignite Company	(MT)	539,639.44	297,624.82	19,623.06	0.00	167,835.80	925.65
4	Adjustment (+/-) In quantity supplied made by Coal / Lignite Company	(MT)						
5	Coal supplied by Coal/Lignite Company (3+4)	(MT)	539,639.44	297,624.82	19,623.06	0.00	167,835.80	925.65
6	Normative transit & Handling losses (for Coal /Lignite based projects)	(MT)	4,317.12	2,381.00	156.98	0.00	335.672	0.00
7	Net Coal / Lignite supplied (5 - 6)	(MT)	535,322.32	295,243.82	19,466.08	0.00	167,500.1280	925.65
C) PRICE								
8	Amount charged by the Coal / Lignite Company	Rs	1,308,916,489.33	1,699,037,878.77	91,046,711.00	0.00	2,077,741,235.67	5,971,721.94
9	Adjustment (+ / -) in amount charged by coal / Lignite Company	Rs						
10	Handling, Sampling and such other Similar charges	Rs	24,045,218.06	21,187,571.91	574,931.85	0.00	2,764,803.84	210,576.91
11	Total Amount charged (8 +9+10)	Rs	1,332,961,707.39	1,720,225,450.68	91,621,642.85	0.00	2,080,506,039.51	6,182,298.85
D) TRANSPORTATION								
12	Transportation charges by Rail / Ship / Road Transport							
	By Rail	Rs	473,350,298.80	230,408,063.35	198,550.00	0.00	1,698,192.00	-3,312,249.02
	By Road	Rs						
	By Ship	Rs						
13	Adjustment (+/-) In amount charged by railways / transport company	Rs						
14	Demurrage charges, if any	Rs	5,460,167.00	3,011,420.00	198,550.00	0.00	1,698,192.00	0.00
15	Cost of diesel in transporting Coal through MGR system, if applicable	Rs						
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	467,890,131.80	227,396,643.35	0.00	0.00	0.00	-3,312,249.02
	Total amount charged for Coal / Lignite supplied including transportation							
17	(11 + 16)	Rs	1,800,851,839.19	1,947,622,094.03	91,621,642.85	0.00	2,080,506,039.51	2,870,049.83
E) TOTAL COST								
18	Landed Cost of Coal/Lignite (2+17) / (1+7)	Rs/MT	3,364.45	6,137.78	4,706.73		12,369.76	3,100.58
19	Blending Ratio (Domestic/Imported)		0.603968	0.290010	0.000000	0.000000	0.105004	0.001019
20	Weighted average cost of Coal /Lignite (Including biomass)	Rs/MT	5,114.07					
20a	Weighted average cost of Coal /Lignite (Excluding biomass)	Rs/MT	5,116.11					
F) QUALITY								
21	GCV of Domestic coal of the opening coal stock as per bill of coal company	(Kcal/Kg)	3,472	4,541				
22	GCV of Domestic coal supplied as per bill of coal company	(Kcal/Kg)	3,811	4,542	4,396			3,411.00
	GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Kg)						
23	GCV of Imported coal supplied as per bill of coal company	(Kcal/Kg)					5,052	
24	GCV of Imported coal supplied as per bill of coal company	(Kcal/Kg)					5,200	
25	Weighted average GCV of Coal /Lignite as billed (Including biomass)	(Kcal/Kg)	4,162					
25a	Weighted average GCV of Coal /Lignite as billed (Excluding biomass)	(Kcal/Kg)	4,163					
26	GCV of Domestic coal of the Opening stock as received at station	(Kcal/Kg)	3,169	3,279				
27	GCV of Domestic coal/biomass supplied as received at station	(Kcal/Kg)	3,158	3,285	3,472			3,411.00
28	GCV of Imported coal of the Opening stock as received at station	(Kcal/Kg)					5,257	
29	GCV of Imported coal supplied as received at station	(Kcal/Kg)					5,186	
30	Weighted average GCV of coal/ Lignite as Received (Including biomass)	(Kcal/Kg)	3,410					
30a	Weighted average GCV of coal/ Lignite as Received (Excluding biomass)	(Kcal/Kg)	3,410					

Details of Sourcewise fuel for computation of Energy Charges

FORM -15

Company		NTPC
Name of the generating Station		MOUDA STAGE I
Month		APRIL 23
Sl. Particulars	Unit	LDO
A) OPENING QUANTITY		
1 Opening Stock of Oil	KL	2,707.30
2 Value of Stock	Rs	208,782,836.27
B) QUANTITY		
3 Quantity of LDO/HFO supplied by Oil Company	KL	3,032.35
4 Adjustment (+/-) in quantity supplied made by Oil Company	KL	0.00
5 LDO/HFO supplied by Oil Company (3+4)	KL	3,032.35
6 Normative transit & Handling losses	KL	NA
7 Net Oil supplied (5 - 6)	KL	3,032.35
C) PRICE		
8 Amount charged by the Oil Company	Rs	230,594,429.00
9 Adjustment (+ / -) in amount charged by Oil Company	Rs	0.00
10 Handling, Sampling and such other Similar charges	Rs	0.00
11 Total Amount charged (8 +9+10)	Rs	230,594,429.00
D) TRANSPORTATION	Rs	
12 Transportation charges by Rail / Ship / Road Transport		
By Rail	Rs	0.00
By Road	Rs	0.00
By Ship	Rs	0.00
13 Adjustment (+/-) in amount charged by railways / transport company	Rs	0.00
14 Demurrage charges, if any	Rs	0.00
15 Cost of diesel in transporting LDO/HFO through MGR system, if applicable	Rs	0
16 Total transportation charges (12+/- 13 - 14 + 15)	Rs	0.00
17 Total amount charged for Oil supplied including transportation (11 + 16)	Rs	230,594,429.00
E) TOTAL COST		
18 Landed Cost of Oil (HFO/LDO) (2+17) / (1+7)	Rs/KL	76,551.28
19 Blending Ratio		NA
20 Weighted average cost. of Oil		76,551.28
F) QUALITY		
21 GCV of Oil of the opening stock as per bill of Oil company	(Kcal/Ltr)	NA
22 GCV of oil supplied as per bill of oil company	(Kcal/Ltr)	NA
23 GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Ltr)	
24 GCV of Imported coal supplied as per bill of coal company	(Kcal/Ltr)	
25 Weighted average GCV of Oil as billed	(Kcal/Ltr)	NA
26 GCV of Oil of the Opening stock as received at station	(Kcal/Ltr)	9447
27 GCV of Oil supplied (HFO/LDO)	(Kcal/Ltr)	9430
28 GCV of Imported coal of the Opening stock as received at station	(Kcal/Ltr)	
29 GCV of Imported coal supplied as received at station	(Kcal/Ltr)	
30 Weighted average GCV of Oil (HFO/LDO)	(Kcal/Ltr)	9438

Details of Sourcewise fuel for computation of Energy Charges

FORM -15

Company		NTPC	
Name of the generating Station		MOUDA STAGE I	
Month		MAY 23	
Sl	Particulars	Unit	LDO
A) OPENING QUANTITY			
1	Opening Stock of Oil	KL	5,365.65
2	Value of Stock	Rs	410,534,914.56
B) QUANTITY			
3	Quantity of LDO/HFO supplied by Oil Company	KL	0.00
4	Adjustment (+/-) in quantity supplied made by Oil Company	KL	0.00
5	LDO/HFO supplied by Oil Company (3+4)	KL	0.00
6	Normative transit & Handling losses	KL	NA
7	Net Oil supplied (5 - 6)	KL	0.00
C) PRICE			
8	Amount charged by the Oil Company	Rs	0.00
9	Adjustment (+ / -) in amount charged by Oil Company	Rs	0.00
10	Handling, Sampling and such other Similar charges	Rs	0.00
11	Total Amount charged (8 +9+10)	Rs	0.00
D) TRANSPORTATION			
12	Transportation charges by Rail / Ship / Road Transport		
	By Rail	Rs	0.00
	By Road	Rs	0.00
	By Ship	Rs	0.00
13	Adjustment (+/-) in amount charged by railways / transport company	Rs	0.00
14	Demurrage charges, if any	Rs	0.00
15	Cost of diesel in transporting LDO/HFO through MGR system, if applicable	Rs	0
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	0.00
17	Total amount charged for Oil supplied including transportation (11 + 16)	Rs	0.00
E) TOTAL COST			
18	Landed Cost of Oil (HFO/LDO) (2+17) / (1+7)	Rs/KL	76,511.74
19	Blending Ratio		NA
20	Weighted average cost. of Oil		76,511.74
F) QUALITY			
21	GCV of Oil of the opening stock as per bill of Oil company	(Kcal/Ltr)	NA
22	GCV of oil supplied as per bill of oil company	(Kcal/Ltr)	NA
23	GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Ltr)	
24	GCV of Imported coal supplied as per bill of coal company	(Kcal/Ltr)	
25	Weighted average GCV of Oil as billed	(Kcal/Ltr)	NA
26	GCV of Oil of the Opening stock as received at station	(Kcal/Ltr)	9438
27	GCV of Oil supplied (HFO/LDO)	(Kcal/Ltr)	
28	GCV of Imported coal of the Opening stock as received at station	(Kcal/Ltr)	
29	GCV of Imported coal supplied as received at station	(Kcal/Ltr)	
30	Weighted average GCV of Oil (HFO/LDO)	(Kcal/Ltr)	9438

Details of Sourcewise fuel for computation of Energy Charges

FORM -15

Company		NTPC	
Name of the generating Station		MOUDA STAGE I	
Month		JUNE 23	
Sl	Particulars	Unit	LDO
A) OPENING QUANTITY			
1	Opening Stock of Oil	KL	5,010.65
2	Value of Stock	Rs	383,373,246.62
B) QUANTITY			
3	Quantity of LDO/HFO supplied by Oil Company	KL	0.00
4	Adjustment (+/-) in quantity supplied made by Oil Company	KL	0.00
5	LDO/HFO supplied by Oil Company (3+4)	KL	0.00
6	Normative transit & Handling losses	KL	NA
7	Net Oil supplied (5 - 6)	KL	0.00
C) PRICE			
8	Amount charged by the Oil Company	Rs	0.00
9	Adjustment (+ / -) in amount charged by Oil Company	Rs	0.00
10	Handling, Sampling and such other Similar charges	Rs	0.00
11	Total Amount charged (8 +9+10)	Rs	0.00
D) TRANSPORTATION			
12	Transportation charges by Rail / Ship / Road Transport		
	By Rail	Rs	0.00
	By Road	Rs	0.00
	By Ship	Rs	0.00
13	Adjustment (+/-) in amount charged by railways / transport company	Rs	0.00
14	Demurrage charges, if any	Rs	0.00
15	Cost of diesel in transporting LDO/HFO through MGR system, if applicable	Rs	0
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	0.00
17	Total amount charged for Oil supplied including transportation (11 + 16)	Rs	0.00
E) TOTAL COST			
18	Landed Cost of Oil (HFO/LDO) (2+17) / (1+7)	Rs/KL	76,511.74
19	Blending Ratio		NA
20	Weighted average cost. of Oil		76,511.74
F) QUALITY			
21	GCV of Oil of the opening stock as per bill of Oil company	(Kcal/Ltr)	NA
22	GCV of oil supplied as per bill of oil company	(Kcal/Ltr)	NA
23	GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Ltr)	
24	GCV of Imported coal supplied as per bill of coal company	(Kcal/Ltr)	
25	Weighted average GCV of Oil as billed	(Kcal/Ltr)	NA
26	GCV of Oil of the Opening stock as received at station	(Kcal/Ltr)	9438
27	GCV of Oil supplied (HFO/LDO)	(Kcal/Ltr)	
28	GCV of Imported coal of the Opening stock as received at station	(Kcal/Ltr)	
29	GCV of Imported coal supplied as received at station	(Kcal/Ltr)	
30	Weighted average GCV of Oil (HFO/LDO)	(Kcal/Ltr)	9438

Details of Sourcewise fuel for computation of Energy Charges

FORM -15

Company		NTPC	
Name of the generating Station		MOUDA STAGE I	
Month		JULY 23	
Sl	Particulars	Unit	LDO
A) OPENING QUANTITY			
1	Opening Stock of Oil	KL	4,429.65
2	Value of Stock	Rs	338,919,925.38
B) QUANTITY			
3	Quantity of LDO/HFO supplied by Oil Company	KL	0.00
4	Adjustment (+/-) in quantity supplied made by Oil Company	KL	0.00
5	LDO/HFO supplied by Oil Company (3+4)	KL	0.00
6	Normative transit & Handling losses	KL	NA
7	Net Oil supplied (5 - 6)	KL	0.00
C) PRICE			
8	Amount charged by the Oil Company	Rs	0.00
9	Adjustment (+ / -) in amount charged by Oil Company	Rs	0.00
10	Handling, Sampling and such other Similar charges	Rs	0.00
11	Total Amount charged (8 +9+10)	Rs	0.00
D) TRANSPORTATION			
12	Transportation charges by Rail / Ship / Road Transport		
	By Rail	Rs	0.00
	By Road	Rs	0.00
	By Ship	Rs	0.00
13	Adjustment (+/-) in amount charged by railways / transport company	Rs	0.00
14	Demurrage charges, if any	Rs	0.00
15	Cost of diesel in transporting LDO/HFO through MGR system, if applicable	Rs	0
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	0.00
17	Total amount charged for Oil supplied including transportation (11 + 16)	Rs	0.00
E) TOTAL COST			
18	Landed Cost of Oil (HFO/LDO) (2+17) / (1+7)	Rs/KL	76,511.74
19	Blending Ratio		NA
20	Weighted average cost. of Oil		76,511.74
F) QUALITY			
21	GCV of Oil of the opening stock as per bill of Oil company	(Kcal/Ltr)	NA
22	GCV of oil supplied as per bill of oil company	(Kcal/Ltr)	NA
23	GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Ltr)	
24	GCV of Imported coal supplied as per bill of coal company	(Kcal/Ltr)	
25	Weighted average GCV of Oil as billed	(Kcal/Ltr)	NA
26	GCV of Oil of the Opening stock as received at station	(Kcal/Ltr)	9438
27	GCV of Oil supplied (HFO/LDO)	(Kcal/Ltr)	
28	GCV of Imported coal of the Opening stock as received at station	(Kcal/Ltr)	
29	GCV of Imported coal supplied as received at station	(Kcal/Ltr)	
30	Weighted average GCV of Oil (HFO/LDO)	(Kcal/Ltr)	9438

Details of Sourcewise fuel for computation of Energy Charges

FORM -15

Company		NTPC	
Name of the generating Station		MOUDA STAGE I	
Month		AUGUST 23	
Sl	Particulars	Unit	LDO
A) OPENING QUANTITY			
1	Opening Stock of Oil	KL	4,069.65
2	Value of Stock	Rs	311,375,698.72
B) QUANTITY			
3	Quantity of LDO/HFO supplied by Oil Company	KL	0.00
4	Adjustment (+/-) in quantity supplied made by Oil Company	KL	0.00
5	LDO/HFO supplied by Oil Company (3+4)	KL	0.00
6	Normative transit & Handling losses	KL	NA
7	Net Oil supplied (5 - 6)	KL	0.00
C) PRICE			
8	Amount charged by the Oil Company	Rs	0.00
9	Adjustment (+ / -) in amount charged by Oil Company	Rs	0.00
10	Handling, Sampling and such other Similar charges	Rs	0.00
11	Total Amount charged (8 +9+10)	Rs	0.00
D) TRANSPORTATION			
12	Transportation charges by Rail / Ship / Road Transport		
	By Rail	Rs	0.00
	By Road	Rs	0.00
	By Ship	Rs	0.00
13	Adjustment (+/-) in amount charged by railways / transport company	Rs	0.00
14	Demurrage charges, if any	Rs	0.00
15	Cost of diesel in transporting LDO/HFO through MGR system, if applicable	Rs	0
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	0.00
17	Total amount charged for Oil supplied including transportation (11 + 16)	Rs	0.00
E) TOTAL COST			
18	Landed Cost of Oil (HFO/LDO) (2+17) / (1+7)	Rs/KL	76,511.74
19	Blending Ratio		NA
20	Weighted average cost. of Oil		76,511.74
F) QUALITY			
21	GCV of Oil of the opening stock as per bill of Oil company	(Kcal/Ltr)	NA
22	GCV of oil supplied as per bill of oil company	(Kcal/Ltr)	NA
23	GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Ltr)	
24	GCV of Imported coal supplied as per bill of coal company	(Kcal/Ltr)	
25	Weighted average GCV of Oil as billed	(Kcal/Ltr)	NA
26	GCV of Oil of the Opening stock as received at station	(Kcal/Ltr)	9438
27	GCV of Oil supplied (HFO/LDO)	(Kcal/Ltr)	
28	GCV of Imported coal of the Opening stock as received at station	(Kcal/Ltr)	
29	GCV of Imported coal supplied as received at station	(Kcal/Ltr)	
30	Weighted average GCV of Oil (HFO/LDO)	(Kcal/Ltr)	9438

Details of Sourcewise fuel for computation of Energy Charges

FORM -15

Company		NTPC	
Name of the generating Station		MOUDA STAGE I	
Month		SEPTEMBER 23	
Sl	Particulars	Unit	LDO
A) OPENING QUANTITY			
1	Opening Stock of Oil	KL	3,674.65
2	Value of Stock	Rs	281,153,561.25
B) QUANTITY			
3	Quantity of LDO/HFO supplied by Oil Company	KL	0.00
4	Adjustment (+/-) in quantity supplied made by Oil Company	KL	0.00
5	LDO/HFO supplied by Oil Company (3+4)	KL	0.00
6	Normative transit & Handling losses	KL	NA
7	Net Oil supplied (5 - 6)	KL	0.00
C) PRICE			
8	Amount charged by the Oil Company	Rs	0.00
9	Adjustment (+ / -) in amount charged by Oil Company	Rs	0.00
10	Handling, Sampling and such other Similar charges	Rs	0.00
11	Total Amount charged (8 +9+10)	Rs	0.00
D) TRANSPORTATION			
12	Transportation charges by Rail / Ship / Road Transport		
	By Rail	Rs	0.00
	By Road	Rs	0.00
	By Ship	Rs	0.00
13	Adjustment (+/-) in amount charged by railways / transport company	Rs	0.00
14	Demurrage charges, if any	Rs	0.00
15	Cost of diesel in transporting LDO/HFO through MGR system, if applicable	Rs	0
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	0.00
17	Total amount charged for Oil supplied including transportation (11 + 16)	Rs	0.00
E) TOTAL COST			
18	Landed Cost of Oil (HFO/LDO) (2+17) / (1+7)	Rs/KL	76,511.74
19	Blending Ratio		NA
20	Weighted average cost. of Oil		76,511.74
F) QUALITY			
21	GCV of Oil of the opening stock as per bill of Oil company	(Kcal/Ltr)	NA
22	GCV of oil supplied as per bill of oil company	(Kcal/Ltr)	NA
23	GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Ltr)	
24	GCV of Imported coal supplied as per bill of coal company	(Kcal/Ltr)	
25	Weighted average GCV of Oil as billed	(Kcal/Ltr)	NA
26	GCV of Oil of the Opening stock as received at station	(Kcal/Ltr)	9438
27	GCV of Oil supplied (HFO/LDO)	(Kcal/Ltr)	
28	GCV of Imported coal of the Opening stock as received at station	(Kcal/Ltr)	
29	GCV of Imported coal supplied as received at station	(Kcal/Ltr)	
30	Weighted average GCV of Oil (HFO/LDO)	(Kcal/Ltr)	9438

Details of Sourcewise fuel for computation of Energy Charges

FORM -15

Company		NTPC	
Name of the generating Station		MOUDA STAGE I	
Month		OCTOBER 23	
Sl	Particulars	Unit	LDO
A) OPENING QUANTITY			
1	Opening Stock of Oil	KL	2,447.65
2	Value of Stock	Rs	187,273,655.59
B) QUANTITY			
3	Quantity of LDO/HFO supplied by Oil Company	KL	3,091.11
4	Adjustment (+/-) in quantity supplied made by Oil Company	KL	0.00
5	LDO/HFO supplied by Oil Company (3+4)	KL	3,091.11
6	Normative transit & Handling losses	KL	NA
7	Net Oil supplied (5 - 6)	KL	3,091.11
C) PRICE			
8	Amount charged by the Oil Company	Rs	265,677,062.00
9	Adjustment (+ / -) in amount charged by Oil Company	Rs	0.00
10	Handling, Sampling and such other Similar charges	Rs	0.00
11	Total Amount charged (8 +9+10)	Rs	265,677,062.00
D) TRANSPORTATION			
12	Transportation charges by Rail / Ship / Road Transport		
	By Rail	Rs	0.00
	By Road	Rs	0.00
	By Ship	Rs	0.00
13	Adjustment (+/-) in amount charged by railways / transport company	Rs	0.00
14	Demurrage charges, if any	Rs	0.00
15	Cost of diesel in transporting LDO/HFO through MGR system, if applicable	Rs	0
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	0.00
17	Total amount charged for Oil supplied including transportation (11 + 16)	Rs	265,677,062.00
E) TOTAL COST			
18	Landed Cost of Oil (HFO/LDO) (2+17) / (1+7)	Rs/KL	81,778.42
19	Blending Ratio		NA
20	Weighted average cost. of Oil		81,778.42
F) QUALITY			
21	GCV of Oil of the opening stock as per bill of Oil company	(Kcal/Ltr)	NA
22	GCV of oil supplied as per bill of oil company	(Kcal/Ltr)	NA
23	GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Ltr)	
24	GCV of Imported coal supplied as per bill of coal company	(Kcal/Ltr)	
25	Weighted average GCV of Oil as billed	(Kcal/Ltr)	NA
26	GCV of Oil of the Opening stock as received at station	(Kcal/Ltr)	9438
27	GCV of Oil supplied (HFO/LDO)	(Kcal/Ltr)	9438
28	GCV of Imported coal of the Opening stock as received at station	(Kcal/Ltr)	
29	GCV of Imported coal supplied as received at station	(Kcal/Ltr)	
30	Weighted average GCV of Oil (HFO/LDO)	(Kcal/Ltr)	9438

Details of Sourcewise fuel for computation of Energy Charges

FORM -15

Company		NTPC	
Name of the generating Station		MOUDA STAGE I	
Month		NOVEMBER 23	
Sl	Particulars	Unit	LDO
A) OPENING QUANTITY			
1	Opening Stock of Oil	KL	5,158.76
2	Value of Stock	Rs	421,524,360.09
B) QUANTITY			
3	Quantity of LDO/HFO supplied by Oil Company	KL	0.00
4	Adjustment (+/-) in quantity supplied made by Oil Company	KL	0.00
5	LDO/HFO supplied by Oil Company (3+4)	KL	0.00
6	Normative transit & Handling losses	KL	NA
7	Net Oil supplied (5 - 6)	KL	0.00
C) PRICE			
8	Amount charged by the Oil Company	Rs	0.00
9	Adjustment (+ / -) in amount charged by Oil Company	Rs	0.00
10	Handling, Sampling and such other Similar charges	Rs	0.00
11	Total Amount charged (8 +9+10)	Rs	0.00
D) TRANSPORTATION			
12	Transportation charges by Rail / Ship / Road Transport		
	By Rail	Rs	0.00
	By Road	Rs	0.00
	By Ship	Rs	0.00
13	Adjustment (+/-) in amount charged by railways / transport company	Rs	0.00
14	Demurrage charges, if any	Rs	0.00
15	Cost of diesel in transporting LDO/HFO through MGR system, if applicable	Rs	0
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	0.00
17	Total amount charged for Oil supplied including transportation (11 + 16)	Rs	0.00
E) TOTAL COST			
18	Landed Cost of Oil (HFO/LDO) (2+17) / (1+7)	Rs/KL	81,710.47
19	Blending Ratio		NA
20	Weighted average cost. of Oil		81,710.47
F) QUALITY			
21	GCV of Oil of the opening stock as per bill of Oil company	(Kcal/Ltr)	NA
22	GCV of oil supplied as per bill of oil company	(Kcal/Ltr)	NA
23	GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Ltr)	
24	GCV of Imported coal supplied as per bill of coal company	(Kcal/Ltr)	
25	Weighted average GCV of Oil as billed	(Kcal/Ltr)	NA
26	GCV of Oil of the Opening stock as received at station	(Kcal/Ltr)	9438
27	GCV of Oil supplied (HFO/LDO)	(Kcal/Ltr)	
28	GCV of Imported coal of the Opening stock as received at station	(Kcal/Ltr)	
29	GCV of Imported coal supplied as received at station	(Kcal/Ltr)	
30	Weighted average GCV of Oil (HFO/LDO)	(Kcal/Ltr)	9438

Details of Sourcewise fuel for computation of Energy Charges

FORM -15

Company		NTPC	
Name of the generating Station		MOUDA STAGE I	
Month		DECEMBER 23	
Sl	Particulars	Unit	LDO
A) OPENING QUANTITY			
1	Opening Stock of Oil	KL	4,948.76
2	Value of Stock	Rs	404,365,162.05
B) QUANTITY			
3	Quantity of LDO/HFO supplied by Oil Company	KL	0.00
4	Adjustment (+/-) in quantity supplied made by Oil Company	KL	0.00
5	LDO/HFO supplied by Oil Company (3+4)	KL	0.00
6	Normative transit & Handling losses	KL	NA
7	Net Oil supplied (5 - 6)	KL	0.00
C) PRICE			
8	Amount charged by the Oil Company	Rs	0.00
9	Adjustment (+ / -) in amount charged by Oil Company	Rs	0.00
10	Handling, Sampling and such other Similar charges	Rs	0.00
11	Total Amount charged (8 +9+10)	Rs	0.00
D) TRANSPORTATION			
12	Transportation charges by Rail / Ship / Road Transport		
	By Rail	Rs	0.00
	By Road	Rs	0.00
	By Ship	Rs	0.00
13	Adjustment (+/-) in amount charged by railways / transport company	Rs	0.00
14	Demurrage charges, if any	Rs	0.00
15	Cost of diesel in transporting LDO/HFO through MGR system, if applicable	Rs	0
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	0.00
17	Total amount charged for Oil supplied including transportation (11 + 16)	Rs	0.00
E) TOTAL COST			
18	Landed Cost of Oil (HFO/LDO) (2+17) / (1+7)	Rs/KL	81,710.47
19	Blending Ratio		NA
20	Weighted average cost. of Oil		81,710.47
F) QUALITY			
21	GCV of Oil of the opening stock as per bill of Oil company	(Kcal/Ltr)	NA
22	GCV of oil supplied as per bill of oil company	(Kcal/Ltr)	NA
23	GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Ltr)	
24	GCV of Imported coal supplied as per bill of coal company	(Kcal/Ltr)	
25	Weighted average GCV of Oil as billed	(Kcal/Ltr)	NA
26	GCV of Oil of the Opening stock as received at station	(Kcal/Ltr)	9438
27	GCV of Oil supplied (HFO/LDO)	(Kcal/Ltr)	
28	GCV of Imported coal of the Opening stock as received at station	(Kcal/Ltr)	
29	GCV of Imported coal supplied as received at station	(Kcal/Ltr)	
30	Weighted average GCV of Oil (HFO/LDO)	(Kcal/Ltr)	9438

Details of Sourcewise fuel for computation of Energy Charges

FORM -15

Company		NTPC	
Name of the generating Station		MOUDA STAGE I	
Month		JANUARY 24	
Sl	Particulars	Unit	LDO
A) OPENING QUANTITY			
1	Opening Stock of Oil	KL	3,417.76
2	Value of Stock	Rs	279,266,437.62
B) QUANTITY			
3	Quantity of LDO/HFO supplied by Oil Company	KL	0.00
4	Adjustment (+/-) in quantity supplied made by Oil Company	KL	0.00
5	LDO/HFO supplied by Oil Company (3+4)	KL	0.00
6	Normative transit & Handling losses	KL	NA
7	Net Oil supplied (5 - 6)	KL	0.00
C) PRICE			
8	Amount charged by the Oil Company	Rs	0.00
9	Adjustment (+ / -) in amount charged by Oil Company	Rs	0.00
10	Handling, Sampling and such other Similar charges	Rs	0.00
11	Total Amount charged (8 +9+10)	Rs	0.00
D) TRANSPORTATION			
12	Transportation charges by Rail / Ship / Road Transport		
	By Rail	Rs	0.00
	By Road	Rs	0.00
	By Ship	Rs	0.00
13	Adjustment (+/-) in amount charged by railways / transport company	Rs	0.00
14	Demurrage charges, if any	Rs	0.00
15	Cost of diesel in transporting LDO/HFO through MGR system, if applicable	Rs	0
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	0.00
17	Total amount charged for Oil supplied including transportation (11 + 16)	Rs	0.00
E) TOTAL COST			
18	Landed Cost of Oil (HFO/LDO) (2+17) / (1+7)	Rs/KL	81,710.47
19	Blending Ratio		NA
20	Weighted average cost. of Oil		81,710.47
F) QUALITY			
21	GCV of Oil of the opening stock as per bill of Oil company	(Kcal/Ltr)	NA
22	GCV of oil supplied as per bill of oil company	(Kcal/Ltr)	NA
23	GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Ltr)	
24	GCV of Imported coal supplied as per bill of coal company	(Kcal/Ltr)	
25	Weighted average GCV of Oil as billed	(Kcal/Ltr)	NA
26	GCV of Oil of the Opening stock as received at station	(Kcal/Ltr)	9438
27	GCV of Oil supplied (HFO/LDO)	(Kcal/Ltr)	
28	GCV of Imported coal of the Opening stock as received at station	(Kcal/Ltr)	
29	GCV of Imported coal supplied as received at station	(Kcal/Ltr)	
30	Weighted average GCV of Oil (HFO/LDO)	(Kcal/Ltr)	9438

Details of Sourcewise fuel for computation of Energy Charges

FORM -15

Company		NTPC	
Name of the generating Station		MOUDA STAGE I	
Month		FEBRUARY 24	
Sl	Particulars	Unit	LDO
A) OPENING QUANTITY			
1	Opening Stock of Oil	KL	3,017.76
2	Value of Stock	Rs	246,582,250.96
B) QUANTITY			
3	Quantity of LDO/HFO supplied by Oil Company	KL	0.00
4	Adjustment (+/-) in quantity supplied made by Oil Company	KL	0.00
5	LDO/HFO supplied by Oil Company (3+4)	KL	0.00
6	Normative transit & Handling losses	KL	NA
7	Net Oil supplied (5 - 6)	KL	0.00
C) PRICE			
8	Amount charged by the Oil Company	Rs	0.00
9	Adjustment (+ / -) in amount charged by Oil Company	Rs	0.00
10	Handling, Sampling and such other Similar charges	Rs	0.00
11	Total Amount charged (8 +9+10)	Rs	0.00
D) TRANSPORTATION			
12	Transportation charges by Rail / Ship / Road Transport		
	By Rail	Rs	0.00
	By Road	Rs	0.00
	By Ship	Rs	0.00
13	Adjustment (+/-) in amount charged by railways / transport company	Rs	0.00
14	Demurrage charges, if any	Rs	0.00
15	Cost of diesel in transporting LDO/HFO through MGR system, if applicable	Rs	0
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	0.00
17	Total amount charged for Oil supplied including transportation (11 + 16)	Rs	0.00
E) TOTAL COST			
18	Landed Cost of Oil (HFO/LDO) (2+17) / (1+7)	Rs/KL	81,710.47
19	Blending Ratio		NA
20	Weighted average cost. of Oil		81,710.47
F) QUALITY			
21	GCV of Oil of the opening stock as per bill of Oil company	(Kcal/Ltr)	NA
22	GCV of oil supplied as per bill of oil company	(Kcal/Ltr)	NA
23	GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Ltr)	
24	GCV of Imported coal supplied as per bill of coal company	(Kcal/Ltr)	
25	Weighted average GCV of Oil as billed	(Kcal/Ltr)	NA
26	GCV of Oil of the Opening stock as received at station	(Kcal/Ltr)	9438
27	GCV of Oil supplied (HFO/LDO)	(Kcal/Ltr)	
28	GCV of Imported coal of the Opening stock as received at station	(Kcal/Ltr)	
29	GCV of Imported coal supplied as received at station	(Kcal/Ltr)	
30	Weighted average GCV of Oil (HFO/LDO)	(Kcal/Ltr)	9438

Details of Sourcewise fuel for computation of Energy Charges

FORM -15

Company		NTPC	
Name of the generating Station		MOUDA STAGE I	
Month		MARCH 24	
Sl	Particulars	Unit	LDO
A) OPENING QUANTITY			
1	Opening Stock of Oil	KL	2,884.76
2	Value of Stock	Rs	235,714,758.90
B) QUANTITY			
3	Quantity of LDO/HFO supplied by Oil Company	KL	3,029.83
4	Adjustment (+/-) in quantity supplied made by Oil Company	KL	0.00
5	LDO/HFO supplied by Oil Company (3+4)	KL	3,029.83
6	Normative transit & Handling losses	KL	NA
7	Net Oil supplied (5 - 6)	KL	3,029.83
C) PRICE			
8	Amount charged by the Oil Company	Rs	205,151,538.80
9	Adjustment (+ / -) in amount charged by Oil Company	Rs	0.00
10	Handling, Sampling and such other Similar charges	Rs	0.00
11	Total Amount charged (8 +9+10)	Rs	205,151,538.80
D) TRANSPORTATION			
12	Transportation charges by Rail / Ship / Road Transport		
	By Rail	Rs	0.00
	By Road	Rs	0.00
	By Ship	Rs	0.00
13	Adjustment (+/-) in amount charged by railways / transport company	Rs	0.00
14	Demurrage charges, if any	Rs	0.00
15	Cost of diesel in transporting LDO/HFO through MGR system, if applicable	Rs	0
16	Total transportation charges (12+/- 13 - 14 + 15)	Rs	0.00
17	Total amount charged for Oil supplied including transportation (11 + 16)	Rs	205,151,538.80
E) TOTAL COST			
18	Landed Cost of Oil (HFO/LDO) (2+17) / (1+7)	Rs/KL	74,538.83
19	Blending Ratio		NA
20	Weighted average cost. of Oil		74,538.83
F) QUALITY			
21	GCV of Oil of the opening stock as per bill of Oil company	(Kcal/Ltr)	NA
22	GCV of oil supplied as per bill of oil company	(Kcal/Ltr)	NA
23	GCV of Imported coal of the opening coal stock as per bill of coal company	(Kcal/Ltr)	
24	GCV of Imported coal supplied as per bill of coal company	(Kcal/Ltr)	
25	Weighted average GCV of Oil as billed	(Kcal/Ltr)	NA
26	GCV of Oil of the Opening stock as received at station	(Kcal/Ltr)	9438
27	GCV of Oil supplied (HFO/LDO)	(Kcal/Ltr)	9480
28	GCV of Imported coal of the Opening stock as received at station	(Kcal/Ltr)	
29	GCV of Imported coal supplied as received at station	(Kcal/Ltr)	
30	Weighted average GCV of Oil (HFO/LDO)	(Kcal/Ltr)	9460