बिहार ग्रिड कम्पनी लिमिटेड
(संयुक्त उपक्रम बिहार स्टेट पावर (होल्डिंग) कं० लि० एवं पावरग्रिड)
BIHAR GRID COMPANY LIMITED
(Joint Venture of Bihar State Power (Holding) Co. Ltd. & POWERGRID)

बिहार ग्रिड

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CIN : U40100BR2013PLC019722

Ref: JV/PT/BG/Comml/BERC/TP/Case-19/2021/96

Date: 31/01/2022

To,

The Secretary,
Bihar Electricity Regulatory Commission,
Vidyut Bhavan – II, Bailey Road,
Patna - 800021

Ref: BERC-Case No. 19/2021

Letter no. BERC Tariff Case No.- 19/2021-41 Patna, dated 11-01-2022

Sub: 2nd Additional submission in Tariff Petition for True-up Petition for FY 2020-21, APR for FY 2021-22, ARR for FY 2022-23 to FY 2024-25 and Transmission Charges for FY 2022-23.

Dear Sir,

In reference to the aforementioned case no. 19/2021 for assessment of Tariff Petition filed by BGCL for True-up for FY 2020-21, APR for FY 2021-22, ARR for FY 2022-23 to FY 2024-25 and Transmission Charges for FY 2022-23 and additional information sought by Hon'ble Commission vide above referred letter. The additional submission is provided as index-I.

You are requested to consider the additional submission for processing of the subject Tariff Petition.

Thanking you,

Yours faithfully,

(Rajesh)
GM (O&M, Commercial)
BGCL, Patna

Encl. As above

1. With reference to claim for approval of CAPEX for ABT metering;

(i) As stated under paragraph 2 of the petition, furnish documents in support of mandatory installation of ABT meter.

(ii) Furnish documents including approval of board of directors in support of planning for installation of 418 ABT Meter, source of funding and that the proposed CAPEX is the least cost & economically viable option. Also justify whether cost of existing CAPEX approved for Part 1&2 does not include Metering of these points where 418 ABT Meter proposed to be installed.

(iii) What is the objective of this proposed CAPEX? Also furnish cost benefit analysis.

(iv) Table 1(Year wise Capital Expenditure for ABT metering) shows that total cost involved for installation and commissioning of 418 ABT Meter is Rs. 17.64 Cr out of which Rs. 5.98 Cr estimated to be incurred during FY 2021-22 is Rs. 5.98 Cr, justify how Rs.5.98 Cr will be incurred during shortest period of March 2022 after its approval. Also furnish, Scheduled date of award of work, Scheduled date of start of work, scheduled date of Completion of work, PERT/CPM analysis.

(v) Furnish Break-up of Project Cost alongwith supporting documents bifurcating into Taxes and Duties, Interest during Construction (IDC), other financing charges (FC), Foreign Exchange Rate Variation (FERV), Hedging Cost etc. Also furnish estimated phasing of fund of different source of finance and calculation of IDC in consonance of PERT/CPM chart and completion schedule.

Reply: As per the provisions of the Act, Load dispatch centers are mandated to schedule the power as per the demand, contracts as well as keep account of the electricity transmitted through the transmission grid. This implies that a 'ledger' of energy transactions have to be maintained, the physical flow of electricity across various notional channels in the electricity grid have to be measured and 'energy balance sheets' have to be prepared at the transmission level. The measurements have to be at the bays terminating at substations and collected using communication medium such as GPRS / OPGW etc. at a centralized location for preparation of 'energy statements' that indicate the scheduled and actual interchange of entities with the grid as well as account for the transmission losses incurred in the grid.

The SAMAST (Scheduling, Accounting, Metering and Settlement of Transactions in Electricity) report by the FOR lays guidelines in this regard. SAMAST is a backbone for ABT/DSM and precursor to ABT/DSM framework. The SAMAST report, inter-alia, mandates different works with timelines to be performed by SLDC and its requirements for acquaintance with ABT/DSM framework to be implemented at the state level. The recommendations of the SAMAST scheme in this regard **Annexed-1A.**

Therefore, in accordance with the Hon'ble CERC Regulations as well as State Regulations, it is incumbent upon the Transmission Licensee to adhere to the SAMAST scheme.

It is also mentioned that the Hon'ble BERC had initiated "Suo Motu proceeding for ensuring compliance of the directives of commission for implementation of SAMAST in Bihar" by its transmission licensee namely Bihar State Power Transmission Company Ltd. (BSTPCL). Relevant extracts of the Order in Case No. 15/2017 of Hon'ble BERC are **Annexed-1B.**

It may also be relevant to mention that the STU (BSPTCL) has also requested BGCL to install ABT meters on its interface points for compliance to SAMAST scheme in the state. The Letter of correspondence in this regard are provided as **Annexure-1C.**

Considering the emergent nature of work, the Licensee has planned to install 87 ABT meters in FY 2021-22 on the 33 kV DISCOM interface points (on priority) and has taken necessary BoD approval to implement the same. The work related to installation of ABT meters is done through agency selected on basis of competitive bidding. Further, the remaining interface points are planned to be undertaken in FY 2022-23 as provided in the Petition under Phase 2. ***The petitioner submits before the Hon'ble Commission to kindly grant approval for the implementation of the works and capital cost pertaining to ABT meters as per the plan submitted in the instant Petition as this work is commenced in emergent conditions and being statutory in nature. Further, these meters will also ensure proper energy accounting of concerned Discoms which are also licensee of Hon'ble BERC.*** The Board Approval is provided as **Annexure 1D.**

The Petitioner submits that it has already procured the meters for works under Phase 1 *i.e.* 87 meters by way of competitive bidding process and execution work of ABT meter is also under progress. The same is expected to be completed by March 2022.

The detailed breakup of the Capital Cost including taxes, DPR is provided as **Annexure-1E.**

2. Table-4, Opening IDC claimed at Rs.72.36 Cr however it is Rs. 37.60 Cr as closing amount approved in Table 18 of truing up Order of FY 2019-20. Further, Closing CWIP claimed for truing of FY 2020-21 at Rs. 1,678.13 Cr however closing CWIP as per audited account is Rs. 832.07 Cr. Justify

Reply: It is humbly stated that BGCL had filed its review petition on 11.06.2021 (vide Case No. 04/2021) before Hon'ble BERC for adjudication upon which Order was awaited at the time of filing of instant petition. Accordingly, the Petitioner has claimed closing balances as claimed in the True up Petition for the FY 2019-20.

3. Table 2 – Gross Fixed Asset for the FY 2020-21: Capitalization (without IDC & IEDC) is Rs. 266.63 Cr. However it is Rs. 264.45 Cr. in Table 3 - CWIP statement for the FY 2020-21?

Reply: The Petitioner submits that the overall capitalization is as shown in the table below:

Particulars	Value
GFA addition (as per Audited Accounts)	297.03
Less: IDC	21.09
Less: IEDC	11.47
GFA addition (hard cost)	264.47
Addition: land cost (Dumraon) earlier disallowed	2.16 (Inadvertently, amount considered is Rs. 2.16 cr., however the actual amount is 2.61 cr.)
GFA additions claim of BGCL for FY 2020-21	**266.64**

The Petitioner submits that the claim of Rs. 266.6 Crore includes land component also (pertaining to Dumraon) as claimed in the table above. The Petitioner submits before the Hon'ble Commission to approve Rs. 266.64 Cr. towards Capitalization for the FY 2020-21.

4. Capitalization claimed detailed in Annexure –D of the petition having nomenclature of transmission line, substation and bay extension different from approval given by the commission in its order approving business plan dated 28.07.2017 for phase IV (Part 2) project and 28.01.2020 for Phase IV (Part 1) project. Substantiate with element wise details and supporting.

Reply: Nomenclature of assets as per DOCO and mapping of the same as per the details submitted in the Business Plan is provided as **Annexure- 2.**

5. Sum of total capitalization claimed as detailed in Annexure-D of the petition is coming at Rs. 294.80 cr however it is showing and claimed at Rs.294.85 Cr. Further Capitalization claimed in table-4 of the petition is at 297.01 Cr and table -7 is at 299.19 cr however audited balance sheet is showing the net capitalization at Rs.297.03 Cr.

Reply: The Petitioner submits that the Capitalization as per Annexure D is Rs. 294.85 Crore, the soft copy of which is appended as **Annexure- 3** for the kind consideration of the Hon'ble Commission.

With reference to Audited accounts, the Petitioner submits that from CWIP (Note 3), Rs. 294.85 Crore has attained capitalization. Further, the land cost (Dumraon) amounting to Rs. 2.16 Crore earlier disallowed by the Hon'ble Commission was also kept in Regulatory CWIP balances which has been considered to have attained capitalization in FY 2020-21. Also, Rs. 2.18 Crore of net capitalization pertains to Furniture and Fixtures and Office Equipment from the Note 2 of the Audited Accounts which has not been a part of Accounting CWIP. Therefore, the breakup of overall capitalization as claimed for the FY 2020-21 is depicted below:

Particulars	Value (Rs. Cr.)
Capitalization from Note 3 of Audited Accounts	294.85
Land Capitalization earlier disallowed (Dumraon)	2.16 (Inadvertently, amount considered is Rs. 2.16 cr., however the actual amount is 2.61 cr.)
Sub Total	**297.01**
Other items (Furniture and office eq.)	2.18
Net capitalization claimed	**299.19**

6. Audited account is showing that IDC of Rs. 9.85 Cr have been capitalized under part-2 however capitalization of IDC for part -2 project has been claimed at Rs. 10.30 Cr for truing up of FY 2020-21. Likewise audited account is showing that IEDC of Rs. 3.6673 Cr and Rs. 7.8059 Cr have been capitalized under part -2 and part -1 respectively however capitalization of IEDC for part -2 and part-1 project have been claimed at Rs. 2.82 Cr and Rs. 8.62 Cr. respectively for truing up of FY 2020-21.

Reply: The petitioner submits that it has considered overall IDC Capitalization and IEDC Capitalization of Rs. 21.09 Crore (for Part 1 and Part 2) and Rs. 11.47 Crore (for Part 1 and Part 2) for the computation of overall GFA for the FY 2020-21 which is as per the Audited Accounts for the FY 2020-21. The Hon'ble Commission is requested to consider the same for the True up of FY 2020-21.

7. As per commission order dated 28.01.2020 (case no- 25/2019), IDC will be considered based on the calculation of IDC from the date of infusion of debt fund upto scheduled date / Actual date of commercial operation showing amount of loan & amount of capex actually attributed/ allocated to each substations & transmission lines but such calculation sheet in support of IDC claim has not been furnished.

Reply: As per the audited account for FY 2020-21, the additions to IDC is Rs. 18.80 Cr. & Rs. 16.64 Cr. for Part I & II respectively. The working of the same is provided as **Annexure- 4.**

8. Audited account note -3, balance of capital work in progress (CWIP) as on 31.03.2021 showing at Rs. 694.34 Cr. & Rs. 832.06 Cr seems to have clerical error as it is not in agreement with CWIP at the beginning of the year adjusted for addition/ adjustment/ reallocation/capitalization made during the year. Furnish details of CWIP at the beginning of the year of each items of CWIP and addition/ reallocation/capitalization made during the year.

Reply: As pointed out by the Hon'ble Commission, there has been a clerical error in the CWIP statement submitted (Note 3) of the Financial statements. The Petitioner has provided a copy of revised Note 3 in reply to the Hon'ble Commission queries (ref Letter dated 29.12.2021) vide Letter dated 10.01.2021. The Petitioner reproduces a copy of the revised Note 3 for the kind consideration of the Hon'ble Commission as **Annexure - 5**.

9. Refer truing up order dated 12.03.2021 of FY 2019-20 read with review order 28.12.20201, no further capitalization will be considered for part-I project unless detailed information, data and justification along with supporting documents is submitted for prudence check, to substantiate the amount actually incurred on each factor as elaborated in said order and for change in cost Rs.1699.36 crores showing deviation amount attributable to each factor contributing into deviation i.e Government Taxes & duties, change in scope of work etc.

Reply: The information sought is under preparation and an additional time of 01 month may be provided to the petitioner for the sought submission.

10. Table 4- Computation of Weighted average Rate of Depreciation

Provide detailed calculation of claimed Depreciation of opening depreciable assets Rs.85.64 Cr and depreciation on asset additions during the year Rs. 9.79 Cr. Further, depreciation showing in Note-2 is Rs.95.40 Cr however statement of profit and loss showing the audited depreciation at Rs.95.M Cr.

Reply: Computation of Weighted average rate of Depreciation is provided as **Annexure- 6** (soft copy).

It is submitted that the P&L statement depicts depreciation including amortization of intangible assets which amounts to Rs. 0.12 Crore (ref Note 24 to the Financial statements) while Note 2 depicts net depreciation of tangible assets which amounts to Rs. 95.40 Crore.

11. Table 5 - BGCL claim of Depreciation for the FY 2020-21

Net Opening GFA (without land) Claimed at Rs. 1,723.45 however it is Rs. 1,653.95 Cr as closing amount approved in Table 27 of truing up Order of FY 2019-20?

Reply: It is humbly stated that BGCL had filed its review petition on 11.06.2021 (vide Case No. 04/2021) before Hon'ble BERC for adjudication upon which Order was awaited at the time of filing of instant petition. Accordingly, the Petitioner has claimed closing balances as claimed in the True up Petition for the FY 2019-20.

12. Land addition to GFA claimed in FY 2020-21 at Rs.2.16 Cr, however audited account showing NIL Land addition to GFA. Clarify.

Reply: The Petitioner vide Letter dated 02.01.2020 (provided as **Table 2**) (as a reply to Hon'ble Commission's query) had submitted that the cost of Rs. 2.61 Cr. of land has attained capitalization in the books of Accounts in FY 2018-19 however the same was not allowed by the Hon'ble Commission since the asset pertaining to Dumraon had not attained capitalization by then. The Petitioner has claimed the same in the True up for FY 2020-21 since the asset on Dumraon has now attained capitalization, so it is requested before the Hon'ble Commission to approve Rs. 2.61 Cr. The Petitioner reproduces the table submitted during the Tariff proceedings for FY 2020-21 as shown in the table below:

Land Acquisition for	Value (in Rs. Cr.)
Dumraon Substation	2.61
Jakkanpur Substation	16.92
Naubatpur Substation	21.80
Pota Cabin	0.45
Total	**41.78**

Further, in the Balance Sheet for FY 2019-20, the petitioner has capitalisedland for Dumraon amounting to Rs. 3.86 Crore, which has been disallowed by the hon'ble commission vide order dtd 12.03.2021 and subsequently vide review order dtd 28.12.2021.

The petitioner hereby submits before the hon'ble commission to approve an additional Rs. 6.47 crore towards capitalization for the land of Dumraon GIS in true up of FY 2020-21.

The relevant extracts of the Hon'ble Commission's Order dated 20.03.2020 in the above regard pertaining to disallowance of Rs. 41.78 Crore is reproduced below:

> It is observed from Para(g) of the petitioner reply vide Letter No-JV/BG/PT/Comml./BERC/04 dated 02.01.2020 that out of total direct capitalization of Rs.46.05 Crore, Rs.41.78 Crore relating to Phase IV Part 2 of 2 works which has been directly charged to GFA. The project relating to Phase IV Part 2 of 2 is proposed to be capitalised and put into use in FY 2019-20 and FY 2020-21 by the petitioner. The capex made amounting to Rs.41.78 Croreis for erection of substations and shall be capitalised along with the cost of equipment on commissioning of substation. As such capex of Rs.41.78 Crore is treated as CWIP and withdrawn from the value of GFA in truing up for FY 2018-19.
>
> The Commission approves capitalisation of capex based on the audited accounts for FY 2018-19 in true up as table 4.4 given below:

13. Table 6 – BGCL claim of interest on Loan for the FY 2020-21: Opening Loan (Normative) claimed at Rs, 1,216.80 however closing loan of FY 2019-20 is Rs. 1,164.04 Cr as approved under Table 31 (Computation of Interest on Loan) in truing up Order of FY 2019-20.

Reply: It is humbly stated that BGCL had filed its review petition on 11.06.2021 (vide Case No. 04/2021) before Hon'ble BERC for adjudication upon which Order was awaited at the time of filing of instant petition. Accordingly, the Petitioner has claimed closing loan balances as claimed in the True up Petition for the FY 2019-20.

14. Addition to loan, for the purpose of truing up, have been claimed on adhoc basis @80% of GFA additions without furnishing the details of actual loan availed, its utilization. Furnish the details of loan utilized towards capitalized assets, CWIP and kept in bank as of close of financial year 2020-21.

Reply:

The Petitioner submits that the ongoing capital schemes have proposed at a debt: equity ratio of 80:20. The same ratio has been approved by the Hon'ble Commission vide Business Plan Order dated 04.01.2014. Furthermore, the debt component as per the projected capital cost of Rs. 2,091.89 Crore has been estimated to be Rs. 1,673.51 Crore which shall be sourced through REC for Part 1 of 2. The Loan is drawn from the financial agencies in accordance with the estimated Capital expenditure (CWIP) for the ongoing project works. The details of loans drawn and utilized during the FY 2020-21 is provided as **Annexure – 8**.

15. Weighted average rate of interest and other terms and conditions of loan:

a) Documents in support of terms and conditions of loan availed have not been furnished. Furnish loan documents along with documents in support of rate of interest claimed.

b) Calculation sheet of WAR0I furnished in Annexure-F showing rate of interest higher than the rate considered in truing up of FY 2019-20 in spite of fact that interest rate have been reduced substantially. Furnish Calculation sheet of WAROI showing separately the Loan tranche no. disbursal date, disbursal amount, rate of interest on disbursal date, rate of interest on each reset date, rate of interest of current financial year 2020-21, balance at the beginning of the year, principal amount repaid during the year, interest amount charged during the year and balance as at 31.03.2021 for each tranche of PFC and REC loan separately.

Reply: The terms & conditions of Loan agreement tied up with REC and PFC are provided as **Annexure- 9.** Further, the computation of weighted average rate of interest is provided as **Annexure- 10.**

16. Opening Equity claimed at Rs. 347.21 cr however it is Rs. 333.32 Cr as closing amount approved in Table 40 of truing up order of FY 2019-20. Justify.

Reply: It is humbly stated that BGCL had filed its review petition on 11.06.2021 (vide Case No. 04/2021) before Hon'ble BERC for adjudication upon which Order was awaited at the time of filing of instant petition. Accordingly, the Petitioner has claimed closing equity balances as claimed in the True up Petition for the FY 2019-20.

17. Para. 3.9 of the petition : Provide details of the actual Tax paid for the FY 2020-21 Rs. 42.00 Crores and income tax computation sheet showing Profit as per audited account, Expenses or losses allowed but not recorded in audited statement of Profit & Loss etc, taxable income under business, Income chargeable under other heads, deduction, exemptions, total taxable income etc.

Reply: The details of Income tax computation pertaining to the FY 2020-21 is provided as **Annexure- 11.**

18. Addition to equity, for the purpose of truing up, have been claimed on adhoc basis @20% of GFA addition without furnishing the details of actual equity raised/fund received as application money, its utilization. Furnish the details of equity fund raised its utilization towards capitalized assets, CWIP and kept in bank as of close of financial year 2020-21.

Reply: The Petitioner submits that the ongoing capital schemes have proposed at a debt: equity ratio of 80:20. The same ratio has been approved by the Hon'ble Commission vide Business Plan Order dated 04.01.2014. Furthermore, the equity component as per the projected capital cost of Rs. 2,091.89 Crore has been estimated to be Rs. 418.38 Crore. It is further submitted that the equity raised is in accordance with the estimated Capital expenditure (CWIP) for the ongoing project works. The details of Equity raised and utilized during the FY 2020-21 is provided as **Annexure- 12**.

19. Table 7 – BGCL claim of Contribution to Contingency Reserve: Provide documents in support of appropriation made to the Contingency Reserve and invested in securities authorised under the Indian Trusts Act, 1882 within a period of six months of the close of the Year.

Reply: BGCL submits that it has decided to open an account for depositing amount equivalent to the contribution to the contingency reserve as claimed in the True up Petition for FY 2020-21. It is further submitted that the Petitioner could not open an account during FY 2020-21 for want of Board approval, therefore it shall open the same and appropriate the amount towards contingency reserve for the FY 2021-22 in the ongoing year. As was discussed in the TVS, the Petitioner submits that it is in agreement to Hon'ble Commission's directions that the contingency reserves will only be allowed for ARR FY 2022-23. Further, regarding the percentage of the contingency reserve, the Petitioner had submitted in the TVS that the same may be considered by the Hon'ble Commission based on its wisdom as the Petitioner is not having any relevant data for historical contingency expenses.

20. Auditors Qualification:

a) Status of Registration of Land; how cost of these lands will considered for capitalization without registration?

b) Furnish Physical verification report of inventory.

Reply: The land acquired by the Petitioner till date has been registered and the same is considered in the claim for capitalization.

The Physical Verification Report of the inventory is provided as **Annexure- 13.**

21. Justify, why huge 65% incremental cost of R&M expenses and 95% incremental cost of A&G expenses will not be considered as controllable factor in terms of regulation 8.2(g) for which no detailed computations and supporting documents are furnished under regulation 9.2. Huge increase in other expenses which are more than two fold of the expenses of FY 2019-20 are being seen in audited account also.

Reply: Reasons for deviation for different heads of the R&M as well as A&G Expenses is provided as **Annexure- 14.**

22. Provide details and reasons of Liquidated damages recovered Rs.13.54 Cr.

Reply: BGCL submits that it has imposed LD amounting to Rs. 13.54 Lakhs (and not Rs. 13.54 Crore) to M/s L&T in respect of the TW02 package awarded to it on account of delay in works execution. The same has been considered in the petitioner's claim of Non-tariff income for the FY 2020-21. The ledger entry for the same is provided as **Annexure- 15**.

23. Directive 2 of the tariff order dated 12.03.2021 requires submission of actual physical progress of the capital expenditure and capitalization but only a summary of Total capital expenditure for 1st Half of FY 2021-22 have been furnished which cannot be construed as complete compliance of Directive 2. Please furnish status of capital expenditure and capitalization of each of the 22 substations & 23 transmission lines provisionally approved for2091.89 crores of Phase - IV (Part-I) project and each of the 4GIS sub-station, 7 EXTENSION OF BGCL BSPTCL (OLD) SUBSTATIONS and 16 TRANSMISSION LINES approved for Rs. 1688.36 crore of phase –IV (Part –II) project showing actual date of start of work, actual COD, scheduled date of work, scheduled COD, amount of CAPEX bifurcating into IDC and IEDC already incurred, as on 31.03.2021, already capitalized as on 31.03.2021, incurred during 1st half of M 2021-22, capitalized during of FY 2021-22, estimated to incurred during 2nd half of M 2021-22 to to capitalized during 1st half of FY 2021-22, estimated to capitalized during 2nd half of FY 2021-22 to FY 2022-23. Also furnish such information separately for Phase IV (Supplementary) projects.

Reply: The physical progress of all 22 substations and 23 Transmission lines as on 31.03.2021 is provided as **Annexure- 16.** Further, the details of IDC, IEDC and Capital Cost pertaining to the assets capitalized as on FY 2020-21 is provided as **Annexure- 17.**

24. Petition states that some assets still not capitalized within scheduled period and claimed in FY 2020-21 to 2022-23 in spite of fact that regulation 8.2 defines the variations in capital expenditure and capitalization on account of time and/or cost overruns as controllable factors.

Also furnish:

(i) Separately for each Plan namely Part 1 of 2, Part 2 of 2, supplementary project and ABT metering, the transmission lines, substations wise details in line with business plan, amount of CAPEX and capitalization bifurcating into IDC and IEDC projected for FY 2021- 22, 2022-23 onward AND as on 31.03.2021. Also states specific reason of delay and incremental cost incurred including IDC and IEDC due to such delay.

(ii) Documents in support of your claim that assets not capitalized within scheduled period due to a reason beyond your control stating the steps taken from your end to mitigate such delay for each of the such Transmission lines, substations etc.

(iii) Information with respect to time & cost overrun for every project/work.

Reply:

The details are provided under **Annexure- 16 & 17**.

25. Approved % Factor on GFA for FY 2021-22 fixed at 0.467 % in the tariff, clarify how it is 0.73% claimed in APR without any supporting documents?

Reply: For FY 2021-22 and beyond, BGCL submits that the % factor has been computed in accordance with the actual R&M expenses and actual GFA of the past years as shown in the table below:

Particulars	FY 2018-19	FY 2019-20	FY 2020-21
Average GFA (Net of Land)	1,110.75	1,554.84	1,872.41
R&M expenses	6.07	8.52	20.46
% of R&M expenses to GFA	0.55%	0.55%	1.09%
Average % of R&M expenses to average GFA	**0.73%**		

The above methodology is in consonance with the approach adopted by the Hon'ble Commission in the Order dated 12.03.2021 while determining the APR for the FY 2021-22 as well.

26. Contribution to Contingency Reserve claimed in APR of FY 2021-22: Since, APR is not a determination of tariff, clarity how Contribution to Contingency Reserve will be considered at this stage.

Reply: BGCL submits that it has decided to open an account for depositing amount equivalent to the contribution to the contingency reserve as claimed in the True up Petition for FY 2020-21. It is further submitted that the Petitioner could not open an account during FY 2020-21 for want of Board approval, therefore it shall open the same and appropriate the amount towards contingency reserve for the FY 2021-22 in the ongoing year. As was discussed in the TVS, the Petitioner submits that it is in agreement to Hon'ble Commission's directions that the contingency reserves will only be allowed for ARR FY 2022-23. Further, regarding the percentage of the contingency reserve, the Petitioner had submitted in the TVS that the same may be considered by the Hon'ble Commission based on its wisdom as the Petitioner is not having any relevant data for historical contingency expenses. It is further submitted that the Tariff Regulations 2021 does not specify the events which are of contingent nature and hence the Petitioner is not in a position to provide the details of contingency expenses.

27. Regulation 21 of the Bihar Electricity Regulatory Commission (Multi Year Transmission Tariff and SLDC Charges) Regulations, 2021 specifies for stipulation of norms for Operation and Maintenance Expenses, however norms have not been proposed in the instant petition. Justify?

Reply: The norms have not been proposed by the petitioner for the O&M Expenses as the project works are still ongoing and are yet to be completed in the FY 2022-23. Further, it is iterated that since the works shall attain completion in the FY 2022-23, the Hon'ble Commission may prescribe norms for the remaining years of the control period *i.e.* FY 2023-24 and FY 2024-25. Since, majority of the Part 2 of 2 works are still ongoing, therefore, the network details along with no. of substation shall be varying significantly during the FY 2021-22 and FY 2022-23. Hence, the Petitioner requests before the Hon'ble Commission to approve the O&M at actuals for FY 2021-22 and FY 2022-23 and thereafter approve the same based on the norms. By the end of FY 2022-23, the expected network is slated to be as follows:

Transmission ckm: 2373 km

Transformation Capacity: 7110 MVA (4*500 MVA, 22*160 MVA, 2*100MVA, 8*80 MVA, 15*50 MVA)

No. of Sub stations: 11 no. New GIS Substation & 21 Bay Extension

No. of bays: 362 no. (400 kV: 12 no., 220 kV: 88 no., 132 kV: 120 no. & 33 kV: 142 no.)

No. of employees: 88 **(as on 31.12.2021)**

S No.	Principle	Interpretation for Financial Accounting	Derived learning for Energy Accounting
18	Time period principle	A business should report the results of its operations over a standard period of time. This may qualify as the most glaringly obvious of all accounting principles, but is intended to create a standard set of comparable periods, which is useful for trend analysis.	All energy accounts should be prepared and uploaded on respective websites over a standard period of time. The settlement cycle shall be harmonized so that energy accounts of different States are comparable. Timeliness of account preparation and timeliness of payments should be important
19	Understandability principle	Transactions and events must be accounted for and presented in the financial statements in a manner that is easily understandable by a user who possesses a reasonable level of knowledge of the business, economic activities and accounting in general	The energy account statement must be presented in a user friendly and comprehensible format.

5.11 Governance Structure - Roles and Responsibilities

Under the prevailing structure of Electricity Supply Industry in India, the Ministry of Power/Energy of the respective State/Central Government is responsible formulating policy guidelines in accordance with the legislation passed by the Parliament. The Central Electricity Authority is the technical advisor to the Central Electricity Regulatory Commission. As per the Electricity Act 2003 it is responsible for notifying the metering standards. The appropriate Electricity Regulatory Commission regulates the electricity market. The Grid Code and other regulations outline principles and rules for the functioning of the electricity market. The ERCs therefore are responsible for overseeing compliance to the standards and regulations. The recommended governance structure specifying the roles and responsibilities of various entities with respect to the energy accounting and settlement system is elaborated below. :

1. **National Load Despatch Centre**

a. Updating and issuing the general guidelines on Technical Specification of Interface Energy Meters to be procured by CTU / STU

b. Notifying the convention to be adopted for Meter serial number on Regional / State basis to ensure uniqueness of Interface Energy Meters across the nation.

2. Central /State Transmission Utility

a. Installing Interface Energy Meters in compliance with appropriate standards and submission of Meter installation report (containing point of installation, date and time of installation, initial meter reading, CTR, PTR etc.) to the appropriate Load Despatch Centre

b. Providing necessary hardware and software at substation level for Automatic Meter Reading

c. Coordinating with Site Owner to facilitate reliable transmission of meter data to the concerned LDC. Provide reliable communication link from substation to the concerned LDC

d. Maintaining all Interface Energy Meters along with its accessories such as DCD etc. to ensure their healthiness and performance. Maintenance activities would include but not limited to Meter calibration, time synchronization, meter replacement etc. within reasonable time

e. Maintaining adequate spare Interface Energy Meters and ensuring healthiness of Meters (keeping them charged to avoid drainage of internal battery)

f. Maintaining CT/PT inputs, AMR cabling

g. Providing feedback on metering deficiencies to appropriate LDC

h. Coordinating onsite testing of Interface Energy Meters at stipulated periods and submit the test certificate to the appropriate Load Despatch Centre

i. Installing and maintaining of the infrastructure for Automatic Meter Reading

j. Assessing of future requirement of Interface Energy Meters and its procurement

k. Liaising with Meter manufactures/vendors – if any problems are encountered in data format, abnormal time drift, hanging when time correction is done, or battery backup button is not working etc.

l. Maintaining of time drift with respect to GPS time and reporting to LDC

m. Claiming reimbursement through tariff for all metering activities like procurement, installation, maintenance the SEMs & accessories, DCDs, software, AMR etc.

3. Site Owner

a. Coordinating and cooperating with authorized representatives from CTU/STU for installation and maintenance of Metering System

b. Ensuring safety and security of the Interface Energy Meter installed within its premises

c. Providing redundant communication link from meter location (substation) to the nearest STU/CTU station for transmission of meter data to the concerned LDC

d. Submitting dummy reading to the appropriate Load Despatch Centre before energization of the Interface tie lines
e. Collecting and transferring recorded data of all the Interface Energy Meter from the Interface point to the concerned Load Despatch Centre
f. Maintaining CT/PT inputs, accessories, software associated with the Metering System

4. Regional /State Load Despatch Centre

a. Preparing and advising all concerned on the Metering Scheme for New Entity connected with the grid
b. Reviewing the metering scheme and issuing revision in case of change in network configuration
c. Maintaining record of Healthiness/Test Certificate of Interface Energy Meters
d. Compiling the IEM data received from field
e. Processing the raw data that includes but not limited to checking format correctness, pair checking, voltage input, time correction checks etc.
f. Forwarding the processed and validated data to the Agency responsible for preparing the Energy Account
g. Providing feedback to the CTU / STU on the metering related deficiency
h. Maintaining database of IEM, CT/PT ratios.
i. Uploading the IEM details including the formula being used for computation of interchange. Submission of the complete Metering scheme used for computation of interchange and transmission losses to the respective Electricity Regulatory Commission
j. IEM Data Management and information dissemination to the stakeholders
k. Coordinating Process Audit of the Metering System
l. Reviewing Meter specifications and providing feedback to STU/CTU

5. Regional Power Committee / State Power Committee

a. Reviewing the adopted metering scheme in the Region/State at periodic interval
b. Preparing Regional / State Energy Account in line with the regulations and uploading it on its website in a convenient format

5.12 Other recommended best practices

a. Uniformity of Meter Technical Specifications
b. Adoption of new technologies-AMR and AMI
c. Adoption of Common Information Model and Uniform file naming convention

d. Adoption of common protocol- DLMS/COSEM/IEC-62053 etc.
e. Compulsory Energy Audit and penal provisions for non-compliance
f. Mock exercises for acclimatizing the stakeholders on the EMASS
g. Workshops for Capacity building

Annexure - 1B

BIHAR ELECTRICITY REGULATORY COMMISSION

Vidyut Bhawan-II, J.L. Nehru Marg, Patna 800 021

Case No. SMP -15/2017

Present :

1. **Shri S.K. Negi - Chairman**
2. **Shri R. K. Choudhary - Member**

Suo-motu proceedings against State Power Transmission Co. Ltd. through its Managing Director for non-compliance of the direction of Commission for submission for submission of report regarding "SAMAST".

APPEARANCE

1.	Shri Premjeet Kumar, ESE (SLDC)	On behalf of Bihar State Power Holding Co. Ltd. (BSPTCL)
2.	Smt. Bibha Kumari A.ExE (SLDC)	
3.	Smt. Neha Srivastava A.ExE (SLDC)	

Interim Order

Date: - 05.01.2018

Forum of Regulators (FOR) has circulated a report on Scheduling, Accounting, Metering and Settlement of Transmission in Electricity (SAMAST) to all the State Electricity Regulatory Commission (SERC) in the month August 2016 and directed to submit an update status report of State Load Dispatch Centre (SLDC). In the light of the direction of FOR, Commission sought status report from Managing Director, Bihar State Power Transmission Co. Ltd. (BSPTCL) by 20.08.2016.

2. BSPTCL had not submitted the required report within the stipulated time, then Commission. In last reminder BSPTCL was directed to submit the report by 31.05.2017 positively, but in spite of repeated reminders letters and also telephonic reminders, Commission could not receive required report. Due to non-submission of required report Commission could not send the report to FOR/CERC and finding no option except to initiate suo-motu proceedings against BSPTCL. Commission having perused the time line for completion of various activities, directed the BSPTCL to submit up-to-date status report of the activities within a week without fail.

In compliance of the order of the Commission BSPTCL filed DPR regarding implementation of 'SAMAST' vide letter no. 308 dated 21.12.2017. The Commission directed the Dy. Director (Transmission) to examine the DPR and place his broad observations (if any) before the Commission.

3. Commission heard the matter on 30.06.2016, 11.08.2017, 17.10.2017, 21.11.2017, 22.12.2017 & 05.01.2018 and examined the DPR along with roadmap. During the hearing on 05.01.2018, it was submitted on behalf of BSPTCL that the proposed DPR has an administrative approval from the Managing Director, Bihar State Power Transmission Company Ltd. and he is authorized to grant administrative approve for the scheme. It has also been submitted that approval of the Board of Directors (BoD) on the proposal is awaited, though the matter has been placed before it. It was further requested by BSPTCL that approval of the Commission for the DPR may kindly be granted subject to the approval of BoD for further necessary action.

In the light of submission made on behalf of BSPTCL and observation of the Deputy Director, Transmission, BERC on the proposed DPR, Commission in the interest of expeditious rollout of SAMAST agrees to accord in principle approval to the CAPEX of Rs. 93,75,55,724 details of which are incorporated in the DPR made available to the Commission through the aforesaid letter subject to the approval of Board of Directors/CMD. There has been considerable delay in implementing SAMAST in the state. The BSPTCL shall seek approval of the Board of Directors/CMD preferably before 15th January, 2018 so that further action can be taken on the approved DPR as per the timeline set for the rollout of SAMAST.

The Commission posts the next date on 03.04.2018 to review the progress of the implementation of SAMAST. BSPTCL is directed to file status report by 20th March, 2018.

Sd/-

(R.K. Choudhary)
Member

Sd/-

(S. K. Negi)
Chairman

Bihar Electricity Regulatory Commission

Vidyut Bhawan-II, J.L. Nehru Marg, Patna 800 021

Case No. 15/2017

Dated: 07.07.2020

Quorum:

1. Sri S. K. Negi -Chairman
2. Sri R. K. Choudhary -Member

In the matter of:

Suo Motu proceeding against Bihar State Power Transmission Company Ltd.(BSTPCL) for ensuring compliance of the directives of commission for implementation of SAMAST in Bihar

Bihar State Power Transmission Company Ltd.
Through its Managing Director .....Respondent

Appearance

1	Sri Kumar Prashant, ESE, SLDC	On behalf of BSPTCL
2	Sri Deepak Kumar Ram, EEE, SLDC	
3	Miss Bibha Kumari, Asstt. Exe. Eng., SLDC	

Dates of Hearing :- 30.06.2017, 11.08.2017, 17.10.2017, 21.11.2017, 05.12.2017, 22.12.2017, 05.01.2018, 03.04.2018, 27.04.2018, 11.05.2018, 18.05.2018, 10.07.2018, 07.09.2018, 02.11.2018, 04.12.2018, 04.01.2019, 09.04.2019, 11.06.2019, 04.10.2019 and 07.07.2020.

1. Introduction:

1.1 For the effective implementation of Availability Based Tariff (ABT) and Deviation Settlement Mechanism (DSM) in the state different activities/works as mandated in the Scheduling, Accounting, Metering and Settlement of Transactions in electricity (SAMAST) are required to be carried out at State Load Dispatch Centre (SLDC) which is functioning as a separate unit in BSTPCL in Bihar. In fact SAMAST is a backbone for ABT/DSM and precursor to ABT/DSM framework. A document on SAMAST was prepared by the Technical Committee of Forum of Regulators (FOR) and was accepted and approved by the FOR in its 55th Meeting on 22.7.2016 and forwarded to all the state. The SAMAST report, inter-alia, mandates different works with timelines to be performed by SLDC and its requirements for acquaintance with ABT/DSM framework to be implemented at the state level. It also speaks of strengthening of SLDC with requisite manpower and infrastructure for capacity building required for Market Operations functions discharged by

SLDC. The SAMAST document lays down 365 days time frame for completion of different activities and works envisaged in it.

1.2 Commission in pursuance to the report of SAMAST of FOR wrote to BSTPCL repeatedly vide its letters dated 11.08.2016, 02.11.2016, 22.12.2016 and 26.05.2017 asking compliance report/implementation schedule of different activities as per the check list given in the SAMAST document considering 01.08.2016 as zero date as it needed to be communicated to the Forum of Regulators. The BSPTCL vide its letters dated 23.08.2016, 14.11.2016 assured the Commission that considering zero date as 31.08.2016, it will furnish an implementation schedule of various activities as recommended in SAMAST and also furnish scope of work needed for rolling out SAMAST in Bihar but it failed to furnish the same to the Commission on the dates as prescribed by Commission and agreed to by the BSTPCL.

1.3 Constrained by repeated non-compliance by the BSPTCL in providing a roadmap of the implementation of various activities as per the check list given in SAMAST, the Commission initiated the instant Suo Motu proceeding against the respondent BSPTCL through its Managing Director vide case no. 15/2017 on 20.06.2017 and listed the case for hearing on 30.06.2017.

2. Hearing:

2.1 As stated in the beginning, the case was listed for hearing on different days the last date being 07.07.2020. The chorological progress of this case is being narrated here. On 30.06.2017, the BSPTCL vide its letter dated 29.06.2017 furnished a time line of implementation as per the check list and different activities required to be successfully implemented as per the recommendations of SAMAST. The last activity under SAMAST check list "**Annual 'Peer Review' of SAMAST by any SLDC/RLDC**" was assured to be completed by the BSPTCL by 01.07.2018 as Annexure-III. Further a list of different activities for SAMAST implementation was also furnished in same letter as Annexure-IV in which broadly two broad classifications were provided namely (A) Meter procurement (ABT meter tender finalization and installation completion date was intimated as 30.10.2017 and 30.06.2018 respectively) and (B) H/W and S/W procurement (Appointment of consultant and commissioning date were provided as 25.08.2017 and 30.04.2018 respectively). In the same letter BSPTCL informed that it has obtained Technical sanction from CEA for schemes of ABT meters and submitted the proposal for approval of ABT meters schemes to Deptt. of Energy, Govt. of Bihar. Commission reiterated its direction for timely implementation of SAMAST in Bihar and asked the up-to-date Status report.

2.2 On 17.10.2017, the BSPTCL vide its letter dated 16.10.2017submitted status and road map for implementation of SAMAST on affidavit sticking on the same timeline of 01.07.2018 for the last milestone activity of the check list "**Annual 'Peer Review' of SAMAST by any SLDC/RLDC**" while showing "Inviting tender" activity as '*completed*' and date of "placement of award" as 15.12.217 for ABT meters, Load Forecasting schemes/EPM/DSM at Sl. No. 14 and 15 of the checklist

respectively. Earlier committed date for placement of award was 30.10.2017. Further, status of IT infrastructure related activities whose earlier committed date of commissioning was 30.04.2018 at Sl. No. 17 of the checklist was shown as "*in process*". Commission directed BSPTCL to provide up-to-date status of SAMAST as some of the activities in road map didn't contain timeline.

2.3 On the next date of hearing on 21.11.2017, then Chief Engineer (System Operation) vide his letter dated 21.11.2017 informed the Commission about the steps taken by the BSPTCL to make SLDC an independent entity and submitted an updated road map reiterating the last milestone activity "**Annual 'Peer Review' of SAMAST by any SLDC/RLDC**" of the checklist same as 01.07.2018, while revised the timeline of activities for "Inviting tenders" as 31.01.2018 (previous submitted status was '*completed*'), "Placement of award" as 15.03.2018 (previous submitted timeline was 15.12.2017) and "status of IT infrastructure related activities" as 12.01.2018 (previous submitted status was '*in process*') at Sl. No. 14, 15 and 17 of the checklist respectively. Further, activities at Sl. No. 18 and 19 of the checklist namely "Completion of boundary metering and AMR System (as per DPR)" and "Implementation of recommended IT applications Software" were to be completed by 31.12.2018. It was also informed that they would be preparing a DPR for the implementation of SAMAST and prayed for further time for it. Commission granted time to BSPTCL with a direction to furnish the complete DPR required for implementation of SAMAST and a comprehensive road map indicating therein start and finish dates for each major activity.

2.4 On 05.12.2017, the BSPTCL vide its letter dated 04.12.2017 submitted a Provisional DPR of SAMAST project and also intimated about the constitution of a state Power Committee (SPC) for the compliance of SAMAST related activities. After perusing the DPR, the Commission directed the BSPTCL to file a comprehensive DPR along with a road map in the prescribed format as the provisional DPR did not appear complete.

2.5 In compliance to the directive given on 5.12.2017, the BSPTCL on 22.12.2017 submitted a comprehensive DPR vide its letter dated 21.12.2017 consisting of cost summery of Capex required for the SAMAST along with a road map for the implementation of SAMAST showing same timeline for different activities. BSPTCL also included cost of Scheme of implementation of 100% ABT metering and energy accounting up to 33 kV amounting to Rs. 71,09,96,220.00 in Capex for SAMAST.

2.6 The Commission vide its interim order dated 05.01.2018 accorded in principle approval to the Total Capex amounting to Rs. 93,75,55,724.00 (including Rs. 71,09,96,220.00 for ABT metering whose Technical sanction was earlier obtained by BSPTCL from CEA) as per the details incorporated and proposed in the DPR for the following items of work subjected to approval of the Board of Directors of the BSPTCL/CMD:

Description	Total Implementation Cost (INR)	Implemented Cost (INR)	To be Implemented Cost (INR) and approved for SAMAST implementation
Hardware	1,56,05,504	69,62,400	86,43,104
Software	7,34,00,000	1,51,12,500	5,82,87,500
Hardware and Services DR	1,75,54,000	0	1,75,54,000
AMC (05 Years)	8,00,00,000	0	8,00,00,000
Man power cost for five years (24*7 Manpower cost (DBA+H/W Engineer + Software Engineer + 2 resources who have analytical expertise and Domain knowledge in Power sector): Rs. 15,000.00 (per person per year))	3,75,00,000	0	3,75,00,000
Civil Work cost associated to DR and DC (approx.)	25,00,000	0	25,00,000
Total Cost	22,65,59,504	2,20,74,900	20,44,84,604
Scheme for implementation of 100% metering, online energy accounting & energy audit of BSPTCL Trans network up to 33 KV (under process)	71,09,96,220	0	71,09,96,220
Total Cost Involved	**93,75,55,724**	**2,20,74,900**	**91,54,80,824**

2.7 While according in principle approval to the Capex envisaged in the DPR as submitted by the BSPTCL, the Commission observed that keeping in view the delay already caused by the BSPTCL, the process of implementation of SAMAST be expedited so that SAMAST is rolled out in Bihar as per set timeline.

2.8 The BSPTCL vide their letter dated 13.04.2018 submitted the resolution of its Board of Director regarding approval of comprehensive DPR amounting to Rs. 93,75,55,724.00, sending proposal to PSDF/Government for Capex of Rs. 91,54,80,824.00 for SAMAST and furnished the details of communication made with PSDF (NLDC, POSOCO) for requirement of funds for the implementation of SAMAST in BIHAR as directed by the Commission earlier. BSPTCL also revised

the timeline of activities for "Inviting tenders" as 15.04.2018 (previous submitted timeline was 31.01.2018), "Placement of award" as 30.06.2018 (previous submitted timeline was 15.03.2018) and "status of IT infrastructure related activities" as *'completed (phase-I)'* (previous submitted timeline was 12.01.2018) at Sl. No. 14, 15 and 17 of the checklist respectively.

2.9 The BSPTCL vide its letter dated 10.05.2018 submitted up-to-date status of SAMAST sticking on the same timeline of 01.07.2018 while again revised the timeline of activity for Inviting tender as 30.05.2018 from 15.04.2018 at Sl. No. 14 of the checklist and informed during hearing that execution of the project would be done under financial model of 80% loan and 20% equity and also informed about the issuance of LOA for ABT metering on 08.05.2018 whose project cost as per DPR was Rs. 71,09,96,220. Commission vide its order dated 11.05 2018 directed the BSPTCL to follow up with NLDC for PSDF funding and complete the boundary metering and AMR system within timeline as envisaged under checklist of activities of SAMAST. The Commission further directed the BSPTCL for submission of details of Software related procurement for phase II of the project along with timeline and deployment details of manpower as per checklist of the SAMAST.

2.10 The BSPTCL vide its letter dated 17.05.2018 submitted a compliance report of commission's order dated 11.05.2018 in which details of communication made with NLDC for PSDF grant and manpower requirement with Organization Chart for SLDC had been furnished. Further, BSPTCL bifurcated the road map of activities of the checklist at Sl. No. 14 and 15 as 14 (a) "Inviting tenders for ABT Meter Scheme" (timeline shown as *'completed'*) and 14(b) "Inviting tenders for Balance work" (timeline shown was 30.05.2018); 15(a) "Placement of award for ABT Meter scheme" (timeline shown as *'completed'*)and 15(b) "Placement of award for Balance work" (timeline shown was 30.06.2018). The Commission vide its order dated 18.05.2018 raised the concern of delay in PSDF funding and consequently overall delay in implementation of SAMAST and directed BSPTCL to submit realistic timeline of implementation considering constraints such as placement of award of balance work, modalities of financial closure, deployment of manpower with break-up of activities as road map furnished by the BSPTCL incorporated the same timeline as were given before.

2.11 On the next date of hearing the BSPTCL vide its letter dated 09.07.2018 submitted that a Tender for **Balance Work** had been prepared while showing timeline as 10.08.2018 for floating of tender for Balance work at Sl. No. 14 (b) (iii) of the checklist of road map of activities and prayed for grant of at least two months time for showing visibility of implementation of SAMAST on ground. Commission vide its order dated 10.07.2018 acceded to the prayer of the BSPTCL.

2.12 In the subsequent hearing, the Commission observed that the BSPTCL keep on modifying timeline for implementation of various activities listed in the check list of SAMAST. For example, Sl. No. 18 of the check list, expected completion for first essential component for SAMAST implementation i.e. "**Completion of boundary metering and AMR system (as per DPR)**" was shown as 28.06 2019

and at Sl. No. 15 (b) "**Placement of award for balance work**" was shown as 15.02.2020 vide BSPTCL letter dated 03.12.2018. it was further submitted by BSPTCL that in anticipation of release of PSDF fund from NLDC, provisional LOI was issued for Balance work to PwC (a JV with M/s Infotek Services) on 08.03.2019 and NOA/WO amounting Rs 22,38,73,600.00 was awarded on 06.06.2019 from the internal resources of the BSPTCL citing a reason of delay in release of fund from PSDF. It was also informed by the BSPTCL that Rs. 11.75 Crores had been requested from the PSDF for the Balance work.

2.13 It is also pertinent to mention here that commission in its Tariff interim order for SLDC since FY 2017-18 has been repeatedly asking for the status report of implementation of SAMAST and also has been directing SLDC to adhere to the timeline. The SLDC vide its letter dated 03.10.2019 furnished ***go-live*** status of SAMAST from January 2020 onwards.

2.14 The case was listed for further hearing on 24.04.2020 but the unprecedented situation arisen due to COVID-19 and nationwide lockdown implemented w.e.f. 25.03.2020, hearing was postponed to 07.07.2020 for further hearing. Amidst fear of corona virus and strict restrictions to follow Social distancing norms, the Commission took up the case for hearing on 07.07.2020 in its court room as scheduled. The representatives of the respondents ventured to be present physically during the hearing. They had also submitted the current status report vide their letter dated 06.07.2020 in which progress of the balance 17 numbers of work have been mentioned and awarded 1st time extension up to 05.09.2020 for Roll out of SAMAST to the agency. The BSPTCL stated that the work has been awarded to M/s PwC (JV with M/s Infotech Services) but due to restrictions on movement due to Covid-19 pandemic the agency is unable to depute its personnel to Patna for coordination with different stakeholders/users before the final roll out of SAMAST. It was emphasized by the BSTPCL during the hearing that physical presence of the subject experts of the agency at Patna was required to synchronize all the activities. It was assured by the BSTPCL representatives that if everything moves as per their plan, the unfinished work would be completed by September, 2020.

3. Order:

After perusing the status report of implementation and the submissions made by them during the hearing today, the Commission observes that the three year journey of this suo-motu proceedings has been successful to a great extent in achieving its intended purpose despite the fact that the state of Bihar does not have and independent SLDC entity and the required funds for the project from the PSDF did not come in spite of the efforts put in by the BSTPCL. To the credit of the BSTPCL Management (BOD) the required money was mobilized from its internal accruals and took forward the SAMAST activities towards their logical end. It is hoped that the BSTPCL shall keep its efforts on to procure the promised fund from PSDF so that the economically backward state of Bihar is not deprived of its rightful due. The adverse impact of Covid-19 were

more pronounced in India from March 2020 onwards and the BSTPCL could have pulled its socks up to finish work (which also includes implementation of ABT Metering schemes up to 33 kV level) by January 2020, as promised by them in their written undertaking filed in the court on 03.10.2019. Therefore attributing corona induced adverse conditions the only reason for delay in completion of the pending works is not justifiable. On the basis of the submission of respondents Commission finds that the BSTPCL is in advance stage of implementation of the SAMAST as 60% of work related to development, implementation, Testing and Commissioning of Software at DC, SLDC have been completed. Due to regular monitoring of the implementation status and relentless efforts taken by the BSTPCL, Bihar would be among the few state in the country to implement SAMAST which is a *sine qua non* for ABT/DSM framework.

As the situation arisen due to Covid-19 pandemic continues to be challenging leading to disruption in normal functioning of the court proceedings of BERC, and the major work has been completed, Commission is of the view that there is no need to continue with these suo motu proceedings. Accordingly, the Commission decides to close these suo motu proceedings at this stage with a direction to the respondent BSPTCL to complete the incomplete last mile work by the end of September, 2020 and furnish the report to the Commission in the first week of October, 2020.

With aforesaid observation and directions this case is dispose of.

Sd/-
(R. K Choudhary)
Member

Sd/-
(S. K. Negi)
Chairman

Annexure - 1C

BIHAR STATE POWER TRANSMISSION COMPANY LTD., PATNA

A subsidiary company of Bihar State Power (Holding) Company Ltd., Patna
CIN – U40102BR2012SGC018889, Website – www.bsptcl.in
Head Office, Vidyut Bhawan, Bailey Road, Patna – 800021

Letter No ..... 361 ...../ Patna, Dated 18/12/2020
File no.- S.O. Cell/ SLDC/BGCL/22/2017

From,

Sri A. K. Chaudhary
Chief Engineer (System Operation)

To,

Sr.GM (O&M / Commercial)
Bihar Grid Company Limited
2nd floor, Alankar Place, Boring Road
Patna-800001

Sub: Regarding availability of 15 min block wise meter data with AMR facility for loss accounting of BGCL substations under SAMAST in EASS application.

Reference: Your letter Ref No. JV/PT/BG/O&M/SAMAST/1057 dated 06/11/2020

Sir,

With reference to above subject, after reviewing enclosure provided in letter under reference, following metering points are missing and these points should also be included:

1) 220/132kV, 100MVA, ICT-3 at Hajipur GIS extension(LV side)
2) 220/132kV, 160MVA, ICT-1 at Dumraon new GIS(LV side)
3) 220/132kV, 160MVA, ICT-2 at Dumraon new GIS(LV side)

Therefore, Kindly install ABT meters at above metering points also and ensure meter data of all BGCL ABT meters must be communicated to SLDC via AMR.

This may be treated as most urgent.

18/12/20

(A. K. Chaudhary)
Chief Engineer (System Operation)

28/12/2020

GM (O&M) / Comml.

28/12/2020

Bihar State Power Transmission Company Ltd., Patna
A subsidiary company of Bihar State Power (Holding) Company Ltd., Patna
CIN – U40102BR2012SGC018889
[SAVE ENERGY FOR BENEFIT OF SELF AND NATION]
Head Office, Vidyut Bhawan, Bailey Road, Patna -800021.
Telephone No. 0612-2504655. Email address - [illegible]
Fax No. 0612-2504655 Website – www.bsptcl.in

Letter No. **Date**
File no-S.O. Cell SLDC BGCL 22 2017

From,
Sri A.K. Chaudhary
Chief Engineer (System Operation)

GM (O&M) Pl. supply with present status. Sr.GM(O&M) 22.09.20

To,
Sr.GM(O & M / Commercial)
Bihar Grid Company Limited
2nd floor ,Alankar Place, Boring Road
Patna-800001

23/9/2020

Subject: Regarding availability of 15 min block wise meter data with AMR facility for loss accounting of BGCL substations under SAMAST in EASS application.

Reference: This officer letter no 467 dated 11/12/2019 and Letter No 159 dated 02.06.2020

Sir,

With reference to above subject, it is to inform that even after several request communication SLDC is still not receiving meter data in ASO format of BGCL substations of all interface points (220 KV , 132 KV , 33 KV & transformer HV LV side) under SAMAST in EASS application. Due to unavailability of meter data SLDC is facing difficulties in calculation of energy account of BGCL and BSPTCL system as a whole for any point of time.

Therefore it is requested to kindly make a arrangement of meters at all strategic locations as per BGCL tariff order for Fy 2020-21 and Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 & its amendment and ensure availability of meter data at SLDC in EASS application under SAMAST implementation

Kindly treat it as **MOST URGENT.**

S/d-

(A.K. Chaudhary)
Chief Engineer (System Operation)

Memo No - 249 **Dated...21/09/2020**

Copy submitted to Managing Director , BGCL Patna /Director (Operation) , BSPTCL for kind information and necessary action.

21/9/20

(A.K. Chaudhary)
Chief Engineer (System Operation)

Bihar State Power Transmission Company Ltd., Patna
A subsidiary company of Bihar State Power (Holding) Company Ltd., Patna
CIN – U40102BR2012SGC018889
[SAVE ENERGY FOR BENEFIT OF SELF AND NATION]
Head Office, Vidyut Bhawan, Bailey Road, Patna -800021,
Telephone No. 0612-2504655, Email address - ce.transbsptcl@gmail.com
Fax No. 0612-2504655 Website – www.bsptcl.in

Letter No. **Date**

File no-S.O .Cell/SLDC/BGCL/22/2017

From,

Sri A.K. Chaudhary
Chief Engineer (System Operation)

To,

Sr.GM(O & M / Commercial)
2nd floor ,Alankar Place, Boring Road
Patna-800001

Subject: Regarding availability of 15 min block wise meter data with AMR facility for loss accounting of BGCL substations under SAMAST in EASS application.

Reference: This officer letter no 467 dated 11/12/2019.

Sir,

With reference to above subject, it is again to inform that for proper energy accounting and accurate loss calculation the installed meter should be as per Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 & its amendment so that 15 min block wise meter data with AMR facility & software to convert in ASO format must be available at SLDC for loss energy accounting of BGCL substations at all interfaces (220 KV , 132 KV , 33 KV & transformer HV/LV side) under SAMAST in EASS application. But till date no such arrangement has been made from your end .

Therefore , it is again requested to kindly confirm the details of above installed meter otherwise kindly make a arrangement of meters at respective locations as per Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 & its amendment at the earliest.

Kindly treat it as **MOST URGENT.**

S/d-

(A.K. Chaudhary)
Chief Engineer (System Operation)

Memo No - 159 **Dated....**02/06/2020

Copy forwarded to Managing Director , BGCL Patna /Director (Operation) , BSPTCL for kind information and necessary action.

02/06/20

(A.K. Chaudhary)
Chief Engineer (System Operation)

Bihar State Power Transmission Company Ltd., Patna
A subsidiary company of Bihar State Power (Holding) Company Ltd., Patna
CIN – U40102BR2012SGC018889
[SAVE ENERGY FOR BENEFIT OF SELF AND NATION]
Head Office, Vidyut Bhawan, Bailey Road, Patna -800021.
Telephone No. 0612-2504655. Email address - [illegible]
Fax No. 0612-2504655 Website – www.bsptcl.in

Letter No. **Date**

File no-SO Cell SLDC BGCL 22 2017

From,

Sri A.K. Chaudhary
Chief Engineer (System Operation)

To,

Sr.GM(O & M / Commercial)
Bihar Grid Company Limited
2nd floor ,Alankar Place, Boring Road
Patna-800001

Subject: Regarding availability of 15 min block wise meter data with AMR facility for loss accounting of BGCL substations under SAMAST in EASS application.

Reference: This officer letter no 467 dated 11/12/2019 and Letter No 159 dated 02.06.2020

Sir,

With reference to above subject, it is to inform that even after several request communication SLDC is still not receiving meter data in ASO format of BGCL substations of all interface points (220 KV , 132 KV , 33 KV & transformer HV/LV side) under SAMAST in EASS application. Due to unavailability of meter data SLDC is facing difficulties in calculation of energy account of BGCL and BSPTCL system as a whole for any point of time.

Therefore it is requested to kindly make a arrangement of meters at all strategic locations as per BGCL tariff order for Fy 2020-21 and Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 & its amendment and ensure availability of meter data at SLDC in EASS application under SAMAST implementation.

Kindly treat it as **MOST URGENT.**

S/d-

(A.K. Chaudhary)
Chief Engineer (System Operation)

Memo No - 249 Dated...21/09/2020

Copy submitted to Managing Director , BGCL Patna /Director (Operation) , BSPTCL for kind information and necessary action.

21/09/20

(A.K. Chaudhary)
Chief Engineer (System Operation)

Annex

BIHAR STATE POWER TRANSMISSION COMPANY LTD., PATNA
A subsidiary company of Bihar State Power (Holding) Company Ltd., Patna
CIN – U40102BR2012SGC018889
[SAVE ENERGY FOR BENEFIT OF SELF AND NATION]
Head Office, VidyutBhawan, Bailey Road, Patna – 800021

Letter No. 864 / SLDC/2019/COD dated 11/10/19

From,

A.K. choudhary,
Chief Engineer (System Operation)
BSPTCL,Patna

→ Sh. Rajesh
P.S. (Secy.)
Prasad
16.X.19

To,

C.C Prasad
Sr. GM (O&M)
BGCL
Mankar Palanee, Boring Road Patna

Sub : Regarding your request issuance of certificate for Date of Commercial Operation (DOCO)" of 160 MVA , 220/132 Kv Transformer -1 at GIS. Khizersarai.

Ref : Your office letter no. 2191 dt. 27.08.2019

Dear Sir,

With respect to the above, it has been observed that the meter details provided for the request of issuance of certificate for DOCO of 160 MVA 220/132 Kv Transformer -1 at GIS Khizersarai are Premium 300 (SECURE Based Tariff).

However as SAMAST is under progress in BSPTCL, energy accounting will be done through SAMAST software. In view of the above, Premium 300 meter should be replaced by ABT complaint meter.

Kindly confirm the above meter replacement at the earliest, so that the certificate for Date of Commercial Operation (DOCO)" of 160 MVA, 220/132 Kv Transformer -1at Khizersarai may be processed from our end.

→ Sr. GM (Projs), BGCL, Patna / DGM(PESM) / DGM(Engg)

ABT compliant Energy Meter is to be installed in all the upcoming projects.

Prasad
16/X/19

Yours Faithfully,

11/10/19
(A.K. choudhary)
Chief Engineer (System Operation)

Annexure - 1D

बिहार ग्रिड कम्पनी लिमिटेड
(संयुक्त उपक्रम बिहार स्टेट पावर (होल्डिंग) कं० लि० एवं पावरग्रिड)
BIHAR GRID COMPANY LIMITED
(Joint Venture of Bihar State Power (Holding) Co. Ltd. & POWERGRID)

बिहार ग्रिड

द्वितीय तल, अलंकार प्लेस, बोरिंग रोड, पटना–800 001, दूरभाष : 0612–2530477 (कार्यालय)
2nd Floor, Alankar Place, Boring Road, Patna - 800 001, Tel. : 0612-2530477 (Off.), e-mail : bihargrid@gmail.com

CIN : U40100BR2013PLC019722

Ref.: JV/PT/BG/Compsec/BM-Extracts-II/ Date: 05.01.2021

Extracts of the Minutes of the 34th meeting of the Board of Directors of Bihar Grid Company Limited held on Tuesday, 22nd December, 2020 at 02.00 p.m. at BSP(H)CL, Vidyut Bhawan, Bailey Road, Patna-800001, through Video-Conferencing.

34.2.6 **To approve award recommendation for Supply, Installation, Testing & Commissioning of Interface Energy Meters (IEM) along with Automated Meter Reading (AMR) as per SAMSAST Guidelines including AMC for 5 years and Energy Audit at various Grid substations of the Company:**

The Board was informed that in order to implement availability-based tariff (ABT) and the deviation settlement mechanism (DSM) at the intra-state level, the recommendations of the Scheduling, Accounting, Metering and Settlement of Transactions in Electricity (SAMAST) report were being implemented Pan-India by all the SLDCs/ STUs under the supervision of the respective SERCs, i.e. BERC in our case.

SAMAST recommended *inter-alia* installation of Interface Energy Meters (IEMs) with Automated Meter Reading (AMR) to measure and record the exchange of energy at the interface point. In this context, BSPTCL, the nodal agency for implementation of SAMAST in the state of Bihar, had, vide its various correspondences including Memo no.249, dated 21/09/2020 as placed before the Board, instructed BGCL to replace the existing installed energy meters with ABT compliant IEMs having the facility of AMR and software to convert the meter data into ASO format at all interface points, i.e. 220KV, 132KV, 33KV, HV & LV side of transformers.

The Board was apprised that at present, a total of 197 nos. Secure Energy meters supplied by M/s Secure Meters Ltd. were installed at the various commissioned GIS substations of the Company and associated bay extensions (under Ph-IV, Part-I). Hence, it was required to replace the entire fleet of existing Secure Energy meters of the Company with ABT compliant Interface Energy Meter with 15-minute interval block (also compatible for 5-minute interval energy block) and set up the AMR system and software for meter data processing and energy accounting at SLDC, BSPTCL.

It was deliberated to start with replacing 87 nos. energy meters in the first phase of SAMAST compliance. A cost estimate of Rs.6,00,85,582/- only was worked out for the procurement of 87 nos. ABT compliant meters including 5 years annual maintenance charges. The Bids were invited through Open Tender Enquiry (OTE) Basis. The NIT was floated on 03.07.2020 and purchased by three vendors. However, even after 2nd

time extension of the tender submission date, only one bid was received from M/s Secure Meters, Udaipur. The price bid of M/s Secure Meters was opened on 12.10.2020 and the quoted and evaluated amount was as follows:

Name of Party	Estimated Cost	Quoted and Evaluated Amount	% variation w.r.t. estimated cost
M/s Secure Meters Ltd., Udaipur	Rs.6,00,85,582/-	Rs.5,98,52,816,.40	-0.39%

Hence, it was proposed to approve the placement of the order for the Supply, Installation, Testing & Commissioning of Interface Energy Meters (IEM) along with Automated Meter Reading (AMR) as per SAMSAST Guidelines, including AMC for 5 years and Energy Audit at various Grid substations of the Company, to M/s Secure Meters Ltd., Udaipur (M/s SECURE) at a total award value of Rs.5,98,52,816.40/- (Rupees Five Crore Ninety Eight Lakh Fifty Two Thousand Eight Hundred Sixteen and Forty paisa) including GST.

The Board considered the same and passed the following resolution:

"**Resolved that** the Board be and hereby approves the placement of the order for the Supply, Installation, Testing & Commissioning of Interface Energy Meters (IEM) along with Automated Meter Reading (AMR) as per SAMSAST Guidelines including AMC for 5 years and Energy Audit at various Grid substations of the Company on M/s Secure Meters Ltd., Udaipur (M/s SECURE) at a total award value of Rs.5,98,52,816.40/- (Rupees Five Crore Ninety Eight Lakh Fifty Two Thousand Eight Hundred Sixteen and Forty paisa) including GST."

"**Resolved further that** the Managing Director / Director (Projects) of the Company, be and are hereby, severally authorized to conduct the post bid discussion with M/s SECURE to finalize the Contract and sign and execute the same and to take all such steps and do all such act and deeds as may be deemed necessary to give effect to the resolution."

Certified True Copy
For Bihar Grid Company Limited
For Bihar Grid Company Limited
Niketa Sinha 05/01/2021
(Niketa Sinha)
Company Secretary
Company Secretary

CGM (Projects) 05/01/2021

Annexure-1E

बिहार ग्रिड कम्पनी लिमिटेड
(संयुक्त उपक्रम बिहार स्टेट पावर (होल्डिंग) कं० लि० एवं पावरग्रिड)
BIHAR GRID COMPANY LIMITED
बिहार ग्रिड Joint Venture of Bihar State Power (Holding) Co. Ltd. & POWERGRID

Detailed Project Report

on

Supply, Installation, Testing & Commissioning of Interface Energy Meters (IEM) along with Automated Meter Reading (AMR) as per SAMAST guidelines at various Substations of Bihar Gird Company Ltd

Table of Content

1 Background

1.1 The National Grid comprising of regional and State power systems is operating as a single synchronous system since December 2013. While the grid reliability and management has improved significantly along with the frequency profile, several building blocks of the developed grid are yet to be put in place. One of them is comprehensive accounting and settlement system that streamlines trade and exchange of power across States and regional boundaries. Government of India put an ambitious target for ramping up the RES capacity to 175GW by 2022. Taking cognizance of the variable and uncertain nature of solar and wind sources, the Central Electricity Regulatory Commission (CERC) notified the 'Framework on Forecasting, Scheduling and Imbalance Handling for Variable Renewable Energy Sources (Wind and Solar)' on 07 August 2015.

1.2 In this context, it is to mention here that The Central Electricity Regulatory Commission (CERC) has also adopted the recommendations by Technical committee of the Forum of regulators (FOR) suggested vide the "Scheduling, Accounting , Metering and settlement of Transactions in Electricity (SAMAST)"report published in July 16 and has suggested for implementation of the recommendations of this report by State Load dispatch Centers/State Transmission Utilities under the supervision of respective State regulatory commissions.

1.3 BSPTCL is nodal agency for implementing the SAMAST in State of Bihar and they have also communicated BGCL for replacement of existing meter with ABT Complaint IEM vide ref. no. 364 dated 11.10.2019 & 467 dated 11.12.2019.

1.4 BGCL intends to implement an AMR system for transmission & sub transmission system, whose scope of work is supply, installation & commissioning of necessary hardware and software (from 400 kV level up to 33 kV level in the respective substations) throughout the geographical domain of Bihar.

1.5 At present the Energy Meters installed at BGCL Substations i.e. Secure Premier 300 is non ABT Complaint & not recording the net energy and Hi & Low reactive energy in 15 min block, also fast communication is not available for remote access. Thus, the entire fleet of existing meters needs to be replaced with ABT complaint Interface Energy Meters-IEM to implement the Automated Meter Reading, Meter Data Processing & energy accounting system for timely preparation of report as per recommendations of the FOR Report (Scheduling, Accounting, Metering and Settlement of Transactions in Electricity (SAMAST).

1.6 There are total 7 nos. BGCL's GIS Substations & 15 no. Bay Extensions under Part-I, Phase-IV and for implementation of SAMAST approx. 234 nos. (211 nos. for interface points + 23 nos. as spare) ABT complaint Interface Energy Meter-IEM has been envisaged against this work including check meters.

Further, there are 04 nos. GIS Substations & 05 no. Bay Extension under Part-II, Phase-IV and for implementation of SAMAST approx. 182 nos. (162 nos. for interface points + 20 nos. as spare) ABT complaint Interface Energy Meter-IEM has been envisaged against this work including check meters.

Under supplementary works there are 02 nos. Bay Extension and for implementation of SAMAST approx. 02 nos. ABT complaint Interface Energy Meter-IEM has been envisaged against this work including check meters.

Total of 418 no. (375 no. for interface points & 43 nos. as spare) ABT complaint Interface Energy Meter-IEM has been envisaged against this work including check meters & spare. The location & bay wise details are provided as **Annexure -**.

2 Scope of activities

Considering the above-mentioned requirements, following activities are envisaged by BGCL against the scope of work:

2.1 Supply, installation/replacement and commissioning of IEM as per the specification attached as **Annexure-I.**

2.2 Supply, installation/replacement and commissioning of IEM with class A power quality monitoring features in compliance with CEA Technical Standard for Connectivity to the Grid (Amendment 2019) as per specification attached.

2.3 Supply, installation and commissioning of DAS/AMR system for meter data.

2.4 AMC for hardware and ATS for software for 5 years.

3 Deployment architecture

3.1 The ABT grid metering system needs to be recognized as an integrated metering system, where all meters need to act in synchronism to deliver comprehensive benefits. There is a need of a system architecture as mentioned in the below Figure 1.

3.2 There should be Automatic meter data collection (AMR/DAS) module to cover all business requirements of SLDC of the state.

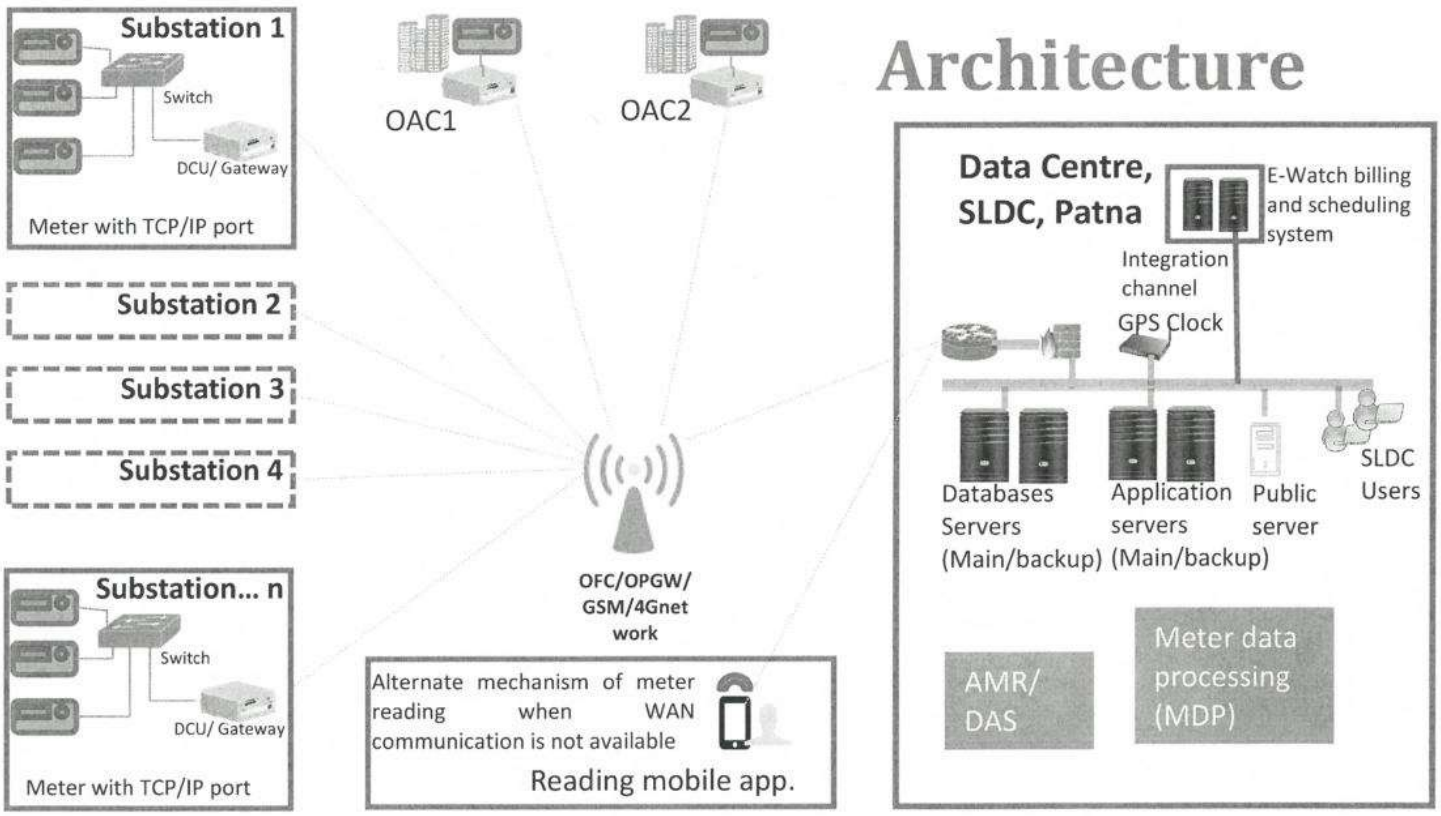

Figure 1 : Deployment architecture at substation and data centre

3.3 At Local Substation:

(i) **Substation meter:** ABT meters at each substation having the facility of additional TCP/IP port to provide reliable and fast communication network at substation.

(ii) **LAN switches/routers/firewalls:** These devices at each substation are required to provide the connectivity of OFC/OPGW/GSM/4G network from each substation to central data centre for data acquisition and analysis purpose.

(iii) **DCU/gateway:** Data concentrator unit (DCU)/communication gateway shall also be installed at each substation. In view of robust and reliable monitoring requirements, DCU/gateway needs to be considered for each substation.

3.4 Central Data Centre: Deployment architecture at Substation and data centre

(i) **Database Server:** There is a single database server maintained for complete system for "AMR/DAS" for data storage and backup/stand by server shall also be installed to increase the reliability of the system.

(ii) **Application Server:** Since the applications should be web/browser based, an Internet Information Server needs to be deployed on a separate server named as application server.

(iii) **Monitoring server:** To monitor the status of the meters/DCU and servers, a separate system shall be installed to show the online status of the IP based devices in a dashboard for corrective actions.

(iv) **Client PCs/Users:** It shall be possible to access the application through a web link (internet/intranet) from remote and viewing the data based on the application deployment/modules.

(v) **GPS Clock:** One GPS clock shall be installed at central location from which DB/application server shall get sync regularly and then all devices like DCU and meter shall also be synced on daily basis.

4 Supply, installation and commissioning of IEM at all substations

4.1 Conducting metering feasibility survey for all 02 nos. 400/220/132/33 kV GIS Substations, 09 nos. 220/132/33 kV GIS Substations of BGCL which include approx. 375 no. of interface feeders, collecting the drawings of each substation, assessing the space available to install the hardware and communication setup at substation etc.

4.2 Supply of the ABT complaint interface energy meters shall be as the attached specification **Annexure- II**.

4.3 Based on the actual survey, installation and commissioning of the meters shall be done as per the standard installation practices.

5 Supply, installation and commissioning of AMR/DAS system for meter data collection

5.1 The intent of meter data collection (AMR/DAS) scheme proposed in this document is to automate the task of data collection from each meter/location to the Central Data Collection System (CDCS) followed by validation, processing and generation of

customized reports. The data shall be stored in Standard RDBMS such as SQL/ORACLE etc. database located at State Load Dispatch Centre, Patna.

5.2 **Energy Meters**: Energy Meters to be covered under proposed AMR/DAS system are ABT complaint Interface Energy Meters (IEMs) manufactured as per Technical Specification attached as **Annexure- II**.

5.3 **Scheme with DCU/gateway at substation:** All meters having TCP/IP port, should be connected to the central data centre through OFC/OPGW/GSM/4G network and data acquisition of all IEM meters should also be performed from CDC. Provision of necessary communication links like OFC/OPGW/ GSM/4G shall be made for reliable and fast communication.

5.4 DCU/Gateway at each substation shall also be installed and connected to the same ethernet switch for increasing the reliability & availability of meter data. DCU/gateway shall have capability of storing the acquired meter data and in case of non-availability of network link, DCU/gateway shall kept the data and transfer whenever link shall be available.

5.5 DCU/gateway should have the capability to read the meters through communication interface of RS485/LAN with local personal computer and central server.

5.6 DCU/gateway should send the data to the central server through communication available like OFC/OPGW/GSM/4G on hourly basis for further processing and analysis.

5.7 Same architecture shall be followed at each substation and through Network switches & routers, meter data can be sent to the central data centre (CDC).

5.8 Therefore, DCU/gateway should have the following functionality:

5.8.1 Acquiring energy data from energy meters

5.8.2 Providing energy data to central server

5.8.3 Intelligence to synchronize IEMs clock with GPS clock located at CDC

5.9 Detailed technical hardware and functional requirements of DCU/gateway are attached in **Annexure- III.**

5.10 **Communication system:** Communication system to be used for transfer of data from DCU/gateway to central server at CDC may be OFC/OPGWGSM/4G. There is option for alternative communication media if it is more efficient and cost effective.

5.11 **Central meter data collection system (AMR/DAS):** A Central meter data collecting system to be provided at SLDC should manage all functionalities of collection of data through DCUs/gateways, validation and verification of the data, storage of the data in Standard RDBMS such as SQL/ORACLE etc. database and management of the complete AMR system.

5.12 The energy meter data to be provided up to Central Data Centre i.e. SLDC Patna (including all the hardware in between).

5.13 All required hardware devices like Database servers, applications servers, routers, firewall etc. shall be supplied, installed and commissioned at Central Data Centre (CDC).

5.14 A back-up/redundant server is required to reduce the risk of the data loss due to undefined failures at the central data centre. Backup server needs to take the regular backup of the data on a pre-defined time from the main DB server. Whenever any failures happen to the main server, back-up server can be used to run the application and regular activities but it may take 30min. to 1 hr. time for configure the back-up server as a main server for some duration and whenever the main server shall restore then application starts using the main server.

5.15 A GPS clock shall also be installed at CDC and all servers, DCU and meters shall be on time sync on a predefined frequency by refereing GPS clock time.

5.16 An application of meter data collection (AMR/DAS) shall be installed at central data centre to get all meter data (instantaneous, energy etc.) from each substation through OFC/OPGW/GSM/4G network at a desired frequency of say daily. Software shall display the data in tabular, graphical format for easy viewing. Meters have the capability to log the load survey data at every 5/15 min so load survey data reading shall be used for further DSM reporting.

5.17 All meters shall be assigned with an individual IP over TCP/IP port and same configurations shall be provided at central server and then in DCU/gateway.

5.18 In case, some meter data is not possible to get from central server due to any communication and other issues then substation PC can also be used to access a weblink to upload the CMRI and converted data in to the system/weblink which provide automatically provision to send the meter data the central server.

5.19 A monitoring application (NMS) shall be provided to track the IP based device & system status for health monitoring at central data centre. This application shall help user to check the status of the connected and disconnected devices like IEMs, DCU, switches, servers etc.

5.20 There are other utility offices which may need the meter data for some specific purpose and the accessibility of the limited part of the application with limited user rights to those offices shall also be available like for Transco, SLDC and Discom users etc.

5.21 Deployed system shall be capable to cater 100 DCUs (considering 10 meters per DCU) and CDCs application shall have a provision to handle max. 1,000 no. of meters. Data collection frequency is considered hourly from data centre (instant, LS, event etc.) while 1/5min. at each substation (instant and event).

5.22 As the end-to-end metering system shall be supplied by the single successful bidder and all meters data shall be available at CDC through AMR/DAS system.

5.23 While performing meter data collection activities, any discrepancy or missing of data in any particular block or wrong raw data format shall be displayed and downloaded in the form of a report. And bidder has the responsibility to recollect the meter data to ensure the weekly DSM billing and provided to other systems through interfaces.

5.24 Software shall have the options to generate the list of Meter IDs whose data is not available, List of meter IDs whose data is available for day wise for the required period.

5.25 Validated data shall be provided to the DSM module (third party) which shall compute deviation of regional entity by comparing the actual injection/drawal with its interchange schedule. It shall also compute the applicable deviation charges and generate the reports that include time block wise normal deviation charges, additional deviation charges, capped deviation charges, aggregate deviation charges etc.

5.26 SLDC/TRANSCO users may require different set of reports and dashboards for different users and perspective therefore during detailed engineering, all requirements shall be discussed and finalised before final deployment.

6 Transition and integration phase:

6.1 Detailed engineering phase should be considered to identify the detailed requirements of project implementation for transition and final deployment. It should also identify the integration requirements with existing & to be deployed system for DSM computation, billing and energy audit systems etc.

6.2 During this phase, integration points of DAS module with other third party module along with integration methodology should be mutually agreed and finalised.

6.3 Presently the time period for scheduling and settlement at ISTS level is 15-min. Until the amendments for 5-min settlement in the appropriate regulations come, the settlement at the interstate level shall continue to be done at 15-min interval.

7 Delivery plan:

7.1 All required software module like DAS shall be installed and commissioned at SLDC Patna and all customer specific database creation and configurations shall be done at site only.

7.2 Before the commissioning and final configurations, Bidder's execution team shall share the inception report of the project which shall cover deployment architecture, flow of data acquisition process, integration techniques, dashboards and shall also discuss the expected changes so that customer specific reports can be created.

7.3 Detailed requirement understanding shall be developed with SLDC and BGCL team during detailed engineering.

7.4 The customer specific requirements to be performed and perform factory acceptance (FAT) test then shall deploy the final solution field/site.

7.5 After commissioning, some identified users of utility team shall validate the application module against the requirement captured which shall be considered as site acceptance test (SAT).

7.6 Project execution duration should be 12 months from the date of LOA till the handover and training activities.

8 AMC and ATS for 5 years

8.1 Annual maintenance contract (AMC) for supplied hardware and Annual technical support (ATS) for software to be kept for initial period of 05 years..

8.2 A web based problem/defect reporting tool where CDC officials / officials at site, who shall execute the system, can log the issues with the flag of the severity level by using provided user name & password.

8.3 The issues shall be checked and to be resolved as per the process and escalate to another level if not resolved by that level of user.

8.4 A dedicate manpower shall be available at SLDC central office during this AMC/ATS tenure for coordination with substation personal, SLDC users and backend team for issue resolution on time. He/she is also being responsible to support SLDC officials for the day to day activities using system deployed at data centre.

Annual maintenance contract (AMC) for supplied hardware for 5 years

8.5 Annual maintenance contract (AMC).

8.6 The aim of AMC is to ensure the proper functioning of the supplied devices either through rectification/correction or via replacement under the specified network environment.

8.7 Initially, this contract shall be for 5 years from the date of service agreement and can be further extended on mutually agreed terms & conditions.

8.8 The consumables and operating expenses are not covered in maintenance cost. ex. printer drum and ink charges, Stationeries, Batteries maintenance, data network charges etc. these items shall be managed by utility only.

8.9 Service and support shall be provided to utility in accordance with the terms of AMC. In case, any service is chargeable / out of scope then it shall not be part of technical support. Support availability for a particular product version is subject to change at any time without prior notice. To fix any service request if any upgrade is required then new version shall be provided based on agreed terms and conditions only.

8.10 The law of force measure is applicable on AMC i.e. any damage caused due to short circuit, earth leakage, earthquake, fire etc. would be out of maintenance contract.

8.11 Adequate safety and security measures shall be in customer account, any theft, damage by mishandling etc. by unauthorized person shall not be covered in the maintenance contract.

8.12 If any seals are found to be broken during maintenance period then, warranty of those items shall be ceased to exist with immediately.

8.13 Hardware technology downgrade/upgrade is not the part of the AMC contract as a common practice but it is only as per contract conditions or mutually agreement between both the parties.

8.1 Hardware maintenance:

- Corrective maintenance
  - Trouble shooting of failure of implemented functionality
  - Identify, isolate, and rectify a fault so that the failed equipment, machine, or system can be restored to an operational condition.
  - Hardware can be replaced with the same spec. and upgraded spec. which is fully compatible with the existing system after mutual agreement.

8.2 Hardware specific activities:

Following are the list of activities that should be carried out during AMC period:

Activity	Scope Description
Hardware installations	• Replacement of faulty hardware (with warranty items/ spares whichever applicable) including meters, N-port (if any), DCU/gateway, routers, servers, switches and firewall etc. (if provided by bidder only). • Any alteration or site shifting during maintenance period is not covered in scope. In addition of new substation, installation shall be done as per separate commercials. • New sites addition/sites swapping cases should be discussed and based on mutual agreement maintenance and support shall be provided to new/swapped sites. • Plan for material and coordinate with end user and vendor
Hardware configuration	• The Procedure for site configuration shall be followed for each of the device and configured accordingly. There shall be mechanism to verify the successful configuration done manually. • Re-configuration of hardware at site like modems, DCU/gateway, routers etc. to take care the change management like new meter configurations in DCU/application. • Ensure its connectivity with central server and raise the

	network issue to utility team & communication provide/vendor.
Maintenance and Support of brought out items	• The third party hardware to be repaired/replaced as per warranty clauses provided by them only to ensure that system is up and running after taking the corrective measures. • Antivirus/SQL/MS office and all other third party licenses shall also be monitored by ATS team during regular visits and interaction with customer and renew of all licenses on time but commercial arrangement shall be mutually discussed with utility for license renew as per the agreement with third party provider. • Adequate number of third party supplied devices to be kept in reserve/stock against the devices whose failure may stop the business operations completely. Ex. Converters, Switch, Moxa, SIMS, Data cards, DCU/gateway etc.

Annual technical support (ATS) for software

8.3 Provide the annual technical support against all supplied software applications to run the project for next 5 years (as per contractual agreement).

8.4 The renewal of the ATS contract, if agreed by customer, shall be received 3 month prior to the expiry of the ATS support contract.

8.5 **Remote access**: Remote access shall be provided to technical support team for remote support, troubleshooting etc. During the entire phase of AMC/ATS support services. It may require additional tools to be installed in the server or a desktop for remote access, troubleshooting and over the air updates to connected nodes such as meters or communication devices depending upon the scope and capability of the system deployed.

8.6 **Application software maintenance activities**

Following are the list of activities that shall be carried out during the ATS project support:

Activity	Scope Description
Execution & Status Monitoring	• One person shall be available at data centre to execute the application for regular activities. • He shall also monitor data centre and substations applications (if applicable) (from remote or can get the feedbacks from substation person) on regular basis for scheduled maintenance and health monitoring of the application performances like services, database, logs status etc. • Application modules shall execute time sync through existing GPS clock on regular basis but ATS team on monthly basis shall ensure the time sync process and also plan field visit in case of time sync issue with the meters and DCU/gateway at any substation to resolve the issue on monthly basis. • Running daily back up automatically from main server to backup server but bidder's ATS team shall also monitor the data centre regularly to ensure the back-up activity and also check the healthiness of server and log files.
Maintenance	• Rectify bugs that prevent the software from being available / reported by the utility/project team during the usage of the system with respect to each software/deliverables under normal use of the hardware for which it was designed. • Resolution of the bug identified in any type of execution of the software, shall be provided as per below defined process. • Rectification of the bugs shall be provided through patches which shall be installed and checked by ATS team only. • In case of changes of DSM rules from CERC/SERC then ATS team shall implement the new rules and regulation during ATS period • Trouble shooting of failure of implemented functionality. • Identify the problem if data doesn't acquire from some of meters and application

	features are not working. • Application configuration (If required) likes VL configuration change and mapping etc. • Testing / User Training / Deployment of patches.
Application installation support	• Installation and commissioning to be done on agreed new sites (over and above the specified quantities in order) and linking with central application etc. on chargeable basis. • Provide the software upgrades, patch updates in case of any issue identified or bug resolution. These would be updated at all the places of installations. • In case, due to any unavoidable reasons, utility has to relocate the data centre to other location then operation team should provide all the technical support only to transfer the hardware and software comprising set-up infrastructures, configurations and setting up the same process at new location.
Application configuration support	• Support in configuration management - alarm rules changes/user access rights if required. • During the specified and agreed period for maintenance and support, there may be chances to add/replace the new metering nodes in existing substations to the system then ATS should also cover the addition of the new metering nodes and related activities to add in the complete process but hardware arrangement to add new meters need some raw material which shall require commercial consideration.
Project monitoring & SLA reports	• On monthly basis, ATS team should generate a summary report including list of activities conducted for the above sections during ATS support. • In case project has some defined SLA for the ATS support then team shall maintain the SLA as well and adhere to SLA for service support. • It should cover ▪ Monthly project status report ▪ Monthly ATS support report

	▪ Monthly field visit report ▪ Monthly SLA status report
Meter reading	• Regular execution of the application modules, monitoring and report generation is also in ATS team scope. • Automatic application shall be deployed but in case of meter data missed for load survey (required parameters) then manual meter reading through CMRI/laptop/mobile app. of all meters at substations shall be done on weekly basis by 2nd day of every week to ensure the DSM reporting on weekly basis. Bidder's team can take help of the substation staff to get the timely meter reading for missed data.

8.7 Exclusions from scope of AMC/ATS:

1. **Hardware-**
   - Major enhancement/ development more than defined limit or defined man days as per the signed contract. Any work involving efforts more than the agreed man days shall have financial impact (to be discussed and agreed internally).
   - Technology migration / upgrade (to be driven by the signed contract and agreement)
   - Third party installed hardware in the field (to be discussed and elaborated).
   - Any civil work required unless and until specified.
   - Hardware failures in the computer systems, any hardware damage due to force majeure conditions.
   - Any new addition within the substation shall be covered in the existing ATS activity (work such as addition of new feeder, new meter replacement and related application activities) but any new addition of the substation or any new geographical area shall have financial implication. Malfunctioning of meters or site material arising due improper earthing of electrical systems by Utility (in case not installed & commissioned by bidder).
   - To ensure the working of CT/PT etc. is in the scope of client.
2. **Application software service -**
   - Any modification in software / development activity more than defined man efforts
   - Customization / enhancements (new feature/new report/dashboard/new UI) having development need more than the defined limit in above clauses.
   - Any new integration requirements other than the part of contract,
   - New module/application development
   - Implementation of new packaged application
   - Technology migration / upgrades

- Multi language development and support. Any audit related and consulting activities for process improvements/re-engineering.

3. Project Field Maintenance

- All activities under project services shall go through change management. For those activities under project services, ARC (Additional Resource Charge) would apply for the same. The pricing shall be mutually discussed and shall be agreed upon case to case basis before initiating the activity.
- Scope of this contract is limited to the equipment supplied against this contract only. Any new hardware / software supply & installation shall not be covered under this scope. For this, utility shall place purchase orders separately.
- The contract is limited against any defect arising due to design and manufacturing defects. Any defect arising due to operational fault or damage or natural calamity shall not be covered under this contract. This Contract does not cover any defect in the product caused by accident, misuse, neglect, alteration, modification or substitution of any of the components or parts, or any attempt at internal adjustment by unauthorised service personnel, external faults or usage other than specified. Any defects / breakages observed out of the warranty period shall be attended on chargeable basis and the same shall be decided on mutually agreed terms & conditions.

8.8 Dependencies

- The end user does not change /alter any hardware and software provided by bidder in the field at its own.
- The performance and availability of the data from field devices and meters heavily depends on maintaining the healthiness of the allied hardware and connections by the end user in the field
- The field problem resolution response shall depend on the cooperation by end user.
- Dependency for Shutdown shall be on Utility.
- To provide base data like CT/PT ratio, transformer capacity, substation details etc. shall be provided by utility only.

Benefits & ROI Calculation

The installation of ABT complaint IEM with AMR facility and software for monitoring the reports on energy meter data will reduce the manual work and hence the human error will be removed from noting energy meter readings and calculation during preparation of report. This will also reduce the time in preparation of various reports based on energy meter data for transmission licensee / SLDC / STU.

The infrastructure will strengthen the SLDC / STU for monitoring the boundary electrical parameters and calculation of energy loss for the state.

Compliance to the requirement of SAMAST and it will smoothen the path for implementation of Intra-state ABT.

This will also create an alternate arrangement for monitoring the grid parameters and dependency on SCADA data will reduce.

Completion Time:

Expected time period for completion of the entire work from supply to commissioning shall be 12 months from the date of issuance of LOA.

Operational Benefits:

- Accurate meter reading, no more estimates.
- Reduced operational costs (No more CMRI based manual / offline readings)
- Clear visibility of Current UI charges for the whole system online.
- Predicted values of UI for the IP (15 mins block) to take corrective actions.
- Compliance with the requirement of SAMAST (5 mins block accounting and settlement).
- Effective meter data monitoring for further corrective & preventive actions
- UI reporting to help during settlement with all participants (DISCOMS, ISGS, PGCIL etc) against all contracts
- Monthly analysis can help for operational management of the network.
- Micro Level (i.e feeder basis) monitoring will be helpful in finding out the cause of under drawl / over drawl on real time basis & to reduce line losses.
- To ensure feeder wise Energy Accounting & Energy Auditing

Proposed New Grid Meter's Advantages – An insight to understand specification;

The proposed meter is based out of new metering platform and superior in many ways as listed below –

Hardware:

- Common design of wide range Aux supply variant (two aux power supply support) supported for 48 to 276 VAC/DC input range. Option is there to have another Aux supply support from 24-48 VDC range. – Operational Benefit & Reduced inventory

- Common product with 3P4W and 3P3W installation support. Existing Meters are different meters for different configuration. - Operational Benefit & Reduced inventory
- Supports 1A/ 5A basic current input in same hardware i.e. wide operating current range. Secondly it supports Imax up to 200% of Ibasic. Earlier Imax support up to 120% of Ibasic was only supported. - Operational Benefit & Reduced inventory
- Magnetic immunity support as per CBIP-304 of 0.27T. – Enhanced Revenue Protection Feature
- A total of 8 I/O support in product where 4 can be configured to inputs and remaining 4 for outputs. In earlier meter no provision to push pulsing application.– More Options for interfacing
- Proposed meter support Power Quality Features like total harmonic distortion (THD) up to 31st level of current and voltages in meter display & plotting at BCS end. – Enhanced Feature for a better quality power system
- This meter support online time synchronization wherein any drift can be corrected online. There is no such facility available in existing meter– More reliable

Mechanical:

- Rack mounted draw out type meter results in minimum shutdown period. Also there's no need to open the connection for meter replacement.
- Existing meter support IP 53 (with Rack) better than existing IP51 – More flexibility & protection in harsh condition
- Proposed meter comes with Graphical bigger display to show values, curves in better and detailed way to user. – More user friendly.

Meter Software feature:

- Proposed meter is complied with DLMS ICS (IS 15959-2011) category B & C specification which makes it suitable to install at Bank/ Ring/ Boundary/ ABT metering application. – Minimum Inventory more flexibility
- Proposed Meter supports more advanced requirement of ABT data recording for current IP values like Average frequency, Energies, Voltages – More features to suit ever changing requirement
- Logging of more load survey days is supported. – More data for enhanced data analytics

Meter Communication capability:

- Proposed meter supports 5 different communication ports / channels to meet different data reading requirement namely –
- Optical port – It is physically an 1107 port for the purpose of local/ on-site meter reading.
- RS232 port – It is a serial RS 232 channel (RJ-45 connector) for the purpose of connecting modem etc device for remote monitoring & meter reading (RMR) application.
- RS485 port – It is a serial RS485 in-out port (RJ-45 connector) for the purpose of connecting suitable hardware device for enabling local / remote on-line monitoring application – More Flexibility.

- Ethernet port – It is a TCP/IP channel (RJ-45 connector) for the meter reading purpose similar to RS485 port. The TCP/IP connection shall be private static in nature. – Feature proof AMI & Smart Grid ready.
- USB port – It is a USB port for supporting local meter reading via pen drive – Reduces the hassle to carry bulky Laptops, MRI etc for offline manual meter reading.
- Supports two Open Protocol in the same hardware – DLMS ICS & MODBUS – Hassle free Integration with 3rd party systems. No dependencies on manufacturer.

The Schedule of Price of 418 nos. ABT Compliant SEM meters (including spare meters) for all interface points of BGCL Phase IV, Part I, II & Suplementory projects is around **Rs. 19.06 Crores,** which includes Supply, installation & commissioning of ABT complaint Interface Energy Meter with AMR facility including spares for online ABT monitoring and Energy Accounting software, Yearly service charge for conducting Energy accounting and audit, generation & analysis of reports, MIS reports etc for 5 years as per requirement & Yearly Service charges for maintenance of the whole system for 5 years and training to personnel as per need. Schedule of prices for 418 nos. ABT Compliant Special Energy Meters (SEM) for 100 % metering & online Energy Monitoring, communication of data on real time basis including Energy Accounting & Audit and ABT Management Software is enclosed as **Annexure- IA** of the DPR.

Annexure I : Location wise ABT Energy Meter Requirement

Sl.	New Substation	Phase 1 at 33kV Level	Phase 2 balance all	No. of Meters
1	220/132/33 kV Amnour	11	14	25
2	220/132/33 kV Khijirsarai	15	20	35
3	220/132/33 kV Narhat	11	12	23
4	220/132/33 kV Shekhopur Sarai	11	13	24
5	220/132/33 kV Haveli Kharagpur	11	16	27
6	220/132/33 kV Goradih	11	14	25
7	220/132/33 kV Mokama	11	12	23
8	400/220/132/33 kV Jakkanpur New		57	57
9	400/220/132/33 kV Naubatpur New		41	41
10	220/132/33 kV Dumraon New		33	33
11	220/33 kV Bhusaula New		19	19
	Bay Extension S/s			
1	220 kV Hajipur		5	5
2	132 kV Siwan		2	2
3	132 kV Chhapra		2	2
4	220 kV Gaya PG		2	2
5	132 kV Jehanabad		2	2
6	132 kV Hulasganj		1	1
7	132 kV Nawada		2	2
8	132 kV Sheikhpura		2	2
9	132 kV Biharsharif		1	1
10	132 kV Jamalpur		2	2
11	132 kV Sabour		2	2
12	132 kV Hathidah		2	2
13	220 kV Patna		2	2
14	220 kV Khagaul		2	2
15	132 kV Bihta		2	2
16	220 kV Bihta		2	2
17	132 kV Masauhri		2	2
18	132 kV Paliganj		2	2
19	132 kV Dumraon		2	2
20	132 kV Buxar		2	2
21	132 kV Katihar		2	2
	Total	**81**	**294**	**375**
	Spare	**6**	**37**	**43**
	Grand Total	**87**	**331**	**418**

Annexure IA

Summary of Cost Estimate

Supply, Installation, Testing & Commissioning of Interface Energy Meters (IEM) along with Automated Meter Reading (AMR) as per SAMAST guidelines at various Grid substations in Bihar Grid Company Limited (BGCL)

Sl. No	Item Description	Total Value		
		Phase 1	Phase 2	Total
1	Supply	3,14,89,986	5,78,83,973	8,93,73,959
2	Erection & Commissioning	43,05,606	1,29,03,833	1,72,09,440
3	Energy Audit and Report Generation for 5 Years	80,97,443	2,98,59,322	3,79,56,765
4	AMC for 5 Years	1,59,59,781	1,59,59,781	3,19,19,562
5	**Total Amount (in Rs.)**	5,98,52,816	11,66,06,909	17,64,59,726
	Total Hard Cost (in Cr.)	**5.99**	**11.66**	**17.65**
	IDC @ 5.92%	0.35	0.69	1.04
	IEDC @ 2.1%	0.13	0.24	0.37
	Total Amount (in Cr.)	**6.47**	**12.60**	**19.06**
	Commissiong Schedule	**31-03-2022**	**31-03-2023**	

BIHARGRID COMPANY LIMITED

Supply, Installation, Testing & Commissioning of Interface Energy Meters (IEM) along with Automated Meter Reading (AMR) as per SAMAST guidelines at various Grid substations in Bihar Grid Company Limited (BGCL)

Supply Portion :

Sr. No.	Item description	Unit	Quantity			Unit Total	Total Price Landed		
A	**Substation Control Relay Room H/W and S/W**		Phase 1	Phase 2	Total	Rs.	Phase 1	Phase 2	Total
1	3 Phase, 4 wire, 0.2S, Rack mounted ABT Meter, Optical, RS232, RS485, Ethernet and USB Port	No.	80	320	400	1,17,557.50	94,04,600.00	3,76,18,400.00	4,70,23,000.00
2	3 Phase, 4 wire, 0.2S, Rack mounted ABT Meter, with Class A PQ features Optical, RS232, RS485, Ethernet and USB Port	No.	7	11	18	4,13,000.00	28,91,000.00	45,43,000.00	74,34,000.00
3	Metering Panel for 8 Nos. Apex 100 Meters	No.	10	71	81	1,18,649.00	11,86,490.00	84,24,079.00	96,10,569.00
4	DCU (inbuilt 4G GPRS Modem)	Set	8	7	15	1,53,400.00	12,27,200.00	10,73,800.00	23,01,000.00
5	Network Switch 24 TCPIP Port +2 SFP port 10/100 Mbps as per project requirement (CISCO)	No.	8	7	15	82,600.00	6,60,800.00	5,78,200.00	12,39,000.00
6	7 core 2.5 sq mm armoured control cable FRLS (Cu) for CT connection	Mtr	3,000	4,000	7,000	363.44	10,90,320.00	14,53,760.00	25,44,080.00
7	4 core 2.5 sq mm armoured control cable FRLS (Cu) for PT connection	Mtr	3,000	1,200	4,200	230.10	6,90,300.00	2,76,120.00	9,66,420.00
8	3 core 2.5 sq mm armoured cable FRLS (Cu) for UPS & other IT H/W supply	Mtr	1,500	1,300	2,800	185.26	2,77,890.00	2,40,838.00	5,18,728.00
9	2 core 2.5 sq mm armoured cable FRLS (Cu) for AC/DC Aux supply	Mtr	3,000	2,600	5,600	146.32	4,38,960.00	3,80,432.00	8,19,392.00
10	Communication cable (Quantity is tentative and the same shall be as per project requirement during detail engineering)	Mtr	720	680	1,400	44.96	32,369.76	30,571.44	62,941.20
11	PVC conduit Pipe for communiction cable (3/4")	Mtr	700	560	1,260	53.45	37,417.80	29,934.24	67,352.04
B	**Sustation Control Room H/W and S/W**								
1	UPS - 2 KVA online with 60 min back up on 100% load	No.	7	7	14	1,20,952.32	8,46,666.24	8,46,666.24	16,93,332.48
2	Client PC as per specification & project requirement (Without Windows License)	Set	7	7	14	1,64,167.50	11,49,172.50	11,49,172.50	22,98,345.00
3	Licenced Data acquisition software for local data monitoring at each GSS	Lot	7	7	14	94,400.00	6,60,800.00	6,60,800.00	13,21,600.00
4	Network Switch 8 SFP Port + 2 TCPIP port 10/100 Mbps as per project requirement (CISCO)	No.	7	7	14	82,600.00	5,78,200.00	5,78,200.00	11,56,400.00
C	**Cetral Data Centre (At Present BSPTCL, Vidyut Bhawan)**								
1	DAS/AMR software module	No.	1	-	1	82,60,000.00	82,60,000.00	-	82,60,000.00
2	Database Server (Main & Backup)	Nos.	2	-	2	10,28,899.82	20,57,799.64	-	20,57,799.64
D	**Supply Total**					**1,06,37,249.67**	**3,14,89,985.94**	**5,78,83,973.42**	**8,93,73,959.36**

Supply, Installation, Testing & Commissioning of Interface Energy Meters (IEM) along with Automated Meter Reading (AMR) as per SAMAST guidelines at various Grid substations in Bihar Grid Corporation Limited (BGCL)

Installation Portion :

Sr. No.	Item description	Unit	Qtty			Total unit Price (Landed)	Total Price (Landed)		
			Phase 1	Phase 2	Total	Rs.	Phase 1	Phase 2	Total
1	Detailed Survey, prepration of drawings for installation of Energy Meters/Metering Panels/modifications in existing panels (as applicable) of the Grid Substations for the actual requirement of Energy meter/Metering panels for accessing GSS wise actual requirement.	Nos.	7	25	32	29,992.06	2,09,944.42	7,49,801.50	9,59,745.92
2	Erection, testing and commissioning of 3 Phase, 4 wire, 0.2S accuracy class Trivector static Energy Meter as per specification including all consumables viz. Lugs, wires, terminals blocks & connectors, ferruls etc. (364 nos. SEM & 11 nos. PQ Meter)	No.	80	295	375	26,550.00	21,24,000.00	78,32,250.00	99,56,250.00
4	Erection, testing and commissioning of Metering panel suitable to mount 8 nos of rack mounted meters as per specification including all consumables viz. Lugs, wires, terminals blocks & connectors, ferruls etc.	No.	10	64	74	50,354.14	5,03,541.40	32,22,664.96	37,26,206.36
5	Erection, testing and commissioning of Communication Hardwares (DCU, switches, LAN etc) at each GSS as per specification & project requirement/ approved drawing after detail engineering including all consumables viz. Lugs, wires, terminals blocks & connectors, ferruls etc. (Per Sub Station)	Set	8	7	15	1,00,376.70	8,03,013.60	7,02,636.90	15,05,650.50
6	Laying, testing and commissioning of 7 core 2.5 sq mm armoured control cable FRLS (Cu) for CT connection as per project requirement	Mtr	3,000	4,000	7,000	55.46	1,66,380.00	2,21,840.00	3,88,220.00
7	Laying, testing and commissioning of 4 core 2.5 sq mm armoured control cable FRLS (Cu) for PT connection as per project requirement	Mtr	3,000	1,200	4,200	48.38	1,45,140.00	58,056.00	2,03,196.00
8	Laying, testing and commissioning of 2 core 2.5 sq mm armoured cable FRLS (Cu) for AC/DC Aux supply as per project project requirement	Mtr	3,000	2,600	5,600	44.84	1,34,520.00	1,16,584.00	2,51,104.00
9	Installation of Database Server (2 Nos.) at Central Station along with DAS Software	Lump sum	1	-	1	2,19,067.00	2,19,067.00	-	2,19,067.00
	Total Installation						**43,05,606.42**	**1,29,03,833.36**	**1,72,09,439.78**

Annexure - ID

Supply, Installation, Testing & Commissioning of Interface Energy Meters (IEM) along with Automated Meter Reading (AMR) as per SAMAST guidelines at various Grid substations in Bihar Grid Corporation Limited (BGCL)

Service Part

Sr. No.	Item description	Unit	Quantity			Duration	Total unit Price (Landed)	Total Price (Landed)		
AMC Services			**Phase 1**	**Phase 2**	**Total**	**in Yrs.**	**Rs.**	**Phase 1**	**Phase 2**	**Total**
1	Yearly service charges for carrying out Energy Accounting and Audit of the entire transmission system, Generation & Analysis of various reports, MIS reports, ABT UI reports & monitoring etc for 5 years as per requirement.	Nos.	80	295	375	1st Year	16,579.00	13,26,320.00	48,90,805.00	62,17,125.00
		Nos.	80	295	375	2nd Year	18,236.90	14,58,952.00	53,79,885.50	68,38,837.50
		Nos.	80	295	375	3rd year	20,061.18	16,04,894.40	59,18,048.10	75,22,942.50
		Nos.	80	295	375	4th Year	22,067.18	17,65,374.40	65,09,818.10	82,75,192.50
		Nos.	80	295	375	5th Year	24,273.78	19,41,902.40	71,60,765.10	91,02,667.50
A.	**Total For Energy Audit & Report generation**							**80,97,443.20**	**2,98,59,321.80**	**3,79,56,765.00**
2	Yearly Service charge for maintenace of the whole system (by way of AMC) for 5(Five) years and training to BGCL personnel as per need.	Lot	1	1	2	1st Year	26,14,172.00	26,14,172.00	26,14,172.00	52,28,344.00
		Lot	1	1	2	2nd Year	28,75,589.20	28,75,589.20	28,75,589.20	57,51,178.40
		Lot	1	1	2	3rd year	31,63,148.12	31,63,148.12	31,63,148.12	63,26,296.24
		Lot	1	1	2	4th Year	34,79,462.46	34,79,462.46	34,79,462.46	69,58,924.92
		Lot	1	1	2	5th Year	38,27,409.06	38,27,409.06	38,27,409.06	76,54,818.12
B	**Total For Yearly Mentainance**							**1,59,59,780.84**	**1,59,59,780.84**	**3,19,19,561.68**
	Total for Service							**2,40,57,224.04**	**4,58,19,102.64**	**6,98,76,326.68**

Annexure II(A) : Specification of Interface Energy Meter (IEM)

TECHNICAL SPECIFICATIONS FOR 0.2s ACCURACY CLASS AC STATIC TRIVECTOR ENERGY METERS, SUITABLE FOR INTER UTILITY METERING, BULK CONSUMER METERING, RING FENCING METERING AND AVAILABILITY BASED TARIFF (ABT)/ DSM (Deviation Settlement Mechanism) METRING

1.0 SCOPE

This specification covers the design, engineering, manufacture, assembly, inspection and testing before supply and delivery at site/ FOR destination of class 0.2s accuracy static HT tri-vector CT/ VT operated meters, along with other associated equipments as per details given in this specification. The meters shall be used for commercial/tariff metering for inter utility power flows/bulk consumers as well for Availability Based Tariff (ABT) application.

The meter shall be complied with DLMS ICS specification. The meter records parameters under import and export conditions.

One static type composite meter shall be installed for each circuit, as a self-contained device for measurement of power transmitted, as described herein, in each successive 15 minute block, and certain other functions, detailed in the following paragraphs. Meter shall have provision for in site configuration of 5 mins in future to comply with statutory requirements.

The metering system shall be housed in rack with draw out type feature capability for inserting the meter module. Current terminal connection must be shorted when module is drawn out. The rack shall have facility to accommodate either one or two individual 0.2s accuracy class meter modules for supporting the single and multiple points of installation practices respectively.

The meter shall have wide secondary current range support i.e. same meter shall be put up for 1A or 5A rating as per field availability of CT's. The meter shall support 200% Ibasic. Meter required to be commissioned at each substation shall be of 3 phase 4 wire.

It is not the intent to specify completely herein all the details of the design and construction of material. The material shall, however, conform in all respects to the best industry standards of engineering, design and workmanship and shall be capable of performing for continuous commercial operation in a manner acceptable to the purchaser The offered equipment shall be complete in all respects including all components/accessories for effective and trouble free operation according to the specifications. Such components shall be deemed to be within the scope of this specification irrespective of whether those are specifically brought out or not.

2.0 APPLICABLE STANDARDS

2.1 STANDARDS

The equipment shall conform (for testing, performance and accuracy) in all respects the relevant Indian/ International metering standards with latest amendments thereof unless otherwise specified.

S. No.	Standard No.	Title
1.	IS 14697	AC static transformer operated Watt-hour and VAR-hour meters for class 0.2s and 0.5s
2.	CBIP technical report no. 304 (magnet immunity)	Specification for AC static electricity energy meters Immunity against magnetic interference up to 0.27T
3.	IS 15959 DLMS companion Standard (ICS)	AC static transformer operated Watthour and VAR hour meters for class 0.2s category B (ABT compliant) metering

2.2 Equipments matching with requirements of other national or international standard which ensure equal or better performance than the standards mentioned above shall also be considered. When the equipment offered by the bidder conforms to standards other than those specified above, salient points of difference between standards adopted and standards specified in this specification shall be

clearly brought out in the relevant schedule and copy of such standards along with their English translation shall invariably be furnished along with the offer.

3.0 CLIMATIC CONDITIONS

The meters to be supplied against this specification shall be required to operate satisfactorily and continuously under the following tropical conditions of hot, humid, dusty, rust and fungus prone environment.

i)	*Max. ambient air temperature (℃)*	*: 55*
ii)	*Min. ambient air temperature (℃)*	*: (-) 5*
iii)	*Average daily ambient air temp. (℃)*	*: 32*
iv)	*Max. Relative Humidity (%)*	*: 95*
v)	*Min. Relative Humidity (%)*	*: 10*
vi)	*Max. Altitude above mean sea level (m)*	*: 1000*
vii)	*Average Annual Rainfall (mm)*	*: 1200*
viii)	*Max. wind pressure (Kg/Sq.m)*	*: 195*
ix)	*Isoceraunic level (days per year)*	*: 50*
x)	*Seismic level (Horizontal Accn. in g)*	*: 0.3*

4.0 PRINCIPAL PARAMETERS

The energy metering rack with meters shall be indoor type connected with the secondary side of outdoor current and voltage transformers and mounted in suitable panel/ cubicles.

S. No.	Item	Specification
1.	Type of Installation	Indoor panel/ cubicle mounted
2.	VT secondary	3x110V/√3 Phase to Neutral (3P4W) Variation -30% to +20%
3.	CT secondary	***3 x /-1 Amps or 3 x /-5 Amps (configurable in field as per requirement)***
4.	Dual Auxiliary AC/ DC Supply	*60-240 V AC/DC ± 20%, 50/60 Hz* *or 24-48 V DC ± 20%* *Note: Any of the one or two auxiliary supply option shall be available*
5.	System frequency	***50HZ +/- 5%***
6.	Earthing System	***Solidly Grounded***

The meter should be suitable for working with above supply variations without damage and without degradation of its metrological characteristics.

5.0 TECHNICAL REQUIREMENTS

5.1 DISPLAY

The meter shall have Graphical LCD with backlight for proper depicting of values in user friendly manner like values with unit, OBIS codes, favourite page etc.

5.2 POWER FACTOR RANGE

The metering system shall be suitable for full power factor range from zero (lagging) through unity to zero (leading). The metering module shall work as an active energy import and export meter along with reactive (lag and lead) meter. The energy measurement should be true four quadrant type.

5.3 ACCURACY

Class of accuracy of the metering system shall be 0.2s for energy measurement. The accuracy should not drift with time.

5.4 POWER CONSUMPTION OF METER

i) The meter must be capable to operate with the power drawn from the Auxiliary Power supply (AC/DC) instead of Station VT power supply.

ii) **Voltage Circuit**: The active and apparent power consumption in each voltage circuit including the power supply of metering module at reference voltage, reference temperature and reference frequency shall not exceed 1 Watt per phase and 1 VA per phase respectively.

iii) **Current Circuit**: The apparent power taken by each current circuit at basic current, reference frequency and reference temperature shall not exceed 1 VA per phase.

5.5 STARTING CURRENT

The metering module should start registering the energy at 0.1% Ib and unity power factor.

5.6 MAXIMUM CURRENT

The rated maximum current of the metering module shall be 200% of basic current (Ib).

5.7 The meter shall work accurately irrespective of phase sequence of the mains supply.

5.8 GENERAL CONSTRUCTIONAL REQUIREMENTS

Meters shall be designed and constructed in such a way so as to avoid causing any danger during use and under normal conditions. However the following should be ensured:

i) Personnel safety against electric shock
ii) Personnel safety against effects of excessive temperature
iii) Protection against spread of fire
iv) Protection against penetration of solid objects, dust and water in normal working condition

All the materials and electronic power components used in the manufacture of the meters shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy.

The meters shall be designed with application specific integrated circuits. The electronic components shall be mounted on the printed circuit board using latest Surface Mount Technology (SMT).

All insulating materials used in the construction of meters shall be non-hygroscopic, non-aging and of tested quality. All parts that are likely to develop corrosion shall be effectively protected against corrosion by providing suitable protective coating.

The metering system when mounted in panel shall conform to the degree of protection IP53 in the normal working condition of IS 12063/ IEC 529 for protection against ingress of dust and moisture.

5.9 MANUFACTURING ACTIVITIES

Meter should be manufactured using SMT (Surface Mount Technology) components and by deploying automatic SMT pick and place machine and reflow solder process; the Bidder should own such facilities.

Quality should be ensured at the following stages:

i) At PCB manufacturing stage, each board shall be subjected to computerized bare board testing.
ii) At insertion stage all components should under go computerized testing for conforming to design parameters and orientation.
iii) Complete assembled and soldered PCB should under go functional testing using Automatic Test Equipment.
iv) Prior to final testing and calibration, all meters shall be subjected to accelerated ageing test to eliminate infant morality.
v) The calibration of meters shall be done in-house.

5.10 SEALING

Proper sealing arrangement shall be provided in metering system as follows:

i) Two numbers sealing screws shall be provided on the front cover of metering module.
ii) Provision shall be available to seal the back connections on the metering rack using the back plate.
iii) Provision shall be available to seal optical port.

The sealing arrangement should be suitable for application of Polycarbonate seals.

5.11 MARKING OF METER

The basic marking on the metering module name plate shall be as follows:

i) Manufacturer's name and trade mark
ii) Serial Number
iii) Year of manufacture
iv) Type Designation
v) Number of phases and wires
vi) VT commissioning information
vii) CT commissioning information
viii) Reference frequency
ix) Accuracy Class

Additionally, following information shall also be available on name plate.

i) Property Of "Purchaser name"
ii) P.O. No. "Number"

5.12 The connection diagram of the connecting 3P4W meter shall be depicted via suitable sticker pasted on meter. The meter terminals shall be properly marked to identify voltage, Current, Auxiliary and communication ports.

5.13 The meters shall be suitable for being connected directly through its terminals to VT's having a rated secondary line- to- line voltage of 110 V, and to CTs having a rated secondary current of 1A or 5A. Any further transformers/ transducers required for their functioning shall be in-built in the meters. Necessary isolation and/or suppression shall also be built-in, for protecting the meters from surges and voltage spikes that occur in the VT and CT circuits of extra high voltage switchyards.

5.14 The active energy measurement shall be carried out on 3 phase, 4 wire principle with an accuracy as per class 0.2s of IS14697. The meters shall compute the active energy and load import; active energy and load export from the substation bus bars during each successive 15 minute integration period block and store it in its non volatile memory.

5.15 The meter shall compute the average frequency during each successive 15 minute block and store in its memory.

5.16 The meter shall have Inputs/ Outputs pulsing pins availability. This shall help in transferring the same Energy parameters being recorded inside the meters on pulse output as well for SCADA application at remote distance.

5.17 The meter shall compute the reactive power on 3-phase, 4-wire principle, with an accuracy as per relevant IS/ IEC standards, and integrate the reactive energy algebraically into two separate reactive energy registers, one for the period for which the average RMS voltage is greater than 103% (Reactive High), and the other for the period for which the average RMS voltage is below 97.0% (Reactive Low). When lagging reactive power is being sent out from substations bus bars, reactive registers shall move forward. When reactive power flow is in the reverse direction, reactive registers shall move backwards.

5.18 Further, the reactive energy shall also be available in four different registers as-

i) Reactive import while active import
ii) Reactive import while active export
iii) Reactive export while active import
iv) Reactive export while active export.

5.19 Active and Apparent energies shall also be made available by meter in separate energy registers as:

i) Active energy Import
ii) Active energy Export
iii) Apparent energy (while active import)

iv) Apparent energy (while active export)

5.20 Meter shall have provision to compute apparent energy based on lag only or lag+lead. The same shall be configured at factory end.

5.21 The meters shall be compatible with ABT tariff as well as TOD tariff.

5.22 For reactive power and reactive energy measurement, limits of errors all the four quadrants shall be in accordance to IS14697/IEC 62053-23.

5.23 Each meter shall have a calibration LED (visual) for checking the accuracy of active energy measurement. Further, it shall be possible to switch over the same test output device to reactive energy via suitable means provided on the metering system. This LED shall be visible from the front side.

The metering system shall normally operate with the power drawn through the auxiliary AC or DC supply. The metering system design should enable the auxiliary supply to be switched automatically between the AC and DC voltage, depending upon their availability. Typical auxiliary voltages available are 60-240 V AC/DC ± 20%, or 24-48 V DC ± 20% *.The system shall continue to work even if any one of the above auxiliary supply (AC/ DC) is present.*

5.24 Each metering module shall have a built-in calendar and clock, having an accuracy of one (1) minute per month or better. The calendar and clock shall be correctly set at the manufacturer's works.

An automatic backup for continued operation of the meter's calendar-clock shall be provided through a long life battery, which shall be capable of supplying the required power for at least two years under meter un-powered conditions. The meters shall be supplied duly fitted with the batteries, which shall not require to be changed for at least ten years, as long as total supply interruption does not exceed two years.

5.25 TOD (Time of day registers): The meter shall have TOD registers for active energy import and export, apparent energy import and export and apparent MD import and export. Maximum eight time of day registers including universal (0-24 hrs) register can be defined. It shall be possible to program number of TOD registers and TOD timings through suitable high level software/ MRI as an authenticated transaction.

5.26 Maximum Demand (MD) Registration: The meter shall continuously monitor and calculate the average demand of configured parameter during the integration period set and the maximum, out of these shall be stored along with date and time when it occurred in the meter memory. The maximum demand shall be computed on fixed block principle. The maximum registered value shall be made available in meter readings. The integration period shall be set as 15 minutes that shall be capable to change to other integration period (30/ 60 minutes), if required, through suitable high level software/ MRI as an authenticated transaction.

5.27 Maximum Demand Reset: Following provisions shall be available for MD reset in meter –

i) Auto billing at predefined date and time
ii) Manual via common MD reset button (optional)
iii) Authenticated transaction through suitable high level software/ MRI (optional)

5.28 The display shall be of Graphical LCD type with colored back-lit and soft push button. Individual display shall be provided for all the meters housed in a metering rack.

The display shall indicate direct values (i.e. without having to apply any multiplying factor) of measured/ computed parameters as per the meter commissioning. It should be possible to easily identify the single or multiple displayed parameters through legends on the metering system display like OBIS codes etc.

The register shall be able to record and display starting from zero, for a minimum of 1500 hours, the energy corresponding to rated maximum current at reference voltage and unity power factor. The register shall not roll over in between this duration.

5.29 Each of the metering module shall display on demand & in Auto scroll mode the following quantities/ parameters:

i) LCD segment check
ii) Date
iii) Time
iv) Cumulative active energy import
v) Cumulative active energy export
vi) Cumulative net active (Import – Export) energy
vii) Cumulative reactive energy lag while active import
viii) Cumulative reactive energy lead while active import
ix) Cumulative reactive energy lag while active export
x) Cumulative reactive energy lead while active export
xi) Cumulative apparent energy (while active import)
xii) Cumulative apparent energy (while active export)
xiii) Cumulative Reactive High energy
xiv) Cumulative Reactive Low energy
xv) Last 15 minutes block average of active import energy
xvi) Last 15 minutes block average of active export energy
xvii) Last 15 minutes block average of the net active (Import – Export) energy
xviii) Last 15 minutes block average frequency
xix) MD reset count
xx) Maximum demand apparent (while active import) for current month (0-24 hrs)
xxi) Maximum demand apparent (while active export) for current month (0-24 hrs)
xxii) Cumulative active import energy reading of predefined date and time for monthly billing purpose
xxiii) Cumulative active export energy reading of predefined date and time for monthly billing purpose
xxiv) Cumulative net active (Import – Export) energy reading of predefined date and time for billing purpose
xxv) Cumulative apparent energy (while active import) reading of predefined date and time for monthly billing purpose
xxvi) Cumulative apparent energy (while active export) reading of predefined date and time for monthly billing purpose
xxvii) Maximum demand for apparent (while active import) of predefined date and time for monthly billing purpose
xxviii) Maximum demand for apparent (while active export) of predefined date and time for monthly billing purpose
xxix) Present anomaly status
xxx) Date of first occurrence of anomaly
xxxi) Time of first occurrence of anomaly
xxxii) Time of last restoration of anomaly
xxxiii) Date of last restoration of anomaly
xxxiv) Total anomaly count

There should a facility to configure the display parameters in favorite pages.

5.30 Load Survey: Each metering module shall have a non-volatile memory in which the following shall be automatically stored for each successive fifteen (15) minute block:

i) Active import
ii) Active export
iii) Average frequency
iv) Apparent while active import
v) Apparent while active export
vi) Reactive High energy
vii) Reactive Low energy

15-minute average of the above parameters shall be available for last thirty five (35) days. It shall be possible to select either energy or demand view at Base Computer Software (BCS) end.

The load survey data should be available in the form of bar charts as well as in spreadsheets. The BCS shall have the facility to give complete time synchronized load survey data both in numeric and graphic form.

5.31 Billing parameters: The predefined date and time for registering the billing parameters of shall be 00.00 hours of the first day of each calendar (billing) month. Each meter shall store the following parameters corresponding to defined bill dates for up to last six (6) months:

i) Active energy import
ii) Active energy export
iii) Apparent energy (while active import)
iv) Apparent energy (while active export)
v) Maximum demand Apparent (while active import)
vi) Maximum demand Apparent (while active export)

5.32 Daily midnight parameters: The metering modules shall store following end day parameters for last thirty five (35) days:

i) Active energy import
ii) Active energy export
iii) Reactive high energy
iv) Reactive low energy

5.33 Data Communication Capability: The metering system should have a suitable communication ports for local reading, remote and on-line communication facilities.

Each metering module shall have an optical galvanically isolated serial communication (in the form of 1107 port) & USB port on its front for tapping all the data stored in its memory. For the purpose of local meter reading Pen drive shall used. It shall be possible to download meter data via Optical port by connecting laptop computer directly. The overall intention is to have the local ports is to tap the data stored in meter once in a week/month and transmit the same to PC with BCS for view. Both optical and USB port shall have sealing provisions.

The metering system shall further provide a serial RS232, RS485 (In & Out) and Ethernet communication TCP/IP port for remote data transfer to a central location. This port shall be capable of data transfer to a remote computer over suitable communication media (GPRS/VSAT/ Leased line/ OFC) using suitable communication hardware (modems/ multiplexer/ communication cables etc.) as required for proper functioning of remote meter reading scheme. All port shall communicate simultaneously. TCP/IP shall have provision for configuring multiple open protocol like MODBUS and DLMS using two separate channel simultaneously.

5.34 Each meter shall have a unique identification code i.e. serial number, which shall be marked on name plate as well as in its memory. Further all meters of the same model shall be totally identical in all respects except for their unique identification codes.

5.35 The meters shall safely withstand the usual fluctuations arising during faults etc. In particular, 115% of rated VT secondary voltage applied continuously and 190% of rated voltage applied for 3.0 seconds, and 20 times of rated CT secondary current applied for 0.5 seconds shall not cause any damage to or malfunctioning of the meters. Further the immunity of metering system to external magnetic field shall be as per latest CBIP recommendations.

5.36 Each meter shall have a non volatile memory in which the parameters as mentioned in this specification shall be stored. The non volatile memory shall retain the data for a period not less than 10 years under un-powered condition; battery back up memory shall not be treated as NVM.

5.37 Meter shall have the capability and facility to compensate for errors of external measurement transformers i.e. CT and VT:

i. Linear compensation for measurement PT errors (ratio and phase); there shall be linear adjustment which shall be applied across the complete measurement range of the transformer.

ii. Non-linear compensation for measurement CT errors (ratio and phase) compensation; this shall allow multiple ratio and phase adjustments to be applied for different load points per phase input of the meter.

It should be possible to program the errors of CT and VT in meter through front optical communication port using compatible high level software. Metering system design should support this feature and further it shall be possible to configure & incorporate this feature in meter at later stage whenever required.

5.38 The metering modules shall be draw out type with automatic CT shorting feature so as to ease the testing/ replacement of meters without disturbing the system.

5.39 The meter display should depict the total harmonic distortion (THD) of current and voltages up to 31st level of power quantity for providing the feature of supply monitoring to Utility.

6.0 ANOMALY DETECTION FEATURES

6.1 The meter shall have features to detect and log the occurrence and restoration of following anamolies, along with date and time of event:

i) **Phase wise Missing Potential** – The meter shall detect missing potential (1 or 2 phases) provided the line current is above a specified threshold. The voltage at that stage would be below a specified threshold.

ii) **Phase wise Current Circuit Reversal** – The meter shall detect reversal of polarity provided the current terminals are reversed. This shall be recorded for 1 or 2 phase CT reversal.

iii) **Voltage Unbalance** – The meter shall detect voltage unbalance if there is unbalance in voltages.

iv) **Current Unbalance** – The meter shall detect current unbalance if there is unbalance in load conditions. Meter should ensure true system conditions before going for current unbalance checks.

v) **CT Miss** – The meter shall detect current miss if the current is below a defined threshold, provided the phase voltage is above a specified threshold.

Snapshots of phase wise voltage, phase wise active current and phase wise power factor shall be provided with above specified anomaly events.

Further, each meter module shall record the following events along with total duration:

i) **Power On/Off** – The meter shall detect power off if both the auxiliary supplies fail. The event shall be recorded on the next power up. At the same time power on event shall be recorded. No snapshot shall be logged with this event.

ii) **Feeder Supply Fail** -This event shall be logged when feeder supply, i.e. all the voltages goes below certain threshold. No snapshot shall be logged with this event.

6.2 Last three hundred & fifty (350) events (occurrence + restoration), in total, shall be stored in the meter memory on first in first out basis.

6.3 There shall be five separate compartments for logging of different type of anomalies :

Compartment No.1	100 events of Missing Potential
Compartment No.2	100 events of CT Reversal
Compartment No.3	100 events for Power Failure / Power On-Off
Compartment No.4	50 events of Transaction related changes as per ICS Category B

Once one or more compartments have become full, the last anomaly event pertaining to the same compartment shall be entered and the earliest (first one) anomaly event should disappear. Thus, in this manner each succeeding anomaly event shall replace the earliest recorded event, compartment wise. Events of one compartment/ category should overwrite the events of their own compartment/ category only. In general persistence time of 5 min. for occurrence and restoration respectively need to be supported in meter.

6.4 Anomaly count should increase as per occurrence (not restoration) of anomaly events. Total no. of counts shall be provided on BCS.

7.0 TRANSACTIONS

The meter shall record critical events (as performed in authenticated manner) of Time set, MD reset operation and tariff change. These events shall be logged in roll over mode for up to twenty numbers.

8.0 SELF DIAGNOSTIC FEATURE

The meter shall be capable of performing complete self diagnostic check to monitor the circuits for any malfunctioning to ensure integrity of data in memory location all the time. The meter shall have indications for unsatisfactory/ nonfunctioning/ malfunctioning of the following:

i) Non volatile memory

ii) RTC battery

The above malfunctioning should be flagged in the meter memory and should be made available in meter reading data.

9.0 TYPE TEST CERTIFICATES

The meters shall be fully type tested as per relevant standards IS 14697. The type test report of the meters shall be submitted by bidder along with the offer. Type test reports shall not be more than 2 years old.

GURANTEED TECHNICAL PARTICULARS

S. No.	Technical Specification Requirements	Bidder's Offer
1.	Manufacturer's name & Country	
2.	Type of Meter	
3.	Name and model no. of offered product	
4.	Standards to which meter complies	
5.	Accuracy class • Active energy measurement • Reactive energy measurement	
6.	Metrology indicator provided on meter and switching facility for reactive & apparent energy	
7.	Variation of voltage at which system functions normally	
8.	Minimum Starting current	
9.	Maximum current	
10.	P.F. range	
11.	Power consumption per phase • Voltage Circuit • Current Circuit	
12.	AC and DC Auxiliary supply ratings for powering up the metering system	
13.	Sealing arrangement	
14.	Energy parameters recorded in meter	
15.	ABT compatibility	
16.	TOD compatibility	
17.	MD Reset provisions • Auto • Manual	
18.	Demand integration period	
19.	Load survey parameters recorded in meter	
20.	Billing parameters recorded in meter	
21.	Daily Midnight parameters recorded in meter	
22.	Communication Capability for • Local reading • On demand Remote reading	
23.	Facility of external CT/ VT error compensation	
24.	Anomaly detection features	
25.	Self diagnostics features	
26.	Magnetic immunity	
27.	Maximum nos of communication ports i.e. Optical, USB, RS232 etc.	

Annexure II(B): SPECIFICATION OF ABT meter with Class A POWER QUALITY measurement

Technical specification for accuracy class "0.2S" AC static Tri-vector energy meter with class "A" power quality measurement

1.0 SCOPE

1.1 This specification covers the design, engineering, manufacture, assembly, inspection and testing before supply and delivery at site/ FOR destination of class 0.2S accuracy along with this Class A conforming to latest edition of IEC 61000-4-30 HT tri-vector CT/ VT operated meter. The meters shall be used for commercial/ tariff metering for inter utility power flows/ bulk consumers as well for Availability Based Tariff (ABT) application.

Meter shall be suitable for power quality measurements, monitoring and recording as per latest international standards which shall support high sampling rate of 1024 samples/ cycle, extensive data logging capabilities, big intuitive display and high end communication capabilities. It shall have capabilities to capture, log and report PQ events, provide necessary data for analysis and assessment of power quality compliance to prevailing international standards.

1.2 The meter shall have wide secondary current range support i.e. same meter shall be put up for 1A or 5A rating as per field availability of CT's. The meter shall support 200% Ibasic. The meter shall supply in 3-phase 4-wire mode. However, provision shall be there to configure the meter in 3-phase 3-wire type, as & when required, through authenticated/secured command.

1.3 The metering system shall be housed in rack with draw out type feature capability for inserting the meter module. Current terminal connection must be automatically shorted when module is drawn out.

1.4 The meter shall be self-powered. The meter shall normally operate with the power drawn from the VT secondary circuits, without the need for any auxiliary power supply. However, there shall be provision of functioning of the meter with the help of auxiliary supply, both AC & DC. The power supply in self powered condition shall be from all the three phases of VT secondary, preferably equally, to ensure meter power supply when VT fuse(s) failures happen in one or two phases.

1.5 It is not the intent to specify completely herein all the details of the design and construction of material. The material shall, however, conform in all respects to the best industry standards of engineering, design and workmanship and shall be capable of performing for continuous commercial operation in a manner acceptable to the purchaser The offered equipment shall be complete in all respects including all components/ accessories for effective and trouble free operation according to the specifications. Such components shall be deemed to be within the scope of this specification irrespective of whether those are specifically brought out or not.

2.0 APPLICABLE STANDARDS

2.1 STANDARDS

The equipment shall conform (for testing, performance and accuracy) in all respects the relevant Indian/ International metering standards with latest amendments thereof unless otherwise specified.

IEC 61000-4-30 edition 3	Electromagnetic compatibility (EMC)-Testing and measurement techniques-Power quality measurement methods
IEC 62586-1	Product and performance requirements for PQ instruments
IEC 62586-2	Functional tests and uncertainty requirements
IEEE 519-2014	Recommended Practices and Requirements for Harmonic. Control in Electrical Power Systems.
EN 50160	Expected limits for the power quality parameters in a public distribution network.
IEC 61000-4-7	Measurement method and limits for harmonics and inter harmonics
IEC 61000-2-4	Limits for conducted disturbances for harmonics and inter harmonics
IEC 61000-3-8	Mains signaling voltage on the supply voltage for mains signaling frequencies over 3kHz
IEC61000-4-15	Flicker Measurement

IEC 62052-11	Electricity metering equipment (AC)-General requirements, tests and test conditions-Part 11: Metering equipment
IEC62053-22	Electricity metering equipment (AC) – Particular requirement –Static meters for active energy (class 0.2S and 0.5S)
IEC62053-24	Electricity metering equipment (AC) – Particular requirement Static meters for reactive energy (class 2 and 3)
IS 14697	AC static transformer operated Watt-hour and VAR-hour meters for class 0.2S
IS 15959	DLMS Indian Companion Standard – Category 'B' for Boundary/Bank/Ring/ABT Metering

3.0 CLIMATIC CONDITIONS

The meters to be supplied against this specification shall be required to operate satisfactorily and continuously under the following tropical conditions of hot, humid, dusty, rust and fungus prone environment.

i)	Max. ambient air température	: 55 ºC
ii)	Min. ambient air temperature	: (-) 5 ºC
iii)	Average daily ambient air temp	: 32 ºC
iv)	Max. Relative Humidity	: 95 %
v)	Max. Altitude above mean sea level	: 2000 m
vi)	limit range of operating	: (-)40ºC to +70 ºC
vii)	Storage temperature range	: (-)40ºC to +70ºC
viii)	Operating temperature range	: (-)20 to +60
ix)	Display operating temperature range	: (-)10 to +60

4.0 PRINCIPAL PARAMETERS

The energy meter shall be indoor type connected with the secondary side of outdoor current and voltage transformers and mounted in suitable panel/ cubicles.

S. No.	Item	Specification
1.	Type of Installation	Rack Type, Indoor/outdoor installation
2.	VT secondary	HV 3x110V/√3 V Phase to Neutral (3P4W) 3x110V V Phase to Neutral (3P3W) Variation -30% to +20%
3.	CT secondary	Ib: 1A, Imax: 2A or Ib: 5A, Imax: 10A Site configurable
4.	Power Supply	Self Powered Auxiliary AC/ DC Supply 60 to 230 V AC/DC, +/- 20%, 50/60 Hz
5.	System frequency	50 Hz +/- 5%

The meter should be suitable for working with above supply variations without damage and without degradation of its metrological characteristics.

5.0 TECHNICAL REQUIREMENTS

5.1 POWER FACTOR RANGE

The metering system shall be suitable for full power factor range from zero (lagging) through unity to zero (leading). The meter shall work as an active energy import and export meter along with reactive (lag and lead) meter. The energy measurement should be true four quadrant type.

5.2 ACCURACY

Class of accuracy of the metering system shall be 0.2S for energy measurement along with confirming to Class A as per IEC 61000-4-30 and IEC62586-2 (Edition 3). The accuracy should not drift with time.

5.3 POWER CONSUMPTION OF METER

The meter must be capable to operate with the power drawn from the Auxiliary Power supply (AC/DC) instead of Station VT power supply.

5.4 STARTING CURRENT

The meter should start registering the energy at 0.1% Ib and unity power factor.

5.5 MAXIMUM CURRENT

The rated maximum current shall be 200% of basic current (Ib) as per the configuration.

5.6 The meter shall work accurately irrespective of phase sequence of the mains supply.

5.7 GENERAL CONSTRUCTIONAL REQUIREMENTS

Meters shall be designed and constructed in such a way so as to avoid causing any danger during use and under normal conditions. However the following should be ensured:

i) Personnel safety against electric shock
ii) Personnel safety against effects of excessive temperature
iii) Protection against spread of fire
iv) Protection against penetration of solid objects, dust and water in normal working condition

All the materials and electronic power components used in the manufacturing of the meters shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy.

All insulating materials used in the construction of meters shall be non-hygroscopic, non-aging and of tested quality. All parts that are likely to develop corrosion shall be effectively protected against corrosion by providing suitable protective coating.

The metering system when mounted in panel shall conform to the degree of protection IP54 in the normal working condition for protection against ingress of dust and moisture.

5.8 SEALING

Proper sealing arrangement shall be provided as follows:

i) 2 nos. sealing arrangement at back side of the meter.
ii) 2 nos. sealing arrangement between meter and rack at front.
iii) 2 nos. sealing, back terminals of product with terminal cover

The sealing arrangement should be suitable for application of Polycarbonate seals.

5.9 MARKING OF METER

The marking on every meter shall be in accordance with IEC. The basic marking on the meter name plate shall be as follows:

i) Manufacturer's name and trade mark
ii) Serial Number
iii) Year of manufacture
iv) Type Designation
v) Number of phases and wires
vi) VT commissioning information
vii) CT commissioning information
viii) Reference frequency
ix) Accuracy Class

Additionally, following information shall also be available on name plate.

i) Property Of "Purchaser name"
ii) P.O. No. "Number"

5.10 The connection diagram of the connecting 3P4W/3P3W meter shall be depicted on meter. The meter terminals shall be properly marked to identify voltage, Current, Auxiliary and communication ports.

5.11 The meters shall be suitable for being connected directly through its terminals to VT's having a rated secondary line- to- line voltage of 110 V, and to CTs having a rated secondary current of 1A or

5A. Any further transformers/ transducers required for their functioning shall be in-built in the meters. Necessary isolation and/or suppression shall also be built-in, for protecting the meters from surges and voltage spikes that occur in the VT and CT circuits of extra high voltage switchyards.

5.12 The active energy measurement shall be carried out on 3 phase, 4 wire principle with an accuracy as per class 0.2S for active energy. The meters shall compute delta values of energies and store in the nonvolatile memory at each successive integration period block. The period should be configurable from 1 to 60 minutes. The instant parameter values shall be configurable to store in nonvolatile memory as well at each successive integration period block. It shall be configurable to select minimum/maximum/average/instant values to log for the instantaneous parameters.

5.13 The meter shall have Inputs/ Outputs pulsing pins availability. This shall help in transferring the same Energy parameters being recorded inside the meters on pulse output as well for SCADA application at remote distance. 4 pulse pins will be fixed for output functionality and 4 pulse pins can be configured for input or output functionality. Potential free pulse output shall withstands 6kV impulse.

5.14 The meter shall have Inputs/ Outputs pulsing pins availability. This shall help in transferring the same Energy parameters being recorded inside the meters on pulse output as well for SCADA application at remote distance. Pulse output shall be configurable for following power quality parameters and general parameters.

Power quality parameters at output	**General parameters at output**
High THD power	Energy pulse on channels
High harmonic voltage	End-of-SIP,DIP Pulse
High harmonic current	End-of-DIP pulse
Frequency healthy	Rate and MD register change
Phase wise Voltage THD (%)	Remote Control
Phase wise Current THD (%)	Average voltage healthy
Phase wise voltage healthy	All phase voltage healthy

6.0 POWER QUALITY AND ANOMALY DETECTION FEATURES

6.1 Power Quality Meter shall be Class A conforming to IEC 61000-4-30 edition 3

6.2 The meter shall have capability to detect and log power quality parameters as defined in IEC61000-4-30 as per the methods specified therein and as well complying with requirements of IEC 62586-2.

- Supply Frequency
- Magnitude of supply Voltage
- Magnitude of supply Current
- Flicker
- Voltage harmonics
- Current harmonics
- Voltage inter harmonics
- Current inter harmonics
- Over voltage deviation
- Under voltage deviation
- Voltage Unbalance
- Mains signaling voltage

6.3 The meter shall have feature to detect and log the occurrence and restoration of power quality events as defined in IEC61000-4-30 along with date and time of event.

- Voltage Sag or Dip
- Voltage Swell
- Interruption
- Rapid voltage change

6.4 The meter shall store following power quality parameters (10 minute aggregated values) data for analysis and meter shall store at least for 30 days.

- THD Voltage (phase wise)
- Flicker
- Supply Frequency
- Voltage unbalances (u2)
- Voltage harmonics L1 (2 to 25th)
- Voltage harmonics L2 (2 to 25th)
- Voltage harmonics L3 (2 to 25th)
- Current harmonics L1 (2 to 25th)
- Current harmonics L2 (2 to 25th)
- Current harmonics L3 (2 to 25th)
- L1 Flicker (Pst)
- L2 Flicker (Pst)
- L3 Flicker (Pst)

6.5 Waveform and RMS value capturing

For analysis, the meter shall have provision to log 10 cycle pre and post waveforms with RMS value for following events:

- Voltage Sag or Dip
- Voltage Swell
- Interruption

Software shall have provision of direction analysis of event as upstream and downstream

6.6 TDD and K-factor

The meter shall have provision for monitoring following:

- % TDD current phase wise
- K- factor
- Crest factor

6.7 Power quality compliance:

Meter shall have capability to log all the parameter required to generate compliance report as per EN50160 & IEEE 519. Limits should be configurable using configuration tool and this stored data in the meter shall be used to generate compliance report.

Meter shall also support the data required to generate ITIC curve using software.

6.8 Web server for remote display:

Meter shall have built in web server to enable viewing of basic Instantaneous parameters and cumulative energy registers data.

6.9 The meter shall have feature to detect and log the occurrence and restoration of anomalies along with date and time of event.

Following configurable events shall be provided in meter for which the persistence/restoration time can be configured through BCS:

- Over voltage
- Under voltage
- Current circuit open
- Current terminal shorting
- Reverse current direction (phase wise)
- Current missing (phase wise)
- Current unbalance
- Power fail
- Neutral Disturbance
- Magnet Interference
- Missing voltage (phase wise)
- Voltage unbalance
- Invalid Phase Association
- Invalid Voltage
- Feeder Supply Fail

Following quality parameter events shall be provided for which % occurrence/restoration limit and time can be configured through BCS:

- Phase wise Voltage THD
- Phase wise Current THD

Last thousand (1000) events (occurrence + restoration), in total, shall be stored in the meter memory on first in first out basis.

6.10 DISPLAY PARAMETERS

Meter display shall be Intuitive, easy to use and understand. The meter shall have minimum 4.3 inch graphical Color display with High resolution.

Meter shall support following display parameters:

1. Voltage (Phase wise)
2. Current (Phase wise)
3. Power (Phase wise)
4. Vector diagram
5. Voltage wave form (Phase wise)
6. Current wave form (Phase wise)
7. Voltage-Current wave form (Phase wise)
8. Voltage %THD (Phase wise)
9. Current %THD (Phase wise)
10. Current %TDD (Phase wise)
11. Voltage harmonic for 3rd order (phase wise)
12. Voltage harmonic for 5th order (phase wise)
13. Voltage harmonic for 7th order (phase wise)
14. Current harmonic for 3rd order (phase wise)
15. Current harmonic for 5th order (phase wise)
16. Current harmonic for 7th order (phase wise)
17. Instant voltage harmonic graphical trend up to 50th order (Phase wise)
18. Instant current harmonic graphical trend up to 50th order (Phase wise)
19. Flicker (phase wise)
20. Voltage crest factor (Phase wise)
21. Current crest factor (Phase wise)
22. Voltage deviation (Under & Over)
23. Voltage unbalance (% value)
24. Current unbalance (% value)
25. Main Signaling voltage
26. Voltage sequence component
27. Current sequence component
28. Cumulative active energy import
29. Cumulative active energy export
30. Cumulative net active (Import – Export) energy
31. Cumulative reactive energy lag while active import
32. Cumulative reactive energy lead while active import
33. Cumulative reactive energy lag while active export
34. Cumulative reactive energy lead while active export
35. Cumulative apparent energy (while active import)
36. Cumulative apparent energy (while active export)
37. Cumulative Reactive High energy
38. Cumulative Reactive Low energy
39. Last block average of active import energy
40. Last block average of active export energy
41. Last block average of the net active (Import – Export) energy
42. Last block average frequency
43. Maximum demand apparent (while active import) for current month (0-24 hrs)
44. Maximum demand apparent (while active export) for current month (0-24 hrs)
45. Cumulative active import energy reading of predefined date and time for monthly billing purpose
46. Cumulative active export energy
47. Cumulative net active (Import – Export)
48. Cumulative apparent energy (while active import)

49. Cumulative apparent energy (while active export)
50. Maximum demand for apparent (while active import)
51. Maximum demand for apparent (while active export)
52. Total event count
53. Present event status
54. Time of last restoration of event
55. Date of last restoration of event
56. Meter information
57. Configuration page for network setting

6.11 Active and Apparent energies shall also be made available by meter in separate energy registers as:

i) Active energy Import total
ii) Active energy Export total
iii) Active energy Import fundamental
iv) Active energy Export fundamental
v) Active energy import total (phase wise)
vi) Active energy export total (phase wise)
vii) Net active energy
viii) Apparent energy (while active import)
ix) Apparent energy (while active export)

6.12 The reactive energy shall also be available in eight different registers as-

i) Reactive import while active import
ii) Reactive import while active export
iii) Reactive export while active import
iv) Reactive export while active export
v) Reactive import
vi) Reactive export
vii) Reactive inductive
viii) Reactive capacitive
ix) Net reactive energy
x) Net Reactive high and low
xi) Reactive high import and export

6.13 Meter shall have provision to compute apparent energy based on lag only or lag+lead. The same shall be configured at factory end.

6.14 For reactive power and reactive energy measurement, limits of errors all the four quadrants shall be in accordance to IEC 62053-23 and IEC62053-24.

6.15 The metering system shall normally operate with the power drawn through the auxiliary AC or DC supply. The metering system design should enable the auxiliary supply to be switched automatically between the AC and DC voltage, depending upon their availability.

6.16 Meter shall have a built-in calendar and clock, having an accuracy of <2 min/year or better. The calendar and clock shall be correctly set at the manufacturer's works.

6.17 **TOD (Time of day registers):** The meter shall have TOD registers for below energies and MD values:

i) Active energy Import total
ii) Active energy Export total
iii) Active energy Import fundamental
iv) Active energy Export fundamental
v) Apparent energy (while active import)
vi) Apparent energy (while active export)
vii) Reactive import while active import
viii) Reactive import while active export
ix) Reactive export while active import
x) Reactive export while active export

Meter shall have support of eight configurable demand registers. It shall be possible to program number of TOD registers and TOD timings through suitable high level software/ MRI as an authenticated transaction.

6.18 **Display sequences**: Meter shall have color graphical display. The meter shall have all screens by default in manual sequences; user can configure auto screens using manual button / software. Meter shall have provision to configure favorite page with the screens available in manual mode. The cycling delays shall be configurable. The configuration option shall be available in the meter with password protection.

The display shall indicate direct values (i.e. without having to apply any multiplying factor) of measured/ computed parameters as per the meter commissioning. It should be possible to easily identify the single or multiple displayed parameters through legends on the metering system display.

6.19 **Data loggers (Load survey):** Meter shall have a non-volatile memory with two individual loggers to store the delta energy values, instantaneous parameter and power quality data values for each successive configurable integration period block. The integration period shall be configurable for each logger. It can be configured for 5, 15, 30 or 60 Minutes.

Minimum 60 days with 5 minute interval shall have support in meter.

Following parameters shall have provision for logging:

a) Energy parameters
b) Voltage (Phase wise)
c) Current(Phase wise)
d) Phase voltage
e) Line Voltage
f) Frequency
g) Power factor (Phase wise)
h) Power factor (Phase wise)
i) Phase angle (Phase wise)
j) Voltage THD (Phase wise)
k) Current THD (Phase wise)
l) Power THD (Phase wise)
m) Voltage harmonic up to 50th order (Phase wise)
n) Current harmonic up to 50th order (Phase wise)
o) Voltage inter- harmonic up to 50th order (Phase wise)
p) Current inter- harmonic up to 50th order (Phase wise)

The instantaneous parameters can be configured for minimum/maximum/average or instant values for the configured integration period.

It shall be possible to select either energy or demand view at Base Computer Software (BCS) end. The logger data shall be available in the form of bar charts as well as in spreadsheets. The BCS shall have the facility to give complete time synchronized load survey data both in numeric and graphic form.

6.20 **Daily snapshot parameters**: The meter shall store the snapshot (or value) of configured parameters (out of 28 energy parameters) at configured time for last hundred 65 days. The BCS will provide facility to configure the parameters and time.

6.21 **Data Communication Capability**: The metering system shall have following communication ports for local/remote reading. All the communication channels shall be capable of simultaneous and independent communication.

- IEC1107 optical port
- RS232 port (for remote communication or dedicated to Modem)
- RS485 port (should be configurable on DLMS/MODBUS)
- Ethernet port (DLMS TCP/MODBUS TCP)
- USB (micro B connector) for meter reading or configuration through Laptop or Tab device.

6.22 Meter shall have provision for PQDIF (Power Quality Data Interchange Format) for integration with any power quality analysis and reporting software. It shall have minimum provision of following power quality data:

- PQ events (Sag, Swell and Interruption)
- Voltages phase wise (10 min aggregation parameters)
- THD Voltages phase wise (10 min aggregation parameters),
- Voltages unbalance (10 min aggregation parameters)

6.23 Meter shall have a unique identification code i.e. serial number, which shall be marked on name plate as well as in its memory. Further all meters of the same model shall be totally identical in all respects except for their unique identification codes.

6.24 Meter shall have a non-volatile memory in which the parameters as mentioned in this specification shall be stored. The non-volatile memory shall retain the data for a period not less than 10 years under un-powered condition; battery backup memory shall not be treated as NVM.

6.25 Meter shall have the capability and facility to compensate for errors of external measurement transformers i.e. CT and VT:

i. Linear compensation for measurement CT/VT errors (ratio and phase); there shall be linear adjustment which shall be applied across the complete measurement range of the transformer.

ii. Non-linear compensation for measurement CT errors (ratio and phase) compensation; this shall allow multiple ratio and phase adjustments to be applied for different load points per phase input of the meter.

7.0 Software package

Software should be support with a powerful multi-user web-based over intranet software package to configure and setup the power quality meter. In addition, the software should provide tools for analysing the measured data. Generally, the following capabilities should be maintained by the software packages:

- EN 50160 reports/Customized limits report
- IEEE 519 (2014) report
- PQ report
- BIS PQ report

8.0 TEST CERTIFICATES

- Power quality compliance certificate as per IEC 61000-4-30 Ed. 3, IEC62586-2 (Class-A)
- Type test report (IS 14697)
- DLMS ICS compliance (IS 15959)

GURANTEED TECHNICAL PARTICULARS

S.N	Technical Specification Requirements	
1.	Manufacturer's name & Country	
2.	Type of Meter	
3.	Name and model no. of offered product	
4.	Standards to which meter complies	
5.	Power quality Class	
6.	Accuracy class	
7.	Metrology indicator provided on meter and switching facility for reactive & apparent energy	
8.	Voltage and frequency range	
9.	Maximum current	
10.	Variation of voltage at which system functions normally	
11.	Minimum Starting current	
12.	P.F. range	
13.	Power consumption per phase • Voltage Circuit • Current Circuit	
14.	AC and DC Auxiliary supply ratings for powering up the metering system	
15.	Sealing arrangement	
16.	Size (W x H x D) in mm	

	Weight Mounting	
17.	Digital input/output	
18.	Communication ports i.e. Optical, USB, RS232, RS485 and Ethernet etc.	
19.	Communication protocol	
20.	IEC 61850	
21.	IEEE 1159.3 (PQDIF)	
22.	HTTP web server	
23.	EN 50160 - PQ report	
24.	Sampling rate	
25.	Data update rate	
26.	Time syncing options	
27.	Memory	
28.	Anti-alias filter provision	
29.	Power quality parameters: • ***Supply Frequency*** • ***Magnitude of supply Voltage & Current*** • ***Flicker*** • ***Voltage & Current harmonics*** • ***Voltage & Current inter harmonics*** • ***Over & Under voltage deviation*** • ***Voltage Unbalance*** • ***Mains signaling voltage***	
30.	Fixed power parameter logger:	
31.	Power quality Events: (with 10 cycle pre and post waveforms with RMS value)	
32.	***TDD, K-Factor and Crest factor***	
33.	Power quality displays • ***Flicker*** • ***Voltage crest factor*** • ***TDD*** • ***K-factor*** • ***Crest factor*** • ***Current sequence component*** • ***Mains signaling voltage*** • ***PQ frequency*** • ***Voltage unbalance ratio*** • ***Current unbalance ratio*** • ***Voltage deviation*** • ***Voltage sequence component*** • ***Voltage harmonics*** • ***Current harmonics*** • ***THD***	
34.	Trends (up to 50th order) on meter display	
35.	Individual Harmonics (both Voltage and Current): Up to 50th order	
36.	Two independent Loggers Configurable for interval 1, 5, 10, 15, 20, 30 or 60 Minutes.	

37.	Anomaly detection features	
38.	IS15959 compliance and category	
39.	Energy parameters recorded in meter	
40.	ABT compatibility	
41.	TOD compatibility	
42.	MD Reset provisions: Auto or Manual	
43.	Demand integration period	
44.	Energy parameters for Loggers, Billing and Midnight	
45.	Facility of external CT/ VT error compensation	

Annexure III : Specification of DAS and DCU/Gateway

Specification of DCU/Gateway and Data acquisition system (DAS) module

Intent of DAS

The intent of DAS scheme is to automate the task of energy meter data collection from each meter/location from the Central Data Centre (CDC) followed by meter data validation, processing and generation of customized reports and integration with other modules. Collected data should be stored in database central data centre. DAS module should have following different capabilities to cater the requirements.

1. Communication with meters and DCU/gateway
2. Event notification and alarming
3. DCU/Gateway functional specification
4. DCU/Gateway hardware specification

Detailed working features of each function are described in the following sections:

1. Communication with meters and DCU/gateway

1. Data acquisition module should be capable to get the meter data directly from meters or via DCU/gateway for selected/configured metering location periodically on schedule basis.
2. All boundary meters at each substation having RS485 or TCP/IP port (preferred with TCP/IP port, if available in meter) should be connected to the LAN switches to make the network and finally connected to the DAS system installed at CDC through DCU/gateway therefore software must be able to support all data reading from each type of feeder meters (viz. instantaneous, energy, load survey, event etc.) with time stamping read using MODBUS/DLMS protocol at hourly reading frequency (user configurable to daily/weekly).
3. Gateway should have further facility to connect to the DAS server at CDC either through cellular 2G/3G/4G communication media or via dedicated OFC/MPLS network.
4. DCU/Gateway should be responsible to collect the data from meters and sent same to DAS server at CDC. DCU should also be responsible to send the data to the local system installed at each substation for the purpose of local substation meter data monitoring.
5. DAS application after collection of data from DCU, should store the data into database like SQL/Oracle at CDC.
6. Communication of data transfer from DCU/Gateway to DAS server at CDC should be encrypted and secure.
7. DCU/gateway configurations and re-configurations should be managed from central data centre like reading frequency, reading schedule change etc. through web portal.
8. DAS should have the facility to fill the non read meter data via some auto fill mechanism so that 100% data of 5/15min. load profile parameters for billing purpose can be acquired. Missing data filling process via DLMS should be auto scheduling as per the availability of the network communication media.
9. DAS application should be web based (intranet) application to be accessed through user id and pwd from the network connected with the CDC server over intranet.
10. DAS system should implement highly efficient WAN data transfer protocol (as used by global IT companies) to CDC which reduces bandwidth requirements, hardware requirements and enhances reliability.
11. Software should be able to consider the configuration changes like CT/PT ratios, meter change etc. for accurate analysis reports.
12. Software should also have a built-in mechanism for data backup and cleaning, with retrieval mechanism for configurable number of days.
13. **Time synchronization:** DCU/gateway shall be able to auto sync regularly from the CDC server which will further connected to the reliable time reference like GPS clock and NTP server and then DCU/Gateway shall be able to auto sync the meter clock time (if the time difference lies between minimum and maximum threshold value of the time difference) on a predefined frequency.

2. Event notification and alarming

1. DAS system should have the provision to send the notification of any identified events like

a. High/low limit violation of instantaneous parameters
b. Limit violation alarms for virtual groups also
c. Events logged by the meter
d. Communication failure

2. At the time of any event occurrence, it should generate a visual alarm on the screen of monitoring software at data centre. Notification may include email and recipients should be pre-configurable according to the utility to one/multiple users.
3. Software should be able to maintain all generated alarm history which can be seen by user based on the selection criteria.

3. DCU/gateway functional specification

1. DCU firmware shall be developed on Linux platform and compatible to Linux kernel 4.X series.
2. DCU/Gateway should be capable to acquire meter data from different protocols i.e. MODBUS, DLMS over different communication ports i.e. RS485 and ethernet.
3. DCU/Gateway should be capable to acquire all type of meter data like Instantaneous parameter at the time of collection, energy data, Load survey profiles, event data, midnight energy data and Date & time of collection of data
4. DCU/Gateway should be capable to transfer the complete meter data to central data centre using MPLS/OFC/VSAT and 2G/3G/4G communication media.
5. DCU/Gateway should support multithreading acquisition on ethernet port as well as simultaneous acquisition on each serial port.
6. DCU/Gateway should be capable to have dual SIM option for redundancy and auto switching from one SIM to another SIM shall be available.
7. DCU/Gateway should have non-volatile memory for storing meter data for 30 days for FIFO buffer mode.
8. DCU/Gateway shall be able to communicate to the local server for substation local monitoring as well to the DAS server at CDC. DCU shall have the capability to transfer the meter data from local substation to CDC as per defined schedule and automatic retries for unsuccessful file transfer cases.
9. DCU/Gateway should have
   a. Number of meter connected per TCP/IP port over modbus channel at 9600 baud rate –
   - 30 (max) in case of 5min. polling for 5 parameters
   - 50 (max) in case of 15min polling and >10 parameters.
10. The DCU/gateway shall support on demand meter reading function also. On demand meter reading can be executed either locally through local application or remotely through CDC end application whenever required. On demand reading can be executed for meter reading from any meter connected to the DCU/gateway irrespective of meter protocol and communication port.
11. **DCU/Gateway data transfer:** The DCU/gateway should be able to communicate through the 3G/4G communication, specifications defined below:
    a. Supported GSM/GPRS/EDGE : Quad Band 850/900/1800/1900 MHz
    b. SIM Lock Function – Yes
12. **Remote configuration:** DCU/gateway should have the facility to upgrade the firmware version over WAN communication network using proper authentication through DOTA (download over the air) process. It should also be possible to configure DCU/gateway in single or batch mode.

4. DCU/gateway hardware specification

DCU/gateway package should have two separate module i.e. power supply module and Gateway/DCU module.

Power supply for DCU/Gateway	
Input Voltage Range	Input:

		100 - 270 V AC (± 10%), 0.2A max 110 – 240 V DC (± 10%), 0.2A max Output: 5.2V @ 1A (Input 48V DC to 5V DC output compatible)
Mounting		Wall / DIN
Ingress protection		IP 54
Certification		**EMC:** *Draft EN 301-489-1, Draft EN 301-489-17, Draft EN 301-489-52, EN 55032 (Class B), EN 61000-3-2, EN 61000-3-3* **Immunity:** *Draft EN 301-489-1, Draft EN 301-489-17, Draft EN 301-489-52, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5* *EN 61000-4-6, EN 61000-4-11* **Safety:** *EN 62368-1: 2014 (Second edition)*
Gateway/DCU		
Mechanical	Mounting	Wall / DIN
	Ingress Protection	IP 54
	Power connection	Input: 5.2V at 1A max. over Modular DC Jack
	Enclosure material	PC-FR (Ploy-carbonate flame retardant grade)
Communication	Ethernet	1 x RJ45, 10/100 Mbps / 6kV isolation from AC mains, IPV4/IPV6
	RS 485	2 x RS 485 half duplex / 6kV isolation from AC mains
	4G / 3G / 2G	Dual Nano SIM – with auto SIM switching, 4G fallback to 3G / 2G / Operating voltage 1.65 to 3.3V DC GSM/GPRS/EDGE: Quad Band 850/900/1800/1900 MHz
General features	Processor	528 MHz, Single core ARM Cortex A7
	Storage	NAND Flash - 512 MB / SDRAM - 256 MB
	User Interface	2 x Push buttons
	LED	2 x Bi Color LED (for device health and network health)
	RTC	Internal Digital temperature compensated Real time clock (battery back)
Environmental	Operating Temperature range	-10 to 55^{0}C
	Extended Temp. range	-20 to 70^{0}C
	Storage Temperature	-20 to 80^{0}C
	Relative Humidity	95%, non-condensing
	Vibration	up to 2g
Operating system	Linux	Linux OS
	Protection features	Temperature protection: Over two trip points, Trip0 @ 85 Deg. And Trip1 @ 105 Deg. / Inbuilt Watch dog timer
Certification	EMC / Immunity	**EMC:** *Draft EN 301-489-1, Draft EN 301-489-17, Draft EN 301-489-52* *EN 55032 (Class B), EN 61000-3-2, EN 61000-3-3* **Immunity:** *Draft EN 301-489-1, Draft EN 301-489-17, Draft EN 301-489-52* *EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5* *EN 61000-4-6, EN 61000-4-11* **Radiated Spurious emission :** *ETSI EN 301-908-1, 3GPP TS 51.010-1*
	Safety	**Safety:** *EN 62368-1: 2014 (Second edition)*
Accessories	Antenna	2 nos. Whip Antenna

Annexure - 2

Details of commissioned elements for FY 2020-21

Sl.	As per DOCO Certificate	As per buisiness plan
1	220kV Mokama - Biharshariff Ckt - 1	LILO of 220kV D/C Biharsharif - Begusarai TL at Hathidah New
2	220kV Mokama - Biharshariff Ckt - 2	
3	220kV Mokama - BTPS Ckt - 1	
4	220kV Mokama - BTPS Ckt - 2	
5	132kV Mokama - Hathidah Ckt - 1	132kV D/C Hathidah New - Hathidah TL
6	132kV Mokama - Hathidah Ckt - 2	
7	220/132kV, 160 MVA ICT II at Mokama	220/132/33 kV Hathidah New GIS
8	132/33kV, 80 MVA ICT - II at Mokama	
9	220 kV Dumraon New - Nadokhar Ckt - I	LILO of 220 KV D/C Ara (PG) - Pusauli TL at Dumraon (New)
10	220 kv Dumraon New - Ara (PG) Ckt - I	
11	220 kV Dumraon New - Nadokhar Ckt - II	
12	220 kV Dumraon New - Ara (PG) Ckt - II	
13	220/132 kV, 160 MVA ICT-I	220/132/33 kV Dumraon New GIS
14	132/33 kV, 80 MVA ICT-I	
15	132 kV Dumraon New - Dumraon Old Ckt II	132 kV D/C Dumraon New - Dumraon Old TL with ACSR Zebra Conductor

Annexure - 3

Type	Transmission element	Expected DOCO	Hard Cost (in Cr.)	IDC (in Cr.)	IEDC (in Cr.)	Soft Cost (In Cr.)	Total Cost (In Cr.)
	FY 2020-21 (True up)						
Phase IV (Part 1)							
Transmission Line	**LILO of 220 kV D/C Biharsharif (BSPTCL) - Begusarai (BSPTCL) at Mokama TL**						
Transmission Line	LILO Portion 220 kV D/C Line _ Mokama (BGCL) - Biharsharif (BSPTCL) Circuit 1	20-09-2020	1.90	0.16	0.13	0.29	2.19
Transmission Line	LILO Portion 220 kV D/C Line _ Mokama (BGCL) - Biharsharif (BSPTCL) Circuit 2	20-09-2020	1.90	0.16	0.13	0.29	2.19
Transmission Line	LILO Portion 220 kV D/C Line _ Mokama (BGCL) - BTPS (Begusarai) Circuit 1	20-09-2020	1.90	0.16	0.13	0.29	2.19
Transmission Line	LILO Portion 220 kV D/C Line _ Mokama (BGCL) - BTPS (Begusarai) Circuit 2	20-09-2020	1.90	0.16	0.13	0.29	2.19
Transmission Line	132 kV D/C Line _ Mokama (BGCL) - Hatidah (BSPTCL) Circuit 1	24-09-2020	4.62	0.40	0.31	0.71	5.33
Transmission Line	132 kV D/C Line _ Mokama (BGCL) - Hatidah (BSPTCL) Circuit 2	24-09-2020	4.62	0.40	0.31	0.71	5.33
Sub Station	220/132 kV 160 MVA Transformer-2 of GIS, Mokama (Hathidah New)	24-09-2020	7.06	0.54	0.48	1.02	8.08
Sub Station	132/33 kV 80 MVA Transformer-2 of GIS, Mokama (Hathidah New)	01-10-2020	5.06	0.39	0.34	0.73	5.79
Sub Station	GIS - 220 kV / 132 kV / 33kV_Mokama (Hathidah New)	01-10-2020	93.42	8.02	6.35	14.37	107.80
Bay Extension	Hatidah Bay Extension (2 x 132 kV Bay AIS)	24-09-2020	4.52	0.39	0.31	0.70	5.22
Phase IV (Part 2)							
Transmission Line	**LILO of 220 kV D/C Ara (PG) - Nadokhar (BSPTCL) at Dumraon New TL**						
Transmission Line	LILO Portion 220 kV D/C Line_Ara (PG) - Dumraon New (BGCL) Ckt-I	13-12-2020	6.34	0.48	0.13	0.62	6.95
Transmission Line	LILO Portion 220 kV D/C Line_Ara (PG) - Dumraon New (BGCL) Ckt-II	13-12-2020	6.34	0.48	0.13	0.62	6.95
Transmission Line	LILO Portion 220 kV D/C Line_Nadokhar (BSPTCL) - Dumraon New (BGCL) Ckt-I	13-12-2020	6.34	0.48	0.13	0.62	6.95
Transmission Line	LILO Portion 220 kV D/C Line_Nadokhar (BSPTCL) - Dumraon New (BGCL) Ckt-II	13-12-2020	6.34	0.48	0.13	0.62	6.95
Transmission Line	132 kV D/C Line_Dumraon New (BGCL) - Dumraon (BSPTCL) Ckt-II	10-01-2021	7.79	0.59	0.16	0.76	8.55
Sub Station	GIS - 220 kV / 132 kV / 33kV_Dumraon New	10-01-2021	84.89	6.47	1.78	8.25	93.14
Sub Station	220/132 kV 160 MVA Transformer-1 of GIS, Dumraon New	01-01-2021	6.83	0.52	0.14	0.66	7.50
Sub Station	132/33 kV 80 MVA Transformer-1 of GIS, Dumraon New	10-01-2021	4.74	0.36	0.10	0.46	5.20
Bay Extension	Dumraon Bay Extension (2 x 132 kV Bay AIS)	10-01-2021	5.75	0.44	0.12	0.56	6.31
Total			**262.29**	**21.09**	**11.47**	**32.56**	**294.85**

Annexure-3

Annexure-4

Statement of IDC 2020-21

Part-2

Finance Cost	Total	Transferred to O&M	Transferred to IDC
2 Interest From Bank	-4,91,17,852.00	-3,58,41,297.00	-1,32,76,555.00
2 Interest on advance to supplier/contractor	-59,89,195.00	-43,70,316.00	-16,18,879.00
Interest on Loan	67,80,46,359.00	49,47,70,428.00	18,32,75,931.00
Adjustment of interest	-19,43,512.00	0.00	-19,43,512.00
	62,09,95,800.00	**45,45,58,815.00**	**16,64,36,985.00** (PFC)

Part-1

Finance Cost	Total	Transferred to O&M	Transferred to IDC
Interest on Loan	1,32,06,26,422.00	1,13,01,92,092.00	19,04,34,330.00
Interest From Bank	-1,23,77,513.00	-1,05,92,676.00	-17,84,837.00
Interest From Others.	-17,55,470.00	-15,02,331.00	-2,53,139.00
Interest on advance to supplier/contractor	-29,86,265.00	-25,55,646.00	-4,30,619.00
	1,30,35,07,174.00	**1,11,55,41,439.00**	**18,79,65,735.00** (REC)

Annexure-4

Annexure - 5

BIHAR GRID COMPANY LIMITED
NOTE 3 - Capital Work-in-Progress

In ₹ (Rupees)

Particulars	As at 01.04.2020	Additions during the year	Adjustments	Reallocated	Capitalised during the year	As at 31.03.2021
Part-2						
Crop Compensation	10,51,59,178	9,22,96,695	-	-	1,45,89,856	18,28,66,017
CWIP - IDC	24,80,63,657	16,64,36,985	-	-	11,23,32,565	30,21,68,077
CWIP - Transformers.	18,67,03,951	72,09,68,330	-	-	11,57,59,100	79,19,13,181
Tree Compensation	6,88,716	19,40,250	-	-	2,82,305	23,46,661
CWIP - Insulators	1,54,12,827	3,92,71,479	-	-	71,11,592	4,75,72,714
CWIP- Ind AS	-1,96,07,020	-1,27,63,154	-	-	-	-3,23,70,174
CWIP - Conductors & EW	31,14,30,010	28,88,85,503	-	-	11,20,79,020	48,82,36,493
CWIP - IEDC.	61,60,30,944	7,21,18,679	-	-	3,66,73,483	65,14,76,140
CWIP-Substation/Bays	1,29,94,56,809	1,94,12,20,947	-	-	90,64,60,237	2,33,42,17,519
CWIP -Towers	1,08,07,67,416	50,51,77,752	-	-	19,74,08,317	1,38,85,36,851
Part-1						
Crop Compensation	6,16,72,751	1,59,08,894	-	-	76,47,809	6,99,33,836
CWIP - Conductors & EW	11,43,58,452	-0	-	-	2,52,36,983	8,91,21,469
CWIP - IDC.	47,55,84,272	18,79,65,735	-	-	9,85,37,791	56,50,12,216
CWIP - IEDC.	7,98,01,400	2,54,59,128	-	-	7,80,58,828	2,72,01,700
CWIP - Ind AS	-1,34,98,414	39,68,896	-	-	-	-95,29,518
CWIP - Insulators	2,47,07,754	-	-	-	76,80,483	1,70,27,271
CWIP-Substation/Bays	5,87,78,367	92,34,34,281	-	-	97,94,55,318	27,57,330
CWIP -Towers	14,01,37,171	1,08,43,046	-	-	12,79,03,339	2,30,76,878
CWIP -Transformers	-	12,17,84,072	-	-	12,12,64,462	5,19,610
Tree Compensation	11,03,168	2,00,980	-	-	-	13,04,148
	4,78,67,51,409	**5,10,51,18,498**	-	-	**2,94,84,81,488**	**6,94,33,88,419**
Part-2						
Constn.Stores with Contractors-Station Materials	2,04,58,88,447	-	1,37,91,65,768	-	-	66,67,22,679
Constn.Stores with Contractors- Towers	31,54,71,098	-	30,33,55,598	-	-	1,21,15,500
Const. Stores - In Transit	-	11,50,23,867		-	-	11,50,23,867
Const.Stores With Contractors-Conductors&EW	34,90,42,324	-	9,44,30,630	-	-	25,46,11,694
Const.Stores With Contractors - Insulators.	4,40,87,206	-	2,37,22,628	-	-	2,03,64,578
Const. Stores with Contractors-Transformers	33,84,83,791	-	20,47,96,547	-	-	13,36,87,244
Part-1						
Constn.Stores with Contractors-Station Materials	18,48,16,865		18,45,15,678	-	-	3,01,187
Constn.Stores with Contractors- Towers	4,93,29,902	1,40,02,461	-	-	-	6,33,32,363
Const. Stores - In Transit.	-	-	-	-	-	-
Const.Stores With Contractors-Conductors&EW	3,70,37,274	4,05,31,010	-	-	-	7,75,68,284
Const.Stores With Contractors - Insulators.	2,09,92,739	1,25,44,005	-	-	-	3,35,36,744
Const. Stores with Contractors-Transformers	-	-	-	-	-	-
	3,38,51,49,646	**18,21,01,343**	**2,18,99,86,849**	-	-	**1,37,72,64,140**
Total	**8,17,19,01,055**	**5,28,72,19,841**	**2,18,99,86,849**	-	**2,94,84,81,488**	**8,32,06,52,559**

Annexure - 5

Annexure -6

WAROD computation

Opening GFA as per Audited Accounts	1,781.99
Opening land	58.10
Net opening depreciable assets	1,723.90
Depreciation of opening depreciable assets	85.64
Weighted average rate of depreciation on opening assets	4.97%
addition to Depreciable GFA (excluding land)	297.03
Depreciation on asset additions during the year	9.76
Weighted average prorate depreciation on asset additions during the year	3.29%

Annexure-8

Statement of Loan					
Loan	Opening Balance	Drawl of Loan	Conversion of interest on Loan	Total	Utilised for the payment of vendor bills
Part-1	11,88,04,80,136.00	1,06,36,36,534.00	-	12,94,41,16,670.00	1,06,36,36,534.00
Part-2	5,91,52,17,985.00	1,70,00,00,000.00	63,22,14,896.00	8,24,74,32,881.00	1,70,00,00,000.00

Annexure- 9A

पावर फाइनेंस कॉर्पोरेशन लिमिटेड
POWER FINANCE CORPORATION LTD.
(भारत सरकार का उपक्रम) (A Govt. of India Undertaking)
(आई.एस.ओ. 9001:2015 प्रमाणित) (ISO 9001:2015 Certified)

Loan No. 88502001
Speed Post/ Courier

No. 03/22/CSP&C/Bihar/BGCL/Patna/Vol.I/88502001 01.01.2018

Shri T. Pandey
Managing Director
Bihar Grid Company Limited (BGCL),
2nd floor, Alankar Place, Boring Road
Patna - 800001

Sub: BGCL - Loan No. 88502001 - Financial assistance for Strengthening of Transmission System under (Phase – IV, Part-II) for construction of 16 nos. of transmission line (400kV, 220 kV, 132kV), 4 nos. of substation and 7 nos. of line bay extension work in Bihar.

Ref: BGCL's request for financial assistance vide letter no. JV/PT/BG/1623 dated 01.11.2017.

Dear Sir,

With reference to Bihar Grid Company Ltd.'s (BGCL) letter referred above and subsequent correspondence regarding financial assistance for **Transmission Strengthening work under (Phase-IV, Part-II) for construction of 16 nos. of transmission line, 4 nos. of sub-station and 7 nos. of line bay extension works in Bihar *(Details attached as Annexure – I)*** involving total estimated cost of ₹ 1688.36 Cr, we are pleased to advise that we are generally agreeable to advance a loan of **₹ 1350. 69 Cr. (Rupees One Thousand Three Hundred Fifty Crore and Sixty Nine Lakh only) (i.e. 80% of the present estimated project cost)** for this project **(Loan no. 88502001).** The loan shall be subject to the terms and conditions given in the attachment to this letter and also the terms and conditions as are laid down in the Memorandum of Agreement (MoA) to be executed between Power Finance Corporation Ltd (PFC) and BGCL. A format of MOA is enclosed.

We request you to communicate your acceptance within one month from the date of this letter to avail the above loan on the said terms and conditions.

The following documents (in the prescribed formats) shall be required at the time of execution /disbursement of loan as per PFC policy applicable:

A. Documents required at the time of execution/signing of loan documents (to be submitted to L&D unit of PFC)

1. Extract of Board Resolution, duly attested by the Secretary/Company Secretary, accepting the loan on the terms and conditions of PFC and authorizing an officer to accept and agree to said terms and conditions and execute the relevant loan documents / undertakings etc.
2. Resolution under section 180 (1) (a) and 180 (1) (C) of the Companies Act, 2013, duly attested by Company Secretary (applicable to entities registered under Indian Companies Act).
3. Specimen signatures of authorized signatory duly attested by Secretary/Company Secretary.

पंजीकृत कार्यालय : "ऊर्जानिधि", 1, बाराखंबा लेन, कनॉट प्लेस, नई दिल्ली - 110001 दूरभाष : 23456000 फैक्स : 011-23412545
Regd. Office : "Urjanidhi", 1, Barakhamba Lane, Connaught Place, New Delhi-110001 Phones : 23456000 Fax : 011-23412545
वेबसाईट / Website : www.pfcindia.com • CIN : L65910DL1986GOI024862

मनोज शर्मा / MANOJ SHARMA
महाप्रबन्धक (विधि एवं दस्तावेज) / General Manager (L&D)
पावर फाइनेंस कॉर्पोरेशन लि. / P.F.C. Ltd.
"ऊर्जानिधि", 1, बाराखंबा लेन, कनॉट प्लेस

राजेश श्रीवास्तव / RAJESH SRIVASTAVA
निदेशक (परियोजना) / Director (Projects)
बिहार ग्रिड कम्पनी लिमिटेड / BIHAR GRID COMPANY LIMITED
द्वितीय तल, आलंकार प्लेस, बोरिंग रोड, पटना - 800 001
2nd Floor, Alankar Place, Boring Road, Patna - 800 001

4. Certificate of compliance of laws, bye-laws, etc. applicable to the borrower- to be issued by the Company Secretary/ Secretary of the borrower, as the case may be.
5. Certificate from the Company Secretary / Statutory Auditors of the Borrower that the borrowing is within the borrowing limits with details thereof.
6. Certificate in prescribed format that the borrower shall continue to be the owner and in physical possession of the project till the outstanding loan amount is fully liquidated.
7. Certificate from the borrower, in the prescribed format, that the borrower has received a copy of Operational Policy Statement (OPS) of PFC and confirming that the borrower is aware of the terms and conditions of OPS which shall also apply to this loan.
8. Quarter-wise drawal schedule.

B. Documents required at the time of disbursement of loan:

1. Security documents in the prescribed format for creation of charge on assets.
2. Materials and equipment schedule, in the prescribed format, for the project/scheme to be financed under the loan.

In addition to above the borrower shall furnish all other documents as may be required in terms of loan.

Your kind attention is invited to clause 18.0 of Terms and Conditions of sanction, which reads as under:-

"The sanction of loan accorded in terms of this sanction letter will stand cancelled if the Borrower fails to execute the complete documents (i.e., MOA along with documents required before or at the time of execution of MOA) within a period of six months from the date of sanction letter. The Corporation may, in exceptional cases, agree to extend the aforesaid period of six months, for such further period as it may deem appropriate if the Borrower makes an application to the Corporation before expiry of initial six months period, duly supported by the reasons for such extension."

Thanking you,

Yours faithfully,
for POWER FINANCE CORPORATION LTD.

01/01/2018
(Subbash Chandra)
GM-I (Projects-CSP&C, ER&NER)

Encl: As above

Copy for information to:

i. MD, BGCL
ii. CFO, BGCL
iii. ED (SEA), PFC- along with a copy of terms and conditions.

मनोज शर्मा / MANOJ SHARMA
महाप्रबंधक (वित्त एवं परियोजना) / General Manager (F&O)
पावर फाइनेंस कॉर्पोरेशन लि. / P.F.C Ltd
Connaught Place

राजेश श्रीवास्तव / RAJESH SRIVASTAVA
निदेशक (परियोजना) / Director (Projects)
बिहार स्टेट पावर (होल्डिंग) कंपनी लिमिटेड / BIHAR STATE POWER (HOLDING) COMPANY LIMITED
द्वितीय तल, अशोक भवन, बोरिंग रोड, पटना - 800 001
2nd Floor, Ashoka Bhawan, Boring Road, Patna - 800 001

iv. GM (Loan Documentation), PFC- along with a copy of terms and conditions.
v. GM (Loan Recovery), PFC – along with a copy of terms and conditions.
vi. GM (Loan Disbursement), PFC – along with a copy of terms and conditions.
vii. GM (Lending Concurrence), PFC – along with a copy of terms and conditions.

मनोज शर्मा / MANOJ SHARMA
महाप्रबंधक (विधि एवं दस्तावेज) / General Manager (L&D)
पावर फाइनेंस कॉर्पोरेशन लि. / P.F.C Ltd.
"ऊर्जानिधि", 1, बाराखंबा लेन, कनॉट प्लेस
"URJANIDHI", 1, Barakhamba Lane, Connaught Place,
नई दिल्ली - 110001 / New Delhi - 110001

राजेश श्रीवास्तव / RAJESH SRIVASTAVA
निदेशक (परियोजना) / Director (Projects)
बिहार ग्रिड कम्पनी लिमिटेड / BIHAR GRID COMPANY LIMITED
द्वितीय तल, अलंकार प्लेस, बोरिंग रोड, पटना - 800 001
2nd Floor, Alankar Place Boring Road, Patna - 800 001

TERMS AND CONDITIONS OF SANCTION FOR RUPEE TERM LOAN NO. 88502001

1 AGREEMENT

1.1 The Borrower shall execute a Memorandum of Agreement (MoA) in the form prescribed by Power Finance Corporation Ltd. (the Corporation) for the purpose and submit all other documents as required within six months of the date of letter of sanction of loan.

1.2 The Memorandum of Agreement shall not be executed in case the borrower has been declared a defaulter by the Corporation.

2 RATE OF INTEREST

2.1 The Borrower shall pay interest on the said Loan at the rate of interest prevailing on the date of each disbursement as per the Corporation's policy which shall be as notified by the Corporation# (presently it is **9.15 % per annum** payable quarterly for three year reset after a rebate of 0.25% for timely repayment by the Corporation), along with tax, if any, at the rate applicable from time to time. The interest in favour of the Corporation shall begin to accrue from the date of payment / cheque issued by the Corporation. The instalment of interest and tax, if any, will be payable quarterly on the 15th day of April, 15th day of July, 15th day of October and 15th day of January every year, after commencement of disbursement. The amount of interest and tax, if any, payable will be calculated at the above rate up to the date immediately preceding the due date of payment, i.e. 14th day of the month on the amount disbursed / outstanding up to the last day of the preceding month. Computation of interest shall be made on a daily basis using 365 days factor.

 # The above interest rate is granted subject to the interest rate not falling below 9.15% p.a. payable quarterly at any point of time. This is subject to that if PFC's notified interest rate (net of timely repayment rebate) as applicable for borrower falls below 9.15% p.a. payable quarterly, PFC's notified applicable interest rate (net of timely repayment rebate) shall be applicable. The above interest rate is governed as follows:-

- If PFC's notified rate for BGCL falls below 9.15%, the applicable interest rate shall be PFC's notified rate for BGCL, without any rebate.
- If PFC's notified rate for BGCL is between 9.15% and 10.75%, the applicable interest rate shall be 9.15%.
- If PFC's notified rate for BGCL goes above 10.75%, a rebate of 160 bps shall be applicable on PFC's notified rate for BGCL.

2.2 Interest Reset: Notwithstanding anything herein above, the Corporation shall have a right to reset the rate of interest, at its discretion, at the end of every third year beginning with the date of first disbursement. However, the methodology as specified above shall be applicable during the reset.

Methodology for resetting, i.e. determination of amount to be reset, reset date etc. shall be as applicable from time to time.

Manoj Sharma
मनोज शर्मा / MANOJ SHARMA
महाप्रबंधक (विधि एवं दस्तावेज) / General Manager (L&D)
पावर फाइनेंस कार्पोरेशन लि / PFC Ltd

राजेश श्रीवास्तव / RAJESH SRIVASTAVA
(Projects)
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3 REPAYMENT OF LOAN

3.1 The loan shall be repaid by the Borrower in 60 (Sixty) equal quarterly instalments on 15th April, 15th July, 15th October & 15th January (each a "repayment date") of each year commencing from the first standard repayment due date falling after scheduled Date of Commencement of Commercial Operation (DCCO)*.

** Could be reviewed and changed at the time of execution of loan documents.*

4 PRE-PAYMENT OF LOAN

4.1 The Borrower may prepay the outstanding principal amounts of the loan only after obtaining the prior written approval from the Corporation which will be at the sole discretion of the Corporation. The approval for prepayment may be granted subject to such conditions as the Corporation may deem fit including prepayment premium.

5 COMMITMENT CHARGES / UPFRONT FEE

NIL

6 ADDITIONAL INTEREST IN CASE OF DELAY IN PAYMENT / LIABILITY TOWARDS ADDITIONAL CHARGES / COSTS, ETC

6.1 In the event of the interest or the principal not being paid to the Corporation by the Borrower on the due date as indicated in the foregoing clauses, the Borrower shall pay to the Corporation additional rate of interest of 2.0% over and above the rate of interest mentioned in para 2.1 ante at which the loan is disbursed / reset, which will be compounded on quarterly basis.

6.2 The additional interest charged from borrowers shall be subject to the rebate of different rates, provided the repayment of dues is received in the following manner:

a. In case the payment is received within one month of the date on which the repayments become due, 50% of the additional interest due from the date of default till the date of receipt, shall be allowed as rebate;

b. In case the payment is received within two months of the date on which the repayments become due, 30% of the additional interest due from the date of default till the date of receipt shall be allowed as rebate;

c. In case the payment is received within three months of the date on which the repayments become due, 10% of the additional interest due from the date of default till the date of receipt, shall be allowed as rebate; and

d. No rebate shall be given in additional interest in case of default of over three months.

6.3 The Borrower shall pay on demand all costs, charges, expenses, losses, applicable taxes, statutory duties and other money that may be incurred by the Corporation, in connection with remittance / receipt of moneys to or to the order of or from the borrower, or in connection with protecting and / or enforcing the rights of the

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बिहार स्टेट [illegible] COMPANY LIMITED
द्वितीय तल, [illegible] - 800 001
2nd Floor, Alankar Place [illegible] Road, Patna - 800 001

Corporation under the Memorandum of Agreement and / or Guarantee Deed and / or any other document for the loan in question. The decision of the Corporation with regard to the amount / loss incurred on these shall be final and binding on the Borrower.

7 APPROPRIATION OF AMOUNT PAID BY THE BORROWER

7.1 The amount paid by the Borrower shall be appropriated in the order of occurrence of dues in the following order:

a) Costs, charges, expenses, losses, applicable taxes, statutory duties and other moneys;

b) Interest on costs, charges, expenses, losses, applicable taxes, statutory duties and other moneys;

c) Additional Interest;

d) Commitment Charges; (not applicable for this loan)

e) Interest/ tax if any;

f) Repayment of principal in the order of the occurrence of the dues; and lastly;

g) Prepayment of principal.

7.2 The borrower shall agree that if the money remains unpaid for more than one due date, the dues shall be appropriated due date wise in order of their occurrence i.e. dues pertaining to a due date which has occurred earlier in sequence would be appropriated first. Thereafter, the dues pertaining to the ensuing due date would be appropriated and the appropriation of dues shall continue in the same manner till all dues are appropriated. The dues for each due date shall be appropriated as per the appropriation clause (7.1) above.

7.3 *Appropriation of Installment of principal payment*
Unless agreed otherwise, the repayment of loan installment shall be appropriated on First In First out (FIFO) basis i.e. loan repayment installment shall be appropriated against the outstanding disbursements (i.e., outstanding loan balance) in the same sequence in which loan was disbursed.

8 ALL PAYMENTS TO BE REALISABLE AT PAR IN NEW DELHI

8.1 The Borrower shall so arrange that the amount due and payable to the Corporation are realizable by the Corporation at par on the due date of the relevant payments in New Delhi. The Corporation shall prefer and encourage the borrowers to make payments of the dues through e-payment system, in specified Bank Account(s) of the Corporation, as may be notified from time to time.

9 SHIFTING OF DUE DATE OF PAYMENT OF INSTALMENT

9.1 In case the standard due date falls on a bank holiday (at the Corporation's bank at New Delhi), the due date shall be shifted to the immediately following bank working day.

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निदेशक (परियोजना) / Director (Proj.)
बिहार ग्रिड कम्पनी लिमिटेड / BIHAR GRID COMPANY LIMITED

10 MAINTENANCE OF ACCOUNTS AND AUDIT

10.1 The Borrower shall maintain proper accounts and other records and prepare annual accounts including the profit and loss account and the balance sheet in the forms and manner prescribed under the applicable Act / Regulations. The Borrower shall furnish to the Corporation the audited accounts within seven months of the close of the year to which the accounts relate.

11 TRANSFER AGREEMENTS IN CASE OF STRUCTURING OF SEBs/State Power Utilities: (applicable for loan(s) sanctioned to SEBs/State Power Utilities)

11.1 The successor state sector entities would execute the transfer agreements, within a period of 6 (six) months from the date of notification of such restructuring or transfer of assets and liabilities whichever is later otherwise, an additional interest of 25 bps p.a. shall be leviable on balance disbursements after expiry of six months from the date of notification of such restructuring or transfer of assets and liabilities whichever is later till execution of transfer agreements.

12 GUARANTEES & SECURITIES

12.1 CHARGE ON ASSETS:

The loan together with all interest (including additional interest), costs, expenses, losses, applicable taxes, statutory duties and other money shall be secured with the prescribed coverage ratio (presently 1.1 times) applicable in case of Bihar Grid Company Limited (BGCL) by a first charge by way of hypothecation in favour of the Corporation, of project assets (save and except book debts), including movable machinery, machinery spares, tools and accessories, fuel stock, spares and material at project sites, present and future,

The Borrower shall make out good marketable title to its properties to the satisfaction of the Corporation and comply with all such formalities as may be necessary or required for the said purpose.

I. CREATION OF ADDITIONAL SECURITY:

The Borrower undertakes that if, at any time during the subsistence of this Agreement, the Corporation is of the opinion that the security provided by the Borrower has become inadequate to cover the balance of the loans then outstanding, the Borrower shall provide and furnish to the Corporation additional security as may be acceptable to the Corporation to cover such deficiency.

II. REGISTRATION OF CHARGE

The Borrower shall have the particulars of charge registered with the Registrar of Companies (RoC) as per the Companies Act within stipulated time, and shall submit a certificate from the RoC certifying the registration of charge.

And / or

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निदेशक (परियोजना) / Director (Projects)
बिहार ग्रिड कम्पनी लिमिटेड / BIHAR GRID COMPANY LIMITED
द्वितीय तल, अलंकार प्लेस, बोरिंग रोड, पटना - 800 001
2nd Floor, Alankar Place Boring Road, Patna - 800 001

The borrower shall have the particulars of charge registered with the Sub-Registrar of Assurances in case of English Mortgage wherever executed.

12.2 The borrower shall enhance / open an escrow account for the entire pendency of the loan with the prescribed coverage ratio (presently 1.1 times) applicable in case of BGCL to the satisfaction of the Corporation. Escrow Agreement shall be entered into three months before DCCO.

12.3 In cases, where the borrower fails to create all securities as per terms of sanction by the stipulated date, the Corporation shall charge an additional interest on the outstanding loan amount at the prevailing rate (presently 1% p.a.) from the date of expiry of the stipulated period allowed (as per terms of sanction).

In case the disbursement against the loan increases beyond 75% of the loan amount and entire security as per terms of sanction has still not been created, additional interest shall be levied on the amount outstanding, from the date the disbursement against the loan exceeds 75% limit.

13 UTILISATION OF LOAN AND COMPLETION OF PROJECT

13.1 The Borrower shall ensure that the equipment / materials for which the loan is obtained from the Corporation are utilised for the implementation of the project.

13.2 The Borrower shall not raise borrowings from any other sources for meeting the cost of equipment / materials / works financed through this loan.

13.3 The Borrower shall take all necessary steps to ensure that the project is completed as envisaged in the manner and according to the time schedule envisaged, i.e. **42 months from the date of first disbursement** (scheduled DCCO)* or such other date as may be agreed to by the Corporation. Presently, Indicative DCCO is **1st July 2021**.

* Could be reviewed and changed at the time of execution of loan documents.

13.4 The procurement by the borrower for various equipment / material / work / studies being fully / partially financed by the Corporation loan shall generally be done in accordance with the borrower's standard procurement procedure or as may be applicable by the International Financial Institution whose loan proceed may be intended to be availed under the loan.

14 DRAWAL OF LOAN

14.1 The Borrower shall before the disbursement of the loan sanctioned, furnish to the Corporation a schedule in the prescribed form containing complete details of the equipment / materials ordered / supplied and / or civil / erection work completed / to be completed for which the payments are required to be made or to become due.

14.2 The Borrower shall have to submit its application for drawl of the loan duly supported by the certificates and documents as required by the Corporation.

14.3 The loan shall be disbursed according to the disbursement procedure of the Corporation, as modified / amended from time to time and / or as mutually

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पावर फाइनेंस कॉर्पोरेशन लि. / P.F.C Ltd
"URJANIDHI", 1, Barakhamba Lane, Connaught Place,

राजेश श्रीवास्तव / RAJESH SRIVASTAVA
निदेशक (प्रोजेक्ट्स) / Director (Projects)
बिहार ग्रिड कम्पनी लिमिटेड / BIHAR GRID COMPANY LIMITED
द्वितीय तल, अलंकार प्लेस, बोरिंग रोड, पटना - 800 001
2nd Floor, Alankar Place Boring Road, Patna - 800 001

agreed. Normally, disbursement will be made on the basis of the standard equipment / materials ordered / supplied as required for the completion of the project / programme and payment for these equipment / materials becoming due by the Borrower to the supplier(s) concerned and also in respect of the civil / erection works completed/to be completed for implementation of project / programme through any agency(ies) engaged for the purpose.

14.4 For specific type of loans or sub-projects or loan arrangements tailor made disbursement / reimbursements procedures would be evolved in consultation with the Borrower and shall be followed on both sides.

14.5 If desired by the Borrower, the Corporation may make an advance payment as per the disbursement procedure of the Corporation on completion of necessary loan documents. (The certificate / proof, as may be needed by the Corporation, in regard to utilisation of advance will be submitted by borrowers normally within six months of the drawl or in such a time frame as agreed to by the Corporation).

14.6 The Corporation shall not be liable for any charge whatsoever for which the Borrower may become liable due to delayed payment in respect of the equipment / materials ordered / supplied or in respect of civil / erection works executed through the agency(ies) engaged.

14.7 The borrower shall draw the loan as per drawl schedule and the closing date of loan shall be **six months from the date of scheduled DCCO*** or such other date as may be agreed to by the Corporation.

** Could be reviewed and changed at the time of execution of loan documents.*

14.8 Claims for expenditure incurred from **01st April 2017** will be admissible against this loan.

15 SUPERVISION AND MONITORING

15.1 The Corporation would monitor the progress of project / scheme financed by it. In this respect:

a. The Borrower shall furnish to the Corporation such reports on its working, either in general or in specific relation to this loan, in the manner as may be prescribed by the Corporation from time to time.
b. The Borrower shall furnish periodic progress reports on the formats, as defined by the Corporation, on the utilization of this loan and on the physical progress of the project / programme from time to time.
c. The Borrower shall furnish a completion report on the successful completion of the project within 6 (six) months of the commercial operation of the projects / schemes as per format prescribed by the Corporation.
d. The Borrower shall provide full co-operation and access to the officials of the Corporation for monitoring through visits to Project related sites, store as well as the Head Quarters of the borrower. The borrower shall also provide documents as may be deemed necessary for assessing the physical as well as financial progress of the project.

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e. It would be open to the Corporation to depute its officers and other staff / nominees for inspection of the matters relating to this loan and its purposes and the inspecting staff shall have access to such books, records and stores of the Borrowers as will be deemed necessary by the inspecting staff / nominees. The Borrower shall allow all facilities to the inspecting officers / nominees for the purpose of carrying out such inspection and render such explanation or elucidation as may be required by the Corporation and or its nominees and allow the taking of any copies of / or extracts therefrom.

In case the Corporation is not satisfied with the progress of the project / scheme financed or the utilisation of financial assistance provided, it may resort to remedial measures as stipulated in the clause DEFAULTS hereunder.

16 STATE GOVERNMENT LOAN / BUDGETARY SUPPORT

16.1 The Borrower shall not make / adjust the payment of interest or repayment of State Government loans due to it until such time that the liability in regard to payment of interest and repayment of loan due up to date to the Corporation is fully paid.

16.2 The loan from the Corporation shall be in addition to the State's budgetary support committed for the project as per the approved annual plan provision.

17 DEFAULTS

17.1 In case it is found to the satisfaction of the Corporation, which shall be final and not questioned, that the amount already disbursed has not been properly and effectively utilised by the Borrower for the project / programme and / or the progress achieved in the implementation of the project / programme or compliance of any of the condition(s) of this loan is considered to be not satisfactory, the Corporation shall have absolute discretion at any time to suspend, reduce, cancel, recall, alter or delay disbursement of said loan and / or instalments in any manner and may decline to disburse any and / or all the remaining instalments without assigning any reason thereof, to the Borrower and without being liable for any losses or damages.

17.2 If the Borrower defaults in the payment of principal or interest or any other payment required under the loan agreement, the Corporation, at its option, may by notice to the Borrower and to the guarantor, declare the principal of the loan then outstanding to be due and payable immediately together with the interest and other charges thereon, and on such declaration such principal, together with the interest and other charges thereon, shall become due and payable immediately.

17.3 In case of default in payment of dues such as principal, interest etc, as the case may be, for loan, the Corporation shall have the right to disclose the name / details of the borrower / loan, etc. to CIBIL or RBI or any such authority.

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2nd Floor, Alankar Place Boring Road, Patna - 800 001

18 VALIDITY PERIOD OF SANCTION

18.1 The sanction of loan accorded in terms of the sanction letter will stand cancelled if the Borrower fails to execute the complete documents (i.e., MoA along with documents required before or at the time of execution of MoA) within a period of six months from the date of sanction letter. The Corporation may, in exceptional cases, agree to extend the aforesaid period of six months, for such further period as it may deem appropriate if the Borrower makes an application to the Corporation before expiry of initial six month period, duly supported by the reasons for such extension.

19 SALE / TRANSFER / ABANDONING OF THE PROJECT BY THE BORROWER

a) The Borrower must be and continue to be the owner and in physical possession of the project at the time of execution of Memorandum of Agreement, disbursement of each instalment of loan amount and till all the moneys due to the Corporation are fully liquidated by the Borrower.

b) The Borrower shall not sell / transfer or abandon the project at any stage in any manner without prior written consent of the Corporation. In case at any stage or on a future date, the project is proposed to be transferred to any other organisation or to be abandoned, the borrower shall seek prior consent of the Corporation before any such transfer is affected and in such case, the Corporation reserves the right to recall the loan with all outstanding dues including prepayment premium as applicable from time to time.

20 Right to Assign/Transfer the Loan to other FIs, Banks & ARCs:

During the currency of the loan, PFC shall have the right to assign all or any of its obligations or transfer the loan to any other FIs, Banks, ARCs without the consent of the borrower, without any financial implication to BGCL.

21 MISCELLANEOUS PROVISIONS

21.1 The Borrower shall be bound to follow and give effect to all instructions / recommendations of the Corporation.

21.2 The said loan shall also be subject to such further terms and conditions as may be laid down in the form of agreement to be executed by the Borrower.

21.3 Notwithstanding the various terms and conditions herein above mentioned the Borrower has been given a copy of the Operational Policy Statement (OPS) of the Corporation and amendments / modifications thereto, for such financial assistance or assistances, and the Borrower is fully aware of the various terms and conditions set out there in which shall apply mutatis mutandis to this loan as if fully set forth herein and all the provisions set out in the OPS shall be binding on the borrowers. Further the Borrower shall also take note of and comply with any change / revision / modification amendments / instructions that may be made subsequently and notified by the Corporation.

21.4 The borrower shall during the currency of loans bear all such imposts, duties and taxes or any other charges as may be levied from time to time by the Government or other authority.

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बिहार ग्रिड कम्पनी लिमिटेड / BIHAR GRID COMPANY LIMITED
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21.5 All Transformers of 16 KVA to 400 KVA rating financed under the loan will be of 3 star or above only as required under the Standard & Labeling (S&L) program of Bureau of Energy Efficiency.

21.6 Borrower shall agree for mapping of project assets and tracking progress of the project using services of National Remote Sensing Centre.

21.7 The Borrowers shall give an undertaking that any change in its pattern of ownership including shareholding of government shall be subject to prior written approval of PFC. Under such cases PFC reserves the right to take necessary measures for safeguarding the interest of PFC and to stipulate additional conditions including but not restricted to rate of interest, additional security, collateral etc.

22 SPECIAL TERMS AND CONDITIONS

22.1 Pre-Commitment Conditions:

1. BGCL shall undertake to acquire the land/obtain RoW as and when required during implementation of the project.
2. BGCL shall submit an undertaking that it shall obtain all statutory and non-statutory clearances including forest clearance (if applicable) as and when required during implementation and commissioning of the project and to comply with the conditionality specified therein.
3. BGCL shall submit an undertaking that any communication from BERC about this project will be intimated to PFC.
4. BGCL shall submit an undertaking that in the event of reduction of project cost by BERC, the loan amount shall be reduced proportionally.
5. BGCL shall submit an undertaking that in case investment in the project covered in this loan is not approved by BERC, BGCL shall refund the entire amount disbursed in the project to PFC with interest within six months from BERC's intimation regarding the same to BGCL.
6. BGCL shall submit an undertaking that BGCL shall not create charge on the immovable assets of the project in favour of any other party and not disposed-off the project assets (excluding office furniture, office equipment etc. totalling more than 5 crore) during the currency of the loan.
7. BGCL shall undertake to enter into Escrow Agreement 3 (three) month prior to the DCCO of the project.

22.2 Pre-Disbursement Conditions:

1. BGCL shall certify that it has acquired complete land required for the proposed substations, within 18 (Eighteen) months from the date of first disbursement.
2. PFC's disbursement to BGCL beyond 75% of the sanctioned amount shall be subject to acquisition of land required for the proposed substations.

22.3 Other Conditions:

1 Reimbursement of expenses incurred from 01.04.2017 shall be permissible.

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राजेश श्रीवास्तव / RAJESH SRIVASTAVA
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Annexure – I

Scope of the project comprises of the following works:

S.No.	Name of Scheme
New Substation	
1	2x500MVA + 2x160MVA + 2x80MVA, 400/220/132/33kV GIS substation at Naubatpur
2	2x500MVA + 3x160MVA + 4x80MVA, 400/220/132/33kV GIS Substation at Jakkanpur (New)
3	2x100MVA, 220/33kV GIS Substation at Bhusaula
4	2x160MVA + 2x80MVA 220/132/33kV GIS Substation at Dumraon
Line Bay Extension Works	
1	Bihta GIS, BSPTCL
2	Dumraon AIS, BSPTCL
3	Buxar AIS, BSPTCL
4	Katihar AIS, BSPTCL
5	Jagdishpur GIS, BSPTCL
6	Palliganj AIS, BSPTCL
7	Masaurhi AIS, BSPTCL
Transmission Lines	
1	LILO of Nabinagar-II – Patna (PG) 400kV D/c (Quad) Transmission Line at Jakkanpur (New)
2	LILO of Sipara (BSPTCL) - Bihta (BSPTCL) 220kV D/c line at Jakkanpur (New)
3	LILO of Khagaul (BSPTCL) - Sipara (BSPTCL) 220kV S/c line at Jakkanpur (New)
4	LILO of Jakkanpur - Sipara 132kV D/c line at Jakkanpur (New) (being re-conductored with HTLS by BSPTCL)
5	LILO of Jakkanpur/Mithapur - Fatuha 132kV S/c line at Jakkanpur (New) (being re-conductored with HTLS by BSPTCL)
6	LILO of Patna - Balia 400kV D/c (Quad) line ckt 3&4 at Naubatpur (New)
7	LILO of Ara (PG) - Khagaul (BSPTCL) 220kVD/c line at Naubatpur (New)
8	Naubatpur - Bihta(BSPTCL) 220kV D/c Transmission line
9	Naubatpur -Bhusaula (New) 220kV D/c Transmission line
10	LILO of Ara (PG) - Pusauli (PG) 220kV D/c line at Dumraon (New)
11	Dumraon (New) - Dumraon (BSPTCL) 132kV D/c Transmission line (ACSR Zebra Conductor)
12	Dumraon (New) - Buxar (BSPTCL) 132kV D/c
13	LILO of one ckt of Purnea – Naugachia/ Khagaria 132kV D/c line at Katihar (BSPTCL)
14	Dumraon (New)- Jagdishpur (BSPTCL) 132kV D/c
15	Naubatpur - Palliganj (BSPTCL) 132kV D/c (with ACSR Zebra conductor)
16	Naubatpur - Masaurhi (BSPTCL) 132kV D/c (with ACSR Zebra conductor)

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Annexure-9B

आरईसी REC
असीमित ऊर्जा, अनन्त संभावनाएं
Endless energy. Infinite possibilities.

रुरल इलेक्ट्रीफिकेशन कारपोरेशन लिमिटेड
RURAL ELECTRIFICATION CORPORATION LIMITED
भारत सरकार का उद्यम A Govt. of India Enterprise
आंचलिक कार्यालय : पूर्व मध्य क्षेत्र
Zonal Office : East Central Zone
(Bihar, Jharkhand, Uttar Pradesh & Uttarakhand)

Ref.No. REC/ZO/PAT/BGCL/96/560 Dated 08.10.2013

The Managing Director
Bihar Grid Company Limited
2nd Floor, Alankar Place, Boring Road
Patna- 800001.

Dir(Proj)BGCL

Sanction Letter for RTL – T&D

Sub:- Financial assistance of Rupee Term Loan of Rs. 1359.49 crores to M/s Bihar Grid Company Limited (BGCL) a joint venture company of PGCIL & BSPHCL for Strengthening of Transmission System of Bihar under category P:SI (Transmission).

Ref: M/s Bihar Grid Company Limited application for Financial assistance vide Letter dated 24.08.2013.

Sir,

This is with reference to your above referred Loan Application for financial assistance of Rs.1359.49 Crores to finance the proposed system improvement Project to be built at a total cost of Rs:1699.36 Crores by Bihar Grid Company Limited in the state of Bihar.

Your request has been considered and REC is agreeable to sanction Rupee Term Loan ("RTL") to the extent of Rs. 1359.49 Crores (Rupees One thousand three hundred fifty nine crores and forty nine lacs). Details of the Scheme is as follows:

Name of the scheme	Strengthening of Transmission System in Bihar- Phase-IV
District / State	Bihar
Scheme code no	BR-TD-CPU-446-2013-7625

Block-'C', 4th Floor, Maurya Lok Complex, Dak Bungalow Road, Patna – 800001. Tel- 0612-2221131, Tel/Fax-0612-2224596 E-mail - popatna@recl.nic.in & popatna@yahoo.com

दिलीप कुमार शर्मा / D. K. SARMA
निदेशक (परियोजना) / Director (Projects)
बिहार ग्रिड कम्पनी लि० / Bihar Grid Company Ltd.

A Veluchamy
Chief Project Manager
Rural Electrification Corporation Limited
A Govt. of India Enterprise
A 'Navratna CPSE' under the Ministry of Power
Patna Project Office

Cost of the project	Rs. 1539.67 Crores
IDC if any	Rs. 159.69 Crores
Cost Escalation if any	NA
Total Cost including IDC and Cost escalation	Rs. 1699.36 Crores
Promoter's contribution (Equity component - 20%)	Rs. 339.87 Crores
Loan Amount Sanctioned	Rs. 1359.49 Crores
Extent of financing (% of loan to cost of project)	80%

The aforesaid term loan is subject to the General Terms and Conditions as set out in Annexure-I and 'Additional/Specific Conditions' as set out in Annexure-II enclosed to this sanction letter and also to the terms and conditions of the Rupee Term Loan Agreement (RTLA) to be executed between REC and M/s Bihar Grid Company Limited (BGCL).

The sanction letter is being sent to you in duplicate and you are requested to return one copy of the same duly signed by the authorized representative/signatory in all pages with seal as a token of acceptance of the terms and conditions of this sanction within thirty days from the date of receipt of this sanction letter to avail the above loan/financial assistance.

This communication should not in any way be construed as any binding obligating on the part of REC unless you communicate your acceptance to REC within 30 days from the date of receipt of this sanction letter and unless the Rupee Term Loan Agreement and other documents relating to the above loan/financial assistance are executed by M/s Bihar Grid Company Limited (BGCL) in such forms as may be required by REC within six months from the date of this sanction letter, or such further time as may be allowed/extended by REC in its absolute discretion on your written request.

The following documents (in the prescribed formats) shall be required as per applicable policy of REC.

A. Documents required at the time of execution/signing of loan documents:

1. Copy of the Board Resolution, duly attested by the Company Secretary/Authorized Officer, regarding:-

Block-'C', 4th Floor, Maurya Lok Complex, Dak Bungalow Road, Patna – 800001. Tel- 0612-2221131, Tel/Fax-0612-2224596 E-mail- popatna@rec.nic.in & popatna@yahoo.com.

दिलीप कुमार शर्मा / D. K. SARMA
निदेशक (परियोजना) / Director (Projects)
बिहार ग्रिड कम्पनी लि॰ / Bihar Grid Company Ltd.
बोरिंग रोड, पटना-800 001 / Boring Road, PATNA-800 001

Chief Project Manage
Rural Electrification Corporati
A Govt. of India Enterp
A 'Navratna CPSE' under the Minis
Patna Project Office
Patna - 800001

a) To accept the loan on the terms and conditions of REC
b) To accept creation of charge on assets by way of hypothecation/mortgage.
c) To furnish undertakings as per the Terms and Conditions of this Term Loan.
d) To authorise an officer to accept and agree to the terms and conditions and to execute the relevant loan documents/undertakings etc.

2. Specimen signature of authorized signatory duly attested by the Company Secretary.
3. Certificate from the Company Secretary in respect of the compliance of laws, bye-laws, etc. Applicable to the borrower.
4. Certificate from the Company Secretary / Statutory Auditors of the Borrower that the borrowing limits with details thereof.
5. Certificate to the effect that the borrower shall continue to be the owner and in physical possession of the project till the outstanding loan amount is fully liquidated.
6. Letter for opting 'commitment charge' or 'upfront fee'.
7. Quarter-wise drawal schedule.

B. Documents required at the time of disbursement of loan:-

1. Tripartite Escrow Agreement/TRA Agreement, as the case may be, in the prescribed format.
2. Materials and equipment schedule, in the prescribed format, for the project/scheme to be financed under the loan.
3. State Govt. Guarantee in the prescribed format or charge on assets by executing security documents by way of Hypothecation and Mortgage Deeds in the prescribed formats.

Kindly acknowledge the receipt of this letter.

Yours faithfully,

(Hemant Kumar)
Chief Project Manager

Encl. As above.

Block-'C', 4th Floor, Maurya Lok Complex, Dak Bungalow Road, Patna – 800001. Tel- 0612-2221131, Tel/Fax-0612-2224596 E-mail - popatna@recl.nic.in & popatna@yahoo.com

31/10/14

दिलीप कुमार शर्मा / D. K. SARMA
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बोरिंग रोड, पटना-800 001 / Boring Road, PATNA-800 001

A Velusamy
Chief Project Manager
Rural Electrification Corporation Ltd.
A Govt. of India Enterprise
A 'Navratna CPSE'

REC
Endless energy. Infinite possibilities.

Annexure-I

Standard Terms and Conditions for sanction of Rupee Term Loan for System Improvement (Transmission) Projects of Bihar Grid Company Limited under PSI (T) category–

1. Details of sanctioned Loan Amount:

Name of the scheme	Strengthening of Transmission System in Bihar- Phase-IV
District / Region	Bihar
Scheme code no	BR-TD-CPU-446-2C 013-7625
Cost of the project	Rs. 1539.67 Crores
IDC if any	Rs. 159.69 Crores
Cost Escalation if any	NA
Total Cost including IDC and Cost escalation	Rs. 1699.36 Crores
Promoter's contribution (Equity component %) 20%	Rs. 339.87 Crores
Loan amount sanctioned	Rs. 1359.49 Crores
Extent of financing (% of loan to cost may be given)	80%
Project Period	36 Months

Brief details of the approved scheme is attached as Annexure-A & B.

2. **Validity of sanction:** The sanction shall be valid for a period of three months from the date of issue of sanction letter, unless all the loan documents are executed to the satisfaction of the REC *(referred hereinafter as "the Lender")* within three months after complying with the Terms & Conditions as mentioned hereunder. However, the lender can extend validity period at its sole discretion on being satisfied for the reasons of delay furnished by the Borrower.

3. **Loan Agreement:**

a) The Borrower shall execute within three months time or such extended period, as the case may be, a Loan Agreement or "Rupee Term Loan Agreement" *(referred hereinafter as "RTLA")*, in the form prescribed by the Lender for this purpose.

b) All the Terms and Conditions herein and of the RTLA shall have full force and effect till all amounts due from the Borrower under the RTLA are paid off in full to the Lender.

c) The sequence of appearing of the conditions herein is not desired to have any preferential order of implementation and hence should not be construed accordingly. All conditions listed herein shall be applicable either concurrently or as the merit of the case may require without any preference of implementation order.

d) For the T&D projects being funded by the REC, if the cost of Land for Sub-station is being claimed by the company, then the Land shall also be mortgaged to the REC as the part of security requirement. If mortgage of Land is not possible due to any reason whatsoever, then REC will not reimburse the cost of Land to the borrower company.

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4. Other Agreements

The Borrower shall also execute such other agreements and documents as may be prescribed for the purpose by the Corporation and as may be necessary in terms of security provided by them, namely, Hypothecation Deed, Default escrow agreement etc., Documents have to be registered and charge created with the ROC affixing on appropriate value of stamp paper, as applicable.

5. Scheme Implementation and Loan Disbursement Period:

a) The Borrower shall complete the work relating to the scheme(s) within the scheme period of 36 months from the date of release of 1st instalment. Unless the Lender agrees otherwise, the Borrower's right to make drawls from the Rupee Term Loan shall cease at end of scheme period by default. However, claims submitted within a period of one month after the completion of scheme period will be considered for release.

b) The Lender may agree to the request of the borrower to extend the period of disbursement of loan and implementation of the project by one year which will be in addition to the original project period. However the period of moratorium and repayment of loan will continue to remain the same and will not be affected by the extension in the period of disbursement of loans and implementation of the project.

c) Works completed within one year prior to issue of sanction letter is also admissible for disbursement under the scheme.

d) Claims can also be submitted within one month after the completion of scheme period to be considered for release.

6. Certificates to be furnished for facilitating disbursement:

The Borrower shall furnish the following certificates to facilitate disbursement of loan from the Lender:

a) "That the loan applied for and being granted by the Lender to the Borrower is within the borrowing powers of the Borrower in accordance with the laws, by-laws and rules applicable to it and all formalities required by the laws/by laws regulating the work and conduct of the borrower in respect of such borrowing have been fully complied with; *and* shall be used exclusively for the purpose of project stated above for which this Rupee Loan has been sanctioned by the Lender".

b) All the works covered under this scheme are being financed by REC and certificate from the authorized Officer of the borrower that the works for which the claim is being lodged, have not been or are not being proposed to be financed from any other loan from REC or from any other funding agencies, including State Government.

c) That the assets created under the scheme, shall remain hypothecated to REC as per terms of agreement.

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7. Disbursement of Loan Instalments/ Advance Amount

Conditions:

The loan will be disbursed as per existing loan policy circulars/guidelines applicable to P:SI (T) category of schemes. Following are the conditions for disbursement of loan amounts:

(I) Mode of Execution: The project shall be executed on turnkey/partial turnkey/departmental basis.

(II) Disbursement of Loan:

A. First Instalment

(a) Eligibility Criteria

i) The 1st instalment as advance, will be considered only where the borrower company has provided adequate acceptable upfront security to REC. In case of hypothecation of only future assets, first instalment as advance is not eligible.

ii) 1st instalment of the sanctioned loan amount shall be released only after execution of the prescribed loan agreements/documents, acquisition of land for sub stations has been completed and fulfilment/compliance of all terms and conditions for release of such instalment as per the clauses of this letter. In case of land not yet acquired, first instalment is not payable for the portion of the scheme pertaining to that sub station only.

iii) In case of turnkey projects, REC shall consider to provide first installment as advance only if the Company provides advance to the turnkey contractor, and such advance is sought by power Company to meet this requirement, subject to ceiling of such advance upto the extent of loan amount as per para (b) below, and on complying with the provisions as per para (i) and (ii) above.

(b) Extent of advance–

(i) Loan amount more than Rs. 100 cr – upto 10% of loan amount
(ii) Loan amount more than Rs. 50 cr but is upto Rs. 100 cr - Upto 15% of the loan amount
iii) Loan amount upto Rs. 50 cr – Upto 20% of loan amount.

B. Conditions for release of first instalment (either as advance or as first release):

The Company shall submit a bar chart showing major milestones (Issue of NIT, award of contract, finalizing of Third Party/Independent Agency for Monitoring/Quality Assurance/Evaluation *(insert the applicable items)*, design, engineering, supply of material, civil works, erection, testing and commissioning etc.) to be achieved for completion of works to the satisfaction of corporation before release of 1st instalment, either as advance or as first release on reimbursement basis.

C. Subsequent Instalments

(i) In case first instalment is drawn as advance by the Company: The 2nd and subsequent instalment of loan would be released on pro-rata reimbursement basis, as per REC norms, of the value of the equipment/material supplied and/or erection work completed or on works completed (as applicable), after adjustment of the 1st instalment proportionately. The detailed progress report should be attached with every claim duly approved and signed by the concerned/authorized officer of the borrower.

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(ii) In case of non eligibility/ nondrawal of advance: The first release and subsequent releases would be made on reimbursement basis, of the value of the equipment/material supplied and/or erection work completed or on works completed (as applicable), as per REC norms. The detailed progress report should be attached with every claim duly approved and signed by the concerned/authorized officer of the borrower.

D. Payment against equipment/material only:

(i) Claims can also be admitted against receipt of material at site.

(ii) The power utilities shall give a certificate that the material has reached the site. This is applicable only for those items where separate cost of material is identifiable i.e wherever the breakup of sanctioned cost of material and erection/ transportation is available.

(iii) The Claim is to be supported by the invoice of material, but restricted to the invoice value or identified material cost, whichever is less. In case the invoice contains more items or more quantity pertaining to other schemes (even if financed by other FIs), the original invoice may be stamped to the extent of quantity reimbursed/proposed for reimbursement under the relevant REC scheme code number.

(iv) Claim admitted and released on this basis shall be deducted from the actual claim after total works of each item is completed and becomes payable as per reimbursement norms of REC.

E. Direct payment to Contractors/Suppliers

Direct payment to contractors/suppliers is permissible, if desired by the Company, as per terms and conditions stipulated in Finance Division instructions on the subject issued vide letter numbers REC/Fin/Claims/2006-07/17.11.2006 and REC/Fin/Claims/Directpay/2007-08/1886 dated 5.9.2007, as amended from time to time.

F. Final Instalment

The last and final instalment of loan or at least 10% of the balance loan shall be considered for release only after all the works, as envisaged in the scheme, have been completed and verified after final field monitoring by REC, and Monitoring/Quality Assurance/Evaluation by Third Party/ Independent Agency. The expenditure for the third party monitoring/Quality Assurance/Evaluation shall be met from the Borrower's own funds *(as applicable)*.

G. Reimbursement based on cost approved by the Regulator

In case the specific scheme cost is approved subsequently by the regulator, the Company would furnish the details thereof. In case of reduction in scheme cost approved by the regulator vis-à-vis the original REC sanctioned cost, the loan would be accordingly reduced. In case the scheme cost approved by the regulator is more than the scheme cost sanctioned, and if the Company requests for reimbursement on the higher cost, decision will be taken at that time depending on the merits of the case.

H. Reimbursement based on award cost:

In case the project is proposed to be executed on turnkey basis, the Company would furnish a copy of the award letter. In case awarded cost is less than the sanctioned cost, REC's loan would be reduced accordingly. In case of awarded cost is more than the sanction cost, if the Company requests for reimbursement on the higher cost, decision will be taken at the time depending on the merits of the case.

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I. Monitoring and Quality Assurance and Evaluation:

(i) Monitoring of all projects shall be as per the monitoring guidelines issued vide REC/MC [illegible] dated 28.8.2006, as amended from time to time. During brief, detailed and final monitoring by REC, it shall be ensured that the major milestones to be achieved are as per agreed bar chart.

(ii) In addition to the monitoring as above, Monitoring/Quality assurance/Evaluation of the projects during implementation by a Third Party/Independent agency shall form an integral part of the Project and the same shall be ensured by the borrower. The expenditure for the third party monitoring/Quality Assurance/Evaluation *(insert as applicable)* shall be met from the Borrower's own funds.

8. **Draw down schedule, Up-front fee and Commitment charges**

a) In terms of REC T&D loan policy circular dt 02.04.12, State / Central sector borrowers are not required to pay commitment charges or upfront fee for loans sanctioned up to Rs. 500 cr.

b) For projects with loan more than Rs.500 crore, the state sector borrowers shall have the option to pay either upfront fee or commitment charges under due intimation to REC before signing of RTLA. This may be subject to change and shall be applicable as per REC policy from time to time.

c) As per the option exercised by the Borrower at the time of signing RTLA which shall be final and binding and irrevocable, Upfront fee at the rate as per REC's prevailing loan policy circular/guidelines of the loan amount shall be levied. Present rate is 0.1%; *or,*

d) *Commitment Charges:* The borrower shall furnish at the time of submission of Memorandum of Agreement (MOA) to the Lender a quarter-wise schedule of drawl of this loan, the year being the financial year commencing April 1st and ending March 31st and the quarters being three months period beginning from 1st April, 1st July, 1st October and 1st January of each year. The borrower will be required to draw the entire amount of committed funds in the respective quarters cumulatively. In case the borrower is unable to draw the committed funds cumulatively in the scheduled quarter, the Lender will recover commitment charges on the un-drawn amount of previous quarter from the first day of following quarter till the date of actual date of drawl at the rate as per prevailing loan policy circular/REC guidelines. Present rate is 0.25% p.a. The commitment charges will be payable quarterly on 20th April, 20th July, 20th October and 20th January every year after execution of loan documents till the date of drawl of loan by the borrower.

e) The borrowers shall be allowed prospective revision of drawl schedule, with due concurrence of REC, two times only during the currency of the loan.

9. Interest Rates & Interest Reset Period:

The interest shall be charged on the loan at the rate prevailing on the date of each disbursement as per REC's latest loan policy circular less admissible rebate of 50 bps with

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State Govt. guarantee or 25 bps with other security options treating BGCL as identifie[illegible] for applicability of interest rates in the following manner:

Option 1

1. That a rebate of 50 bps may be allowed to BGCL with State Govt. Guarantee. The present effective rate of interest after rebate shall be 11.75% with State Govt. Guarantee.
2. That on each reset date (after 3 years) the interest rate applicable shall be set at 50 bps lower than REC's applicable Circular interest rate subject to no rebate will be allowed if Circular rate becomes 11.75% or lower.

Option 2

1. That a rebate of 25 bps may be allowed to BGCL with other security options as Per REC guidelines excluding State Government Guarantee. The present rate after rebate shall be 12.00% without State Govt. Guarantee.
2. That on each reset date (after 3 years) the interest rate applicable shall be set at 25 bps lower than REC's Circular rate subject to no rebate if Circular rate becomes 12% or lower.

BGCL may opt any of the above option before the execution of loan documents.

a) The Interest shall be payable quarterly by the Borrower on 20th March, 20th June, 20th September and 20th December every year till the full Loan amount along with all other dues are paid to the Lender. There is no moratorium for payment of interest.

b) Notwithstanding anything stated hereinbefore, it will be open to the Lender to periodically reduce or enhance the rate of interest in respect of loan instalments not disbursed up to the date of such revision. The revision in the rate of interest shall take effect from such date as may be notified by the Lender in this behalf.

c) The Borrower shall exercise the option of the reset of Interest Rate in respect of the Rupee Term Loan before seeking first disbursement of loan and the option once exercised shall be final and binding and can not be modified at a later stage during the subsistence of loan tenure.

10. Loan Repayment/ Moratorium Period

a. The period of moratorium for repayment of principal shall be 3 years from the 15th day of the month of disbursement of first instalment of loan but the entire loan shall be repaid by the Borrower within a period of 15 years from the date of disbursement of the first instalment of loan. The principal instalment is payable in equal annual instalments on 20th of the month in which the first disbursement was made.

b. The Borrower shall pay interest as indicated in clause (9) above during the period of moratorium. The repayment of principal thereafter will be effected on the basis of equal annual instalments and interest shall be calculated at the rates prescribed in clause (9) above on the amount outstanding.

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c. It shall be endeavour of the Borrower to ensure the realization of all payments due from them at the designated bank branch at New Delhi or other places as may be directed by the Lender on the dates on which same falls due or immediately preceding working day if such due date is a bank holiday at the recipient branch.

11. **Default and Penal Interest**

a) In the event of any instalment of interest or principal not being paid to the Lender by the Borrower on the due dates and terms as indicated herein, the Borrower shall pay to the Lender a penal interest at prevailing rate per annum over and above the applicable rate of interest, on quarterly compounding basis, during the period of default.

b) Further in the event of default in payment of interest and/or repayment of principal by the Borrower, unless otherwise agreed, subsequent receipts shall be appropriated as per the Accounting Policy of the Lender.

c) Further in case of such defaults, Lender shall have absolute rights to either enforce the entire or any part of securities created under the RTLA and/or to take possession of charged assets including entire or any part of plant/project and sell, transfer or dispose otherwise as the Lender may deem fit beside of taking necessary legal recourse as may be available to the Lender.

d) The occurrence of default shall be judged during any stage of subsistence of RTL-A by the lender at its sole discretion which shall be final.

e) The Lender shall have right to call for premature repayment of entire or any part of outstanding Loan amount at any time during the subsistence of this RTLA without assigning any reason, if Lender is satisfied that any of terms and conditions of this RTLA has been deviated/violated materially, or the loan amount has been used for the purpose other than the specified purpose, or no work is taken up in the project within one year after drawl of first instalment (unless otherwise approved for revival), or viability of the Project, financial strength of Promoters or the Security created herein has deteriorated substantially, or the scheme is intended for closure with less than 50% financial achievement. And in such an event, the entire outstanding loan shall be immediately payable by the Borrower to the Lender along-with outstanding interest and applicable penal interest shall also be payable from the original date of disbursement of the loan.

12. **Prepayment:** The Borrower shall not prepay the outstanding amount of the Rupee Term Loan in full or in part unless the Lender gives its explicit consent for such repayment. Prepayment of the Rupee Term Loan shall be at the sole discretion and on the terms and conditions *(including prepayment premium)* as may be stated by the Lender on such request.

13. **Service Tax, levies & duties and Other Costs & Expenses.**

All rates of interest / fees and other charges mentioned in this agreement are exclusive of service tax and / or any such other levies/ duties. Such service tax/ other levies/ duties, if any applicable, including stamp duties, court fee, professional fees, cost and charges for counsel/ advocate's fees for drafting, vetting of loan documents and rendering opinions, advice, creation of security, investigation of title, protection of the Lender's interests and expenses and fees incurred/ borne by the Lender for the monitoring and inspection of the project implementation/ operation by its representative and any other charges or surcharges as levied

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by the Government or any other statutory authorities on any Rupee Term payment under the loan or any other activity directly applicable to the Term Loan shall be payable by the Borrower to the Lender in addition to and in the manner of the Loan Repayment / Interest Payments.

It shall also be endeavour of the Borrower to keep indemnified the Lender, at all times during the subsistence of this RTLA, of any loss/ costs/ expenses suffered due to the conduct of Borrower or out of execution of intent RTLA or collection, preservation, disposing of or otherwise dealing the offered Securities as per provisions herein.

14. Security

The loan along with interest and other charges shall be secured by providing any of the following options/combination of securities:

Option-I:

i) Bank Guarantee for a minimum of 25% of the value of loan amount sanctioned.
ii) Creation of charge by Hypothecation of future assets to be created (out of the Project loan sanctioned by REC) up to 100% of the value of loan amount sanctioned; and
iii) Creation of Charge of Hypothecation of existing assets for the balance 5% of the value of loan amount sanctioned.

OR

Option-II

i) Creation of charge by Hypothecation of existing fixed assets related to Plant and machinery/equipment in Thermal & Hydro – Electric Power Generation Stations and 400/230/220/132/110/66/33 KV power substations and 11/0.415 KV Distribution Sub Stations and all lines from 11 KV upto 400 KV level, for a minimum of 30% of the value of loan amount sanctioned.
ii) Creation of charge of Hypothecation of future assets to be created (out of the project cost sanctioned by REC).

OR

Option-III.

i) English/Equitable/Simple Mortgage with or without pari-passu charge on existing Immovable properties i.e. land together with buildings and other civil works attached thereto for a minimum 25% of the value of loan amount sanctioned and
ii) Creation of charge by hypothecation of future assets to be created (out of the project cost sanctioned by REC) and
iii) Creation of charge by Hypothecation of existing assets for the balance 5% of the value of loan amount sanctioned.

OR

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Option-IV

i) State Government Guarantee for a minimum of 30% of the value of loan amount sanctioned.

ii) Creation of charge by Hypothecation of future assets to be created (out of the project cost sanctioned by REC).

OR

Option V:

State Govt. Guarantee (Individual/Bulk/Revolving) to the extent of 100% of the loan amount which shall also cover the interest, penal interest and other charges thereon. The loan shall be guaranteed by the State Government fully and unconditionally in respect of repayment of principal and payment of interest and other charges thereon, either by being secured by an individual guarantee or a Bulk/Revolving Guarantee executed between the said government and the Lender and/or between lender and borrower, as may be prescribed by the Lender before drawls of loans are permitted.

OR

Option VI:

English/Equitable/Simple Mortgage without pari-passu charge on other existing immovable properties i.e. Land together with buildings and other civil works attached thereto, subject to compliance of requirement as to clear title as prescribed by REC in this behalf. The value of Securities shall be 130% of the loan amount to cover the interest thereon and depreciation.

OR

Option VII:

In case of State Sector Projects, Mortgage/Hypothecation of future assets so created out of loan amount sanctioned for the project subject to the value being 110% of the loan amount so sanctioned. The security by way of creation of charge on FUTURE ASSETS ONLY shall be accepted subject to the loan amount being restricted to 90% of the project cost.

Any of the above options/combinations of securities shall be acceptable to REC subject to the following conditions:-

a) It shall be ensured that the total value of securities shall be 130% (except in case of option V&VII) of the loan amount sanctioned, to cover the loan amount sanctioned, interest thereon and depreciation in the value of assets charged.

b) In the case of prior charge on assets to be mortgaged /hypothecated, it shall be ensured that first pari-passu charge will have to be to the extent of security coverage available in relation to the value to be charged.

c) State Power Utilities will also have the option, after moratorium period as provided in the sanction letter, to replenish Bank Guarantee with Mortgage/ Hypothecation of existing

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unencumbered fixed assets in proportion to the amount of loan repaid. Such re-encumbrance may be allowed on annual basis at the discretion of REC, subject to the condition that at any given point of time the aggregate value of securities shall not be less that 130% of the loan amount sanctioned.

15. Other Conditions :

(i) Payment security:

a) As payment security during the construction stage and during the loan repayment period, BORROWER shall make operational a default Escrow arrangement for payment to the satisfaction of REC.

b) The escrow account to be opened will be exclusively in favour of the lender for the due amount and charge shall be created before ROC.

(ii) If at any time during the subsistence of loan, the Lender is of the opinion that the security provided by the BORROWER has become inadequate to cover the balance of the loan then outstanding, the BORROWER shall provide and furnish to the Lender additional security as may be acceptable to the Lender to cover such deficiency.

(iii) In case of privatization of the borrower, the entire dues of REC to be repaid in full or secured to the satisfaction of REC in the manner that REC would require.

(iv) In case of asset hypothecation:

a) First charge/pari-passu charge on all movable & immovable assets (both present & future) of the project shall be created in favour of REC. Wherever loan is taken against land from REC, it is subject to equitable mortgage irrespective of the option available in REC guidelines. To make such charge meaningful, appropriate provision will be made to the satisfaction of REC, to allow the REC the right to inspect, take possession thereof and sell the same in accordance with the provisions of the Securitization Act.

b) Project assets to be created including contracts and project documents shall be Mortgaged/hypothecated/Assigned in favour of REC, and further, BORROWER during the pendency of REC loan, shall not mortgage/hypothecate these assets in favour of any institution other then REC without prior written permission from REC.

c) It shall be endeavour for the Borrower to ensure registration of charge with the Registrar of Companies (ROC), and/or, with any other statutory authority in this regard, as the case may be, and shall furnish the necessary details and testimonials in this regard, before as well as after creation of securities, as required herein, and any further registration of charges with ROC/other statutory authorities shall be done only with prior approval of the Lender.

16. Project Progress Reports & Inspection

a) The Borrower should furnish quarterly progress report and provide other information on the progress of work, including photographs if any, of the project in the prescribed stages of project implementation/ financial progress.

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b) It will be open to the Lender to arrange for inspection/monitoring of the implementation of the project at all stages in respect of such matters as may be considered necessary and expedient either by itself or by monitoring agencies including institutions/individuals as may be appointed by the Lender. In particular, the inspection/monitoring envisaged will include the following:

i) Arrangements for organization, materials/equipment purchased, according to specifications and verification of quality of materials/equipment.

ii) Proper modification / improvements of the Transmission / Distribution network, inventory of the material utilized, submission of reports on pre and post efficiency measurements.

c) The officers/staff/consultants deputed by the Lender for the inspection/monitoring of matters relating to the project shall have access to such books and records of the Borrower as may be deemed necessary by them. The Borrower shall also furnish such reports on its working either in general or in specific relating to the Project financed by the Lender in the manner prescribed by the Lender from time to time.

d) The Borrower will carry out and comply with such further changes, modifications, improvements and/or guidelines as may be given by the Lender in the course of or on the basis of inspections so undertaken for the purpose of more effective and proper implementation of the project.

e) The Borrower will furnish to the Lender such reports, returns, information, statements etc. at such intervals and in such manner as may be prescribed by the Lender from time to time in regard to implementation of the Project.

f) The Borrower will permit and depute its officers and other employees as may be considered necessary by the Lender for the purpose of providing training from time to time in the procedures to be followed for making modifications/improvements in the project as may be considered relevant by the Lender

g) The Borrower shall have to certify and satisfy the Lender that necessary budget allocation has been made in the plan outlay for financing the balance/additional cost of the Project, for reason(s) whatsoever, before the release of loan by the Lender.

17. **Loan Assignment:**

The Borrower agrees that the Lender shall be fully empowered to assign the debt and the benefit of this loan, guarantees and the securities to be created for the loans to the Government of India, RBI or any other institution as security of any refinance/arrangement which may be worked out by the Lender with such organization in respect of the loan and the Borrower shall, as and when required by the Lender, join in doing and executing all such acts, deeds, documents and assurances as the Lender may require for effectuation of such assignment.

18. **Project Clearances**

The Borrower shall obtain all applicable statutory and other clearances from the Central/State Govt. and all other agencies required for implementation of the Project and installation of plant and systems.

19. Pre-disbursement Conditions :

31/10/11

दिलीप कुमार शर्मा / D. K. SARMA
निदेशक (परियोजना) / Director (Projects)
बिहार ग्रिड कम्पनी लि० / Bihar Grid Company Ltd.
बोरिंग रोड, पटना-800 001 / Boring Road, PATNA-800 001

A Velucham
Chief Project Manag
Rural Electrification Corporat
A Govt. of India Enter
A 'Navratna CPSE' under the Mini
Patna Project Office
Patna - 800001

The obligation of Lender to commit the Rupee Term Loan shall be subject to the Borrower complying with the conditions given below to the satisfaction of the Lender. The Borrower shall always demonstrate that:

a) BORROWER have not defaulted on any of its loans & submit satisfactory cash flow of the project.
b) BORROWER to submit confirmed source of own investment & shall raise and proportionately invest the same along with REC loan (where applicable) & shall not utilize it for repayment/settlement of outstanding liabilities.
c) BORROWER will submit the implementation schedule and draw down schedule, if asked for.
d) Undertake that all statutory and non-statutory clearances as applicable for implementation of the project have been obtained.
e) BORROWER shall have tied up for equity and balance loan amount, if any, before disbursement.
f) BORROWER has created security as acceptable to REC.

20. Other Terms & Conditions

The Borrower shall always ensure that:

a) REC reserves the right to specify additional requirement by REC, in security package if any, in terms & conditions and loan documents.
b) BORROWER shall keep REC informed about any happening/events which shall have a substantial effect on the business of the borrower & shall provide necessary information, in case of any new project/expansion of existing project taken up during the currency of REC loan. REC shall have the right to cancel/recall the entire loan in case of misrepresentation/ suppression of information, if any noticed at any stage.
c) In case the project is abandoned/stuck-up by any of the reason, BORROWER shall be bound to repay its entire outstanding loan amount immediately.
d) BORROWER not to transfer or abandon the project at any stage or in any manner whatsoever without prior written consent of REC.
e) BORROWER will be required to display board at the site showing that the project is financed by REC.
f) No dividend would be declared by BORROWER if there is any default to the REC's loan.

21. Maintenance of Books of Accounts and Audit thereof

The Borrower shall maintain all the time during subsistence of RTLA, proper accounts and other records and prepare annual financial statements and get them audited as are required by Indian Companies Act or other relevant law and shall furnish to the lender the Unaudited Financial Statements within 3 months and Audited Financial Statements within 7 months from the close of relevant accounting years.

22. Demand Notice

The Lender shall send demand notice of the amount falling due to be paid by the Borrower to the Lender at least 7 business days in advance to the Due Dates of such payments solely for the

दिलीप कुमार शर्मा / D. K. SARMA
निदेशक (परियोजना) / Director (Projects)
बिहार ग्रिड कम्पनी लि. / Bihar Grid Company Ltd.

A Velucham
Chief Project Ma
Rural Electrification Corpo
A Govt. of India En
A 'Navratna CPSE' under the
Patna Project O

convenience of the Borrower. However, any delay or absence of such demand notic[illegible] shall not absolve the Borrower of their obligations under RTLA.

23. REC's liability Rested

Notwithstanding to above and hereafter, the REC shall not be liable for any direct or indirect loss/ damage/ injury to the property, manpower or business of the Borrower or their affiliates caused due to the act, negligence, misconduct or omission of the Lender or its representative(s) except as defined herein or by virtue of any prevalent law.

24. Interpretation

The decision of Chairman & Managing Director of REC Ltd. in all matters including interpretation of any clause relating to the RTLA shall be final and binding on the Borrower.

दिलीप कुमार शर्मा / D. K. SARMA
निदेशक (परियोजना) / Director (Projects)
बिहार ग्रिड कम्पनी लि० / Bihar Grid Company Ltd.
बोरिंग रोड, पटना-800 001 / Boring Road, PATNA-800 001

A Velucham
Chief Project Man
Rural Electrification Corpor
A Govt. of India Ent
A 'Navratna CPSE' under the M
Patna Project Off
Patna - 80000

Annexure-10

REC Loans

Sl.No.	Tranch No	First Disb Date	Days	ROI	O/S Bal	t Amount D	Contribution	Weight of Interest
1	1	19-FEB-2015	91	10.5	39990755	1046881	0.33%	0.04%
2	2	02-MAR-2015	91	10.5	120000000	3141370	1.00%	0.11%
3	3	27-MAR-2015	91	10.5	148000004	3874356	1.24%	0.13%
4	4	13-MAY-2015	43	10.5	100000004	1236986	0.83%	0.09%
6	5	01-JUL-2015	91	10.75	233439680	6256503	1.95%	0.21%
7	6	16-OCT-2015	91	10.75	408000000	10934959	3.41%	0.37%
8	7	30-NOV-2015	91	10.75	163999996	4395425	1.37%	0.15%
9	8	13-JAN-2016	91	10.75	223999996	6003507	1.87%	0.20%
10	9	17-FEB-2016	91	10.75	162559996	4356831	1.36%	0.15%
11	10	07-MAR-2016	91	10.75	544320000	14588522	4.54%	0.49%
12	11	28-MAR-2016	91	11	226800000	6219912	1.89%	0.21%
13	12	31-MAR-2016	91	11	45096703	1236762	0.38%	0.04%
14	13	11-APR-2016	91	11	163519996	4484480	1.36%	0.15%
15	14	25-MAY-2016	91	11	348240000	9550363	2.91%	0.32%
16	15	17-JUN-2016	91	11	271999996	7459507	2.27%	0.25%
17	16	18-JUL-2016	91	11	48000000	1316384	0.40%	0.04%
18	17	18-JUL-2016	91	11	352000004	9653480	2.94%	0.32%
19	18	12-SEP-2016	91	11	559999996	15357808	4.67%	0.51%
20	19	20-OCT-2016	91	11	799999996	21939726	6.68%	0.73%
21	20	21-DEC-2016	91	11	1015999996	27863452	8.48%	0.93%
22	21	31-DEC-2016	91	11	133645714	3665188	1.12%	0.12%
23	22	14-FEB-2017	91	11	264000000	7240110	2.20%	0.24%
24	23	31-MAR-2017	91	11	166753565	4573159	1.39%	0.15%
25	24	31-MAR-2017	91	11	73246435	2008758	0.61%	0.07%
26	25	29-MAY-2017	91	11	559999996	15357808	4.67%	0.51%
27	26	30-JUN-2017	91	11	304268436	8344458	2.54%	0.28%
28	27	30-JUN-2017	91	11	312000000	8556493	2.60%	0.29%
29	28	30-JUN-2017	91	11	183731560	5038775	1.53%	0.17%
30	29	06-SEP-2017	91	10.5	600000000	15706849	5.01%	0.53%
31	30	27-DEC-2017	91	10.5	247600004	6481693	2.07%	0.22%
32	31	31-DEC-2017	91	10.5	232311794	6081477	1.94%	0.20%
33	32	25-MAY-2018	55	10	199999996	3013699	1.67%	0.17%
35	33	30-JUN-2018	91	10.25	247712371	6330239	2.07%	0.21%
36	34	30-JUN-2018	91	10.25	7008316	179096	0.06%	0.01%
37	35	25-SEP-2018	91	10.25	276610168	7068716	2.31%	0.24%
38	36	13-NOV-2018	91	10.25	227586210	5815919	1.90%	0.19%
39	37	20-MAR-2019	91	10.5	188800003	4942422	1.58%	0.17%
40	38	24-JUN-2019	91	10.5	143914289	3767400	1.20%	0.13%
41	39	30-JUL-2019	91	10.5	413149089	10815451	3.45%	0.36%
42	40	17-DEC-2019	91	10.5	208291973	5452684	1.74%	0.18%
43	**1**	**10-JUN-2020**	**91**	**10.5**	**225882354**	**5913167**	**1.89%**	**0.20%**
44	**2**	**17-SEP-2020**	**91**	**10**	**426524226**	**10633892**	**3.56%**	**0.36%**
45	**3**	**31-DEC-2020**	**91**	**10**	**362894248**	**9047500**	**3.03%**	**0.30%**
					11981897865	**320016277**	**100.00%**	**10.72%**
						5917222.6		
						314099054		

ROI	Weight	WAROI
10.72%	0.59	0.06
9.52%	0.41	0.04
		10.23%

WAROI

PFC Loans

Sl.No.	Disbursement Date	Days	ROI	O/S Bal	Int Amount	Rate	WEIGHTS	weighted avg ROI
1	20-04-2018	75	9.15	25,00,00,000	4700342	9.40	0.03	0.28%
2	15-07-2018	75	9.40	54,52,397	105313	9.65	0.00	0.01%
3	16-08-2018	75	9.40	25,00,00,000	4828767	9.65	0.03	0.28%
4	15-10-2018	75	9.40	96,93,876	187238	9.65	0.00	0.01%
5	26-10-2018	75	9.40	31,00,00,000	5987671	9.65	0.04	0.35%
6	15-01-2019	75	9.40	1,85,14,590	357611	9.65	0.00	0.02%
7	25-03-2019	75	9.65	19,00,00,000	3767466	9.90	0.02	0.22%
8	15-04-2019	75	9.65	2,04,55,220	405602	9.90	0.00	0.02%
9	18-06-2019	75	9.65	52,27,00,000	10364497	9.90	0.06	0.61%
10	25-07-2019	75	9.65	38,50,00,000	7634075	9.90	0.05	0.45%
11	15-07-2019	75	9.65	2,84,10,431	563344	9.90	0.00	0.03%
12	02-08-2019	75	9.65	1,50,00,00,000	29743151	9.90	0.18	1.76%
13	15-10-2019	75	9.65	7,60,48,396	1507946	9.90	0.01	0.09%
14	11-11-2019	75	9.65	75,00,00,000	14871575	9.90	0.09	0.88%
15	03-01-2020	75	9.65	1,00,00,00,000	19828767	9.90	0.12	1.17%
16	15-01-2020	75	9.65	9,89,43,075	1961919	9.90	0.01	0.12%
17	13-03-2020	75	9.40	50,00,00,000	9657534	9.65	0.06	0.57%
18	**15-04-2020**	**75**	**9.40**	**13,70,24,464**	**2646637**	**9.65**	**0.02**	**0.16%**
19	**27-05-2020**	**75**	**9.40**	**50,00,00,000**	**9657534**	**9.65**	**0.06**	**0.57%**
20	**15-07-2020**	**75**	**9.40**	**15,08,41,195**	**2913508**	**9.65**	**0.02**	**0.17%**
21	**15-09-2020**	**75**	**9.15**	**50,00,00,000**	**9400685**	**9.40**	**0.06**	**0.55%**
21	**15-09-2020**	**75**	**9.40**	**16,53,00,620**	**3192793**	**9.65**	**0.02**	**0.19%**
21	**30-12-2020**	**75**	**9.40**	**50,00,00,000**	**9657534**	**9.65**	**0.06**	**0.57%**
21	**15-01-2021**	**75**	**9.40**	**17,90,48,619**	**3458336**	**9.65**	**0.02**	**0.20%**
21	**26-03-2021**	**5**	**9.40**	**20,00,00,000**	**257534**	**9.65**	**0.02**	**0.23%**
				8247432883	**157657380**		**1**	**9.52%**

WAROI

Annexure - II

Name of the Assassee	:	Bihar Grid Company Limited	Financial Year	:	2020-21
Date of Birth	:	4-Jan-2013	A. Y.	:	2021-22
PAN	:	AAFCB3344L	Contact No.	:	
Address	:	Second Floor, Alankar Place, Boring Road, Patna- 800001	Bank A/c No.	:	
			IFS CODE	:	

Computation of total income and tax liability

Net Proft as per Profit & Loss A/c		1,95,69,94,646.00	
Less: Brought forward previous year loss		33,29,56,473.00	
			-
Net Profit after adjustment of loss		1,62,40,38,173.00	
Add: Depreciation as per books		95,54,50,533.00	
		2,57,94,88,706.00	
Less: Depreciation as per Income Tax		91,06,49,901.54	1,66,88,38,804.46
Total income from business & profession			**1,66,88,38,804.46**
Tax on total income			**36,71,44,536.98**
Add:	Surcharge		3,67,14,453.70
Tax & Surcharge			**40,38,58,990.68**
Add:	E.Cess		1,61,54,360.00
	Total Tax Liability		**42,00,13,350.00**
Add:	Interest u/s- 234A/B/C		-
	Total Tax Liability & Interest		**42,00,13,350.00**
Less	**TDS**		-
	Tax Deducted at Source	6,06,28,675	
	Tax Collected at Source	3,32,020	
	Advance Tax	39,81,70,765	45,91,31,460.13
Tax payable/(refundable)			**-3,91,18,110.13**

Annexure - 12

Statement of Bank balance

Bank	Opening Balance	Drawl of Loan	Drawl of Equity	Receipt from Costomer	Total	Utilised for Payment	Closing Balance
Part-1	19,39,99,610.00	1,06,36,36,534.00	79,00,28,180.00	1,91,21,00,000.00	3,95,97,64,324.00	3,67,36,59,526.00	28,61,04,798.00
Part-2	1,45,18,98,575.00	1,70,00,00,000.00	-	-	3,15,18,98,575.00	2,33,53,63,739.00	81,65,34,836.00

Annexure - 12

G KRISHNA & CO.
Chartered Accountants

Annexure - 13

Patna Begusarai Lucknow

TO
Director (Projects)
BIHAR GRID COMPANY LIMITED
PATNA
BIHAR 800001

SUB:- Physical Verification of O&M and Construction Stores.

Ref. :- JV/PT/BG/2020-21/22 Dated 07-01-2021

Dear Sir

Physical Verification of O&M and Construction stores of Bihar Grid Company Ltd. have been conducted by us.

We are enclosing herewith our comments on the said verification and the Statement of O&M and Construction Material Lying in different stores/offices/locations.

Thanking You

Place: - Patna
Date: - 27/07/2021

For G KRISHNA & CO
CHARTERED ACCOUNTANT
FRN-010098C

Partner (DILIP KUMAR SINGH)
M.No-099637

UDIN 21099637AAAALL2044

End As Above.

G. KRISHNA & CO. PATNA 010098C Chartered Accountants

H.O.: 305, Shashi Complex, Exhibition Road Patna—**800 001**
E-mail: gkrishna05@gmail.com, Ph.0612-2218047 Mob: 9431023147, 9386155718

Auditors Reporting

A. We have conducted physical Verification of O&M and Construction stores on various dates in the July, 2021 and we observe the following:

1. The Construction Stores/Sites are located in different places for different Project/Packages in Bihar.

2. We have been provided with a list of stores for different projects/Packages. It is seen that Material are stored as per convenience for execution of work in Various Places even for particulars project also.

3. The coverage of the Physical verification of O&M and construction Stores of transmission lines and substation of BIHAR GRID COMPANY LIMITED.

4. Though the ownership of such store material lies with BGCL but as per methodology construction stores materials are directly handed over by BGCL to the construction agencies and stores during construction period is maintained by the erection agencies and after construction the respective line or substation on required parameter the asset is handed over to BGCL.

5. The O&M and Construction Stores have been mostly verified by a committee comprising of two /more persons out of the following member as is available on the date of verification.
   A) One member of finance Department
   B) One technical member from concerned site/ PESM Department.
   C) One representative of the erection agency for the concerned store.
   D) One member from M/s G Krishna & Co, Chartered Accountants.

6. As told to us, during construction stage BGCL does not maintain any stores. Only when the system comes under operation, BGCL Starts maintaining stores for system maintenance as per requirement.

7. During Construction stage whatever material are procured from different parties, the same are handed over to erection agencies for the specific work.

8. When the materials are used in construction for line and substation, BGCL Transfer the cost of materials used in construction from construction stores to Capital work in progress (CWIP) through consumption entries by the respective Engineers in charge of the Project.

9. Finally, when the system is charged /Commissioned and the balance construction stores is returned to BGCL, the balance materials, if any, are transferred to BGCL O&M Stores. As told, the process is usually done after material reconciliation and final bill.

10. The physical verification of constructions stores lying in the store of construction agencies has been done by us based on list provided by BGCL.

G. KRISHNA & CO. PATNA 010098C Chartered Accountants

B. In order to verify the O&M and construction stores lying in different stores we have adopted the following methodology:

1. We have checked stores issue vouchers (SIV), stores receipt vouchers (SRV), Material Return Notes (MRN), Stores transfer voucher (STV), Materials received and handling over vouchers (MRHOV) Stores ledger and all related documents as are required for the purpose of verification of construction stores and we have seen internal control are generally found to be reliable.

2. Verification has been done based on list of materials provided to us store wise project wise and same has been reconciled with Stores Ledger.

3. It has been explained to us that the materials lying in construction stores are covered under insurance. The erection contractor shall be liable for any shortage or theft thereof as per the provisions of the contract.

4. As drum wise actual measurement of conductor was not possible, Conductor has been physically verified based on no. of drums and total km of conductors store wise generally matches with the stores ledger considering length of conductor per drum as told to us by site.

5. As weigh Bridge facility and allied infrastructure for weighing are not available in site, tower parts, stubs and other materials which are likely to be measured in MT has been verified on visual inspection on the basis of numbers and sets available at site and no weighment could be done for arriving at the actual quantity as per verification.

6. Insulators are not properly segregated based on different dimension of insulators and there was no proper spacing between the rows for which physical counting thereof was very difficult.

7. In case of substations, as the no. of items are very large, visual inspection of the materials has been carried out and it has been found that in some the stores no proper system is adopted for storing thereof.

C) While carrying out the physical verification of O&M and construction stores following were noticed in the system:

1. Safety aspect in store is also to be taken care of reasonably.

2. Updation of stores records are not done on regular basis in some of the stores.

3. Proper staking of materials is not done in some stores.

4. There was excess of 1 Nos of Split Ac, maintain 53 Nos on Stock register during physical verification founded 54 Nos at Hatidah Stores, Mokamah, as store incharge inform to us 1 Nos recently installed by ABB but handover not taken still by store.

G. KRISHNA & CO. PATNA Chartered Accountants

5. There was excess of 5 Nos of computer in SCADA Room, maintain 3 Nos on Stock register during physical verification founded 8 Nos at Hatidah Stores, Mokamah, as store Incharge inform to us 5 Nos ABB not handover to us.

6. There was excess of 1 Nos of HP Laser jet Printer, maintain 2 Nos on Stock register during physical verification founded 3Nos at Hatidah Stores, Mokamah, as store Incharge inform to us 1 Nos received from HQ. I ask for any paper but not show.

7. There was excess of 6 Nos of computer in SCADA Room, maintain 2 Nos on Stock register during physical verification founded 8 Nos at Haveli Kharagpur, Jamui as store Incharge inform to us 5 Nos ABB not handover to us.

8. There was excess of 1 Nos of 145kv voltage transformer, Gas insulated, on register maintain NIL during physical verification found 1 Nos at Goradih, Bhagalpur Store.

9. There was excess of 6 Nos Oil drum, as per stock register 251 Nos received, consumed show 233 Nos, 4 Nos Delivered to Nawada Stock shown 14 Nos During Stock verification founded 20 Nos at store Khijipursarai- Gaya.

Place: - Patna
Date: - 27/07/2021

For G KRISHNA & CO
CHARTERED ACCOUNTANTS
FRN-010098C

G. KRISHNA & CO. PATNA 010098C Chartered Accountants

Partner (DILIP KUMAR SINGH)
M.No-099637

UDIN 21099637AAAALL2044

Attachment: -

1. Various Verified Store Material Sheets duly signed and stamped.
2. List of Store Verified.

Annexure – 14

Comparision sheet for R&M and A&G expense for FY 2019-20 & FY 2020-21

Amount in Cr.

Particulars	FY 2019-20	FY 2020-21	Increase	Reason for increase
Repair & Maint.-Sub-Stations	1.079	9.579	8.50	• Bay maintenance Rs 1.10 Lakh • E5Amnour restoration works Approx Rs 7.00 Crore • Due to change in expense allocation ratio between R&M and IEDC.
R&M-Sub-Stn Security-Manpower Outsource	7.219	10.511	3.29	• New assets capitalised, consequently Security & Manpower for sub-station increased as per requirement. • Due to change in expense allocation ratio between R&M and IEDC.
R&M-Transmission-Manpower Outsource	0.177	0.321	0.14	• Due to change in expense allocation ratio between R&M and IEDC. • New assets capitalised, consequently Manpower for sub-station increased
-Others	0.008	0.028	0.02	• Due to change in expense allocation ratio between R&M and IEDC. • As per Actual
Advertisement Expenses	0.171	0.203	0.03	• Due to change in expense allocation ratio between R&M and IEDC. • The actual expenses was reduced by 50 % in compare to last year. In Fy 2020-21 Rs 10.95 Lakh transferred to IEDC out of Rs 31.29 Lakh and In FY 2019-20 Rs 45.83 Lakh transferred to IEDC out of Rs 62.97 Lakh.
Audit Fees	0.005	0.032	0.03	• Due to change in expense allocation ratio between R&M and IEDC. • As per Actual
Communication Expenses	0.013	0.102	0.09	• Installation and commissioning of LAN at Amnaur-Rs 3.01 Lakh & • Paid Bandwith Charges - Rs 7.34 Lakh
CSR Exp.-Sports,Art & Culture	0.067	0.515	0.45	• Due to change in expense allocation ratio between R&M and IEDC. • As per Actual
Entertainment Expenses	0.011	0.032	0.02	• Due to change in expense allocation ratio between R&M and IEDC. • Actual as per the entitlement of employee.
Filing Fee	0.041	0.081	0.04	• Due to change in expense allocation ratio between R&M and IEDC. • Actual expenses was reduced but allocation of IEDC reduced in current year.
Insurance	0.146	0.971	0.83	• Due to change in expense allocation ratio between R&M and IEDC. • Actual insurance expenses
Legal Expenses	0.012	0.020	0.01	• Due to change in expense allocation ratio between R&M and IEDC. • Actual expenses was reduced but allocation of IEDC reduced in current year.
Licence Fee	0.101	1.000	0.90	• Due to change in expense allocation ratio between R&M and IEDC. • As per Actual
Meeting Expenses	0.001	0.023	0.02	• Due to change in expense allocation ratio between R&M and IEDC. • Actual expeses for emeeting of employee & picnic.
Office Expenses	0.209	0.984	0.78	• Due to change in expense allocation ratio between R&M and IEDC. • As per Actual
Printing & Stationery Expenses	0.030	0.062	0.03	• Due to change in expense allocation ratio between R&M and IEDC. • Actual expenses was reduced but allocation of IEDC reduced in current year.
Recruitment Expenses	0.002	0.004	0.00	• Due to change in expense allocation ratio between R&M and IEDC. • As per Actual
Rent	0.207	0.527	0.32	• Due to change in expense allocation ratio between R&M and IEDC. • As per Actual
Telephone & Mobile Expenses	0.032	0.072	0.04	• Due to change in expense allocation ratio between R&M and IEDC. • Actual expenses was reduced but allocation of IEDC reduced in current year.
Travelling Expenses	0.234	0.329	0.09	• Due to change in expense allocation ratio between R&M and IEDC. • Actual expenses was reduced but allocation of IEDC reduced in current year.
Vehicle Expenses	0.444	1.185	0.74	• Due to change in expense allocation ratio between R&M and IEDC. • Actual expenses was reduced but allocation of IEDC reduced in current year.

Annexure – 14

BIHAR GRID COMPANY LIMITED

2nd FlOOR, ALANKAR PLACE, BORING ROAD, PATNA

CIN: 040100BR2013PLC019722

Printing & Stationery Exp.

Monthly Summary

Particulars	1-Apr-2020 to 31-Mar-2021			1-Apr-2019 to 31-Mar-2020		
	Transactions		Closing Balance	Transactions		Closing Balance
	Debit	Credit		Debit	Credit	
Opening Balance						
April	*1,180*		1,180 Dr			
May	*15,706*		16,886 Dr	8,205		*8,205 Dr*
June	*1,02,786*		1,19,672 Dr	1,55,875		*1,64,080 Dr*
July	*30,700*		1,50,372 Dr	1,23,596		*2,87,676 Dr*
August	*25,177*		1,75,549 Dr	24,073		*3,11,749 Dr*
September	*74,350*		2,49,899 Dr	89,786		*4,01,535 Dr*
October	*1,10,493*		3,60,392 Dr	1,40,153		*5,41,688 Dr*
November	*27,186*		3,87,578 Dr	96,784		*6,38,472 Dr*
December	*13,606*		4,01,184 Dr	50,020		*6,88,492 Dr*
January	*33,436*		4,34,620 Dr	1,31,456		*8,19,948 Dr*
February	*2,92,492*		7,27,112 Dr	71,098		*8,91,046 Dr*
March	*2,27,605*	*3,34,346*	6,20,371 Dr	2,20,592	8,09,040	*3,02,598 Dr*
Grand Total	***9,54,717***	***3,34,346***	**6,20,371 Dr**	**11,11,638**	**8,09,040**	***3,02,598 Dr***

BIHAR GRID COMPANY LIMITED

2nd FIOOR, ALANKAR PLACE, BORING ROAD, PATNA

CIN: 040100BR2013PLC019722

Travelling Exp.

Monthly Summary

Particulars	1-Apr-2020 to 31-Mar-2021			1-Apr-2019 to 31-Mar-2020		
	Transactions		Closing Balance	Transactions		Closing Balance
	Debit	Credit		Debit	Credit	
Opening Balance						
April				1,26,157		*1,26,157 Dr*
May	*28,760*		28,760 Dr	2,10,562		*3,36,719 Dr*
June	*1,61,338*		1,90,098 Dr	3,66,571		*7,03,290 Dr*
July	*4,70,602*		6,60,700 Dr	7,66,870		*14,70,160 Dr*
August	*1,37,758*		7,98,458 Dr	3,60,817		*18,30,977 Dr*
September	*6,62,170*		14,60,628 Dr	11,61,253		*29,92,230 Dr*
October	*6,11,845*		20,72,473 Dr	6,72,808		*36,65,038 Dr*
November	*3,02,163*		23,74,636 Dr	8,77,195		*45,42,233 Dr*
December	*5,20,669*		28,95,305 Dr	10,77,799		*56,20,032 Dr*
January	*7,74,199*		36,69,504 Dr	11,42,065		*67,62,097 Dr*
February	*5,79,665*		42,49,169 Dr	6,39,810		*74,01,907 Dr*
March	*8,08,334*	*17,71,160*	32,86,343 Dr	11,82,571	62,47,704	*23,36,774 Dr*
Grand Total	***50,57,503***	***17,71,160***	**32,86,343 Dr**	**85,84,478**	**62,47,704**	***23,36,774 Dr***

BIHAR GRID COMPANY LIMITED

2nd FIOOR, ALANKAR PLACE, BORING ROAD, PATNA

CIN: 040100BR2013PLC019722

Legal Services

Monthly Summary

Particulars	1-Apr-2020 to 31-Mar-2021			1-Apr-2019 to 31-Mar-2020		
	Transactions		Closing Balance	Transactions		Closing Balance
	Debit	Credit		Debit	Credit	
Opening Balance						
April						
May				69,349		*69,349 Dr*
June	*15,587*		15,587 Dr	13,110		*82,459 Dr*
July			15,587 Dr	27,668		*1,10,127 Dr*
August	*16,626*		32,213 Dr			*1,10,127 Dr*
September			32,213 Dr	44,987		*1,55,114 Dr*
October			32,213 Dr	65,784		*2,20,898 Dr*
November	*14,218*		46,431 Dr	17,096		*2,37,994 Dr*
December			46,431 Dr	21,588		*2,59,582 Dr*
January	*26,390*		72,821 Dr			*2,59,582 Dr*
February	*17,204*		90,025 Dr	41,148		*3,00,730 Dr*
March	*2,12,207*	*1,05,843*	1,96,389 Dr	1,29,664	3,13,237	*1,17,157 Dr*
Grand Total	***3,02,232***	***1,05,843***	**1,96,389 Dr**	**4,30,394**	**3,13,237**	***1,17,157 Dr***

BIHAR GRID COMPANY LIMITED

2nd FIOOR, ALANKAR PLACE, BORING ROAD, PATNA

CIN: 040100BR2013PLC019722

Insurance

Monthly Summary

Particulars	1-Apr-2020 to 31-Mar-2021			1-Apr-2019 to 31-Mar-2020		
	Transactions		Closing Balance	Transactions		Closing Balance
	Debit	Credit		Debit	Credit	
Opening Balance						
April						
May						
June				26,57,452		*26,57,452 Dr*
July						*26,57,452 Dr*
August						*26,57,452 Dr*
September	*75,49,739*		75,49,739 Dr			*26,57,452 Dr*
October	*24,710*		75,74,449 Dr	45,320		*27,02,772 Dr*
November			75,74,449 Dr	4,98,762		*32,01,534 Dr*
December			75,74,449 Dr	3,294		*32,04,828 Dr*
January	*21,39,605*		97,14,054 Dr	21,67,715		*53,72,543 Dr*
February			97,14,054 Dr			*53,72,543 Dr*
March			97,14,054 Dr		39,10,087	*14,62,456 Dr*
Grand Total	***97,14,054***		**97,14,054 Dr**	**53,72,543**	**39,10,087**	***14,62,456 Dr***

Annexure- 15

BIHAR GRID COMPANY LIMITED
2nd FlOOR, ALANKAR PLACE, BORING ROAD, PATNA
State Name : Bihar, Code : 10
CIN: 040100BR2013PLC019722
E-Mail : bihargrid@gmail.com

Journal Voucher

No. : **1139** Dated : **5-Mar-2021**

Particulars		Debit	Credit
Retention Money- L & T Ltd.	*Dr*	**85,12,530**	
Retention Money- L & T Ltd.	*Dr*	**1,80,696**	
To Liquidated Damages Recovered.			**13,53,534**
To CGST (RCM)			**1,21,818**
To SGST (RCM)			**1,21,818**
To CWIP -Towers			**4,49,214**
To Contractors/Suppliers Control A/C			**1,80,696**
To Contractors/Suppliers Control A/C			**64,66,146**
On Account of :			
Paid to LARSEN & TOUBRO LTD. TW02 for Final 5% Release/LD Recovered for Phase-IV Part- Projects.			
		₹ 86,93,226	**₹ 86,93,226**

Authorised Signatory

Progress Report

SUMMARY of TOWER PACKAGES - Part-I

Date : 31/12/2021

Sch Compl : 19 months for NOA

CD Pkg	Sl. no	Name of Transmission Line [Revised Name]	CD type*	Route length (kms) As per LOA	Route length (kms) Act/ Rev	Nos. of fdn (Rev)	Fdn Cumm Pgr.	Erec. Cumm Pgr.	Strg. Cumm Pgr	Bal Strg kms.	Remarks/Schedule Completion
A. Tower Package TW-01 M/s Tata Projects (NOA date :Nov'14)											
CD-01	1	220kV D/C Hajipur- Amnaur(New)	Z	70	47.7	147	147	147	47.7	0.0	CHARGED on 17/04/17.
CD-01	2	132kV D/C Amnaur (New)- Siwan	P	90	65.7	211	211	211	65.7	0.0	CHARGED on 11/08/17
CD-01	3	132kV D/C Amnaur (new)-Chapra(old)	Z	30	25.6	84	84	84	25.6	0.0	CHARGED on 26/12/17
CD-02	4	220kV D/C Patna-Khagaul	H	18	25.5	87	87	87	25.5	0.0	CHARGED on 07/08/19
CD-01	5	LILO of one ckt of132kV D/C Khagaul-Digha at Bihta	P	25	29.3	97	97	97	29.3	0.0	Work completed. Shutdown awaited from BSPTCL for line charging. Completion likely by Jan'22
				233	193.8	626	626	626	193.8	0.0	
B. Tower Package TW-02 M/s L&T (NOA date : Oct'14)											
CD-01	1	LILO OF 132kV S/C Bodhgaya-Wazirganj Line at Khizersarai	P	30	30.2	110	110	110	30.2	0.0	CHARGED on 31/08/17
CD-01	2	132kV S/C (on D/C Tower) Khizersarai New -Hulasganj	P	50	10.3	40	40	40	10.3	0.0	CHARGED on 25/08/17
CD-03	3	220kV D/C Gaya(PG) - Khizersarai	H	45	56.2	197	197	197	56.2	0.0	CHARGED on 26/05/18
CD-03	4	220kV D/C Narhat -Khizersarai	H	65	55.0	181	181	181	55.0	0.0	CHARGED on 14/09/17
CD-01	5	LILO OF 220kV D/C Biharsharif-Bodhgaya Line at Khizersarai	Z	30	15.9	54	54	54	15.9	0.0	CHARGED on 06/08/17
				220	167.5	582	582	582	167.5	0.0	
C. Tower Package TW-03 M/s L&T (NOA date : Oct '14)											
CD-01	1	132kV D/C SheikhpurSarai -Sheikhpura	Z	30	24.5	84	84	84	24.5	0.0	CHARGED on 22/12/17
CD-01	2	132kV S/C (on D/C Towers) SheikhpurSarai - Biharsharif	P	50	42.6	179	179	179	42.6	0.0	CHARGED on 25/02/19
CD-01	3	132kV D/C Narhat -Nawada	Z	25	17.5	55	55	55	17.5	0.0	CHARGED on 16/09/17
CD-04	4	220kV D/C SheikhpurSarai - Haveli Khagarpur	H	135	125.0	411	411	411	125.0	0.0	CHARGED on 27/04/18
CD-02	5	220kV D/C Narhat -SheikhpurSarai	H	75	50.8	170	170	170	50.8	0.0	CHARGED on 21/12/17
				315	260.4	899	899	899	260.4	0.0	
D. Tower Package TW-04 M/s RS Infra (NOA date : Jan'15)											
CD-01	1	132kV D/C Goradih to Sabour TL *(incl XLPE cable)*	Z	10	25.0	43	43	43	25.0	0.0	CHARGED on 11/06/19
	2	LILO of 132kV D/C Kahalgaon- Sultanganj at Goradih	3ac P	10	18.1	72	72	72	18.1	0.0	CHARGED on 18/04/17
CD-05	3	220kV Goradih to Haveli Khagarpur	H	85	60.3	198	198	198	60.3	0.0	CHARGED on 24/01/19
CD-01	4	132kV D/C Haveli Khagarpur - Jamalpur *(incl XLPE cable)*	Z	7.5	34.3	119	119	119	34.3	0.0	CHARGED on 16/01/19
	5	LILO of132kV D/C Sultanganj- Lakhisarai at Haveli Khagarpur	3ac P	5	37.0	149	149	149	37.0	0.0	CHARGED on 01/05/18
CD-01	6	LILO of 220kV D/C Begusarai- Biharsarif at Mokama	Z	30	6.5	24	24	24	6.5	0.0	CHARGED on 18/09/20
CD-01	7	132kV D/C Hathidah to Mokama	Z	8	6.9	28	28	28	6.9	0.0	CHARGED on 22/09/20
				155.5	188.0	633	633	633	188.0	0.0	
				923.5	809.7	2740	2740	2740	809.7	0.0	
				OVERALL Completion			100.0%	100.0%	100.00%		

* Z - ACSR ZEBRA, P- ACSR PANTHER , H-HTLS ZEBRA , 3ac P- AAAC PANTHER

Annexure-16

Date : 31/12/2021

Summary of GIS S/s - PART-I

Sl. No.	Name of GIS Substation (220/132/33kV)	Package	NOA Date	Agency	Land availability date	Scheduled completion (NOA)	Sch comp / Rev L2 based on land Availability	Anticipated/ Actual compl.	Work status/Constraints
NEW GIS SUB STATION (220/132/33KV)									
1	**Amnaur (2X160+2X50MVA)**	SS-04	30.09.2014	M/s SIEMENS	16.03.15	Apr'16	Dec'16	COMMISSIONED	Commissioned on **18.04.2017.**
2	**Khisersarai (2X160+3X50MVA)**	SS-03	30.09.2014	M/s SIEMENS	31.03.15	Apr'16	Oct'16	COMMISSIONED	Commissioned on **12.08.2017.**
3	**Narhat (2X160+2X50MVA)**	SS-04	30.09.2014	M/s SIEMENS	14.05.15	Apr'16	Dec'16	COMMISSIONED	Commissioned on **14.09.2017.**
4	**Sheikhopursarai (2X160+2X50MVA)**	SS-02	04.11.2014	M/s ABB	11.03.15	May'16	Sept'16	COMMISSIONED	Commissioned on **21.12.2017.**
5	**Haveli Kharagpur (2X160+2X50MVA)**	SS-01	04.11.2014	M/s ABB	05.05.15	May'16	Nov'16	COMMISSIONED	Commissioned on **27.04.2018.**
6	**Goradih (2X160+2X50MVA)**	SS-01	04.11.2014	M/s ABB	18-6-2015	May'16	Jan'17	COMMISSIONED	Commissioned on **24.01.2019**
7	**Mokama (2X160+2X50MVA)**	SS-02	04.11.2014	M/s ABB	Nov'17	May'16	May'19	COMMISSIONED	Commissioned on **22.09.2020**

Date : 31/12/2021

Summary of Bay extension PART-I

BAY EXTENSION WORK										
Sl. No.	Name of bay extension	Type f bay GIS/AIS	Package	NOA Date	Agency	Bay detail		Schedule Completion (NOA)	Anticipated/ Actual Completion	Work status/constraint
						220KV level	132KV level			
1	Sabour	AIS	SS-01	04.11.2014	M/s ABB	NA	2	May'16	Comp	Charged.
2	Jamalpur	AIS				NA	2	May'16	Comp	Charged.
3	Biharsharif	AIS	SS-02	04.11.2014		NA	1	May'16	Comp	Charged.
4	Sheikpura	AIS				NA	2	May'16	Comp	Charged.
5	Hatidah	AIS				NA	2	May'16	Comp	Charged.
6	Gaya(PG)	AIS	SS-03	30.09.2014	M/s SIEMENS	2	NA	Apr'16	Comp	Charged.
7	Hulasganj	AIS				NA	1	Apr'16	Comp	Charged.
8	Patna(PG)	AIS				2	NA	Apr'16	Comp	Charged.
9	Khagaul	GIS				2	NA	Apr'16	Comp	Charged.
10	Siwan	AIS	SS-04	30.09.2014	M/s SIEMENS	NA	2	Apr'16	Comp	Charged.
11	Chapra	AIS				NA	2	Apr'16	Comp	Charged.
12	Hazipur	GIS				2	NA	Apr'16	Comp	Charged.
13	Nawada	AIS				NA	2	Apr'16	Comp	Charged.
14	Bihta	GIS	SS-10	26.04.2018	M/s Shandong Taikai+Godrej	2			Comp	CHARGED on 30.01.2021(on no-load.) Load flow to commence on charging of LILO of one ckt of132kV D/C Khagaul-Digha at Bihta T/L. Ant. by Jan'22

SUMMARY of TOWER PACKAGES - Part-II

Sch Compl : 23 Months from date of NOA

Date : 31/12/2021

Sl.No	Name of tranmission Line	**CD Type	Route length - (Kms)	No. of fdn (Nos)	Construction Activity						Status	Remarks
					Fdn Cumm Progress (nos)	Bal Fdn Nos.	*Erec. Cumm Progress (nos)*	Bal Erec. Nos.	*String Cumm Progress (Kms)*	Bal String. Kms.		
Tower Package-TW02 (M/s BAJAJ) [NOA dt- 17.04.2018]												
1	132kV D/C Gaya(new)-Jehanabad transmission line	Z	30.59	95	*95*	0	*95*	0	*30.59*	0.00	**Line Charged on 22.01.2020 .**	
2	LILO of 220kV D/C Ara(PG)-Pusauli(PG) line at Dumraon (New)	Z	40.53	136	*136*	0	*136*	0	*40.53*	0.00	**Line Charged on 11.12.2020 .**	
3	132kV D/C Dumraon (new) - Dumroan (BSPTCL) transmission line	Z	25.90	89	*89*	0	*89*	0	*25.90*	0.00	**Line Charged on 30.12.2020 .**	
4	220kV D/C Naubatpur(new)-Bihta(BSPTCL) transmission line	Z	20.24	74	*68*	6	*68*	6	*16.32*	3.92	Expected completion by Mar'22 **(Severe ROW- Charging of line will take 3 months from the date ROW is resolved)**	**- WORK PROGRESS AFFECTED DUE TO COVID SECOND WAVE OF DEADLY MUTATION & IMPOSITION OF LOCKDOWN.** **- MAJOR GANGS DEMOBILISED DUE TO SEVERE ROW.** **- Work obstructed due to heavy rain/ monsoon** **- Water logging at various location/area and paddy field , Locations unapprochable** **- Anticipated charging is kept matching with S/S**
5	220kV D/C Naubatpur(new)-Bhusaula(new) transmission line (partly on monopoles)	Z	19.54	63	*63*	0	*56*	7	*14.19*	5.35	Expected completion by Mar'22	
6	132kV D/C Naubatpur-Masauhri transmission line (partly on monopoles)	Z	13.35	48	*48*	0	*48*	0	*13.35*	0.00	Line Ready. Commissioning by Mar'22 (matching with Naubatpur S/s)	
7	132kV D/C Dumraon(new)-Buxar (BSPTCL) transmission line	P	37.20	128	*128*	0	*128*	0	*37.20*	0.00	Expected completion by Feb'22 (Matching with readiness of Buxar bay)	
8	LILO of both ckt of 132kV Ara-Jagdishpur D/C T/L at Dumraon (new)	P	43.85	157	*157*	0	*154*	3	*40.55*	3.30	Expected completion by Feb'22	
9	132kV D/C Naubatpur-Palliganj transmission line	Z	27.52	81	*81*	0	*80*	1	*11.00*	16.52	Front made available recently by BSPTCL. Engg activities commenced. Expected completion by June'22	
			258.72	871	*865*	6	*854*	17	*229.63*	*29.09*		
		% compl TW02			*99%*		*98%*		*89%*			

SUMMARY of TOWER PACKAGES - Part-II

Sch Compl : 23 Months from date of NOA

Date : 31/12/2021

Sl.No	Name of tranmission Line	**CD Type	Route length - (Kms)	No. of fdn (Nos)	Construction Activity						Status	Remarks
					Fdn Cumm Progress (nos)	Bal Fdn Nos.	*Erec. Cumm Progress (nos)*	Bal Erec. Nos.	*String Cumm Progress (Kms)*	Bal String. Kms.		
Tower Package-TW01 (M/s KEC) [NOA dt - 26.04.2018]												
1	LILO of 400kV D/C (Quad) Nabinagar-II - Patna (PG) line at Jakkanpur (new)	QM	16.25	45	*45*	0	*43*	2	*14.73*	1.52	Expected completion by Mar'22. (matching with Jakkanpur S/s)	- WORK PROGRESS AFFECTED DUE TO COVID SECOND WAVE OF DEADLY MUTATION & IMPOSITION OF LOCKDOWN. - MAJOR GANGS DEMOBILISED DUE TO SEVERE ROW in various T/Ls associated with Jakkanpur/Naubatpur - Work obstructed due to heavy rain/ monsoon - Water logging at various location/area and paddy field , Locations unapprochable -Anticipated charging is kept matching with S/S
2	LILO of 400kV D/C (Quad) ckt. 3&4 of Patna-Balia line at Naubatpur (new)	QM	2.84	8	*8*	0	*7*	1	*0.00*	2.84	Expected completion by Mar'22 (matching with Naubatpur S/s)	
3	LILO of 200kV D/C Sipara(BSPTCL)-Bihta(BSPTCL) line at Jakkanpur (new)	Z	23.35	88	*47*	41	*40*	48	*6.02*	17.33	Expected completion by Mar'22 (Severe ROW)	
4	LILO of 220kV S/C Khagaul(BSPTCL)-Sipara(BSPTCL) line at Jakkanpur(new)	Z	24.81	103	*94*	9	*91*	12	*17.82*	6.99	Expected completion by Mar'22. (Severe ROW)	
5	LILO of 220kV D/C Ara(PG)-Khagaul(BSPTCL) line at Naubatpur (new)	Z	13.39	52	*43*	9	*41*	11	*5.22*	8.17	Expected completion by Mar'22 (Severe ROW)	
6	LILO of 132kV S/C Jakkanpur/Mithapur-Fathua line at Jakkanpur (new) (with HTLS conductor)	HTLS P	28.35	105	*99*	6	*97*	8	*20.40*	7.95	Expected completion by Mar'22. (Severe ROW)	
7	LILO of 132kV D/C Jakkanpur-Sipara line at Jakkanpur (new) (with HTLS conductor)	HTLS P	30.04	116	*44*	72	*26*	90	*0.00*	30.04	Expected completion by Mar'22 (Severe ROW)	
8	LILO of one ckt of 132kV D/C Purnea-Naugachia/Khagaria line at Kathihar (BSPTCL)	P	20.67	69	*68*	1	*67*	2	*18.72*	1.95	1 no. loc is under severe ROW. (DD+25 twin tower) Matter pending at Kathihar court. Status Quo order issued for said loc. Hon'ble High Court passed order in favour of BGCL and rejected appellant petition. Next hearing in Kathihar civil court . The said location 1/0 work has pile fdn & cable laying further. Exp comp by Mar'22	
			160.18	586	*448*	138	*412*	174	*82.91*			
		% compl TW01			*76%*		*70%*		*52%*			
	TOTAL PROGRESS		418.89	1457	*1313*	144	*1266*	191	*312.54*			
					90%		*87%*		*75%*			

**QM- Quad Moose, Z- ACSR Zebra, HTLS P- HTLS Panther, P-Panther

Summary of Substations Package under Ph-IV Part-II

Date : 31/12/2021

Sl no	Name of GIS S/S	Pkg	NOA dt	Agency	Land availability date	Sch Comp	Ant. Compl	Status
1	**220/132/33kV Dumraon GIS new substation (2X160MVA+2X80MVA)**	SS10	26-4-2018	M/s SHANDONG TAIKAI / M/s GODREJ	16.05.18	Feb'20	**Commissioned**	**Commissioned on 11.12.2020**
2	**400/220/132/33kV Naubatpur GIS new substation (2x500MVA+2X160MVA+2X80MVA)**	SS09	26-4-2018	M/s SHANDONG TAIKAI / M/s GODREJ	07.08.18	Feb'20	**Mar'22**	S/Y work : 85% compl Transformer - 90% compl FFPH - 85% compl GIS - 85% compl Control Room - 90% compl Water Tank -90% compl 33kV SGR - 85% compl **- Naubatpur will be commissioned after charging of 220kV D/c Naubatpur-Bihta Line (currently under severe ROW) as all Data Communication will be through this line.**
3	**220/33kV Bhusaula GIS new substation (2X100MVA)**	SS09	26-4-2018	M/s SHANDONG TAIKAI / M/s GODREJ	12.05.18	Feb'20	**Mar'22**	S/Y works - 80% comp FFPH building – 75% compl Transformer – 75% compl. Control Room - 75% compl. GIS - 70% compl 33kV SGR - 80% compl Water Tank - 80% compl **- Bhusaula will be commissioned after charging of 220kV D/C Naubatpur-Bhusaula line (i/c line)**
4	**400/220/132/33kV Jakkanpur GIS new substation (2X500MVA+3X160MVA+4X80MVA)**	SS10	26-4-2018	M/s SHANDONG TAIKAI / M/s GODREJ	12.05.18	Feb'20	**Mar'22**	S/Y works - 75% compl. FFPH - 75% comp. Transformer - 75% compl. Control Room - 75% compl. GIS - 70% compl. 33KV SGR - 70% compl. Water Tank - 85% compl **- Jakkanpur associated tranmission lines are under Severe ROW.**

Summary of Bay extensions under Ph-IV Part-II

Date : 31/12/2021

Sl no	Name of GIS/AIS bay extension	Pkg	NOA dt	Agency	Sch Compl	Ant. Compl	Status
1	**132/33kV Jehanbad AIS Extn S/s**	SS10	26-4-2018	M/s SHANDONG TAIKAI / M/s GODREJ	Feb'20	**CHARGED**	**Charged on 25.02.2020**
2	**132/33kV Dumraon AIS Extn S/s**		26-4-2018		Feb'20	**CHARGED**	**Charged on 30.12.2020.** *2nd bay to be connected by 132kV XLPE Cable.* Gantry foundation completed. Erection and cabling work balance. ***Ant by Jan'22***
3	**132/33kV Buxar AIS Extn S/s**		26-4-2018		Feb'20	**Feb'22**	Tower & Equipment foundation completed. Erection completed. Main bus stringing u/p. Cable laying under progress. GIBD work commenced.
5	**220/132/33KV Bihta (BSPTCL) GIS Extn.S/s**	SS09	26-4-2018	M/s SHANDONG TAIKAI / M/s GODREJ	Feb'20	**Mar'22**	Tower & equipment foundations/ erection completed. GIS erection completed. Bus duct erection , cable trench work under progress.
6	**132/33kV Masuhari AIS Extn S/s**		26-4-2018		Feb'20	**Mar'22**	Tower/Equipment erection completed. Bus Duct foundation, Cable trench work under progress. CRB both floor roof casting done. GIBD erection work commenced.
4	**132/33kV Katihar AIS Extn S/s**		26-4-2018		Feb'20	**Mar'22**	All Tower/Equipment foundation and erection completed. Equipment testing completed. Relay & PLCC work pending. (***Associated line- 1 no. loc held up due to Status Quo order by court***)
7	**132/33kV Palliganj AIS Extn S/s**		26-4-2018		Feb'20	**Jun'22**	Front made available recently by BSPTCL. - Engg. Work under progress.

Supplementary Works of BGCL

Project Cost	:	₹ 111.14 Cr
Funding tie up	:	₹ **88.91 cr.** (80% of Project Cost) Through domestic(Funding) **loan** from **M/s REC** and ₹ **22.282 cr**. (20% of project cost) **Equity** from the promoters [**BSP(H)CL & POWERGRID**]
Debt : Equity	:	80:20

Scope of Works:

1) Installation of 2nos. 125MVAR, 420kV Bus Reactors at 400kV Jakkanpur GIS
2) Installation of 2nos. 125MVAR, 420kV Bus Reactors at 400kV Naubatpur GIS
3) Installation of 1no. 160MVA, 220/132kV ICT at 220/132/33kV Amnour GIS of BGCL.(3rd ICT)

>> This scheme as approved by Central Electricity Authority (CEA), Ministry of Power, Govt of India and requested by BSPTCL.

FINANCIAL STATUS

Sl. No	Project	Sanctioned DPR/ Project Cost	Receipt towards Equity from Promoters	Receipt loan M/S REC	Total Receipt	Expenditure as on date
1	**Supplementary Work**	111.14	22.23	4.48	26.71	20.25

Work Status

> Section 68 granted by Govt. Of Bihar for installation of supplementary works on 09.10.2018

> Business Plan approved by Hon'ble BERC vide tariff order no 39 of 2018 and 52 of 2018,dated 15.02.2019 as Supplemental works of BGCL.

> NOA has been placed to JV of M/s Godrej and M/s Taikai India on 30.01.2020 under Substation package SS-28

> Contract agreement has been signed on 02/09/2020.

> Work is under progress for installation of Bus reactor at Jakkanpur & Naubatpur and of 3rd ICT at Amnour.

~~Proof~~ Annex - 17

Sl No	NAME OF THE SUBSTATION (NEW)	FIN YEAR	REVISION DATA BY BGCL (AMOUNT IN CR.)			TOTAL
		DOCO	HARD COST	IDC	IEDC	COST
SUBSTATIONS						
1	AMNOUR GIS	17-18	92.40	7.92	5.51	105.82
1a	AMNOUR GIS	18-19	4.33	0.37	0.27	4.96
2	KHIJIRSARAI GIS	17-18	133.48	11.44	7.96	152.87
2a	KHIJIRSARAI GIS	19-20	7.16	0.55	0.49	8.19
2b	KHIJIRSARAI GIS- 01 no. 50 MVA Xmer is pending	22-23				
3	GORADIH GIS	18-19	84.00	7.09	5.28	96.37
3a	GORADIH GIS	19-20	2.17	0.19	0.15	2.50
3b	GORADIH GIS- 01 no. 160 MVA Xmer is pending	22-23				
4	HAVELI KHARAGPUR GIS	18-19	93.00	7.85	5.85	106.70
4a	HAVELI KHARAGPUR GIS	19-20	6.68	0.51	0.45	7.65
5	SHEIKOPURSARAI GIS	17-18	89.62	7.68	5.34	102.64
5a	SHEIKOPURSARAI GIS	19-20	4.48	0.38	0.30	5.17
6	NARHAT GIS	17-18	97.43	8.35	5.81	111.58
6a	NARHAT GIS	19-20	7.16	0.55	0.49	8.19
7	MOKAMA GIS	20-21	105.55	8.94	7.18	121.67
7a	MOKAMA GIS- 01 no. 160 MVA & 01 no. 50 MVA Xmer pending	22-23				
	TOTAL (New GIS)		**727.45**	**61.80**	**45.07**	**834.33**
EXTENSION OF BSPTCL(OLD) SUBSTATION						
1	132/33 KV SIWAN	17-18	3.57	0.31	0.21	4.09
2	132/33 KV CHAPRA	17-18	10.40	0.89	0.62	11.91
3	220/132 KV HAZIPUR	16-17	42.11	1.92	2.28	46.31
4	400/220 KV GAYA	18-19	9.13	0.77	0.57	10.47
5	132/33 KV HULASGANJ	17-18	2.08	0.18	0.12	2.38
6	400/220 KV PATNA	19-20	15.28	1.31	1.04	17.62
7	220/132 KV KHAGAUL (GIS)	19-20	15.28	1.31	1.04	17.62
8	132/33 KV SABOUR	19-20	3.48	0.30	0.24	4.02
9	132/33 KV JAMALPUR	18-19	4.14	0.35	0.26	4.75
10	132/33 KV BIHARSARIF	18-19	2.44	0.21	0.15	2.80
11	132/33 KV SEIKHPURA	17-18	3.43	0.29	0.20	3.92
12	132/33 KV NAWADA	17-18	3.95	0.34	0.24	4.52
13	132/33 KV HATIDAH	20-21	4.52	0.39	0.31	5.22
14	220/132/33 KV BIHTA	21-22	-	-	-	-
15	132/33kV JEHANABAD	19-20	3.89	0.30	0.26	4.45
	TOTAL (Bay Extension)		**123.70**	**8.85**	**7.55**	**140.10**
	Total (Substation)		**851.15**	**70.66**	**52.63**	**974.43**

Sl No	NAME OF THE TRANSMISSION LINES	FIN YEAR	REVISION DATA BY BGCL (AMOUNT IN CR.)			TOTAL
		DOCO	HARD COST	IDC	IEDC	COST
1	132 kV D/C Amnour - Chapra (Old) with ACSR Zebra conductor	17-18	19.31	1.65	1.15	22.11
2	220 kV D/C Hazipur-Amnour transmission line with ACSR Zebra conductor	17-18	44.40	3.80	2.65	50.85
3	132 kV D/C Amnour -Siwan Transmission Line with ACSR Panther	17-18	28.82	2.47	1.72	33.01
4	220kv LILO Biharsharif-Bodhgaya 220 KV D/C Line at Khijirsarai	17-18	13.87	1.19	0.83	15.88
5	LILO OF 132kv Bodhgaya-Chandauti AT Khijirsarai	CANCELLED				
6	132kV D/C Gaya(new)-Jehanabad Transmission Lines (partly on monopoles)	19-20	19.25	1.47	1.31	22.03
7	LILO OF 132kv Bodhgaya-Wazirganj S/C Line at Khijirsarai	17-18	14.37	1.23	0.86	16.45
8	132kv S/C Khijirsarai-Hulasganj Line (on D/C Tower)	17-18	5.97	0.51	0.36	6.83

Sl No	NAME OF THE TRANSMISSION LINES	FIN YEAR	REVISION DATA BY BGCL (AMOUNT IN CR.)			TOTAL
		DOCO	HARD COST	IDC	IEDC	COST
9	220 kV D/C Patna -Khagaul transmission line with HTLS Zebra conductor	19-20	33.28	2.85	2.26	38.39
10	LILO of one circuit of 132 kV D/C Khagaul-Digha at Bihta with ACSR Panther Conductor	20-21	-	-	-	-
11	220kv Gaya (PG)-Khizirsari Line	18-19	73.83	6.23	4.64	84.70
12	220 kV D/C (High Capacity) Shiekhopursarai-Narhat	17-18	61.54	5.27	3.67	70.48
13	220kv Narhat-Khijirsarai Line with High Capacity Conductor	17-18	68.17	5.84	4.06	78.07
14	132 kV D/C Narhat-Nawada (old) with ZEBRA Conductor	17-18	10.33	0.88	0.62	11.83
15	132 KV S/C (on D/C Towers) Sheikhopursarai-Biharsharif	18-19	26.68	2.25	1.68	30.61
16	132 kV D/C Sheikhopursarai-Sheikhpura (old) with Zebra Conductor	17-18	15.86	1.36	0.95	18.16
17	LILO of 220 KV D/C Begusarai - Biharsharif transmission line at Mokama with ACSR Zebra conductor	20-21	7.60	0.65	0.52	8.77
18	132 KV D/C Mokama - Hatidah (old) Transmission line with ACSR Zebra conductor	20-21	9.25	0.79	0.63	10.67
19	220 kV D/C (High Capacity) Haveli Kharagpur-Sheikhopursarai	18-19	146.77	12.39	9.23	168.39
20	LILO of 132 kV D/C Sultanganj-Lakhisarai line at Haveli Kharagpur with AAAC PANTHER Conductor	18-19	25.70	2.17	1.62	29.48
21	132 kV D/C Haveli Kharagpur- Jamalpur (Old) with ACSR ZEBRA Conductor	18-19	36.97	3.12	2.33	42.41
22	132 KV D/C Goradih- Sabour(old) Transmission line with ACSR Zebra conductor	19-20	20.91	1.79	1.42	24.12
23	LILO of 132 KV D/C Kahalgaon-Sultanganj at Goradih with AAAC Panther Conductor	18-19	12.03	1.03	0.82	13.88
24	220 KV (High capacity) Goradih - Haveli Karagpur transmission line with HTLS Zebra Conductor	18-19	79.29	6.78	5.39	91.46
	TOTAL (TL)		**774.17**	**65.74**	**48.69**	**888.60**
	Total (Plant & Machinery)		**1,625.32**	**136.40**	**101.32**	**1,863.04**

Sl No	Land Cost	FIN YEAR	REVISION DATA BY BGCL (AMOUNT IN CR.)			TOTAL
		DOCO	HARD COST	IDC	IEDC	COST
1	Land Cost-Chapara		1.13	-	-	1.13
2	Land Cost-Gaya (Khirjisarai)		1.22	-	-	1.22
3	Land Cost-Jamalpur		1.55	-	-	1.55
4	Land Cost-Nalanda (Narhat)		0.95	-	-	0.95
5	Land Cost-Shiekhpura		0.50	-	-	0.50
6	Land Cost-Sabour New SS		1.45	-	-	1.45
7	Land Cost-Hatidah New SS		6.10	-	-	6.10
	TOTAL		**12.90**	**-**	**-**	**12.90**
	Add: Directly Capitalised (Furniture & Equipments)		8.11	-	-	**8.11**
	TOTAL AMOUNT (IN CR.)		1,646.34	136.40	101.32	1,884.05
	Add: Contingencies		51.47	-	-	**51.47**
	TOTAL PROJECT COST - PART I PHASE IV		**1,697.81**	**136.40**	**101.32**	**1,935.52**