Annexure-VI

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED
4th Floor, Vidyut Bhawan-1, Jawaharlal Nehru Marg,
Patna-800 021

Letter No. 170, Patna, Dated 11/07/2016
Trans-O&M-Misc-IS/244/2014

From,

Bhaskar Sharma
Director (Project)

To,

speed post
Member (GO & D)
Central Electricity Authority
Sewa Bhawan, Ramkrishnapuram,
New Delhi-110 066

Sub: Revised proposal of BSPTCL for installation of ABT meters with provisions for communication of data on-line and monitoring of data On-line including Energy Accounting & Audit.

Ref: 1. Letter no. CEA/DPD/Metering/2016, Dated 03/06/2016
2. BSPTCL Letter no. 94 Dated 27.04.2016
3. BSPTCL Letter no. 136 Dated 02.04.2016

Sir,

Kindly refer letters of BSPTCL under reference 2 &–3. The proposal for installation of ABT meters along with proposed scheme for communication of data on-line and monitoring of data On-line including Energy Accounting & Audit was posed before CEA for approval.

The metering scheme & revised cost estimate (i.e. Rs. 71.10 crores) was submitted to CEA based on the discussion with Member (GO&D), CE (DP&D) & Director (DP&D), CEA and PGCIL officials (Shri Y. K. Dixit, DGM), the cost of the scheme was reviewed by CEA & PGCIL in the meeting held on 6th February 2015.

Notwithstanding the above, the said proposal was posed to CEA to examine the scheme technically & financially owing to the expertise CEA have in this regard. It is imperative to mention that the investment proposed for the abovementioned scheme have benefit in reduction of T & D losses, Drawl / Surrender of Power by the DISCOMs under Unschedule Interchange & proper Energy Accounting & Audit, which are beneficial not only for DISCOMs but also to the end consumers. Therefore, in the interest of the end consumers, CEA may not differentiate the proposal of BSPTCL under State plan or Central Government plan.

Based on the fact enunciated above, it is requested to communicate approval on the proposed scheme of BSPTCL, so that the work may be initiated & completed on time.

Yours faithfully

11/7

(Bhaskar Sharma)

Memo No. **Trans-O&M-Misc-IS/244/2014/....., Patna. Dated: 11.07.2016**

Copy for information to

a. MD / North Bihar Distribution Company Limited
b. MD / South Bihar Distribution Company Limited
c. CMD / Bihar State Power (Holding Company Limited.

11/7

(Bhaskar Sharma)

(48

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED
(Regd. Office :Vidyut Bhawan-1, Bailey Road, Patna-800 021)

Letter no. ....., Patna, Dated ...../04/2016
Trans/O&M/Misc/IS/244/2014

From

Bhaskar Sharma
Director (Project)

To

SPEED POST

The Member (PS)
Central Electricity Authority
Sewa Bhawan, New Delhi – 110066

Sub: **Revised Proposal of BSPTCL for Installation of ABT meters with provisions for communication of data on-line including Energy Accounting & Audit.**

Ref: BSPTCL letter no. 136 dated 02.04.2015

Sir,

BSPTCL vide letter under reference has submitted revised proposal for Installation of ABT meters with provisions for communication of data on-line including Energy Accounting & Audit based on the discussion held on 06.02.2015 with Member (GO & D), CEA.

It is essential to mention that BSPTCL is also contemplating to complete the work in two phases and complete the entire work in 22 months (refer Clause 1.6 of the revised DPR) The expenditure towards the implementation of the above said scheme of total approximate value of Rs. 71,09,96,220.14 (i.e. Rs. 71.10 Crs.) is based on the price applicable as on April, 2015 and will be met through the amount available under State Plan.

In view of the above, it is requested to communicate approval of the CEA on the scheme proposed by BSPTCL for the Installation of ABT meters with provisions for communication of data on-line, Monitoring of data on real time basis including Energy Accounting & Audit at the earliest on the basis of the revised DPR under reference.

Yours Faithfully

Sd/-
(Bhaskar Sharma)

(187)

Memo no. ..... Patna Dated ...../04/2016

Copy forwarded for information & necessary action to;

a. Shri Ghanshyam Prasad, Joint Secretary, Ministry of Power, Government of India, Shram Shakti Bhawan, Delhi.

b. Member (Power System), Central Electricity Authority, Sewa Bhawan, Delhi

Sd/-

(Bhaskar Sharma)
Director (Project)

Memo no. 94 ..... Patna Dated 22/04/2016

Copy forwarded for information & necessary action to;

a. OSD to CMD, BSP(H)CL
b. OSD to MD/NBPDCL
c. OSD to MD/SBPDCL

O/C

26/04

(Bhaskar Sharma)
Director (Project)

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

VIDYUT BHAWAN, 4th Floor, JAWAHARLAL NEHRU MARG,PATNA 800 021

Department of Transmission (O&M)

Letter no. Trans. (O&M)/Mis-IS 244/2014 ..... 136 ..... Patna, Dated: 02/04/2015

From:

Bhaskar Sharma
Director (Project)

To

The Member (GO & D)
Central Electricity Authority,
R. K. Puram, New Delhi

Reg Post

Sub: Revised Proposal of BSPTCL for Installation of ABT meters with provisions for communication of data on-line and monitoring of data on-line including Energy Accounting & Audit.

Ref: 1. Meeting of the BSPTCL officials held with Member (GO&D), CEA, Chief Engineer, DP&DD, & Director, DP&DD CEA, New Delhi on 06.02.2015.
2. BSPTCL letter no. 49 dated 21.01.2015
3. BSPTCL letter no. 296 dated 30.01.2014

Sir,

Kindly refer our discussion on the issue under reference 1. In accordance with the discussion held on the subject five (5) copies of the revised DPR is enclosed for further action in this regard. The revised cost of the scheme consequent upon the discussion with Member (GO&D), CEA held on 06.02.2015 is Rs. 71.09 crores, which is primarily due to minor decrease in the cost of meters and requirement of panels for erection.

The proposed Apex Metering scheme is design in a manner so that it can operate as an integrated metering system, where all meters are synchronized to deliver comprehensive monetary benefit. All Feeder meters having TCP/IP port will be connected to the Central Data Centre (CDC) through MPLS / OFC network. Data acquisition & online monitoring of all feeder meters shall be done from CDC, which is the central feature of the Scheme.

The requirement of the CEA on the specific issues related with the proposed metering scheme has also been dealt in the DPR. The implementation of the scheme proposed by BSPTCL is a one time investment coupled with various advantages. This scheme is also in use in DVC system. The on line data communication and monitoring of data on-line and energy accounting & audit shall be accessed at Central Energy Centre at SLDC, Patna and handled by a dedicated team of engineers deputed for the said work.

In view of the position explained above, it is requested to communicate approval of the CEA on the revised DPR to Bihar at the earliest in view of the priority assigned to the said scheme by the State Government & BSPTCL.

Encl: As above

Yours faithfully

2/4/15

(Bhaskar Sharma)
Director (Project)

BIHAR STATE POWER TRANSMISSION COPMANY LIMITED
(A GOVERNMENT OF BIHAR UNDERTAKING)

DETAILED PROJECT REPORT (DPR) FOR IMPLEMENTATION OF 100% METERING, DATA ACQUSITION AND ABT MONITORING FOR THE TRANSMISSION & SUBTRANSMISSION SUBSTATIONS UPTO 33 KV LEVEL, MONTHLY ENERGY ACCOUNTING AND SERVICE MAINTENANCE FOR A PERIOD OF 5 YEARS

1.0 Background

1.1 Bihar State Power transmission Co. Ltd (BSPTCL) a wholly Owned corporate entity under Bihar Government was incorporated under the Companies Act 1956 on 1st Nov 2012 after re-organisation of erstwhile Bihar State Electricity Board (BSEB).

1.2 Bihar State Transmission Company Limited (BSPTCL) is a State Transmission Utility under BSP(H)CL formed under the Company Act 1956 to carry out the activities related with Intra State Transmission and wheeling of electricity in the State. BSPTCL is a Deemed transmission licensee in the State of Bihar. The company is also discharging the functions of State Load Dispatch Centre from its Head-Quarter, 4th floor, Vidyut Bhawan, Patna.

1.3 BSPTCL operates a transmission network of 6182 Kms. of 132 K.V. Lines & 1663 Kms. of 220 K.V. lines & 75 Kms of 400 K.V. Line as well as 97 Nos. of operational EHV sub- stations with 7360 MVA Transformation Capacity.

1.4 BSPTCL intends to implement 100% metering schemes across all its Transmission & Sub-transmission system for;

- Development of ABT mode scheduling (UI) based boundary metering schemes of Transmission (covering 400 KV upto 33 KV level) and establishment of inter-utility ABT based mechanism.
- System Energy Measurement (Accounting & Audit) as per CEA Regulation-2006 & 2010 and also in accordance with the Bihar Grid Code 2010 for implementation at all locations and voltage level up to 33 KV outgoing feeders interfacing DISCOMs, OA customer including tie points with PGCIL & other State Utility so as to facilitate accounting for energy transmitted & distributed in various segments of Intra State power system and the energy loss.
- At present the meters installed at different substation are of older generation of meters. They do not have communication facility other than sluggish and outdated serial communication. There is no scheme available

presently to communicate with this standalone system. Present practice is to read the entire available meters on monthly basis. The joint meter readings are taken manually thru MRI. BSPTCL intend to replace this outdated standalone meter system with more advance communicable grid meters.

- There are various boundary/interface points wherein BSPTCL is not having its own meters. These are metered either by PGCIL or by DISCOMS. Due to this there is no mechanism to address any billing for accounting related scrutiny or anomalies.
- DISCOMS like NBPDCL & SBPDCL are presently being fed thru various 33 KV outgoing feeders emanating from 220/132/33 KV & 132/33 KV sub- stations of BSPTCL spread across the whole state. The meters available at all outgoing feeders at 220 KV, 132 KV & 33 KV are non communicable as well as not capable to provide data on real time basis. BSPTCL propose to install & monitor all these metering points to curb any sort of revenue pilferage.
- BSPTCL initially propose to install ABT compliant meters with features of online communication of data & monitoring of data on real time basis in the Intra State transmission system and at the interface point with PGCIL, Jharkhand, DVC, Uttar Pradesh (UP) and with NBPDCL & SBPDCL at 33 KV in Grid S/s & other Open Access customer renewable energy based generation plant interconnected with the Grid S/s at 132 KV or 33 KV. The Interface points with different utilities are as follows

Interface with Utility	Total Interface Point (nos.)
a. PGCIL	37
b. Jharkhand	02
c. DVC	04
d. NBPDCL+SBPDCL (i.e at 33 KV outgoing feeders	543

- Requirement of ABT meters:

Location of ABT Meters with Special features	**Requirements of Meters (nos.)**
a. Other Utilities	**43**
b. 33 KV outgoing feeders*	**543**
c. HV & LV side of Transformers *	**426 (213 + 213)**
d. Energy Accounting & Audit Meters * ➢ 220 KV Incoming feeder bays ➢ 132 KV feeder bays	 53 414

Note: *

1. For Sl. no. **b**: **33 KV Check meters are not required as per CEA Regulations**

2. For Sl. no. **c: Main & Standby meters of same features and equal in numbers are to be provided on HV & LV side respectively as per CEA Regulations.**

3. The Requirement of meters mentioned above were discussed and finalized after discussion with Director (DP&D), CEA in the meeting held on 5th February 2014 at CEA, Sewa Bhawan, New Delhi.

1.5. Financial Benefits:

- At present there is no established system to monitor & control UI related activities at BSPTCL

- During the period of FY 2013-14 & April'14 to November 2014, total UI payable by BSPTCL was Rs. 31.00 Crores & Rs. 38.38 Crores respectively. Saving on account of management of UI may help DISCOMs to save substantial amount at least Rs. 30 Crores per annum.
- At present the transmission loss of BSPTCL is 4.38% against BERC target of 3.97%.
- By effectively using the metering data for feeder level energy accounting - BSPTCL may reduce transmission loss by 0.5% within the project tenure. Assuming per unit cost of Rs. 4.5 & annual energy handled 21154 MU, there is a saving potential of approx Rs. 40 Cr annually.
- This will enable BSPTCL to recover cost of the proposal within 20 months.

1.6 Completion Time:

Expected time period for completion of the entire work from supply to commissioning shall be 22 months from the date of issuance of LOI.

1.7 Expenditure incurred towards the said work is proposed to be incurred in two phases.

- Phase – I : May 2015 to March 2016
- Phase – II : April 2016 to February 2017

2.0 Scope of Activities

Considering the above mentioned requirements of BSPTCL, following activities are proposed against the scope of work:

- Supply, erection, testing and commissioning, delivery of all items as required for system energy measurements, accounting & audit schemes at 33kv, 132 kV, 220kV and 400 kV level.
- Data acquisition of all meters as per the requirement from central data centre.
- ABT (UI) monitoring for all boundary meters under T&D system including intra state ABT scheduling between different beneficiaries, PGCIL, ISGS, DICOMS, Distribution Franchisee etc.

- Energy accounting & audit for the complete system from central data centre on daily & monthly basis.
- Integration of DISCOMS (NBPDCL & SBPDCL) boundary metering data with respect to energy accounting.
- Set-up complete metering & communication infrastructure at all identified points and at central data centre.
- Operational & maintenance, Data Collection, Generation of energy audit reports and provides technical support for 5 years.

3.0 Indicative Deployment Architecture

A. Supply, erection, testing and commissioning, delivery of all items as required for system energy measurements, Energy Accounting & Audit schemes at 33 KV, 132 KV, 220kV and 400 KV

3.1 Conducting metering feasibility survey for all identified substations of different voltage levels (combination of 220 / 132 / 33 kV) which includes the no. of feeders in each substation, collecting the drawings of each substation, assessing the space available to install the metering panels and communication setup at substation etc.

3.2 Supply, installation & commissioning of 0.2s Accuracy class, rack mounted Trivector meters with metering panels, networking the same at the substation with necessary communication components like switch & routers for using the existing communication network at local substations and required data acquisition, monitoring & energy audit software at Data Centre.

3.3 The meters shall be installed in a separate metering panel with TTB so as not to disturb the existing Control Panels. Necessary interfaces with the hardware arrangement shall be made to get the data feeder-wise with further transmission to the control centre at Central Control Room, through existing OPGW, PLCC, MPLS communication link.

3.4 Installation of the Meters, cable laying, Panel Erection etc at different sub-stations as per requirement.

3.5 Installation of the meters, metering panels, etc shall be done using the best installation practices as possible.

4.0 Data acquisition of all meters under this proposed 100% metering project from central data centre (CDC).

4.1 Transmission system: There will be no of substations whose data needs to be monitored from a single & central location i.e. CDC (Central Data Centre at Patna). All meters at each substation will be read periodically from central data centre. Local monitoring for each sub-station shall also be provided for micro level monitoring.

4.2 Proposed Grid meters will have TCP/IP port & will be connected to a Network switch. Monitoring of the meters will be done from central data centre at a frequency of 1 min & (instantaneous data) profile data will be read every 15 min for ABT UI calculation.

4.3 Same architecture will be followed at each substation and through Network switches & routers, meter data can be accessed from each substation.

4.4 Central data center at Patna will be dealing with monitoring, proposed energy accounting & MIS for the Transmission / Sub-transmission system.

4.5 There are other BSPTCL offices also and the accessibility of the application with limited rights to those offices will also be available. Connectivity between those offices and the central data centre would be thru existing LAN or equivalent media.

5.0 ABT (UI) monitoring for all boundary meters of BSPTCL Transmission system including ABT scheduling (UI) between ERLDC & other beneficiaries & DISCOMS.

5.1 ABT online application will be installed in the CDC, Patna.

5.2 ABT application will have facility to online monitor the complete system ABT-UI overview in a dashboard for fast tracking and then further details can be extracted for analysis purpose.

5.3 Dashboard will provide the information of UI penalty in terms of kW and Rupees against the defined schedule for that period. After getting 1 min data, software can extrapolate the possible UI in this 15 min so that corrective action can be taken by the utility to avoid UI penalty for that period. This will facilitate to take preventive actions.

5.4 Complete schedule & contract management will also be done by the ABT software.

5.5 Online acquired data shall be displayed in graphical & tabular views. Apart from this, load survey data is also needed to be collected periodically to serve the purpose of UI accounting. System shall also provide facility to view historical data in tabular & graphical mode.

5.6 Acquired feeder meter data at Data centre will be available for monitoring at the data centre based on the selection of parameters. History data will also be available for viewing by the user.

5.7 Data Centre system shall facilitate to define abnormal conditions of electrical parameters and those recorded by the meter as events. Proper alarming system needs to be put in place to show these alarms online for taking preventive measures. Alarms shall also be generated on

threshold limit violation on defined electrical parameters.

5.8 Data Centre application software shall support availability based tariff implementation for metering locations, which shall include Un-Scheduled Interchange management, Integration of schedule with Online Monitoring, Online UI Display, Reports based on UI for selected period.

5.9 Data processing, analysis and preparation of daily/monthly reports e.g. online monitoring, UI trend monitoring within a SIP, UI reports can also be done by ABT software.

6.0 Energy accounting & audit for the complete system from central data centre on daily/weekly/ monthly basis.

6.1 After having complete meter data from all the meters from all voltage level, energy accounting & audit reports can be prepared by Energy Audit application from central data centre.

6.2 The data from all energy meters shall be processed at CDC for deriving necessary reports as described here-in-under from time to time on a monthly / daily basis. All related activities must be completed so that the reports duly compiled can be generated in the month end.

6.3 Meter data reports for energy accounting, supply reliability and identification of weak areas of T&D losses shall be possible to be made for each metering point of Transmission / Sub-Transmission system as decision support information for taking remedial measures (from EHV level up to feeder level energy meters in respective substations) for 5 years period.

6.4 The software used at data centre shall be capable of monitoring the acquired data (which can be instantaneous, energy etc.,) carrying out energy

accounting, technical loss calculation, operation reports and system analysis using the 15 / 30 min. time stamped load survey data and event data logged by the meters.

6.5 Meter data shall be used for ascertaining the technical loss of the system and methods to appropriately use the meter data to assess the technical loss in a reliable manner by considering the technical components of transmission system.

6.6 The system implemented is capable of accurately accounting the parameters by taking care of changes happening in the field like CT/PT/Meter changes, their respective ratios and concerned multiplication factors etc. In addition to this, the propoed system will help BSPTCL to find out problems in the metering system like wiring errors, PT failure etc., as the problems affect the accuracy of the energy audit.

7.0 Set-up complete 100% metering infrastructure at all identified points and at central data centre and operational & maintenance support for 5 years

7.1 Setting up Central Data Center (CDC) at Patna for data acquisition from the meters through communication network. This includes creation of centralized database of the metering system along with month on month energy meter data acquired for entire contract period at this data center.

7.2 The setup shall include all necessary infrastructure including databases, UPSs, PCs and PC, Printers, Computational and all other necessary systems/accessories as required during the contract period.

7.3 A back-up 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 which also forms the part of the scope of this tender for the 5 year O&M period at the same location.

7.4 Replication of the central data centre will also be available at another location also to ensure double reliability. The contractor will be responsible to maintain this backup server during O&M period. In case main server fails due to some reason, then all type of data recovery shall be possible through backup server upto the last update period.

7.5 For the successful implementation of the project and to ensure continuous data flow from the metering systems, it is necessary that the metering systems together with the AMR systems are maintained in a healthy condition. Failure in metering systems would result in absurd/abnormal results in the reports due to non - availability of data. The Scope of operational maintaining for 5 years of the system includes meters, communication devices, software etc. supplied in this contract.

7.6 Training of BSPTCL Engineers to familiarize the data acquisition, monitoring and energy Audit system will also be part of this scope.

7.7 Detailed technical specifications for Meters, meter panel etc. are attached as Annexure-I.

7.8 The Data Centre will have different severs for different applications for monitoring, energy accounting etc. The Data Centre will have connectivity to read the substation meter data. It consists of the following.

a. Data base servers:

Database servers for monitoring application and energy audit application will be available

(Oracle and SQL). Standby database server will also be available.

b. Application servers:

The monitoring application database server facilitates to define various configurations for monitoring ABT data, energy accounting process settings etc. One stand by application server will also be available at the same location in active passive mode for redundancy.

c. GPS Clock:

The data Center consists of a GPS clocks to assist in time synchronization.

****

Annexure-I

1.0 Technical Specification of Central Data Centre Software:

1.1 Software at Central Data Center:

The software shall be web based with inbuilt security interlocking and password protection and shall comprise the following packages. The software should have two modules at DC with specific purpose as mentioned below:

1.1.1 PACKAGE 1

A. Software for meter data acquisition and ABT monitoring requirements are detailed below:

A.1 Data acquisition software must be able to support data from all types of existing feeder meters (viz. instantaneous, energy, event etc.) with time stamping read by DCU using MODBUS/DLMS protocol min at a 1 min. reading frequency.

A.2 Data Centre application software shall support availability based tariff implementation for metering locations, which shall include Un-Scheduled Interchange management, Integration of schedule with Online Monitoring, Online UI Display, Reports based on UI for selected period.

A.3 Software should be able to give the facility to user to select the monitoring locations and views to view the acquired meter data. Meter parameters should also be selective for viewing purpose against each meter.

A.4 Historical meter data should be available for the user to view selecting the date / time, parameters & meter option.

A.5 Software should be able to define the validation rules against acquired meter data so that it shows some visual alarms/alerts on validation failure cases.

A.6 The software shall provide a tabular as well as graphical interface to view different type of feeder meter data acquired from substations at pre-defined frequency. All views with parameter level selection should be user configurable.

A.7 Features of Online monitoring application for all boundary points for managing the UI

B. Online display for utility level / Discom:

1. Scheduled value (MW)
2. Actual value (MW)
3. Deviation/Unscheduled Interchange (UI) in terms of MW & MUs and Rupees
4. Current UI rate
5. Average rate

C. Cumulative UI calculation till date and for the month.

D. Current grid frequency and average grid frequency on the main screen

E. As data acquisition is on 1 min. basis and schedule data is on 15 min. basis so as per the current value, projection will be shown for 15 min so that user can take action accordingly to avoid the deviation

F. As per the requirement, virtual grouping of no. of schedule points can be done for group level analysis against MW and Rupees Parameters.

G. Capability to handle the time to time updation in ABT tariff regulations like changes in UI rates, cap rates etc.

H. Reporting can be generated on daily/weekly/monthly basis:

1. Daily Unscheduled Interchange (UI) report having details of Schedule, Actual, UI charges in MWh & Rs. for each 15min SIP and cumulative for the day.
2. Weekly Unscheduled Interchange (UI) report having details of Schedule, Actual, UI charges in MW & Rs. for each day and cumulative for the week.

3. Annually Unscheduled Interchange (UI) report having details of Schedule, Actual, UI charges in MW & Rs. for each week and cumulative for the year.

4. Energy charges report considering all defined contracts with all participants.

5. Reactive High and Reactive Low energy report

6. Reports for substation wise meter logged sheet

7. Feeder outage Report

8. Daily peak Report

1.1.2 **PACKAGE 2**

A. Software requirements for Energy Accounting and Audit are detailed below:

1. Energy audit software is able to generate the required reports as mentioned in the below sections on a monthly basis.

2. Energy Audit software is able to generate the total and technical loss reports for overall system.

3. Software architecture is able to consider the configuration changes like CT/PT ratios. Meter change etc. as for creation of accurate energy audit reports on daily / weekly/monthly / revised.

4. The software provides a tabular as well as graphical interface to view different types of feeder meter data acquired from substations. All views should be user configurable.

5. The software is capable of generating the energy balance sheet for substations and administrative hierarchies like Division, Zone etc.

6. Software is supported by a user management module to control and manage the access of the application to different users as required by BSPTCL.

7. Software solution supports client-server architecture as they may be required at the other BSPTCL offices as well. Connectivity between

the central data centre and the BSPTCL office will be under the scope of BSPTCL.

8. The software is capable to create Data base for summing as well as subtracting the information from a number of meters spread over geographically in different substation within the BSPTCL Command area. This feature is necessary for creating Energy accounts for the different substation and also for creating logical substitutes for individual locations where there might be a problem for any particular day/month.

9. Energy Audit software is able to generate the monthly reports for the substation wise meter reading data.

B. Transmission System Energy Audit Reports:

- This shall comprise of a balance sheet of energy input, output and loss. The loss should be further bifurcated to technical loss and unaccounted energy.
- The technical loss shall be further bifurcated into technical loss in lines and transformers and further segregated voltage level wise.
- The energy output to each zone shall be computed and reported zone wise as per the energy dispatched from transmission system utility system.
- A trend report for energy input, output and losses is also required.

C. ABT Analysis reports:

- Daily, Weekly, Monthly source wise analysis report for schedule and actual for input points (in MW and Rs.).
- Daily, Weekly, Monthly report for schedule and actual for output points (in MW and Rs.).
- Daily / Weekly / Monthly loss calculation (in MW and Rs.).

D. Source wise effective rate (Rs. / kWh) calculation:

a. Operational Reports:

- Operation reports shall comprise of peak & base demand for system as a whole with further bifurcation into Zone-wise

energy drawn and peak and base demands and Peak Contribution Factors (PCF) for each of the three Zones.

- Loading of lines with more than x% ampacity shall be provided. Exception of line loading reports.
- Statistics of overloaded lines & Transformers showing trend for the past months as required on a rolling basis.
- Trend of energy drawl and peak demands.
- Exception reports shall be substantiated by analysis of loading duration of transformers (with & without concurrent loading) and lines etc. for providing information on prioritized actions to be taken by utility.

b. Hierarchical System Reports:

- System reports shall be generated on a hierarchical basis i.e. Zone, Circle & Divisions respectively.
- Energy balance reports shall be delivered for each of the Zones separately.

c. Substation Wise Reports:

- This report should comprise of feeder wise detail energy consumption and other operational figures viz. MD, Energy consumption, Supply reliability figures, PF, Voltage condition, etc.
- All reports shall be in soft format in PDF
- All above mentioned reports will be provided in tabular & graphical form as suitable. Trend reports will be generated to monitor the performance of the area & asset.

2.0 Technical Specification for proposed Grid Metering system

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) METRING.

2.1 SCOPE

2.1.1 This specification covers the design, engineering, manufacture, assembly, inspection and testing before supply and delivery at site/ FOR destination

of class 0.2s accuracy 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.

2.1.2 The meter shall be complied with Indian Company Standard (ICS) of Category B for DLMS specification. The Category B specifies the parameters to be used for Boundary/ Bank/ Ring Fencing/ ABT metering along with other additional features. The meter records parameters under import and or export conditions.

2.1.3 One static type composite meter shall be installed for each circuit, as a self-contained device for measurement of power transmittals, as described herein, in each successive 15 minute block, and certain other functions, detailed in the following paragraphs.

2.1.4 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.

2.1.5 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.

2.2 APPLICABLE STANDARDS

2.2.1 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.

2.3 STANDARDS FOR METER READING INSTRUMENT

2.3.1 The Meter Reading Instrument (CMRI) shall conform in all respects to the following standards:

Standard No.	Title
CBIP technical report no 111with latest amendment	Specification for Common Meter Reading Instrument

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.

2.3.2 CLIMATIC CONDITION:

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

Sl. No.	Tropical Conditions	Parameters
i	Max. ambient air temperature (°C)	55
ii	Max. Relative Humidity (%)	95
iii	Average Annual Rainfall (mm)	1200
iv	Seismic level (Horizontal Accn. in g)	0.3
v	Min. ambient air temperature (°C)	(-) 5
vi	Average daily ambient air temp. (°C)	32
vii	Min. Relative Humidity (%)	10

viii	Max. Altitude above mean sea level **(m)**	1000
ix	Max. wind pressure (Kg/Sq.m)	195
x	Isoceraunic level (days per year)	50

2.4 PRINCIPAL PARAMETER

2.4.1 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.

Item	Specification
Type of Installation	Indoor panel/ cubicle mounted
VT secondary	3x110V/√3 Phase to Neutral(3P4W) Variation -30% to +20%
CT secondary	3 x /-1 A Amps or 3 x /-5 Amps (configurable as per requirement)
Dual Auxiliary AC/ DC Supply	110/ 220 V (-20% to +15%)
System frequency	50HZ +/- 5%
Earthing System	Solidly Grounded

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

2.5 TECHNICAL REQUIREMENTS

a. 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.

b. 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.

c. ACCURACY

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

d. 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.
- 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.
- 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.

e. STARTING CURRENT

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

f. MAXIMUM CURRENT:

- The rated maximum current of the metering module shall be 120% of basic current (Ib).
- The meter shall work accurately irrespective of phase sequence of the mains supply.

g. 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:

- Personnel safety against electric shock
- Personnel safety against effects of excessive temperature
- Protection against spread of fire
- 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.

h. 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:

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

I. SEALING

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

- Two numbers sealing screws shall be provided on the front cover of metering module.
- Provision shall be available to seal the back connections on the metering rack using the back plate.
- Provision shall be available to seal optical port.
- The sealing arrangement should be suitable for application of Polycarbonate seals.

j. MARKING OF METER:

- The marking on every meter shall be in accordance with IS 14697. The basic marking on the metering module name plate shall be as follows:

  - Manufacturer's name and trade mark
  - Serial Number
  - Year of manufacture
  - Type Designation
  - Number of phases and wires
  - VT commissioning information
  - CT commissioning information
  - Reference frequency
  - Accuracy Class

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

  - Property of "Purchaser name"
  - P.O. No. "Number"
  - The connection diagram of the connecting 3P 4W 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.
  - 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.

- 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.
- The meter shall compute the average frequency during each successive 15 minute block and store in its memory.
- 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.
- 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.
- Further, the reactive energy shall also be available in four different registers as-

    - Reactive import while active import
    - Reactive import while active export
    - Reactive export while active import
    - Reactive export while active export.

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

- Active energy Import
- Active energy Export
- Apparent energy (while active import)
- Apparent energy (while active export)

- Meter shall have provision to compute apparent energy based on lag only or lag+lead. The same shall be configured at factory end.
- The meters shall be compatible with ABT tariff as well as TOD tariff.
- For reactive power and reactive energy measurement, limits of errors all the four quadrants shall be in accordance to IEC 62053-23/ IS14697.
- 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 110V AC and 110/ 220V DC. The system shall continue to work even if any one of the above auxiliary supply (AC/ DC) is present.
- 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.

k. 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 times 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.

l. 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 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 anauthenticated transaction.

m. Maximum Demand Reset: Following provisions shall be available for MD reset in meter:

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

n. 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.

Each of the metering modules 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
xxxv. There should a facility to configure the display parameters in favorite pages.

O. 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:

- Active import
- Active export
- Average frequency
- Apparent while active import
- Apparent while active export
- Reactive High energy
- 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.

p. 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:

- Active energy import
- Active energy export
- Apparent energy (while active import)
- Apparent energy (while active export)
- Maximum demand Apparent (while active import)
- Maximum demand Apparent (while active export)

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

- Active energy import
- Active energy export
- Reactive high energy
- Reactive low energy

q. 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. Meter reading instrument (MRI) shall be used for the purpose of local meter reading via this optical communication port and Pen drive for USB port. MRI shall serve as the interface between meters and PC loaded with Base Computer Software. It shall also be possible to download meter data via this 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.

» The metering system shall further provide a serial RS232, RS485 and Ethernet communication 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.

» 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.

r. The meter shall fully 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 mal-functioning of the meters. Further the immunity of metering system to external magnetic field shall be as per latest CBIP recommendations.

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.

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

► 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.

► 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.

t. 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.

u. 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.

3.0 ANOMALY DETECTION FEATURES:

3.1 The meter shall have features to detect and log the occurrence and restoration of following anomalies, 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.

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

3.2.1 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.

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

3.3 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.

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

4.0 TRANSACTIONS

4.1 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.

5.0 SELF DIAGNOSTIC FEATURE

5.1 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/ non-functioning/ 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.

6.0 TYPE TEST CERTIFICATES

6.1 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 6 months (in place of 2 years old).

7.0 Benefits & ROI Calculation

A. Operational Benefits:

- Accurate meter reading, no more estimates
- Reduced operational costs (No more CMRI based manual readings)
- Clear visibility of Current UI charges for the whole system
- Predicted values of UI for the IP (15 mins block) to take corrective action

- Effective meter data monitoring for further corrective & preventive actions
- UI reporting to help during settlement with all participants (Franchises, 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

8.0 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:

- 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.

10.0 The Schedule of Price of 1600 nos. ABT Compliant SEM meters (including spare meters) for **96 locations** is around **Rs. 71.09 Crores, which includes** Supply of Meters for 100 % metering, online ABT monitoring and Energy Accounting software, Installation, testing & commissioning of materials, 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 1600 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-I** of the DPR. Details of the 96 locations are enclosed as **Annexure-II.** Scope wise cost details are indicated in the table hereunder:

Sl. No.	Item Description	Total Price (Rs.)
1	Price for Manufacturing, Testing, Supply & Delivery of Materials	441,241,745.61
2	Price for Installation, testing & commissioning of materials	838,602,00.61
3	Price for 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.	123,613,030.41
4	2) Price for Yearly Service charges for maintenance of the whole system for 5 years and training to personnel as per need	62,281,243.51
	Grand Total	71,09,96,220.14

****

BIHAR STATE TRANSMISSION COMPANY LTD.

SCHEDULE OF PRICE
PRICE FOR MANUFACTURING, TESTING, SUPPLY & DELIVERY

Sl .No.	Item Description	Qty	Unit	Unit Ex-works price	Unit Freight Charges	Unit Excise Duty leviable at Present	Unit Sales Tax leviable at Present	Entry Tax	Specify other taxes leviable if any	Unit Landed price including sales Tax, Entry tax, excise duty and freight	Total landed price including sales tax, entry tax, excise duty and freight (Rs.)
	1	2	3	4	5	6	7	8	9	10	11
				(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)
	Substation H/W and S/W										
1	3 Phase, 4 wire, 0.2S accuracy class Trivector static Energy ABT Meter (compatible to various protocols like TCP/IP, MODBUS and ICS DLMS)	1,100	No.	1,20,000.00	250.00	14,832.00	2,022.48	10,968.36	-	1,48,072.84	16,28,80,122.24
2	3 Phase, 4 wire, 0.2S accuracy class Trivector static Energy non-ABT Meter (compatible to various protocols like TCP/IP, MODBUS and ICS DLMS)	500	No.	1,20,000.00	250.00	14,832.00	2,022.48	10,968.36	-	1,48,072.84	7,40,36,419.20
3	Metering panel suitable to mount 4 nos of rack mounted meters	410	No.	99,000.00	3,500.00	-	1,980.00	8,358.40	-	1,12,838.40	4,62,63,744.00
4	DCU with Box as per specification	96	Set	1,60,000.00	750.00	-	3,200.00	13,116.00	-	1,77,066.00	1,69,98,336.00
5	Network Switch 8 port 10/100 Mbps as per project requirement	560	No.	8,089.00	150.00	-	161.78	672.06	-	9,072.84	50,80,791.74
6	UPS - 2 KVA online with 60 min back up on 100% load	96	No.	96,148.00	1,250.00	-	1,922.96	7,945.68	-	1,07,266.64	1,02,97,597.13
7	Industrial Grade Client PC as per specification & project requirement	96	Set	1,35,000.00	450.00	-	2,700.00	11,052.00	-	1,49,202.00	1,43,23,392.00
8	Router for Grid sub stations as per project requirement during detail engineering	96	No.	98,000.00	250.00	-	1,960.00	8,016.80	-	1,08,226.80	1,03,89,772.80

9	7 core 2.5 sq mm armoured control cable for CT connection	55,800	Mtr	403.28	3.00	-	8.07	33.15	-	447.49	2,49,70,123.24
10	4 core 2.5 sq mm armoured control cable for PT connection	55,800	Mtr	240.84	2.00	-	4.82	19.81	-	267.47	1,49,24,789.40
11	2 core 2.5 sq mm armoured cable for AC/DC Aux supply	55,800	Mtr	153.11	1.00	-	3.06	12.57	-	169.75	94,71,825.46
12	Communication cable as per project requirement during detail engineering	55,800	Mtr	68.76	1.00	-	1.38	5.69	-	76.83	42,86,891.69
13	Data acquisition software for local data monitoring at each GSS as per project requirement during detail engineering	96	Lot	85,000.00	300.00	10,506.00	1,432.59	7,779.09	-	1,05,017.68	1,00,81,697.01
									Total	**for substation**	**40,40,05,501.92**
	Central station H/W and S/W										
14	Data Base Server (Main & Backup) for online monitoring	2	Nos.	9,50,000.00	1,250.00	-	19,000.00	77,620.00	-	10,47,870.00	20,95,740.00
15	Application server (Main and Backup)	2	Nos.	8,50,000.00	1,250.00	-	17,000.00	69,460.00	-	9,37,710.00	18,75,420.00
16	Data Base Server (main & Backup) for Energy Audit	2	Nos.	9,50,000.00	1,250.00	-	19,000.00	77,620.00	-	10,47,870.00	20,95,740.00
17	Industrial Grade Client PC as per specification & project requirement	5	Nos.	1,35,000.00	450.00	-	2,700.00	11,052.00	-	1,49,202.00	7,46,010.00
18	GPS Time synchronization machine complete set with GPS antenna, GPS receiver signal processing unit etc as per specification & project	2	Set	22,500.00	150.00	2,781.00	379.22	2,064.82	-	27,875.03	55,750.06
19	Network Switch 16 port 10/100 Mbps as per project requirement for central station	4	No.	56,622.00	150.00	-	1,132.44	4,632.36	-	62,536.80	2,50,147.18

20	Firewall for data Central station stations as per project requirement during detail engineering	1	No.	8,50,000.00	1,200.00	-	17,000.00	69,456.00	-	9,37,656.00	9,37,656.00
21	Router for dta Central stations as per project requirement during detail engineering	1	No.	4,10,000.00	1,200.00	-	8,200.00	33,552.00	-	4,52,952.00	4,52,952.00
22	UPS-10 KVA online with 60 min back up on 100% load	2	No.	6,70,000.00	3,000.00	-	13,400.00	54,912.00	-	7,41,312.00	14,82,624.00
23	Laser Line Printer A4 size Heavey Duty	1	Set	1,28,048.00	500.00	-	2,560.96	10,488.72	-	1,41,597.68	1,41,597.68
24	Rack for Server	2	No.	74,692.00	2,000.00	-	1,493.84	6,254.87	-	84,440.71	1,68,881.41
25	Lan setup H/W at central station	1	Lot	5,55,555.00	1,500.00	-	11,111.10	45,453.29	-	6,13,619.39	6,13,619.39
26	Data acquisition online & ABT monitoring software for central data centre	1	Lot	1,00,00,000.00	1,500.00	12,36,000.00	1,68,540.00	9,12,483.20	-	1,23,18,523.20	1,23,18,523.20
27	Software at Central Data Centre for Energy accounting, audit ,development of comprehensive energy measurement system and MIS for transmission network as per project requirement during detail engineering	1	Lot	95,00,000.00	4,500.00	11,74,200.00	1,60,113.00	8,67,105.04	-	1,17,05,918.04	1,17,05,918.04
										Total for central data centre	**3,49,40,578.96**
	PC , Printer and UPS Circle office and Area board office										
28	PC for Circle office	7	Nos.	1,35,000.00	450.00	-	2,700.00	11,052.00	-	1,49,202.00	10,44,414.00
29	PC for Area Board	2	Nos.	1,35,000.00	450.00	-	2,700.00	11,052.00	-	1,49,202.00	2,98,404.00
30	UPS 1KVA with 60 Min Backup for circle office and Area Board office	9		34,636.00	500.00	-	692.72	2,866.30	-	38,695.02	3,48,255.16
31	Printer A4 Size laser jet Low PPM for circle office and Area Board office	9		52,500.00	250.00	-	1,050.00	4,304.00	-	58,104.00	5,22,936.00
32	LAN switch 8 port for circle office and Area Board office	9		8,089.00	150.00	-	161.78	672.06	-	9,072.84	81,655.58
										Total	**22,95,664.74**
										Grand Total for supply	**44,12,41,745.62**

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

SCHEDULE OF PRICE
PRICE FOR INSTALLATION, TESTING & COMMISSIONING

Sl. No.	Item Description	Qty	Unit	Unit Basic price	Service Tax @ 12.36% per unit	Total Unit Price	Total Price	Remarks
	1	2	3	4	5	6	7	8
				(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)
1	3 Phase, 4 wire, 0.2S accuracy class Trivector static Energy ABT / Non ABT Meter as per specification	1,600	No.	22,625.00	2,796.45	25,421.45	4,06,74,320.00	Prevaililng Service tax @12.36% will be applicable
2	Metering panel suitable to mount 4 nos of rack mounted meters as per specification	410	No.	45,125.00	5,577.45	50,702.45	2,07,88,004.50	
3	Communication Hardwares (DCU, switches, LAN etc) at each GSS as per specification & project requirement/ approved drawing after detail engineering	96	Set	82,375.00	10,181.55	92,556.55	88,85,428.80	
4	PC, Server , Printer , UPS and GPS clock installation and commissioning at Central Data Centre	1	LS	19,62,500.00	2,42,565.00	22,05,065.00	22,05,065.00	
5	Laying of 7 core 2.5 sq mm armoured control cable for CT connection as per project requirement	55,800	Mtr	75.23	9.30	84.53	47,16,686.28	
6	Laying of 4 core 2.5 sq mm armoured control cable for PT connection as per project requirement	55,800	Mtr	58.68	7.25	65.93	36,79,052.92	
7	Laying of 2 core 2.5 sq mm armoured cable for AC/DC Aux supply as per project project requirement	55,800	Mtr	46.44	5.74	52.18	29,11,643.11	
	Grand Total						**8,38,60,200.61**	

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

ANNEXURE -I

SCHEDULE OF PRICE
PRICE FOR ANNUAL MAINTENANCE CONTRACT & SERVICE CHARGES FOR 5 YEARS

Sl. No.	Item Description	Qty		Unit Basic Price (Per meter per year	Service Tax@12.36% per unit	Total Unit Price (per meter/Year)	Total Price (Per Meter/Year)	Total Price (For all the Five Years)	Remarks
	1	2	3	4	5	6	7	8	9
				(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	
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.	2232 nos.	1st Year	10,296.00	1,272.59	11,568.59	2,58,21,083.06	12,36,13,030.41	Prevailing Service tax @12.36% will be applicable
			2nd Year	11,532.00	1,425.36	12,957.36	2,00,19,113.78		
			3rd year	13,146.00	1,624.85	14,770.85	2,28,20,956.45		
			4th Year	14,723.00	1,819.76	16,542.76	2,55,58,568.53		
			5th Year	16,932.00	2,092.80	19,024.80	2,93,93,308.58		
		Qty		**Unit Price (Yearly Charges)**	**Service Tax@12.36% per unit**	**Total Unit Price (Yearly Charges)**		**Total Price (For all the Five Years)**	
				(Rs.)	(Rs.)	(Rs.)		(Rs.)	
2	Yearly Service charge for maintenace of the whole system (by way of AMC) for 5(Five) years and training to BSPTCL personnel as per need	1 Job	1st Year	85,65,480.00	10,58,693.33	96,24,173.33		6,22,81,243.51	
			2nd Year	95,93,338.00	11,85,736.58	1,07,79,074.58			
			3rd year	1,09,36,405.00	13,51,739.66	1,22,88,144.66			
			4th Year	1,22,48,773.00	15,13,948.34	1,37,62,721.34			
			5th Year	1,40,86,089.00	17,41,040.60	1,58,27,129.60			

BIHAR STATE TRANSMISSION COMPANY LTD.

PRICE SCHEDULE

TOTAL PRICING/ABSTRACT OF PRICING

Sl. No.	Item Description	Tota Price (Rs.)
1	Price for Manufacturing, Testing, Supply & Delivery of Materials	44,12,41,745.62
2	Price for Installation, testing & commissioning of materials	8,38,60,200.61
3	1) Price for Yearly service charge for data collection, Energy accounting and audit, generation of reports, MIS reports etc for 5 years as per requirement.	12,36,13,030.41
4	2) Price for Yearly Service charges for maintenance of the whole system for 5 years and training to personnel as per need	6,22,81,243.51
	Grand Total	71,09,96,220.14

(434

220/132/33 KV Bay

	Name of GSS	220 KV Bay (Nos.)	132 KV Bay (Nos.)	33 KV Bay (Nos.)
	Forbesganj	-	7	9
	Sonenagar	-	15	5
	Rafiganj	-	7	7
	Aurangabad	-	5	6
	Goh	-	4	5
	Begusarai	10	7	11
	Buxar	-	4	7
	Dumraon	-	7	4
	Sabour	-	8	9
	Sultanganj	-	7	7
	Kahalgaon	-	6	5
	Naugachia	-	5	7
	Ara	-	4	8
	Banka	-	4	7
	Darbhanga	5	7	10
	Motihari	-	6	11
	Dhaka	-	5	7
	Raxaula	-	4	4
	Bodhgaya	13	15	7
	Chandauti	-	14	6
	Belaganj	-	4	5
	Tekari	-	5	7
	Wazirganj	-	5	7
	Gopalganj	5	9	7
	Jamui	-	7	9
	Jehanabad	-	7	9
	Hulasganj	-	4	7
	Katihar	-	5	9
	Khagaria	-	6	8
	Kishanganj	-	6	9
	Mohania	-	5	7
	Karamnasa	-	10	7
	Lakhisarai	-	9	8
	Udakishanganj	-	4	5

		220 KV Bay (Nos.)	132 KV Bay (Nos.)	33 KV Bay (Nos.)
		-	7	14
		-	5	12
		-	5	5
		-	5	10
		-	5	5
		-	6	5
		-	4	8
		15	14	3
		-	7	13
		-	9	9
		-	5	7
		12	13	14
		8	12	11
48	Jakhanpur	-	9	6
49	Masaurhi	-	5	7
50	Bihta	-	5	9
51	Gaighat	-	5	7
52	Mithapur	-	4	11
53	Katra	-	5	9
54	Hathidah	-	10	5
55	Purnea	-	12	11
56	Dehri-on-Sone	8	13	9
57	Sasaram	-	6	6
58	Bikramganj	-	5	9
59	Banjari	-	5	6
60	Sitamarhi	-	5	10
61	Chāpra	-	7	9
62	Sheetalpur	-	7	9
63	Siwan	-	7	7
64	Samastipur	-	11	14
65	Dalsingsarai	-	5	4
66	Supaul	-	9	7
67	Kataiya	-	6	7
68	Saharsa	-	6	9
69	Sheikhpura	-	6	9

	Name of GSS	220 KV Bay (Nos.)	132 KV Bay (Nos.)	33 KV Bay (Nos.)
70	Hazipur	-	9	8
71	Vaishali	-	6	5
72	Bettiah	-	8	10
73	Ramnagar	-	8	9
74	Karpi (Ataula)	-	4	7
75	Musrakh	-	5	5
76	Digha	-	5	9
77	Runnisaidpur	-	4	4
78	Harnaut	-	4	5
79	Nalanda	-	4	4
80	Jagdishpur	-	3	6
81	SKMCH	-	6	6
82	Sherghati	-	4	5
83	Sipara	8	9	9
84	Madhepura	6	9	5
85	Sonebarsa	-	5	7
86	Dinara	-	5	7
87	Kudra	-	5	7
88	Kusheshwarsthan	-	5	7
89	Tehta	-	5	8
90	Imamganj	-	4	6
91	Jandaha	-	5	7
92	Karbigahiya	-	7	14
93	Ekma	-	1	3
94	Hazipur	8	7	-
95	Dhanha		5	7
96	Pusauli	10	8	13
	TOTAL:-	108	627	725

ANNEXURE - II

FORMAT - 12
Periodicity-Annual
Data of year 2012-2013
Submission by 30th June

DETAILS OF STEP - DOWN TRANSFORMERS * IN SERVICE AS ON 31.03.2013

Name of the Undertaking : Bihar State Power Transmission Company Limited, Patna

		STEP DOWN TRANSFORMERS					
Sl. No.	VOLTAGE CLASS (in KV)	TOTAL NO. OF SUBSTATIONS	DIFFERENT VOLTAGE RATIO IN USE	DIFFERENT CAPACITIES IN USE (in KVA)	NO. IN EACH CAPACITY-SIZE	TOTAL NO. OF TRANS-FORMERS	AGGREGATE CAPACITY (in KVA)
1.0	400 KV	Nil	Nil	Nil	Nil	Nil	Nil
2.0	220 KV	09	(a) 220/132	(i) 150 MVA (ii) 100 MVA (iii) 50 MVA	(i) 150 MVA - 08 Nos. (ii) 100 MVA - 16 Nos. (iii) 50 MVA - 01 No...	25 Nos.	28,50,000.00
3.0	132 KV	(a) 84	(a)132/33	(i) 50 MVA (ii) 20 MVA (iii) 12.5 MVA (iv) 10 MVA	(i) 50 MVA - 49 Nos. (ii) 20 MVA - 120 Nos. (iii) 12.5 MVA - 01 No. (iv) 10 MVA - 12 Nos.	182 Nos	49,82,500.00
		(b) 03	(b) 132/25	(i) 21.6 MVA (ii) 20 MVA (iii) 13.35 MVA	(i) 21.6 MVA - 02 Nos. (ii) 20 MVA - 02 Nos. (iii) 13.35 MVA - 02 Nos.	06 Nos.	1,09,900.00
						TOTAL -	79,42,400.00 KVA