

SECTION A

5.2 DEPARTMENT OF ELECTRICITY, GOA

Executive summary

The Department of Electricity (DoE) was formed in January 1963 under the Government of Goa, Daman and Diu. Out of 5.09 lakh consumers as of March 2010, 601 were HT consumers and the contribution of HT consumers to the Department's total revenue during 2008-09, was ₹ 470.87 crore (69 per cent).

The electricity tariff was last revised by Government in April 2002 and the tariff structure contained six categories of consumers under Low Tension Tariff, five categories under High Tension and one under Extra High Tension (EHT).

The "High Tension Consumer Billing System" (HTCBS) deals with monthly billing of all EHT/HT consumers of all the nine billing Divisions of the Department and covers functions of preparation and issue of bills to consumers. Information Technology Audit of the HTCBS was conducted from March to July 2010, to see the:

- Correctness of bills generated with reference to tariff orders issued by Government;
- Adequacy of controls built in with reference to 'conditions of supply of electricity'; and
- General adequacies or deficiencies in the system.

System Design deficiencies

The System permitted adjustments (credit or debit/plus or minus) without exhibiting reasons for such adjustments. There was no provision in the system to incorporate data regarding Minimum Guarantee amount, deemed date of connection etc.

Provision was also absent in the system to indicate the reason for zero consumption, the basis of average billing, and the annual line minimum charges in the absence of which correctness of bills could not be ensured.

Continued dependency over manual procedures

Absence of provision in the system to enter any supporting details of payment received such as receipt number, date of receipt, amount actually received, etc. provides scope for errors during generation of bills and necessitates manual intervention for ensuring correctness and integrity of the data. Further, as there is no integrated system linking the billing and cash collection, the correctness of collection with respect to the billing could not be vouchsafed.

Mapping of business rules

There was no system of computing the 'average maximum recorded demand' based on the reading during the period the meter was not working and billing the demand charges accordingly. As the HTCBS does not indicate whether the meter installed was owned by the Department or by the consumer, the veracity of data regarding meter rent collection could not be ensured. Further, meter rent was not collected in full for the month of initial service connection/ disconnection by some of the Divisions, whereas some Divisions collected the rent on pro-rata basis, which indicate that the HTCBS was flexible so as to adopt any rate.

Absence of provision in the system to compute the average consumption by default and to raise the bill accordingly, resulted in short billing of 27.24 lakh units valued ₹ 84.94 lakh in respect of 25 consumers of four Divisions.

Though no Electricity duty shall be leviable on the units of energy consumed by Government Departments, ₹ 5.97 crore was collected as duty unauthorisedly from 98 consumers, as there was no provision in the system to identify and segregate Government consumers.

Computation of power factor and power factor rebate by the HTCBS could not be relied upon as the power factor data contained errors. Further, though the Power factor was recorded as zero in 2,952 cases, penal charges were not collected and disconnection effected.

As electricity bill for the first month of connection was omitted to be prepared loss of revenue of ` 12.96 lakh was noticed in 20 cases.

Input Controls

Most of the fields in the Master data were left blank or recorded as 'Zero'. Entries in the Master data were also found varying with the details available in the generated bills indicating that Master data was not promptly updated. Instances were also noticed where the Multiplying Factor (MF) applied for KVA of the same consumer for the same month was found varying with the MF applied for KWH.

As the tariff recorded in the system and applied for billing varied with reference to the service connection records in the Department loss of revenue of ` 14.98 lakh was noticed in respect of four consumers test checked.

Logical, physical and Change Management controls

Audit scrutiny revealed that the access to the system is being controlled by a common username and common password for data administrator as well as the other data entry operators and no scope existed for audit trail and user accountability.

As the revised rates of electricity duty was not implemented from the date of applicability of the order, the Department had incurred loss of revenue of ` 75.39 lakh.

The Department does not have any approved 'System Operation Manual' or 'User Manual' and is fully dependant on a single person for its day to day system related issues. Further, an approved/ documented back-up policy, Disaster Recovery Plan etc. were also not in existence.

System integration of billing and revenue collection

As System integration of billing and revenue collection was lacking, payment was recorded as received before the due date whereas the field records revealed that payments were received after the due date, which led to omission in levying Delayed Payment Charges (DPC). DPC is computed manually for disputed amounts also and levied and subsequently reversed.

Delay in issue of bills

The very purpose of the computersation of billing is to avoid delay and processing and issuing of bills. However, billing was delayed in all months in all the divisions except in division 3 for 24 months causing delay in realization of revenue and consequent loss of ` 101.37 lakh by way of interest.

Though the annual revenue generated from HT/EHT consumers was 69 per cent of the total revenue of the Department, internal audit of the billing system was not being conducted.

Conclusion and Recommendations

The High Tension Billing System did not have effective physical security, logical and change management controls. There were several deficiencies in input controls and processing controls in the system and hence data integrity could not be ensured which led to generation of erroneous bills and loss of revenue. In short, the system was not effective in achieving the objectives of a computerised billing operation. Hence the Department should take immediate action to rectify the deficiencies in the existing HTCBS and to review system data with reference to service connection records. Further, the system of collection of electricity charges should be automated and linked to the HTCBS and all faulty HT meters should be replaced and exact consumption data recorded/billed Manual interventions in the system should also be avoided.

Introduction

5.2.1 The Department of Electricity (DoE) was formed in January 1963 under the Government of Goa, Daman and Diu. Consumers of the Department are broadly divided into two categories *viz.* High Tension (HT)¹ consumers and Low Tension (LT) consumers. Out of 5.09 lakh consumers, 601 were HT consumers (March 2010) and the contribution of HT consumers to the Department's total revenue during 2008-09 was ` 470.87 crore (69 *per cent*).

The DoE does not have its own power generation units and hence purchases power through the national grid from Central Sector Power Stations as per the allocation made by the Central Government. On an average, around 2,300 MU of energy is purchased yearly, 1,950 MU is billed and the remaining 350 MUs (15 *per cent*) is accounted as Transmission and Distributions losses. The electricity tariff was last revised by Government in April 2002 and the tariff structure contained six categories of consumers under Low Tension Tariff, five categories under High Tension and one category under Extra High Tension (EHT).

Organisation Setup

5.2.2 The Department is headed by the Chief Electrical Engineer and assisted by four Superintending Engineers, Deputy Director (Administration), Joint Director of Accounts and Executive Engineers. There are 17 divisional offices each headed by Executive Engineer, of which nine² are Operation and Maintenance Divisions engaged in the distribution of power. These nine Divisions were having a total of 33 sub divisions, each headed by Assistant Engineer.

The High Tension Consumer Billing System (HTCBS) installed in the Chief Electrical Engineer's office at Panaji, Goa is operated by two Junior Engineers of the Department and supervised by an Executive Engineer.

Salient features of HT billing system

5.2.3 The HTCBS was initially developed in the year 1988 by National Informatics Centre (NIC), using COBOL³. The system was modified using 'C' language on UNIX platform in the year 1992 and further ported to Red Hat LINUX platform in 2003. The System may be considered as a self operated one, as the data entry and printing of bills was done with the involvement of staff of DoE only with technical help, from NIC. In the recent past, an ex-employee of NIC who had developed the programme, while he was in service, has been appointed as consultant for any necessary technical assistance.

¹ High Tension Consumers means those who obtain power supply at pressures higher than 400/450 volts AC 50 cycles (11 KV and above).

² Divisions: 1, 3, 4, 5, 6, 7, 10, 11 and 14.

³ COmmon Business-Oriented Language.

The system deals with monthly billing of all EHT/HT consumers of all the nine billing Divisions of the Department and covers functions of preparation and issue of bills to consumers only. Functions such as sanction of new connection to a consumer, periodical meter reading, collection of amount billed, collection of shortfall in security deposit, *etc.* are done manually and the details fed in to the system.

Basic inputs comprise ‘Master’ and ‘Transaction’ data. Master data relate to data pertaining to each consumer *viz.* consumer number, billing unit, processing cycle, details of address, applicable tariff code, data in respect of the connection such as date of connection, connected load, details regarding the meter installed for measuring consumption. Transaction data relate to the periodical data pertaining to the meter reading, status of meter, payments by consumers, *etc.* Master and transaction data are linked to each other by consumer number. Data input is done manually via key board by Junior Engineers of concerned Division offices. Bills generated by the HTCBS are checked by the Division office and issued to consumers.

Objectives of High Tension Billing System

5.2.4 Although the Department had not documented any objectives of the billing system, it is expected that a computerised billing system must be able to achieve:

- Reduction of time lag between meter reading and issue of bills
- Accurate and current billing and accounting information
- Effective control over billing operations and prompt follow up action in the event of non-payment of energy bills

Scope of Audit and Audit Methodology

5.2.5 Information Technology Audit of the “High Tension Consumer Billing System” was conducted from March to July 2010. Billing data in the system related to all the HT consumers of all the Divisions for the five years from March 2005 to February 2010 was analysed in audit and test checked with reference to the service connection and meter reading records maintained by Division offices to see the :

- Correctness of bills generated with reference to tariff orders issued by Government
- Adequacy of controls built in with reference to ‘conditions of supply of electricity’, and
- General adequacies or deficiencies in the system.

In addition, the following areas of importance, required to be maintained in an established computerized system, were also examined:

- Access controls policy – both physical and logical
- IT back-up policy and Disaster recovery policy/plan
- MIS reports generated by the HTCBS, and
- Input verification methods and system checks in place.

Data analysis was done by obtaining the data in MS EXCEL format and filtering the same. Audit also used dummy data to understand the software checks in place and the reliability of the system.

Audit Findings

General Controls

System Design

On a review of the system along with the data obtained from the department, the following system design deficiencies were noticed.

Adjustment entries without supporting documents

The system permitted credit/debit adjustments without indicating reasons

5.2.6 It was noticed that provision existed in the System to create adjustment entries (credit or debit/plus or minus) without exhibiting reasons for such adjustments. Further, supporting authenticated documents/details were not available with the billing centre and as such the authenticity of such adjustments could not be verified/relied upon. Out of 36,531 records verified in audit, adjustment by way of ‘other charges (-)’, which gives effect of credit to consumer was found in 187 cases, value of which aggregated to ` 47.42 crore.

On a further scrutiny, it was noticed that payment of electricity charges in advance, adjustments relating to subsequent corrections made by the Division offices manually in the previous bills were being accounted as credit under the head ‘other charges’. In the event of a dishonoured cheque, Delayed Payment Charges (DPC) along with Bank charges is computed manually and incorporated in the system in the subsequent month’s Bill as “Other/Sundry Charges”.

The adjustments on account of reduction or additions in the bills are incorporated in the system in the subsequent month’s bill which is highly irregular and defeats the very purpose of computerised billing. Further, there was no provision in the system for issuing supplementary bills.

Agreement for contract demand

Correctness of Demand charges billed could not be ensured as documentation was not proper

5.2.7 It is required that a consumer has to execute an agreement with the Department for a new connection, which, *inter alia*, includes the Contract Demand. Energy Bills include Demand charges which is computed based on the Contract Demand⁴. A new agreement has to be executed as and when any reduction or addition is made in the Contract Demand. The HTCBS did not contain any provision to indicate such agreements. Hence the authenticity of the Contract Demand recorded in HTCBS and demand charges billed could

⁴ Contract Demand” means the maximum KVA (Kilo Volt Ampere) for which the Electricity Department has undertaken to provide the facilities from time to time.

not be ensured. It was also noticed during test check of records in Divisions 3 and 4 that such changes were only endorsed to the original agreements instead of executing fresh agreements.

Charges for factory/residential lighting purposes

5.2.8 The monthly energy consumption (KWH) of a HT consumer included factory lighting consumption and residential light consumption also. Separate meters are to be installed for factory lighting and residential lighting and consumption arrived at by taking the differences between opening meter reading and closing meter reading of each meter. As per the tariff orders, in respect of energy consumed for factory lighting purposes by certain HT consumers⁵, maximum of 10 *per cent* of the total monthly energy consumption is allowed to be billed under HT-Industrial tariff and excess is to be billed at a higher LT-commercial rate.

Meter reading data was not fully available in the system and certain bills were raised without data

Audit Scrutiny, however, revealed that:

- No provision existed in the billing system to incorporate/indicate the opening and closing reading of factory light meter and residential light meter. These data are computed manually and fed in to the HTCBS.
- In several cases factory lighting consumption/residential light consumption was billed based on ad-hoc figures. This could be due to the fact that either no such meter was installed or the meter reading was not taken or meter was faulty.

In the absence of separate meter readings, the accuracy of the bills generated by HTCBS could not be ensured.

Minimum Guarantee

5.2.9 HT consumers while applying for connection have to execute an agreement with the Department which, *inter alia*, contain the “Minimum Guaranteed” (MG) amount per annum being 15 *per cent* of the total capital cost. Further, the agreement also stipulates that the consumer shall commence power consumption within a period of three months from the date of intimation of line being ready for charging. The date of commencement of supply shall be deemed as the date of expiry of the three months period from the date of intimation or the date of actual supply whichever is earlier. However, there was no provision in the system to incorporate data regarding Minimum Guarantee amount, deemed date of connection, etc.

Minimum Guarantee data was not available in the system

Temporary connections

5.2.10 As per the tariff orders issued by Government, separate rates are fixed for HT-Temporary consumers. However instances were noticed where details of HT-Temporary consumers are not recorded and billed by the system, instead bills were manually prepared.

⁵ HT-Industrial, HT-Metal, EHT- Industrial, HT-PW, HT-Steel, and HT-IT consumers.

Bank guarantees from Consumers

5.2.11 As per the tariff rules, each HT consumer has to furnish security deposit in the form of Bank Guarantees (BG) from Nationalised Bank for an amount equal to three month's energy charges⁶ either in a single or multiple documents. BG is to be reviewed and renewed periodically and raised according to the increase in energy charges.

However it was noticed that the HTBCS is not designed to compute, on its own, the required BG to be submitted by the consumer. The system is capable of incorporating data of only three BGs of a consumer at a time. In respect of one of the divisions, aggregate value of BG alone is incorporated in the system.

Adequacy of bank Guarantee could not be verified from the system data

Test check of details of BG as available in the system in three Division Offices further revealed that out of a total of 222 consumers required to submit the BG, details of BG furnished by 77 consumers were not available in the system and in respect of 103 consumers, the value of BG furnished by them was not adequate to cover three months' current charges. The amount of shortage is worked out at ` 9.22 crore. Moreover, out of 235 BGs held by these Divisions, 89 BGs were invalid/time-expired. This indicated non-updating of the data in the system.

Other System design deficiencies

5.2.12 The following system deficiencies were also noticed.

No provision existed in the system to show Check Meter reading data

(i) As per the guidelines issued by the Department, each HT meter is to be supported by a 'Check Meter' (Standby Meter) which would facilitate computation of consumption when the main meter is faulty. The billing system did not incorporate the Check Meter Reading and hence the accuracy of meter reading and billed consumption could not be cross checked and confirmed.

No reasons available for recording zero consumption

(ii) It was noticed that energy consumption was recorded as "Zero" in 1,565 bills. However, there was no provision in the system to indicate the reason for zero consumption. The possible reasons could be:- (a) Meter reading not taken (b) Meter faulty/not working and (c) Consumer not using power.

(iii) Where zero energy consumption is recorded, billing was not done in 618 cases for energy charges and in the remaining 947 cases average was computed manually and fed in to the system. However there was no provision in the system to indicate the basis of such billing.

Initial reading was not equal to final reading of previous month

(iv) The initial energy meter reading of a month recorded in the system was found not equal to the closing reading of previous month, in several cases. Similarly, closing meter reading of a month was found less than the opening reading. The possible reasons could be faulty meter or wrong meter reading or replacement of meter. However, there was no provision in the system to indicate the reason and to compute the exact consumption (KWH) by default.

⁶ In respect of HT consumers under Industrial- Metallurgical, steel melting and steel rolling categories, BG is required for two month's energy charges only.

In such cases, consumption is arrived at manually and fed in to the system. Thus the reliability of the data could not be ensured.

No provision existed in the system to indicate line minimum charges

(v) As per Tariff orders, consumers under HT Industrial (Metal and Steel Rolling) have to pay demand charges on pro rata basis if the industry is closed continuously for a minimum period of seven days or more during a month. In the event of such industries remaining closed, one-twelfth of 'annual line minimum charges', as indicated in the HT Agreement executed with the Consumer, is to be charged. However, there was no provision in the HTCBS to incorporate the annual line minimum charges and the number of days during which industry was closed. Hence the correctness of demand charges billed for such industries under such situations could not be ensured.

Continued dependency on manual procedures

Demand, Collection and Balance (DCB)

As the system was not capable of generating accounting statements manual records were to be prepared

5.2.13 The Computerised HT Billing system can derive the data regarding the monthly arrear position of all consumers of all Divisions. However, it was noticed that the Department continued to prepare Demand, Collection and Balance (DCB) statement manually.

There was no integrated system of billing and cash collection

Cash collected against the billing demand is entered manually in the system during the next billing cycle. The payment received in full is indicated by codified flags and the system would process the next bill considering the previous bill amount as 'received in full'. There is no provision in the system to enter any supporting details such as receipt number, date of receipt, amount actually received, etc. This provides scope for errors during such generation and necessitates manual intervention for ensuring correctness and integrity of the data. As there is no integrated system linking the billing and cash collection, the correctness of collection with respect to the billing could not be vouchsafed.

A review of the arrear position in the manually prepared DCB to the details available in the system revealed wide variations as shown below:

Division No.	Arrear position as of 31 March 2009 as per		Difference
	DCB Statement (Manual)	Computerised Billing system	
1	15271130	904011	14367119
3	170639734	121733764	48905970
4	338678856	(-) 18614303	357293159
5	51708082	42708927	8999155
6	38876110	8535162	30340948
7	20193333	5456663	14736670
10	15195753	6533384	8662369
11	12140122	5330756	6809366

It was observed that no effort was made to reconcile the differences thus rendering the data in HTCBS unreliable.

Mapping of business rules

Faulty demand meter

5.2.14 As per Tariff orders, demand charges for each month is to be computed based on (i) the actual maximum demand recorded during the month or (ii) 75 per cent of the contract demand or (iii) actual maximum demand recorded during the previous 11 months or (iv) 50 KVA, whichever is higher.

Correctness of demand charges billed could not be ensured

In respect of 62 consumers, though the energy meter was showing normal consumption, the KVA reading (Maximum Recorded Demand) was showing zero in 758 bills indicating that the meter was faulty or no reading was available. Hence, in such cases demand charges were assessed on the basis of 75 per cent of Contract Demand and not on the basis of actual maximum recorded demand. There was no system of computing the 'average maximum recorded demand', based on the reading during the period the meter was not working and billing the demand charges accordingly.

Short collection of Meter Rent

5.2.15 As per the Tariff orders issued by Government, meter rent is to be collected from all HT consumers (@ ` 500 per month per meter for the main meter and @ ` 10 per month per meter for light meter). However, no meter rent is required to be collected from consumers who have installed their own meters. As the HTCBS does not indicate whether the meter installed was owned by the Department or by the consumer, the veracity of data regarding meter rent collection could not be ensured.

Meter rent was not being collected from some consumers

Analysis of the billing data related to 85 months (January 2003 to January 2010) revealed that no meter rent was levied in respect of 43 consumers. Further, meter rent was not collected in full month of initial service connection/disconnection by some of the Divisions, whereas some Divisions collected the rent on pro-rata basis. This indicates that the HTCBS was flexible so as to adopt any rate.

At the instance of Audit, the Department agreed to effect recovery of meter rent amounting to ` 1.44 lakh in respect of 12 consumers. In respect of nine consumers the meter was stated to be installed by consumers themselves. For the balance consumers, reply is awaited. The fact, however, remained that there was no provision to indicate the ownership of meter in the system.

Average billing

Incorrect computation of average consumption caused loss of revenue of ` 0.85 crore

5.2.16 Clause 24 of the 'Conditions of Supply of Electrical Energy' stipulates that a consumer should be finally billed for the periods when meter was faulty, on the basis of three month's average consumption subsequent to the replacement of faulty meter. Audit scrutiny of HTCBS revealed that there was no provision in the system to compute the average consumption by default and to raise the bill accordingly. This had resulted in short billing of

27.24 lakh units valued ` 84.94 lakh (including electricity duty) in respect of 25 consumers of four Divisions⁷.

Billing of Agricultural consumers

Correctness of billing of Agriculture consumers could not be ensured in the absence of adequate data in the system

5.2.17 As per the *tariff* orders, in respect of HT (Agriculture) consumers, energy charges were to be levied at the rate of ` 1.25 per unit subject to a minimum of ` 10 per HP of connected load (minimum of ` 700 per month). It was observed that though connected load (HP) was available in HTCBS, the same is not considered, instead, minimum charges are computed based on Contract Demand (KVA). Contract Demand (in KVA) and connected load (HP) are different and cannot be equal. Further, there were variations between the connected load and Contract Demand recorded in the system as to those available in the manual records. Thus the correctness of the bills raised by the system could not be ensured.

Collection of Electricity duty from Government Departments

Excess of ` 5.97 crore was collected as Electricity duty

5.2.18 As per Section 2(2) of the Goa, Daman and Diu Electricity Duty Act, 1986, no duty shall be leviable on the units of energy consumed by Government Departments. Audit scrutiny revealed that, no provision existed in the HTCBS to identify and segregate Government consumers. Hence Electricity duty was seen collected throughout the period on energy consumed by Government Department/Institutions. The amount of duty collected unauthorisedly from 98 consumers through 4,337 Bills during the period of 60 months (March 2005 to February 2010) aggregated to ` 5.97 crore.

Billing of Hotel Consumers

5.2.19 As per the Tariff orders, HT Consumers engaged in Hotel Business are to be billed under HT-Mix Tariff⁸. However, hotel HT Consumers on producing certificate from the Tourism Department can avail the concessional HT-Industrial tariff⁹. The Electricity duty was revised to ` 0.58 per unit in May 2008 for industrial HT consumers and to ` 0.18 per unit for HT-Mix Tariff consumers. As a result, the total rate per unit (energy charges plus electricity duty) for HT-Mix Tariff became cheaper by ` 0.15 per unit compared to HT-Industrial tariff.

Absence of adequate data led to discriminatory billing

In this context, Audit scrutiny of the HTCBS revealed that certain HT-Mix consumers doing hotel business who had produced the prescribed certificate and availed the benefit of cheaper tariff of HT Industrial were changed suo moto by the Department, back to HT-Mix tariff without any request from the consumer. This was, however, not implemented for all consumers doing hotel business.

There was no provision in the HTCBS for identifying HT (Hotel) consumers who were billed under Industrial tariff and Mix tariff. The system also did not

⁷ Division 6, 10, 11 and 14.

⁸ Energy charges @ ` 3.25 per unit and Electricity duty @ ` .05 per unit.

⁹ Energy charges @ ` 3 per unit and Electricity Duty @ ` 0.05 per unit.

indicate whether the prescribed Certificate had been submitted by HT (Hotel) consumers who were availing the concessional tariff. The omissions could lead to discriminatory billing.

Pro rata billing of demand charges

Short collection of demand charges caused loss of revenue of ` 19.88 lakh

5.2.20 When a new HT connection is effected, demand charges is levied in certain cases for the full month irrespective of date of connection, whereas in some cases demand charges were being collected on *pro rata* basis only. Similarly, in the case of disconnection also full Demand Charges is billed for the month in which disconnection is effected, but *pro rata* Demand Charges was only levied in some cases. Further, there were cases where no bill was raised for the month of disconnection. This discriminatory billing had caused loss of revenue of ` 19.88 lakh in respect of 14 consumers, test checked in audit. This also indicates that HTCBS was flexible and not free from loopholes.

Billing of Demand Charges in respect of HT installations with LT metering system

Absence of the specified metering system caused incorrect computation of demand charges

5.2.21 All HT/EHT consumers are required to install HT metering system which provides two readings:- Maximum Demand reading and the main Energy Meter reading. Maximum Demand reading (expressed in KVA) is the basis for computing the monthly Demand Charges and Energy Meter reading (expressed in KWH) is the basis for computing the monthly energy charges. As per the rules, even if an HT connection is released with LT Metering System (LTMS), the same is to be replaced with HT Metering System (HTMS) within three months from the date of connection. The LTMS is not having the facility to indicate the Maximum Demand meter data and hence, Demand Charges in such cases are computed by the system based on *75 per cent* of the Contract Demand. Thus the exact Demand Charges cannot be billed in such cases.

Audit scrutiny revealed that, in nine cases LTMS installed was not replaced by the HTMS and hence Demand Charges was being billed continuously since inception based on *75 per cent* of Contract Demand, causing huge revenue loss. The loss could not be assessed as the Maximum Demand data was not available. It was also noticed that there is no provision in the HTCBS to indicate whether the HT installation is having proper HTMS.

Rebate for power factor

Excess rebate granted has not been recovered

5.2.22 Tariff notification stipulates that “*all High Tension and Extra High Tension installation where the power factor is maintained above 0.95 lagging shall be eligible for a rebate at the rate of one per cent of the energy charges only for every one per cent improvement in the Power Factor above 0.95 lagging*”. Rebate of one *per cent* of the energy charges was allowable only when one *per cent* improvement of power factor was achieved in full and not in part. The HTCBS, however, allowed rebate by rounding off fraction of power factor to the upper stage and thus without achieving the one *per cent*

power factor in full. This was pointed out by Audit vide earlier Audit Report, and the department assured (January 2009) to recover the excess rebate (₹ 4.53 crore). However, the same has not been recovered so far (September 2010).

Data regarding power factor derived by the system was not reliable

5.2.23 Technically, Power Factor can never be more than '0.99'. However, out of 36,531 records (Bills from March 2005 to February 2010, in respect of all consumers of all Divisions) verified in Audit, power factor was recorded as '1', in 8,746 cases and the total amount of power factor rebate charges allowed was ₹ 12.72 crore. Meanwhile in 16 cases, though the power factor recorded was '1', no rebate was allowed. It was also noticed that in 125 cases, Power Factor recorded was more than "1". This indicates that computation of power factor and power factor rebate by the HTCBS cannot be relied upon.

5.2.24 As per the tariff notification, if the power factor is less than 0.85, penal charges¹⁰ at the prescribed rates shall be levied. In case the power factor is less than 0.7, the installation shall be disconnected. Out of 36,531 records (Bills from March 2005 to February 2010, in respect of all consumers of all Divisions) verified in Audit, power factor was recorded as zero in 2,952 cases in respect of 308 consumers. However, penal charges were neither collected nor disconnection effected in any of the cases, resulting in considerable loss of revenue.

Omission in billing

Omission in billing caused revenue loss of ₹ 12.96 lakh

5.2.25 When a new HT connection is effected, the initial meter reading on the date of connection is recorded and the billing is to be started from that date. Audit scrutiny revealed that the date of connection was not being recorded in the HTCBS. Further, in certain cases, the date of connection as per service connection records varied from the date of initial reading recorded in the HTCBS. Consequently, electricity bill for the first month of connection was omitted to be prepared and issued in 20 cases which caused loss of revenue of ₹ 12.96 lakh by way of Demand Charges.

Input control

5.2.26 Data integrity refers to the completeness, accuracy and relevance of the data in the system. Existence of adequate controls is necessary to ensure data integrity. A control is a system that prevents, detects and/or corrects unlawful events. Input to the billing system comprises data and instructions for processing. Effective control over inputs is critical as they involve considerable human intervention and are, therefore, error prone and susceptible to fraud.

Audit tested the billing system for existence and adequacy of management controls, input controls and processing controls and found the following deficiencies:-

¹⁰ These charges are termed as "Low Power Factor Charges".

Master Data

5.2.27 The HT billing system consists of a Master file for defining various categories of HT Tariff to be applied to different categories of HT consumers. The billing system refers this to the Master tariff file for applying the relevant tariff applicable to each category of HT consumer. Master data in the system contained details of Tariff code, HT Meter rent, connected load, category of consumers, Contract Demand, etc. of each consumer. Audit scrutiny revealed that:-

(i) Most of the fields were left blank or recorded as ‘Zero’ out of a total 677 consumer records, as given below:-

Master file was not updated

Fields	Number of entries kept blank or zero
HT Meter rent	31
LT Meter rent	653
HT Meter Number	12
Connected load	321
Category	126
HT Meter ratio	8
Installation date	74

Variations noticed between Master data and bill data

(ii) Entries in the Master data were also found varying with the details as available in the generated bills. For instance, Contract Demand recorded in the Master Data varied from the Contract Demand recorded in the Bill data in 25 cases out of 230 records test checked. The variation ranged between (+) 19,650 KVA and (-) 19250 KVA.

(iii) Entries in the Master data contained factual errors. For instance, category of consumers recorded in the Master data as “Government” was found wrong in 57 cases.

Multiplying Factor used for computing consumption was not correct

(iv) The meter reading figures are to be multiplied by a ‘Multiplying Factor (MF)’ for arriving at the exact number of units consumed (KWH) and to calculate the energy charges. This factor varies according to the type and specification of meter. Based on the details of meter specification available in the Master File, audit had computed the exact MF to be applied for each consumer. This MF varied from the actual MF used for billing in respect of 97 consumers.

This indicated non updation of the Master data and non utilization of the same for billing purpose. Thus the reliability of the data in the system could not be ensured.

Meter reading

5.2.28 A meter provided by the Department at the consumer’s premises records energy consumed by the consumer. Monthly meter reading is done by a meter reader and details thereof are entered in the billing system. As the meter reading is vital for accurate computation of the energy bill, adequate

control should be exercised to ensure its accuracy. In this context, audit scrutiny revealed the following deficiencies:-

Confirmation of meter reading was not obtained

(i) Though the meter reading statement contained a provision to incorporate the signature of consumer as a confirmation/acceptance of the reading data, the same was not seen obtained in most of the statements. Absence of confirmation by the consumer resulted in non-acceptance and subsequent revision of bills.

Multiplying Factor applied for KVA and KWH varied

(ii) Demand Charges is computed based on the 'connected load' which is expressed in terms of "KVA" (Kilo Volt Ampere). Monthly KVA is arrived at by multiplying 'KVA reading' with the 'multiplying factor' applicable. The Multiplying Factor (MF) for KVA of an HT installation will be same as that of KWH. However, instances were noticed where the MF applied for KVA of the same consumer for the same month was found varying with the MF applied for KWH.

Test checked reading data was not available in the system

(iii) Meter reading furnished by Meter Readers were not being test checked by an authority other than the Meter Reader for ensuring accuracy and identification of variance. The billing system is also not depicting any data regarding 'test check readings'.

(iv) The tariff recorded and applied for billing for same category of consumers was found varying from Division to Division indicating absence of input control and inadequate supervisory checks. For example, though all BSNL Telephone Exchanges are billed under HT (Industrial) Tariff, one of the Exchange is billed under HT-mix Tariff.

Rent for factory light meter was not levied

(v) Every HT consumer under industrial tariff have to install a separate meter for recording the factory light consumption and meter rent for the same is ` 10 per month. However, in several cases, though factory light consumption charges were levied, no meter rent was seen levied.

Loss of revenue due to incorrect application of tariff

5.2.29 While analyzing the billing data of HT/EHT consumers it was noticed in Audit that in respect of certain consumers, the tariff recorded in the system and applied for billing was found varying with reference to the service connection records maintained by Division offices, resulting in loss of revenue of ` 14.98 lakh in respect of four consumers, as detailed in **Appendix 5.8**.

Logical and physical controls

Logical access controls and Audit Trail

Logical access control and audit trail were absent

5.2.30 The HT Billing system is installed on a personal computer (PC) in the Office of the Chief Electrical Engineer, Panaji. The access to the system is being controlled by a common username and common password for data administrator as well as the other data entry operators.

This provides scope for unauthorized modification of software and modification of master data as well. Further, this also leaves no scope for existence of audit trail and user accountability. In view of the above, the security of the data and the software has been compromised.

It was noticed in audit that the 'Master Tariff File' was accessible to every user. This provides scope for manipulation of tariff rates and incorrect computation of bills.

Physical access controls

Physical access controls were not adequate

5.2.31 The computer room in which HT Billing system is installed did not have firefighting equipment installed to protect against occurrence of fire due to short-circuit or any other reason.

It was also noticed that the Computer room was dumped with stationeries, and used/damaged computer hardware. The approach way to the Computer room is being used as storage space for old records and thus had accumulated lot of dust, which may be harmful for the day to day functioning of the HTBCS.

Change management controls

5.2.32 Change management control refers to control to be exercised in carrying out changes to the system. It also includes proper authorization for changes to the system to incorporate tariff and other changes.

It was noticed that there was no formal documentation procedure describing the manner in which changes made to the programme are to be documented such as records of programme code, use of charts to show the structure of programme in terms of its major components, the relationships among these components and flow of logic in calculation of various charges. The following instances relating poor change management procedures were noticed.

Loss of revenue due to short collection of electricity duty

Short collection of electricity duty caused revenue loss of ` 75.39 lakh

5.2.33 The electricity duty was revised by the Government from five paise to 18 paise per unit of energy from 28 May 2008 in respect of all HT consumers except in the case of HT Industrial consumers where it was revised to 58 paise per unit. However, the corresponding changes in the billing programme were not effected immediately and the revision was effected from June 2008 only. Non-levying of the revised rates from the date of applicability of the order has resulted in short collection of revenue to the tune of ` 75.39 lakh in respect of 602 consumers for the four days in May 2008.

Rebate for power factor

5.2.34 The system of granting rebate for power factor contained some errors due to which the Department had been incurring revenue loss. The same was corrected at the instance of Audit (Para 5.6 of CAG'S Audit Report,

Government of Goa, 31 March 2009) in March 2009. This change, however, was not properly documented.

Delayed Payment Charges (DPC)

Delayed Payment Charges was not being properly billed

5.2.35 If the electricity bill is not paid before the due date, Delayed Payment Charges (DPC) is calculated by the system by default for the entire amount of arrears. However, vide executive orders DPC need not be computed for the Electricity duty portion w.e.f 1 April 2009. However, necessary changes to effect this decision was not made in the system. Hence the excess DPC collected on Electricity duty is computed manually and credit is given in the subsequent bills. There was no provision in the system to exclude Electricity duty arrears and to calculate Delayed Payment Charges on the remaining portion of arrears.

Systems Operation/User Manual

System Operation Manual was not available

5.2.36 In order to ensure use of a software system in an authorized and useful manner, it is necessary to have a 'Systems Operation Manual' and 'User Manual' approved by the user department which shall list out the method of operation of the software, hardware requirements, security controls provided by the system, list of reports that the system is designed to generate, guidance necessary for 'system operator' and normal 'users' of the system. Audit scrutiny revealed that the Department does not have any approved Systems Operation Manual or User Manual. The Department has been fully dependant on a single person (One retired official of NIC) for its day to day system related issues.

Back-up Policy and Disaster Recovery Plan

Back-up policy was not documented

5.2.37 The HT billing software and the data pertaining to bills generated from the system is being stored in the PC placed in the Computer room itself. Audit scrutiny revealed that the Department does not have an approved/documented back-up policy and there was no system of taking periodic back-up of data or testing the quality/reliability of the backed up data. It was also noticed that the Department does not have any approved and documented 'Disaster Recovery Plan' except a copy of the software system and current data kept separately in the same building.

System integration of billing and revenue collection

Delayed Payment Charges

5.2.38 As per the tariff order and the "Conditions of Supply of Electricity", DPC is to be levied from all consumers who have paid the bill after the due date. Audit scrutiny, however revealed that in certain cases, the system recorded that payment was received before the due date whereas the field records revealed that payments were received one or two days after the due date in 10 instances test checked. Thus DPC was omitted to be levied.

Computation of DPC required manual intervention

It was noticed that in the event of payments after the due date, DPC to be levied is calculated manually and collected on the spot and in some cases it is added as arrears in the subsequent month. As the system is not computing DPC by default, omissions in levying DPC cannot be ruled out. At the end of March 2009, the amount pending collection from HT Consumers was ` 66.27 crore (Net) and it included disputed amount of ` 1.72 crore. DPC is computed manually for disputed amounts also and levied and subsequently reversed. In view of such manual intervention in the system, the accuracy cannot be ensured.

Management information

Non-recording of age/period of arrears

System was not capable of generating proper accounting records

5.2.39 It was noticed that though the system indicated the total amount of arrears of a defaulted consumer as on a particular date, the age/periodicity of such arrears was not ascertainable. In the absence of this vital information, progress of recovery of arrears could not be ascertained from the system.

5.2.40 Personal Ledger Account of each consumer showing opening balance, addition/demand, collection and closing balance of electricity dues was not being prepared using the HTCBS.

Delay in issue of bills

Delay in billing caused loss of revenue of ` 101.37 lakh by way of interest

5.2.41 The very purpose of the computerisation of billing is to avoid delay in processing and issuing of bills. As per the standing instructions, billing for HT consumers has to be completed and bills issued to consumers on or before fifth of every month.

- (i) On examining the billing data relating to 60 months of all Divisions it was revealed that, billing was delayed in all months in all the Divisions except in Division 3 for 24 months. The delay in billing ranged from one to 10 days. The delay in billing caused delay in realisation of revenue and led to loss of ` 101.37 lakh (@14 per cent per annum) by way of interest.
- (ii) Payment of electricity charges are to be made in 14 days from the date of Bill. Hence last date of payment is fixed by the billing system by adding 14 days to the bill date. However, on 10 occasions more days were allowed while fixing the last date of payment. The extension of last date of payment caused delay in realisation of revenue.

Other points of interest

Energy consumption data was erratic

5.2.42 There were several cases of erratic energy consumption data which indicate that there was no system to analyse and compare the consumption data of each month with previous month's/year's data and to find out cases of short/excess billing.

5.2.43 When payment is received by cheque or demand draft, pre-printed receipt is filled up and issued to consumer on the spot. This system is not fool

proof as receipt can be prepared/issued at any time with back date and levy of DPC can be avoided.

Though the due date/last date for receipt of bill amount is mentioned in the bill, no timing is prescribed for the last date and payment is received till the end of office hours. Hence cheques/DDs received could not be remitted into the Bank on the date of receipt itself.

Internal Audit

Internal audit of HT billing system was not conducted

5.2.44 The role of the HTCBS of the Department is vital as well as critical as 69 *per cent* of its total annual revenue is from HT/EHT consumers. However, no system existed to conduct internal audit of the billing system so as to avoid errors and omissions. Further, though the Chief Electrical Engineer had instructed (March 2005) that all bills of HT Consumers were to be checked by the Accounts Officer of Electrical Circle Office, no such exercise was being conducted.

Conclusion

The High Tension Billing System used by the Department to cater to the needs of HT consumer billing continued to be used with lot of system deficiencies like absence of provisions to accommodate advance payments, Delayed Payment Charges, supplementary billing and thus was permitting adjustments through credits in the subsequent bills without exhibiting reasons. This made the system not reliable. The physical and logical controls were inadequate. Poor change management controls resulted in loss of revenue. Lack of proper input controls and non mapping of business rules resulted in generation of erroneous bills and loss of revenue. Revenue collection process was not mapped in the system. Thus, the system was found not effective in achieving the objectives of a computerised billing operation.

Recommendations

- **The Department should take immediate action to rectify the deficiencies in the existing HTCBS, as discussed in the foregoing audit findings.**
- **Service connection records of all HT consumers are to be thoroughly reviewed and compared with the system data.**
- **The system of collection of electricity charges should be automated and linked to the HTCBS.**
- **Faulty HT meters should be replaced without delay and exact consumption data recorded/billed.**
- **Manual interventions should be avoided as far as possible.**

The matter was referred to the Government in September 2010, their reply had not been received (October 2010).