Performance Audit relating to Power Sector PSUs

CHAPTER II

PERFORMANCE AUDIT RELATING TO POWER SECTOR PSUS

Performance Audit on Computerised Electricity Billing System in Assam Power Distribution Company Limited

Highlights

The process of migration of consumer data from Power Computerised Billing System (CBS) to SAP was not documented. The Company did not provide any formal training to its regular staff, being the intended System Users.

(Paragraph 2.7 and 2.9)

Deficiencies in the Meter Billing Collection (MBC) and Customer Relationship Management (CRM) Modules led to various anomalies such as non-interfacing of the System with Common Meter Reading Instrument (CMRI), absence of provision for automatic calculation of processing fee, wrong billing of fixed charges due to incorrect conversion of KW into KVA, non-updation of Geographical Information System database leading to overloading of distribution transformers, delay in release of new service connections due to absence of necessary system alert *etc*.

(Paragraph 2.11, 2.12, 2.13, 2.16 and 2.17)

Incorrect mapping of business rules as well as lack of adequate validation checks in the System resulted in excess recovery of power factor penalty, incorrect billing of fixed/energy charges and wrong categorisation of consumers leading to allowance of government subsidy to ineligible consumers, *etc*.

(*Paragraph 2.20, 2.21 and 2.22)*

Lack of adequate application controls in the System resulted in acceptance of unusual meter numbers, processing of unusual transactions, duplicate generation of bills, *etc*.

(*Paragraph 2.25, 2.28 and 2.30)*

Introduction

2.1 Assam Power Distribution Company Limited (Company) which undertakes distribution of electricity in the State was formed (23 October 2009) after the unbundling of the erstwhile Assam State Electricity Board. As on 31 March 2018, the Company had 43.28 lakh consumers comprising of two broad categories, namely low-tension (LT[1]) and high-tension (HT[2]) consumers. The LT and HT consumers were being billed under 158 Electrical Sub-Divisions (ESDs) and 17 industrial revenue collection areas (IRCAs) of the Company. All the consumers (both HT and LT) received power from the sub-stations functioning under the control of ESDs. The Company billed and collected revenue from consumers against the electricity supplied as per the Schedule of Tariff (SoT) issued by the Assam Electricity Regulatory Commission (AERC) from time to time. The Company was operating with the system of billing and collection of revenue through the following two billing applications:

- **Power Computerised Billing System**: It was a decentralized billing system being used for billing and collection purpose since 2003-04. As on 31 March 2018, around 79.52 *per cent* (34.42 lakh consumers) of total consumers were being billed through this application. During 2013-18, the Company billed a revenue aggregating ₹ 9,507.42 crore through this application.

- **SAP**: SAP is a software application in data processing where SAP stands for System, Application and Products. SAP based billing application was developed by Tata Consultancy Services (TCS) with Oracle as the database on a centralised platform comprising of four Modules namely, Meter Billing Collection (MBC), Customer Relationship Management (CRM), Web Self Service (WSS) and Energy Audit (EA). The primary database server of SAP based billing system was located at Data Centre, Guwahati while the Disaster Recovery Centre (*replica* of Data Centre) was situated at Agartala. SAP was introduced (March 2013) after implementation of Restructured Accelerated Power Development and Reforms Programme (R-APDRP[3]) of the Government of India (GoI). The R-APDRP scheme was implemented within the confined area of a town termed as 'Ring-fenced area'[4]. Initially the consumers[5] falling within this area were selected for migration from Power Computerised Billing System (Power CBS) to SAP and those falling outside the said area continued to be billed through Power CBS. As HT consumers were the primary source of revenue for the

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1 Consumers having connected load below 20 Kilowatt
2 Consumers having connected load of 20 Kilowatt and above
3 R-APDRP is a central sector scheme approved by Ministry of Power, Government of India.
4 An imaginary boundary line demarcated through installation of import/export meters at the boundary for the purpose of energy audit.
5 Both LT and HT

Company and their migration to SAP ensured centralised monitoring of revenue billing, all HT consumers were migrated from Power CBS to SAP irrespective of the fact whether these consumers are covered within or outside the Ring-fenced area. As on 31 March 2018, the Company had total 8.86 lakh[6] consumers (20.48 *per cent* of total consumers) being billed through SAP. The Company billed a total revenue of ₹ 9,041.21 crore during 2013-18 through this application.

The status of billing application used in ESDs and IRCAs as on 31 March 2018 was as shown in ***Table 2.1.***

Table 2.1: Details of usage of Power CBS & SAP

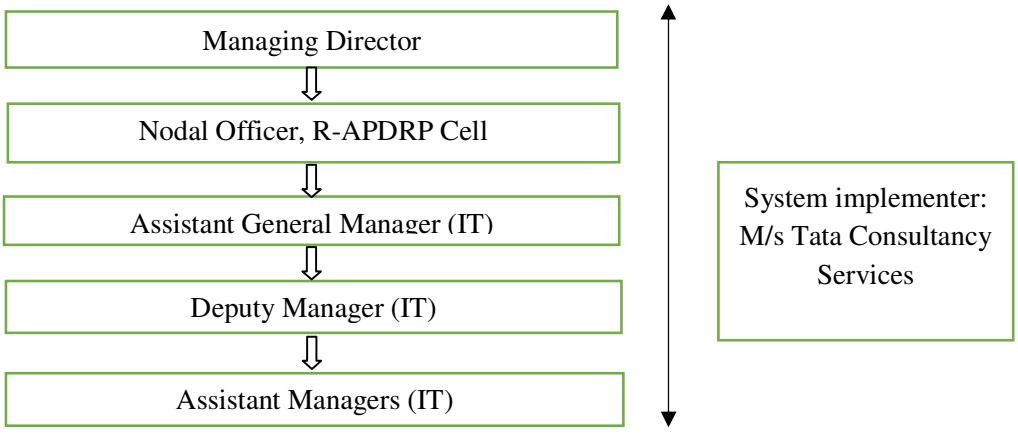
Billing Units	Billing Application			Total
	Power CBS	SAP	Power CBS & SAP	
Electrical Sub-divisions (in numbers)	68	17	73	158
Industrial Revenue Collection Area (in numbers)	Nil	17	Nil	17

Source: information furnished by the Company

The Company was in the process of migrating all its remaining LT consumers to SAP. For this purpose, the Company had already prepared (November 2017) a Detailed Project Report (DPR) while the Request for Proposal (RFP) was under preparation. After preparation of RFP, the Company would be initiating the tendering process for migration of LT consumers from Power CBS to SAP.

Organisational Structure

2.2 The organisational structure of the Company dealing with the billing application has been depicted in the ***chart*** below:



[6] 8.69 lakh LT and 0.17 lakh HT consumers

Scope of Audit

2.3 The present Report covered the audit of the performance of SAP System during the period from April 2013 to March 2018. As the SAP was a centralized billing application, the System existing in all ESDs and IRCAs was identical. Hence, the selection of any ESDs/IRCAs in terms of software application would not make any difference excepting the verification of Physical, Logical and Environmental Controls. Considering this, 6 out of 17 ESDs[7] and 5 out of 17 IRCAs where SAP was fully implemented were selected for detailed scrutiny for the present audit. The number of consumers and connected load formed the basis of selection of samples. The details of the total number of consumers and the connected load as on 31 March 2018 in respect of selected ESDs and IRCAs have been shown in ***Table 2.2.***

Table 2.2: Details of consumers/connected load as on 31 March 2018 in respect of selected ESDs/IRCAs

Sl. No.	Name of ESD/IRCA	No. of consumers	Connected Load (in KW)
1.	Jalukbari ESD	27,351	52,454
2.	Garbhanga ESD	26,677	74,868
3.	Jorhat ESD	25,010	76,413
4.	Basistha ESD	22,313	74,893
5.	Kalapahar ESD	21,226	55,534
6.	Nagaon ESD[8]	20,628	36,377
7.	Guwahati IRCA - I	2,863	3,83,977
8.	Jorhat IRCA	1,051	1,47,067
9.	Guwahati IRCA - II	1,032	2,51,500
10.	Nagaon IRCA	898	1,10,861
11.	Tinsukia IRCA	716	1,47,380
Sample		**1,49,765**	**14,11,324**
Sample size in *per cent*		**48**[9]	**52**[10]

Source: Information furnished by the Company

Audit Objectives

2.4 The audit objectives of the present performance audit were to assess whether:

- appropriate methodology for development and implementation of SAP was adopted;

[7] Out of total 158 ESDs of the Company, SAP system was fully implemented only in 17 ESDs
[8] Selected additionally being the pilot project of SAP based billing application.
[9] 1.5 lakh consumers (Sample) out of total 3.13 lakh consumers in 17 ESDs and 17 IRCAs
[10] 14.11 lakh KW (sample) out of total connected load of 27.04 lakh KW in 17 ESDs and 17 IRCAs

- desired results were achieved by implementing all the four Modules of the SAP based billing application;
- the business rules were correctly mapped and the System was customized in conformity with these rules; and
- adequate controls existed to ensure data integrity and security in the System so as to maintain business continuity plan.

Audit Criteria

2.5 The audit findings were benchmarked against the criteria derived from the following sources:

- Electricity Supply Code and Related Matters Regulations (Regulations) issued by Assam Electricity Regulatory Commission (AERC) from time to time;
- Schedule of Tariff issued by AERC;
- User manual of SAP;
- Letter of Award, Request for proposal, Software requirement specifications; and
- Information Technology Audit Manual

Audit Methodology

2.6 The Audit methodology adopted for attaining the audit objectives involved explaining the audit scope, audit objectives, audit criteria *etc*. to the top management of the Company in the Entry Conference (11 May 2018). During the conduct of audit, front-end view, access to portal along with data in excel, Comma-Separated Values (CSV) and text format of SAP System of the Company were scrutinized. The bills processed during 2016-17 and 2017-18 were analysed using software tools *namely* Interactive Data Extraction and Analysis (IDEA), and Excel to check integrity (accuracy and completeness), compliance (with rules and regulations) and reliability of the billing data. Besides, Physical verification of IT system in selected ESDs/IRCAs was also carried out during the course of audit.

The draft audit report was discussed (20 November 2018) with the representatives of the GoA, Company and the System Developer (Tata Consultancy Services Limited) in the Exit Conference. The formal replies (2 November 2018) of the Company to the draft audit report as well as the views expressed by the representatives of GoA and the Company in the Exit Conference, have been taken into consideration while finalising the audit report.

Acknowledgement

The Indian Audit and Accounts Department acknowledges the cooperation of the Government/Company for providing necessary information and records during the course of the audit.

Audit Findings

General Controls

General controls include controls over Data Centre operations, system software acquisition and maintenance, access security and application system development and maintenance. Thus, general controls create the environment in which the application systems and application controls operate.

Project proposal, planning and documentation

2.7 A feasibility study is essential to determine the viability of implementing any project taking into account the legal, technical as well as economical aspects. A proper feasibility study at pre-planning stage tells us whether the intended project is doable and worth the investment. It was, however, observed that the Company had not conducted any feasibility study before taking up computerisation of billing system. It was, further observed that while implementing the new billing system, the process of migration of consumer data from Power CBS (old system) to SAP System was not documented. As a result, the inception process of the project could not be verified by Audit.

Further, for effective monitoring of implementation of any project, a competent Steering Committee comprising of representatives of the intended Users from all areas of the business including the IT department was required to be in place. The future direction in the course of implementation and improvement of system agreed to by the Steering Committee is normally set out in a document known as the IT strategic plan. Audit observed that no such Steering Committee was in existence in the Company to guide the whole process of computerisation of billing system.

During the Exit Conference (20 November 2018), the Government/Company accepted the facts and stated that SAP was introduced under R-APDRP and implemented in other States of the Country as well. Hence, the Company presumed that SAP system would be feasible to implement. It was further stated that no major issues as such, were faced by the Company due to non-conducting of feasibility study. As regards the absence of Steering Committee, it was stated that the IT Cell monitored the process of computerization. It was further added that initially there were only two members in IT Cell and as such, the records

relating to formation of IT Cell were not documented properly. At present, the IT Cell was having about 50 members to monitor the IT process and assist the field units in their billing related issues.

The contention of the Government/Company for not conducting feasibility study was not acceptable in view of the fact that the IT system requirements vary from State to State due to variation in their existing IT setup, applicable Rules, Regulations *etc*. As regards non-existence of Steering Committee, the reply itself indicated that IT cell was not sufficient to monitor the process of computerisation, which eventually led to improper documentation of various stages of SAP implementation.

Thus, absence of a proper feasibility study before implementing SAP system as well as non-documentation of the process of migration of data from Power CBS to SAP indicated deficient planning of the Company with regard to development and implementation of SAP System.

Recommendation No.1: *The Company should keep proper documentation of the migration process of data while augmenting the new System to the left out LT Consumers.*

Dependency on old system of billing

2.8 As per Clause-3.9 of Section-G1[11] of the Work Order, the work scope of the system developer (TCS[12]) included migration of the historic transactions for at least three years from Power CBS to SAP. On verification of SAP application in the selected 6 ESDs and 5 IRCAs, Audit observed that although the historic data were migrated for three years, the same could not be opened and viewed in the new System. As a result, the IRCAs/ESDs had to access the required data through the old billing system (Power CBS) whenever necessary. The above contention was confirmed during the field inspection of 6 ESDs and 5 IRCAs conducted by Audit. During the said field inspection, the Company officials had mentioned about the old court cases, when the ESDs/IRCAs had to trace out the details of the consumers concerned (such as connected load and consumption) from the old billing system. It was informed by the Company officials that due to non-availability of said records in the new billing system, ESDs/IRCAs had no other option but to depend on old billing system.

In the Exit Conference (20 November 2018), the Government/Company stated that the Company had not felt the necessity to open and view all the past details of bills as the same would have overloaded the system and hampered normal business processes. It was further stated that to resolve any issue arising from old

[11] General-Technical Specification of Letter of Award.
[12] Tata Consultancy Services Limited.

court cases, the historical data would be saved in centralized data bank for any future requirement.

The fact, however, remained that the historic data though migrated, was of no use for the field units due to its inaccessibility in the new system. This defeated the prime objective of migration of data from Power CBS to SAP.

Recommendation No. 2: *The issue of inaccessibility of migrated data should be addressed so that the field units do not need to depend on old billing system in case of any need.*

Training of Users

2.9 Training and development of manpower were closely linked with staff resource planning. The training to staff by the Company on regular basis was essential to fulfil the requirement of changing IT environment, which was a continuous process.

Audit observed that the Company had not imparted any formal training on SAP with its regular employees (intended System Users) in 4 out of 5 IRCAs and 2 out of 6 ESDs test checked. As such, the Users were completely dependent on the IT personnel of the Company and TCS for operating the new System. This led to various anomalies in operation of the application by the Users as discussed in the succeeding paragraphs:

Manual preparation of temporary connections bills

(i) As per tariff provisions, temporary connections (TC) were those against which the electricity was supplied for a period not exceeding one month. During field inspection of six selected ESDs by Audit, it was observed that though the provision for processing of temporary connections bills was incorporated in the system, five out of six selected ESDs did not process the temporary connections bills through SAP system due to lack of adequate training to its staff. On the contrary, it was noticed that the temporary connection bills in said five ESDs were being prepared manually thereby leaving ample scope for human errors in preparation of bills.

On verification of 230 cases of temporary connection under 5 ESDs, it was observed that in 13 cases, there was short billing of ₹ 9,653 due to application of incorrect tariff, calculation mistakes and short levy of electricity duty. In another 26 such cases, there was excess billing of ₹ 1,733 due to calculation mistakes, excess levy of electricity duty *etc*.

Manual preparation of assessment bills

(ii) On detection of various malpractices such as theft/misuse of electricity, meter tempering, hooking and excess connected load, the Company was to prepare assessment bills as per the methodology prescribed by Assam Electricity Regulatory Commission (AERC) and serve the same to the consumer for payment. Audit observed that though the provision for processing of assessment bills was incorporated in the System, 5 out of 6 ESDs and 3 out of 5 IRCAs test checked did not process assessment bills through SAP and these bills were prepared manually. Out of 378 theft/misuse cases verified by Audit, anomalies such as application of incorrect tariff/formula/electricity duty/energy charges/meter rent were noticed in 56 cases leading to short-billing of ₹ 19.97 lakh.

As evident from the above, the Company failed to eliminate billing errors due to the existence of human intervention in preparation of bills even after implementation of SAP.

During the Exit Conference (20 November 2018), the Government/Company stated that training was imparted selectively based on the concept of training of trainers. It was, however, assured to impart required training with the System Users wherever necessary. As regards the manual processing of bills, the Government/Company stated that henceforth, all bills would be processed through SAP system.

The reply was not tenable as the system was meant to be used by all the field units, as such the choice of selective training was not justified. Further, there was also failure on the part of the Company to address the instances of preparing the bills manually by evaluating the effectiveness of training.

Thus, absence of proper training of the intended System Users had led to existence of manual system of billing defeating the basic objective of the SAP system.

Recommendation No. 3: *Adequate training should be imparted to the System Users so as to eliminate the scope of manual billing.*

System Design Deficiencies

On review of the SAP application through data entry screens as well as the analysis of data received from the Company, the following system design deficiencies were noticed:

Meter Billing Collection (MBC) Module

Absence of vital business logic in the system

2.10 Clause 4.2.2.4 of the AERC Regulations stipulated that where actual meter reading cannot be ascertained, the assessed quantity of energy consumed shall be determined by taking the average consumption for the previous three months, preceding the date on which the defect was detected or the next three months after correction of the defect, whichever was higher.

Audit observed that the System was enabled to calculate the average consumption for the previous three months automatically in case the meter became defective. The System, however, had no provision to calculate revised average consumption for next three months after correction of meter defect. Hence, in all such cases, IRCAs/ESDs concerned had been doing this exercise manually. Further, the system did not give any alert for raising of the supplementary energy bill in case the revised average consumption for three months after rectification of meter defect was higher than the average consumption of previous three months. During the conduct of audit, 22 cases of defective meters relating to 3 IRCAs were test checked, Audit observed that the revised average consumption in 5 out of 22 cases was higher than the previous average consumption. In absence of above business logic in the system, supplementary bills were not served to the consumers concerned resulting in short billing of revenue aggregating ₹ 32.40 lakh by the Company.

During the Exit Conference (November 2018), the Government/Company accepted the facts and stated that the Company would incorporate necessary provision in the system to raise alert in case the revised average consumption (after replacement of meter) of any consumer recorded higher than the previous consumption so that the consumers could be served with supplementary bill through the system without manual intervention.

The fact, however, remains that design deficiencies in SAP system made it unreliable for the purpose of raising supplementary bills.

Recommendation No. 4: *Issue of supplementary bills after replacement of meter is a normal practice in electricity business. Hence, the Company needs to rectify the system defect at the earliest to avoid further loss of revenue .The Company should internally examine similar issues in other IRCAs also.*

Failure to establish interface with Common Meter Reading Instrument

2.11 As per Clause M15 of the Metering Module of Software Requirement Specifications (SRS), the system should support the data downloading and uploading from Common Meter Reading Instrument (CMRI). During field

inspection (June-July 2018) of 5 out of 17 IRCAs test checked, Audit observed that the data of HT consumers captured through CMRI in all the 5 IRCAs were first downloaded to computers and then the meter reading data were manually fed into the SAP system. The methodology adopted by the Company leaves the scope for error while feeding the meter reading data manually into the System. As such, the correctness and the accuracy of the consumption data maintained in SAP could not be assured.

During the Exit Conference (20 November 2018), the Government/Company stated that the provision of data downloading/uploading from/to CMRI in the system had already been implemented. The Government/Company, however, could not provide the exact date of implementation of the said supporting provision to Audit. The Government/Company further accepted that some CMRIs could not be interfaced with SAP due to compatibility issues.

The reply was not acceptable as the SAP system failed to establish interface with CMRIs as on January 2019 as confirmed by field unit.

Recommendation No. 5: *The Government/Company needs to address the compatibility issues between SAP and the CMRIs to rule out the scope of any human intervention in recording of the meter reading data into the System. The Company should internally examine similar issues in other IRCAs also.*

No provision for automatic calculation of processing fee

2.12 AERC specified (November 2017) rates of processing fees applicable for various operations such as change in name/category/load of the consumer on payment of the processing fees ranging between ₹ 20 to ₹ 5,000. Audit observed that the System design was not enabled to calculate the processing fee automatically in case of change in the load/name/category/phase of the consumer. As such, the processing fee for any change in the consumer details was being entered manually in the System leaving a scope for human errors. In 122 out of 301 cases of change in the load/name of the consumers in respect of five[13] out of six ESDs test checked, a short levy of processing fee of ₹ 14,950 was observed in audit. Similarly, there was also excess levy of processing fee of ₹ 5,560 in another 53 cases test checked by Audit under the said 5 ESDs.

Thus, business rules were not properly programmed in the system, which allowed the Users to enter processing fees manually. As a result, the System could not ensure collection of processing fee in accordance with the provisions of AERC Regulation.

[13] Out of 17 ESDs where SAP was fully implemented

During the Exit Conference (20 November 2018), the Government/Company accepted the facts and stated that the processing fee as prescribed by AERC would be incorporated in the System to avoid such error in future.

The fact, however, remains that the Company kept the system for collection of processing fee at the User's choice, which led to violation of AERC Regulation.

Recommendation No. 6: *The processing fees prescribed by AERC for various purposes should be incorporated in the system immediately to eliminate the scope for errors. The Company should internally examine similar issues in other ESDs also.*

Incorrect conversion of connected load from KW to KVA

2.13 As per the Schedule of Tariff (SoT), four categories of consumers (*i.e.* HT Domestic, HT Commercial, HT Public Water Works and HT Small Industries category) did not have a choice to opt separately for the Contract Demand.For the purpose of levying the fixed charges in the case of said four categories of consumers, the Contract Demand was to be worked out automatically through system by converting the Connected Load (in KW) into Contract Demand (in KVA). As such, the System should have been enabled to derive the Contract Demand (KVA) of the said consumers through conversion of the Connected Load (KW) after applying the power factor of 0.85. The fixed/demand charge should accordingly be levied in the System for the said four categories of consumers based on the Contract Demand so derived from the Connected Load (100 *per cent)*.

It was, however, seen that the convertible value of KW into KVA was entered into the System manually, which led to determination of incorrect Contract Demand and levying of incorrect fixed/demand charges on consumers. Analysis of 58,861 transactions relating to 5,325 HT consumers in 17 IRCAs for the period 2016-17 revealed that the Contract Demand of the consumers was not correctly entered into the System. In 3,063 cases pertaining to 270 consumers under 15 IRCAs, Contract Demand corresponded to 46 to 99 *per cent* of the Connected Load. The understatement was in the range of 1 KVA to 311 KVA due to which the Company short-billed an amount of ₹ 35.40 lakh towards fixed/demand charges during 2016-17 against these consumers.

Further, the Contract Demand in other 5,231 cases pertaining to 496 consumers under 17 IRCAs corresponded to 101 to 270 *per cent* of total Connected Load resulted in overstatement of Contract Demand in these cases. The Contract Demand of the consumers was overstated in the range of 1 KVA to 99 KVA due to which there was excess billing of fixed charges by ₹ 9.67 lakh.

Thus, absence of automatic conversion of KW in KVA rendered the system unreliable for the purpose of calculating fixed charges in respect of the above mentioned four categories of HT consumers.

During Exit Conference (20 November 2018), the Government/Company accepted the facts and assured to rectify the defect in the System to avoid revenue loss in future.

Recommendation No.7: *The provision for auto-conversion of Connected Load (KW) into Contract Demand (KVA) for the relevant categories of consumers should be incorporated in the system immediately so as to eliminate reoccurrence of such errors.*

Processing of bills ignoring the basic logic

2.14 The electricity bill of a consumer should have been processed considering the basic logic that a consumer with a connected load of 1 KW could consume a maximum of 720 kwh[14] in 30 days even if the consumer uses the full load 24 hours a day.

Audit observed that the System allowed processing of electricity bills ignoring this basic logic. Analysis of data revealed that one LT domestic consumer (No. 51000348063) having connected load of 1 KW was served with a bill for 99,428 KWH consumption for 31 days instead of a maximum possible consumption of 744 KWH.

During the Exit Conference (20 November 2018), the Government/Company accepted the observation and assured to incorporate necessary provisions in the billing system so that a small consumer was not billed for abnormally high consumption ignoring the basic logic.

Recommendation No. 8: *The system should allow to process bills only after considering the basic logic. To ensure this, the Company needs to incorporate proper provision in the system with the help of system developer.*

Mismatch of bill format

2.15 Analysis of bill format issued to the consumers revealed that some of the basic consumer details like service connection number, billing status (regular/assessed/provisional bill), previous payment details *etc.* were not incorporated in the monthly electricity bill in violation of Clause 6.3.5 read with 6.3.13 of AERC Regulations.

During the Exit Conference (20 November 2018), the Government/Company stated that there were some practical difficulties in setting of the bill format. The

[14] 1 KW x 24 Hours x 30 Days = 720 KWH

Government/Company, however, assured to modify the billing format shortly so as to include all the relevant particulars in the electricity bill as far as practicable.

Recommendation No. 9: *The Company needs to modify the billing format immediately so that the bills generated through SAP system includes all relevant details of consumers as prescribed by AERC.*

Customer Relationship Management (CRM) module

Pending updation of Geographical Information System (GIS) database

2.16 As per the advisory issued by Power Finance Corporation Limited[15], it was essential for the Company to have up-to-date GIS asset and consumer information in the GIS repository at all times. Further, as per the Software Requirement Specifications (SRS[16]), while releasing a new service connection, a request with information on connected load, connection type, consumer ID and other details were to be transmitted through the System from the CRM Module to GIS module. This exercise was essential to confirm whether the distribution transformer (DTR) and feeder from which the connection was to be allowed had the required capability to release the desired load to the consumer. In response to such request, a Load Flow Analysis (LFA) Report was to flow from GIS to CRM containing information on DTR Capacity/Loading, GIS feasibility (either positive or negative), *etc*. and the said information/fields were to be stored in service contract item.

Audit observed that the Company had never updated the GIS database for ongoing changes in electrical network and consumers in field, which was a continuous process. As a result, the GIS mapping of assets and consumer information prepared for the project areas became outdated. Due to outdated GIS, the ESDs had been by passing the requirement of load flow analysis by selecting the option 'Network feasibility not required' at the time of releasing new service connections in SAP. As such, new service connections were being released without getting any LFA report from the GIS. Audit further observed that out of 456 new service connections released by 6 ESDs[17] during April 2017 to June 2017, 396 connections (86.84 *per cent*) were released from overloaded DTRs. The overloading of DTRs could result in increase in distribution losses as well as possibilities of frequent breakdown of DTRs.

During Exit Conference (20 November 2018), the Government/Company assured to explore the possibility of updating the GIS database so that no new connection was released from overloaded DTRs.

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[15] A Government of India PSU appointed as Nodal Agency for implementation of R-APDRP scheme under the guidance of Ministry of Power, Government of India.

[16] Condition NC9 and NC26 of CRM module

[17] Out of 17 fully SAP based ESDs

The fact, thus, remains that due to absence of up-to-date GIS database, the Company could not ensure the connected load of distribution transformers at optimum level.

Recommendation No. 10*: The Company needs to ensure regular updation of the GIS database for successful implementation of CRM module.*

System alert message for delay in issuing new connection

2.17 As per Clause 3.5 of AERC Regulations, the maximum prescribed time limit for the new connection release in urban areas was 30 days from the date of submission of registration form provided no extension work to existing network was required and the pole distance from the premises of the consumer was less than 30 meters.

Audit observed that the provision for generating alert message in case of delay in release of connection was not incorporated in the system to facilitate timely release of new connections. Audit observed that in 6 ESDs test checked, 650 out of 1,366 service connections released during December 2017 to March 2018 had been delayed for periods ranging from 1 to 840 days. Hence, timely release of new service connections could not be ensured due to absence of necessary alert system.

During the Exit Conference (20 November 2018), the Government/Company assured to take necessary action in the matter to address the issue.

The fact, thus, remains that in absence of necessary alert system, the Company could not release new service connections within the prescribed time limit.

Recommendation No. 11: *The existence of necessary alert system helps in timely release of new service connection. The Company needs to incorporate the same in the system immediately to maximize consumer satisfaction. The Company should internally examine similar issues in other ESDs also.*

Web Self Service (WSS) Module

Designing of web portal and its associated facilities

2.18 The WSS Module was mapped in the portal[18] to provide a high quality experience for the consumers and make it easy for them to communicate with the Company through the web instead of direct phone calls or visits. The portal also acted as a source of information for the consumers regarding policies and procedures of the Company. On checking of WSS Module, the audit observed the following:

[18] www.apdcl.org

- The web page contained the brief description about the Company, its mandate, Board of Directors, power map, tariff rates, applicable Acts and Rules *etc*. Login component was present and registered Users could login using the username and password. New Users could also register by clicking on the 'First Time Users Register' link. The 'Forgot Password' link was meant to help the Users to retrieve their password. Further, the facility to lodge complaint and track its status by the applicant also existed in the System.

- The portal facilitated for online application of new service connection along with the option to upload scanned copies of necessary documents such as passport, photo, affidavit, proof of ownership *etc*. The applicants could also check their application status. The consumer could also make online payment of electricity bills through various modes such as net-banking, debit/credit card, NEFT/RTGS and e-wallets.

- The portal contained various interactive features, such as, Frequently Asked Questions (FAQ), email facilities, feedback forms, presence of social media links (facebook, twitter *etc*).

Hence, the web portal of the Company was appropriately designed duly incorporating all possible provisions in the System as far as practicable to provide quality experience to its consumers, thereby increasing the consumer satisfaction.

Energy Audit (EA) Module:

Anomalies in generation of Energy Audit Report

2.19 The purpose of implementing the Energy Audit (EA) Module was to monitor important distribution parameters, capture hierarchical view of energy accounting, intelligent analysis tools for plugging loopholes and identifying revenue leakage and calculate/identify technical and commercial losses.

Audit observed that the system facilitates for EA at three levels[19]. Ideally the energy injected into the system should be either equal to or greater than energy billed. On analysis of Energy Audit Report of 6,140 DTRs for the month of March 2018 in respect of four project areas[20], Audit observed that in case of 2,533 DTRs, energy injected figure was recorded as 'Zero' while energy billed against these DTRs was 35.02 MU which was not realistic. Similarly, in case of another 124 DTRs, the energy injected figure (*i.e.* 0.73 MU) was less than the energy billed figure (*i.e.* 2.12 MU) which was not possible and indicated the existence of defects in the System.

[19] Project area wise, Feeder wise and DTR-wise
[20] Guwahati, Nagaon, Jorhat and Tinsukia

The Company accepted the facts and stated (November 2018) that it would look into the matter and resolve the issue at the earliest.

The fact, however, remains that the DTR wise energy audit reports generated by the System were not reliable and the same could not be used as analysis tools for plugging loopholes and identifying revenue leakage.

Recommendation No. 12: *The Company needs to rectify the deficiencies in EA module immediately so that the system would generate correct energy audit reports which can be used for further analysis purpose.*

Mapping of business rules

The Company mapped business rules in the billing system in accordance with the AERC Regulations and Schedule of Tariff (SoT) issued by AERC. Audit observed the instances where business rules were not properly mapped as discussed in the following paragraphs:

Meter Billing Collection (MBC) Module

Excess billing of Power Factor penalty

2.20 The Power factor (PF) is an indicator of the quality of design and management of an electrical installation and the same is worked out as a ratio of the total kilowatt-hour (KWH) to kilo volt-ampere hour (KVA) supplied during a given period. The PF was recorded electronically by the energy meters and the same was taken into account while preparing the bill of a consumer. As per SoT, PF penalty at different slabs was to be levied on the consumer in case the monthly average PF of the consumer ranged between 85 and 30 *per cent*. Hence, as per the SoT, no PF penalty was leviable in case the PF fell below 30 *per cent.*

On analysis of 77,385 transactions of 6,969 HT consumers[21] of 17 IRCAs for the year 2016-17, Audit observed in 2,933 transactions pertaining to 618 consumers under 17 IRCAs, PF penalty was imposed even though the PF fell below 30 *per cent* in violation of SoT. As a result, there was excess billing of PF penalty amounting to ₹ 20.56 lakh.

During the Exit Conference (20 November 2018), the Government/Company accepted that any penalty imposed not backed by any Rule/Act was irregular. The Government/Company, however, assured to take up the matter with AERC for their opinion.

The fact, however, remains that the logic for imposing power factor penalty was mapped ignoring the provisions of SoT issued by AERC.

[21] Six categories: HT Domestic, HT Commercial, Public Water Works, Bulk Supply (Government), Bulk Supply (others), HT Small Industries category

Recommendation No. 13*: The Company needs to map the business rules strictly in adherence to SoT/AERC Regulations.*

Non-incorporation of provision for minimum contract demand

2.21 As per SoT, the HT consumers under Tea, Coffee, Rubber category could opt for seasonal tariff (April to August) or off-season tariff (September to March) as per their convenience.

To avail the above option, the Contract Demand of such consumers during seasonal and off-season period, should be at minimum prescribed level of 65 *per cent* and 26 *per cent* of the Connected Load respectively. Audit observed that the provision regarding minimum Contract Demand for seasonal and off-season period was not incorporated in the System. As a result, SAP system allowed fixing Contract Demand below the minimum prescribed level in violation of SoT.

The analysis of 4,261 transactions of 865 consumers under 17 IRCAs for the period April 2016 to August 2016 revealed that in 83 transactions pertaining to 19 consumers under 7 IRCAs, the seasonal Contract Demand ranged between 25 and 64 *per cent* of total connected load against minimum Contract Demand of 65 *per cent* leading to short-billing of ₹ 7.89 lakh in the form of demand charges. Similarly, out of 6,036 transactions of other 885 consumers under 17 IRCAs, in 19 transactions pertaining to 10 consumers under 6 IRCAs for the period September 2016 to March 2017, the off-seasonal Contract Demand ranged between 16 and 25 *per cent* against minimum contract demand of 26 *per cent* of total connected load. As a result, the Company short-billed an amount of ₹ 0.90 lakh in the form of demand charges.

During the Exit Conference (20 November 2018), the Government/Company assured to look into the matter and incorporate the necessary provisions for seasonal and off-seasonal demand in case of Tea, Coffee & Rubber category of consumers.

Recommendation No. 14: *The provision for minimum contract demand for seasonal and off-season consumers under HT Tea, Coffee and Rubber category should be incorporated in the system immediately to avoid further loss of revenue.*

Wrong categorization of consumers due to lack of validation check

2.22 Proper categorization of consumers was essential for ensuring correct and accurate billing of energy supplied so as to eliminate any scope for under or over recovery of electricity charges. To achieve this, the System should have proper validation checks of data with reference to the applicable category and Connected Load/Contract Demand of the consumer. Audit observed that there was absence

of data validation checks in the System due to which the following cases of wrong categorization came to the notice of Audit:

(i) As per SoT, the consumers (exclusively domestic) having Connected Load of (i) below 5 KW and (ii) 5 KW or more but below 20 KW; were to be categorized as 'Domestic-A' and 'Domestic-B' consumers respectively. The applicable tariff in case of Domestic-B category was higher than that of Domestic-A category of consumers.

Audit observed that 1,485 consumers having Connected Load in the range 5 KW to below 20 KW during the year 2016-17 under all 17 ESDs[22] were billed as Domestic-A instead of Domestic-B category in violation of SoT due to wrong classification of consumers in the System. As a result, the Company short-billed an amount aggregating ₹ 12.21 lakh in respect of these consumers. Besides, these consumers had also irregularly availed the benefit of Government subsidy of ₹ 6.91 lakh despite their being not eligible for the same.

(ii) Similarly, as per SoT, the industrial consumers having Contract Demand between 25 to 50 KVA and 50 to 150 KVA were to be categorized as 'HT-Small Industry' and 'HT-I Industry' respectively. The applicable tariff was accordingly higher in case of HT-I Industry category.

On analysis of 11,477 transactions of 1,042 HT Small Industry consumers in 17 IRCAs, it was noticed that in 26 transactions of 3 consumers in 3 IRCAs, categorisation was wrongly done in the System as HT-Small Industry instead of HT-I Industries during the year 2016-17. As a result, the Company short-billed an amount of ₹ 2.10 lakh due to billing the consumers at lower tariff.

(iii) As per SoT, the industrial consumers having Contract Demand between 50 to 150 KVA and above 150 KVA were categorized as 'HT-I Industry' and 'HT-II Industry' respectively. Accordingly, the tariff was higher in case of HT-II Industry category.

On analysis of 1,621 transactions of 153 HT-I Industries consumers in 15 IRCAs for the year 2016-17, it was seen that 57 transactions of 9 consumers under 7 IRCAs were wrongly categorized under HT-I Industries instead of HT-II Industries. As a result, there was short billing to the extent of ₹ 9.56 lakh in these cases.

Further, on analysis of 637 transactions of 69 HT Industries consumers for the year 2016-17 in 12 IRCAs, it was seen that 10 transactions of 3 consumers in 1 IRCA were wrongly categorized as HT-II Industries instead of HT-I Industries. As a result, there was excess billing of ₹ 2.15 lakh against these consumers.

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[22] Where SAP was fully implemented

Therefore, lack of proper validation checks in the system resulted in wrong categorisation of consumers. This led to incorrect billing and grant of government subsidy to ineligible consumers.

During the Exit Conference (20 November 2018), the Government/Company stated that at present, necessary validation checks have been placed in the System to maintain proper rate category in accordance with Connected Load/Contract Demand of a consumer. The Government/Company further assured to explore the possibility of recovering the short-billed amount from the consumers, which occurred due to incorrect classification of consumers.

The fact, however, remains that the Company suffered loss of revenue due to absence of proper validation checks in the system.

Recommendation No. 15: *The Company needs to recover the short-billed amount from the consumers concerned, which had occurred due to wrong categorization of consumers. The Company should internally examine similar issues in other ESDs also.*

Anomalies in calculation of revised security deposit

2.23 Clause 6.2.1.2.1 of the AERC Regulations stipulated that the amount of security deposit obtainable from a consumer should be reviewed every year based on the actual consumption of the consumer during the previous year. The consumer was accordingly required to pay additional security deposit or be refunded any excess amount of security deposit held by the Company beyond the stipulated amount.

Audit observed that although the System was enabled to calculate the revised security deposit, the security deposit of consumers were revised through SAP system only in 2[23] out of 5 IRCAs test checked. In the remaining 3 IRCAs, however, the security deposit was revised manually as and when required. In this connection, following anomalies were noticed:

(i) Refundable logic at the choice of the user: The logic for demand/refund of the security deposit should have been automatically processed and adjusted in the monthly bills by the System. On analysis of data, relating to the security deposit of 2,805 consumers revised through SAP in respect of Guwahati IRCA-I for the year 2016-17, Audit observed that in respect of 767 consumers, the company held a security deposit amount, which was higher than the revised security deposit calculated by the System. The differential amount of ₹ 10.93 crore was, however, not refunded to the consumers through adjustments in subsequent electricity bills. Similarly, on analysis of data relating to security

[23] Guwahati IRCA-I (2015-16 and 2016-17) and Tinsukia IRCA (2016-17)

deposit of 511 consumers revised through SAP in respect of Tinsukia IRCA for the year 2015-16, Audit observed that the System failed to refund ₹ 1.09 crore through automatic adjustment in electricity bills in respect of 73 consumers whose revised security deposit was less than the original security deposit.

During the Exit Conference (20 November 2018), the Government/Company stated that there was option of refund of excess security deposit in the System and the same was placed at the disposal of the field offices. The Government/Company further mentioned that since high rate of interest was payable on security deposit, it was wise for the Company to refund the excess security deposit. The Government/Company assured to attempt designing the System in such a way that no provision of AERC Regulation was violated.

The contention of the Government/Company regarding placing the option of security refund at the disposal of field offices was not acceptable as refund of excess security deposit was mandatory as per AERC Regulation. Hence, any refund of excess security deposit should have been automatically adjusted in monthly bills in the same way as recovery of additional security deposit was effected through adjustment in bills.

Recommendation No. 16: *The Company needs to design the system in such a way that the refund amount gets automatically adjusted in the subsequent bills of the consumer on revision of security deposit instead of placing the same at User's discretion.*

(ii) Non-consideration of interim payments made by consumers: The exercise for revision of security deposit was carried out on 20 December 2017 based on the consumption for the year 2016-17. While calculating the amount of additional security deposit, the System should have taken into account all the payments made by the consumers towards security deposit till the date of revision. On analysis of data relating to the security deposit of 2,805 consumers revised through SAP in respect of Guwahati IRCA-I for the year 2016-17, Audit observed that the system did not consider payments aggregating ₹ 3.39 crore made by the 448 consumers towards security deposit between 31 March 2016 and 20 December 2017. As a result, the consumers were asked to pay additional security deposit, which they were not actually liable for. On receipt of complaints from consumers, the same had to be rectified by the Company manually.

The Company accepted (November 2018) that the procedure followed for not considering interim payment for calculation of additional security deposit was incorrect. The Company further assured to immediately re-check the logic and rectify the same so that there were no complaints from consumers.

The fact, however, remains that the System kept in place for revision of security deposit failed to ensure accuracy in calculation and hence, the same was unreliable.

Recommendation No. 17: *The System should consider all payments made by the consumer towards security deposit till the date of revision while calculating the amount of additional security deposit. To ensure this, the Company needs to map the business logic accordingly with the help of system developer.*

Application and Security Controls

Application controls

Application controls pertain to specific computer applications. These application controls help to ensure the proper authorization, completeness, accuracy, and validity of transactions, maintenance and other types of data input. The absence of application controls such as input control and processing controls were noticed in the SAP system, which have been elaborated under the following paragraphs:

Input controls

Acceptance of invalid PIN Codes

2.24 All the possible Postal Index Number (PIN) codes of different localities of the State should have been incorporated in the system so as to provide an effective validation check against the entry of invalid PIN codes for any electricity connections. Audit observed that in 19,094 out of 21,618 transactions processed by Basistha ESD for the month of March 2018, the PIN code was mentioned as '000000' which was incorrect and should not have been accepted by the System. This implied that there was absence of data validation check with respect to input entry of PIN code.

During the Exit Conference (20 November 2018), the Government/Company assured to conduct Know Your Customer (KYC) process in all ESDs and IRCAs to incorporate the correct PIN code in the personal details of each consumer.

Recommendation No.18: *The Company needs to incorporate proper validation checks in place to ensure acceptance of correct PIN codes by the system.*

Acceptance of unusual meter numbers

2.25 To ensure the accuracy and authenticity of the data input, the System should have appropriate in-built control for automatic check of the input data entries. Audit observed that in 3 out of 178 consumers details (LT Domestic-A) test checked in Basistha Sub Division for the year 2017-18, meter numbers were

found captured by the System with unusual patterns (*viz.* AS128048_1, AS066821_1, 460862_1). As such, the possibility of processing the transactions with arbitrary meter numbers through SAP system could not be ruled out.

During the Exit Conference (20 November 2018), the Government/Company stated (November 2018) that when a meter was replaced and the same meter was reissued to a different consumer, the meter numbers were being entered in the System with a combination of special characters and number as SAP only allowed input entry of unique meter numbers.

The reply was indicative of the fact that there was a possibility of processing transactions with forged meter numbers through SAP System.

Recommendation No. 19: *The Company needs to address the issue of accepting unusual meter number through appropriate modification in the system logics.*

Processing controls

Processing of transactions without pole number

2.26 The LT consumers were provided the connection from a particular pole attached to a DTR. Hence, it was essential that every LT consumer should have a pole number assigned to it. Audit observed that in Garbhanga ESD (2017-18), 36 out of 2,96,533 transactions under LT category were processed without assigning any pole number. In absence of the pole number details in the System, the exact location of the consumer could not be ascertained. Further, absence of this information in the System would also create difficulties in updating of the GIS database.

During the Exit Conference (20 November 2018), the Government/Company accepted that pole number was an essential information and it must be displayed in all the transactions of consumers. The Government/Company also assured to look into the matter and resolve the issue at the earliest.

Recommendation No. 20: *The Company needed to address the issue of processing transactions without pole number at the earliest to overcome the difficulties that might arise during updation of GIS database.*

Processing of bills for abnormal billing cycles

2.27 Clause 6.2.6.1 of AERC Regulations stipulated that the billing cycle of consumers should normally be 30 days. However, the billing cycle could be extended upto 60 days in special circumstances with proper communication to the consumer concerned. On analysis of billing data, Audit observed that 22 transactions pertaining to 10 consumers were processed by the System for a period ranging from 116 to 1,889 days in violation of AERC Regulations.

During the Exit Conference (20 November 2018), the Government/Company stated that the provision for higher billing cycle than prescribed was kept in the System to take care of the exceptional cases such as regularizing the irregular connections and billing the unbilled consumers. The Government/Company further assured to look into the issue for appropriate action.

The fact, however, remained that there was no provision in the System to indicate the reason for processing bills beyond the prescribed billing period.

Recommendation No. 21: *It is recommended that the Company should incorporate necessary provision in the system to indicate proper reason while processing bills for period more than the prescribed billing period.*

Processing of unusual transactions

2.28 On analysis of 5,05,939 transactions of 43,881 LT consumers in Basistha ESD for the year 2017-18, Audit observed the following unusual transactions:

- Two bills having same consumer ID (51000281910) were processed with same bill date (7 May 2017), bill period, bill amount, kWh consumption, document number but with different combination of previous and current reading. This indicated existence of bill processing issues in the System providing scope for processing more than one bill against the same document number.

- Three transactions of a consumer ID (51000289557) were processed with doubtful meter readings, wrong calculation of energy charge, different meter numbers and wrong consumer ID pattern *etc*.

- In case of 'Zero' consumption recorded during a billing cycle, the consumer concerned should be billed for the minimum fixed charges. Audit observed that in 242 transactions having 'Zero' consumption, no billing was done by the System.

- In 8,352 transactions, although energy consumption was found to be recorded as 'Zero', no provision in the System was present to indicate the reason for the same.

- As the System allowed processing of unusual transactions, the possibility of errors in billing data could not be ruled out.

During the Exit Conference (20 November 2018), the Government/Company assured to verify the data analysed by Audit and take appropriate steps to resolve the issues pointed out.

Recommendation No. 22: *The Company should place proper control mechanism in the System so that there is no scope for processing of unusual transactions.*

Output controls

Consideration of power factor with three decimal places

2.29 AERC Regulations stipulated that the PF ratio should be determined after rounding off the figures to two decimal places. Audit observed that the System did not round off the PF ratio to two decimal places. As a result, while processing the bills, the digit in the third place was considered for calculation of PF penalty/rebate leading to short and excess recovery of electricity charges. On analysis of 77,385 transactions of 6,969 HT consumers in 17 IRCAs for the year 2016-17, Audit observed that there was a short recovery of energy charges aggregating ₹ 6.01 lakh in 5,305 transactions of 2,099 consumers, while there was an excess recovery of ₹ 9.44 lakh in another 7,061 transactions of 2,391 consumers.

During the Exit Conference, the Government/Company stated (20 November 2018) that the facility was provided at the disposal of the End Users to enter the PF readings in the billing system. It was further stated that in the case of automatic meter reading (AMR) based consumers (all HT consumers), the AMR meters were pushing Average Power Factor Readings up to 3 Digits.

The reply was not acceptable as the SAP application should be configured to round off the readings upto 2 decimal places so that it was processed as per the provisions of AERC Regulation.

Recommendation No. 23: *The Company should either modify the system to round off the PF ratio to two decimal places as per AERC Regulations or in case of any practical difficulties in modifying the system, it should pursue the matter with AERC for necessary modification in the Regulations.*

Duplicate generation of bills

2.30 On analysis of 1,77,789 transactions of 15,117 Domestic-A consumers in Basistha ESD for the period 2017-18, Audit observed that the transactions of 341 consumers appeared 20 to 48 times against maximum possible 12 transactions in a year considering the billing cycle of 30 days. This indicated a lack of output control in the System leading to existence of same bill in the database for multiple times. As a result, the System would be overloaded with unnecessary billing data hampering its efficiency considerably.

During Exit Conference (20 November 2018), the Government/Company stated that the data analysed by Audit would be checked for further reply from their end.

Recommendation No. 24: *The Company needs to incorporate proper output controls in the system to address the issue of generating duplicate bills.*

Security Controls

2.31 A well-thought comprehensive IT policy demonstrates the ability of an organization to reasonably protect all business critical information and related IT information processing assets from loss, damage or abuse. It was, thus, important for the Company to establish an appropriate IT policy to ensure effective operation of the IT system and safety/security of its database. IT Policy of the Company envisaged following two basic levels of controls:

Physical Access Controls: These controls restrict the physical access of the System to the authorised Users only; and

Logical Access Controls: This protection mechanism limits User's access to information relevant to their work profile only besides restricting the forms of the User's access on the System to only what was appropriate for them.

Audit observed that even though the Company had implemented the computerized billing System in the organisation, it had not devised and adopted an appropriate IT Policy so far (December 2018). The following observations have been noticed in this regard:

Weak Environmental Controls

2.32 For a secured IT set up, well-planned environmental controls were necessary to protect the hardware in case of any accident or mishap including the incidence of fire. Physical verification of IT Setup of 6 ESDs and 5 IRCAs revealed that no fire extinguishers or fire alarm system had been installed in any of the ESDs/IRCAs for protection against fire.

In the Exit Conference (20 November 2018), the Government/Company assured to place fire extinguisher/fire alarm system in ESDs and IRCAs so as to maintain a healthy environment for IT set-up in all offices.

Recommendation No. 25: *It is recommended that the Company should immediately install fire extinguishers/fire alarm system to ensure protection of the hardware against the incident of fire.*

Secured mode of login

Password Policy

2.33 The most common form of logical access control was login identifiers (IDs) followed by password authentication. To ensure effectiveness of the passwords, there must be appropriate password policy and procedures in place, which should be followed by all the Users. To ensure effective control on the access to the System, password policy could define the requirements regarding

minimum password lengths, forcing change of the password at regular time intervals and automatically rejecting purely numerical passwords, etc.

Audit observed that the Company had not devised and put in place any password policy so far (December 2018). As a result, the Users could set easy passwords and keep the same unchanged for long periods. As such, in absence of a well-defined password policy, the database of the Company was vulnerable against the risk of unauthorised access and manipulation, which was not in the interest of the Company.

In reply, the Company assured (November 2018) to incorporate an appropriate password policy in the System binding the Users to change passwords at an interval of every 30 days to ensure proper security of authorised User login.

Recommendation No. 26: *The Company needs to formulate and adopt an appropriate password policy to ensure security of database against the risk of unauthorised access and manipulation.*

Use of biometric devices

2.34 As per Clause 2.2 of the work order issued to the system developer, the login in the computer systems for commercial applications like, Metering, Billing and Collection Modules had to be only through biometrics authentication system Audit observed that 4 out of 5 IRCAs and 4 out of 6 ESDs test checked did not use biometric devices for login purpose. Absence of biometric authentication system to login into the System leaves the scope for unauthorized access to data.

During the Exit Conference (20 November 2018), the Government/Company stated that as the login would be based on finger scanning, the same would be applicable to a particular User. As such, in case the regular User remained on leave, the System would not be accessible by the alternate User making it difficult to attend the work even in case of necessity.

The reply was not acceptable as the concern of the Government/Company could be addressed by incorporating appropriate provision in the System authorising the alternate User with administrative privilege to access computer and perform the job of absentee User.

Recommendation No. 27: *It is recommended that the Company should adopt the methodology of login into the system through biometric devices to eliminate the scope for unauthorised access to data.*

Outcome of implementation of SAP based Computerised Billing System

2.35 The main objective of implementation of SAP based Computerised Billing System was to reduce the aggregate technical and commercial (AT&C) loss of the Company. The Company installed SAP based billing application in case of 8.86 lakh[24] (20.48 *per cent*) out of its total 43.28 lakh consumers in a phased manner during the period from March 2013 to March 2016. The impact on the performance of the Company in areas where the SAP based Centralised Billing System was implemented improved considerably which is shown in ***Table 2.3*** below:

Table 2.3: Details of Billing & Collection efficiency and AT&C loss after implementation of SAP based Computerised Billing System

Year	SAP based project areas		
	Billing efficiency	Collection efficiency	AT&C loss
	(in percentage)		
2015-16	70.09	90.93	36.27
2016-17	82.03	98.03	19.58
2017-18	84.02	100.00	15.98

As seen from above, the billing efficiency[25] of the SAP based project areas was increased from 70.09 *per cent* (2015-16) to 84.02 *per cent* (2017-18). As regards the collection efficiency, the same was increased from 90.93 *per cent* (2015-16) to 100 *per cent* (2017-18). Consequently, the AT&C loss of the SAP based project areas reduced from 36.27 *per cent* (2015-16) to 15.98 *per cent* (2017-18) which contributed in improving the overall performance of the Company.

Recommendation No. 28: *Considering the significant advantages of implementation of SAP based Computerised Billing System in respect of 8.86 lakh consumers (20.48 per cent), the Company needs to ensure that SAP based Computerised Billing System is extended to the remaining 79.52 per cent consumers also at the earliest.*

Conclusion

- The Company neither had conducted any Feasibility study nor had properly documented the migration process of consumer data to new System. This was indicative of deficient planning and implementation of the SAP System. The

[24] Comprising 8.69 lakh LT consumers and 0.17 lakh HT consumers.

[25] Inspite of Computerised system, billing efficiency was not 100 *per cent* because, the meter reading in case of LT consumers are still done manually.

Company had also not provided the necessary training to the System Users leaving scope for human intervention in its day-to-day operations, which was undesirable and against the basic objective of the System.

- System design deficiencies existing in the Meter Billing Collection (MBC), Customer Relationship Management (CRM) and Energy Audit (EA) Modules led to various anomalies such as non-serving of supplementary bills, non-interfacing with CMRI, wrong billing of fixed charges due to incorrect conversion of KW into KVA, processing of bills ignoring basic logic, overloading of distribution transformers, delay in release of new service connections, generation of incorrect energy audit report *etc*. Besides, Geographical Information System (GIS) was not operative in absence of regular updation. As such, the intended benefits of implementing MBC and CRM module could not be achieved to the desirable extent.

- Incorrect mapping of business rules coupled with inadequate validation checks in place led to short and excess recovery of electricity charges from consumers in violation of the Electricity Supply Code and Related Maters Regulations and Schedule of tariff issued by AERC. Wrong categorization of consumers, non-incorporation of minimum contract demand, inaccuracy in calculation of power factor penalty, non-refund of excess security showed deficiency of the billing system. The above deficiencies in the System have led to large-scale human interventions in the billing operations of the Company disregarding the concept of computerisation.

- The application controls of the System were not adequate for ensuring accuracy and integrity of data. This led to processing of transactions with invalid PIN codes, unusual meter numbers, generation of bills with NIL amount in case of zero consumption instead of raising bills at minimum fixed charges *etc*. Further, an IT Policy was not clearly defined and as such, strict enforcement of the same could not ensure compromising with the security and safety of the System.