BSES

BSES Rajdhani Power Limited

Best Practices in Power Distributon

Submitted To: DP&DD, Central Electricity Authority
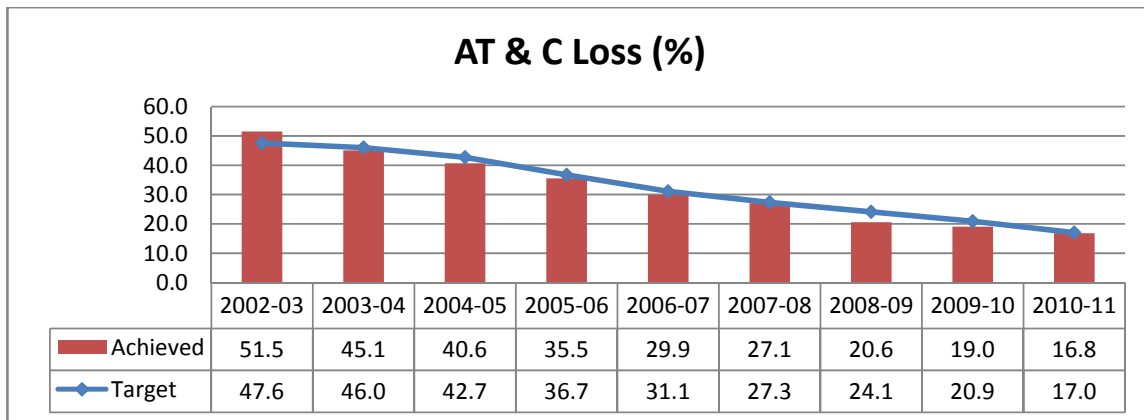
2012

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1. Introduction

BSES Rajdhani Power Limited came into existence in the year 2002, with the task of providing reliable & quality electricity supply to the consumers of South & West Delhi. Panning a geographical area of 750 sq km, it is the largest electrical licensee in the national capital, catering to over 1.6 million consumers.

For greater reach and easy serviceability, the company serves its customer base through four circles, further subdivided into 19 divisions. Each of the Divisions is led by an empowered group of officials. Since most of the venues for the 19th Commonwealth Games were in the licensed area of BSES Rajdhani Power Limited (BRPL), the company along with BSES Yamuna Power Limited (BYPL) played its role with aplomb as the host DISCOMs.

S.No	Items	UoM	As on 31-03-2011
1	Geographical Area	Sq. Km	750
2	Total Consumers	Lacs	16.51
3	Consumer Density	Consumers / sq. Km	2200
4	Peak Demand	MW	1920
5	Annual Energy Consumption	MU	10461

The AT&C losses in BRPL's area are way below the national average and the loss reduction trajectory since 2002 has been unmatched till date. The losses in the system in 2002 were in the range of 62% which has been brought down to sub 17 levels, considering a high customer density of about 2200 per sq.km and about 80% of energy sold at LT level, this achievement is unparalleled till date. This has been made possible by optimal planning of the network along with the state-of-the-art technologies and use of best operational practices by the trained, skillful and motivated manpower.

AT & C Loss (%)

	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Achieved	51.5	45.1	40.6	35.5	29.9	27.1	20.6	19.0	16.8
Target	47.6	46.0	42.7	36.7	31.1	27.3	24.1	20.9	17.0

2. Revenue Mechanism

BRPL is licensed to distribute electricity in South and West Delhi. The company is distributing electricity to consumers and collecting revenue. The revenue is collected under three heads:-

- ❖ Energy
- ❖ Non- Energy
- ❖ Enforcement

For collection purposes, BRPL is having their own collection offices namely – West Circle and South Circle. In total appx 100 counters are divided among the two circles where cash., Cheque, and card payments are accepted.

Other than their own counters, the following collection agencies are appointed by BRPL to collect the bill payment from the consumers:-

1. Skypak drop boxes - cheque payments
2. Techprocess Solutions - ECS and net banking
3. Bill desk - ECS, Net banking and card acceptance through gateway
4. Minc Bill Box - Drop box at Major metro stations - cheques only
5. TSI – Electronic drop box - For cheques only
6. Jeevan Centers - Counters controlled by Delhi Govt.- cash & Cheque payments
7. ITZ Cash Card - Collection through internet / BSES Web site.
8. Kiosk machines - operated by TSI - Cash/cheque/card (run from 08.00 am to 08.00pm at all divisional offices and select complaint centres)
9. Kiosk Machines- operated by Forbes - Cash and cheque only (installed at selected complaint centres)
10. Suvidhaa Infoserve Ltd – accepting cash and cheque payment through retailers
11. Easy Bill ltd – Accepting cash and cheque payment through retailers
12. Oxigen - Accepting payment of bills through retailers/internet via virtual cash card.

The collection made at counters are downloaded at CPC office (Collection Processing Cell), matched with the actual collections, and validation are done through internal IT software and payments uploaded in consumer account. CPC works round the clock and is responsible for payment updation and dishonour updation in consumers account. All the divisional queries relating to payments is being handled from the CPC successfully.

The online collection system maintained by BRPL is so effective and best in the industry that Senior Executives from Master Card – USA especially from the US and met our senior officers and commended the activities done in the field of online collections.

3. Technical Initiatives for Loss Reduction

1. Replacement of electromechanical meters,

2. Replacement of bare overhead conductors with insulated aerial bunched (AB) conductors,

3. Balancing of unbalanced Distribution Transformer.

4. Augmentation of Overloaded Distribution Transformer.

5. Revamping of low tension (LT) distribution systems by changing/repairing worn-out equipment and cables.

5. Installation of automatic power factor controllers for providing reactive compensation.

6. Distribution transformers metering for computing AT&C Loss at DT level.

7. Installation of Street Light Controller to avoid Energy Wastage.

4. Customer Care

Improved Customer Satisfaction - Prompt Service from all customer touchpoints like

- Modern Customer Care Centres - Queue Management System
- Website - Availability of Duplicate Bill / Complaint Registration etc through www.bsesdelhi.com
- State of the Art Call Centre - 24* 7 with easy to remember # 39999707
- Easy Payment Options like Credit Cards / Online / Payment Kiosks etc.
- Providing escalation matrix on web for due escalation of unresolved issues.

Securing Interest of Consumers - Pre Emptive measures to ensure Customers' safety

- Installation of ELCB
- Sharing of Safety Tips through website
- Caution snippets in the media during rains
- Load Enhancement / Service Line Cable change
- Imparting training to RWA nominated electricians to avoid Earth Leakages (EL) related issues.

Consumer Education - Generating Awareness on relevant points

- Energy Conservation Surveys
- Media Releases
- Energy calculator
- Earth Hour
- SYNERGY News letter for regularly sharing important information with all consumers.

5. Energy Accounting Practices & Result Achieve

Following are the basic principle, which should be followed while doing Energy Audit:

a) Energy Audit should not be done just at total energy purchased v/s total consumer energy, but, it should be done at every level.

b) Energy measurement for audit should be done right at receiving feeder, in all HT Grids, at outgoing Grids feeders, at all DT RMU and at consumer point.

c) The first Audit should be energy billed by Transmission Company versus energy received at Grid by the DISCOM. Such audit should be done feeder wise.

d) Similarly, the audit should be done for each grid to ensure grid energy balancing.

e) Regarding HT feeder, the audit should be done between Grid outgoing feeder energy and transformer(s) energy.

f) DT audit is one of the toughest thing, but it is desirable specially, if the company loss is less than 15%.

g) Whenever, audit activity is initiated, one may found abnormal gap value. Do not get disappointed with the abnormal gap data. Treat them as observation and analyze the cause.

h) While doing Energy Audit, lot of information is collected. The audit output should have brief about network health, load curves and load Growth/ Change   trends.

i) The purpose of Energy Audit is not to just found gap but also to recommend measures required to fill the gap.

Result Achieve:

Today in BRPL, we know the Energy Gap/ Energy Loss at each voltage level and each part of network. We have saved lot of money by verifying the purchase energy bills. Further, network health report, prepared during the Energy Audit has reduced the burning and overloading of the equipments. Further, continuous monitoring of energy has helped to control UI power purchase charges.

Energy Efficiency in Demand Side Management:

1. The purpose of Energy Efficiency and Demand Side Management should not be only to reduce the peak but also to look for load during the non-peak. In addition, to commercial reason, this activity should be carried out to protect the environment and to win the trust of consumer(s). The DSM can be carried out at three levels:
   A) DISCOM level
   B) B) Consumer Level
   C) C) Using technology like energy storage.
2. Although, most of the DSM activities are initiated by DISCOM & should be carried out by consumer but few activities can be managed at DISCOM level. PF regulation and voltage regulation are such activities.

3. Before initiate any schemes, generate enough data by doing consumer load research and have enough expertise including expertise in the field of M&V before launching DSM programme.
4. DSM programme needs skill about energy conservation and art of communication (with a consumer). It is better to hire Energy Manager/ Energy Auditors.
5. For most of the DSM initiative, DISCOM needs approval of regulator. However, awareness etc are few initiatives which could be done without a formal approval.
6. Few scheme may affect ARR & thus tariff. However, if consumption goes down, the over, all bill will also go down.
7. At consumer level, the involvement of consumers is must. Awareness, incentives, penalties and legislation are four main tools to involve consumer. Formulate schemes based on the four tools.
8. Awareness is the key for success of DSM programme. In case, the DISCOM officials, acting as consumers, are not convinced about any scheme, do not launch such scheme as it will bound to fail.
9. Energy conservation is a powerful DSM tool and specially helps in avoiding setting up new generation plants.
10. Tariff policy is always used as one of the key tool to implement DSM.
11. Energy storage is not a very popular method of DSM but it will become a powerful tool in future. Explore it.

6. Information Technology

Automation Foreword

Business today demands agility to respond to the business requirements, growth, competitive threats, regulatory requirements, customer care, and more. A primary goal of the information technology allignment with the business has usually been to assure that the investments in IT generate business values and the mitigation of risks. Implementing a set of sound and best business practices is a key to deliver IT services that meet organizational needs.

Deregulation and privatization of power industry has thrown a big challenge towards improving efficiency of operations, enhance customer care and improve overall service delivery. Perhaps the most important determinant of success in such an endeavor is the proper use of IT. A well designed, as well as, an integrated IT system is the way in which utilities can move from their current operational levels to the desired level. A proper IT system implementation would aid in improving efficiency by eliminating unnecessary manual involvements in transaction processing or complaints redressal. The IT would augment efforts at quick resolution of issues by providing the appropriate information to the correct person in the shortest possible time frame. The Information Technology is definitely playing a key role in the energy industry particularly in utilities. Efficiency being the main criteria, automation is being given the highest priority.

BSES Automation Initiatives

At **BSES Rajdhani Power Ltd., Delhi**, our mission is **customer's satisfaction through technology driven services** by empowering people to be creative as well as productive and this has been possible through leveraging IT in the entire spectrum of business operations. We have started recognizing technology criticality for managing the distribution operations as well as maintenance of the grid and accordingly have started system-wide deployments. Technologies like SCADA, Automated Meter Reading (AMR), GIS, ERP (SAP), Outage Management System (OMS), DMS applications, Load Forecasting, Mobile computing and the integration of all these are some of the initiatives already implemented or being implemented at BSES Delhi.

The IT applications developed, are spread across all functions, including Administrative activities, Billing, Legal, Recovery, Reception, Meter Reading, Remote Meter Reading (RMR), Automated Meter Reading (AMR), OMS(Outage Management System), Network Planning and dispatches in an integration fashion. This makes our working integrated and brings closure all distributed as well as diverging functions. This is rarely visible in utilities across the globe and BSES at Delhi is one amongst few unique sites to illustrate this very resolve. Today, consumers' issues are addressed effectively through the IT tools and this has made

possible to not only finish work on daily basis but also take kind of futuristic planning. Any consumer's complaint can be tracked effectively and efficiently, thus, making within reach to approach consumers as a marketing drive. This was, otherwise or impossible, to address a large consumers base at Delhi with all sort of problems inherited with years of legacies, creating a chaotic situation.

A strong IT infrastructure is established connecting all offices approx 400 plus locations, installing LAN/WAN and relevant hardware. The great enabler had been the sustained training of the large workforce and taking us close to the destination.

Snapshot

- One of the biggest IT establishment in this part of the country
- Connectivity of about 400 plus offices across a wide geographical stretch
- Deployment of more than 5000 PC's and 1500 printers
- More than 7000 application users community
- Implementation and integration of SAP, AMR, SCADA, GIS, OMS and Load Forecasting applications
- State of the art Datacenter with 40 servers in a 24*7 operations
- Telecom connectivity with intercom facility of 850 Avaya phones and 470 phones on Centrex in an integration

Benefits of IT Benefits of IT Initiatives @BSES

Customer Care

- Faster resolution of problems
- Easy traceability and monitoring of information on a complaints
- More and more satisfied consumers / customers
- Automated and customer friendly processes
- Customer empowerment through web interface

Billing

- Error free bills and mechanism to correct bills on a single window system
- Faster resolution of problems
- Reduction in customer complaints
- Better revenue realization

Operations

- Reduced time to address problems
- Efficiency in operations
- Stable power supply
- Proper monitoring and control. Manpower & resource management through OMS
- Better productivity and cost control
- Proper accounting

- Real time monitoring and maintaining information in the database system for all grid stations
- Through implementation of GIS complex power system analysis like fault analysis, optimization of network and load forecasting
- SCADA has helped in visibility of network operations, real time accurate with consistent information of the system, flexibility in operations control, faster fault identification / isolation / system restoration, extensive reporting and statistical data archiving

Material Management

- Core application SAP
- Ease of manageability of critical material in emergency hours
- Reduced inventory cost
- Easy traceability of material and interlinking of stores
- Streamlined material management
- Efficient material management
- Satisfied and motivated venders

Finance

- Efficient system and better visibility
- Improved information sharing and planning
- Timely payments and satisfied venders

SMART INFRASTRUCTURE (BUN)
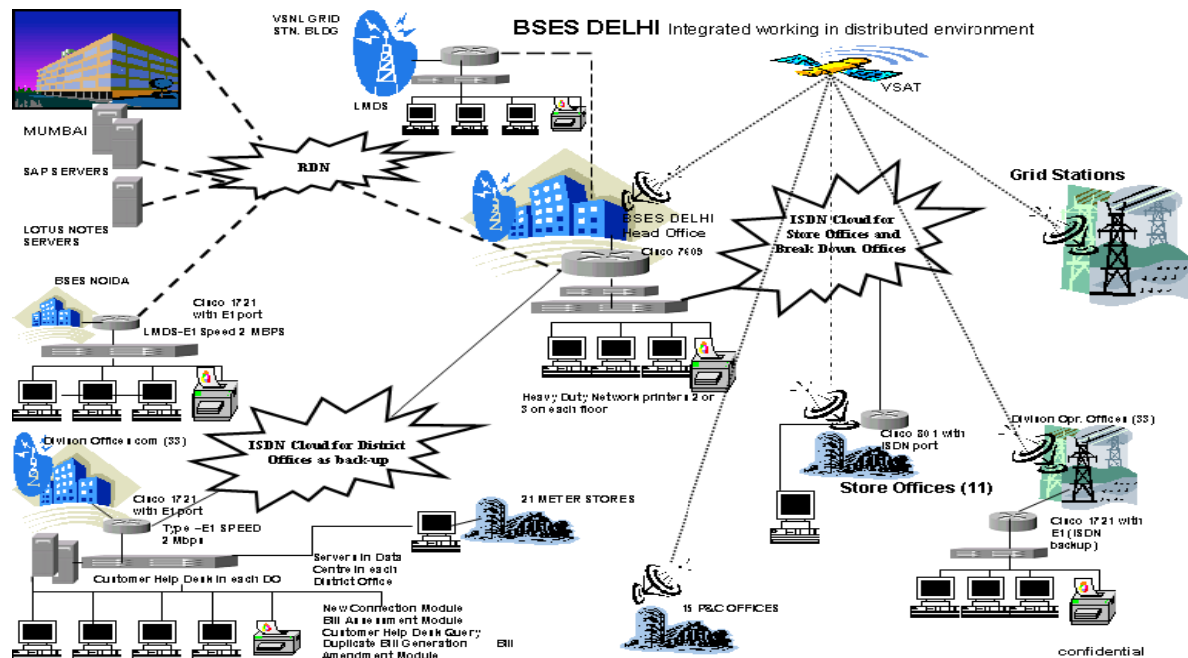
Integrated Operations

Integrated IT Systems

IT Projects For Operational Efficiency & Customer Care
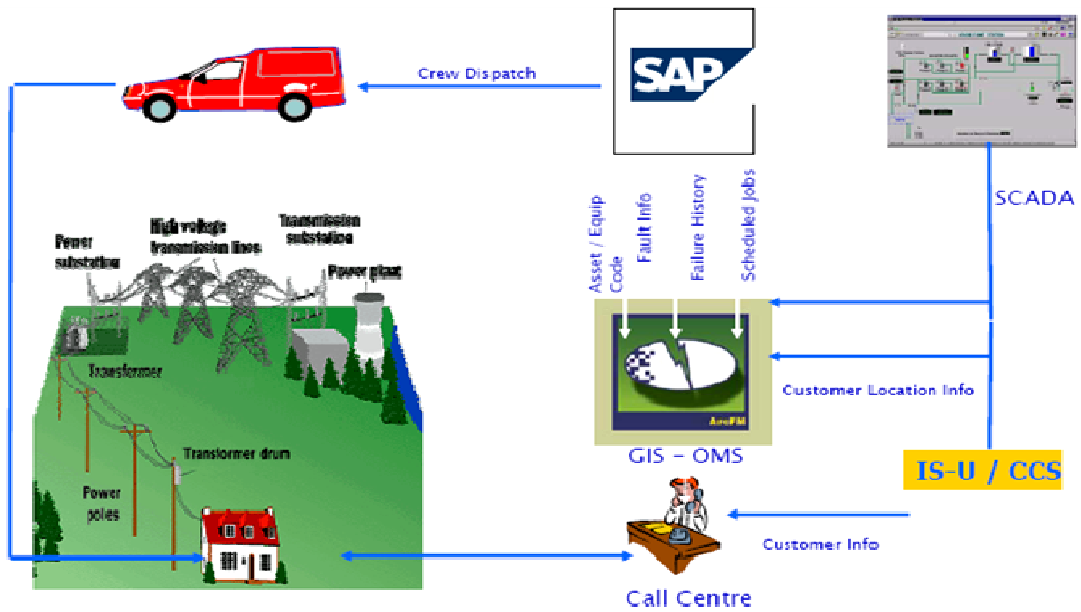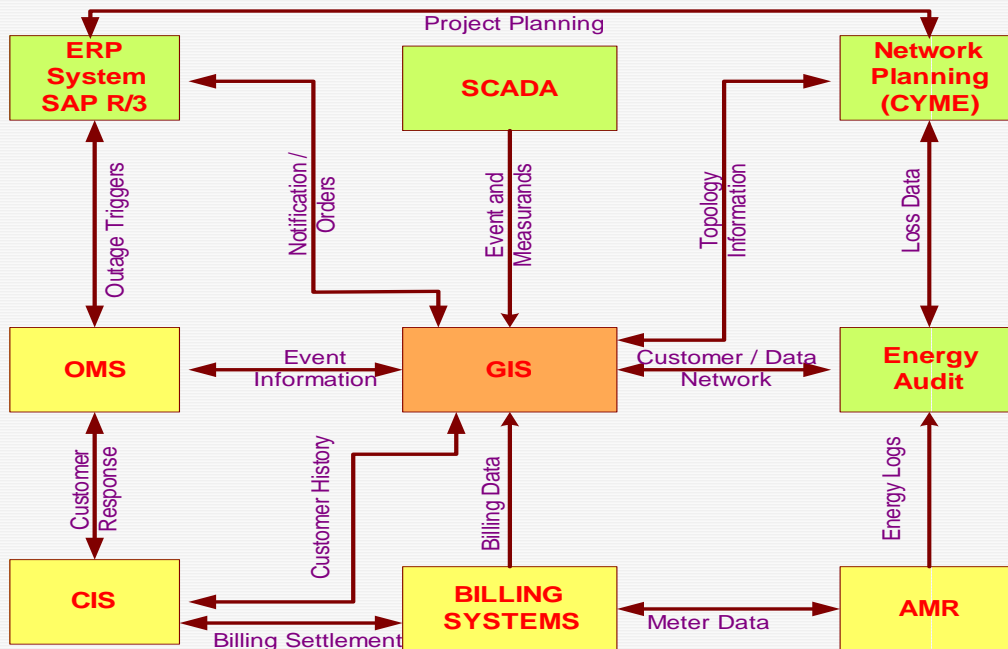
Project –I: "IT Connect" - Thinking Beyond Boundaries

Problem Defined

BSES took over operations in 2002 of Delhi power distribution and then there was hardly any Automation as well as Computerization. There was lack of integration and connectivity between different locations. There was no telecom related initiatives. The challenge was connecting more than 500 offices for anytime on-line operations. The constraint was geographical stretch as well as bringing in multiple technology and vendors on a unified platform. The risks defined were maintaining a 100% secure uptime 24x7. The connectivity should help in a seamless information flow.

The Solution

The intension was to connect more than 400 offices and 20 mobile offices online across Delhi. Hence, these offices were put on on-line operations which included Commercial as well as O&M, Customer care, Enforcement, Recovery, Vigilance, SAP, Complaint centers and Cash Counters. We deployed around 5000 PC's, 575 Laptops and 1500 Printers. State of the art Datacenter was set-up with 40 servers having installation of Sun, Lotus Notes, AMR, Anti-Virus and DHCP Servers. The connectivity link is through 208 Fibre optic lines, 161 ISDN, 110 VSAT, 142 RF and 20 mobile connections. Further the Unified Telecom Connectivity was setup at 24 locations with AVAYA, 25 locations on CENTREX and rest on FWP with about 4000 users in a close user group. Hence, we achieved integrated IT operations in a distributed environment.

Implementation Learning
Post implementation, all operations are Automated and made on-line with the Integrated Billing, Customer Care, Operations Management System, Vigilance, Recovery, Administration, Material Management (SAP), HR(SAP), Finance(SAP), Projects Automation and Lotus Notes. This has helped in streamlining business operations and enabling the fast information flow. These in turn have helped us in serving our customers fast and diligently.

Business Benefits
Through this connectivity the Outage Management system got linked to call centre transferring proper outage information which in-turn helped in reducing outage time and hence reduce commercial losses. Commercial call centre linked with IVRS and business applications helped in fast resolution of consumer's problems. The website www.bsesdelhi.com designed aesthetically with customer centric approach provides all information to consumers and further enables them to register and track complaints. The look and feel of the website was designed to be customer centric.

Conclusion

The project "IT Connect" is one of the biggest and unique projects in North India. The vastness in its planning, implementation, security, disaster recovery plans, integrating multiple vendors and bringing them in our network, expense monitoring, ROI, 24*7 support and its impact on customer service is a case study in itself.
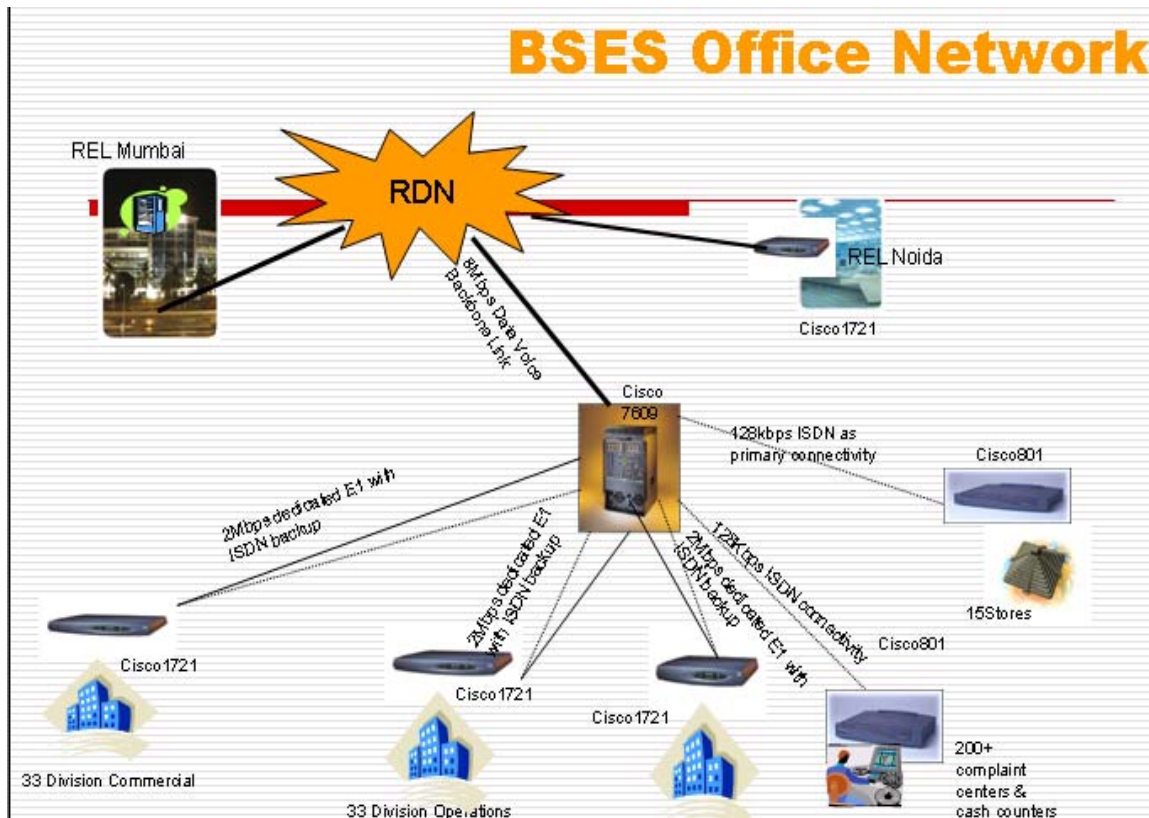
Project—II: Automated Meter Reading (AMR) – An Emerging Technology

This project was implemented for Key Consumers and Grid monitoring.

Problem Defined

The project was conceptualized to minimize human interference while downloading/uploading the meter data and to reduce billing as well as accounting errors. Further through this technology, the entire meter data along with history can be downloaded and analyzed. It will save operational cost in long run and help us in identifying as well as minimizing the power theft. The meter reading was earlier done through a MRI (Meter Reading Instrument) or manually by physically going to the consumer end and connecting MRI to the serial port of meter. Since most of the key consumers have their meters installed well within premises, the readers had to wait for the gate pass/permission for going inside for meter reading. This used to take a lot of time for them to read each meter. It was a tedious job and lot of manpower was required for reading the meters as these consumers are spread across Delhi.

As far as Grid AMR is concerned the project was targeted towards capturing exact data of energy flow into our network which in-turn will help us in Energy Audit as well as Demand Forecast, the biggest challenge for an energy utility.

Problems defined were:
- *In Grids human interaction in 3 shifts to monitor load and energy release at an interval of 15 min.* This can be automated.
- *Herculean task of compiling log at month end to generate MIS.* This was possible through the project.
- *No Correlation between energy imported and distributed*. One of the key results generated through the project.
- *Central monitoring of each grid was not possible*, which will become possible through implementation of AMR

Last but not the least it was a unique automation initiative towards customer services as well as customer care to their satisfaction.

The Solution

A modem is installed at the consumers / Grid end. The reading of the meter is taken remotely from the central location by making a call to the remote modem. The downloaded data of the meter is then used for Billing, analyzing load survey and checking the tamper data of the consumer meter. Further data from grid is used for the business critical MIS reports.

It is a point to point dial-up system and works on GSM/CDMA as well as PSTN network. Total 14 Server grade PC are dedicated at the central location with 7 modems per PC at central location connected. These makes schedule calls to 15000 modems in the field. GSM/CDMA technology is used to remotely interface and read the meters of consumers & Grids.

Learnings are:
- *The Vendor Management: Modem supply from the vendor* i.e., execution team of BSES was working at such a pace that the manufacturer was not able to cope up with the supply
- *The Connectivity: Connectivity at remote locations and signal strength of service provider*, further there always remains a challenge of reducing instances of signal drop while data transfer from meters to server
- *Change Management:* Educating own personnel on using the software and recording data

AMR Setup

Business Benefits

The entire process from meter reading to billing is fully automated without human intervention resulting in the operational efficiency, better billing/improved quality and early revenue realization.

Key Consumers

Now these meters can be read from a central location, using software to schedule the meter reading one after the other. Now, the same job can be handled by few people only and the reading process is much faster. Further the reading is without errors because of minimal human intervention. This has resulted in reducing the time for billing, in improving billing quality and better revenue realization leading to consumers' satisfaction.

Grids

- Monitoring and logging of Voltage, current, power factor, KWh, KVARh & KVAh on 5 minutes basis
- Alarm feature to draw attention of the operator to any breach of various parameters beyond preset limits
- Facility to generate spread sheet and MIS reports on System outage / Down time of the Feeders, Daily Peak loads, Voltage Profiles
- Availability of all grids' data at common server

Conclusion

The implementation of AMR at such a vast scale is in itself one of the largest deployments in India, which makes it unique. Connectivity across a vast geographical stretch for its streamlined operations also makes it very unique. The immediate cost benefit derived by implementation of the same has been one of the remarkable features. It encompasses both GSM and CDMA technologies**.**

AMR Architecture
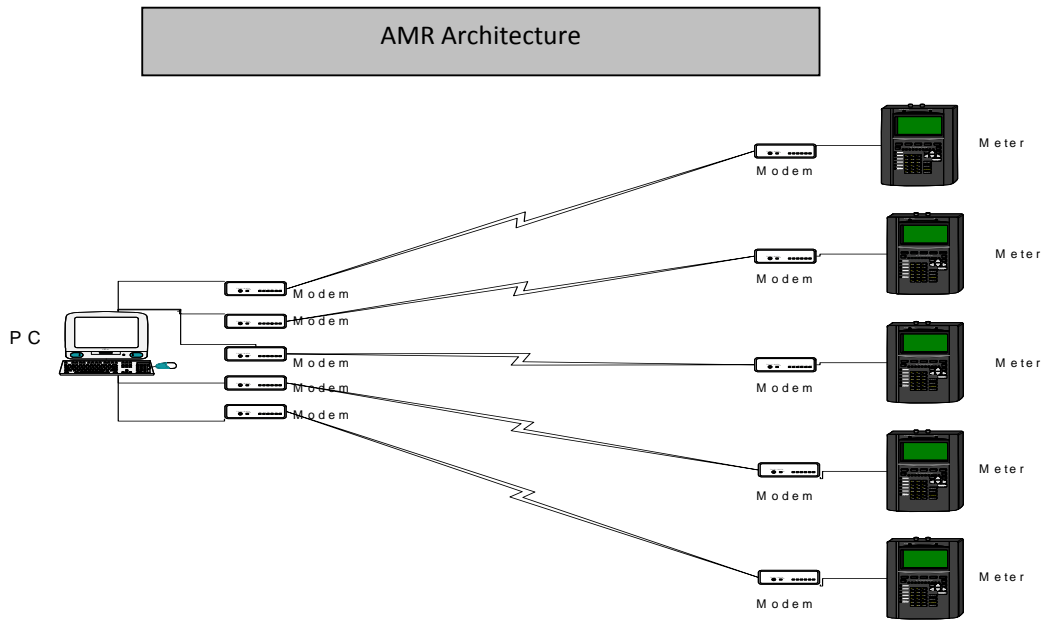
Project–III: On-Line Mobile Cash Collection and Customer Service – An Innovative Project

Problem Defined

Consumers irrespective of their age, health and other external constraints had to travel to the BSES offices to make payments and request for the support. Further the mobile vans used to collect cash and update payments to the central system in a batch mode which may take ½ days in the process. Hence, the prime objective was to reach at consumer doorstep with all up-to-date information and values add to the consumers' services and customers' care; first time in power utility, India.

The Solution

The cash collection is done by mobile cash collection vans to extend service to consumers who cannot visit BSES offices for payment as well as support. The transactions are updated online using CDMA technology for connectivity of mobile vans with the central office. The vans are connected through VPN with the central office ensuring security of data. Customer services are being extended through the mobile vans including complaints tracking, new connection, logging complaints and various other consumer related services.

Business Benefits

Using the CDMA connectivity, the vans are now online and can connect to the central database. The payments are updated instantaneously and the system is online. This has resulted in saving a lot of time and effort, further improving the consumer services and care.

Conclusion

The uniqueness of the project is that the concept can be extended to all the customer interface points and the vans can now be upgraded to a fully functional moving office. An innovative way of extending consumer services resulting in improvement of consumer satisfaction index

Project–IV: OMS (Outage Management System) – Reaching Consumers

Problem Defined

Information collation on faults and managing fault restoration within defined timeline. Further managing and allocating resources and integration with system control and call center

The Solution

The Outage Management System implemented monitors and analyzes the whole process of fault restoration, from the receipt of consumer's complaint to the normalization of supply including tracking of resources, in the power distribution and power supply system.

This system has been divided in two parts

- 11 KV and Below

- EHV (Extra High Voltage)

Business Benefits

- Real Time monitoring of HT, LT & no current faults
- Full integration with system control, circle control, call center, breakdown offices and local complaint center
- Job allocation & tracking
- Optimum allocation of O&M resources (vehicles, manpower, etc.)
- Automated SMS escalation of fault and breakdowns
- This system also provides input to financial system
- Exhaustive MIS report

Conclusion

The uniqueness of the project is the business impact like
- Speed redressal of faults
- OMS linked to Call center provides seamless information towards

customer care & satisfaction

Project–V: SCADA– Technical Breakthrough

Problem Defined

Poor visibility of Electrical Network Operations, absence of real time and historical data, lack of network analysis resulting in delays in fault restoration with inadequate information to consumers.

The Solution

The SCADA system is a real time operating system. It closely monitors the distribution system and its behavior. Data is utilized in planning as well as in the management decision support system. Further it helps in energy monitoring and audit along with increasing the efficiency of operations as well as resulting in a better regulatory compliance. The SCADA is an industrial measurement and control system consisting of a central host or master usually called a Master Control Center; one or more field data gathering and control units or remotes traditionally called remote stations, remote terminal units, or RTU's; and a collection of standard and/or custom software used to monitor as well as control remotely located field data elements. Communications may be via a local area network (LAN) and will normally be reliable with a better speed. SCADA systems generally cover larger geographic areas and rely on a variety of in the field electrical distribution network as well as communication systems. This is used for monitoring/ controlling of multiple substations from a Master Control Center. The communication link between the two ends could be a dedicated cable, a satellite channel or fiber- optic link. All the data of the receiving station are logged at a half an hour intervals. The logged data provides trends of the load flow.

Business Benefits

- Visibility of the network operation
- Real-time, accurate and consistent information
- Flexibility in operational controls
- Faster fault identification, Isolation and system restoration
- Extensive reporting & statistical data archiving
- Central database and history of all system parameters
- Optimized and efficient operation of the network based on real time calculation.

Conclusion

The project implemented at BSES is the biggest and first of its kind in India. The criticality lies not only in implementing the project but also to integrate it with GIS and SAP. With the help of

this we have successfully been able to record the profile of consumers with their consumption pattern, Audit energy and further reduce theft of electricity. The turn around time for closing complaints has reduced thus giving the consumers respite from long outages.

Project–VI: Project EDGE (SAP ISU/CCS)– A World class solution

Problem Defined

At BSES Delhi 60% assured revenue gets generated from 20% of our Key high value consumers. Hence these consumers become a key reason towards improved customer care. To provide them services, better than the best, there was a need to improve our processes, bring in an integrated scalable, secured system which would further improve our Revenue Management Cycle. Further the earlier billing system which included customer care, too, was on a legacy system and needed to be integrated to other functions like finance and contracts, which existed on SAP.

The Solution

The solution designed and which got implemented was to migrate the entire billing system from legacy to SAP-ISU/CCS. The project is titled **EDGE** (**E**nhanced **D**ata **G**eneration for **E**nterprise). It is an initiative towards automation of business processes leading to customer care covering automation through implementation of ERP, SAP IS-U/CCS. The IS-U/CCS is an Industry Solution from SAP which addresses the needs of a customer oriented utility company. The solution encompasses CRM (Customer Relationship Management) and BW (Business Warehouse). It is a customer centric futuristic billing system built on Enterprise SOA Architecture.

Business Benefits

As project **"EDGE"** is an initiative towards automation of business processes leading to customer care covering automation through implementation of world's best practices and ERP, hence the solution deployed has helped our business grow multifold with many other benefits.

- Integrated platform
- Improved security
- Greater flexibility and scalability
- Reduced billing errors
- Faster and robust tariff setting process
- Improved credit management
- Facilitates energy accounting resulting in reduction in AT&C Losses
- Single face to customer, 360 degree view
- Improved capabilities at call center

- Faster resolution of querries
- Supports Complex billing options
- Support for customer segmentation for marketing campaigns
- End to end meter management
- Single billing system catering to multiple customer segments
- Very less bandwidth usage resulting in system availability to all users on emergency
- Ease of extracting information
- Entire organisation views/ transacts on the same system
- Better user discipline

Data storage and monitoring is done from a centralized datacenter. Security of usage also got streamlined through implementation of User Access Control policies and applications. Currently there are more than 2600 users. Well structured and defined MIS reports get generated providing mission critical information to the Management. Further we are also able to send bills, required information and reminders to consumers through **SMS** and **emails.**

Improved Customer Service

- Improved customer satisfaction and loyalty through quick, accurate responses to inquiries
- Give Customer a smooth, consistent experience across all avenues of customer connect including voice, email, sms etc.
- Improved capabilities at the call centres
- Improved service order tracking
- Automated correspondence
- Enhanced ability to monitor, track and analyse trends based on the complaint/ request history
- Enhanced customer self-service capabilities thorough the web
- Reduce total cost of ownership by carrying out all customer service activities on a single integrated platform

Conclusion

The implementation of "EDGE" for such critical database is in itself one of the largest deployments in India, which makes it unique. Connectivity across a vast geographical stretch for its streamlined online, 24*7 operation also makes it very unique. As ISU has hardly been implemented in India by any enterprise, because of its complexity, cost and availability of skillset, it became a real challenge for us to migrate our existing billing data and make it live for 32Lac customers without any glitch and zero percentage error.
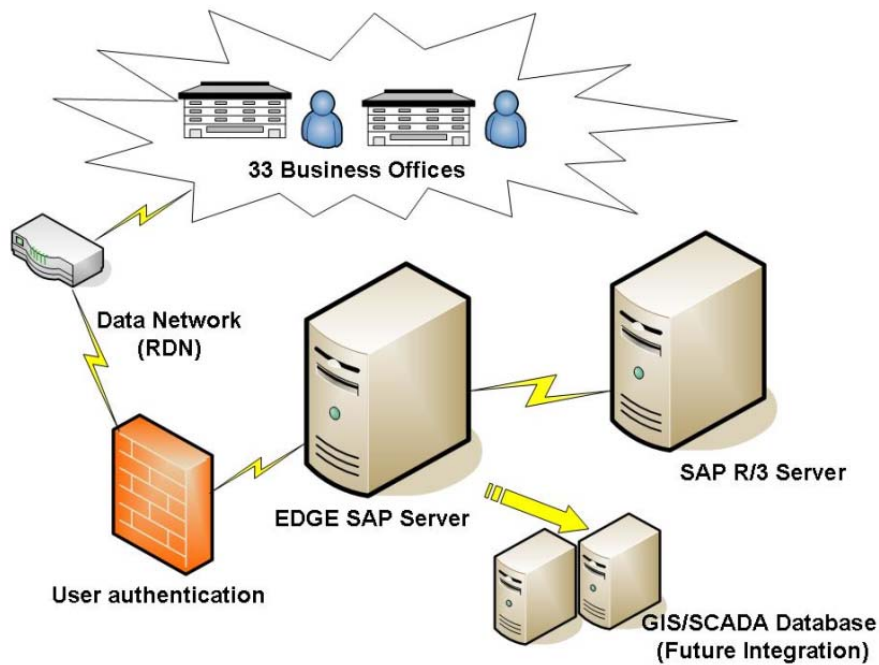
PROJECT EDGE OPERATIONAL ARCHITECTURE

Project–VII: Project " PALMS": Power Management and Load Forecasting

(SAS)– The Need Of The Hour

Problem Defined

The primary role of an electricity distribution utility is to arrange quality power for its licensed registered consumer and distribute uninterrupted power to them. Power Management function encompasses arrangement of power for the DISCOM predicting the future demand.

Power demand has three types of inbuilt seasonality i.e. Daily, Weekly (short Term) and Annual (Long Term). Short term demand for power is also dependent on a host of other factors on a daily basis. The external factors are:-

- Holidays within the week
- Temperature
- Humidity
- Rainfall and cloud cover

- Wind speed and direction
- Special occasions

Hence the immediate need (Phase-I) for our BSES DISCOMs, was to forecast short term demand taking into consideration all the above factors and any other factors that may be identified and effectively captured.

The Solution

There are various statistical tools available and are being used for forecasting of power across the globe however BSES selected SAS institute and its Load Forecasting Engine to improve its current load forecasting process. The objective is to provide a day ahead forecast for demand at 15 minutes intervals. The solution shall also help us in predicting Delhi's appetite for power more accurately and hopefully save on both overbuying and last-minute scouting for power. The solution known as SAS Smart Load Forecaster is a level up from the prevalent practice of the intelligent guesswork that is the result of tracking historical load patterns coupled with the current weather forecast and past weather trends.

Business Benefits

The savings accrued from the more precise planning will ultimately benefit the consumers; as reduced power costs will have a direct bearing on the customer tariffs. With the new technology in place, BSES will also be able to plan their surplus power sales better, leading to higher returns from such sales to other utilities.

Conclusion

The project i.e. Short term Load Forecasting was made go-live on 01 April 2011 and is being tuned for forecasts within world class limits. The Project is currently under progressive improvements involving data population, regression and smoothening. This works in perfect integration with PMG i.e. Power Management suit of applications, Grid AMR (Grid Automated Meter Reading) and SCADA. This is not only helping a money saver but helping to manage power effectively as well as efficiently to a customer centric power utility.
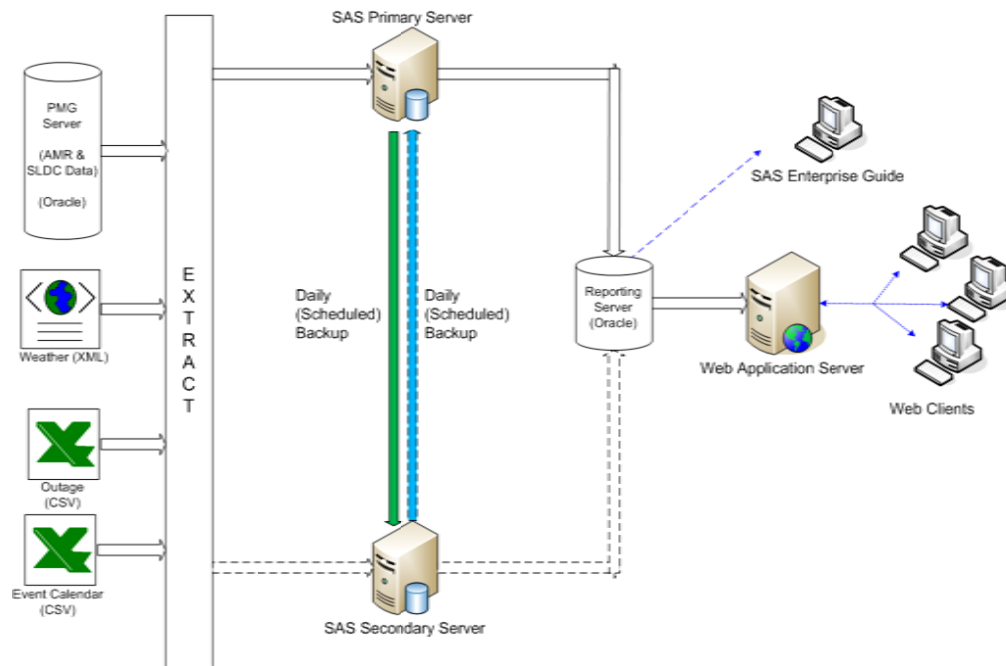
PALMS architecture

Project –VIII: Project "CORE"

Problem Defined

Functional vertical in an electricity distribution organisation like, Operations & Maintenance, requires data exchange and communication with related support functions like Stores & Meter Management. Further the Operations and maintenance department should have proper visibility of electricity network. Unless all these updated data are available online, there is always a tendency of glitches in the operations which leads to delay in fault restoration, long outages resulting in poor customer service and other negative cascading effects. This also hits the business i.e., AT&C (Aggregate Technical & Commercial) losses. Further the O&M department should also have a structured data source available for manpower & other resource planning. Hence automating O&M, implementing SAP R/3 for stores and meter management, implementing GIS for network visibility and integrating all these was the need identified and implemented through the project CORE.

Hence project CORE (Converged Operational & Reporting Engine) is an integration of highend, critical, live application and database like SAP, GIS, OMS (Outage Management System) to generate smooth operational advantage and mission critical reports for customer benefit.

The Solution

The solution designed was towards tuning, streamlining and integrating Outage Management System(OMS), SAP & Meter Management, and GIS. Further the CMS (Complaint Management System) was also plugged into CORE. Complaint Management System is for monitoring the complaints of consumers related to No Current, Meters etc so that there is a fast & efficient resolution with in the time frame. The OMS was integrated with GIS (Geographical Information System) also so that the Equipments used in O&M could be tagged in GIS to find out the fault locations with its occurrence & hence time saved in resolution of the fault by sending the restoration team to the exact location.
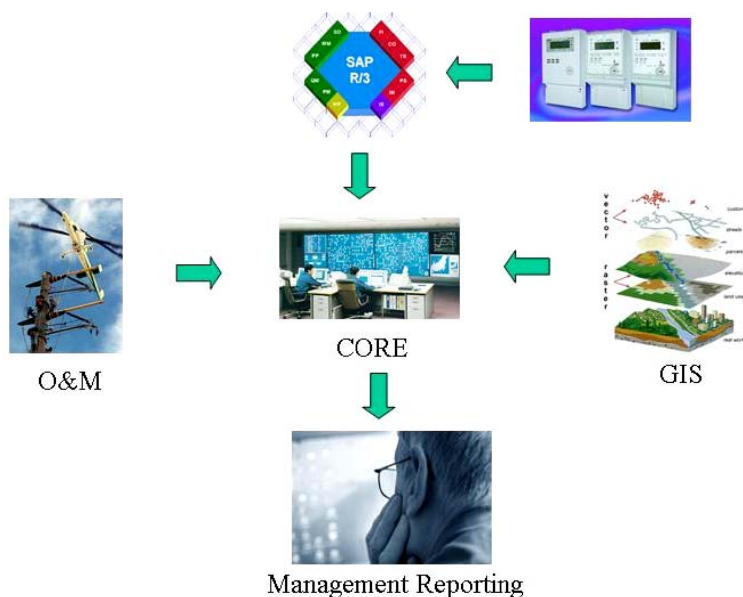
Business Benefits

- Structured Data source available to Operations and Maintenance team for planning manpower and resource deployment
- Complaint resolution within regulatory timeline due to factors like transparency and visibility of electricity network and automated SMS escalation of faults and breakdowns
- All assets mapped and recorded in SAP
- Improvement in customer satisfaction index
- Unified reporting engine
- Green initiative

Due to very less faults and outages business targets are met. Further a satisfied customer brings in more business. As fault rectification time is less and consumer's time is saved, hence performance figures are better. Power outages decreased by 98%. Transformer

failure rate was more than 15% which has reduced to less than 1%. All these have helped us in considerable amount of cost saving. The main impact of this project is fast & efficient resolution of the Consumers' complaints/ queries/ problems. 90% complaints attended in less than 2 hrs. The customer reliability index has reached more than 99%.

Conclusion

The implementation of CORE at such a vast scale is in itself one of the largest deployments in India, which makes it unique. Connectivity across a vast geographical stretch and varied platform for its streamlined operation also makes it very unique. The immediate cost benefit derived by implementation of the same has been one of the remarkable features. It was a unique automation initiative towards customer services and care to their satisfaction. The project was deployed for internal business operations of BSES Power at Delhi. It impacted business, customer care, technical operations & monitoring and regulatory compliance

RECOGNITIONS

IT of BSES Delhi in the recent past received awards

- Network Innovation Award (2005) from HECL
- CIO 100 Award (2007) from IDG, USA
- CIO Leadership Award (2007, 2008) from IDG, USA
- NASSCOM recognition (2007) from NASSCOM
- BOLD CIO 100 Award (2008) from IDG, USA
- Smart Infrastructure Award (2008) from AMD Athlon, USA
- Diamond EDGE Award (2009) from Unified Business Media (Network Computing)
- "PC Quest Best IT Implementations of the Year" (2009) from PCQuest
- "Enterprise Connect Award"(2009) from CIOL (Cybermedia Online)
- CIO100 Award(2009) from IDG (International Data Group)
- Finalist for NASSCOM CNBC IT user Award (2009) under Energy & Utilities Category
- CIO100 Award(2010) and HALL OF FAME from IDG (International Data Group)
- Finalist for NASSCOM CNBC IT user Award (2010) under Energy & Utilities Category
- Top 3 for Champion Uptime Award and Strategic Security Award (2010) from Indian Express
- EDGE AWARD(2010) in General IT Category from Unified Business Media
- Finalist for ICT for INDIA - SKOTCH Award (2010)
- Uptime Champion Award(2011) from Indian Express
- SKOTCH Award (2011) for ICT for India
- EDGE Award(2011) in General IT Category from Unified Business Media
- CIO100 Award(2011) from IDG (International Data Group)

7. Human Resource - Skill Development Measures of Employees

BSES Rajdhani Power Limited (BRPL) has always strived for excellence, whether in Operations or in terms of work force development. To achieve throughout excellence; work force skill development is one of the key attributes. For the same we have a dedicated department namely Learning Organization, which looks after the training requirements and organizes necessary trainings.

As a process, training need identification is done in consultation with the stake holders i.e. for a particular department a discussion at the Divisional and Corporate Office level is done to know the training requirements. These discussions would involve grass root level employees up to the Head of Departments. Post discussion a buying is created amongst the top management about the requirement which has come up and accordingly training is designed. We also try as far as possible that these trainings are imparted by our employees who are involved in the training design and also are trained as internal trainers. These trainings are not conducted just to provide training but also to provide a solution to the issues for which the same is being conducted.

Under the technical training initiative; one of the most successful examples of this is the RMU training wherein a need for training in Execution, Operation and maintenance of HT switchgears was identified. A team of O&M engineers were sent to various RMU manufacturers e.g. C&S, CGL, ABB & Schneider where they were trained on operations and maintenance of the RMUs which have been installed in our organization. These engineers further provided training to our work force and till date we have covered 1134 O&M participants across levels. This training has helped to bring down the failure rates from 122 in 2010 to only 69 in 2011. Subsequently, a RMU Workshop was established in 2011. This workshop has successfully repaired 185 RMUs till April 2012.

We conducted a Half-Day Training Workshop of Assistant Line Mate (ALM), which was training on Basics - Tools Tackle & Safety. This training was held at the Divisional level and covered Assistant Linemates. The main contents of the Trainings were the following:

- ✓ Know about tools and tackles and their usage
- ✓ Know about consumable and their applications
- ✓ Safety precautions and norms

2 day Training Program for the Supervisors and Engineers deployed through contractors was conducted during the FY 2011-12. A total of 40 Supervisors & Engineers were Trained under this Training. Main topics covered under this program were as follows:

a) Importance of various tools & tackles and safety equipment
b) Shut down procedures and safety precautions
c) Assessing LM on their practices relating to LT and HT preventive and break down maintenance

d) Record keeping and reporting to officer-in-charge
e) DERC Supply Codes as applicable to O&M

A 2 day Training on LT & HT Maintenance Practices has been conducted for the O&M work force. A total of 400 participants were trained under this program. As per the senior personnel in O&M this was one of the Training which was greatly required by the work force in the field.

In continuation to its efforts for improvement of skills and safety concern among AMC workers, Learning Organization has managed to create another milestone of its own; a six days practical training program for AMC linemen "AMC Certification Program" was launched on 22nd March 2012. This six days Program has been developed after getting inputs from O&M officers and the recommendations of apex Committee. The training covered other topics beside issues related to day-today working, included, understanding Job responsibilities, Safety, Accident Prevention and First Aid & Treatment of Shock. Display & explain the use of tools & equipment etc. In the coming year we would covering all our outsourced Linemen in and ensure all of them undergo this program.

Another of the successful initiatives undertaken is Sampoorn Bijli Abhiyan (Developing Consumer Centric Behavior). The objective of the training is to stress the importance of customer delight, employee ownership, service quality, effective communication with consumers, dispute resolution and handling customer complaints. This program is targeted for the work force in O&M and Business Function at the Division level. This program is conducted in phases wherein the participants undergo the training between October to January due to the fact during summers due to peak demand our workforce is busy serving our customers. In the first stage of the program participants from O&M and Business are identified, who are later addresses as 'Champions'. These Champions carry the baton of sharing their learning's with other personnel in the Division. Along with the training of these Champions an interaction between Consumer groups (RWAs, Vishisht Sahyogi's) and the Champions is organized in each division, wherein issues pertaining to both sides are discussed and solutions to address them are identified. The uniqueness of this program is that it does not end at training but is linked to a recognition program. The recognition is done through scorecards which have been designed and implemented in consultation with the Champions and key stakeholders like Divisional Heads for O&M and Business, Business Head, O&M Head, Business Analysis Group. Since this program encourages team work, hence we have tried to recognize teams rather than individuals. Also, through this ceremony we recognize important consumers in appreciation of their support. Employees and their family members enthusiastically participate in the cultural programs organized as a part of the ceremony. Importantly, each of these ceremonies is organized by the Champions with an active support of their Divisional and Circle Heads. The recognition ceremony is not a onetime event but has been designed in such a manner that it will be institutionalized and is

held every year. Under this program we have so far covered 11 out of our 19 Divisions and by the end of this Financial Year we would have covered all the 19 Divisions.

Our organization focuses to cover all segments of workforce which includes permanent employees and staff deployed by contractors. For instance, during the last financial year, 656 Linemen and 492 Additional Linemates deployed by the contractors were trained on operations and maintenance practices, safety procedures, etc.. In the year 2011-12 we have conducted 254 training programs covering 4960 employees and totaling 7863 mandays.