付　属　資　料

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SCOPE OF WORK
FOR
THE DEVELOPMENT STUDY
ON
THE IMPROVEMENT
OF
POWER DISTRIBUTION SYSTEM
OF
ANDHRA PRADESH IN INDIA

AGREED UPON BETWEEN

THE TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED

AND

THE JAPAN INTERNATIONAL COOPERATION AGENCY

NEW DELHI, May 29, 2002

Mr. T.R.C. Bose, B.E.
Director (Projects)
Transmission Corporation of Andhra
Pradesh Limited (APTRANSCO)

Mr. Kazuo Tanigawa
Leader
Preparatory Study Team
Japan International Cooperation Agency
(JICA)

Mr. Ajay Shankar
Joint Secretary
Ministry of Power
Government of India

I. INTRODUCTION

In response to the request of the Government of India (hereinafter referred to as "India"), the Government of Japan decided to conduct the Development Study on the Improvement of Distribution Power System of Andhra Pradesh in India (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Accordingly, Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with the Transmission Cooperation of Andhra Pradesh Limited (hereinafter referred to as "APTRANSCO").

The present document sets forth the scope of work with regard to the Study.

II. OBJECTIVE OF THE STUDY

The objective of the Study is to formulate a master plan for distribution loss reduction, and technically and economically feasible and ready-to-go loss reduction programs based on the master plan. Technical methods and skills that are suitable for selected districts will be developed throughout the Study.

III. THE STUDY AREA

Some districts will be specified as model areas, where the detailed survey on existing substations below 132/33 kV, Distribution facilities and customers' information will be conducted.

IV. SCOPE OF THE STUDY

The Study covers the components in the following three stages. At each stage, technology transfer of specified technical skills and/or methods on the fields such as loss analysis and assessment, examination of investment for transmission/distribution facilities, planning of operation and maintenance of transmission/distribution facilities, and others will be conducted, when the necessity arises.

1. Preliminary Investigation Stage

(0) General Review

a. Review of the national and regional development plan and long-term policy on power development

b. Review of the present system and organization related to power supply, transmission and distribution in Andhra Pradesh

c. Collection of basic data and information, such as power supply and demand record, etc.

(1) Loss Analysis and Assessment

a. Selection of model areas

b. Review, analysis and assessment of the present distribution/substation system, the present method of operation and maintenance, and the method of loss calculation and data collection.

c. Detailed survey on the present condition of distribution/substation facilities & customers

d. Data collection for loss calculation

(2) Functional Enhancement of SCADA

a. Review, analysis and assessment of the effect of the substation SCADA project

b. Review, analysis and assessment of the present method of operation and maintenance

(3) Tariff and billing system analysis and assessment

a. Review of the present tariff system and billing system, from metering to collection of money and customer record management

2. Detailed Investigation Stage

(1) Loss Analysis and Assessment

e. Selection of the feeders and associated equipment thereof including terminals

f. Identification, analysis and assessment of the sources of technical/non-technical loss

g. Identification of the measures of technical/non-technical loss reduction from the viewpoints of facility investigation, refurbishment and customer management

h. Consideration of the cost, benefit, and the possibility of funds of each measure of technical/non-technical loss reduction

(2) Functional Enhancement of SCADA

c. Identification of improved SCADA system from the technical/non-technical viewpoints

d. Identification of necessary measures to improve the functions of the present SCADA from the technical/non-technical viewpoints

e. Consideration of the cost, benefit, and the possibility of funds of each necessary measure from the technical/non-technical viewpoints

(3) Tariff and billing system analysis and assessment

b. Review of the present tariff system and billing system, from metering to collection of

money and customer record management

c. Identification of the measures of non-technical loss reduction in the present billing system

d. Consideration of the cost, benefit, and the possibility of funds of each measure of technical/non-technical loss reduction

3. Recommendation Stage

(1) Loss Analysis and Assessment

i. Identification of the optimal distribution/substation system

j. Identification of the loss reduction programs

k. Identification of the standard for investment in distribution/substation facilities

(2) Functional Enhancement of SCADA

f. Identification of the optimal improvement program of the present SCADA and/or alternative measures

(3) Tariff and billing system analysis and assessment

e. Identification of the optimal billing system

V. WORK SCHEDULE

The Study will be conducted in accordance with the tentative work schedule shown in the Appendix 1.

VI. REPORTS

JICA shall prepare and submit the following reports in English to the Government of India;

1) Inception report	Twenty	(20) copies	
2) Progress report	Thirty	(30) copies	
3) Interim report	Thirty	(30) copies	
4) Draft final report	Thirty	(30) copies	(main report and summary)

APTRANSCO shall provide its comments on the draft final report within one (1) month after the submission of that report.

5) Presentation

The presentation of the draft final report shall be made to APTRANSCO and the Ministry of Power.

6) Final report	Forty	(40) copies	(main report and summary)

The Team will submit these reports within six (6) weeks after receiving the comments of the Government of India on the draft final report.

VII. OUTLINE OF TECHNICAL UNDERTAKING

The outline of technical undertaking of the Study by APTRANSCO and JICA is as described in the appendix II.

VIII. UNDERTAKING OF THE GOVERNMENT OF INDIA

1. To facilitate smooth conduct of the Study, the Government of India shall accord privileges, exemptions and other benefits to the team in accordance with the Embassy of Japan Note Verbale No.5-42-02, dated May 3 2002 exchanged vide Department of Economic Affairs Note Verbale No. 7-1-98 JAP II, dt. May 8 2002 in respect of this development study and take necessary measures;
   (1) to secure the safety of the Team,
   (2) to permit the members of the Team to enter, leave and sojourn in India for the duration of their assignment therein, and exempt them from foreign registration requirements and consular fees,
   (3) to exempt the members of the Team from taxes, duties, fees and other charges on equipment, machinery and other materials brought into, and out of, India for the conduct of the Study,
   (4) to exempt the members of the Team from income taxes and charges of any kind imposed on, or in connection with, any emoluments or allowances paid to them for their services for the implementation of the Study,
   (5) to provide necessary facilities to the Team for remittance as well as utilization of the funds introduced into India from Japan in connection with the implementation of the Study,
   (6) to secure permission for entry into all areas concerned for the implementation of the Study,
   (7) to secure permission for the Team to take all data and documents including maps and photographs related to the Study out of India to Japan,
   (8) to provide medical service as needed. Its expenses will be chargeable on members of the Team.
2. The Government of India shall bear claims, if any arises, against members of the Team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Team.
3. APTRANSCO shall act as counterpart agency to the Team and also as coordinating body in relation with DISCOMs and other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

4. APTRANSCO shall, at its own expense, provide the Team with the following, in cooperation with other organizations concerned;

(1) available data and information related to the Study,

(2) counterpart personnel,

(3) suitable office space with necessary equipment in APTRANSCO or its nominating agency,

(4) credentials or identification cards if necessary,

(5) necessary vehicles with drivers, fuel and maintenance services for carrying out the field survey,

(6) communication facilities during the execution of the Study, such as internal telephone, facsimile etc., if necessary.

IX. UNDERTAKING OF JICA

For the implementation of the study, JICA shall take the following measures;

1. to dispatch, at its own expense, study teams to India, and

2. to pursue technology transfer to the India counterpart personnel in the course of the Study.

X. OTHERS

JICA and APTRANSCO shall consult with each other in respect of any matter that may arise from or in connection with the Study.

Tentative Work Schedule

Appendix I

Project Months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Calendar Month	2002						2003								
	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11
I. Preliminary Investigation																
0. General Review																
0.-a Review of the national and regional development plan and long-term policy on power development																
0.-b Review of the present system and organization related to power supply,																
0.-c Collection of basic data and information, such as power supply and demand record, etc.																
1. Loss Analysis and Assessment																
1.-a Selection of model areas																
1.-b Review, analysis and assessment of the present distribution /substation system, and the method of loss calculation and data collection																
1.-c Detailed survey on the present condition of distribution/substation facilities and customers																
1.-d Data collection for loss calculation																
2. Functional Enhancement of SCADA																
2.-a Review, analysis and assessment of the effect of the substation SCADA project																
2.-b Review, analysis and assessment of the present method of operation and maintenance																
3. Tariff and Billing System Analysis and Assessment																
3.-a Review of the present tariff and billing system, from metering to collection of money and customer record management																
II. Detailed Investigation Stage																
1. Loss Analysis and Assessment																
1.-e Identification of the present situation of loss at each point of the line between each substation and its users																
1.-f Identification of the measures of technical/non-technical loss reduction in terms of facility investigation, refurbishment and customer management																
2. Functional Enhancement of SCADA																
2.-c Identification of improved SCADA system from the technical/non-technical viewpoints																
2.-d Identification of necessary measures to improve the functions of the present SCADA from the technical/non-technical viewpoints																
2.-e Consideration of the cost, benefit, and the possibility of funds of each necessary measure from the technical/non-technical viewpoints																
3. Tariff and Billing System Analysis and Assessment																
3.-b Identificaiton, analysis and assessment of the sources of non-technical loss originated in the present billing system																
3.-c Identification of the measures of non-technical loss reduction in the present billing system																
III. Recommendation																
1. Loss Analysis and Assessment																
1.-i Identification of the optimal distribution/substation system																
1.-j Identification of the loss reduction program																
1.-k Identification of the standard for investment in distribution /substation facilities																
2. Functional Enhancement of SCADA																
2.-f Identification of the optimal improvement program of the present SCADA and/or alternative measures																
3. Tariff and Billing System Analysis and Assessment																
3.-d Identification of the optimal billing system																
Submission of Reports		▲				▲					▲			▲		▲
		Ic/R				Pr/R					It/R			Df/R		F/R
Seminar/Workshop			■(1)				■(2)				■(3)			■(4)		
				Work in India									Work in Japan			
		Ic/R: Inception Report				It/R: Interim Report										
		Df/R: Draft Final Report				F/R: Final Report										

Stage	Work Item	APTRANSCO/DISCOMS	JICA
Preliminary Investigation	0. General Review		
	0.-a Review of the national and regional development plan and long-term policy on power development	Provision of data and information	Review
	0.-b Review of the present system and organization related to power supply, transmission and distribution in Andhra Pradesh	Joint Work	Joint Work
	0.-c Collection of basic data and information, such as power supply and demand record, etc.	Support of Supervision	Supervision
	1. Loss Analysis and Assessment		
	1.-a Selection of model areas	Joint work	Joint work
	1.-b Review, analysis and assessment of the present distribution/substation system, and the method of loss calculation and data collection	Joint work	Review, analysis and assessment + Technical transfer
	1.-c Detailed survey on the present condition of distribution/substation facilities & customers	Joint supervision of the research work by the subcontractor	Joint supervision of the research work by the subcontractor
	1.-d Data collection for loss calculation	Data collection of power flow at each votages	Joint supervision of the research work by the subcontractor
	2. Functional Enhancement of SCADA		
	2.-a Review, analysis and assessment of the effect of the substation SCADA project	Joint work	Joint work
	2.-b Review, analysis and assessment of the present method of operation and maintenance	Joint work	Joint work
Preliminary Investigation	**3. Tariff and Billing System Analysis and Assessment**		
	3.-a Review of the present tariff system and billing system, from metering to collection of money and customer record management	Provision of data and information	Review + Technical transfer

Stage	Work Item	APTRANSCO/DISCOMS	JICA
Detailed Investigation	**1. Loss Analysis and Assessment**		
	1.-e Identification of the present situation of loss at each point of the line between each substation and its users	Joint Work	Joint Work
	1.-f Identification, analysis and assessment of the sources of technical/non-technical loss	Joint Work	Joint Work
	1.-g Identification of the measures of technical/non-technical loss reduction in terms of facility investigation, refurbishment and customer management	Joint Work	Joint Work
	1.-h Consideration of the cost, benefit, and the possibility of funds of each measure of technical/non-technical loss reduction	Joint Work	Joint Work
	2. Functional Enhancement of SCADA		
	2.-c Identification of improved SCADA system from the technical/non-technical viewpoints	Joint Work	Joint Work
	2.-d Identification of necessary measures to improve the functions of the present SCADA from the technical/non-technical viewpoints	Joint Work	Joint Work
	2.-e Consideration of the cost, benefit, and the possibility of funds of each necessary measure from the technical/non-technical viewpoints	Joint Work	Joint Work
	3. Tariff and Billing System Analysis and Assessment		
	3.-b Identification , analyze and assessment of the sources of non-technical loss originated in the present billing system	Joint Work	Joint Work
Detailed Investigation	3.-c Identification of the measures of non-technical loss reduction in the present billing system	Joint Work	Joint Work
	3.-d Consideration of the cost, benefit, and the possibility of funds of each measure of technical/non-technical loss reduction	Joint Work	Joint Work

Stage	Work Item	APTRANSCO/DISCOMS	JICA
Recommendation	**1. Loss Analysis and Assessment**		
(Proposal of a Masterplan and ready-to-go programs for loss	1.-i Identification of the optimal distribution/substation system	Joint Work	Joint Work
	1.-j Identification of the loss reduction programs	Joint Work	Joint Work
	1.-k Identification of the standard for investment in *distribution/substation facilities*	Joint Work	Joint Work
	2. Functional Enhancement of SCADA		
	2.-f Identification of the optimal improvement program of the present SCADA and/or alternative measures	Joint Work	Joint Work
	3. Tariff and Billing System Analysis and Assessment		
	3.-d Identification of the optimal billing system	Joint Work	Joint Work

MINUTES OF MEETING
FOR
THE DEVELOPMENT STUDY
ON
THE IMPROVEMENT
OF
POWER DISTRIBUTION SYSTEM
OF
ANDHRA PRADESH IN INDIA

AGREED UPON BETWEEN

THE TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED

AND

THE JAPAN INTERNATIONAL COOPERATION AGENCY

HYDERABAD, May 28, 2002

Mr. T.R.C. Bose, B.E.
Director (Projects)
Transmission Corporation of Andhra
Pradesh Limited (APTRANSCO)

Mr. Kazuo Tanigawa
Leader
Preparatory Study Team
Japan International Cooperation Agency
(JICA)

ATTACHMENT

The preparatory study team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") visited India from May 19 to 30 2002 for the purpose of discussing the scope of work for the development study on the improvement of power distribution system of Andhra Pradesh in India (hereinafter referred to as " The Study")

The Team had serious discussions on the above mentioned Study in India with the concerned officials of the Transmission Corporation of Andhra Pradesh Limited (hereinafter referred to as "APTRANSCO"), together with the officials of the Power Distribution Companies of Andhra Pradesh Limited (hereinafter referred to as "DISCOMs") and of the Ministry of Power.

1. Study Area

APTRANSCO suggested to consider 4 districts, at least one district from each DISCOM as model areas, where the detailed survey on existing substations below 132/33 kV, Distribution facilities and customers' information will be conducted.

2. Organizational Framework

Since each DISCOM has come to be financially independent, with 100% of its stock owned by the Government of Andhra Pradesh, once the study area mentioned above is decided, the actual work of the Study will be implemented between each DISCOM concerned and the consultant team which will be selected through tender in Japan. However, APTRANSCO as the counterpart agency will be closely in cooperation with the Japanese side as well as DISCOMs concerned in conducting the full-scale study and will be ready for consultation when the necessity arises.

3. Counterpart Assignment

Each related DISCOMs as well as APTRANSCO will assign its staff to work with the consultant team throughout the Study before the commencement of the Study.

4. Equipment for Training

(1) APTRANSCO requested that the equipment to be provided at the training center for the purpose of smooth implementation of training related to the Study will be identified during the course of further discussions and will be handed over to the consultants. Necessary training for APTRANSCO/DISCOM Engineers shall also be provided.
(2) Necessary assistance will be provided by APTRANSCO/DISCOM for data collection.

5. Office Space and Necessary Equipment

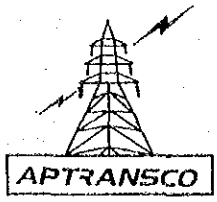
APTANSCO confirmed that office space together with necessary furniture will be provided at any offices of APTRANSCO/ related DISCOMs.

インド国アンドラプラデシュ州配電改善計画調査（予備調査）収集資料リスト

番号	資料名	作成者	入手先
1	Power Development in Andhra Pradesh(Statistics) 2000-2001	APTRANSCO	APTRANSCO
2	TARIFF ORDER 2002-2003	APERC	APTRANSCO
3	Andhra Pradesh Power Sector Reforms & Restructuring Progrmme-An Overview May 2002	APERC	APTRANSCO
4	Integrated Distribution Project Nalgonda District Summary Report	POWERGEN *Global Energy Consulting* Engineers	APTRANSCO
5	Integrated Distribution Project Nalgonda District Distribution Network Studies	POWERGEN Global Energy Consulting Engineers	APTRANSCO
6	Road Map for Reforms in Power Distribution in India *Based on a case study-APEEP*	DFID	DFID
7	CONFARENCE OF CHIEF MINISTERS/POWER MINISTERS MARCH 3,2001 AGENDA NOTES 抜粋	DFID	DFID
8	Distribution Planning and Management DEVELOPING IT IN POWER UTILITY	DFID	DFID
9	Daily Log Sheet of 132/3KV Sub-Station, Manoharabad,Medak(Dist)	APTRANSCO	APTRANSCO
10	A Fact Sheet India and ADB	ADB	ADB
11	Fighting Poverty in Asia and the Pacific: The Poverty Reduction Strategy	ADB	ADB
12	ADB at a Glance	ADB	ADB
13	REPORT AND RECOMMENDATION OF THE PRESIDENT TO THE BOARD OF DIRECTORS ON PROPOSED LOANS AND TECHNICAL ASSISTANCE GRANTS TO INDIA FOR THE GUJARAT POWER SECTOR DEVELOPMENT PROGRAM	ADB	ADB
14	REPORT AND RECOMMENDATION OF THE PRESIDENT TO THE BOARD OF DIRECTORS ON PROPOSED LOANS TO INDIA FOR THE GUJARAT POWER SECTOR DEVELOPMENT PROGRAM	ADB	ADB
15	A ROAD GUIDE TO HYDERABAD	地図	書店
16	A ROAD GUIDE TO ANDHRA PRADESH	地図	書店
17	10th ANNUAL REPORT 2000-2001	INFOTECH	INFOTECH
18	INFOTECH 会社概要	INFOTECH	INFOTECH

2．APTRANSCOから提出されたTOR

T.R.C. Bose, B.E.,
Director (Projects)



Transmission Corporation of Andhra Pradesh Limited
(A Govt. of Andhra Pradesh Undertaking)
Vidyut Soudha, Hyderabad - 500 082.
Andhra Pradesh, India.
Off. : 040-3317650, Tele Fax : 040-6665133
Res. : 040-6626363,

To
Mr. Go Shimada,
Assistant Resident Representative,
JICA India Office (Government of Japan)
2nd Floor, DLF Centre, Sansad Marg,
New Delhi – 110 001.
Fax : 91-11-3311996.

Lr.No.CE(DFID&Reforms)/F.JICA/ 965 /2002, Dt. 16-03-2002.

Dear Sir,

Sub:- APTRANSCO – Proposal for Development Study by JICA – Furnishing of Revised TOR – Reg.

Thank you for your fax dated 6th March 2002. As suggested by you, I am enclosing herein a Revised Terms of Reference (TOR) for a Development Study by JICA, Tokyo in APTRANSCO in the field of Power Distribution. The revised TOR reflects the changes suggested by you in your fax in the introductory para. We have also requested for JICA Co-operation for study and implementation support for add on functions in the Hyderabad SCADA Project, where substation SCADA is in the final stages of implementation. This would prove to be a great value addition for the project.

We look forward for JICA Co-operation and also confirm our acceptability for the visit of your team in May 2002 for finalizing the scope of work.

Encl: Revised TOR.

Yours faithfully,

(T.R.C. BOSE)
Director / Projects

Copy to M/s Yamada, Fumiko, M&E Division, JICA, Shinjuku Maynds Tower Building, 8th Floor, 1-1, Yoyogi, 2-Chome, Shibuya-ku, Tokyo 151-8558, Japan. *
Fax No. 81-3-5352-5356
* for information and necessary action.

APTRANSCO

Transmission Corporation of Andhra Pradesh Limited

(A Govt. of Andhra Pradesh Undertaking)

Vidyut Soudha, Hyderabad - 500 082.

Revised Terms of Reference (TOR) for JICA Technical Cooperation

Andhra Pradesh State consists of 23 districts. In view of ever growing demand for Power, the gap between the supply and usage is widening. APTRANSCO is making efforts to reduce the gap by purchasing power from Independent Power Producers and also by reducing the distribution losses. APTRANSCO has implemented Transmission and Distribution Improvements in 3 districts (Khammam, Mahaboobnagar and Nalgonda) through external AID (Provided by DFID, Government of U.K). These districts were selected as number of people living in these districts are tribals with per capita income below the poverty line. So DFID wished to implement poverty allevation programme in these districts. Further these districts have predominantly agricultural loads and high line losses which is also considered by DFID as an important criteria for funding. Besides these 3 districts, there are other districts also which have high agricultural loads and high line losses. To reduce the losses much more within a short period in these other districts of AP, APTRANSCO would like to request JICA to conduct Development Studies. During the study the APTRANSCO would like to request JICA to have a technical or management seminar on various issues which are not covered by other donor agencies.

In view of the above, it is necessary to

- Asses the over all energy loss.
- Identify system elements causing excessive loss.
- Establish the actual causes (i.e.) contribution of technical & non-technical losses in the total loss.
- Conduct Feasibility Studies for feeder SCADA, Remote Customer Reading and online Energy Audit in Hyderabad SCADA Project.

a) To carryout the study, it is proposed to take a typical 132 KV substation in each of the 10 predominantly agricultural districts and analyse losses at each voltage level.

NEW DELHI

b) Based on the above system study, refurbishment with least cost alternative will be proposed estimating the cost of investment and the accrued benefits. The following alternatives will be considered in the study.
   - Refurbishment of Substations, lines & Distribution Transformers.
   - Replacement of equipment which has served its normal life.

c) The benefits will also be quantified to check the viability of the investment proposal.

d) For carrying out the work at item (b), JICA will suggest the methods followed in Japanese Distribution Systems and their applicability to the Indian scenario for carrying out the studies.

e) APTRANSCO is implementing substation SCADA in the Twin Cities of Hyderabad and Secunderabad with DFID assistance. To enhance the capabilities of the present system, APTRANSCO would like to implement other functionalities in the network such as feeder SCADA, Remote Customer meter reading, online energy audit etc. Study and implementation support for these functions in the project which are not covered till now by DFID assistance may be provided as this would prove to be a great value addition.

f) At present billing of around 14 million L-T customers in APTRANSCO/DISCOMS (company) is being done in two ways (viz) (a). Through in house billing system (b) through private contract agencies.

For the billing done by the company, the meter readings are either fed to the in-house computers/ given to the Private Accounting Agencies for preparation of bills which are served to the consumers.

For the spot billing done by the company, hand held computers are taken to the customer premises where the meters are read and data entered in to the hand held computer to generate a spot bill. A billing package is required for the company.

- To monitor meter readings,
- Billings,
- Payments and arrears to be collected
- Accounting.

Provision shall be made available in the package to have features to account payments through cash, by cheques or by online payment though credit cards with facilities to reconcile daily payments and remittances to bank. Facilities to add new customers and down loading of data from spot billing computers (data loggers) to base computer shall also be provided.

Facilities for distribution transformers wise customer and energy linkage shall be made available for planning and customer service. An elaborate description of the requirements is furnished in the Annexure.

During the process of above study mentioned in Paras (a) to (f)

g) Training by the Study team of Engineers engaged in

i. Transmission and Distribution planning and design.

ii. Operation Management:

Procedure for 1) Reduction of failure of distribution transformers 2) Maintenance schedules for substations & switchgear 3) Preventive maintenance 4) Improvement in construction standards to reduce outages

iii. Quality Control:

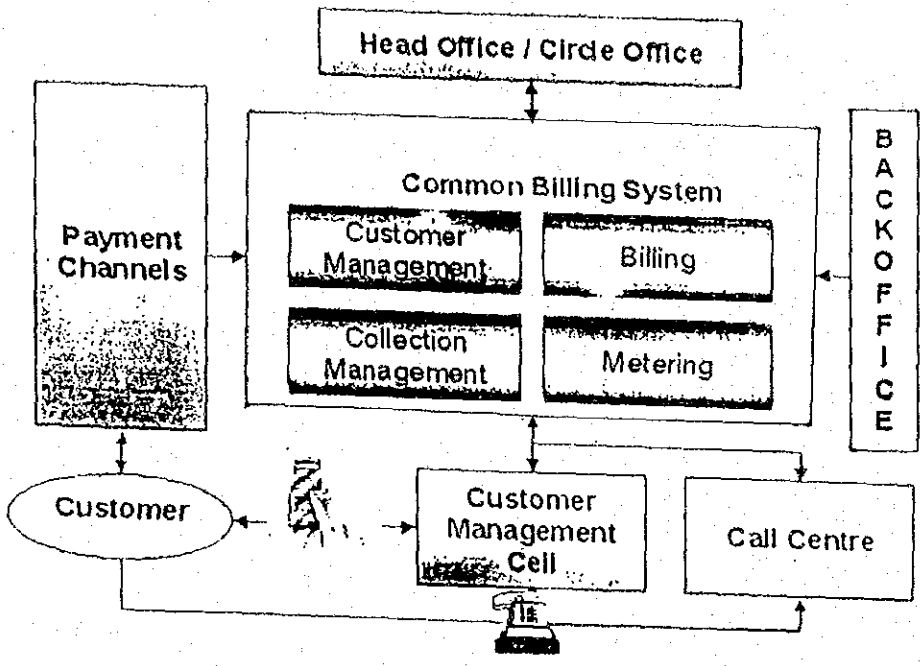
Procedure to be followed for quality assurance in the erection of lines and substations.

iv. SCADA Improvements:

(T.R.C. Bose)
DIRECTOR (PROJECTS)

Annexure-I

Common Billing System (CBS) Structure



In its envisioned state the operational structure of CBS would comprise entities that are formed around the various tasks performed in the MBC process (*Error! Reference source not found.*). The tasks would be grouped with the customers as focal point. The various functions performed by these entities would revolve around improving customer service and efficiency of operations. The billing software would act as a common backbone for these operational entities and would bind them into one cohesive unit. An integral part of this system would be to provide a 360-degree view of the customer across the client organisation. What it effectively means is that the information on the end customer would be made available throughout the organisation. The various entities forming the operational structure for the CBS would be:

- Customer Management Cell ("CMC")
- Back office processing
- Remote Customer Interaction Centre ("RCIC") or Call Centre
- Multiple Payment Channels (i.e. banks, credit card, online payment etc.)
- Billing and Accounting

Customer Management Cell

This entity would essentially be a single point contact for the customers of Discoms to handle all customer facing activities. These activities would include functions like.new connection initiation and installation, complaint handling on the field, meter reading, bill generation and distribution, bill collection and remittance to banks, customer query resolution, exceptions handling etc. Some of the features of this cell would be:

- Bill generation and collection on a rolling basis. (SPOT BILL or CONVENTIONAL BILLING for LT and HT Customer)
- Accounting
- Complaint handling and resolution on a rolling basis and Trouble Call Management.
- Facilities Management
- New Customer Management

Back Office Processing

The back office, as the name suggests, would be responsible for handling all the back office activities related to metering, billing and collection required for the Discom operation. The activities could involve maintaining records, ensuring data backup and disaster recovery procedures, contingency planning, reconciliation activities etc. This entity would be centralised for the Discoms and would handle all SOs from this set-up. The basic concept here would be to concentrate all activities that allow remote processing in one location to minimise costs and ensure availability of all related data in a consolidated form in that location.

The Discoms could also extend the services of this entity to other organisations on a chargeable basis, thereby increasing their revenues and increasing utilisation of infrastructure along with maximising return on investments.

Remote Customer Interaction Centre

This entity would provide the customers with an option of remote complaint registration and query handling. RCIC would essentially be a customer contact centre to service all customers of the Discoms. This could either be a common entity for all the 4 Discoms or could be individual to each Discom. This would provide customers multiple channel options like telephone, e-mail and web. This could also provide customers with a self-service option where they could log into their accounts and get any details required on their consumption, payment or any other account details over the internet.

The RCIC could be used to generate alternate revenue streams for the organisation by taking on external clients and servicing their end customers at a price. The management could also decide to expand the capabilities of this centre and provide

features like customer analytics with a Customer Relationship Management Solution installed for customer profiling etc.

Payment Channels

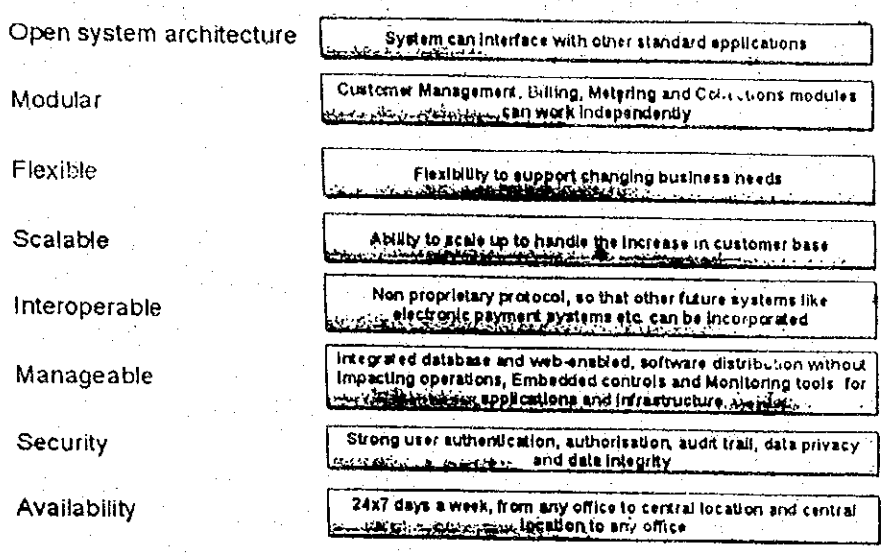
The customer would be provided with an option of settling their dues through a host of mediums. Whilst the CMC would handle all collections made by the customers directly at the Discom Offices, there would also be options of making these payments over the web, directly at the bank etc.

Annexure-II

REQUIREMENTS OF SOFTWARE (OUT-LINE)

1. Broad System Requirements

The CBS would be very critical to efficient operations of Discoms, and would be implemented on a large scale. Broad system requirements for such a system can be illustrated through the following schematic:



Broad system requirements

Apart from the broad system requirements detailed above, since CBS would be operating in a complex environment, it would need additional features. The billing logic used to generate bills by the Discoms is dynamic and is dependent upon several factors like Customer Profile, Regulatory Guidelines, Government Policies, etc. The CBS is expected to be flexible and easily adaptable to changing business demands. It should be possible to tune the system at the user level without obscure technical intervention.

Each Discom would run its own independent instance of the CBS. The data pertaining to each Discom would not be shared with the other Discoms and would be maintained by its own instance of the CBS.

The CBS would automate the processes of customer acquisition, metering, billing and collection in a comprehensive integrated manner. This integrated approach to business processes would ensure the success of CBS in increasing the business efficiency of the Discoms.

2. DETAILS OF REQUIREMENTS OF MODULES

2.1 BILL GENERATION AND COLLECTION

The electrical energy consumed by various customers is measured through energy meters fixed at various locations . The measured energy is billed as per tariff. The tariff is reviewed every year and revised if necessary.

The customers/consumers are classified as:

i) HT consumers who avail electrical power supply from any of the distribution companies on higher voltage(11Kv or above)

ii) LT consumers who avail power supply from any of distribution companies at Low Voltages (LT at 400V or 230V).

HT CONSUMERS:

The HT Consumers are billed monthly and classified into 6 categories . They are billed for the Maximum demand and energy consumed. As per present tariff. They are classified into 6 categories. The following are the main modules of the HT billing & Accounting routine.

- Computation of Demand & Energy Charges, Customer charges, Fuel cost adjustment, Electricity duty, Additional Charges for delayed payments etc
- Colony & lighting consumption (in case of Industries)
- Penalties for low power factor and low voltage
- Third party shares and allocation
- Demand quota monitoring
- Wheeling of power charges
- Differential Voltage surcharge calculation
- Banking of energy by non-conventional sources
- Payment receivable
- Ledger Processing, etc.

The following are most general outputs required from this subset of modules

- Exception listing
- Bills
- Ledger
- Bill Book Abstract
- Monthly Reports like Load pattern, Assessed consumption, Consumption by Rural Electrical Corporation consumers. Low power factor & Low voltage consumers, etc..

The LT consumers are billed monthly or bimonthly (the period of billing may vary). The energy consumed is measured and charges are billed in the case of LT consumers.

For these consumers , billing can be by :

i) spot billing , where the meter reading is taken in the consumer premises, bill prepared on the spot through a hand held computer and served to consumer.

ii) In the spot billing the master data like previous reading etc., of all customers covered by the hand held computer are loaded on the hand held computer from base computer before proceeding for spot billing of that area. After issue of bills in that area the data of billed services is brought back and down loaded on base computer.

iii) Conventional billing , where
   i) meter reading is taken from meter to the meter reading book.
   ii) Data entry of the meter reading is made into the base computer.
   iii) Bills are produced on base computer by comparing with previous reading available on master files of the base computer utilizing bill process routine of billing software.

In conventional billing and as well in spot billing the ledger is to be closed and the software for bill and accounting of LT consumers is to take care of all these functions.

The following are the main modules of routine for billing and accounting of LT consumers.

- Computation of Energy charges, customer charges, Fixed charges, Fuel cost adjustment ,electricity duty etc
- Computation of additional charges and interest on electricity duty for belated payments.
- Computation of ACD (Additional consumption deposit) and interest on security deposit
- Ledger Processing
- Payments receivables
- Defaulters' list processing
- . Journal entries, etc.,

The following are most general outputs required from this subset of modules

- Exception listing
- Bills
- Bill Book Abstract
- Demand Collection Balance report
- Ledger
- Revenue reports
- .Bill exceptions

- Financial progress report
- Defaulter's lists
- Journal entry report, etc.

The following are the exception reports generated:

- List of stuck-up meter cases
- List of UDC (under disconnection) cases
- List of meter changed cases
- List of door-lock cases
- List of meter not existing cases
- List of RNF (reading not furnished) cases
- List of nil consumption cases
- List of burnt meter cases
- List of sluggish meter cases
- List of abnormally low consumption cases
- List of abnormally high consumption cases
- List of consumers having negative balances, etc.

2.2 ACCOUNTING

- Ledger Maintenance
- Defaulters List
- Exceptional Listing
- Deposits Accounting etc.,

2.3 COMPLAINT HANDLING AND RESOLUTION

This routine is to attend to the complaints of the customer. The customers register their complaints on a phone call or personally to Customer Relation Management system (CRM). The call is registered in the database of the computer of CRM, the rectification is pursued and complaint is attended to. The details of the complaint and the rectification, time at which the complaint was attended to etc., are recorded in the database. Day end -, Week-end and Month-end reports are generated about the activity. The activity is closely monitored through on-line screens and other aids.

The following are the features desired:

- Registration at any utility office
- Registration possible through internet, IVR, Voice-Mail etc.,
- Automatic dispatch to corresponding office based on consumer location
- Consumer complaint status can be obtained at any time
- Complaint allocation based on the personal availability and territorial job assignments
- Should enable integration of complaints communication to field staff through SMS using different telecom network/carriers

- Integration with different software interfaces for GIS/GPS vehicle tracking should be possible.
- Analysis of complaints for future network maintenance planning
- Auto alert messages for complaint attendance and zip message across the command chain if not adhered to the set time schedules.

- Analysis of complaints by locating the customer using GPS,GIS mapping of the area covered. The geographic referencing is limited to:

  i) digitizing single line diagrams on geographic maps(1:1000 scale)

  ii) georeferencing the 33/11 KV substation, 11 KV feeders(one point for KM length) and distribution transformers.

  iii) Survey will be got done for mapping and data will be collected for identity numbers of all consumers under each distribution transformers.

The following are the functions desired:

- Allocation of complaints to field staff with various options for easy resolving
- Informing the consumer of complaint status through different modes
- Registration of calls for all types of complaints with automatic identification of locational and contact details.
- Automatic dispatching to respective offices irrespective of where the call is registered.
- Attending to complaints
- Updating complaint status
- Analysis of call received based on topology of network, type of call, the number of calls received and location of consumer on the network
- Allocation of call to field staff based on disposition of staff. Identification of consumer location if linked to Route maps or GIS.
- Preparing balance sheet of complaints and the end of the month
- Prepare comprehensive daily, monthly, yearly analysis of Trouble calls received for identifying weak points in the system
- Informing the consumers of prearranged shutdowns
- Upgradable to future needs like SMS messaging, GIS/ GPS, IVR etc.

2.4 NEW CUSTOMER ACQUISITION PROCESS

New customer management system is to register into accounts the details of a customers who is given with a new service connection .

The Features are;

- Registration through Internet should be possible for all categories
- Consumer identification should be possible based on the address details or service connection for checking the past credibility.
- Load and consumption calculator for estimating contract load
- Wizard for preparing auto estimate
- Materials linked to cost data book
- Auto indenting of materials based on the work orders

- Material release based on pending connections to be released and material availability at stores
- Automatic calculation of additional charges
- Auto indenting based on the work orders
- Analysis of registration for load forecasting and load balancing
- Graphical reports category wise, area wise, period wise

The Functions are :

- Registration of application through CRM centers and Internet with provision of Load Calculator for estimating contract load and approximate consumption
- Collection of registration fee at any collection centers
- Prepare estimate if new facilities needed and approval
- Prepare work order and approval
- Release of materials
- Releasing of service taking test report
- Applicant should be able to login through internet and view the status of application
- Graphical analysis of registration reports
- Load forecasting based on registrations
- Comparative analysis of registrations period wise, area wise category wise.
- Total demand for load feeder wise, transformer wise, category wise, region wise and period wise.

2.5 FACILITIES MANAGEMENT

- Survey using GPS aids
- Mapping using GIS
- Collection of Data
- Building-up Database and Network
- Building-up Facilities Management System

3. BACK OFFICE PROCESSING

The back office, as the name suggests, would be responsible for handling all the back office activities related to metering, billing and collection required for the Discom operation. The activities could involve maintaining records, ensuring data backup and disaster recovery procedures, contingency planning, reconciliation activities etc. This entity would be centralised for the Di coms and would handle all SOs from this set-up. The basic concept here would be to concentrate all activities that allow remote processing in one location to minimise costs and ensure availability of all related data in a consolidated form in that location.

The Discoms could also extend the services of this entity to other organisations on a chargeable basis, thereby increasing their revenues and increasing utilisation of infrastructure along with maximising return on investments.

4. REMOTE CUSTOMER INTERACTION CENTRE

This entity would provide the customers with an option of remote complaint registration and query handling. RCIC would essentially be a customer contact centre to service all customers of the Discoms. This could either be a common entity for all the 4 Discoms or could be individual to each Discom. This would provide customers multiple channel options like telephone, e-mail and web. This could also provide customers with a self-service option where they could log into their accounts and get any details required on their consumption, payment or any other account details over the internet.

The RCIC could be used to generate alternate revenue streams for the organisation by taking on external clients and servicing their end customers at a price. The management could also decide to expand the capabilities of this centre and provide features like customer analytics with a Customer Relationship Management Solution installed for customer profiling etc.

5. PAYMENT CHANNELS

The customer would be provided with an option of settling their dues through a host of mediums. Whilst the CMC would handle all collections made by the customers directly at the Discom Offices, there would also be options of making these payments over the web, directly at the bank etc.

5.1 On-Line Revenue Collection:

This module is for collecting revenues from customer against electricity bills issued from time to time. The collection terminals(PC's) usually are connected on network to remote server.

The main functions expected from the module are:

i) Display of particulars of customer on entry of identity number. The particulars are like Consumer name, connected load, phase, previous bill particulars, amount due from customer.
ii) Provision to enter amount paid.
iii) Provision to enter cheque details, if paid by cheque
iv) Provision to accept 'other miscellaneous' charges like reconnection charges etc
v) Provision to print receipt with valid receipt number for the amount paid
vi) Provision to update the paid amount, receipt number, cheque number/ DD number, Cheque/ DD date etc.,

The following are general reports expected from this module:

- Section wise revenue collection report
- Day wise revenue collection report
- RC(Revenue collector) wise revenue collection report
- Miscellaneous amount collection report, etc.