

# **Rajasthan Distribution Sector**

## **Feeder Renovation Program**

**June 2009**

**Jaipur Vidyut Vitran Nigam Limited**

**Jaipur**

## **A1: INTRODUCTION**

- 1.1 The distribution system was suffering from very high distribution losses to the tune of 42% as well as poor quality of infrastructure, which required to be improved by making proper capital investment on a techno-economic consideration to finally affect a turn around of the Discoms.
- 1.2 In the updated Financial Restructuring Plan, the Discoms have committed to reduce the overall distribution loss level to 20% by the end of Financial Year 2012. The success of turnaround strategy for the sector hinge on the progress made by the Discoms in the implementation of Loss Reduction Programme.
- 1.3 Feeder Renovation Programme has been conceived as one of the key activities besides other programmes to achieve this end result
- 1.4 A pilot project was implemented in Badhal (Population : 8240, No. of consumers: 707) in Jaipur District Circle. The distribution loss in the above feeder came down from 67% before the implementation of program to 13% after the completion of the project. No transformer has got burnt after the implementation of the project and the voltage fluctuations in the feeder have become minimal due to elimination of unauthorised tapping of power. The payback period for the investment of Rs. 68.57 lacs made on the project was less than a year.
- 1.5 After the success of this project had prompted the distribution companies to undertake similar exercise in other feeders in their Discoms. Looking to the benefits from renovation of 50 feeders in the initial phase, it was decided to implement the programme to cover all 8475 rural 11 kV distribution feeders in a phased manner

### **Badhal Pilot Project**

- 1.6 A pilot project was implemented in Badhal during July 04-Sep 04 (82 Kms.) from Jaipur city in Jaipur District Circle of Jaipur Discom. As per Census 2001, the population of Badhal village is 8,240 and it has 1,110 households. Before implementation of the Feeder Renovation Program, there were 707 consumers as on March 31, 2004. The consumer profile of the village feeder was Domestic (384 Nos.), Non-domestic (95 Nos.), Agriculture (203 Nos.), Small Industries (12 Nos.) and Mixed load (3 Nos).
- 1.7 As part of the renovation of the feeder all the three phase connections (mainly industrial and agriculture load) were segregated from the single phase Domestic and Non-domestic connections. All 100 KVA & 63 KVA Distribution Transformers were replaced by smaller 25 KVA transformers with individual radial feeders on Ariel Bunched Conductors (ABC) each supplying to 2-3 agricultural consumers. All LT naked wires were removed & converted into Three Phase & Single Phase Ariel Bunched Cables. Approximately 16.7 kilo meters of three phase and 14 kilo meters of single phase LT AB cables were laid as part of the project. All stopped and defective consumer meters were replaced by the electronic meters and the LT terminal of the transformers were concealed to

prevent unauthorised tapping of power. The works undertaken are summarised in the Table below:

S.N.	Particulars	Unit	Total Quantity	Cost in Lac Rs	
1	Providing of 25 KVA Dist. Transformers	Nos.	83	34.03	
2	Additional 11KV line drawn for 25 KVA DTs	Kms.	19	15.20	
3	3 phase ABC Cable	Kms.	16.7	7.52	
4	1 Phase ABC Cable	Kms.	14	3.50	
5	LT Capacitors on Dist. Transformer	Nos.	126	1.26	
6	Providing of 11 kV 1 phase 2 wise XLPE	Km	0.9	3.06	
7	Providing of 1 Phase transformers	25 kVA	Nos.	8	1.60
		10 kVA	Nos.	15	2.40
A	Total cost of new works in Lac Rs.			68.57	
B	Cost of Redundant material in Lac Rs			18.52	
C	Net Expenditure on New Works(A-B)			50.05	
D	Energy saving per year in LU			40.20	
E	Saving in cost per Yr @ Rs 2.27 per unit of availability in Lac Rs			91.25	
F	Pay back period in years			0.75	

1.8 The distribution loss in the above feeder came down from 67% before the implementation of program to 13% after the completion of the project. No transformer has got burnt after the implementation of the project and the voltage fluctuations in the feeder have become minimal due to elimination of unauthorised tapping of power. The number of consumers increased from 707 consumers to 817 after FRP implementation.

1.9 The success of this project has prompted the distribution companies to undertake similar exercise in other feeders in their Discoms. The main thrust of the “Feeder Renovation Program” is to reduce the losses (both technical and non-technical) through technological intervention. The main activities and the initiatives undertaken under the “Feeder Renovation Program” are covered briefly in the following sections.

## **A2: FEEDER RENOVATION PROGRAM**

### **2.1 Objectives:**

The main objective of the Feeder Renovation Program is as outlined below:

- (a) Reduce distribution losses on 11 kV feeders to a level below 15%.
- (b) Reduce burning rate of distribution transformers.
- (c) Improve quality of power supply and make it interruption free and increase consumer satisfaction levels.
- (d) Consequent to loss reduction, providing 24 hours supply to rural domestic & non domestic consumers and thus eliminating urban-rural supply disparity.
- (e) To make investment supported technical interventions for prevention of theft.
- (f) Segregation of domestic and agriculture supply.
- (g) Interruption free supply to the agriculture consumers.
- (h) Preventing un-authorized use of capacitors during the peak load hours by Agriculture consumers thereby reducing power requirement during peak load hours and saving money on purchase of costly power.
- (i) Reduce accident risks associated with snapping of conductor in rural areas.

## **2.2 Technical interventions under the Feeder Renovation Program**

- (a) Segregation of agriculture load from other loads.
- (b) Installation of single phase transformers to feed domestic and non domestic load in rural areas.
- (c) Providing of small 25/40 kVA distribution transformers with a distribution box attached to its body, having provision for installation of meters, MCCB and capacitor.
- (d) Laying of direct insulated service line to each agriculture consumer from distribution transformers.
- (e) Replacement of LT over head lines by ABC cables.
- (f) Replacement of existing obsolete service line of consumers by armoured PVC cables.
- (g) Installation of push-fit meters by replacing the existing sluggish meters.

## **Advantages from Technical Interventions**

2.3 The advantages from the various technical intervention initiatives include:

- (a) Transformers will rarely burn.

- (b) System will enable segregation of domestic and agriculture supply.
- (c) It will be possible to prevent use of capacitors during peak load hours.
- (d) Rural domestic consumers will receive round the clock supply as distribution losses would come down to less than 15% on completion of programme.
- (e) Theft by hooking of bare conductor by domestic and other consumers will be eliminated.
- (f) Faults and accidents due to possible breaking of conductor shall be minimized.
- (g) System will become interruption free.
- (h) Consumers will be induced to take regular connections.
- (i) It will not be possible to by-pass the service line by the domestic and other consumers which will help in prevention of theft.

### **Management of the FRP**

2.4 Officers responsible for FRP are as follows:

- (a) JEN designated as Feeder Manager
- (b) Executive Engineer designated as Dy. Project Manager for the Project for their Jurisdiction
- (c) Superintending Engineer of the area has been designated as Project Manager

### **Investment Plan**

- 2.5 In updated Financial Restructuring Plan document an investment of Rs 4,000 crores (FY 05-FY 10) has been considered under Feeder Renovation Program. However, looking to the huge benefits in terms of reduction in losses, the distribution companies would endeavour to accelerate the investment program under Feeder Renovation Program so as to complete the same by FY 2009-10.
- 2.6 The Discoms are funding above investments through borrowings from Financial Institutions like REC.

### **A3: IMPLEMENTATION STRATEGY**

- 3.1 These investments are apart from the normal investments for strengthening of the sub-transmission system and the rural electrification to provide access to all by FY 12. Considering such huge investments in the sector, a well thought out implementation strategy is needed for effective and successful implementation of the plan.

3.2 The implementation strategy for “Feeder Renovation Program” essentially consists of the following:

- (a) Preparation of detailed project report feeder-wise: A preliminary survey has to be conducted to assess the investment requirements i.e. number of transformers, length of ABC conductors, Meters etc. The base line data for the feeders i.e. consumers, consumption pattern, loading of transformers, number of defective meters, distribution loss, and average revenue collected/unit of energy input etc. has to be collected and compiled.
- (b) Execution of work would be done either on turnkey basis or through a labour contractor on central labour rate contract (CLRC). In case of CLRC contracts the material is arranged departmentally.
- (c) Monitoring of end results after completion of program and also regular monitoring to assess the sustainability: The performance parameters identified in the baseline data has to be compared with the end results. The conditions laid out in Paragraph 3.4 have to be completed to declare a feeder as renovated.

### Pre-requisite for declaring Feeder Renovation Program

3.3 The completion of the renovation in any feeder is assessed and the before-after analysis is done to ascertain the benefits accruing from the investment. For this purpose baseline data are collected before starting the renovation program and the results are compared with the base line data after the completion of the program.

3.4 A Feeder is considered renovated only if following conditions are satisfied:

- (a) Distribution losses should be around 10-15% and not more than 15% in any case.
- (b) Domestic/non-domestic rural supply is made available to all renovated feeders at par with Urban Towns.

3.5 The performance of the feeders renovated has been monitored regularly and suitable corrective actions have been taken time to time for quality & performance improvement of the work.

## A4: CURRENT STATUS

4.1 The progress as on June, 2009 is as under:

Nigam	Total coverage of FRP		Work Completed up to June 2009				Balance feeders for renovation
	No of feeders	No. of villages	No of Feeders renovated	No of Villages getting supply at par with nearby urban area	Completion in %		
					No of Feeders renovated	Villages getting supply at par with nearby urban area	
1	2	3	4	5	6	7	8
Jaipur	2468	13117	2259	13117	91.5%	100.00%	209
Ajmer	2975	12529	2216	12529	74.5%	100.0%	759
Jodhpur	3407	10848	2966	10848	87.1%	100.0%	441
<b>Total</b>	<b>8850</b>	<b>36494</b>	<b>7441</b>	<b>36494</b>	<b>84.1%</b>	<b>99.99%</b>	<b>1409</b>

4.2 Physical achievement up to June, 2009.

Nigam	Physical Progress				Expenditure in Cr Rs
	Installation of 3 ph small size DTs with mtr, capacitor & MCCB	Installation of single ph transformers	Laying of AB cable in kms	Installation of Push fit type meters	
1	2	3	4	5	6
Jaipur	123242	59536	23522	542985	1392
Ajmer	71790	55261	35068	615533	1017
Jodhpur	50877	287780	23727	489296	505
<b>Total</b>	<b>245909</b>	<b>402577</b>	<b>82317</b>	<b>1647814</b>	<b>2914</b>

4.3 Work of remaining Feeders will be completed up to Aug, 2009.

4.4 Rajasthan's power sector has achieved reduction in distribution losses of 13.46 % in three years (2006-07 & 2008-09). This declining trend in distribution losses is continuing in 2009-10 and by May, 2009 losses have further reduced by 2.13 % as compared to previous year. The reduction in losses is primarily due to Feeder Renovation Programme apart from effective vigilance efforts..

Discom	% Loss level at the end of 2005-06	Loss Reduction in % during				% Loss level at the enf of 2008-09
		2006-07	2007-08	2008-09	Total in last 3 yrs	
1	2	3	4	5	6	7
Jaipur	37.34	3.60	5.06	4.27	12.93	24.41
Ajmer	42.09	4.40	3.53	4.86	12.79	29.30
Jodhpur	41.72	9.25	5.05	0.24	14.54	27.18
<b>Sector as a whole</b>	<b>40.22</b>	<b>5.57</b>	<b>4.56</b>	<b>3.33</b>	<b>13.46</b>	<b>26.76</b>