



GUJARAT ENERGY TRANSMISSION CORPORATION LTD

System Improvement Scheme(R&M) : FY 2012-13

In GETCO network, large number of substations and lines are quite old, some of its equipments viz. CT's, PT's, Breakers, Transformers, LA's are very old and have completed their service life. Also Original Equipment Manufacturers (OEM) have discontinued the supply of spares due to obsolete design and outdated technology. Hence such equipments are required to be replaced. Similarly corrosion takes place on conductor, Insulator, Hardware, earth wire etc. on transmission lines passing through coastal area, creek area & chemical zone. It is required to replace line materials & strengthen the lines. Similarly, it is required to strengthen the footing of line structure at various place where footings got deteriorated.

Such enhancement in the life of substation equipments & transmission line materials is necessary to feed continuous and uninterrupted power supply to DISCOM's & our valuable consumers.

A scheme has been prepared covering above mentioned criteria for improvement in system – R & M Scheme, which covers following major activities.

(I) SUB-STATION EQUIPMENTS:

1. Replacement of equipments of all voltage class.

In many substations equipments namely breakers, CT's, PT's, battery sets, battery chargers, isolators are very old i.e. completed their normal service life. Obsolete design, non-availability of critical spares, Low short circuit current capacity etc. are leading factors to consider for replacement of various balance equipments. Quantum of work is considered under buy back scheme as per procedure adopted earlier under system improvement, modernization & replacement of over aged equipments in sub station.

2. (a) Augmentation of sub station capacity

The industrial / commercial load demand is increasing day by day. Therefore it is essential to increase the capacity of existing sub-station by adding the new transformers or augmenting the existing transformers capacity by higher capacity transformers. This requires 220 / 132 / 66 kV class transformers with associated equipments. This will help to cope-up the demand of new as well as existing consumers with better reliability .

(b) Providing second transformer at sub station having single transformer.

The second power transformer is provided at critical sub-station to avoid zero power and increase availability & reliability of sub station with quality power.

3. Improvement of Earthing system

With increase loading in sub stations vis-à-vis evacuation of more power from Generating stations, the short circuit level at some sub stations have increased rapidly as compared with time of commissioning of substations. Simultaneously the aging of earthing system components such as pipe electrode / GI Strips / CI plates etc. over a span of 25-30 years have resulted in erosion and deterioration of earthing components. This situation warns for strengthening of earthing system for protection of costly & precious equipments from likely damages and to avoid serious situation like floating neutral.

4. Relay and Protection.

Looking to the present scenario & development of latest technology for protection of equipments and lines it is pertinent to replace electromechanical type of relays having old & obsolete technology by modern technology numerical relays having distinct feature & reliable operation over a period of time for betterment of system. Also now a days fault study & analysis has greater significance. For fault analysis fault data is necessary, which can be possible only with numerical relays, which has inbuilt disturbance recorder that provides pre fault & post fault data.

5. Procurement of testing equipments.

Purchase of modern testing equipment for various sub stations are required to check & know the healthiness of each equipments and their electrical and mechanical parameters for better operation and maintenance of the sub-stations and transmission lines, which includes computers for remote monitoring, safety tools, modern tools and tackles, testing equipments etc. At present testing equipments available with SMS / testing wing are very old and requires new technology testing equipments.

6. PLCC equipments for providing carrier protection scheme on 132 kV lines:

The important D/C & S/C 132 kV lines connected between sub-stations / power stations having dual source of power supply are at present considered for providing carrier aided protection scheme for isolation of the Transmission lines during fault within zone-1 time from both ends for protection of lines & sub-stations equipments and to have better system stability. Also, to have better carrier protection single strength & carrier S/N ratio, PH to PH coupling arrangement is necessary & required to be on 132 kV lines.

(II) TRANSMISSION LINES:

1. Replacement of Conductor, Insulators, Earth wire & line materials with strengthening of structure involve following activities:

220/132/66 KV lines strengthening taken up with mainly following activities.

- **Mechanical Strengthening:**

The transmission lines which were in service for more than 25 years and situated on coastal areas, creek area, chemical zone etc. are affected due to saline atmosphere and aging. The towers / H-frames of such line are badly affected due to corrosion and chemical reaction. Hence it is required to strengthen the same by providing new members in towers / H-frames, strengthening of stubs & foundation, Earthing, stays, Painting etc.

- **Replacement of Conductor, Insulators & line materials:**

Corrosion takes place due to oxidation on conductor, Insulator, Hardware, earth wire etc. on transmission lines passing through coastal area, creek area & chemical zone. Due to corrosion and aging occurrence of insulator failure, tripping & snapping of conductor takes place which interrupt the power supply. To enhance the life of transmission lines it is required to be strengthen by replacement of insulator, conductor, earth wire, H/W etc.

- **Enhancement of line capacity:**

The Transmission lines are nerves of power flow from Generation station to the end consumers. The Transmission line loading is function of standard capacity of particular size of conductor. Augmentation of line capacity shall therefore be required to meet increased demand of power. In case of exigency, to cater to the demand of power, Augmentation of line capacity shall be required for a safe Transmission system.

2. Link lines

In existing network where more than two sub stations are connected on single source, the line is overloaded. Also when a sub station is connected through one source of supply, it is prone to zero power condition. In both such conditions second source is necessary to reduce the over load and to avoid zero power condition respectively. It is proposed to erect link lines for existing overloaded lines and for sub station having single source.

(III) GENERAL:

• Maintenance of office building, switchyard & colony:

Maintenance of offices, staff quarters, switchyard foundations etc. Purchase of new office furniture, computers and peripherals for modernization and up-gradation of offices, which results in facilitates to office works through fast communication via WAN and Internet. Modernization of office buildings, improves the efficiency of employees.

Tower footing Protection:

Protection to the tower footing with revetment in Creek / Hill / River area.

Since last 5 to 7 years Gujarat has witnessed heavy rain, flood etc resulting into water logging and erosion to the tower / structure foundation. At some times due to heavy flood and cyclone, the tower / structures falls down resulting into damage to the line & interrupting the power. It is necessary to do revetment of tower & structure foundation specially in creek, river, and hill area.

By way of such activities, following advantages will be achieved:

- ❖ Improvement in power quality & availability.
- ❖ Reduction in equipment failure.
- ❖ Reduction in transmission losses.
- ❖ Voltage improvement.
- ❖ Adoption of new technology.
- ❖ Better diagnosis with new technology testing equipments.
- ❖ Reduction in accidents
- ❖ Better amenities to employees.

For above work budget allocated for year 2012-13 as under.

Sr. No.	Item	Approved
1	Replacement of Equipment & Low STC CT's under buy back	882.30
2.	Providing of Bus Coupler Panel	145.50
2	Augmentation of S/s capacity	
	(A). Sub stations having single Transformer	
	(B). Augmentation of 66 KV sub stations	4811.1
3	Improvement of earthing in S/s	502.31
4	Relay & protection & testing Equipments	896.00
	Testing equipments (O&M)	279.50
5	PLCC equipments	192.40
6	R&M of Transmission Lines	
	(A). Link Lines	7500.00
	(B). Strengthening of Lines	7000.00
7	Civil Maintenance Work	
	(A). Maintenance of s/s, office building & colony	2200.00
	(B). Tower Footing Protection	202.00
8	Specific work to be carried out	1300.00
	Sub total	25911.11
	Civil & labour work @ 15%	3800.00
	Total	29711.11

System Improvement Scheme(R&M) : Spill Over work.

1. Replacement of aged transformers:

In GETCO system the total population of various class of Transformers. Out of these, many transformers are very old i.e. completed the service life of more than 30 years. For these transformers either to carry out re-insulation of windings or to replace by new transformer. The re-insulation of winding in EHV class transformer is not possible; in case of Inter leaved winding as there will be nos. of joints. The core of the transformer might be non CRGO. Hence the no load losses will be more. It is therefore proposed to replace transformers having completed 30 years of service life.

2. Providing of 132 kV & 66 kV receiving end Breakers.

To prevent Transformer & other equipments failure due to reflected fault of 132 / 66 kV lines & to avoid power interruption it is necessary to provide breaker & allied equipments for protection & metering at receiving end sub-station.

3. Modification of 11 KV Breakers.

There is huge population of old 11 KV Jyoti / Siemens / CGL make Circuit Breakers having service life of more than 25 years. Modification work is carried out on 11 KV breakers for safety point of view with providing VDI. This will increase the safety interlocks and reduce the accidents in the sub-station.

4. Second 66 KV bus at 220KV Chhatral S/S.

220KV Chhatral S/S in one of the most important sub-station having only one 66 KV bus catering high industrial load of North Gujarat Area having 15 Nos of Outgoing Feeders, 2 Nos of Capacitor bank, 2 Nos of 66/11KV, Transformers bays & 3 Nos of 220/66KV, Transformers bays. Due to only single bus & high loading on the bus, frequent shutdown of the bus is required for attending hot points/ burning of jumpers, which can be avoided after erection of second 66KV Bus. Also zero power to the sub-station having single power source from 220KV Chhatral S/S can be avoided during outage/ maintenance of 66KV bus.

5. HT Shunt Capacitor in GETCO grid for the year 2012-13.

During year 2009, due to dry spell of rain draught situation aroused resulting into huge power demand in agriculture sector. This also created increase in reactive power demand. Therefore necessary field study was done to identify low voltage pockets during high agriculture demand. Low voltage pockets are prominently observed under various TR circles of GETCO and identified various low voltage pockets. On the basis of system study, it is proposed to add 11KV class Capacitor bank in to GETCO grid.

Accordingly order for 233 nos.(630 MVAR) 11KV class capacitor banks was placed in the year 2010. Out of 233 nos. of 11KV capacitor banks, 191 nos. of banks (495 MVAR) have commissioned up to February 2012. The balance 42 nos. of banks (135 MVAR) will be commissioned within 2-3 months.

Again as per reactive power requirement study, low voltage pockets identified and it was proposed to add further 11KV class, 72 Nos. (180 MVAR) Capacitor bank in to GETCO grid in the year 2012-13 at proposed cost of Rs. 11.82 Crore. Tender is at final stage. The budget will be provided in FY 2012-13.

6. City Development plan (General): (FY 2011-12)

An action plan to meet the increasing power demand and give reliable & uninterrupted power to various cities of Gujarat was made by GETCO. Various projects of conversion of 66 KV over head lines to 66 KV under ground cables, enhancement of lines & increasing the sub station capacity approved by GETCO Board at an estimated cost of Rs. 105.46 Cr for Ahmedabad, Vadodara, Rajkot, Jamnagar & Bhavnagar cities under 11th Five Year Plan during the year 2009 to 2012 vide BR No. 51.2 / 696 dtd. 10.11.2008. Various projects of conversion of 66 KV over head lines to 66 KV under ground cables, enhancement of lines & increasing the sub station capacity approved by GETCO Board.

Out of this following work was completed.

- 132/66 KV, 50 MVA X'mer with 66 KV bus erection at Manjusar.
- 66 KV D/C Manjusar – Tundav with ACSR Panther.
- 66 KV Gorwa-Subhanpura u/G cable line (approx. 3.0 Kms.) - Baroda city
- 66 KV Gotri - Vidyut nagar U/G cable line - Baroda city.
- 66 KV Vidyutnagar - Atladra U/G Cable
- 66 KV Moriaya Changodar from Dog-Panther – Ahmedabad City.
- 66 KV Sanand Bavala line from Dog-Panther – Ahmedabad City.
- 66 KV Moriaya tap line from Dog - Panther – Ahmedabad City.
- 66 KV Vikram-Shapar-S'shwar D/C line from Dog – Panther –Rajkot City

Sr. No	Item Description	Spill over of budget 2011-12
1	66 KV City - Valketgate U/G Cable line	104065300
2	66 KV Hapa Bedeshwar O/H + U/G line	58978299
3	66 KV Nagedi Satrasta U/G line	53319516
4	66 KV Nagedi Jamnagar 1 & 2 U/G line	204224843
	Total Rs. In lacs	4965.00

7. Vadodara City Development Plan:

Looking to the forecasting @ 35 % load growth of Vadodara city and surrounding area during next five year (from 305 MVA to 462 MVA) by Madya Gujarat Vij Company Limited (MGVCL) authority & they have proposed to establish five nos. new 66 KV sub stations at various places of Vadodara city.

A project report is prepared based on present established network and load forecasting for Vadodara city considering feasibility of projects & examining technical requirements. Vadodara City development plan proposed is approved vide Board Resolution No. 61.14 / 929 dtd. 23.02.2010 at an estimated amount of Rs. 232.00 Cr.

- Establishing new 66 KV S/s with associated lines.
- Expansion of 400 KV Asoj sub station - Creation of 66 KV bus and providing new 220/66 KV transformers along with bay equipments.
- Increasing the existing 66 KV sub station capacity by augmentation of transformer.
- Increasing the existing 66 KV line capacity by replacement of higher capacity 66 KV under ground cable and high Amp. overhead line conductor.
- New link lines for uninterrupted power supply to Vadodara city.

Benefit by implementing city development plan will be:

1. Increase in % availability of lines and sub stations.
2. Reduction in Transmission losses of the system.
3. Consumer end: Reduce production loss due to uninterrupted power supply.
4. Improvement in power quality & availability.
5. Reduction in equipment failure.
6. Voltage improvement.
7. Reduction in accidents.

Sr. No	Item Description	Spill over of budget 2012-13
1	Expansion of 400 KV Asoj s/s - Creation of 66 KV bus and providing new 220/66 KV transformers along with bay equipments	2500.00
2	66 KV Jambuva-Tarsali : ACSR Dog to Panther/High Amp.: 06 Kms	480.00
3	66 KV Jambuva-Gajrawadi O/H : ACSR Dog to Panther : 14.4 Kms	116.00
4	66 KV Waghodia-Gajrawadi O/H : ACSR Dog to Panther : 19.5 Kms	156.00
5	66 KV Jambuva-Gajrawadi U/G : 630 mm ² XLPE (3+1) : 2.2 Kms	480.00
6	66 KV Gotri-Godhara (Chhani onward) Dog to Panther cond.:52 Kms	832.00
	Total Rs. In lacs	4564.00

8. Up gradation of sub stations & lines especially in chemical industrial estate Under ASIDE Scheme:

The proposal includes following activities, such as (a) Up gradation of transmission lines. (b) Proposal for 66 KV under ground cable line. (c) Replacement / modernization of s/s equipments. (d) Augmentation of HV / EHV class power transformers etc.

Detailed expenditure of work to be carried out for up gradation of sub stations & lines especially in chemical industrial estates is Rs. 6642.65 lacs as under.

- | | |
|---|------------------|
| 1. Baroda Chemical Zone(Nandesari, Ranoli, Koyli) : | Rs. 690.25 lacs |
| 2. Bharuch Chemical Zone (Ankleshwar & Panoli) : | Rs. 2775.55 lacs |
| 3. Ichhapore (Bhestan) Chemical Zone : | Rs. 1779.75 lacs |
| 4. Vapi Chemical Zone : | Rs. 1397.10 lacs |

Total estimated cost for 4 nos. chemical estate : Rs. 6642.65 lacs.

Budget allocation under R&M scheme under 2010-11 for Rs. 1016.58 lacs. Details are as under.

Total project cost proposed under ASIDE Scheme :	Rs. 6642.65 lacs.
Total grant considered under ASIDE Scheme (50 %) :	Rs. 3321.33 lacs.
Balance amount to be borne by GETCO :	Rs. 3321.33 lacs.

Scheme is approved vide BR No. 61.7 / 921 dtd. 23.02.2010.

Benefits:

- ❖ Improvement in power quality & availability.
- ❖ Reduction in equipment failure.
- ❖ Reduction in transmission losses.
- ❖ Voltage improvement.
- ❖ Reduction in accidents
- ❖ Reduced production loss of continuous process industries.

9. Ahmedabad City Development Plan

10. Morbi City Development Plan

11. Tatkal Scheme

An action plan to meet the increasing power demand and give reliable & uninterrupted power to various cities of Gujarat was made by GETCO. Various projects of conversion of 66 KV over head lines to 66 KV under ground cables, enhancement of lines & increasing the sub station capacity approved by GETCO.