

Cost benefit analysis for various strengthening schemes planned for commissioning during 2022-23

Calculation Methodology:

- Average Demand scenario is considered for **base case** study for the year 2022-23, considering following points:
 - Anticipated demand is considered as per demand projections given by respective DISCOMs.
 - Anticipated generation capacity additions from State and private sector within the state along with respective evacuation scheme.
 - RE power addition with evacuation scheme. Overall 40% of Solar power injection and 10% wind power injection is considered from RE sources.
 - ISTS transmission network addition for respective year.
 - Generation capacity addition from Central Sector projects within the State are considered along with its evacuation scheme. Share of Central sector power plants located outside Gujarat is adjusted through power flow on ISTS lines.
- After freezing case study as above, revised study is carried out considering Intra-state strengthening schemes planned for the year 2022-23, to have a **final case**, as under:
 - New substations are considered with planned transformation capacity and associated transmission lines and additional planned transmission lines.
 - Load of nearby 66 KV substations is transferred on new 220KV/132KV substations through 66 KV lines.
- Based on above case study, following two cost benefit analysis is carried out
 - Based on reduction in system losses
 - Reduction in actual power loss in terms of MW is derived from final case and base case and converted into saving per units (in KWH)
 - Revenue saving in terms of Rs. is derived considering Rs. 5.45/- per unit cost
 - Payback period: The ratio of project cost for considered schemes and revenue earned based on saving units.
 - It is pertinent to note that the transmission losses in all the case studies includes losses across GETCO network, Torrent network (Ahmedabad & Surat area), UT of DD & DNH network, dedicated lines, losses across all generator transformers and losses occurred on ISTS elements also i.e. evacuation lines of central sector generators, other ISTS network within Gujarat, Inter-State lines connected with neighboring states, etc.

Cost benefit analysis for FY 2022-23

1) Power Scenario:

The summary of the system study for the year 2022-23 is reproduced below:

Summary of results:

Total average Real Power Generation	: 23441 MW
Total average Real Power Load	: 22267 MW
Total average Real Power Loss	: 1173 MW
Percentage average Real Loss	: 5.01 %

The above projected transmission loss for the year 2022-23 is based on the system study considering anticipated generation capacity addition and planned transmission elements for the year 2022-23.

2) Cost benefit analysis:

➤ **Cost benefit based on reduction in system losses:**

System studies have been carried out under peak load condition for year 2022-23. The study results reveal that there is a reduction in overall transmission losses by 40.79 MW (due to system strengthening schemes only). The cost benefit analysis reveals that the pay-back period is around 11.27 years as shown below:

Sr. No.	Particulars		
1	Reduction in loss		40792.1 KW
2	Savings in units per annum	Sr. No. (1) x 8760 Hours	357338796 KWh
3	Revenue earned in Rs. considering Rs. 5.45 per unit	Sr. No. (2) x Rs. 5.45/-	Rs. 1947496438/-
4	Project cost (without inflation)		Rs. 21946255000/-
5	Pay-back period	Sr. No. (4) ÷ Sr. No. (3)	11.27 years

Cost benefit analysis for planned transmission schemes is shown at Annexure-1(A).

Annexure-1:

March-2023 Condition:

DGVCL	MGVCL	UGVCL	PGVCL	SEC+AEC	Gujarat Total	Export+ DD+DNH	Grand Total	Loss	Loss+Load
4918	2573	4919	6367	2923	21700	567	22267	1173	23441

Case	Description	Total Loss (MW)	Reduction in Loss (MW)
1	March-2023 – Base-case	1173.45	-
2	In base case, addition of Transmission lines and ICTs are added which will be commissioned during 2022-23	1132.66	40.79
	Schemes as per Annexure-1		
	Transmission lines		
	Substations		
	Total Investment (Rs. In Crore)	2194.626	
	Total reduction in losses (MW)		40.79

DGVCL	MGVCL	UGVCL	PGVCL	SEC+AEC	Gujarat Total	Export+ DD+DNH	Grand Total	Loss	Loss+Load
4918	2575	4906	6378	2921	21699	569	22268	1133	23400

Substations during 2022-23

Sr. No.	Voltage class	Name of Substation	Transformation voltage level	Transformation Capacity (MVA)	Estimated cost (Rs. In Cr.)
1	400 kV	400 kV Bhachunda GIS substation (Dist. Kutch) (220/66 kV scheme is already approved) (1) 400/220 kV, 3 X 500 MVA (2) 6 Nos. of 400 kV feeder bays (3) 400 kV, 1 x 125 MVAR Reactor with bay	400/220	1500	154.26
2	400 kV	400/220/66 kV Bhogat GIS substation (Dist. Jamnagar) (1) 400/220 kV, 3 X 500 MVA (2) 220/66 kV, 2 X 160 MVA (3) 4 Nos. of 400 kV feeder bays (4) 400 kV, 1 x 125 MVAR Reactor with bay (5) 8 Nos. of 220 kV & 10 Nos. of 66 kV feeder bays	400/220 & 220/66	1820	210.90
3	220 kV	220kV Mera S/S / (220kV MithiPaldi S/S) 220/66 kV, 2x160 MVA X'mer; 220 kV FB-4, 220 kV BC bay-1, PT Bays - 2 nos. 66 kV FB - 10 (Provision of 4 No. of 220 kV & 6 Nos. of 66 kV bays for future purpose)	220/66	320	56.23
4	220 kV	220 kV Giyavad substation (Dist. Morbi) (1) 220/66 kV, 2 X 160 MVA, (2) 8 Nos. 220 kV, 6 Nos. 66 kV feeder bays.	220/66	320	44.80
5	220 kV	220 kV Kamlapur substation (Dist. Rajkot) (1) 220/66 kV, 2 X 160 MVA, (2) 8 Nos. 220 kV, 6 Nos. 66 kV feeder bays.	220/66	320	44.80
6	220 kV	132kV System at 220kV Vijapur S/S with FB & Termination from 220/132 kV ICT to 132 kV Bus and other misc civil works	220/132	300	39.86
7	220 kV	Up gradation of 66kV Sevalia S/S to 220kV Level 220/66 kV s/s with 2X 160 MVA Transformers, 220 kV FB-4, 220 kV BC Bay-1, 220 kV TBC-1, 66 kV FB-6	220/66	320	59.80
8	220 kV	220 kV Bhesan (AIS) 220/66 kV s/s with 2x160 MVA X'mer (2 Nos for future provision); 220 kV FB-5 (additional space for 4 nos. of future bays), 220 kV BC bay-1, 220 kV TBC - 1, 66 kV FB - 10	220/66	320	43.29
9	220 kV	220kV Patkhilori 220/66 kV s/s with 2x160 MVA X'mer (provision to be kept for additional 2 ICTs for later stage); 220 kV FB-4 (provision to be kept for additional 4-6 bays for later stage), 220 kV BC bay-1, 220 kV TBC - 1, 66 kV FB - 10	220/66	320	43.29
Total					697.23

Transmission lines during 2021-22

Sr. No.	Voltage class	Name of Transmission line	Length in Ckm	Estimated cost (Rs. In Cr.)
1	400 kV	400 kV Essar - Amreli line (Twin Moose) (Vadinar- Amreli)	356	158.00
2	400 kV	400 kV D/C Vadavi - Halvad line	290	125.30
3	400 kV	400 kV D/C Bhachunda - Varsana line	264	210.00
4	400 kV	400 kV D/C Shapar - Fedra line (twin moose)	200	168.00
5	400 kV	LILO of one ckt of 400 kV D/C Halvad - Vadavi line at 400 kV Chharodi s/s (ACSR Twin Moose)	86	38.08
6	400 kV	400 kV D/C Bhogat - Kalavad line	250	202.50
7	220 kV	220 kV D/C Gavasad - Salejda line	194	63.90
8	220 kV	220 kV D/C BECL- Botad	190	16.96
9	220 kV	220kV D/C Chorania - Salejada line with AL-59 conductor	134	44.82
10	220 kV	220 kV D/C Bhatia - Kalavad line	238	50.85
11	220 kV	220 kV D/C Kalavad - Kangasiali	112	50.85
12	220 kV	220 kV D/C Chorania - Botad line	104	35.00
13	220 kV	220 kV D/C Bhogat (400 kV) - Moti Gop line	139	51.16
14	220 kV	LILO of one circuit of 220 kV D/C Kasor - Gavasad line at 220 kV Gotri substation	98	40.78
15	220 kV	LILO of 220 kV S/C Sartanpar - Wankaner line at 220 kV Makansar substation	2	0.70
16	220 kV	LILO of both ckts of 220kV D/C Bhimasar - Charadva at Vankda (Nichimandal), (Shapar) (4 x 10 = 40Ckm)	8	15.81
17	220 kV	LILO of 220 kV S/C Gondal – Padavala – Shapar – Sadla line at 220 kV Kamlapur	34	14.77
18	220 kV	LILO of one ckt of 220kV D/C Hadala - Sartanpar at 220kV Ghiyavad (2 x 10 = 20Ckm)	16	7.01
19	220 kV	LILO of both ckts of 220kV D/C Jambuva - Karamsad line at Dhuvaran CCP (by using existing LILO portion and through 220kV D/C Pachham - Kasor line)	32	64.00
20	220 kV	LILO of both circuit of 220kV D/C Kansari-Deodar at 220kV Bhildi	10	34.74
21	220 kV	LILO of bothcircuit of 220kV D/C Tharad-Dhanera at 220kV Rah S/S	24	14.03
22	220 kV	LILO of 220 kV S/C Kosamba – Ichchhapore line at GSEG along with other miscellaneous work (High Ampacity Conductor)	16	4.60
23	220 kV	LILO of 220 kV S/C Jetpur - Visavadar line at 220 kV Bhesan substation	16	6.99
24	220 kV	LILO of one circuit of 220 kV Amreli - Babara line at 220 kV Patkhilori	44	34.96
25	132 kV	LILO of 132 kV S/C Chhota Udepur - Tilakwada line at220 kV Kawant	58	15.00
26	132 kV	LILO of circuit of 132 kV D/C Mehsana - Patan line at 400 kV Sankhari substation with AL-59	50	12.88
27	132 kV	132 kV S/C Sankhari (400 kV) - Deesa line	40	15.70
Total				1497.40

