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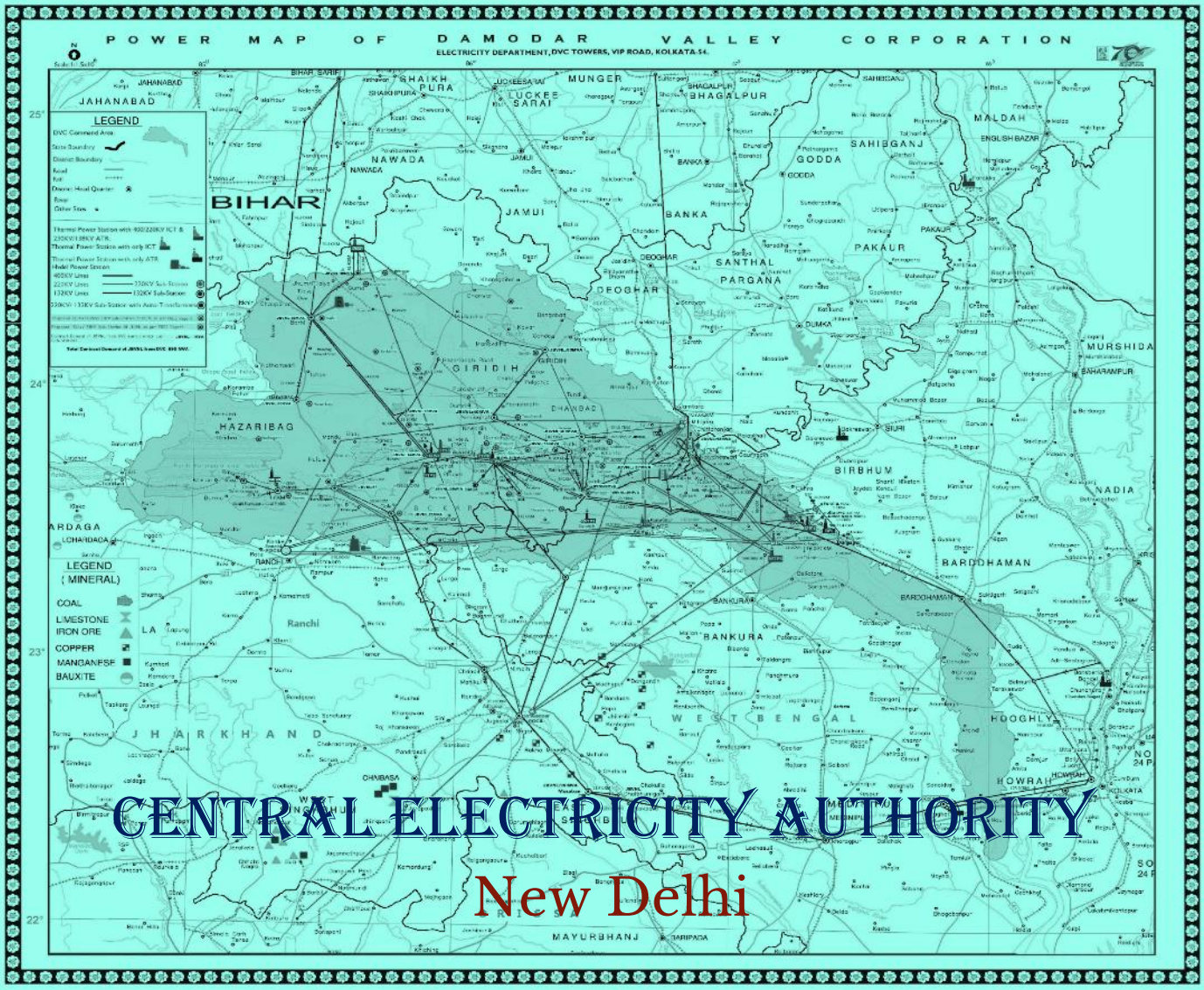
REPORT ON INTRA STATE TRANSMISSION RESOURCE ADEQUACY PLAN FOR DVC BY THE YEAR 2034-35



CENTRAL ELECTRICITY AUTHORITY

New Delhi

Disclaimer

This Intra-State Transmission Resource Adequacy Plan for the State has been prepared based on data and inputs provided by the State utilities. The analysis, findings, and conclusions contained herein rely on the accuracy, completeness, and timeliness of the information furnished by the State. Any errors, omissions, or inconsistencies in the data may influence the results of this study.

The Central Electricity Authority (CEA) has facilitated and supported the State in the preparation of this plan to address intra-state transmission requirements. The recommendations of this study—including but not limited to the establishment of new substations, construction of new transmission lines, reconductoring of existing lines, and augmentation of substations— depends upon data furnished by the State utilities. It is suggested to take up new intra-state elements, commensurate to the generation/demand in the area.

Executive Summary

Electricity (Transmission System Planning, Development and Recovery of Inter-State Transmission Charges) Rules 2021, provides that CEA to draw up short term plan every year on rolling basis for up to next five years and perspective plan every alternate year on rolling basis for next ten years.

Further, Guidelines for Resource Adequacy Planning Framework for India issued by MoP on 28.06.2023 provides that CEA to prepare the Resource Adequacy Plan for each states. Generation resource adequacy studies for the DVC State has already been carried out by CEA.

For the transmission part, this report presents a comprehensive assessment of the intra-state transmission infrastructure in DVC, with projections and planning aimed at ensuring transmission resource adequacy by the year 2034-35. The analysis incorporates current electricity demand, projected growth, existing and planned transmission assets, and key recommendations for strengthening the state's transmission network.

The highest demand met by DVC in 2024-25 was 3,708 MW, and Projected Peak Demand by 2034-35 is estimated to 6,900 MW, which is more than the Electric Power Survey report. Further, as on October 2025 contracted Capacity in the state is about 3,258.28 MW. Presently, the state has 3,648 ckm of 132 kV lines, 3,087 ckm of 220 kV and 478 ckm of 400 kV lines. It has transformation capacity of 3,640.5 MVA at 132 kV, 5,840 MVA at 220 kV and 2,520 MVA at 400 kV level.

Considering the anticipated demand, generation capacity, demand pattern, operational feedback from ERLDC and SLDC, system studies have been conducted for June Solar Max, Peak Demand (Summer Evening), and February Night Off-peak scenarios for the timeframe 2031-32 and 2034-35 in consultation with DVC, CTUIL and Grid-India. Based on the studies, the requirement of transmission system by the year 2034-35 has been identified.

A total of 11,005 MVA transformation capacity addition/augmentation and 2,738.3 ckm of new transmission lines/reconductoring of old lines at an estimated cost of Rs 5,112.05 Crs. would be required for implementing the DVC transmission proposals for meeting the electricity demand of the state by the year 2034-35. Further, reactive power compensation need to be provided at various substations at distribution level for addressing low voltage issues.

Summary of year-wise MVA capacity, ckm addition and tentative expenditure required for implementation of above recommended proposals is given below:

Year	Capacity Addition (in MVA)			Transmission line addition (in ckm)			Reconductoring (in ckm)		Estimated Cost (in Rs. Cr.)
	132 kV	220 kV	400 kV	132 kV	220 kV	400 kV	132 kV	220 kV	

2026-27	-	400	-	-	-	-	-	-	52.85
2027-28	1385	800	1100	74	15	-	844.2	-	822.18
2028-29	720	1000	-	9	11	-	643.5	418	1274.13
2029-30	-	200	1500	-	1	-	348.6	-	528.75
2030-31	-	760	1600	37	80	41	-	-	1245.2
2031-32	-	-	-	-	-	137	-	-	560
2032-33	460	520	-	13	22	-	-	-	394.96
2033-34	-	560	-	-	16	-	-	-	133.98
2034-35	-	-	-	-	-	28	-	-	100
Total	**2565**	**4240**	**4200**	**133**	**145**	**206**	**1836.3**	**418**	**5112.05**

To ensure reliable and adequate power supply in DVC by 2034-35, substantial investments and infrastructure upgrades are essential. With a projected demand of 6,900 MW and local generation and contracted capacity covering only part of this, a robust and resilient transmission network becomes critical. The outlined plan, if implemented timely, will ensure resource adequacy and support economic and industrial development in the state.

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Intra State Transmission Resource Adequacy of Damodar Valley Corporation (DVC) by the year 2034-35

1. Demographics

1.1. The Damodar Valley Corporation Act 1948 was passed by the Central Legislature, requiring the three Governments, The Central Government and the State Governments of West Bengal and Bihar (now Jharkhand) to participate jointly for the purpose of building the Damodar Valley Corporation. The Corporation came into existence on 7th July, 1948 as the first multipurpose river valley project of India. Damodar Valley Corporation (DVC) operates in the eastern region of India, primarily serving areas in West Bengal and Jharkhand. DVC spans a vast area, covering both urban and rural regions along the Damodar River. The region is bordered by Bengal to the west, Jharkhand to the east, and is influenced by industries like coal, steel, and power generation. The major languages spoken in the region are Bengali in West Bengal and Hindi and local tribal languages in Jharkhand.

2. Electricity profile of DVC

2.1. Power generation-demand scenario of DVC:

2.1.1. In the FY 2024-25, DVC had peak electricity demand of 3708 MW and total electrical energy requirement of 25891 MU. As on October 2025, DVC has central sector allocation of 3108.28 MW which includes hydro plants (221.26 MW), thermal plants (2887.02 MW). In addition, private sector installed capacity is 150.00 MW.

2.1.2. Peak demand & Energy of DVC is given at Table 2-1 below

Table 2-1 Peak demand & Energy of DVC

DVC	Peak Demand(MW)	MW as per EPS	Energy(MU)	MU as per EPS
2018-19	3,100	2913	22,745	15953
2019-20	3,014	3129	22,429	17126
2020-21	3,173	3340	21,368	18435
2021-22	3,355	3081	23,741	16630
2022-23	3,402	3248	26,339	17624
2023-24	3,451	3450	26,560	18757
2024-25	3,708	3689	25,891	20100

2.1.3. The graph indicating the above Peak Demand (MW) & Energy (MU) is given at Figure 2-1 below.

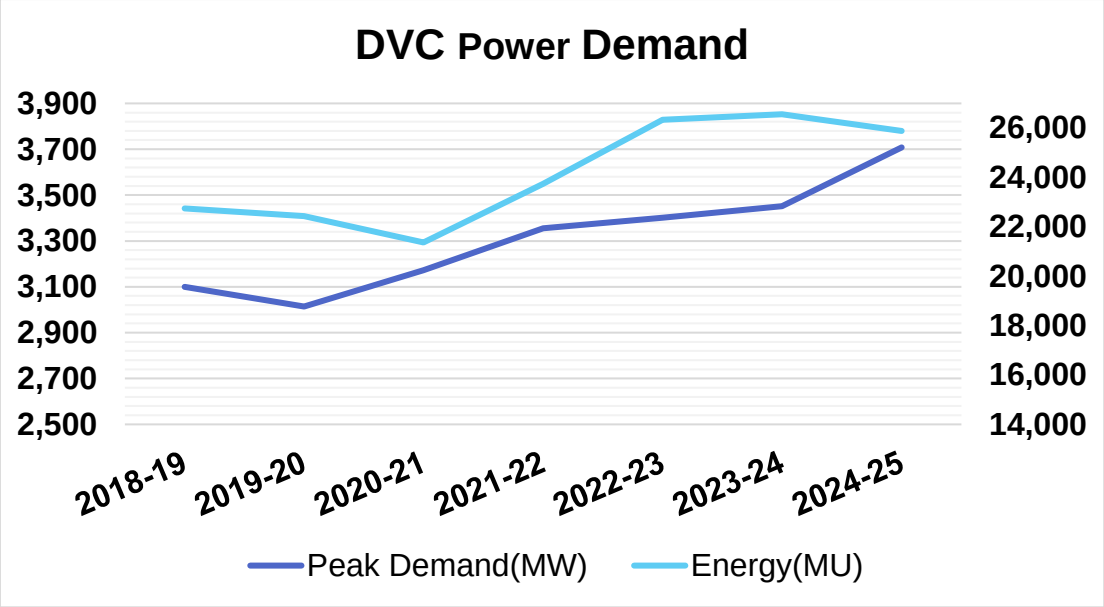

Figure 2-1 Peak Demand and Energy

2.1.4. The peak demand of DVC occurs in summers and daily peak occurs in the evening period. The graph indicating of Seasonal Load variation is given at Figure 2-2 below.

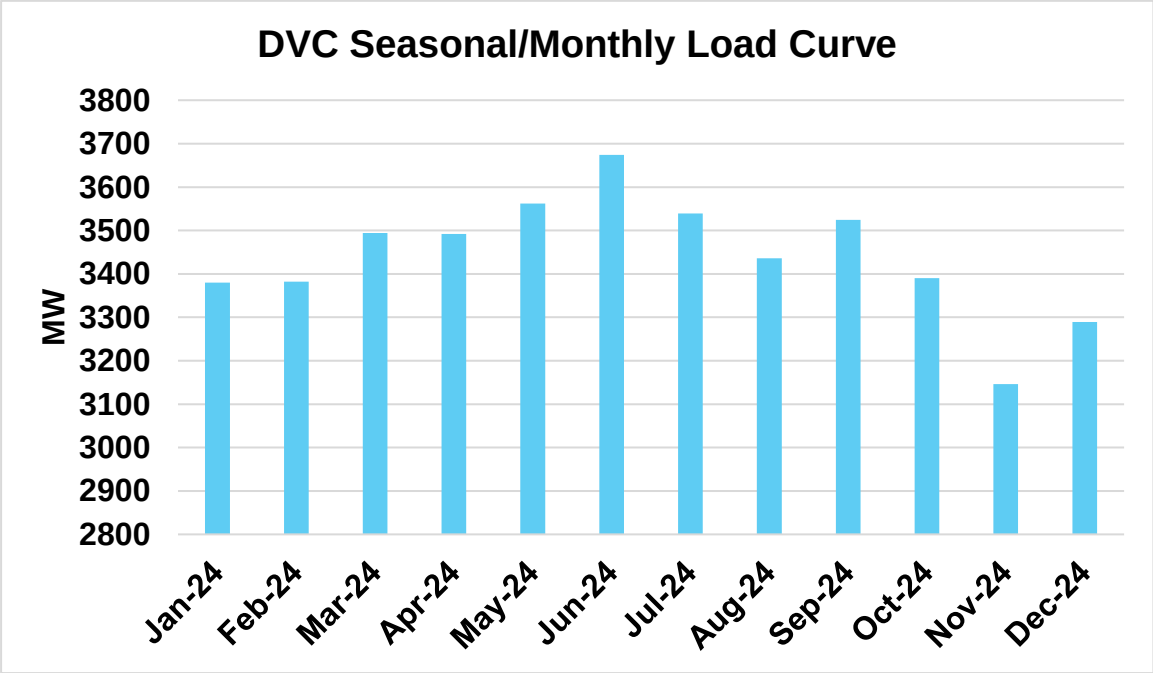

Figure 2-2 Seasonal Load Curve

2.1.5. The graph indicating of Hourly Load variation is given at Figure 2-3 below.

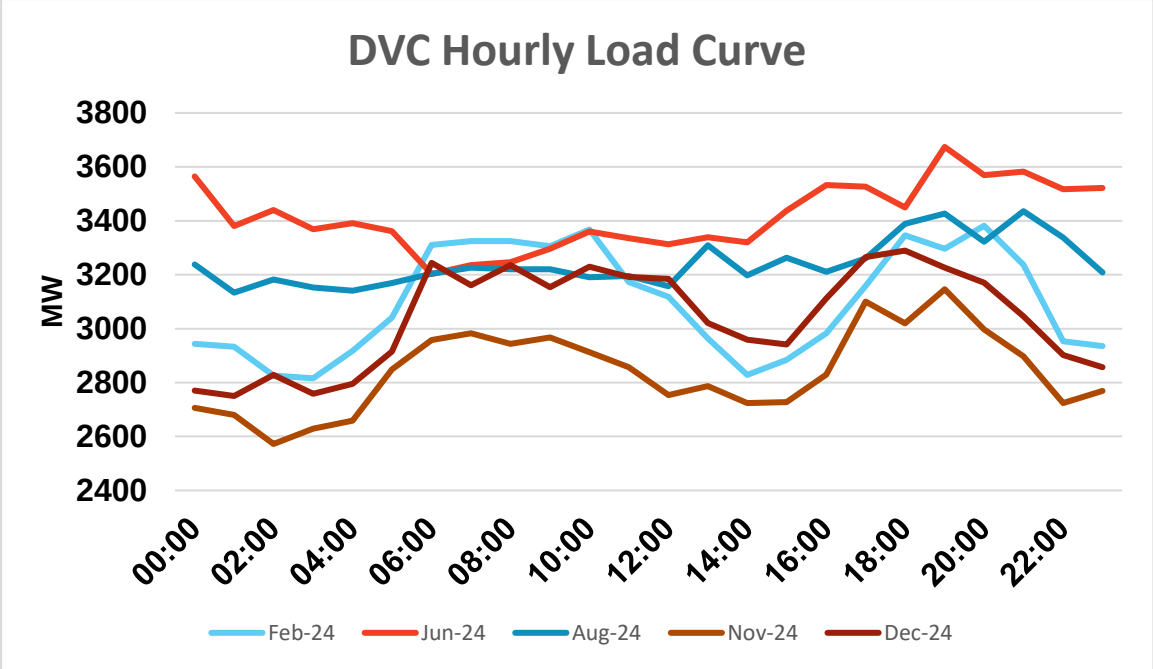

Figure 2-3 Hourly Load Curve

2.1.6. The projected peak electricity demand as per 20th EPS report is 7388 MW in the year 2036-37.

2.1.7. Contracted capacity (MW) of generating stations in DVC as on October 2025 is given at Table 2-2 below:

Table 2-2 Contracted capacity of DVC

SECTOR	HYDRO		THERMAL				NUCL-EAR	R.E.S. (MNRE)	TOTAL
		COAL	LIGNITE	GAS	DIESEL	TOTAL			
State	0	0	0	0	0	0	0	0	0
Private	0	150	0	0	0	150	0	0	150
Central allocation	221.26	2887.02	0	0	0	2887.02	0	0	3108.28
Total	221.26	3037.02	0	0	0	3037.02	0	0	3258.28
%	6.79	93.21	0.00	0.00	0.00	93.21	0.00	0.00	100.00

Source: Installed Capacity Report, CEA

2.1.8. The graph indicating the generation capacity mix is given at Figure 2-4 below

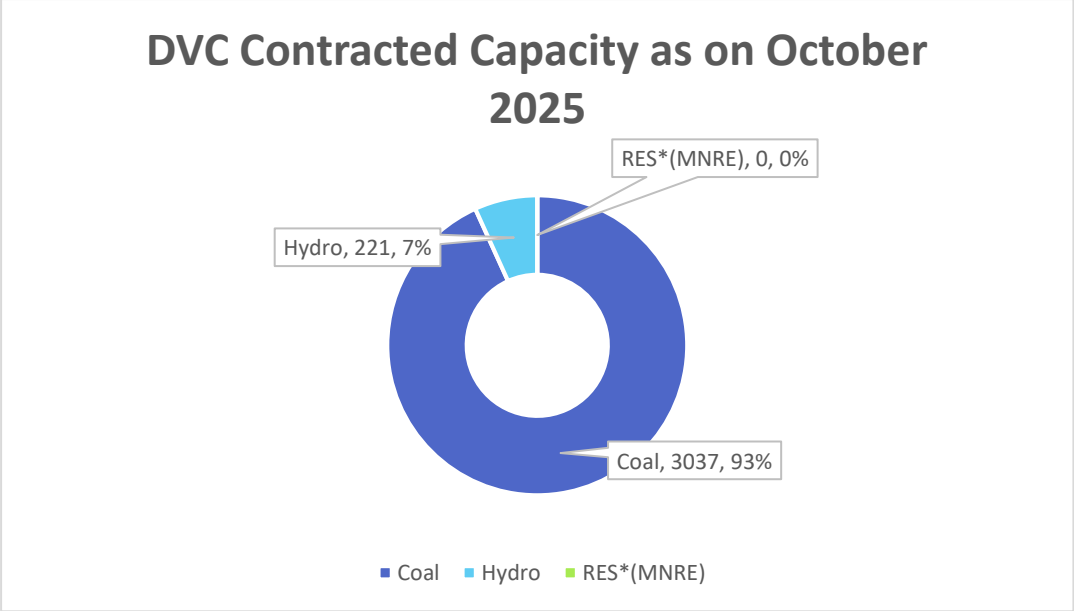

Figure 2-4 Contracted Capacity

2.1.9. As on October 2025, the General Network Access (GNA) quantum for ISTS drawal and Available Transfer Capability (ATC) of the state is 956 MW and 1927 MW (Import ATC) and 3165 MW (Export ATC) respectively.

3. Existing Transmission System

The details of existing Intra-state and Inter-state transmission system in DVC are as under.

3.1. Existing Intra State Transmission assets (as on October 2025):

3.1.1. Intra State Transmission assets of DVC state in past five years is given at Table 3-1 below

Table 3-1 Intra State Transmission assets in DVC

Financial Year	Voltage (kV)	Transmission lines (ckm)	Substations (MVA)
2018-19	132	3613	3354
	220	2206	4850
	400	478	1890
	Total	**6297**	**10094**
2019-20	132	3633	3384
	220	2206	5010
	400	478	2205
	Total	**6317**	**10599**
2020-21	132	3638	3481
	220	2213	5010
	400	478	2205
	Total	**6329**	**10696**
2021-22	132	3639	3492

Financial Year	Voltage (kV)	Transmission lines (ckm)	Substations (MVA)
	220	2308	5410
	400	478	2520
	Total	**6425**	**11422**
2022-23	132	3639	3621
	220	2958	5730
	400	478	2520
	Total	**7075**	**11871**
2023-24	132	3640	3692
	220	2967	5760
	400	478	2520
	Total	**7085**	**11972**
2024-25	132	3640	3692
	220	3001	5760
	400	478	2520
	Total	**7119**	**11972**
2025-26 (Upto October 2025)	132	3648	3640.5
	220	3087	5840
	400	478	2520
	Total	**7213**	**12000.5**

3.1.2. DVC state has total 7,213 ckm transmission line and 12,000.5 MVA Substation capacity which include 3,648 ckm of 132 kV, 3,087 ckm of 220 kV, 478 ckm of 400 kV transmission line and 3,640.5 MVA of 132 kV, 5,840 MVA of 220 kV, 2,520 MVA of 400 kV Substation capacity in Intra-state transmission system. Details of existing system given in **Annexure – I.**

3.1.3. The graph indicating of year on year growth of Transmission lines is given at Figure 3-1 below.

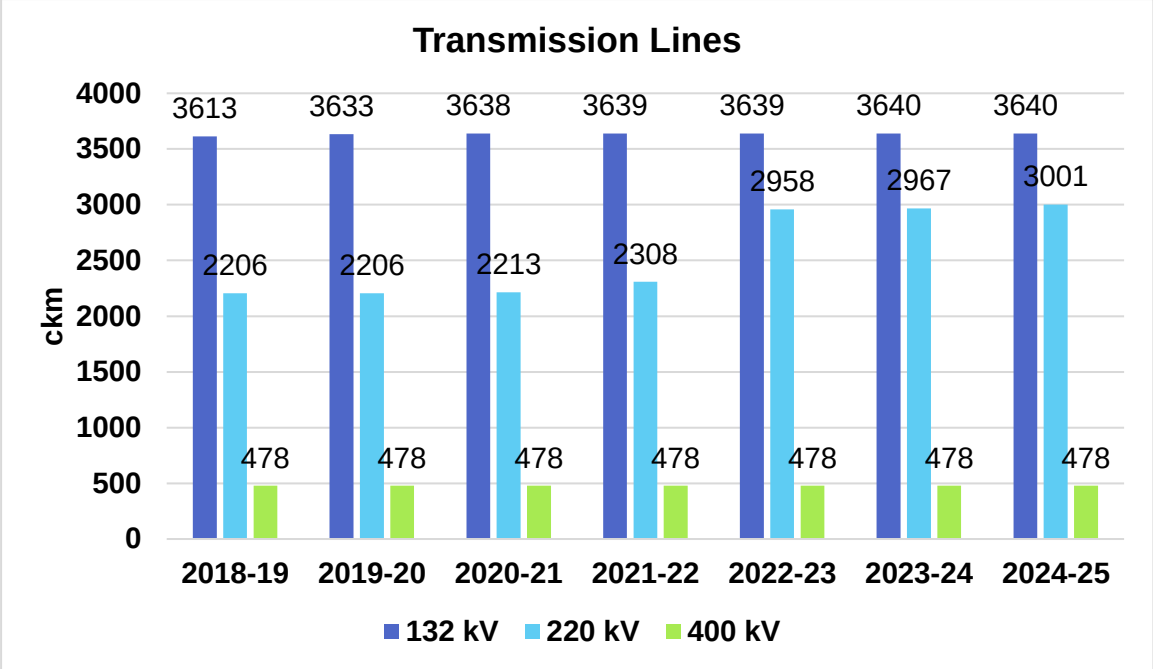

Figure 3-1 Existing Intra-state Transmission Line

3.1.4. The graph indicating of year on year growth of substation MVA capacity is given at Figure 3-2 below.

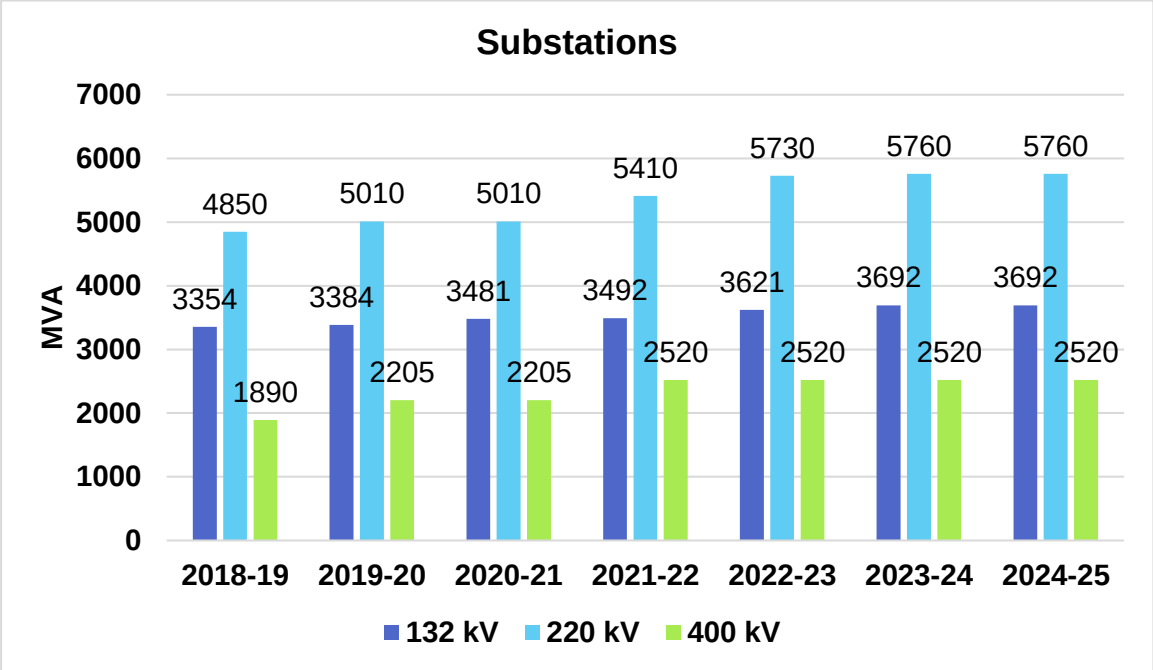

Figure 3-2 Existing Intra-State Substations

4. Under Implementation Transmission System

4.1.1. The summary of under implementation Intra-state transmission system in DVC are as under. Details of under implementation transmission system given in **Annexure – II.**

Table 4-1 Under Implementation Intra-State Transmission assets in DVC (as on October 2025)

Voltage (kV)	Transmission lines (ckm)	Substations (MVA)
132	24.6	691.5
220	24	1001.3

4.1.2. Summary of under implementation Intra State Transmission assets of DVC state is given at Figure 4-1 below

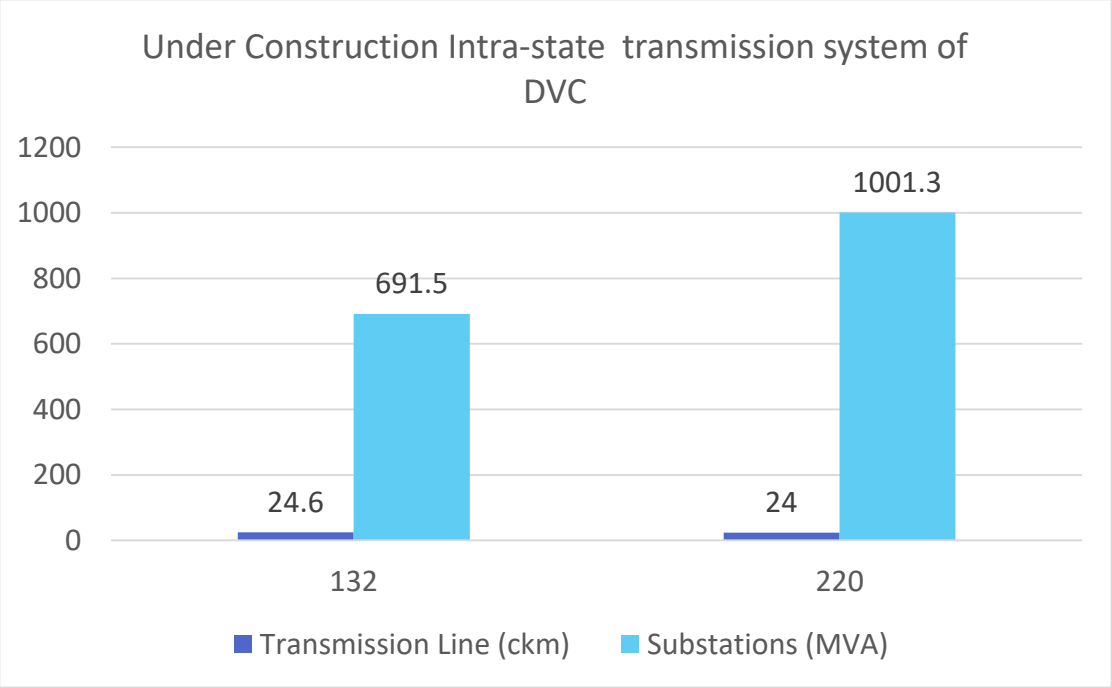

Figure 4-1 Under Construction Intra-state transmission system

5. System operator feedback

5.1. The operational constraint faced in the Intra-state transmission network by DVC SLDC including transmission line constraints, ICT constraints, nodes experiencing high voltage/ low voltage are attached at **Annexure-III**.

The operational constraint faced in the Intra-state and Inter-state transmission network by ERLDC including transmission line constraints, ICT constraints, nodes experiencing high voltage/ low voltage are attached at **Annexure-IV**.

6. Assumptions for study:

6.1. The matter regarding ISTS-DVC periphery is sub judice under petition 279/MP/2023. However, system studies haves been carried out pending CERC order and certain assumptions in line with meeting held at CERC on the subject petition. Accordingly, evacuation plan for upcoming generations and load centres etc. are subject to outcome in the petition.

6.2. In DVC system few consumers are connected through T-connection of grid lines at 132 kV level. New elements has been planned to remove the T-connections.

6.3. Peak electricity demand (MW) of DVC according to the 20th EPS Report and as estimated by the state are given at Table 6-1. The demand estimated by the state is higher than the EPS for that the state has given justification of expected high growth and industrial demand. Accordingly, the demand figures provided by the State has been considered.

Table 6-1 Peak electricity demand

Reference↓ / Parameter→	**Year**	**Peak Demand (MW)**	**CAGR**
Actual Peak	2024-25	3708	
As per 20th EPS	2025-26	3947	6.45
	2026-27	4220	6.68
	2027-28	4510	6.74
	2028-29	4814	6.74
	2029-30	5176	6.90
	2030-31	5409	6.50
State Estimated Peak electricity demand	2031-32	6100	7.37
	2034-35	6900	6.41
As per 20th EPS	2036-37	7,388	5.91

**including upcoming industrial demand. Further the demand also includes the 600 MW load of Jharkhand to be supplied through DVC network.*

6.4. **Industrial Demand:**

The total additional industrial demand of 2000 MW is expected by 2035. Which majorly includes Steel Industries at CTPS, Burnpur, Giridih, Jamshedpur and MTPS area.

6.5. **Generation capacity by 2034-35**

The details of upcoming generation under control of DVC by 2034-35 is as under.

Table 6-2 Upcoming generation by 2034-35

Sl. No	**Technology**	**Place**	**Capacity (MW)**	**Time Frame to be commissioned**
1.	Thermal	KTPS PH-II	1600	U#1 (Aug-29) U#2 (Feb-30)
2.	Thermal	RTPS PH-II	1320	U#1 (Jun-29) U#2 (Jan-30)
3.	Thermal	DTPS	800	U#1 (July-30)
4.	Thermal	CTPS PH-II	1600	U#1 (July-31) U#2 (Nov-31)
5.	Solar	Tilaiya Block -1	155	2026-27
6.	Solar	Tilaiya Block -2	285	2032-33
7.	Solar	Tilaiya Block -3	160	2033-34
8.	Solar	Panchet Block -1	75	2027-28
9.	Solar	Panchet Block -2	80	2028-29
10.	Solar	Maithon Block -1	234	2027-28
11.	Solar	Maithon Block -2	365	2033-34
12.	Solar	Konar	225	2027-28

13.	Solar	Barhi	250	2032-33
		Total	**7199**	

6.5.1. In addition to above 250 MW (1000 MWh) BESS at Maithon in the timeframe of 2027-28 and 100 MW (400 MWh) BESS at Konar in the timeframe of 2027-28 have also been considered.

6.5.2. For the purpose of the study the Mundra UMPP in Gujarat state has been considered as Swing/Slack Bus.

6.5.3. The following Parameters were considered during the study

a) The total intra state generation installed capacity: 6,427.2 MW (including 1,694 MW RE Power) by 2031-32 and 2034-35 has been considered in the study.

b) The Inter-state Generation capacity located in DVC has been considered as 7,620 MW.

c) Peak Demand: about 6,100 MW by the year 2031-32 and about 6,900 MW by 2034-35.

d) The demand pattern of the State such as seasonal and hourly variation are consistent, however to capture the load variations, and high solar injection from adjacent states, the scenarios considered for the study are mentioned at Table 6-3.

Table 6-3 Demand and dispatch of the study

Sl.No.	Scenario	Demand Factor	Dispatch Factors			
			Hydro	Thermal	Solar	BESS
1.	June Solar Max (Scenario-4)	80%	0%	60%	85%	-100% (Charging)
2.	Peak Demand (Summer Evening Peak-Scenario-5)	100%	70%	90%	0%	100% (Discharging)
3.	February Night Off-peak (Scenario-9)	80%	0%	60%	0%	0%

7. Study Results

7.1. Based on the demand and generation projections, the State has outlined its need for new transmission elements. Taking into account operational feedback from DVC SLDC and ERLDC, as well as the provisions in the Manual on Transmission Planning Criteria (with Amendment-I), 2025, studies were conducted to identify the state's transmission system requirements, which are detailed in Paragraph 8. Taking in account of identified system and related assumptions, the import/export on tie lines by the year 2031-32 are presented in Table 7-1 below:

Table 7-1 Study Results for the time frame 2031-32

Parameter↓ / Scenario→	June Solar Max (Scenario-4)	June Peak load (Scenario-5)	February Night Off-peak (Scenario-9)
Generation despatch (intra-state + ISGS located in state) (in MW)	7761	11124	7116
Total load including losses (in MW)	4786	6097	4783
Net interchange ((-) import / (+)export) at ISTS-STU periphery (in MW)	3229	5027	2333

The import/export on tie lines by the year 2034-35 are presented in Table 7-2 below.

Table 7-2 Study Results for the time frame 2034-35

Parameter↓ / Scenario→	June Solar Max (Scenario-4)	June Peak load (Scenario-5)	February Night Off-peak (Scenario-9)
Generation despatch (intra-state + ISGS located in state) (in MW)	8556	11124	7116
Total load including losses (in MW)	5558	6900	5562
Net interchange ((-) import / (+)export) at ISTS-STU periphery (in MW)	2998	4224	1554

7.2. The line flows and voltage were in permissible limit as mentioned in the Manual on Transmission Planning Criteria (with Amendment-I), 2025 in the critical as well as other scenario after modelling the required additional transmission system by 2031-32 and 2034-35.

7.3. The planned transmission system of the state is N-1 contingency criteria compliant. The planned system addresses the all the constraints in the Intra-state transmission as mentioned by DVC SLDC and ERLDC at **Annexure-III** and **Annexure-IV** respectively. The constraints in ISTS system mentioned at **Annexure-IV** would be duly taken care in the Inter-state transmission planning.

7.4. According to CEA's generation resource adequacy report for DVC (2034-35) DVC is likely to have unserved energy in coming years and may need to contract non-fossil capacities for meeting energy requirements other than the planned capacities. The additional quantum of capacities required (other than already planned) to be contracted by 2034-35 is as under.

- 265 MW from Coal,
- 8699 MW of Solar,

- 5748 MW of storage
- 2276 MW of DRE

7.5. The agreed system by the year 2034-35 was modelled and studied considering the N-1 contingency criteria, in such situation no constraints were observed in transmission system of DVC taking into account of above future contract capacity requirement. Hence, the transmission system as planned by 2034-35 (including new schemes identified in this report) ensure the Resource Adequacy in the Transmission system of the State.

8. Intra-state Transmission system requirement by 2034-35.

8.1. New substations along with their associated transmission lines which are required by 2034-35 are listed at Table 8-1 below

Table 8-1 New substations alongwith their associated transmission lines of DVC

Sl.No	Transmission System	Justification	Estimated Cost (in Rs. Cr.)	Time frame
1.	**i. Establishment of new 400/220/132 kV, 2x500+3x200 MVA S/s at Gola-B.**	To meet load growth Load: 110 MW by 2034-35	515	2030-31
	ii. LILO of RTPS – Ranchi (PG) 400 kV D/c Line (Quad Moose) at Gola-B (41 ckm) (20.5 ckm Loop In and 20.5 ckm Loop out)		165	
	iii. LILO of Ramgarh 2B (Proposed) – Ranchi 220 kV S/c Line at Gola-B (08 ckm) (Presently Ramgarh – Ranchi Line). (04 ckm Loop In and 04 ckm Loop out)		15	
	iv. LILO of Ramkanali B (Proposed) – Ramgarh 2B 220 kV S/c Line at Gola-B (08 ckm) (Presently MTPS – Ramgarh Line). (04		15	

	ckm Loop In and 04 ckm Loop out)			
	v. LILO of Ranchi – Ramkanali B (Proposed) 220 kV S/c line at Gola-B (08 ckm) (Presently Ranchi MTPS Line). (04 ckm Loop In and 04 ckm Loop out)		15	
	vi. LILO of Gola – CTPS A 132 kV D/c Line at Gola-B (08 ckm) (04 ckm Loop In and 04 ckm Loop out)		10	
2.	**i. Establishment of new 220/132 kV, 3x200+2x80 MVA S/s at Ramkanali-B**	To meet load growth as well as to provide dedicated power supply to consumer. Load: 65 MW by 2034-35 Provision for creating of 400 kV infrastructure with D/c LILO of DSTPS – RTPS 400 kV D/c twin moose line at Ramkanali-B (19 ckm). (9.5 ckm loop in and 9.5 ckm loop out) will be kept in future	405	2030-31
	ii. LILO of MTPS A – Gola B (proposed) 220 kV S/c (Proposed) Line at Ramkanali-B (28 ckm) (Original MTPS – Ranchi Line 220 kV line). (14 ckm Loop In and 14 ckm Loop out)		40	
	iii. LILO of MTPS A – Gola B (Proposed) 220 kV S/c Line (28 ckm) at Ramkanali-B (Original MTPS–Ramgarh 220 kV Line). (14 ckm Loop In and 14 ckm Loop out)		42	
	iv. LILO of CTPS A – Ramkanali 132 kV D/c with HTLS (Ampacity – 800A) at Ramkanali-B (29 ckm). (14.5km Loop In and 14.5 ckm Loop out)		23.2	

3.	**i. Establishment of new 220/33 kV, 2x100 MVA S/s at Ramgarh-B**	To meet load growth Load: 66 MW by 2034-35 Future provision for creation of 132 kV infrastructure will be kept in S/s	206	2032-33
	ii. LILO of Ramgarh – Gola B 220 kV D/c line at Ramgarh-B (12 ckm) (6 ckm Loop In and 6 ckm Loop out)		9.6	
4.	**i. Establishment of new 220/33 kV S/s, 2x100 MVA at Panagarh Substation**	To meet load growth and new power supply to eastern railway TSS at Panagarh Load: 100 MW by 2034-35 Future provision for creation of 132 kV infrastructure will be kept in S/s	130	2029-30
	ii. LILO of Burdwan – Parulia 220 kV S/c line at Panagarh (0.5 ckm Loop In and 0.5 ckm Loop out)		15	
5.	**i. Establishment of new 220/33 kV, 2x100 MVA S/s at Mejia**	To meet load growth and power supply to new consumers at 220 kV Load: 150 MW by 2034-35 Future provision for creation of 132 kV infrastructure will be kept in S/s	127.72	2027-28
	ii. LILO of DTPS – MTPS 220 kV S/c Line at Mejia S/s (3 km) (1.5 ckm Loop In and 1.5 ckm Loop out)		2.4	
6.	**i. Establishment of new 220/33 kV, 2x100 MVA S/s at Kalyaneswari-B**	To meet load growth and power supply to new 220 kV consumers Load: 140 MW by 2034-35 Future provision for creation of 132 kV	127.72	2028-29
	ii. LILO of MTPS – Kalyaneswari 220 kV S/c line at Kalyaneswari-B S/s (3 km) (1.5 ckm Loop In and 1.5 ckm Loop out)		2.4	

		infrastructure will be kept in S/s		
7.	**i. Establishment of new 220/33 kV, 2x100 MVA S/s at Giridih-B Substation**	To meet load growth Load: 190 MW by 2034-35	130	2028-29
	ii. LILO of KTPS – Giridih 220 kV D/c line at Giridih-B (8 ckm) (4 ckm Loop In and 4 ckm Loop out)	Future provision for creation of 132 kV infrastructure will be kept in S/s	9.6	
8.	**i. Establishment of new 132/33 kV, 2x80 MVA S/s at Galsi**	To meet load growth Load: 70 MW by 2034-35	49.5	2028-29
	ii. LILO of DTPS – Bardhaman 132 kV S/c at Galsi S/s (4 ckm) (2 ckm Loop In and 2 ckm Loop out)		2	
9.	**i. Creation of 33 kV with 2x80 MVA ICT at existing 132 kV Chandil switching station**	To meet load growth Load: 40 MW by 2034-35	49.5	2028-29
10.	**i. Establishment of new 132/33 kV, 2x80 MVA S/s at Mugma Substation**	To meet load growth Load: 70 MW by 2034-35	49.5	2032-33
	ii. LILO of Maithon S1 – Sindri 132 kV S/c line (HTLS) at Mugma (3 ckm) (1.5 ckm Loop In and 1.5 ckm Loop out)		3.36	
11.	**i. Establishment of new 132/33 kV S/s, 2x80 MVA at Koderma-B Substation**	To meet load growth in Koderma Zone Load: 50 MW by 2034-35	49.5	2027-28
	ii. LILO of KTPS – Tilaiya Solar (1) 132 kV D/c line (HTLS) at Koderma (B) (40 ckm) (20 ckm Loop In and 20 ckm Loop out)		32	

	iii. Koderma A – Koderma B 132 kV D/c line(8 ckm)		6.4	
12.	**i. Establishment of new 220/33 kV, 4 x 80 MVA Polling S/s for solar evacuation of 285 MW at TILAIYA BLOCK–2.**	To meet load growth and meet RE obligation Evacuation of power from DVC Solar projects – 285 MW	61.5	2032-33
	ii. Koderma TPS – TILAIYA BLOCK–2 220 kV D/c line along with associated bays at both end (ACSR Zebra) (10 km)		6.5	
13.	**i. Establishment of new 220/33 kV, 2 x 80MVA Polling S/s for solar evacuation of 160 MW at TILAIYA BLOCK – 3.**	To meet load growth and meet RE obligation Evacuation of power from DVC Solar projects – 160 MW	61.5	2033-34
	ii. LILO of one circuit KTPS – Tiliaya Solar-2 220 kV D/c line (ACSR Zebra) (10 ckm)		6.5	
14.	**i. Establishment of new 132/33 kV, 3 x 80 MVA Polling S/s for solar evacuation of 75 MW at PANCHET BLOCK – 1.**	To meet load growth and meet RE obligation Evacuation of power from DVC Solar projects – 75 MW	49.5	2027-28
	ii. LILO of Panchet – Ramkanali 132 kV S/c Line at Panchet S1 along with associated bays at Panchet S1 end (HTLS) (5 ckm)		4	
15.	**i. Establishment of new 132/33 kV, 2x 80 MVA Polling S/s for solar evacuation of 80 MW at PANCHET BLOCK - 2**	To meet load growth and meet RE obligation Evacuation of power from DVC Solar projects – 80 MW	49.5	2028-29
	ii. LILO of Panchet – Kumardhubi 132 kV S/c Line at Panchet S2 alongwith bays at		4	

	Panchet S2 end (HTLS) (5 km)			
16.	**i. Establishment of new 132/33 kV, 3 x 100 MVA Polling S/s for solar evacuation of 234 MW at MAITHON BLOCK - 1**	To meet load growth and meet RE obligation Evacuation of power from DVC Solar projects – 234 MW	49.5	2027-28
	ii. LILO of both circuit of MHS – Sindri 132 kV Line at Maithon S1 along with bays at Maithon S1 (HTLS) (4 km)		2.48	
17.	**i. Establishment of new 132/33 kV, 3 x 125 MVA Polling S/s for BESS evacuation of 250 MW at MAITHON BLOCK - 1**	To meet load growth and meet RE obligation Evacuation of power from Battery energy storage systems (BESS) – 250 MW	49.5	2027-28
	ii. LILO of MHS – Hydel and MHS Solar 132 kV D/c line at Maithon BESS 250 MW (HTLS) (2 km)		2	
18.	**i. Establishment of new 220/33 kV, 4x100 MVA Polling S/s for solar evacuation of 365 MW at MAITHON BLOCK - 2**	To meet load growth and meet RE obligation Evacuation of power from DVC Solar projects – 365 MW	61.5	2033-34
	ii. LILO of both circuit of 220 kV Dhanbad – Maithon(PG) Line at Maithon S2 along with bays at Maithon S2 (HTLS) end(6 ckm)(3 ckm Loop in and 3 ckm Loop out)		4.48	
19.	**i. Establishment of new 132/33 kV, 3 x 50 MVA Polling S/s for solar evacuation of 225 MW at KONAR along with 100 MW BESS**	To meet load growth and meet RE obligation	49.5	2027-28

	ii. LILO of BTPS – Konar 132 kV S/c Line at Konar Solar (HTLS) (5 ckm) along with bays at Konar	Evacuation of power from Solar projects – 225 MW And evacuation of power from Battery energy storage systems (BESS) – 100 MW	4	
	iii. LILO of Barhi – BTPS 132 kV S/c line at Konar Solar (2 ckm)		1.60	
20.	**i. Establishment of new 132/33 kV, 3 x 100 MVA Polling S/s for solar evacuation of 250 MW at BARHI Solar**	To meet load growth and meet RE obligation Evacuation of power from DVC Solar projects – 250 MW	49.5	2032-33
	ii. LILO of Barhi – Barachatti 132 kV D/c Line (HTLS) at Barhi Solar (5 ckm Loop in and 5 ckm Loop out)		9	

8.2. New Intra-state Transmission lines which are required by 2034-35 are listed at Table 8-2 below

Table 8-2 New Transmission lines of DVC

S.No	Transmission System	Justification	Estimated Cost (in Rs. Cr.)	Time frame
1.	LILO of one circuit of Gola B (proposed) – CTPS A 132 kV D/c line (presently Gola – CTPS A line) at Biada S/s along with bays at Biada S/s end. (4 ckm Loop In and 4 ckm Loop out)	To meet load growth	21.70	2027-28
2.	LILO of 2nd circuit of Mejia TPS – Kalyaneswari 220 kV D/c line at Burnpur S/s (6 ckm Loop In and 6 ckm Loop out)	To meet load growth of M/s. SAIL and others in the region	29	2027-28 One circuit of this line is already made LILO at 220 kV Burnpur s/s.

8.3. Reconductoring of existing transmission lines which are required by 2034-35 are listed at Table 8-3 below

Table 8-3 Reconductoring of existing transmission lines of DVC

S.No	Transmission System	Justification	Estimated Cost (in Rs. Cr.)	Time frame
1.	Jamshedpur – Mosabani 132 kV D/c line (78.6 ckm)	Due to increased loading in the area reconductoring of this line is required. ● Existing conductor - ACSR Lark ● Year of commissioning – 1962 ● Ampacity of HTLS – 800 A	56.16	2029-30
2.	Barhi – Hazaribag 132 kV D/c line (72 ckm)	Due to increased loading in the area reconductoring of this line is required. ● Existing conductor – ACSR Lark ● Year of commissioning – 1978 ● Ampacity of HTLS – 800 A	51.44	2029-30
3.	Burdwan – Belmuri 132 kV D/c line (103 ckm)	Due to age old conductor restringing of this line is required. ● Existing conductor –ACSR Lark ● Year of commissioning – 1965 ● Reconductoring with same Ampacity	73.59	2028-29
4.	Belmuri – Howrah 132 kV D/c line (98.6 ckm)	Due to age old conductor restringing of this line is required. ● Existing conductor – ACSR Lark ● Year of commissioning – 1957 ● Reconductoring with same Ampacity	70.45	2028-29
5.	Chandil – Gola 132 kV D/c line (198 ckm)	Due to increased loading in the area reconductoring of this line is required. ● Existing conductor – ACSR Lark ● Year of commissioning – 1955	167.85	2029-30

		● Ampacity of HTLS – 800 A		
6.	CTPS – Gola 132 kV D/c line (126.7 ckm)	Due to increased loading in the area reconductoring of this line is required. ● Existing conductor – ACSR Lark ● Year of commissioning – 1955 ● Ampacity of AAAC Panther – 480 A	16.32	2028-29
7.	Kalyaneshwari – Kalipahari 132 kV D/c line (54.6 ckm)	Due to increased loading in the area reconductoring of this line is required. ● Existing conductor – ACSR Lark ● Year of commissioning – 1987 ● Ampacity of AAAC Panther – 480 A	7.03	2027-28
8.	Howrah – Kolaghat 132 kV D/c line (264 ckm)	Due to increased loading in the area, reconductoring of this line is required. ● Existing conductor – ACSR Lark ● Year of commissioning – 1959 ● Ampacity of AAAC Panther – 480 A	15.85	2027-28
9.	Jamshedpur – Purulia 132 kV D/c line (176.8 ckm)	Due to increased loading in the area reconductoring of this line is required. ● Existing conductor – ACSR Lark ● Year of commissioning – 1959 ● Ampacity of AAAC Panther – 480 A	22.77	2028-29
10.	Gola – Ramgarh 132 kV D/c line (50.6 ckm)	Due to increased loading in the area reconductoring of this line is required. ● Existing conductor – ACSR Lark ● Year of commissioning – 1956 ● Ampacity of AAAC Panther – 480 A	6.53	2027-28

11.	CTPS – Purulia 132 kV D/c line (112 ckm)	Due to increased loading in the area reconductoring of this line is required. ● Existing conductor – ACSR Lark ● Year of commissioning – 1961 ● Ampacity of AAAC Panther – 480 A	14.42	2027-28
12.	Kharagpur – Mosaboni 132 kV S/c line (199 ckm)	Due to increased loading in the area reconductoring of this line is required. ● Existing conductor – ACSR Lark ● Year of commissioning – 1957 ● Ampacity of AAAC Panther – 480 A	24.13	2027-28
13.	Kharagpur – Kolaghat 132 kV S/c line (138.4 ckm)	Due to increased loading in the area reconductoring of this line is required. ● Existing conductor – ACSR Lark ● Year of commissioning – 1959 ● Ampacity of AAAC Panther – 480 A	17.82	2028-29
14.	DTPS – Burdwan (partly 40 km) 132 kV D/c line (164 ckm)	Due to increased loading in the area reconductoring of this line is required. ● Existing conductor – ACSR Lark ● Year of commissioning – 1956 ● Ampacity of AAAC Panther – 480 A	1.30	2027-28
15.	CTPS (A) – BTPS 220 kV D/c line (108 ckm)	Due to increased loading due installation of 2 x 800 MW U#3 & U#4 at KTPS reconductoring with HTLS of this line is required. ● Existing conductor – ACSR ZEBRA ● Year of commissioning – 1986 ● Ampacity of HTLS equivalent – 1500 A	140	2028 -29

16.	BTPS - Ramagarh 220 kV D/c line (110 ckm)	Due to increased loading due installation of 2 x 800 MW U#3 & U#4 at KTPS reconductoring with HTLS of this line is required. ● Existing conductor – ACSR ZEBRA ● Year of commissioning – 2005 ● Ampacity of HTLS equivalent – 1500 A	142	2028 -29
17.	KTPS – Giridih 220 kV D/c line (200 ckm)	Due to increased loading due installation of 2 x 800 MW U#3 & U#4 at KTPS reconductoring of this line with HTLS is required. ● Existing conductor – AAAC ZEBRA ● Year of commissioning – 2015 ● Ampacity of HTLS equivalent – 1500 A	250	2028 -29

Note: - Before taking up the reconductoring, state shall ensure the tower healthiness and commensurate rating of Bay equipment.

8.4. Augmentation of Substations which are required by 2034-35 are listed at Table 8-4 below

Table 8-4 Augmentation of Substations of DVC

S.No	Transmission System	Justification	Estimated Cost (in Rs. Cr.)	Remarks
1.	Augmentation of transformer capacity by replacement of 1x315 MVA ICT with 1x500 MVA at 400/220 kV at **DSTPS 400 kV S/s**	To cater the future load demand and to satisfy N-1 contingency criteria the Augmentation is required. Existing transformer capacity: 2X315MVA	36.30	Time frame: 2027-28 Total capacity after Augmentation: 1x 315MVA + 1x500 MVA
2.	Augmentation of transformer capacity by replacement of 2x315 MVA ICT with 2x500 MVA and additional 1x500 MVA	To cater the future load demand and to satisfy N-1 contingency criteria the Augmentation is required. Existing transformer capacity: 2x315 MVA	108.30	Time frame: 2027-28 Total capacity after Augmentation: 3x500 MVA

S.No	Transmission System	Justification	Estimated Cost (in Rs. Cr.)	Remarks
	ICT at 400/220 kV at **BTPS 400 kV S/s**			
3.	Augmentation of transformer capacity through installation of additional 1x500 MVA ICT at **400/220 kV RTPS S/s**	To cater the future load demand and to satisfy N-1 contingency criteria the Augmentation is required. Existing transformer capacity: 2x315 MVA	36.30	Time frame: 2027-28 Total capacity after Augmentation: 2 x 315 MVA +1x500 MVA
4.	Augmentation of transformer capacity by replacement of 1x315 MVA ICT with 1x500 MVA at and installation of additional 2x500 MVA ICT at 400/220 kV at 400/220 kV **KTPS 400 kV S/s**	To cater the future load demand due to installation of 2 x 800 MW U#3 & U#4 at KTPS and to satisfy N-1 contingency criteria the Augmentation is required. Existing transformer capacity: 2x315 MVA	108.30	Time frame: 2029 – 30 Total capacity after Augmentation: 1x315 MVA + 3x500 MVA
5.	Augmentation of transformer capacity by additional of 1x200 MVA ICT at 220/132 kV at **Barjora 220 kV S/s**	To cater the future load demand and to satisfy N-1 contingency criteria the Augmentation is required. Existing transformer capacity: 2x150 MVA	28.29	Time frame: 2027-28 Total capacity after Augmentation: 2x150 MVA + 1x200 MVA
6.	Augmentation of transformer capacity by additional of 1x200 MVA ICT at 220/132 kV **Kalyaneswari S/s**	To cater the future load demand and to satisfy N-1 contingency criteria the Augmentation is required. Existing transformer capacity: 2x160 MVA + 1x150 MVA	27.46	Time frame: 2027-28 Total capacity after Augmentation: 2x160 MVA + 1x150 MVA + 1x200 MVA
	Augmentation of transformer capacity by additional of 1x200 MVA ICT at 220/132 kV at **CTPS-A S/s**	To cater the future load demand and to satisfy N-1 contingency criteria the Augmentation is required. Existing transformer capacity: 2x150 MVA + 1x160 MVA	25.67	Time frame: 2026-27 Total capacity after Augmentation: 2x150 MVA + 1x160 MVA + 1x200 MVA

S.No	Transmission System	Justification	Estimated Cost (in Rs. Cr.)	Remarks
7.	Augmentation of transformer capacity by additional of 1x200 MVA ICT at 220/132 kV at **Giridih S/s**	To cater the future load demand and to satisfy N-1 contingency criteria the Augmentation is required. Existing transformer capacity: 1x150 MVA + 1x160 MVA	24.67	Time frame: 2027-28 Total capacity after Augmentation: 1x150 MVA + 1x160 MVA + 1x200 MVA
8.	Augmentation of transformer capacity by additional of 1x200 MVA ICT at 220/132 kV at **Ramgarh S/s**	To cater the future load demand and to satisfy N-1 contingency criteria the Augmentation is required. Existing transformer capacity: 2x150 MVA	27.18	Time frame: 2026-27 Total capacity after Augmentation: 2x150 MVA + 1x200 MVA
9.	Augmentation of transformer capacity by additional of 1x200 MVA ICT at 220/132 kV at **Koderma TPS** S/s	To cater the future load demand and to satisfy N-1 contingency criteria the Augmentation is required. Existing transformer capacity: 2x150 MVA	51.24	Time frame: 2028-29 Total capacity after Augmentation: 2x150 MVA + 2x200 MVA
10.	Augmentation of transformer capacity by replacement of 1x150 MVA by 1x200 MVA ICT and additional of 1x200 MVA ICT at 220/132 kV at **Jamshedpur S/s**	To cater the future load demand and to satisfy N-1 contingency criteria the Augmentation is required. Existing transformer capacity: 2x150 MVA	49.52	Time frame: 2028-29 Total capacity after Augmentation: 1x150 MVA + 2x200 MVA
11.	Augmentation of transformer capacity by replacement of 2x50 MVA with 2x80 MVA at 132/33 kV **Jamshedpur S/s**	To cater the future load demand and to satisfy N-1 contingency criteria the Augmentation is required. Existing transformer capacity: 2x50 MVA	10.8	Time frame: 2027-28 Total capacity after Augmentation: 2x80 MVA
12.	Augmentation of transformer capacity by replacement of 2x50 MVA with 2x80 MVA at 132/33 kV at **N'Karanpura S/s**	To cater the future load demand and to satisfy N-1 contingency criteria the Augmentation is required. Existing transformer capacity: 2x50 MVA	10.8	Time frame: 2028-29 Total capacity after Augmentation: 2x80 MVA

S.No	Transmission System	Justification	Estimated Cost (in Rs. Cr.)	Remarks
13.	Augmentation of transformer capacity by replacement of 1x50 MVA with 1x80 MVA at 132/33 kV **Kumardhubi S/s**	To cater the future load demand and to satisfy N-1 contingency criteria the Augmentation is required. Existing transformer capacity: 2x50+1x80 MVA	5.4	Time frame: 2028-29 Total capacity after Augmentation: 1x50 + 2x80 MVA

8.5. Evacuation system for upcoming Solar and thermal projects which are required by 2034-35 are listed at Table 8-5 given below

Table 8-5 Evacuation system for upcoming Solar projects of DVC

Sl. No	Transmission System	Justification	Estimated Cost (in Rs. Cr.)	Time Frame
1.	RTPS Phase-II – Ranchi 400 kV D/c line (24 ckm)	Transmission system for evacuation of power from 2x660 MW RTPS Phase-II thermal generating project.	100	**2031-32**
2.	DTPS – Durgapur (PG) 400 kV D/c line (70 ckm)	Transmission system for evacuation of power from 1x800 MW DTPS thermal generating project.	300	**2031-32**
3.	KTPS Phase-II – Bihar sharif 400 kV S/c line (26 ckm)	Transmission system for evacuation of power from 2x800 MW KTPS Phase-II thermal generating project.	100	**2031-32**
4.	KTPS Phase-II – Gaya 400 kV S/c line (17)		60	
5.	CTPS PH-II – Ranchi 400 kV D/c line (28 ckm)	Transmission system for evacuation of power from 2x800 MW CTPS PH-II Thermal generating project.	100	**2034-35**

9. Reactive compensation:

9.1. The system studies of the State has identified the Reactive power compensation requirement by 2034-35 at transmission level (132 kV and above voltage level)

9.2. The following reactive power compensation requirement has been identified to be implemented along with implementation of above recommended Intra-state transmission system:

Sl. No	Name of the Substation / Node	Capacitor requirement (in MVAr)
1	Chandil	4x15
2	Demotant	2x15
3	Giridih	2x15
4	Hazaribag	2x15
5	Kharagpur	1x15
6	Mosabani	2x15
7	Nimaghat	1x15

10. Summary of identified transmission system by 2034-35:

10.1. A total of 11,005 MVA transformation capacity addition/augmentation and 2,738.3 ckm of new transmission lines/reconductoring of old lines at an estimated cost of Rs 5,112.05 Crs. would be required for implementing the intra-state transmission proposals for meeting the electricity demand of the state by the year 2034-35.

The summary of voltage wise identified transmission system of the state by 2034-35 is as below:

400 kV Transmission system

S.No	Transmission system	No.	Length (in ckm)	Capacity (in MVA)	Estimated Cost (Rs. Cr.)*
1.	New substation	1	-	1600	515
2.	Augmentation of existing substation	4	-	2600	289.2
3.	New transmission line including LILO and 2nd Ckt Stringing	6	206	-	825
4.	Reconductoring of transmission line	-	-	-	-

220 kV Transmission system

S.No	Transmission system	No.	Length (in ckm)	Capacity (in MVA)	Estimated Cost (Rs. Cr.)*
1.	New substation	9	-	2640	1310.94
2.	Augmentation of existing substation	7	-	1600	234.03
3.	New transmission line including LILO and 2nd Ckt Stringing	14	145	-	212.48
4.	Reconductoring of transmission line	3	418	-	532

132 kV Transmission system

Sl. No	Transmission system	No.	Length (in ckm)	Capacity (in MVA)	Estimated Cost (Rs. Cr.)*
1.	New substation	9	-	2005	445.5
2.	Augmentation of existing sub-station	4	-	560	76.5
3.	New transmission line including LILO and 2nd Ckt Stringing	10	133	-	125.74
4.	Reconductoring of transmission line	14	1836.3	-	545.66

10.2. Summary of year-wise MVA capacity, ckm addition and tentative expenditure required for implementation of above recommended proposals is given below

Year	**Capacity Addition (in MVA)**			**Transmission line addition (in ckm)**			**Reconductoring (in ckm)**		**Estimated Cost (in Rs. Cr.)**
	132 kV	**220 kV**	**400 kV**	**132 kV**	**220 kV**	**400 kV**	**132 kV**	**220 kV**	
2026-27	-	400	-	-	-	-	-	-	52.85
2027-28	1385	800	1100	74	15	-	844.2	-	822.18
2028-29	720	1000	-	9	11	-	643.5	418	1274.13
2029-30	-	200	1500	-	1	-	348.6	-	528.75
2030-31	-	760	1600	37	80	41	-	-	1245.2
2031-32	-	-	-	-	-	137	-	-	560
2032-33	460	520	-	13	22	-	-	-	394.96
2033-34	-	560	-	-	16	-	-	-	133.98
2034-35	-	-	-	-	-	28	-	-	100
Total	**2565**	**4240**	**4200**	**133**	**145**	**206**	**1836.3**	**418**	**5112.05**

11. Conclusion

11.1. By the year 2034-35, the power demand of DVC would be increasing significantly. Total expected demand of DVC by the year 2034-35 is around 6,900 MW. This anticipated increase in demand includes the expected industrial load coming progressively from 2024-25 to 2034-35.

11.2. About 4 Nos. of Thermal power projects and 9 Nos. of solar projects connected with DVC transmission network are expected to be commissioned by 2034-35.

11.3. In order to meet this growing load demand, evacuation of power from solar and thermal generation and for drawal of power from ISTS in accordance with GNA

requirement of DVC by 2034-35, the DVC as well as inter-state transmission system of the state need to be strengthened. It has been observed that the transmission system infrastructure in DVC at voltage levels of 132 kV, 220 kV and 400 kV needs to be upgraded.

11.4. The planned network is related to the DVC transmission system of the State, the State is also advised to plan its downstream network at distribution level in matching timeframe with this planned transmission system.

11.5. At some of the sub-stations there may be low voltage issues due to long lines the State is advised to installed suitable capacitor at distribution level (i.e. 33 kV or 11 kV level). The compensation requirement is given at Paragraph-10 above in this report.

11.6. It is recommended that DVC shall update their transmission systems on the PM GatiShakti (PMGS) National Master Plan on regular basis.

11.7. The quantum of GNA is nearing the ATC of the DVC and demand of the state is increasing, therefore, the state is advice to take up their transmission system strengthening progressively. As per CERC (Connectivity and General Network Access to the Inter-State Transmission System) Regulations, 2022 States (STUs) may apply for additional GNA once in a financial year by the month of September for the next 3 (three) financial years. Therefore, it is suggested that State shall asses their GNA requirement and apply well before considering the timelines prescribed in the regulations.

11.8. A total of 9,465 MVA transformation capacity addition/augmentation and 2,659.3 ckm of new transmission lines/reconductoring/underground cabling at an estimated cost of ₹ 4,483.11 cr. would be required for implementing the intra-state transmission proposals for meeting the electricity demand of the state by the year 2031-32.

11.9. Further a total of 11,005 MVA transformation capacity addition/augmentation and 2,738.3 ckm of new transmission lines/reconductoring at an estimated cost of ₹ 5,112.05 cr. would be required for implementing the intra-state transmission proposals for meeting the electricity demand of the state by the year 2034-35.

11.10. As loading on some existing/under implementation elements expected to quite low, the state may examine the possibility of load shifting and taking up new elements commensurate to the demand in the area.

11.11. To ensure reliable and adequate power supply in DVC by 2034-35, a robust and resilient transmission network becomes critical. The outlined plan, if implemented timely, will ensure resource adequacy and support economic and industrial development in the state.

Annexure-I

List of Intra-state Elements

a) Sub-Station Details

Voltage Ratio	220/132kV		220/33 KV		132/33 KV	
Sub-Station	**Nos.**	**MVA**	**Nos.**	**MVA**	**Nos.**	**MVA**
Howrah	-	-	-	-	2	110
Burdwan	2	320	-	-	3	180
Belmuri	-	-	-	-	1	50
Kolaghat	-	-	-	-	-	-
Kharagpur	-	-	-	-	-	-
Kalyaneswari	3	470	2	100	3	161.5
Burnpur	-	-	2	100	-	-
Kumardubi	-	-	-	-	2	130
Ramkanali	-	-	-	-	-	-
M' thn R. Bank	-	-	-	-	-	-
Jamsedpur	2	300	-	-	2	100
Chandil	-	-	-	-	-	-
Purulia	-	-	-	-	2	60
Mosabani	-	-	-	-	2	63
Putki	-	-	-	-	3	240
Patherdih	-	-	-	-	3	210
Giridih, New	2	310	2	80		-
Giridih, Old	-	-			3	80
Dhanbad	2	320	2	160	-	-
BIADA	-	-	-	-	3	240
Sindri	-	-	-	-	-	-
CTPS' A	3	460	2	160	-	-
Hazaribag	-	-	-	-	3	150
Koderma	-	-	-	-	2	130
KTPP S.Stn.	2	300	2	160	-	-
Konar	-	-	-	-	2	51.5
Barhi	-	-	-	-	2	160
Koderma R/S	-	-	-	-	-	-
Durgapur	-	-	4	290	-	-
Parulia	-	-	2	160	-	-
Borjora	2	300	2	160	-	-
Kalipahari	-	-	-	-	2	160
Jamuria	-	-	-	-	3	180
ASP Sub. Stn	-	-	-	-	2	130
DTPS	4	640	-	-	1	50
Ramgarh	2	300	2	130	3	240
Gola	-	-	-	-	2	81.5
Patratu	-	-	-	-	1	31.5
N'K.Pura	-	-	-	-	2	100

Voltage Ratio	220/132kV		220/33 KV		132/33 KV	
Sub-Station	Nos.	MVA	Nos.	MVA	Nos.	MVA
BTPS' B	2	300	-	-	2	160
TOTAL:	26	4020	22	1500	56	3249

Voltage Ratio	400/220kV	
Power House	Nos.	MVA
BTPS	2	630
KTPS	2	630
RTPS	2	630
DSTPS	2	630
MTPS	1	315
Total	**9**	**2835**
Grand Total	**113**	**11604**

b) Reactor Details

Power House	Type	No	REACTOR CAPACITY
KTPS	Bus Reactor	2	50MVA
RTPS	Bus Reactor	2	50MVA
RTPS	Line Reactor	2	50MVA

c) Line details

Voltage Level	Line Name	No of Circuit	Length in km	Length in ckm
400 kV	DSTPS-Jamsedpur	D/C, 3ф	4	8
400 kV	DSTPS-RTPS	D/C, 3ф	68.9	137.8
400 kV	RTPS-PGCIL Maithon	S/C, 3ф	10.5	10.5
400 kV	RTPS-PGCIL Ranchi	S/C, 3ф	168.447	326.4
220 kV	BTPS' B-Jamsedpur	D/C, 3ф	153.5	307
220 kV	Burnpur-SAIL, ISP	D/C, 3ф	1.2	2.4
220 kV	CTPS' A-BSL	D/C, 3ф	19.6	39.2
220 kV	CTPS' A-BTPS' B	D/C, 3ф	31.8	63.6
220 kV	CTPS' A-CTPS' B	S/C, 3ф	7.5	7.5
220 kV	CTPS' A-Kalyaneswari	D/C, 3ф	135.73	271.46
220 kV	CTPS' B-Dhanbad	D/C, 3ф	46.5	93
220 kV	Dhanbad-Electro-Steel	D/C, 3ф	60	120
220 kV	Dhanbad-Giridih, New	D/C, 3ф	44.4	88.8
220 kV	Dhanbad-PGCIL, P'kari	D/C, 3ф	50.92	101.84
220 kV	DSTPS-Parulia	D/C, 3ф	17.34	34.68
220 kV	DTPS-DSTPS	D/C, 3ф	11.14	22.28
220 kV	DTPS-MTPS	D/C, 3ф	42	84

Voltage Level	Line Name	No of Circuit	Length in km	Length in ckm
220 kV	DTPS-WBTCL	D/C, 3ф	17.26	34.52
220 kV	Jamsedpur-JSPL-Joda	S/C, 3ф	135	135
220 kV	Kalyaneswari-Burnpur	S/C, 3ф	22	22
220 kV	Kalyaneswari-MTPS	S/C, 3ф	126.66	193.32
220 kV	Kalyaneswari-PGCIL, P'kari	D/C, 3ф	7.16	14.32
220 kV	Koderma-Giridih, New	D/C, 3ф	101.11	202.22
220 kV	MTPS-Borjora	D/C, 3ф	16.8	33.6
220 kV	MTPS-Burnpur	S/C, 3ф	58.23	58.23
220 kV	MTPS-Durgapur	D/C, 3ф	31.5	63
220 kV	MTPS-PGCIL Ranchi	S/C, 3ф	232	232
220 kV	MTPS-Ramgarh	S/C, 3ф	211.999	212
220 kV	Parulia-Burdwan	D/C, 3ф	103.055	206.11
220 kV	Parulia-Durgapur	D/C, 3ф	16.68	33.36
220 kV	Parulia-PGCIL, Parulia	D/C, 3ф	1	2
220 kV	Parulia-SAIL, DSP	D/C, 3ф	36	54
220 kV	Ramgarh-BTPS' B	D/C, 3ф	54.6	109.2
220 kV	Ramgarh-PGCIL Ranchi	S/C, 3ф	95	95
132 kV	Barhi-Bihar Sariff	S/C, 3ф	75	75
132 kV	Barhi-Hazaribag	D/C, 3ф	39.63	79.26
132 kV	Barhi-Konar	S/C, 3ф	64	64
132 kV	Barhi-KTPS	D/C, 3ф	23.5	47
132 kV	Barhi-Rajgir	S/C, 3ф	75	75
132 kV	Belmuri-Howrah	D/C, 3ф	49.5	99
132 kV	Borjora-Sonic Thermal	S/C, 3ф	10.237	10.24
132 kV	BTPS' B-Barhi	S/C, 3ф	90.5	90.5
132 kV	BTPS' B-ECR, GOMIA	S/C, 2ф	3.5	3.5
132 kV	BTPS' B-Konar	S/C, 3ф	26.5	26.5
132 kV	Burdwan-Belmuri	D/C, 3ф	49.5	99
132 kV	Burdwan-DTPS	D/C, 3ф	81	162
132 kV	Chandil-Gola	D/C, 3ф	103.5	207
132 kV	Chandil-JUSCO	D/C, 3ф	11.6	23.2
132 kV	CTPS' A-BIADA	D/C, 3ф	15	30
132 kV	CTPS' A-ER, Rajabera	D/C, 2ф	4.9	9.8
132 kV	CTPS' A-Gola	D/C, 3ф	70.38	140.76
132 kV	CTPS' A-MSDS, BSL	S/C, 3ф	20	40
132 kV	CTPS' A-Purulia	D/C, 3ф	57.86	115.72
132 kV	CTPS' A-Putki	D/C, 3ф	59	118
132 kV	CTPS' A-Ramkanali	D/C, 3ф	71.2	142.4
132 kV	CTPS' A-TPP, BSL	D/C, 3ф	9	18
132 kV	Dhanbad-Patherdih	D/C, 3ф	37	74
132 kV	DTPS-ASP Sub. Stn	D/C, 3ф	5	10
132 kV	DTPS-DPL	S/C, 3ф	0.12	0.12
132 kV	DTPS-Jamuria	D/C, 2ф	33	66

Voltage Level	Line Name	No of Circuit	Length in km	Length in ckm
132 kV	DTPS-Ramkanali	D/C, 3ф	9.08	18.16
132 kV	Gola-Ramgarh	D/C, 3ф	25.28	50.56
132 kV	Gola-SER, Muri	D/C, 2ф	30.289	60.58
132 kV	Howrah-Kolaghat	D/C, 3ф	61.7	119.7
132 kV	Jamsedpur-Chandil	D/C, 3ф	44.38	87.81
132 kV	Jamsedpur-Mosabani	D/C, 3ф	42.82	85.64
132 kV	Jamsedpur-Purulia	D/C, 3ф	87	174
132 kV	Jamuria-Gagan ferrotech	S/C, 3ф	1.334	1.33
132 kV	Jamuria-Ramkanali	D/C, 3ф	57.25	114.5
132 kV	Jamuria-Super Smelter	S/C, 3ф	2.246	2.25
132 kV	Kalipahari-DTPS	D/C, 3ф	41.05	80.75
132 kV	Kalyaneswari-Captain Steel	S/C, 3ф	0.226	0.23
132 kV	Kalyaneswari-Kalipahari	D/C, 3ф	28.8	57.6
132 kV	Kalyaneswari-MPL, Impex	S/C, 3ф	1.5	1.5
132 kV	Kharagpur-Kolaghat	D/C, 3ф	69.2	138.4
132 kV	Kharagpur-Mosabani	D/C, 3ф	102.6	205.2
132 kV	Konar-Hazaribag	D/C, 2ф	38.5	77
132 kV	KTPS-Koderma	D/C, 3ф	21	42
132 kV	Mosabani-JBVNL, Dh'garh	D/C, 3ф	10.5	21
132 kV	M'thn L. Bank-Deoghar	S/C, 3ф	107.06	107.06
132 kV	M'thn L. Bank-Kalyaneswari	S/C, 3ф	3.2	3.2
132 kV	M'thn L. Bank-Kumardubi	S/C, 3ф	4.8	4.8
132 kV	M'thn L. Bank-Panchet	S/C, 3ф	14.4	14.4
132 kV	Nimiaghat-Giridih, New	D/C, 3ф	41	82
132 kV	N'K.Pura-Eastern Rail	S/C, 2ф	4.5	4.5
132 kV	N'K.Pura-ECR, Balumath	D/C, 3ф	38.9	77.8
132 kV	N'K.Pura-NTPC, Tandwa	D/C, 3ф	25.6	51.2
132 kV	Panchet-Kumardubi	S/C, 3ф	9.6	9.6
132 kV	Panchet-Ramkanali	D/C, 3ф	15	30
132 kV	Patherdih-Balihari	S/C, 3ф	24	24
132 kV	Patherdih-M'thn L. Bank	D/C, 3ф	18.34	34.14
132 kV	Patherdih-Sindri	D/C, 3ф	14.3	28.6
132 kV	Patratu-JSPL, Patratu	D/C, 3ф	0.5	1
132 kV	Patratu-N'K.Pura	D/C, 3ф	36.5	73
132 kV	Patratu-PTPS	D/C, 3ф	7	14
132 kV	Putki-Balihari	S/C, 3ф	0.5	0.5
132 kV	Putki-Nimiaghat	D/C, 3ф	43.5	87
132 kV	Putki-Patherdih	S/C, 3ф	45	45
132 kV	Ramgarh-Patratu	D/C, 3ф	32.2	64.4
132 kV	Sindri-M'thn L. Bank	D/C, 3ф	22.8	45.6
132 kV	Sindri-P. Khanta	D/C, 2ф	19.6	39.2

Annexure-II

Under Construction / Implementation List

Sl. No	Transmission System	MVA	CKM	Time frame
1.	**Establishment of new 132/33 kV, 2x50 MVA S/s at Demotand.** **132/33 kV, 50 MVA Transformer – 2 Nos**	100		2027-28
	S/C LILO of Barhi – Hazaribagh 132 kV D/c line with HTLS (Ampacity–800A) (20 ckm)		20	
2.	**Establishment of new** 132/33 kV, 3 x 80 MVA Polling S/s for solar evacuation of 155 MW at TILAIYA BLOCK – 1.	240		2026-27
	LILO of both circuits of Koderma TPS–Barhi 132 kV D/C line at Tilaiya Solar along with bays at Tilaiya Solar-S1 end (HTLS conductor) (4 ckm)		4	
3.	S/C LILO of CTPS/Ramkanali B – Jamuria 132 kV line at Ramkanali S/s along with line bays at Ramkanali S/s (0.3 ckm Loop In and 0.3 ckm Loop out)		0.6	2026-27
Augmentation of transformer				
1.	Augmentation of transformer capacity by replacement of 1x20 MVA with 1x31.5 MVA at 132/33 kV **Konar S/s**	31.5		2026-27
2.	Augmentation of transformer capacity by replacement of 1x50 MVA with 1x80 MVA at 132/33 kV **MHS S/s**	80		2026-27
3.	Augmentation of transformer capacity by replacement of 1x50 MVA with 1x80 MVA at 132/33 kV **Hazaribagh S/s**	80		2026-27
4.	Augmentation of transformer capacity by additional of 1x80 MVA ICT at 132/33 kV at **Koderma S/s**	80		2026-27
5.	Augmentation of transformer capacity by replacement of 3x50 MVA with	240		2028-29

Sl. No	Transmission System	MVA	CKM	Time frame
	3x80 MVA at 220/132/33 kV **Kalyaneswari S/s**			
6.	Augmentation of transformer capacity by replacement of 1x50 MVA with 1x80 MVA at 132/33 kV **Patherdih S/s**	80		2027-28
Reconductoring of Lines				
1.	DTPS – DSTPS 220 kV D/c line (24 ckm) along with upgradation of requisite bay equipment		24	2025-26
2.	DTPS – Jamuria 132 kV D/c line (61 ckm)		61	2024-25
3.	MHS – Kumardhubi 132 kV S/c line (4.9 ckm)		4.9	2025-26
4.	MHS – PHS 132 kV S/c line (14.4 ckm)		14.4	2025-26
5.	DTPS – Kalipahari 132 kV D/c line (80.8 ckm)		80.8	2025-26
6.	KTPS – Barhi 132 kV D/c line (42.4 ckm)		42.4	2025-26
7.	PHS – Ramkanali 132 kV D/c line (30 ckm)		30	2025-26
8.	Ramkanali – Jamuria 132 kV S/c line (116 ckm)		116	2026-27
9.	PHS – Kumardhubi 132 kV S/c line (9.6 ckm)		9.6	2025-26
10.	KTPS – Koderma 132 kV D/c line (38.5 ckm)		38.5	2025-26
11.	MHS – Sindri 132 kV D/c line (112.8 ckm) along with upgradation of requisite bay equipment		112.8	2027-28
12.	Jamshedpur – Chandil 132 kV D/c line (87.5 ckm)		87.5	2027-28
13.	BTPS – Barhi - Konar 132 kV D/c line (163.4 ckm) along with upgradation of requisite bay equipment		163.4	2027-28

Annexure-III

Operational Feedback from DVC SLDC.

The latest Operational Constraints in DVC Grid are as follows:

1. (N-1) Loading Violation for 315 MVA ICTs at BTPS & RTPS, during solar hours.
2. Under contingency of CTPS units, (N-1) loading violation is observed in 220kV D/c Dhanbad - Maithon PG Tie-line.

SL No.	Constraints	Description	Remarks
1.	Transmission system at **33 kV Koderma RS** is facing inadequacies due to increasing demand	Transmission system at **33 kV Koderma RS** is facing inadequacies due to increasing demand, leading to congestion in transmission corridors and straining the existing infrastructure	To address this, DVC has included the voltage upgradation of Koderma RS from 33 kV to 132 kV in its Rolling Plan for 2034-35, ensuring enhanced capacity and improved reliability of the power supply.
2.	Tapping the 132 kV transmission line to supply power to industrial consumers (9 in total — 7 currently connected and 2 under construction: M/s BRGD and M/s Shiv Shambhu) is not in accordance with safety regulations and poses operational challenges**.**	DVC is currently supplying power to seven industrial consumers by tapping various 132 kV transmission lines, which are not in accordance with CEA Safety Regulation 2023.	To address this issue, DVC has included the construction of two new LILO substations in its Rolling Plan for 2034-35: a) **Ramkanali B (400/220/132kV) Substation**–This substation is proposed to be developed through a LILO of the 400 kV DSTPS–RTPS Transmission line. This substation will cater to the power requirements of five existing industrial consumers, one upcoming consumer (M/s BRGD – 24 MVA), and other prospective consumers in the region. The project has already received approval from the CEA

			b) **The 132 kV Kumardhubi B substation (S/C LILO of 132 kV MHS–Sindri Line #15**) is proposed to meet the power requirements of one existing industrial consumer, **M/s Ridhi Sidhi (10 MVA),** alongwith two additional consumers whose applications—collectively seeking 70 MVA of load—have already been received. The future construction of new LILO substations for new consumers, including M/s Shiv Shambhu (10 MVA from the 132 kV Dhanbad–Patherdih line), may be proposed based on projected demand growth in the region. This will ensure adequate power supply, enhanced system reliability, and compliance with applicable regulatory standards
3.	**Transmission Line Overloading/N-1 Contingency**	132kV KTPS-Koderma Transmission Lines (#101 & #102) are operating close to or above their rated capacities, failing to meet the N-1 Contingency Criteria, which raises reliability concern 132 kV KTPS-Barhi Transmission Lines (43&44) are operating close to their rated capacities, failing to meet the N-1 Contingency Criteria, which	To mitigate these issues, DVC has included the HTLS reconductoring of these transmission lines in its Rolling Plan for 2034-35. CEA approval has already been obtained for the proposed upgrades, ensuring enhanced transmission capacity and improved system reliability

		raises reliability concern.	
		132 kV MHS-Kumardhubi & MHS-PHS Transmission Lines (16&17) are operating close to their rated capacities, failing to meet the N-1 Contingency Criteria, which raises reliability concern	
4.	**ICT/ATR/Power Transformer at critical locations nearing their operational limits or N-1 contingency Issues**	2×150 MVA, 220/132 kV ATRs (#1& #2) at KTPS are nearing their operational limits and do not comply with the N-1 Contingency Criteria, posing reliability concerns	To address this, DVC has included ATR augmentation in its Rolling Plan for 2034-35 by adding a new 1×200 MVA, 220/132kV ATR at KTPS. CEA approval has already been obtained for this upgrade, ensuring improved system reliability and capacity enhancement.
		2×315 MVA, 400/220 kV ICTs (#1 & #2) at BTPS do not comply with the N-1 Contingency Criteria, posing reliability concern	To mitigate this issue, DVC has included ICT augmentation in its Rolling Plan for 2034-35 by adding a new 1×500 MVA, 400/220kV ICT at BTPS. CEA approval has already been obtained, ensuring enhanced system reliability and capacity.
		2×315 MVA, 400/220 kV ICTs (#1& #2) at DSTPS do not comply with the N-1 Contingency Criteria, leading to reliability concerns	To address this, DVC has included ICT augmentation in its Rolling Plan for 2034-35 by replacing them with 2×500 MVA, 400/220kV ICTs. CEA approval has already been obtained, ensuring improved system reliability and enhanced transmission capacity
		2×150 MVA + 1×160 MVA, 220/132 kV ATRs (#1, #2 & #3) at CTPS are	To address this, DVC has included ATR augmentation in its Rolling Plan for 2034-35 by adding a new 1×200

		operating near full load and do not comply with the N-1 Contingency Criteria, raising reliability concerns.	MVA, 220/132kV ATR at CTPS. CEA approval has already been obtained, ensuring enhanced system reliability and capacity.
		The **1×150 MVA +1×160 MVA, 220/132kV ATRs (1& #2) at Giridih** are operating near full load and do not comply with the **N-1 Contingency Criteria**, leading to reliability concerns.	To address this, **DVC has included ATR augmentation** in its **Rolling Plan for 2034-35** by adding a **new 1×200 MVA, 220/132kV ATR** at Giridih. **CEA approval has already been obtained**, ensuring improved system reliability and capacity.
		1×150 MVA + 2×160 MVA, 220/132 kV ATRs (#1, #2 & #3) at Kalyaneswari are operating near full load and do not comply with the N-1 Contingency Criteria, raising reliability concerns	To address this, DVC has included ATR augmentation in its Rolling Plan for 2034-35 by adding a new 1×200 MVA, 220/132kV ATR at Kalyaneswari. CEA approval has already been obtained, ensuring enhanced system reliability and capacity.
5.		2×150 MVA, 220/132kV ATRs (#1& #2) at Barjora are operating near full load and do not comply with the N-1 Contingency Criteria, leading to reliability concerns.	To address this, DVC has included ATR augmentation in its Rolling Plan for 2034-35 by adding a new 1×200 MVA, 220/132kV ATR at Barjora. CEA approval has already been obtained, ensuring improved system reliability and capacity.

Annexure-IV

Operational feedback from ERLDC/NLDC

Operational constraints in DVC Area

Sl. No	Corridor	Season/ Antecedent Conditions	Description of the constraints
	Line & ICT Constraints: A number of lines and ICTs which are not satisfying N-1 security criteria are detailed below:		
1	220 kV Maithon-Dhanbad D/C (DVC), & 220 kV Maithon-Kalyaneshwari D/C (DVC)	High loading at DVC and Jharkhand area	**Constraints:** These lines are not N-1 compliant. Further, high loading of 220 kV Maithon-Dhanbad D/C and 220 kV Maithon-Kalyaneshwari D/C is observed due to: - • Less generation at CTPS • NIL generation at Bokaro-B • Less generation at Koderma • Any forced outage of ICTs at Koderma/Bokaro. • CTPS –A-Kalyaneshwari D/C has been LILO-ed at RTPS (2*600 MW) in Nov-24 causing the line Maithon –Kalyaneswari to be decongested. But during high generation at RTPS and low generation in Mejia 220kV, now N-1 violation occurring from Kalyaneshwari to Maithon direction too. **Remedial Action:** **Short term measure:** As short-term measure loading of 220KV Maithon-Dhanbad is controlled by 220 kV network rearrangement like bus splitting at 220 kV Dhanbad or Shifting of Giridih load to 220 kV Koderma. **Long term measure:** • Generation increase/ augmentation at CTPS, and Koderma (Koderma PH-II is expected by Aug 2028). • Establishing connectivity between 220 kV and 400 kV of Mejia power plants: 2 x 315 MVA 400/220 kV ICTs are available at MTPS-B. However, it is not integrated with 220 kV system. LILO of 220kV D/C MTPS-A – Barjora Line at MTPS – B Switchyard and 220kV S/C LILO of MTPS-A – Durgapur at Barjora substation has been planned by DVC. The connectivity between

Sl. No	Corridor	Season/ Antecedent Conditions	Description of the constraints
			Mejia B 400KV with 220KV DVC System will be established by Dec'26.
2	220 kV Waria-DSTPS D/C (DVC)	High generation of DSTPS.	**Constraints:** High generation of DSTPS coupled with high demand of DVC leads to N-1 loading limit violation in the above line. **Remedial Action:** Reconductoring with HTLS is under discussion at DVC.
3	400/220 kV 315 MVA ICT at Bokaro -1 & 2 (DVC)	During Peak demand of Jharkhand and Decommissioning of Units at Bokaro-B	**Constraint:** ICTs are not N-1 compliant during high demand season. **Remedial Actions:** **Short Term: -** • As a short-term measure 220 kV Bokaro bus split and network re-configuration is done to relieve congestion. • SPS scheme for N-1 compliance of ICTs at Bokaro is under discussion stage to be finalised after joint study with DVC and ERLDC). **Long Term: -** DVC has planned to install an additional 3rd, 500 MVA ICT at Bokaro. As per latest status the project is still under planning stage.
4	400/220 kV 315 MVA Koderma ICT - 1 & 2 (DVC)	During high demand season	**Constraint:** ICTs are not N-1 compliant during high demand season. **Remedial Actions:** **Short Term: -** 315MVA 400/220KV Koderma ICT replacement to be completed by Dec-25. **Long Term: -** • 400/220KV ICTs upgradation to 500MVA at Koderma (May'27) Koderma (PH-II) generation along with additional ICT for internal consumption is expected by Feb 2028 which is likely to relieve the congestion of ICTs in Ph-I.
5	400/220 kV 315 MVA	During high demand season	**Constraint:**

Sl. No	Corridor	Season/ Antecedent Conditions	Description of the constraints
	DSTPS (Andal) ICT -1 & 2 (DVC)		ICTs are not N-1 compliant. **Remedial Actions:** As per information from DVC is planning to replace 2*315 MVA ICTs with 2*500MVA ICTs. Currently order is placed for 1st 500MVA ICT.
6	400/220 kV 315 MVA Raghunathpur ICT -1 & 2 (DVC)	High demand in DVC and high generation in RTPS, low generation in Mejia and CTPS, high injection from WR	**Constraint:** During high injection from WR during solar hours, high demand in DVC and high generation from RTPS these ICTs become N-1 compliant. **Remedial Actions:** **Short term measure:** 220kV RTPS-Kalyaneswari Circuits and 220kV CTPS-Dhanbad are opened to reduce the ICT loading. **Long term measure:** There is need for long term measures for making system N-1 secure.