



**TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED
Vidyut Soudha, Vijayawada**

NOTIFICATION

STATE ELECTRICITY PLAN

VIDYUT SOUDHA, VIJAYAWADA, Monday, June 14, 2021

In accordance with clauses 5.1 and 5.2 (a) of the “Guidelines for Load Forecasts, Resource Plans, And Power Procurement” issued in December, 2006 by the Hon’ble Andhra Pradesh Electricity Regulatory Commission (APERC), in pursuance of the directions at para 188 of the Hon’ble APERC’s order dated 15.04.2019 on Load Forecasts, Resource Plans and Power Procurement Plan and after obtaining the approval of the State Co-ordination Forum on 14.06.2021, the TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED hereby notifies the “**State Electricity Plan**” for 4th Control Period (FY2019-20 to FY2023-24) which is formulated in co-ordination with the APDISCOMs and APGENCO for promotion of Generation, Transmission, Distribution and Supply of electricity in the State of Andhra Pradesh.

CHAIRMAN & MANAGING DIRECTOR

STATE ELECTRICITY PLAN (FY 2020 – FY 2024)



January 2020

State Electricity Plan for 4th Control Period
(FY 2019-20 to FY 2023-24)

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1 INTRODUCTION

The State Electricity Plan (SEP) for Andhra Pradesh from FY 2019-20 to FY 2023-24 considers the projections of energy demand for the said period. Various factors like historical trends, new capital city, PCPIR (Petroleum, Chemicals and Petrochemical Investment Region) corridor, Vizag Chennai Industrial Corridor (VCIC), Sri City SEZ, new airports, new sea ports etc. have been considered for projecting the energy demand for the state up to FY 2023-24. The energy demand is projected to grow at a CAGR of about 8% in the said period as per the resource plan approved by Hon'ble APERC.

The availability of energy from various sources (long term and medium term) and the addition of generation capacity of various fuel types (coal, gas, hydel, nuclear and Renewables) in order to meet the increasing demand is indicated. Addition of around 3,320 MW of thermal capacity, -154 MW of renewable energy capacity and around 960 MW of Hydel capacity are projected to be added from FY 2019-20 to FY 2023-24. Retirement of thermal stations has not been considered. The SEP also considers the projected additions of substations and Transmission lines by APTRANSCO up to FY 2023-24. Around 155 Nos. of substations and 7,059 ckm of Transmission lines are projected to be added from FY 2019-20 to FY 2023-24.

1.1 APERC Guidelines

The Andhra Pradesh Electricity Regulatory Commission (APERC), directs that APTRANSCO has to formulate State Electricity Plan in co-ordination with Discoms and APGENCO for the promotion of generation, Transmission, distribution and supply of electricity and notify the same once in the Control Period under consideration for tariff review.

APTRANSCO, in preparing the State Electricity Plan, shall publish the draft State Electricity Plan and invite suggestions and objections thereon from licensees, generating companies, the Commission and the public within such time as may be specified by the Commission:

Provided that APTRANSCO shall:

(a) notify the plan after considering the comments of the Commission and all stakeholders, and obtaining the approval of the State Coordination Forum; and

(b) revise the plan incorporating therein the directions, if any, given by the State Coordination Forum while granting approval under (a) above.

The State Electricity Plan would be for a short-term framework of a period equal to Control Period under consideration for tariff review and shall include:

- Short-term and long-term demand forecast, with inputs from the last approved Load Forecast;
- Suggested areas/locations for capacity additions in generation and Transmission keeping in view the economics of generation and Transmission, losses in the system, load centre requirements, grid stability, security of supply, quality of power including voltage profile etc. and environmental considerations including rehabilitation and resettlement;
- Integration of such possible locations with Transmission system and development of state grid including type of Transmission systems and requirement of redundancies;
- Different technologies available for efficient generation, Transmission and distribution ; and
- Fuel choices based on economy, energy security and environmental considerations.

The State Electricity Plan would be used as a reference document by all stakeholders and also assist CEA in planning the National Electricity Plan or any other Plan requiring inputs from the State.

1.2 Power for All

Andhra Pradesh is one of the state in the country selected for implementation of "Power for All"- flagship program of Govt. of India.

The objective of the above program is to supply 24x7 quality, reliable and affordable power supply to all domestic, commercial and industrial consumers within a fixed timeframe. This program covers the entire gamut of

power sector, including generation, Transmission, distribution, consumer initiatives, renewable energy, energy efficiency measures, financial health of the utilities and support required from Govt. of India to achieve the objectives of the program.

The program would be implemented jointly by Govt. of India & Govt. of Andhra Pradesh as partners. The various ministries of Central Govt. which would be involved in this program are Ministry of Power, Ministry of Coal, Ministry of Petroleum & Natural Gas, Ministry of New & Renewable Energy, Ministry of Environment & Forests and Ministry of Railways.

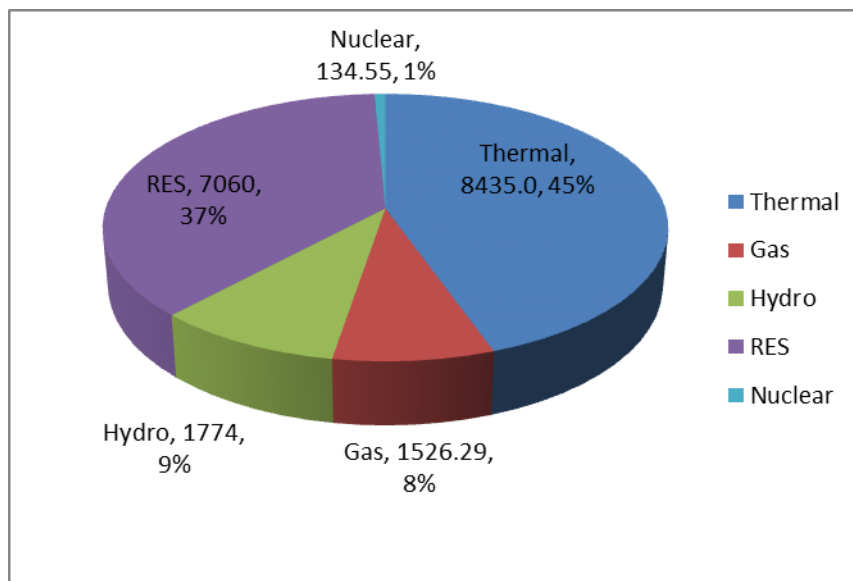
CEA would be functioning as the nodal authority for implementation & monitoring of the program. The Central PSUs namely NTPC, CIL, MCL, WCL, SCCL, PFC, REC, NHPC, NPCIL, PGCIL, BHEL, EESL, BEE, SECI, ONGC, GAIL, NRVNL along-with the State PSUs APGENCO, APTRANSCO, APDISCOMS, NREDCAP and SECM would be partners in the implementation of the program.

1.3 Andhra Pradesh Power Sector at a glance

The total installed capacity of Andhra Pradesh is 18930 MW as per power allocation after state bifurcation as on 31-03-2019. The total number of consumers in the state is 185.06 lakhs which includes 147.99 lakhs of domestic, 14.65 lakhs of commercial, 1.63 lakhs of industrial, 17.37 lakhs of agricultural categories as on 31.3.2019. The total energy consumption (at utility periphery) in Andhra Pradesh during FY 2018-19 was 64,148 MU and the peak demand was 9453 MW.

1.4 Installed Capacity

The present installed capacity as on 31-03-2019 in the state is 18930 MW , comprising 5010 MW of APGenco thermal, 1,774 MW of APGenco Hydel, 1526 MW of Gas projects, 2,409 MW of CGS Share, 1105 MW of IPP's & others and 7060 MW of NCE's.



1.5 Position of State Transmission and Distribution

The Transmission and Distribution infrastructure as on 31-03-2019 consists of 15 Nos. of 400 kV substations, 93 Nos. of 220 kV substations, 212 Nos. of 132 kV substations and 27,979.23 Ckm of EHT lines. The Transmission losses during FY 2018-19 was 3.10%. There are 3038 Nos. of 33/11 kV substations, 913158 Nos. Distribution Transformers and 26,262 ckm of 33 KV lines as on 31st March 2019.

1.6 Power Supply Position

Power is being supplied to Domestic, Commercial & Industrial consumers along with Agricultural consumers in rural areas through mixed feeders. There are dedicated/express industrial feeders. 9 hours three phase Day time power supply is being given to agricultural consumers mostly in single/two spells.

Three phase supply to rural areas for Domestic, Commercial & Industrial consumers is along with 9 hrs Agricultural supply only. Whereas, balance 15 hrs supply is given to rural areas through single phase power supply. As a result, most of the consumers, other than Agricultural in rural areas on mixed feeders get 24 hours of supply every day.

The total No. of Agricultural Feeders in the state are 6663(5283 SPDCL,1380 EPDCL) Nos and Total No of Agl Consumers as on 31.03.2019 is 17.37 Lakhs. APTRANSCO has planned to augment the system for extending 9 Hrs Day time

supply to Agricultural Consumers.

Domestic consumers are being extended 3 phase supply depending upon availability of power. However, there is a system in Andhra Pradesh which enables single phase supply to be extended to all domestic consumers through suitable control mechanism at the substations. All rural areas have been extended 24 hours single phase/ three phase power supply to all Domestic, Commercial & Industrial consumers. The segregation of Agricultural feeders would enable extension of 24x7, reliable 3 phase supply to all domestic, commercial & industrial consumers.

2 Load Forecast

Electrical energy is vital input for economic development of any country. Projection of Electricity demand is a prerequisite for planning of electricity utilities. Accurate forecasts lead to increased reliability and Quality of power supply and helps in taking correct decisions for future development. Electricity demand is assessed by accumulating the consumption details periodically.

2.1 Methods of forecast

The following forecast methods are used for finalization of sales projection for the fourth control period.

- **End use approach by CEA:** CEA has published the load forecast based on 19th Electric Power Survey using End use methodology. End-use models focus on the various uses of electricity in the residential, commercial, and industrial sector. These models are based on the principle that electricity demand is derived from customer's demand for light, cooling, heating, refrigeration, etc. Thus end-use models explain energy demand as a function of the number of appliances in the market.
- **Econometric Method:** takes into account GDP growth, Population growth and other demographic factors. The econometric approach combines economic theory and statistical techniques for forecasting electricity demand. The approach estimates the relationships between energy consumption (dependent variables)

and factors influencing consumption. The relationships are estimated by the least-squares method or time series methods. One of the options in this framework is to aggregate the econometric approach, when consumption in different sectors (residential, commercial, industrial, etc.) is calculated as a function of econometric and other demographic variables, and then estimates are assembled using recent historical data. GDP growth, Population growth, housing and other demographic factors were considered in the preparation of Econometric forecast for FY 2018-FY 2024.

- **Adjusted Compound Average growth rate method (CAGR)** : DISCOMs have arrived load forecast based on the earlier 6years growth rate (CAGR) i.e. 2012-13 to 2017-18 data. CAGR method is the classical method of business forecasting . In this method, a large amount of reliable data is required for forecasting demand. In addition, this method assumes that the factors such as sales and Demand, responsible for past trends would remain the same in future. By assessing historical trends and arriving at CAGRs, projections for the sales will be arrived based on them.

2.2 Sales projections by above forecast methods

2.2.1 19th EPS (Electric Power Survey) by CEA

CEA prepared 19th EPS in fulfillment of CEAs obligation under section 73(a) of the electricity act 2003. This forecast is prepared using End use approach. The Sales and energy forecast published by Central Electricity Authority (CEA) in 19th Electric Power Survey is tabulated below :

ENERGY CONSUMPTION - MUS	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	CAGR
1. Domestic	15060	16290	17557	18910	20354	21894	7.90%
2. Commercial	5165	5644	6165	6732	7349	8020	9.20%
3.Public lighting	351	366	381	397	411	425	3.90%
4.Public Water Works	737	766	796	827	859	892	3.90%
5.Irrigation	13674	14276	14907	15570	16266	16997	4.40%
6.Industries LT	2972	3226	3501	3799	4120	4467	8.50%

7. Industries HT	16118	17727	19493	21432	23576	25946	10.00%
8.Railway traction	1640	1706	1774	1845	1919	1995	4.00%
Bulk Supply	969	1032	1098	1169	1246	1327	6.50%
Total(Energy Consumption)	56686	61033	65672	70681	76100	81963	7.70%
T&D losses - %	10.05	9.91	9.77	9.63	9.48	9.34	
Energy Requirement-MU	63022	67746	72781	78207	84072	90410	7.50%
Energy Requirement(Ex Bus) - MU	63290	68034	73090	78540	84429	90794	7.50%

2.2.2 Econometric forecast

The sales and energy forecast prepared using Econometric model is tabulated below.

ENERGY CONSUMPTION -Mus	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	CAGR
1. Domestic	14916	16534	18048	19791	21946	24268	10.22%
2. Commercial	4296	4748	5243	5749	6367	7037	10.37%
3.Public lighting	371	392	392	437	461	487	5.59%
4.Public Water Works	659	698	697	777	820	866	5.62%
5.Irrigation	15392	15810	16235	16668	17108	17555	2.66%
6.Industries LT	3125	3484	3885	4290	4783	5317	11.21%
7. Industries HT	13798	14874	16088	17456	18906	20530	8.27%
8.Railway traction	1398	1448	1499	1552	1608	1665	3.56%
Bulk Supply	1265	1352	1437	1523	1631	1746	6.66%
Total(Energy Consumption)	55219	59341	63525	68243	73630	79471	7.55%
T&D losses - %	12.44	12.17	11.96	11.82	11.59	11.44	
Energy Requirement-MU	63060	67559	72151	77386	83277	89732	7.31%
Energy Requirement(Ex Bus) - MU	64029	68599	73298	78597	84629	91168	7.32%

2.2.3 Adjusted Compound Average growth rate Method (CAGR)

The sales and energy forecast using adjusted CAGR method is as follows

ENERGY CONSUMPTION -Mus	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	CAGR
1. Domestic	14,522	16,073	17,793	19,703	21,824	24,181	10.73%
2. Commercial	4,267	4,664	5,127	5,664	6,273	6,972	10.31%
3. Public lighting	647.5	679	712.5	749.5	786	827	5.01%
4. Public Water Works	481.5	501	521.5	543.5	566	590	4.14%
5. Irrigation	13,928	15,124	15,611	16,114	16,638	17,181	4.28%
6. Industries LT	3,821	4,355	4,974	5,695	6,537	7,516	14.48%
7. Industries HT	14,361	15,374	16,487	17,713	19,065	20,561	7.44%
8. Railway traction	1,441	1,470	1,500	1,530	1,561	1,592	2.01%
Bulk Supply	832	906	989	1078	1177	1283	9.04%
Total(Energy Consumption)	54,301	59,146	63,715	68,790	74,427	80,703	8.24%
T&D losses - %	15.19	12.38	12.07	11.97	11.18	10.46	
Energy Requirement-MU	64030	67640	71549	77483	84113	91443	7.50%
Energy Requirement(Ex Bus) - MU	64030	68606	73212	79146	85776	93106	7.50%

The approach followed by DISCOMs for the Load Forecasts involves (i) analyzing the historical sales data to arrive at the Compounded Annual Growth Rate (CAGR), (ii) moderating the CAGR with due regard to justifiable adjustments due to various policy initiatives and directions of the State Government etc., (iii) projecting the sales for the next Control Period with the moderated CAGRs, (iv) grossing up the sales with voltage-wise losses to arrive at the energy requirement at the DISCOM level and then aggregating the same together with energy expected to be handled through Open Access (OA) transactions to arrive at the energy requirement at State level, (v) deriving the system load factors at base year and projecting the same into the future years of the Control Period under consideration and (vi) arriving at the State Peak Demand by applying respective annual load factors.

The formula followed for sales projection in CAGR method as follows

$$\text{Sales} = \text{Projected CAGR} * \text{Sales of previous year}$$

Assumptions:

The factors that are expected to stimulate the sales are:

- New capital city at Amaravathi
- PCPIR (Petroleum, Chemicals and Petrochemical Investment Region) corridor
- Vizag Chennai Industrial Corridor (VCIC)
- Sri City SEZ ,
- New airports, new sea ports
- New lift irrigation schemes i.e. Purushottampatnam , Krishnavaram under Polavaram LI Scheme, Chintalapudi, Kondaveeti Vaagu etc.
- Promotion of Electric Vehicles

The factors that are expected to reduce the sales are:

- Promotion of Off-grid Solar Pump sets and Solar Roof top Schemes
- Moderation of growth rates in view of saturation in the industry such as Ferro Alloys
- Reduction in HT Lift Irrigation Schemes, LT Industry
- Migration of Railway Traction loads to Open Access

The State level sales forecast derived from discom sales forecast is tabulated below.

Determination of State level Energy Requirement and Peak Demand:

The methodology followed for determination of Energy input at Discom level and subsequently at State level is as below:

- a) Based on sales forecast and open access sales projected , the energy input at the DISCOM periphery has been determined by undertaking following steps:
 - Energy Input at LT level = LT sales + LT losses
 - Energy Input at 11 kV level = Energy Input at LT level + 11 kV sales + 11 kV losses
 - Energy Input at 33 kV level = Energy Input at 11 kV level + 33 kV sales + 33 kV losses
 - The total energy input from various schemes at 33 kV level and Energy input from Open access sales at 33 kV level has been separately calculated and added to the DISCOM level Energy input at 33 kV.

- b) Total Energy Input at DISCOM periphery = Energy Input at 33 kV level + 132 kV Sales + 132 kV Open Access sales.
- c) The Energy Input at State level has been determined by combining the Energy Input of both the DISCOMS and grossing up that energy with Transmission losses and PGCIL losses.

The Open access transactions which are being embedded into the Transmission & Distribution networks are stated to be in the range of 3187 MU to 4639 MU for each year of the 4th Control period.

Load factor

Due to high solar power infusion in the State power portfolio the agriculture demand which is currently being catered over a period of 16 hours in the entire day can be shifted to day time so that the load factor will decrease and peak demand will increase.

Table 01 - Forecast of the State Load Factor

	FY18	FY19	FY20	FY21	FY22	FY23	FY24
Load Factor	72.9%	69.4%	68.4%	68.4%	68.4%	68.4%	68.4%

Energy and Demand requirement by the DISCOMs (MU) is tabulated below.

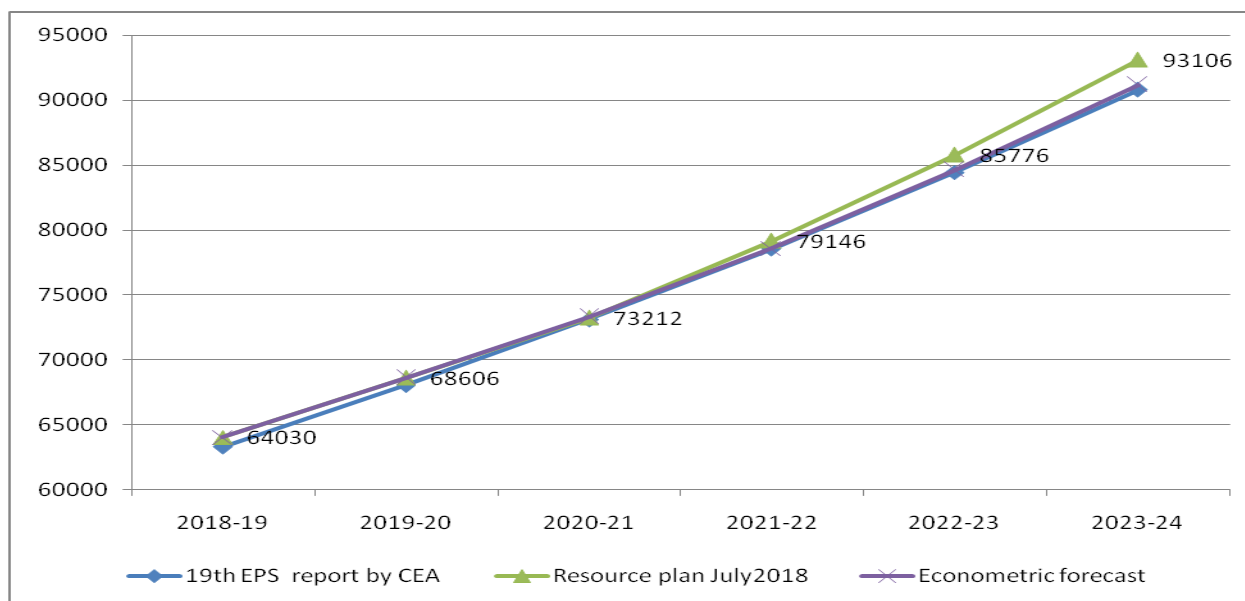
Energy/Demand	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Total Energy Input at State Level (Including Open Access) MU	64030	68606	73212	79146	85776	93106
Peak Demand (MW)	10532	11,450	12,219	13,209	14,315	15,539

2.3 Comparison of Load Forecasts

Comparison of Energy (MU) forecast projected by Discoms to 19th EPS are shown in below table and figure 1. The slight change in Discoms load forecast (as filed in the Discoms Resource plan) compared to 19th EPS report by CEA is due to

expected higher industrial sales growth, 9hrs supply to Agriculture, Energy efficiency initiatives like Domestic Efficient Lighting Programme (DELP), Domestic Efficient Fans Programme (DEFP) etc. Econometric forecast which takes into account GDP growth, Population growth and other demographic factors is also prepared and compared with Resource plan forecast.

Energy Requirement (MU)	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	CAGR 2019-24
19th EPS report by CEA	63290	68034	73090	78540	84429	90794	7.5%
Adjusted CAGR	64030	68606	73212	79146	85776	93106	7.8%
Econometric forecast	64030	68599	73298	78597	84629	91168	7.3%



Peak Demand (MW)	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	CAGR 2019-24
19th EPS report by CEA	9544	10259	11021	11843	12731	13690	7.5%
Adjusted CAGR	10532	11450	12219	13209	14315	15539	8.1%

2.4 Forecast for 4th Control period :

The Hon'ble Commission has thoroughly examined the load forecast for the 4th Control period proposed by APTransco in the Resource Plan, duly reckoning all

the views/objections/suggestions expressed by stakeholders during public hearings. The final approved details which are communicated in the Transmission Tariff, dated 15.04.2019 by Hon'ble Commission are given below:

Transmission Loss Trajectory

Financial Year	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
Transmission Loss	3.10%	3.08%	3.06%	3.03%	3.00%

Distribution Loss Trajectory - APEPDCL

Voltage	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
LT	4.01%	3.99%	3.97%	3.95%	3.93%
11 kV	3.20%	3.15%	3.10%	3.05%	3.00%
33 kV	2.79%	2.78%	2.77%	2.76%	2.75%

Distribution Loss Trajectory - APSPDCL

Voltage	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
LT	4.26%	4.23%	4.20%	4.17%	4.14%
11 kV	3.27%	3.22%	3.17%	3.12%	3.07%
33 Kv	3.20%	3.15%	3.10%	3.05%	3.00%

Approved sales forecast for the 4th Control period

Consumer Category		DISCOM	FY20	FY21	FY22	FY23	FY24	CAGR
Category-I Domestic	LT	SPDCL	9117	10162	11330	12636	14097	11.5%
		EPDCL	5671	6206	6792	7434	8136	9.4%
		Total	14788	16368	18122	20070	22233	10.7%
	HT	SPDCL	30	31	32	34	35	3.9%
		EPDCL	27	27	28	29	30	2.7%
		Total	57	58	60	63	65	3.3%
Category-II	LT	SPDCL	1993	2211	2467	2757	3091	11.6%

Commercial & Others	EPDCL	1124	1243	1383	1540	1721	11.2%	
		Total	3117	3454	3850	4297	4812	11.5%
		HT	SPDCL	919	1005	1103	1216	1348
	EPDCL		721	761	803	847	894	5.5%
	Total	1640	1766	1906	2063	2242	8.1%	
Category-III Industry	LT	SPDCL	1090	1246	1428	1642	1893	14.8%
		EPDCL	423	484	554	635	727	14.5%
		Total	1513	1729	1982	2276	2621	14.7%
	HT	SPDCL	7716	8207	8747	9345	10008	6.7%
		EPDCL	7668	8288	8970	9720	10545	8.3%
		Total	15384	16495	17717	19065	20554	7.5%
Category-IV Institutional	LT	SPDCL	840	884	929	977	1029	5.2%
		EPDCL	308	317	328	339	351	3.3%
		Total	1148	1201	1257	1316	1380	4.7%
	HT	SPDCL	878	896	916	935	955	2.1%
		EPDCL	734	749	764	779	795	2.0%
		Total	1611	1645	1681	1715	1751	2.1%
Category-V Agricultural & Related	LT	SPDCL	11054	11487	11963	12486	13065	4.3%
		EPDCL	3487	3761	4069	4413	4799	8.3%
		Total	14541	15249	16032	16899	17863	5.3%
	HT	SPDCL	3113	3311	3525	3754	3999	6.5%
		EPDCL	1452	1526	1603	1685	1772	5.1%
		Total	4565	4837	5128	5440	5771	6.0%
TOTAL	LT	SPDCL	24094	25990	28117	30498	33175	8.3%
		EPDCL	11013	12011	13126	14361	15734	9.3%
		Total	35107	38001	41243	44859	48909	8.6%
	HT	SPDCL	13071	13904	14817	15824	16933	6.7%
		EPDCL	10983	11770	12630	13569	14594	7.4%
		Total	24054	25673	27447	29393	31527	7.0%
RESCOs	SPDCL	415	453	494	539	587	9.1%	
	EPDCL	381	419	461	508	558	10.0%	
	Total	796	872	955	1047	1145	9.5%	
LT+HT	Total	SPDCL	37165	39894	42934	46322	50108	7.8%
		EPDCL	21996	23780	25755	27930	30328	8.4%
		Total	59161	63674	68690	74252	80436	8.0%

Energy and Demand requirement by the DISCOMs (MU)

FY	FY20	FY21	FY22	FY23	FY24
Energy Input @ EPDCL	24154	26246	28403	30773	33386
Energy Input @ SPDCL	41605	44822	48170	51894	56054
Total Energy Requirement (Excluding OA Transactions)	65759	71068	76573	82667	89441
Open access transactions	3187	3460	3787	4203	4639
Total Energy Requirement at APTransco periphery	68946	74528	80360	86870	94080
State Peak Demand (MW)	11450	12219	13209	14315	15539
Open Access Demand (MW)	383	310	366	438	513
State Peak Demand (MW) Excluding open access	11067	11909	12843	13877	15026

3 Generation Plan

3.1 Energy Availability from various sources

This section discusses the methodology and assumptions considered for estimating the quantum of power purchase of the Licensee for the next control period - FY 2019-20 to FY 2023-24. In the following sections, the capacities and availability from various existing and upcoming generating sources along with their expected date of Commissioning have been described.

3.1.1 APGENCO

3.1.1.1 APGENCO Existing Capacities

The below table shows the capacities of the existing Thermal and Hydel generating stations of APGENCO including its share in the interstate projects. The APDISCOMs would purchase the 100% share from the existing APGENCO stations.

Source	Project Installed Capacity (MW)	Contracted Capacity -AP Share (MW)
THERMAL		
Dr. NTTPS (I, II, III)	1,260	1,260
RTPP-I	420	420
RTPP-II	420	420
RTPP- III	210	210
RTPP VI	600	600
Dr. NTTPS – IV	500	500
SDSTPS – I	800	800
SDSTPS – II	800	800
TOTAL THERMAL	5,010	5,010
HYDEL		
Interstate projects:		
Machkund, Orissa	120	60
T.B. Station, Karnataka	72	58
State projects:		
Donkarayi	25	25
Upper Sileru	240	240
Lower Sileru	460	460
Srisailam right bank PH	770	770

Source	Project Installed Capacity (MW)	Contracted Capacity -AP Share (MW)
Nagarjunsagar right canal PH	90	90
PABM	20	20
Mini hydro	1	1
Nagarjunsagar Tail Pond	50	50
TOTAL HYDEL	1,848	1,774
TOTAL APGENCO	6,858	6,784

3.1.1.2 APGENCO Capacity Additions/ Contract Expiry

The following table captures the expected capacity addition of APGENCO Thermal and Hydel stations from FY 2019-20 to FY 2023-24:

Source	Project Installed Capacity (MW)	Expected COD
THERMAL		
VTPS - V	800	Apr-20
SDSTPS Unit-3	800	Apr-20
TOTAL THERMAL	1,600	
HYDEL		
Polavaram – 12 Units	960	Apr-22
TOTAL HYDEL	960	
TOTAL APGENCO	2,560	

**Based on the latest information, data has been updated with respect to Resource Plan*

An additional 2560 MW of capacity is expected to be added by APGENCO by the completion of the fourth control period.

The Commission in its Order dated 29-04-2019 has determined the tariff for the thermal and hydel plants of AP GENCO (NTTPS-I to IV, RTPP-I to III and Sileru Complex, Nagarjuna Sagar Right Canal Power House, Srisailam Right Bank Power House, Penna Ahobilam Power House, Nagarjunsagar Tail Pond Power House and Chettipeta Power House) for 4th control period FY 2019-20 to FY 2023-24 in O.P. No. 35 of 2018.

Commission, vide its order dated 13.07.2018 in O.P.No.21 of 2016 granted in-principle approval to the amended and restated Power Purchase Agreement dated 24.08.2016 between AP Power Development Company Ltd. (APPDCL) and APDISCOMs

in respect of 2 X 800 MW SDSTPS-I and also determined both the Capital Cost and tariff vide Order dated 02.03.2019 in O.P. No.47 of 2017.

The DISCOMs have filed a petition dt. 15.03.2019 (O.P. No. 33 of 2019) seeking approval of the Power Purchase Agreement entered with APGENCO in respect of the 600 MW RTPP-IV in which it is stated that the project has been commissioned on 29.03.2018. The Hon'ble Commission, vide its Order on Retail Supply Tariffs for FY2019-20, has considered energy availability from RTPP-IV.

PPAs in respect of NTPPS-V (800 MW), SDSTPS Stage-II (800 MW) and Indirasagar Polavaram Hydro Electric Power Project (12 X 80 MW) are in different stages of approval such as making amendments, furnishing essential information for fixation of tariff and for want of jurisdiction. However these projects are taken into consideration by Commission in larger public interest, being state-owned projects and developed at considerable public expense. 800 MW Units of NTPPS Stage-V and Sri Damodaram Sanjeevaiah Thermal Power Station (SDSTPS) Stage-II are expected to come up by FY 2020-21 and the Hon'ble Commission considered these units accordingly for future projections.

The 12 units each of 80 MW of Indirasagar Polavaram Hydro Electric Power Project are considered from the respective expected years of COD.

Accordingly, Commission considered the thermal and hydel power plants of APGENCO and APPDCL being the state-owned utilities indicated above for power supply projections for the 4th Control Period.

3.1.1.3 Thermal and Hydel stations of APGENCO

The below table shows the projected capacities of the Thermal and Hydel generating stations of APGENCO including its share in the interstate projects.

APGENCO THERMAL:

S. No.	Source	Capacity (MW)	AP Share (%)	AP Share (MW)	Aux (%)	Ex-Bus Capacity considered (MW)				
						FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
APGENCO - Thermal										
1	NTTPS I	420.00	100%	420.00	8.75%	383.25	383.25	383.25	383.25	383.25
2	NTTPS II	420.00	100%	420.00	8.75%	383.25	383.25	383.25	383.25	383.25
3	NTTPS III	420.00	100%	420.00	8.75%	383.25	383.25	383.25	383.25	383.25
4	NTTPS IV	500.00	100%	500.00	7.50%	462.50	462.50	462.50	462.50	462.50
5	RTPP Stage-I	420.00	100%	420.00	9.00%	382.20	382.20	382.20	382.20	382.20
6	RTPP Stage-II	420.00	100%	420.00	9.00%	382.20	382.20	382.20	382.20	382.20
7	RTPP Stage-III	210.00	100%	210.00	9.00%	191.10	191.10	191.10	191.10	191.10
8	NTTPS Stage-V (800MW)	800.00	100%	800.00	6.50%	0.00	748.00	748.00	748.00	748.00
9	Rayalaseema TPP Stage IV Unit- 6 (600MW)	600.00	100%	600.00	7.00%	558.00	558.00	558.00	558.00	558.00
10	Krishnapatnam TPP (JVP) Stage I (2X800MW) Unit-1	800.00	100%	800.00	6.50%	748.00	748.00	748.00	748.00	748.00
11	Krishnapatnam TPP (JVP) Stage I (2X800MW) Unit-2	800.00	100%	800.00	6.50%	748.00	748.00	748.00	748.00	748.00
12	Krishnapatnam TPP (JVP) Stage II (1X800MW) Unit-3	800.00	100%	800.00	6.50%	0.00	748.00	748.00	748.00	748.00
Total AP GENCO Thermal		6,610.00		6,610.00		4621.75	6117.75	6117.75	6117.75	6117.75

APGENCO HYDEL:

S. No.	Source	Capacity (MW)	AP Share (%)	AP Share (MW)	Aux (%)	Ex-Bus Capacity considered (MW)				
						FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
APGENCO - Hydel										
1	MACHKUND AP SHARE	120.00	50%	60.00	1.00%	59.40	59.40	59.40	59.40	59.40
2	TUNGABHADRA AP SHARE	72.00	80%	57.60	1.00%	57.02	57.02	57.02	57.02	57.02
3	USL	240.00	100%	240.00	1.00%	237.60	237.60	237.60	237.60	237.60
4	LSR	460.00	100%	460.00	1.00%	455.40	455.40	455.40	455.40	455.40
5	DONKARAI	25.00	100%	25.00	1.00%	24.75	24.75	24.75	24.75	24.75

6	SSLM	770.00	100%	770.00	1.00%	762.30	762.30	762.30	762.30	762.30
7	NSRCPH	90.00	100%	90.00	1.00%	89.10	89.10	89.10	89.10	89.10
8	PABM	20.00	100%	20.00	1.00%	19.80	19.80	19.80	19.80	19.80
9	MINI HYDRO(CHETTIPE T)	1.00	100%	1.00	1.00%	0.99	0.99	0.99	0.99	0.99
10	Nagarjunasagar Tail pond(1)	25.00	100%	25.00	1.00%	24.75	24.75	24.75	24.75	24.75
11	Nagarjunasagar Tail pond(2)	25.00	100%	25.00	1.00%	24.75	24.75	24.75	24.75	24.75
12	Polavaram-(12×80 MW) Unit-1	80.00	100%	80.00	1.00%	0.00	0.00	79.20	79.20	79.20
13	Polavaram-(12×80 MW) Unit-2	80.00	100%	80.00	1.00%	0.00	0.00	79.20	79.20	79.20
14	Polavaram-(12×80 MW) Unit-3	80.00	100%	80.00	1.00%	0.00	0.00	79.20	79.20	79.20
15	Polavaram-(12×80 MW) Unit-4	80.00	100%	80.00	1.00%	0.00	0.00	0.00	79.20	79.20
16	Polavaram-(12×80 MW) Unit-5	80.00	100%	80.00	1.00%	0.00	0.00	0.00	79.20	79.20
17	Polavaram-(12×80 MW) Unit-6	80.00	100%	80.00	1.00%	0.00	0.00	0.00	79.20	79.20
18	Polavaram-(12×80 MW) Unit-7	80.00	100%	80.00	1.00%	0.00	0.00	0.00	79.20	79.20
19	Polavaram-(12×80 MW) Unit-8	80.00	100%	80.00	1.00%	0.00	0.00	0.00	79.20	79.20
20	Polavaram-(12×80 MW) Unit-9	80.00	100%	80.00	1.00%	0.00	0.00	0.00	79.20	79.20
21	Polavaram-(12×80 MW) Unit-10	80.00	100%	80.00	1.00%	0.00	0.00	0.00	0.00	79.20
22	Polavaram-(12×80 MW) Unit-11	80.00	100%	80.00	1.00%	0.00	0.00	0.00	0.00	79.20
23	Polavaram-(12×80 MW) Unit-12	80.00	100%	80.00	1.00%	0.00	0.00	0.00	0.00	79.20
Total AP GENCO Hydel		2808		2734		1755.86	1755.86	1993.46	2468.66	2706.26

2.5.2 Central Generating Stations

The Discoms have Power Purchase Agreements (PPA) with the Central Generating Stations to purchase power from NTPC (SR), NTPC (SR) Stage-

III, NTPC -Talcher-II, NTPC Simhadri-I and Simhadri Stage-II,NTPC Kudigi, Neyveli Lignite Corporation Ltd (“NLC”), Madras Atomic Power Station (“MAPS”) and Kaiga Atomic Power Station (“KAPS”) NTECL Vallur and NTPL Tuticorn (JV of NLC and TNEB). The share of the DISCOMs in the total capacity of the stations and year-wise net (ex-bus) capacities determined by the Commission for the 4th Control Period are mentioned below.

S.NO	SOURCE	Capacity (MW)	AP SHARE (MW)	Aux (%)	FY 2019- 20	FY 2020- 21	FY 2021- 22	FY 2022- 23	FY 2023- 24
1	NTPC (SR)	2,100.00	273.11	6.68%	254.86	254.86	254.86	254.86	254.86
2	NTPC (SR) Stage III	500	68.77	5.75%	64.82	64.82	64.82	64.82	64.82
3	Talcher Stage 2	2,000.00	175.2	5.75%	165.13	165.13	165.13	165.13	165.13
4	NLC Stage-I	630	47.64	10.00%	42.87	42.87	42.87	42.87	42.87
5	NLC Stage-II	840	86.81	10.00%	78.13	78.13	78.13	78.13	78.13
6	NPC-MAPS	440	16.47	0.00%	16.47	16.47	16.47	16.47	16.47
7	NPC-Kaiga unit I &II	440	50.35	0.00%	50.35	50.35	50.35	50.35	50.35
8	NPC-Kaiga unit III & IV	440	53.66	0.00%	53.66	53.66	53.66	53.66	53.66
9	NTPC Simhadri Stage I	1,000.00	461.1	5.25%	436.89	436.89	436.89	436.89	436.89
10	NTPC Simhadri Stage II	1,000.00	190.5	5.25%	180.49	180.49	180.49	180.49	180.49
11	Bundled power under JVNSM (or western region)	539.12	506.93	0.00%	506.93	506.93	506.93	506.93	506.93
12	Vallur Thermal Power Plant	1,500.00	87.93	6.69%	82.04	82.04	82.04	82.04	82.04
13	Kudigi	1,600.00	215.04	5.75%	202.68	202.68	202.68	202.68	202.68
14	Tuticorn joint venture plant	1,000.00	123.22	6.25%	115.52	115.52	115.52	115.52	115.52
15	NNTPS	1,000.00	52	6.50%	48.62	48.62	48.62	48.62	48.62
Total CGS		15,029.12	2,408.73		2299.46	2299.46	2299.46	2299.46	2299.46

Apart from the existing CGS stations, no new CGS stations are expected to come up with which the Discoms are expected to enter into PPA.

3.1.3 Gas Based Power Plants

3.1.3.1 APGPCL & APDISCOM Gas IPPs

The share of APDISCOMs in the APGPCL stations is **34 MW**. APDISCOMs bought out the erstwhile GVK Phase-I (now known as Godavari Gas Power Plant) on April 22nd 2016. Hence, the entire **216.82 MW** capacity of Godavari Gas Power Plant is now being scheduled for APDISCOMs. In Gas IPP's, Lanco's PPA with the licensee expired on 01.01.2016; Spectrum's PPA with the license expired on 18.04.2016 and BSES's PPA with the licensee expired in Dec 2017. After the expiry of PPA with Lanco, Spectrum and BSES, Discoms are purchasing power from Lanco and Spectrum on short term basis. The below tables show the projected capacities of the APGPCL ,Godavari gas, & Gas IPPs.

Sr. No.	Source of Power	COD	AP Share	Aux Consumption	PLF	Proposed PPA Expiry Date
		Date	MW	%	%	
1	APGPCL I - Allocated capacity	03-01-2018	9.3	3.00%	25.00%	03-01-2030
2	APGPCL II - Allocated capacity	03-01-2018	24.96	3.00%	29.00%	03-01-2030
3	Godavari Gas Power Plant	6/20/1997	216.82	3.97%	80.00%	03-01-2030
4	Spectrum	4/19/1998	205	3.00%	68.50%	
5	Kondapalli (Lanco)	01-01-2001	362	3.00%	80.00%	

Despite the fact that MoUs for APGPCL-I & II expired on 24.12.2012 and the matter is sub-judice, The Hon'ble APERC considered these capacities for power projection calculations. The Discoms have considered Godavari Gas Power Plant (GGPP), Spectrum and Lanco Kondapalli (Gas) for the entire 4th Control Period. The Commission considered power procurement from these three power projects for FY2019-20 in the Order for Retail Sale of Electricity for FY2019-20. The Commission, while expressing its view on the renewal of PPAs of Spectrum and Lanco, stated that a decision will be taken on merits in

appropriate proceedings on any request for renewal of the PPAs with Lanco and Spectrum in accordance with the prescribed procedure. As such, the capacities of Spectrum and Lanco are factored only for FY2019-20. As regards GGPP, the same is considered for the entire 4th Control Period as being available since the power from this project should be given preeminence over others as it is owned by DISCOMs which are conferred with the universal service obligation.

The Discoms have considered 17 MW capacity in respect of M/s Srivathsa under 'IPP-others'. The PPA with M/s Srivathsa was expired by 31.03.2018 and 7.05.2021 is the date of expiry of Gas Supply Agreement. Commission considered power procurement from this plant for FY2019-20 vide its Order on Retail Supply Tariffs for FY2019-20. Accordingly, the capacity is considered for FY2019-20 only and the plant being a gas-based project, is included in 'IPPs-Gas' instead of 'IPP- Others'.

Energy Source	Capacity	AP share (%)	AP SHARE (MW)	AUX (%)	FY 2019-20 (MW)	FY 2020-21(MW)	FY 2021-22(MW)	FY 2022-23(MW)	FY 2023-24(MW)
APGPCL I - Allocated capacity	100	9.33	9.33	3	9.05	9.05	9.05	9.05	9.05
APGPCL II - Allocated capacity	172	14.51	24.96	3	24.21	24.21	24.21	24.21	24.21
Godavari Gas Power Plant	216.82	100	216.82	3.97	208.22	208.22	208.22	208.22	208.22
Spectrum	205.19	100	205.19	3	199.03	0	0	0	0
Kondapalli (Gas)	361.92	100	361.92	3	351.06	0	0	0	0
Srivathsa	17.2	100	17.2	3.4	16.62	0	0	0	0
Total	1073.1		835.42		808.19	241.48	241.48	241.48	241.48

3.1.3.2 Gas based IPP's connected to 400KV Vemagiri complex:

The following IPP's connected to 400 KV Vemagiri complex are under commercial operation:

Sl. No.	Source	Capacity (MW)	AP Share (%)	AP Share (MW)	Aux (%)	Ex-Bus Capacity considered MW				
						FY	FY	FY	FY	FY

						2019-20	2020-21	2021-22	2022-23	2023-24
1	GMR Vemagiri	370	46.11%	170.61	3.00%	165.49	165.49	165.49	165.49	165.49
2	GVK Extns	220	46.11%	101.44	3.00%	98.4	98.4	98.4	98.4	98.4
3	GVK Gautami	464	46.11%	213.95	3.00%	207.53	207.53	207.53	207.53	207.53
4	Konaseema	444	46.11%	204.73	3.00%	198.59	198.59	198.59	198.59	198.59

The Hon'ble Commission considered the four Gas based IPPs (GMR Vemagiri, GVK Extn., Konaseema, GVK Gouthami, totalling Ex bus capacity share of 670 MW) being available as base load plants for the entire 4th Control Period. The Hon'ble Commission notes that these Gas based IPPs are stranded due to lack of gas for the last few years barring the period they were run on e-bid RLNG for some time. To assess the probable risk of unavailability of the above said four Gas IPPs, Commission analyzed the capacity requirements by excluding the capacity of the four Gas based IPPs from the list of Installed Capacities, as an alternate scenario.

3.1.4 Non-Conventional Energy Sources (NCE)

The expected Generation capacities of NCE projects as per Hon'ble commission Resource plan order in the state from FY 2019-20 to FY2023-24 is given below:

Energy Source	Existing(MW)	AUX(%)	FY 2019-20 (MW)	FY 2020-21(MW)	FY 2021-22(MW)	FY 2022-23(MW)	FY 2023-24(MW)
NCE – Solar	2777.43	0.1	2728.89	2728.89	2728.89	2728.89	2728.89
NCE - Wind Power	3944.7	0.5	3892.14	3887.17	3881.89	3881.89	3757.72
NCE - Mini Hydrel	65.89	1	63.6	63.6	53.2	47.17	43.91
NCE - Bio-Mass	84.5	10	76.05	76.05	61.65	39.6	28.35
NCE - Bagasse	108.5	10	96.92	96.92	95.55	80.99	62.799
NCE - Industrial Waste based power project	21.66	10	19.49	19.49	19.49	19.49	19.49
NCE - Municipal Waste to Energy	59	10	53.1	53.1	53.1	53.1	53.1
Total	7061.68		6930	6925	6894	6851	6694

3.1.5 Other Sources

3.1.5.1 Hinduja

In respect of Hinduja, the Hon'ble Commission, vide its order on Retail Supply Tariffs for FY2019-20 observed that, "Though any scheduling of

power from HNPCL to either DISCOM is not specifically included in this Tariff Order, it shall be deemed to have been so included to the extent of faithful compliance with the interim order of Hon'ble APTEL dated 31.05.2018 in E.P.No. 3 of 2018 in I.A.No.211 of 2018 in Appeal No. 41 of 2018 and to have been permitted by this Commission accordingly subject to any further or future Order / judgement / direction of the Hon'ble APTEL."

In pursuance to the directions of APTEL power was availed till 18th July 2020. The issue of procurement of power from this plant is presently sub-judice in Supreme Court of India.

3.1.5.2 Simhapuri

Power from Simhapuri (600MW) was not considered due to pending legal issues. However, licensees have not considered the capacity of 600 MW of M/s Simhapuri (DBFOO) in their projections for the 4th Control Period. In respect of this capacity, the Commission, vide its order on Retail Supply Tariffs for FY2019-20, observed that, *"Though any scheduling of power from M/s Simhapuri to either DISCOM is not specifically included in this Tariff Order, it shall be deemed to have been so included to the extent of faithful compliance with the Orders of this Commission and to have been permitted by this Commission accordingly, as per merit order dispatch."*

3.1.5.4 Medium Term:

AP Discoms have signed the PPA with KSK Mahanadi for 400 MW for 100% of its share from 15th June 2016 to March 31st 2021.

The generator is not supplying power since 13-7-2020 and is not expected to resume supply in the financial year FY2020-21.

3.1.5.5 Long Term

The licensees have signed PPA with Thermal Power Tech for 500 MW. This project is operating from 1-4-2015. Out of which 46.11% share i.e. 231MW was considered for AP.

The details of the other sources are shown in the table below.

Sl.No	Source	Capacity (MW)	AP Share (%)	AP Share (MW)	Aux (%)	Ex-Bus Capacity considered MW				
						FY	FY	FY	FY	FY
						2019-20	2020-21	2021-22	2022-23	2023-24
1	Hinduja*	1040	100%	1040*	6.00%	977.6	977.6	977.6	977.6	977.6
2	DBFOO	600	100%	600	0.00%	600	600	600	600	600
3	KSK Mahanadi(MT)	400	100%	400	0.00%	400	400	0	0	0

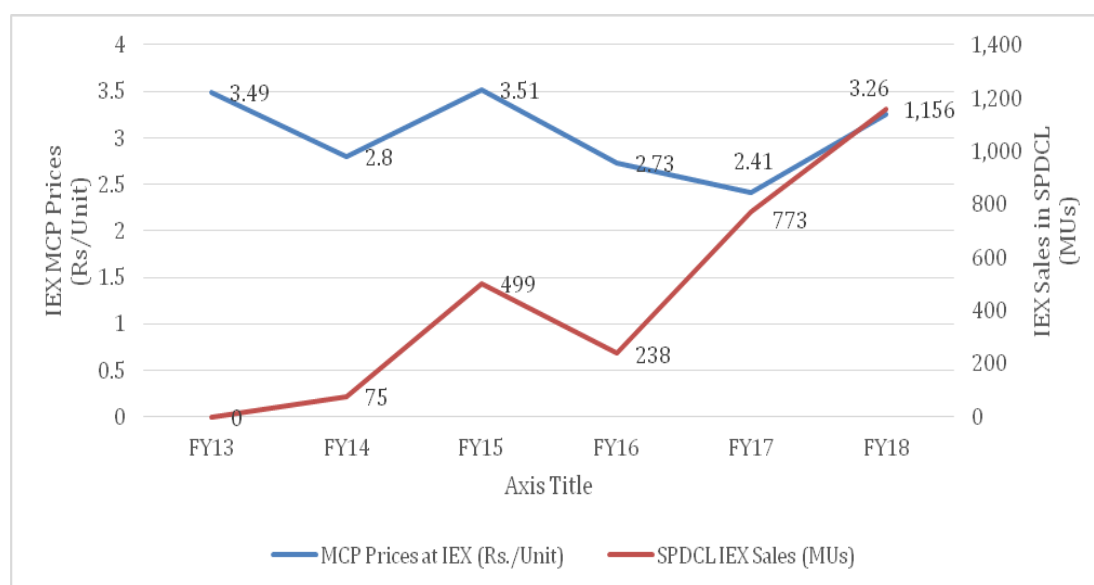
4	Thermal Power Tech	500	46.11 %	230.55	0.00%	230.55	230.55	230.55	230.55	230.55
Total		2540		2270		2208.15	2208.15	1808.15	1808.15	1808.15

* sub-judice

3.1.5.6 Short term purchases from IEX

From FY 2014-15 onwards, whenever there is a short term requirement of power due to exigency conditions or operational constraints, the shortages are being met from Power Exchanges.

IEX Sales by OA: The trend of growth from FY2013 to FY2018 in IEX sales of open access consumers vis a vis Average MCP (Market clearing price) is shown below:



3.2 APERC's decision on methodology for Power Procurement Planning

1. The objective of the Long Term/Medium Term Power procurement planning is to meet the Demand/Load incident on the system throughout the planning period while ensuring reliability. Load is a function of time and varies from time to time duly following a pattern during a day, cycle in a month, or across seasons in a year.
2. Addressing hourly deficit & shortage is not the scope of the Medium-term or Long-term planning. Long-term or Medium-term perspective planning focuses on meeting the system demand with the existing and prospective sources including

type of fuel /nature of operation. Choosing the type of sources (Thermal, Hydel, RES etc.) is of critical importance in generation planning. Planning approach is to meet the peak demand and energy requirements. In view of the increasing penetration of Renewable Energy (Solar, Wind and others about 7000 MW as on date) in the State of Andhra Pradesh, it becomes imperative to plan for more optimal mix of base, intermediate and peaking capacities as might be drawn out from the Load Duration Curves for the respective years in the planning horizon.

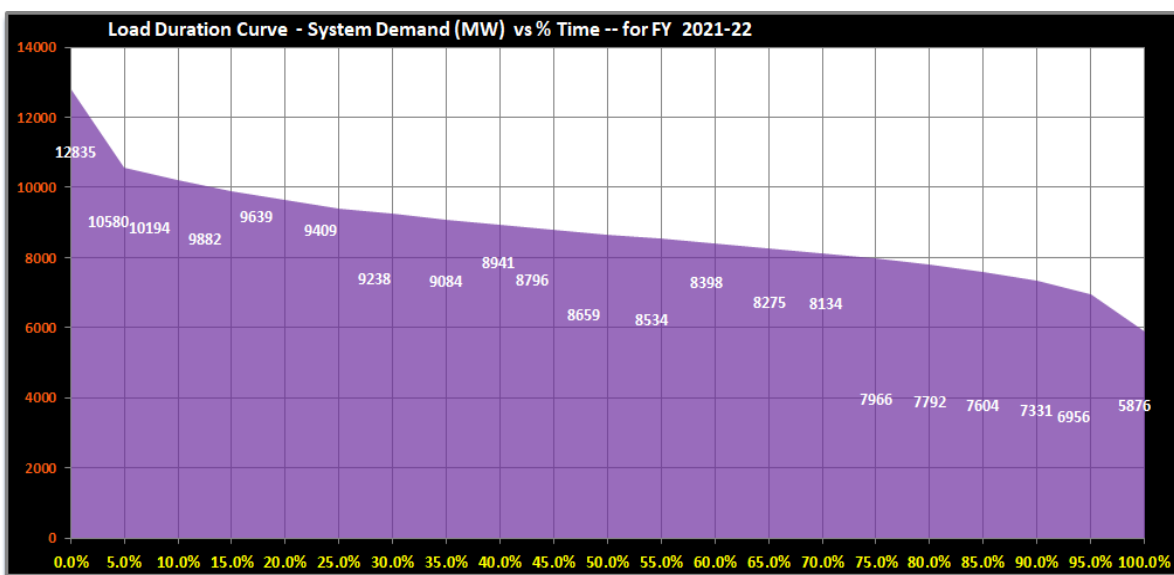
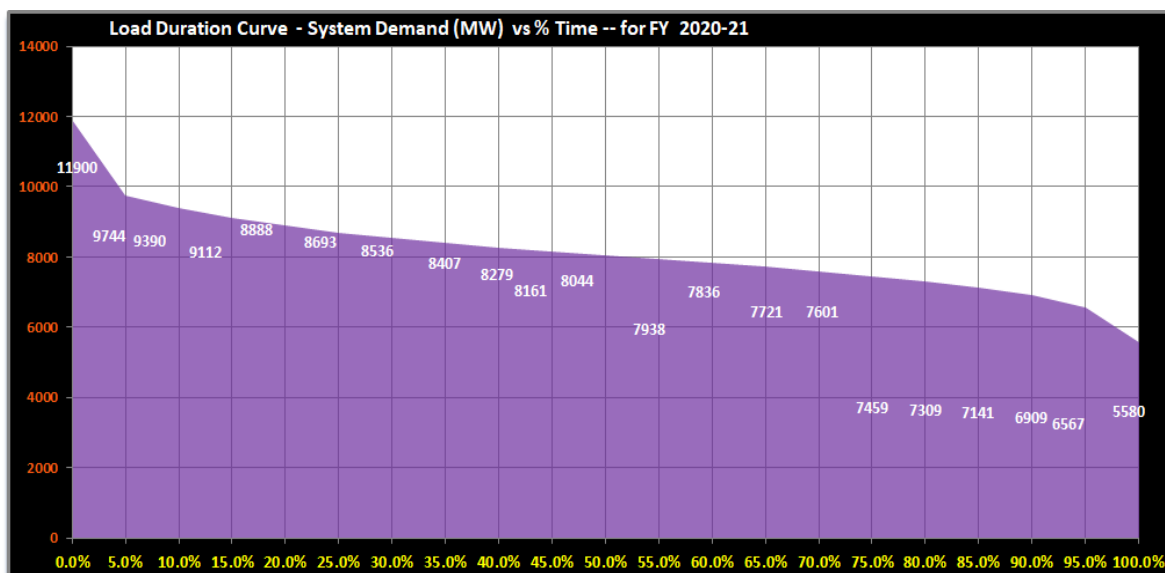
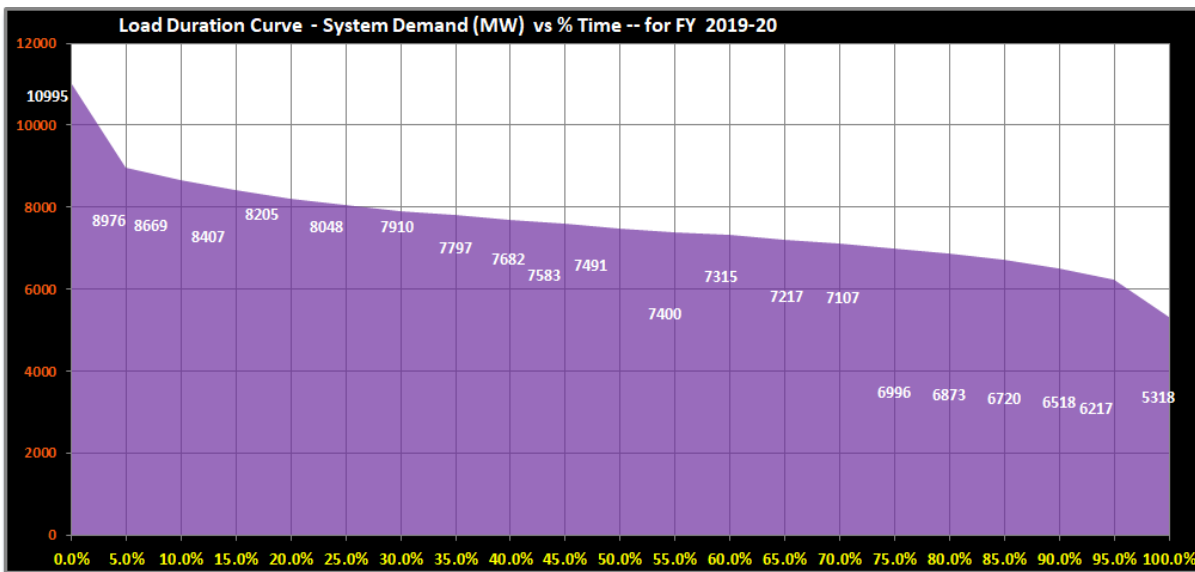
3. The base capacities will take care of 'bulk-power' requirement by meeting the consistent load incident on the system i.e. base load, while the other capacities will provide the required flexibility and are valuable tools to take care of intermittency of renewable generation, seasonal spikes or time-of-day variations – expected and unexpected in electricity demand. The dynamic response characteristics of such a balanced system would be far superior and would certainly contribute to higher reliability.
4. In this context, it is to state that for projecting the Generation Capacity requirements at National Level on long-term basis in the National Electricity Plan (NEP) published in January, 2018, the Central Electricity Authority (CEA), which is the highest technical authority in power sector in the Country, has adopted Load Duration Curve based approach.
5. Load duration Curve represents the distribution of quantum of Load supposed to be incident on the System over a period of time i.e. one year or one month or a day. It gives critical inputs such as percentage of time during which the load on the system is equal to or above certain quantum, or percentage of time during which the load on the system is equal to or below certain quantum specified, to the System planner.
6. The load corresponding to a certain percentage of time duration is expected to be met through the type of generation source having the availability factor equivalent to that of the same load duration percentage. The yearly additional generation sources required based on the above criteria, over and above the existing committed capacities, are to be derived with due regard to the committed capacities and the corresponding load on the Load Duration Curve.

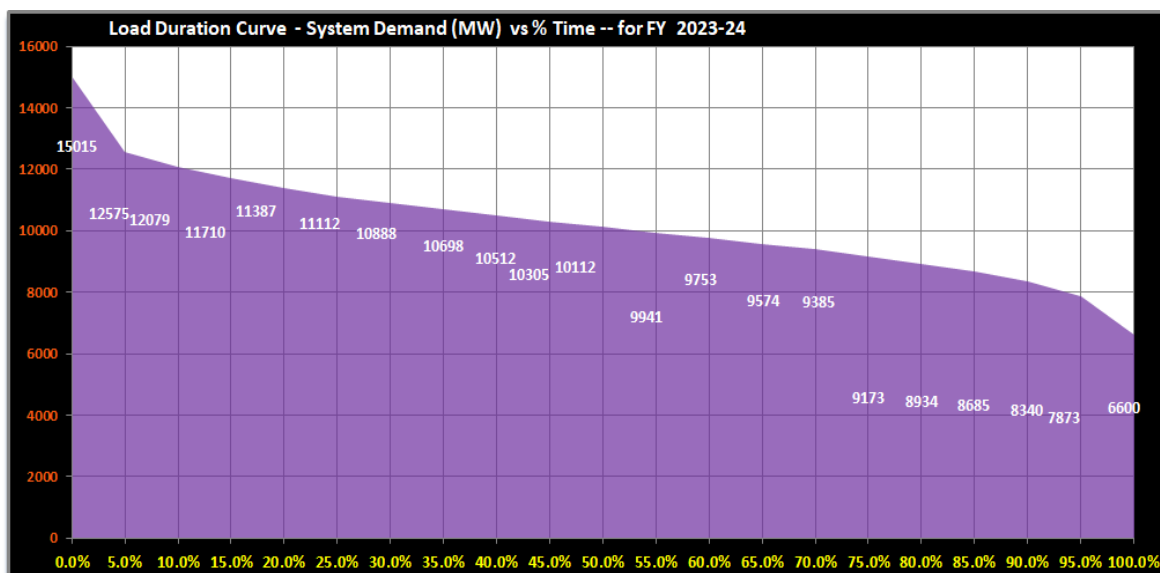
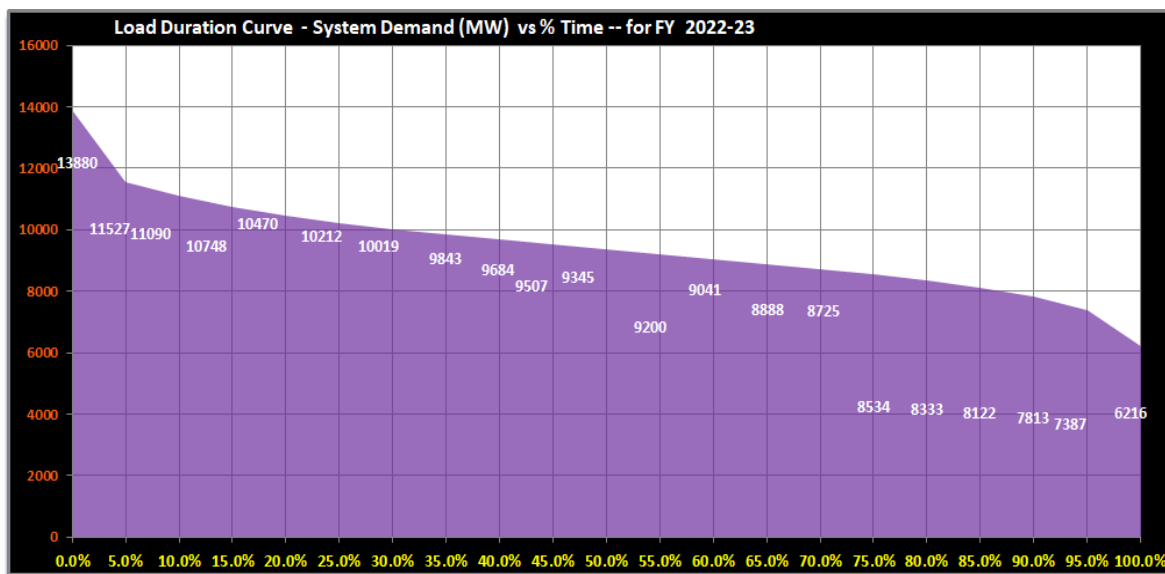
7. Commission recognized that the Load Duration Curve approach followed by the Central Electricity Authority, while developing the Generation Plan under National Electricity Plan is more suitable for long term / medium term planning compared to planning based on the deficit/surplus time blocks followed by the licensees which is more suitable for short term planning and likely to overstate the capacity requirement to be added. As such approach makes the already surplus time blocks more surplus, the Commission is inclined to adopt the Load Duration Curve method.
8. Based on the projected hourly demands made available during the course of proceedings and after validation with the approved sales forecast and load forecast in this order, for each year of the 4th Control Period, Annual Load Duration Curves are drawn with respect to percentage time duration with a step of 5% of time in a year ($5/100 \times 8760$ Hours in a year = 438 Hours.) The data points thus obtained for each year of the 4th Control Period are shown below.

Table 1 – Data points of Annual Load Duration Curves for 4th Control Period

FY	Percentage of Time																				
	0.0%	5.0%	10.0%	15.0%	20.0%	25.0%	30.0%	35.0%	40.0%	45.0%	50.0%	55.0%	60.0%	65.0%	70.0%	75.0%	80.0%	85.0%	90.0%	95.0%	100.0%
2019-20 (MW)	10995	8976	8669	8407	8205	8048	7910	7797	7682	7583	7491	7400	7315	7217	7107	6996	6873	6720	6518	6217	5318
2020-21 (MW)	11900	9744	9390	9112	8888	8693	8536	8407	8279	8161	8044	7938	7836	7721	7601	7459	7309	7141	6909	6567	5580
2021-22 (MW)	12835	10580	10194	9882	9639	9409	9238	9084	8941	8796	8659	8534	8398	8275	8134	7966	7792	7604	7331	6956	5876
2022-23 (MW)	13880	11527	11090	10748	10470	10212	10019	9843	9684	9507	9345	9200	9041	8888	8725	8534	8333	8122	7813	7387	6216
2023-24 (MW)	15015	12575	12079	11710	11387	11112	10888	10698	10512	10305	10112	9941	9753	9574	9385	9173	8934	8685	8340	7873	6600

9. Load Duration Curves are plotted with the above data points for each year of the 4th Control Period, which are shown below:





- a) After duly examining the graphs as above and keeping in view the criteria laid down supra, the Commission considered the load point corresponding to 30% time duration (e.g. 10888 MW on the LDC for FY2023-24) as Base Load and the remaining as other than base (OTB) load on the annual Load Duration Curves with due regard to the PLFs of base load plants obtaining in the State keeping in view the fuel availability issues etc. on the supply side.
- b) Accordingly, the corresponding base and other than base load points in the respective Load duration curves are extracted.
- c) The points so extracted indicate the respective annual net (Ex-bus) capacity requirement for the base and OTB capacities.

- d) Accordingly, the annual net Capacity requirement to meet the Base Load and Other than base Load as determined by the Commission to meet the System Demand duly including a spinning reserve of 5% on the corresponding demand points across the 4th Control Period is derived and is shown below:

Table 2 – Approved: Net (Ex-bus) Capacity requirement to meet the Demand (MW) including 5% spinning reserve

Capacity Required to meet the Demand as per the LDC	FY19-20	FY20-21	FY21-22	FY22-23	FY23-24
Base Capacity	8326	8986	9724	10547	11461
OTB Capacity	3247	3541	3787	4064	4344
Total Capacity	11574	12526	13511	14611	15805

10. The annual net capacity requirement is compared with the ex-bus capacities existing as on 31st March 2019 and the expected net capacities during the Control period, as determined vide Table 136.
11. Based on the annual net capacity requirement worked out with the methodology as above duly recognizing the existing & future generation capacities, the additional net capacity required (including 5% spinning reserve) during the 4th Control Period is as under.

Table 3 – Approved: Additional Net Capacity requirement to meet the Demand (MW) including 5% spinning reserve

Additional Ex-bus Capacity required (MW)	FY19-20	FY20-21	FY21-22	FY22-23	FY23-24	Total
Base Capacity	0	0	0	0	161	161
OTB Capacity	0	0	0	0	0	0
Total Capacity	0	0	0	0	161	161

12. In the above scenario, the Commission considered the four Gas based IPPs (GMR Vemagiri, GVK Extn., Konaseema, GVK Gouthami, totaling to a capacity share of 670 MW) being available as base load plants for the entire 4th Control Period. The Commission notes that these Gas based IPPs are stranded due to lack of gas for the last few years barring the period they were run on e-bid RLNG for some time. To assess the probable risk of unavailability of the above said four Gas IPPs,

Commission analyzed the capacity requirements by excluding the capacity of the four Gas based IPPs from the list of Installed Capacities, as an alternate scenario which are shown in the table below.

Table 4 – Alternate Scenario: Year-wise base and Other than base Capacities (MW)

Capacities	2019-20	2020-21	2021-22	2022-23	2023-24
Base Capacity (MW)	10183.10	11112.39	10696.63	10660.02	10630.57
OTB Capacity (MW)	8440.49	8435.52	8657.45	9126.62	9236.78
Total Capacity	18623.59	19547.91	19354.08	19786.64	19867.35

13. The year on year additional net capacity requirement in the alternate scenario with respect to the capacity requirement as at Table 139, works out as hereunder:

Table 5 – Alternate Scenario: Additional year on year net capacity requirements

Capacity (MW)	FY19-20	FY20-21	FY21-22	FY22-23	FY23-24	Total
Base Capacity	0	0	0	0	831	831
OTB Capacity	0	0	0	0	0	0
Total	0	0	0	0	831	831

14. In this scenario, there is an additional net capacity requirement (including 5% spinning reserve) to the extent of 831 MW, over and above the existing & future generation capacities and the requirement is arising towards the end of the Control Period.

The alternate scenario, in the considered opinion of the Commission, appears to be the worst-case scenario in terms of long-term capacity addition planning and as such the Commission is inclined to approve for procuring a base load capacity of 831 MW or say 1000 MW by FY2023-24. Further, since the Commission is approving only the additional capacity requirements for the 4th Control Period, even assuming that the alternate scenario does not come true, it is the firm opinion of the Commission that the base load capacity added by FY2023-24 will be at least useful for the 5th Control Period and hence licensees are authorized to procure only a base load capacity to the extent of 1000 MW to be available from

FY2023-24.

3.3 Coal Requirement by APGENCO

The total expected availability of coal by APGENCO is 24.342 MTPA against the requirement of 26 MTPA to generate 37182.3 MU. The coal is mainly supplied by CIL and SCCL the details are tabulated below for FY 2018-19.

Sl. No.	Description	Units	2018-19
1	Coal Based Generation programme during 2018-19 (Target)	MU	37,182
1.1	Coal based generation achieved during 2017-18 (Actual)	MU	26,964
2	Coal Requirement		
2.1	For plants designed for domestic coal	MT	23.99
2.2	For plants designed on imported coal	MT	2.018
2.3	Total Coal requirement	MT	26.0
3	Coal availability from indigenous sources		
3.1	From CIL	MT	17.962
3.2	From SCCL	MT	3.88
3.3	From captive mines	MT	-
3.4	From e-auction/stock	MT	2.5
3.5	Total domestic coal availability	MT	24.342
3.6	Requirement of imported coal for blending	MT	1.667

The above details pertain to Dr. NTTPS (1,760 MW), RTPP (1,050 MW) and Krishnapatnam Stg-I (1,600 MW). And RTPP-IV 600 MW

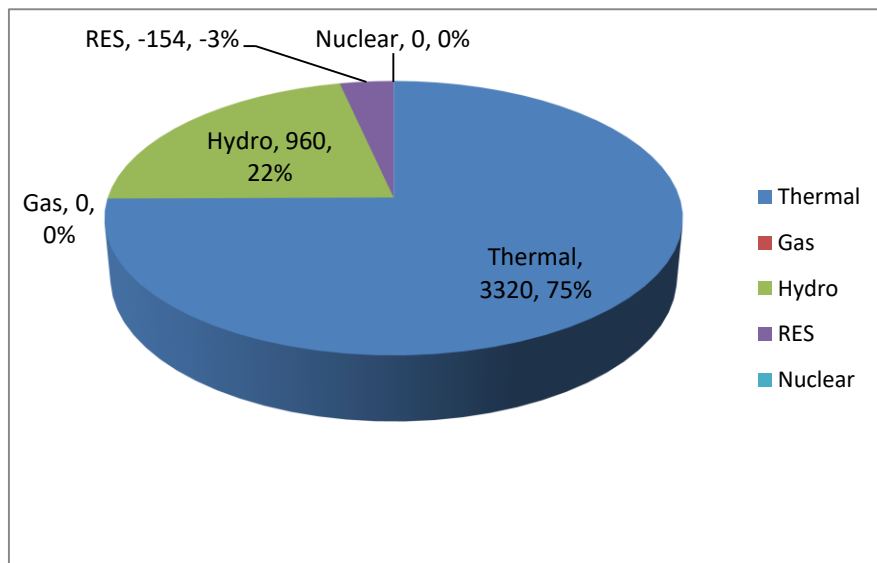
The coal required by APGENCO is 33.19 MTPA to generate 49218 MU by FY 2023-24 and the details are tabulated below for FY2023-24.

Sl No	Description	Units	2023-24
1	Coal based generation	MU	49218
2	Coal Requirement	MT	33.19
3	Imports by plants designed on imported coal	MT	2.14
4	Domestic coal requirement	MT	31.05

3.4 Fuel Wise Capacity Addition FY 2019 - FY 2024

The expected total capacity addition from FY2019-20 to FY 2023-24 is 4126 MW which comprises of 3320 MW thermal, 960MW Hydro and -154 MW

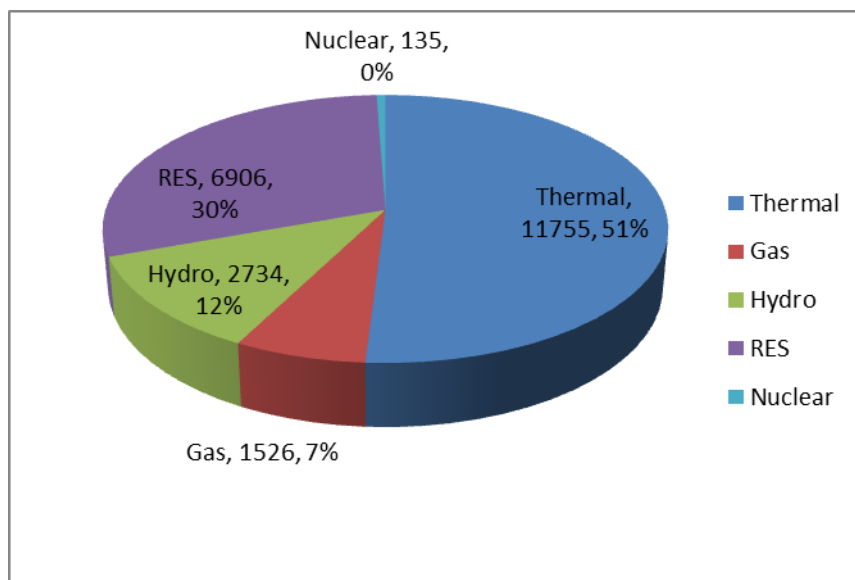
Renewable Energy Sources.



The major chunk i.e 75% capacity addition is from Thermal energy sources in the 4th control period.

3.5 Expected Installed Capacity by 31st March 2024

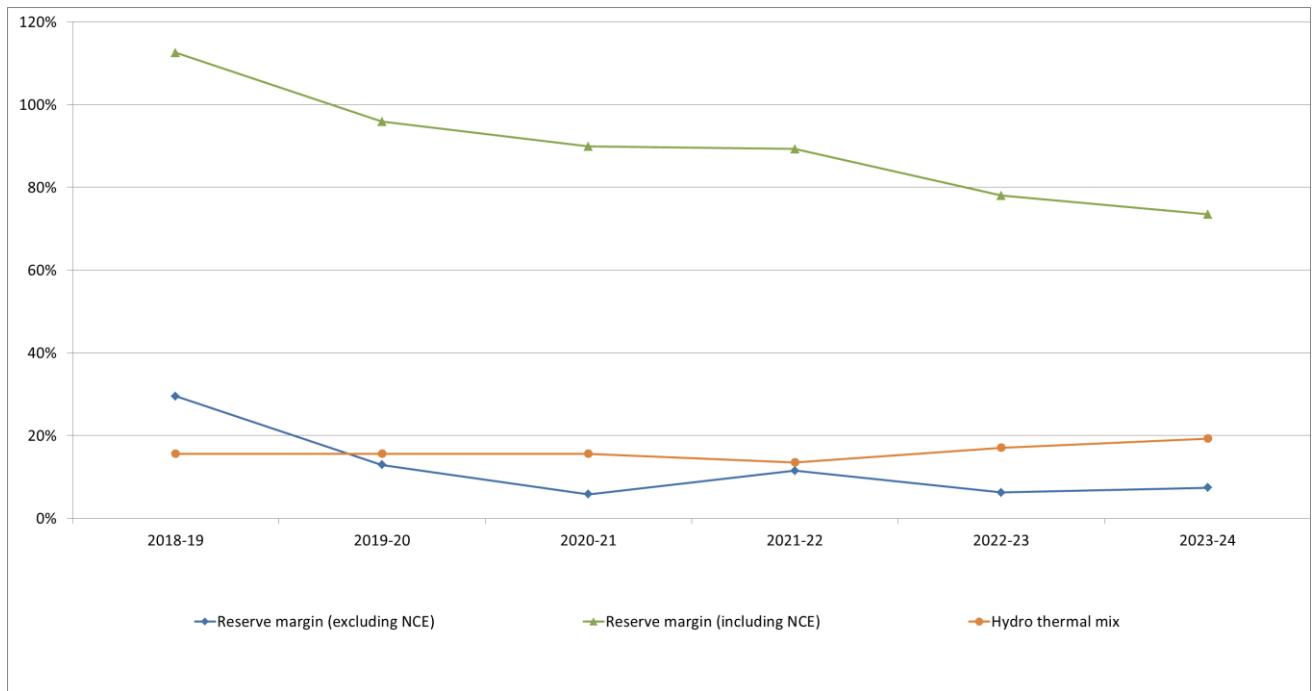
The expected installed capacity by 31st March 2024 would be 23056 MW comprises of 11755 MW thermal, 1526 MW gas, 2734 MW Hydro, 134.5 MW Nuclear , and 6906 MW Renewable Energy Sources.



3.6 Reserve margin and Hydro thermal mix

Reserve margin of a system is defined as the difference between the Installed Capacity and the peak load met as a percentage of the peak load met. This factor depends on a number of parameters, major ones being the mode of power generation i.e. hydro, thermal, renewable and the availability of the generating stations which primarily is a function of forced and planned shutdown of the generating units, capacity of the Discoms to procure power The Reserve margin and hydro thermal mix from FY2017-18 to FY2023-24 is tabulated below.

Hydro thermal mix increased from 15.6% in FY2018-19 to 19.3% by FY2023-24 in terms of installed capacity however Reserve margin (Excluding NCE) decreased from 29% in FY2018-19 to 7% in FY2023-24 .



4 Introduction of Transmission Plan

Transmission Planning is a continuous process of identification of Transmission system additional requirement, their timing and need. The Transmission requirement could arise from

- i) New generation addition in the system
- ii) Increase in demand
- iii) System strengthening that may become necessary to achieve reliability as per the planning criteria under change load scenario.

The Transmission requirement are identified, studied and firmed through the Transmission planning process.

The Transmission system consists of Inter state Transmission system (ISTS) and Intra state Transmission system (Intra STS). ISTS is mainly owned by and operated by PGCIL which is also Central Transmission Unit whereas Intra -State Transmission system are mainly owned by the state.

The Intra-STs serves the following purposes.

- i) Evacuation power from the state's generating stations (both under state and private sector) having beneficiaries in the state.
- ii) Onward Transmission within the state from ISTS boundary up to the various substations of the state grid network.
- iii) Transmission within the state grid for delivery of power to the load centers within the state.

There has been a consistent increase in Transmission network and transformation capacity in the state. This increase is in consonance with increase in generation and demand of electricity in the state. This as part of growth in Transmission highlights requirements of Transmission network to carry bulk power over longer distances and then at the same time optimize ROW, minimize losses and to improve grid stability.

The objective of the Transmission Planning is to develop Transmission Expansion Plan based on the load forecast and generation supply scenario developed as part of the Load forecast and Resource plan for the state of Andhra Pradesh with the inputs of DISCOMs and GENCO. The purpose of this report was to present a comprehensive summary of the process, assumptions, methodology, Transmission network expansion plan required to ensure the Transmission system which would be capable transmitting the planned generation to meet the forecast loads up to FY 2024. The proposed Transmission system was evaluated for the load and generation conditions for FY 2024.

The system studies were carried out for the Peak Load Scenario and analyzed the Transmission system required from FY 2019-20 to FY 2023-24 which comes under short term plan.

This report envisages the various assumptions & standards adopted for conducting load flows followed for preparation of Transmission Resource plan from FY2020 to FY2024. After conducting load flow studies and contingency analysis under maximum thermal generation scenario as the peak demand occurs in March various generation evacuation schemes at 765KV, 400KV are depicted. The Transmission expansion plan which includes 400KV and 220 KV lines and Substations are also depicted. Sub Transmission plan comprises of 132KV network is also prepared and depicted.

4.1 Criteria for Load Flow Studies

The assumptions and standards adopted while conducting Load Flow studies for UHV (220KV and above) are shown below.

4.1.1. Standard Transformer sizes

The utility's standard Transformer Sizes

Voltage	ONAN Rating (MVA)	OFAF Rating (MVA)
765/400 kV	900	1500
400 / 220 kV	300	500
400 / 220 kV	190	315
220 / 132 kV	96	160
220 / 132 kV	60	100

4.1.2. Standard Conductor types

Sl. No	Line Voltage	Conductor Type	Configuration
1	765 kV	Quad Besimis	ACSR Bersimis,4/PH, 42/4.57 mm Al + 7/2.54 mm Steel

2	400 kV	Twin Moose	ACSR Moose, 2/PH, 61/3.53mm
3	400 kV	Quad Moose	ACSR Moose, 4/PH, 61/3.53mm
4	220 kV	Single Moose	ACSR Moose, 1/PH, 61/3.53mm
5	220 kV	Twin Moose	ACSR Moose, 2/PH, 61/3.53mm
6	132 kV	Panther	ACSR Panther, 37/3.00mm

4.2 Operating Limits under normal conditions

The operating limits as in practice for system studies are adopted as follows:

Sl. No	Item	Operating Limit during normal conditions
1	765/400 KV 1500 MVA Transformer*	900MVA
2	400 / 220 kV 315 MVA Transformer	190 MVA
3	220 / 132 kV 100 MVA Transformer	60 MVA
4	765 KV Quad Besimis Line*	2250MVA
5	400 kV Twin Moose Line	555 MVA
6	220 kV Single Moose / Zebra Line	178 MVA
7	132 kV Panther Line	67 MVA

4.2.1 Thermal Limits of Transmission Lines at Rated Voltage

Thermal limit of the Transmission line shall be its thermal loading limit. The thermal loading limit of a line is determined by design parameters based on ambient temperature, maximum permissible conductor temperature, wind speed, solar radiation, absorption coefficient, emissivity

coefficient etc. The maximum permissible thermal line loadings for different types of line configurations and different type of conductors are taken as per revised CEA guide lines.

Note:75 °C is the normal maximum operating conductor temperature.100 °C is the maximum emergency operating conductor temperature, permitted for short duration of periods, during emergencies in the system.

Number of transformers in 765/400KV ,400/220 kV and 220/132 kV Sub-Stations: Based on the standard transformer sizes adopted, transformer loading limits adopted and the CEA specified sub-station loading limits, the utility has adopted the maximum number of transformers in 765/400KV, 400/220 kV and 220/132 kV Sub-Stations as 4. In Uravakonda, Uravakonda - 2, Hindupur and Manubolu 400/220KV SS maximum number of Transformers adopted are four.

The Transformer augmentation in 220/132kV substations will be carried out in the long term planning studies considering minimum of 2 numbers PTRs to meet the N-1 contingency. The additional PTR will be provided whenever the substation load reaches 100MVA.

(A) Capacity of Substation

As per CEA revised planning criteria, the capacity of any single substation at different voltage levels shall not normally exceed:

SS Voltage	SS MVA(Max Capacity)
765 KV	9000MVA
400 KV	2000 MVA
220KV	500 MVA
132 KV	250 MVA

(B) Voltage Limits

Permitted voltage limits, as per CEA guidelines

Nominal Voltage in kV	Maximum Voltage in kV	Minimum Voltage in kV
765	800	728
400	420	380
220	245	198

132	145	122
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(E) Power Factor of the Loads: All the loads power factor at 220kV and 132kV voltage levels are assumed to be 0.95 lag during peak load condition and 0.98 lag during light load condition as per Transmission Planning criteria specified by CEA.

4.2.2 Contingency criteria:

The system is planned to supply loads during normal conditions and the following contingency conditions without the need for rescheduling of generation and to maintain voltage and line loading criteria.

a) All the equipment in the transmission system shall remain within their normal thermal and voltage ratings after a disturbance involving loss of any one of the following elements (called single contingency or 'N-1' condition), but without load shedding / rescheduling of generation:

- Outage of a 132kV or 110kV single circuit,
- Outage of a 220kV or 230kV single circuit,
- Outage of a 400kV single circuit,
- Outage of a 400kV single circuit with fixed series capacitor(FSC),
- Outage of an Inter-Connecting Transformer(ICT),
- Outage of a 765kV single circuit
- Outage of one pole of HVDC bipole.

b) The angular separation between adjacent buses under ('N-1') conditions shall not exceed 30 degree.

(Prior to such contingency, all elements shall be considered to be in service)

Criteria for single contingency (N-1):

The Transmission planning was based on a deterministic approach using the single contingency (or N-1) criterion. This is the most common approach used world-wide, and it requires the system to be able to operate satisfactorily with one element out of service (Generator, Transmission Line or Transformer), and to survive

the transition from the normal state to the contingency state without any operator intervention.

An exception to the above criteria, is that the system shall survive a 400kV DC line outage evacuating a power plant located in the coastal area, because damage caused by cyclones are of great concern to APTRANSCO

4.3 Transmission Investments (FY2019-20 to FY 2023-24)

APERC has approved the investment of Rs10696.34 Cr against the proposed investment of Rs 14616.58 Cr by Transco for the 4th control period .The details of Investment plan and Transmission Plan for the 4th control period are given below:

Financial Year	Evacuation and System Improvement		Augmentation and R&M Works	Total
	440 kV	132 kV and 220 kV		
2019-20	568.35	831.95	62.25	1462.55
2020-21	809.41	1533.82	259.53	2602.76
2021-22	804.13	1758.78	227.80	2790.71
2022-23	738.47	1176.82	224.39	2139.68
2023-24	463.00	988.17	249.46	1700.63
Total	3383.36	6289.54	1023.44	10696.34

FY	Sub-Station			Lines		
	(Nos.)			Ckm		
	400	220	132	400	220	132
2019-20	3	14	32	221	1036.4	841
2020-21	2	8	27	230	596	500
2021-22	2	6	21	440	898	241
2022-23	2	2	12	270	860	115
2023-24	1	5	18	40	306	465
Total	10	35	110	1201	3696.4	2162

4.3.1 Capacity Addition in Transmission

The state is at present handling 64,130 MU (FY 2018-19) of energy & maximum demand reached so far in FY 2019-20 is 10207 MW. This is likely to increase to 93106 MU of energy & 15539 MW of peak demand by FY 2023-24. To meet this demand, robust & reliable Transmission network is required for Transmission (inter-state & intra state) of required energy.

For handling the above energy, PGCIL (CTU) has drawn up the following plans:

Inter Regional Lines (ER-SR corridor): PGCIL constructed Anugul-Srikakulam-Vemagiri 765 kV double circuit lines. Vemagiri-Chilakaluripeta line will be operationalized by June'19. These double circuit 765 kV lines will be able to transmit 3,000 MW power.

APTRANCO can import power from other Regions through this ER-SR corridor, by getting linkage through a 400 kV substation at Srikakulam (Palasa).

APTRANSCO has planned of Transmission system addition during the period FY 2019-20 to FY 2023-24 which includes 1201 ckm of 400 KV, 3696 ckm of 220 kV ,2162 ckm of 132 kV lines and 10 numbers 400 kV substations, 35 numbers 220 kV substations and 110 numbers 132 kV substations.

The 400 kV network enhancements also cover a 400 kV Transmission ring network around the new capital city Amaravathi and cities of Vijayawada & Guntur .

4.3.2 District wise Load Forecast.

Discoms have projected their circle wise Demand forecast and submitted to honorable APERC in Discoms Resource plan. District wise demand forecast from FY 2018 to FY 2024 is shown in the below table.

EPDCL - Circles	FY18* (Actuals)	FY19	FY20	FY21	FY22	FY23	FY24
Srikakulam	264	248	295	321	349	381	417
Vizianagaram	369	431	478	532	592	660	736
Visakhapatnam	1,036	1,157	1,268	1,391	1,528	1,681	1,850
Rajahmundry	718	781	829	909	1,000	1,102	1,216
Eluru	986	977	1,180	1,271	1,373	1,486	1,614
SPDCL-Circles	FY18* (Actuals)	FY19	FY20	FY21	FY22	FY23	FY24
Vijayawada	893	1,030	1,142	1,268	1,411	1,572	1,755
Guntur	781	863	950	1,050	1,164	1,293	1,442
Ongole	622	688	733	784	839	900	967
Nellore	687	751	814	886	969	1,063	1,172
Tirupati	975	1,292	1,374	1,464	1,562	1,668	1,785
Kadapa	793	938	981	1,029	1,083	1,143	1,210
Anantapur	985	1,185	1,234	1,288	1,348	1,414	1,486
Kurnool	756	1,029	1,083	1,143	1,208	1,280	1,358
DISCOM	FY18* (Actuals)	FY19	FY20	FY21	FY22	FY23	FY24
EPDCL	3,038	3,251	3,825	4,176	4,573	5,020	5,523
SPDCL	5,864	6,909	7,618	8,200	8,863	9,610	10,455

The circle level peaks are monthly peaks & may be arriving with discom peak in the same month.

4.3.3 Capacity Addition in Transmission (400kV, 220kV & 132kV).

Load Growth: Transmission expansion programme is prepared to meet the increasing demand .

Power Evacuation: For evacuation of power from Power projects, Transmission system is to be planned which includes lines and Substations.

System Improvement: In case of overloading of the existing line/substation, new system is to be proposed for next higher voltage. This also includes reconductoring of existing Transmission lines with higher ampacity conductors. These are categorized under system improvement for strengthening the system.

The following plan is the abstract of the lines and Substations proposed to meet the additional load, Generation Evacuation and System Improvement in the FY 2018-19.

Category	Sub-Stations			Lines		
	(Nos.)			Ckm		
	400	220	132	400	220	132
Load Growth	2	8	26	6	602.3	1069
Generation Evacuation	1	1	0	255	108	0
System Improvement	1	0	0	400	0	0
Total	4	9	26	661	710.3	1069

4.3.4 Details of Transmission Expansion Plan for FY 2018 -2019.

4.3.4.1 Substations programmed during FY 2018-19 (400kV, 220kV & 132kV).

400kV Substations:

Sl. No	District	Name of the SS	Voltage	Type
1	Prakasam	Podili	400	S
2	Anantapuramu	Hindupur	400	G
3	Chittor	Kalikiri	400	L
4	West Godavari	Guddigudem	400	L

220kV Substations:

1	Kadapa	Tirumalaipally	220	G
2	Guntur	Guntur	220	L
3	Srikakulam	Pydibhimavaram	220	L
4	Krishna	Nuziveedu	220	L
5	Nellore	Atmakur	220	L
6	Prakasam	Kandukur	220	L
7	Nellore	Racharlapadu	220	L
8	West Godavari	Thadipudi	220	L
9	Anantapuramu	Mutyalacheruvu	220	L

132kV Substations:

Sl. No	District	Name of the SS	Voltage Ratio (kV/kV)
1	Guntur	Ponnuru	132/33
2	Guntur	AIIMS/Mangalagiri	132/33
3	Visakhapatnam	Kapuluppada	132/33
4	Vizianagaram	G Chodavaram	132/33
5	Krishna	Narasapuram	132/33
6	Krishna	GIS at Moghalrajpuram	132/33
7	Guntur	Yadavalli	132/33
8	Chittoor	V.Kota	132/33
9	YSR Kadapa	C.Orampadu	132/33
10	YSR Kadapa	Kalasapadu	132/33
11	YSR Kadapa	T.Sundupalli	132/33

12	YSR Kadapa	Satellite City	132/33
13	YSR Kadapa	Brahmamgarimattam	132/33
14	Anantapur	33kV features at 132 kV Switching station Nagalapuram	132/33
15	Anantapur	33kV features at 220 kV Boksampalli Substation	132/33
16	Prakasam	Chinnarikatla	132/33
17	Prakasam	East Gangavaram	132/33
18	East Godavari	Jaggampeta	132/33
19	Krishna	Mylavaram	132/33
20	Anantapur	33kV features at 132 kV LIS Madakasira	132/33
21	West Godavari	Reddyganapavaram	132/33
22	West Godavari	Routhugudem	132/33
23	Nellore	Marripadu	132/33
24	Chittor	Musalikunta	132/33
25	Guntur	Undavalli	132/33
26	Chittor	Kalicherla	132/33

4.3.4.2 Lines programmed during FY 2018-19 (400kV, 220kV & 132kV).

400kV Lines:

Sl.No	Name of the Transmission Line	IC	Conductor Type	Ckt	Length in Ckt KM
1	LILO of 400kV Uravakonda - Jammalamadugu to Thalaricheruvu SS	G	Quad Moose	LILO	2
2	400 kV Sattenapalli SS - 400 kV Podili SS	S	Twin Moose	D/C	215.28
3	400 kV Vemagiri SS - 400 kV Kamavarapukota SS	S	Twin Moose	D/C	184.942
4	400 kV Uravakonda SS to 400 kV Hindupur SS	G	Quad Moose	D/C	252.56
5	400 kV LILO of HNPCL - Kamavarapukota SS at proposed 400 kV Guddigudem SS.	L	Quad Moose	LILO	6

220kV Lines:

Sl.No	Name of the Transmission Line	IC	Conductor Type	Ckt	Length in Ckt KM
1	Proposed Jammalmadugu 400 kV SS To Proposed Tirumalaipally SS	G	Single Moose	D/C	108
2	220 kV DC line from 400/220 kV Sattenapalli to proposed 220 kV Guntur SS	L	Single Moose	D/C	110
3	400/220 kV Garividi SS to proposed 220/132 kV Pydibhimavaram SS DC line	L	Single Moose	D/C	100
4	220 kV DC Line for LILO of existing one circuit of 220kV VTS - Kamavarapukota line at proposed 220kV SS Nuzivedu.	L	Single Moose	LILO	24
5	220kV DC Line for LILO of existing one circuit of 220kV VTS-Kamavarapukota at 400/220kV SS Kamavarapukota	L	Single Moose	LILO	8
6	220kV DC line from 220kV SS Gunadala to 220kV SS Nunna in the same corridor of existing SC line with Monopoles (6.0 with Monopole & 1.0 with MC)	L	Single Moose	D/C	14
7	220kV Line With Four (4) Circuits on Multi - Circuit towers for LILO of Circuit - I & 2 of 220 kV Podili - Nellore DC Line at proposed 220 kV SS, Atmakur	L	Single Moose	LILO	80
8	220kV DC line from the proposed 400/220kV Podili SS to the 220/132kV Kandukur SS	L	Single Moose	D/C	96
9	220kV DC Line for making LILO of existing 220kV Nellore-Ongole line at proposed 220/132kV SS Racharlapadu	L	Single Moose	LILO	18
10	220 kV DC line from 400/220 kV Guddigudem to proposed 220/11 kV Thadipudi SS	L	Single Moose	D/C	36
11	220 kV DC line from Pulivendula to Muthyalacheruvu	L	Single Moose	D/C	109.4
12	220 kV LILO of Nannur-Regumanugadda line to 220 kV Brahmankotkur SS	L	Single Moose	LILO	6.902

132kV Lines:

Sl. No	Name of Transmission line	Length in Ckt kM
1	132 kV DC Line with XLPE Cable from proposed Up-gradation of 132/33 kV SS Tadepalli to 220/132/33 kV SS to proposed 132 kV SS AIIMS/Mangalagiri	9
2	132 kV DC Line with XLPE UG Cable from 220 kV Diary Farm to the proposed 132 kV GIS SS at Kapuluppada.	14
3	33 kV 400sqmm 1 core copper XLPE Cable with terminal blocks (for 2 LVs)	2
4	Stringing of 2nd circuit on 132 kV Parchur - Chirala line	25
5	Stringing of 2nd circuit from 220 kV SS Markapur to 132 kV SS Kesinenipally	19
6	2nd circuit stringing on existing 132 kV Markapur - Cumbum	32
7	132 kV DC Line with XLPE UG Cable from proposed 220/132/33 kV SS Amaravati to the proposed 132/33 kV SS Amaravati	5
8	Stringing of 2nd circuit on 132 kV Uravakonda - Guntakal DC/SC Line	30
9	LILLO of one circuit of 132 kV Uravakonda - Guntakal Line to 220 kV SS Vajrakarur	6
10	132 kV DC line with XLPE UG Cable from 132 kV SS Vijayawada to the proposed 132/33 kV GIS SS Moghalrajpuram	6
11	132 kV DC/SC line from tapping point to the proposed 132/33 kV Yernagudem Substation	1
12	2nd circuit stringing on 132 kV Nidadavolu - kV Kota line from 220 kV SS Kamavarapukota to the proposed 132 kV SS Yernagudem	38
13	132 kV DC/SC line from proposed 220/132 kV Pydibhimavaram Substation to the proposed 132/33 kV G.Chodavarm Substation	9
14	132 kV DC radial line from proposed 220/132 kV SS Nuzividu to the proposed 132/33 kV SS Narsapuram	25

15	132 kV DC radial line(UG Cable) from 220/132 kV Gunadala Substation to the proposed 132/33 kV GIS substation Moghalrajpuram	8
16	33 kV 400sqmm 1 core copper XLPE Cable with terminal blocks (for 2 LVs)	2
17	2 nd circuit on 132 kV DC/SC line from Parchur 220/132 kV Substation to the Martur 132/33 kV Substation	19.28
18	132 kV DC/SC line from 132/33 kV Martur substation to the proposed 132/33 kV Yadavalli substation	18
19	132 kV DC/SC line from 220/132/33 kV Palamaneru Substation to the proposed 132/33 kV V.Kota Substation	42
20	132 kV DC/SC line from 220/132 kV Rajampet substation to the proposed 132/33 kV C. Orampadu substation	22
21	132 kV DC radial line from proposed 220/132 kV Porumamilla to the proposed 132/33 kV Kalasapadu substation	36
22	132 kV DC radial line from 132/33 kV SS Rayachoti to the proposed 132/33 kV SS T. Sundupalli	20
23	132 kV DC radial line from 220/132 kV SS Chinakampalli to the proposed 132/33 kV SS Satellite city	30
24	132 kV DC radial line from proposed 220/132 kV SS Porumamilla to the proposed 132/33 kV SS Brahmamgarimattam	15
25	132 kV DC Radial line from 220/132 kV SS Podili to proposed 132 kV SS Chinnarikatla	26
26	132 kV DC radial line from 220/132 kV SS Podili to the proposed 132/33 kV SS at East Gangavaram	21
27	132 kV DC radial line from 220/132 kV SS Samarlakota to the proposed 132/33 kV SS at Jaggampet	20
28	132 kV DC radial line from 220/132 kV SS Kondapalli to the proposed 132/33 kV SS at Mylavaram	25
29	Stringing of 2nd circuit from 220 kV SS Gollapuram to 132 kV SS Lepakshi	15

30	132 kV DC line from 132 kV SS Lepakshi to the proposed 132 kV SS Palasamudram	20
31	132 kV DC Line with XLPE UG Cable from proposed 220/132/33 kV SS Amaravati to the proposed 132/33 kV SS Achampeta	32
32	132 kV DC/SC Line with XLPE UG Cable from proposed 220/132/33 kV SS Amaravati to the proposed 132/33 kV SS Dondapadu	15
33	132 kV DC/SC Line with XLPE UG Cable from proposed 220/132/33 kV SS Malkapuram to the proposed 132/33 kV SS Dondapadu	11
34	132 kV DC line from 220 /132 kV Kota SS to proposed 132/11 kV Reddyganapavaram SS.	60
35	132 kV DC line from Reddyganapavaram SS to proposed 132/11 kV Routhugudem SS.	8
36	132 kV DC/SC Line from 220/132 kV Atmakuru SS to proposed 132/11 kV Marripadu SS	45
37	132 kV DC/SC line from 220/132 kV Timmapuram SS to proposed 132 kV Musalikunta SS.	40
38	132 kV DC line from 132/33 kV Tadepalli SS to Proposed 132/11 kV Undavalli LIS SS	10
39	132 kV line with four Circuits on Multi Circuit Towers to make LILO of both circuits of 132 kV Guntur-Tenali DC line at proposed 220 kV Guntur Substation	80
40	Proposed 220/132 kV Pydibhimavaram SS to the Tap point of 132 kV LILO line going to the existing 132/33 kV Pydibhimavaram SS	4
41	Proposed 220/132 kV Pydibhimavaram SS - 132 kV Chilakapalem SS DC line	80
42	132 kV DC line for LILO of existing 132 kV Nellore - Atmakur line at proposed 220/132 kV SS Atmakur	6.00
43	132 kV DC line for LILO of existing 132 kV Atmakur - Udayagiri line at proposed 220/132 kV SS Atmakur	4.00

44	LILO of 132 kV SC line from 132 kV existing Kavali - Kandukur SS to the proposed 220 kV Substation at Kandukur	15
45	132 kV DC Line for making LILO of existing 132 kV NTS - Allur line at proposed 220/132 kV SS Racharlapadu	2.40
46	132 kV DC Line for making LILO of existing 132 kV Kavali - Allur line at proposed 220/132 kV SS Racharlapadu	48.00
47	132 kV DC Line to proposed Dagadathi SS from proposed 220/132 kV SS Racharlapadu	48.00

4.4 Capacity Addition in Transmission Plan (for FY 2020 to 2024)

Tentative Transmission expansion plan for the short term i.e from FY 2019-20 to FY 2023-24 is prepared as per the load requirement. This includes 1201 ckm of 400 KV, 3696.4 ckm of 220 kV lines and 2162 ckm of 132 kV lines towards transmission expansion and 10 numbers of 400 kV substations, 35 numbers of 220kV substations and 110 numbers of 132kV substations towards Transmission expansion as below :

FY	Sub-Stations			Lines		
	(Nos.)			Ckm		
	400	220	132	400	220	132
2019-20	3	14	32	221	1036.4	841
2020-21	2	8	27	230	596	500
2021-22	2	6	21	440	898	241
2022-23	2	2	12	270	860	115
2023-24	1	5	18	40	306	465
Total	10	35	110	1201	3696.4	2162

4.5 Details of Transmission Expansion Plan for FY 2020 to 2024.

4.5.1 400kV, 220kV & 132kV Substations programmed during FY 2019-24

Sl. No	District	Name of the SS	Voltage	Target year of Commissioning
400 kV Substations				
1	Guntur	Thallayapalem GIS	400	2019-20
2	Chittoor	Rachagunneri	400	2019-20
3	Kadapa	Mylavaram	400	2019-20
4	Nellore & Visakhapatnam	Augmentation at Manubolu and Kalpaka	400	2019-20
400 kV Substations				
1	West Godavari	Eluru	400	2020-21
2	Anatapur	Uravakonda-2	400	2020-21
400 kV Substations				
1	Krishna	Gudivada	400	2021-22
2	Kurnool	Aspiri	400	2021-22
400 kV Substations				
1	Guntur	Chilakaluripeta	400	2022-23
2	East Godavari	Konaseema	400	2022-23
400 kV Substations				
1	East Godavari	Kakinada SEZ	400	2023-24
220 kV Substations				
1	Kurnool	Betamcherla	220	2019-20
2	Anantapur	Penukonda	220	2019-20
3	Visakhapatnam	Koruprolu (Chandanada/Nakkapalli)	220	2019-20
4	Nellore	Naidupeta(Menakuru)	220	2019-20
5	Chittoor	Chervi	220	2019-20
6	Visakhapatnam	Achutapuram	220	2019-20
7	East Godavari	Kakinada SEZ	220	2019-20
8	Guntur	220/33 kV GIS SS Lingayapalem (CRDA)	220	2019-20
9	Guntur	Upgradation of 132 kV SS Piduguralla To 220 kV SS	220	2019-20

10	Visakhapatnam	Upgradation of 132 kV SS Simhachalam to 220/132 kV SS	220	2019-20
11	East Godavari	132 kV & 33 kV Features at 220/11 kV LIS SS Ramavaram	220	2019-20
12	East Godavari	220/33 kV SS Chinturu	220	2019-20
13	Guntur	220/33 kV GIS SS Nelapadu (CRDA)	220	2019-20
14	Anantapur	Pampanur Thanda	220	2019-20
1	East Godavari	Korukonda	220	2020-21
2	West Godavari	220/33 kV SS Akiveedu	220	2020-21
3	Vizianagaram	Vizianagaram	220	2020-21
4	Anantapur	Dharmavaram	220	2020-21
5	East Godavari	Amalapuram (Siripalli)	220	2020-21
6	Guntur	Upgradation of 132 kV SS Tadepalli to 220 kV SS	220	2020-21
7	Guntur	Thulluru	220	2020-21
8	Guntur	Rayapudi	220	2020-21
9	Guntur	Velagapudi	220	2020-21
1	Nellore	Kothapalem	220	2021-22
2	East Godavari	Ramachandrapuram	220	2021-22
3	Guntur	Repalle	220	2021-22
4	Kurnool	Adoni	220	2021-22
5	Krishna	Gannavaram	220	2021-22
6	East Godavari	Machilipatnam	220	2021-22
7	Prakasam	Kanigiri	220	2021-22
1	Nellore	Kavali	220	2022-23
2	Anantapur	Kadiri	220	2022-23
3	East Godavari	Prattipadu	220	2022-23
4	Kurnool	Dhone 132 kV Features	220	2022-23
5	East Godavari	Editha	220	2022-23
6	West Godavari	Tanuku	220	2022-23
1	Kadapa	Rayachoti	220	2023-24
2	West Godavari	Penugonda	220	2023-24
3	Prakasam	Podalakuru	220	2023-24

4	Nellore	Sarvepalli	220	2023-24
5	Visakhapatnam	Anandapuram	220	2023-24
6	Visakhapatnam	Commom Point	220	2023-24

132kV Substations

Sl. No	District	Name of the SS	Target year of Commissioning
1	Prakasam	Anumalapalle	2019-20
2	Nellore	Kallurpalli	2019-20
3	Nellore	Vinjamur	2019-20
4	Nellore	Koruturu	2019-20
5	East Godavari	Mummidivaram	2019-20
6	East Godavari	Gollapalem	2019-20
7	Chittoor	Kothapalli (Gudipala)	2019-20
8	Chittoor	Penumur	2019-20
9	Nellore	Kadivedu	2019-20
10	Anantapur	Palasamudram	2019-20
11	Krishna	Bantumilli	2019-20
12	Chittoor	Mangalam	2019-20
13	Nellore	Gottiprolu	2019-20
14	East Godavari	Vepakayaladibba	2019-20
15	Visakhapatnam	APMTZ, Nadupuru	2019-20
16	Vizianagaram	Alamanda	2019-20
17	West Godavari	Vatluru/ Hanuman Junction	2019-20
18	West Godavari	TR Palem/ Gunnampalli	2019-20
19	West Godavari	Attili (Pippara)	2019-20
20	West Godavari	Palakollu	2019-20
21	West Godavari	Dharmajigudem	2019-20
22	Srikakulam	Veeraghattam	2019-20
23	Srikakulam	Sarubujjili (Amadalavalasa)	2019-20
24	Kurnool	33kV features at Nansuralla LIS SS	2019-20

25	Visakhapatnam	Jamathulapalem	2019-20
26	Visakhapatnam	Tida	2019-20
27	Visakhapatnam	Bhudevi Tank	2019-20
28	Vizianagaram	Veeranarayanapuram	2019-20
29	Vizianagaram	Tatipudi	2019-20
30	Vizianagaram	Kondagandrelu	2019-20
31	Vizianagaram	GM Valasa	2019-20
32	Vizianagaram	Burjavalasa	2019-20

1	East Godavari	Annavaram	2020-21
2	Prakasam	Chinnaganjam	2020-21
3	Krishna	Gunadala	2020-21
4	Krishna	Mukthyala	2020-21
5	Krishna	Gampalagudem	2020-21
6	Krishna	Vuyyuru	2020-21
7	Prakasam	Kothapatnam	2020-21
8	Prakasam	Pallamalli	2020-21
9	Prakasam	Singarayakonda	2020-21
10	Prakasam	Mekalavaripalli	2020-21
11	Prakasam	Ulavapadu	2020-21
12	Prakasam	Pullalacheruvu	2020-21
13	Prakasam	Komarole	2020-21
14	Prakasam	Elchuru (V), Santhamaguluru (M)	2020-21
15	Prakasam	Siddannapalem (V), Pullalacheruvu (M)	2020-21
16	Kurnool	Near Ayyaluri Metta (Nandyal)	2020-21
17	Chittoor	Kakalamitta	2020-21
18	Chittoor	Gudipadu	2020-21
19	Chittoor	Vijalapuram	2020-21
20	Kurnool	Gondiparla (E.Thandrapadu)	2020-21
21	Srikakulam	Sompeta	2020-21
22	Srikakulam	Hiramandalam	2020-21

23	Krishna	Kabela	2020-21
24	Vizianagaram	Chipurupalli	2020-21
25	Vizianagaram	Nellimarla	2020-21
26	Vizianagaram	GajapathiNagaram	2020-21
27	Guntur	Nekarikallu	2020-21
28	Kurnool	Kosgi	2020-21

1	Nellore	Chintavaram	2021-22
2	Krishna	Jakkampudi	2021-22
3	Krishna	Mallavalli	2021-22
4	Krishna	Devanakonda	2021-22
5	Krishna	Kalluru	2021-22
6	Chittoor	Gandhipuram	2021-22
7	Kurnool	Gajulapalli	2021-22
8	Anantapur	Kuderu	2021-22
9	Guntur	Bhattiprolu	2021-22
10	Guntur	Bellamkonda	2021-22
11	Kurnool	33kV features at Krishnagiri LIS SS	2021-22
12	Chittoor	Satyavedu	2021-22
13	Chittoor	Poothalapattu	2021-22
14	Chittoor	BN Kandriga	2021-22
15	Prakasam	Kaligiri	2021-22
16	Prakasam	Veligandla	2021-22
17	Prakasam	Ponnaluru	2021-22
18	Krishna	Penamaluru	2021-22
19	Krishna	Kankipadu	2021-22
20	Krishna	Challapalle	2021-22
21	Srikakulam	Gara	2021-22
22	Srikakulam	Polaki	2021-22
23	Srikakulam	Vajrapukothuru	2021-22
1	Vizianagaram	Pusapathirega	2022-23
2	Vizianagaram	Kurupam	2022-23

3	Vizianagaram	Mentada	2022-23
4	Nellore	Duttalur	2022-23
5	Nellore	Buchireddypalem	2022-23
6	Nellore	Somasila	2022-23
7	Nellore	Dakkili	2022-23
8	Nellore	Jonnawada	2022-23
9	Nellore	Vidavaluru	2022-23
10	Visakhapatnam	Madugula	2022-23
11	Visakhapatnam	Sabbavaram	2022-23
12	Visakhapatnam	Nathavaram	2022-23
13	West Godavari	Unguturu	2022-23
14	West Godavari	Undrajavaram	2022-23
15	West Godavari	Veeravasarevu	2022-23
16	Guntur	Peddakakani	2022-23
17	Guntur	Gurazala	2022-23
18	Guntur	Edlapadu	2022-23
19	YSR Kadapa	Galiveedu	2022-23
20	YSR Kadapa	Nandaluru	2022-23
21	YSR Kadapa	Pullampeta	2022-23
22	YSR Kadapa	Lakkireddipalle	2022-23

1	Kurnool	Jupadu	2023-24
2	Kurnool	Miduthur	2023-24
3	Kurnool	Chagalamarri	2023-24
4	Nellore	Mallam	2023-24
5	Nellore	Varagali	2023-24
6	Vizianagaram	Govada	2023-24
7	Visakhapatnam	K.Kotapadu	2023-24
8	Visakhapatnam	Vaddadhi	2023-24
9	Visakhapatnam	Bhimili	2023-24
10	Visakhapatnam	Rambili (Lalam Koduru)	2023-24
11	Visakhapatnam	Auto Nagar	2023-24

12	Visakhapatnam	East Point Colony	2023-24
13	East Godavari	Hamsavaram	2023-24
14	East Godavari	Panasapadu, Kakinada Rural	2023-24
15	East Godavari	Teki	2023-24
16	East Godavari	Uppalaguptam	2023-24
17	East Godavari	Mamidikuduru	2023-24
18	East Godavari	Gokavaram	2023-24
19	East Godavari	Dwarapudi or Mukkinada	2023-24
20	East Godavari	Atreyapuram	2023-24
21	East Godavari	Addathigala	2023-24

4.5.2 400kV , 220 kV and 132 kV lines Programmed during FY 2020-24:

Sl.No	Name of the Transmission Line	IC	Conduc tor Type	Ckt	Length in Ckt KM	Target year of Commiss ioning
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400 kV Lines

1	400 kV LILO of 400 kV Chittoor SS - 400 kV APGENCO Krishnapatnam to proposed 400/220/132kV Rachagunneri SS	L	Quad Moose	LILO	180	2019-20
2	Diversion of 400 kV Lines in CRDA	S			37	2019-20
3	400kV LILO of existing - 400kV VTS - Sattenapalli DC line at proposed 400/220kV Thallayapalem GIS	L	Twin Moose	LILO	2	2019-20
4	400 kV Jammalamdugu SS to 400 kV Mylavaram	G	Quad Moose	D/C	2	2019-20

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1	LILO of 400 kV Vemagiri - Sattenpalli DC twin lines at Eluru 400 kV substation	L	Twin Moose	LILO	40	2020-21
2	400 kV Existing Urvakonda SS to proposed 400 kV Urvakonda 2 SS	G	Quad Moose	D/C	50	2020-21
3	400 kV Kamavarapukota SS to Polavaram Generating Station	G	Quad Moose	D/C	140	2020-21

230

1	400 kV Eluru SS to 400 kV Gudivada SS	L	Quad Moose	D/C	80	2021-22
2	400 kV Jammalamdugu SS to 400 kV Gani SS	G	Quad Moose	D/C	180	2021-22
3	400 kV Narnoor to 400 kV Aspiri SS	G	Quad Moose	D/C	180	2021-22

440

1	765 kV PGCIL Chilakaluripeta SS to 400 kV APTRANSCO Chilakaluripeta SS	L	Quad Moose	D/C	64	2022-23
2	400 kV Chilakaluripeata SS to 400 kV Gudivada SS	L	Quad Moose	D/C	206	2022-23

270

1	400kV LILO of existing 400 kV HNPCL - Kamavarapukota at proposed 400/220 kV Kakinada SEZ SS	L	Quad Moose	LILO	40	2023-24
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220 kV Lines

1	Jammalmadugu 400 kV SS To proposed Betamcherla SS	G	SM	DC	136	2019-20
2	220 kV DC line with Moose ACSR on Galvanised towers for LILO of 220 kV Parwada - Samalkota SC line at the proposed 220 kV SS, Koruprolu	L	SM	LILO	32	2019-20
3	220kV DC line for LILO of 220 kV VSS - Kakinada SC Line at the proposed 220 kV SS, Koruprolu	L	SM	LILO	32	
4	Hindupur 400 kV SS to proposed Penukonda SS	G	SM	DC	70	2019-20
5	220kV DC Line from proposed 400/220/132kV SS Rachagunneri to the proposed 220 kV Menakuru/ Naidupeta SS	L	SM	DC	80	2019-20
6	Rachagunneri 400 kV SS To proposed Chervi 220 kV SS	L	SM	DC	100	2019-20
7	Sullurpet 220 kV SS To proposed Chervi 220 kV SS	L	SM	DC	60	
8	220kV DC Line from 220kV SS Brandix to the proposed 220kV GIS Atchutapuram SS on Multi-circuit Towers	L	SM	DC	16	2019-20
9	220kV DC Line from 220kV SS Samarlakota Switching Station to the proposed 220 kV Kakinada SEZ Sub-Station (10.00Km MC +50.00 Km OH Line)	L	SM	DC	120	2019-20

10	220kV DC Line for making LILO of existing VTS - Podili line at proposed 220 kV GIS SS Lingayapalem (One circuit) 2 (OH) + 1.8 (Cable)	L	SM	LILO	7.6	2019-20
11	220kV DC Line for making LILO of existing VTS - Narasaraopet line at proposed 220/33 kV GIS SS Lingayapalem 2 (OH) + 1.8 (Cable)	L	SM	LILO	7.6	
12	Erection of 220kV DC line for making LILO of existing 220kV VTS-Thallapalli 3rd circuit to proposed 220/132/33kV SS Piduguralla on Narrow based towers	L	SM	LILO	4	2019-20
13	Erection of 220kV DC line for making LILO of existing 220kV VTS-Thallapalli 4th circuit to proposed 220/132/33kV SS Piduguralla on Narrow based towers	L	SM	LILO	4	
14	220kV DC line for making LILO of 220kV Kalapaka - Dairyfarm to proposed 220/132/33kV SS Simhachalam on MC Towers	L	SM	LILO	8	2019-20
15	LILO of 220kV Tadikonda - Ongole SC line to 220kV SS Guntur (Prathipadu) under construction on NMD towers	L	SM	LILO	4.2	2019-20
16	220 kV LILO of Kalpaka - Brandix to 220 kV Simhachalam SS	L	SM	LILO	105	2019-20
17	LILO of 220kV Lower Sileru - KTS-II (Old stage) to proposed 220kV SS Chinturu	L	SM	LILO	6	2019-20
18	220kV DC XLPE 1000 Sq.mm UG Cable from proposed 400/220kV GIS SS Tallayapalem to proposed 220/33 kV GIS SS Nelapadu	L	XLPE CABLE	DC	20	2019-20
19	Hindupur 400 kV SS to proposed Pampanur Thanda SS	G	SM	DC	180	2019-20
20	220kV DC line from 400/220kV SS Kamavarapukota to 220kV SS Bhimadole in West Godavari district	L	SM	DC	44	2019-20
					1036.4	
1	220kV DC line for making LILO of 2nd circuit from proposed 220kV Korukonda Switching Station - Rampachodavaram to 220kV SS Lower Sileru	G	SM	LILO	164	2020-21

2	Erection of 2nd circuit from proposed 220kV Korukonda Switching Station to 220kV SS Rampachodavaram	G	SM		78	
3	220kV LILO of one circuit of 220kV Bhimavaram-Eluru line to proposed 220kV SS Akiveedu	L	SM	LILO	2	2020-21
4	220kV DC line for making LILO of 220 kV Garividi- Pendurthy line to proposed 220/132kV SS Vizianagaram	L	SM	LILO	20	2020-21
5	Tirumalayapalli To proposed Dharmavaram SS	L	SM	DC	168	2020-21
6	220kV DC Line for LILO of existing one circuit of 220kV Vemagiri - Undi DC Line at proposed 220kV SS Siripalli (Amalapuram)	L	SM	LILO	48	2020-21
7	LILO of VTS-Tallapalli Ckt2 to proposed Tadepalli 220 kV SS	L	SM	LILO	40	2020-21
8	Lingayapalem 220 kV SS To proposed Tadepalli 220 kV SS (Cable)	L	XLPE CABLE	DC	24	2020-21
9	Inavolu / Thullur 400 kV SS to Proposed Tadepalli 220 kV SS (Cable)	L	XLPE CABLE	DC	22	2020-21
10	220kV DC 1000Sq mm XLPE UG Cable from proposed 400/220 kV GIS SS Borupalem to proposed 220/33 kV GIS SS Thulluru	L	XLPE CABLE	DC	12	2020-21
11	220kV DC 1000Sq mm XLPE UG Cable from proposed 400/220 kV GIS SS Borupalem to proposed 220/33 kV GIS SS Rayapudi	L	XLPE CABLE	DC	6	2020-21
12	220kV DC 1000Sq mm XLPE UG Cable from proposed 400/220 kV SS Tallayapalem to proposed 220/33 kV GIS SS Velagapudi	L	XLPE CABLE	DC	12	2020-21
					596	
1	220kV DC line from 400kV Manubolu to proposed 220kV SS Kothapalem	L	SM	DC	50	2021-22
2	220kV DC line from 220kV Amalapuram to proposed 220kV SS Ramachandrapuram	L	SM	DC	80	2021-22
3	Parchuru To proposed Repalle 220 kV SS	L	SM	DC	200	2021-22
4	Guntur To proposed Repalle 220 kV SS	L	SM	DC	120	2021-22

5	Gooty 400 kV SS To proposed Adoni SS	L	SM	DC	128	2021-22
6	Gudiwada 400 kV SS To proposed Gannavaram 220 kV SS	L	SM	DC	70	2021-22
2	220kV DC line from 220kV SS Nunna to Proposed 220kV SS Gannavaram in Krishna District	L	SM	DC	50	2021-22
7	Gudivada 400 kV SS To proposed Machilipatnam 220 kV SS	L	SM	DC	80	2021-22
8	Proposed Podili 400 kV SS To proposed Kanigiri(Prksm) 220 kV SS	L	SM	DC	120	2021-22
					898	
1	Manubolu 400 kV SS To proposed Kavali 220 kV SS	L	SM	DC	360	2022-23
2	N P Kunta To proposed Kadiri 220 kV SS	L	SM	DC	160	2022-23
3	Koruprolu 220 kV SS To proposed Prattipadu 220 kV SS	L	SM	DC	140	2022-23
4	Vemagiri 400 kV SS To proposed Editha 220 kV SS	L	SM	DC	80	2022-23
5	Nidadavolu 220 kV SS To proposed Tanuku 220 kV SS	L	SM	DC	120	2022-23
					860	
1	220kV DC line from 400kV SS Kalikiri to Proposed 220kV SS Rayachoti in Y.S.R Kadapa District	L	SM	DC	100	2023-24
2	220 kV SS Tanuku to proposed 220 kV SS Penugonda in West Godavary District	L	SM	DC	26	2023-24
3	220 kV SS Nellore To 220 kV SS Podalakuru	L	SM	DC	80	2023-24
4	400 kV Manubolu To 220 kV SS Sarvepalli	L	SM	DC	50	2023-24
5	220 kV Diary Farm To proposed 220 kV Anandapuram	L	SM	DC	30	2023-24
6	220 kV Gajuwaka To Common Point	L	SM	DC	20	2023-24

132kV Lines :

Sl. No	Name of Transmission line	Length in Ckt kM	Target year of Commissioning
1	Stringing of 2nd circuit on 132 kV Cumbum - Giddalur DC/SC Line	37.5	2019-20
2	132 kV DC Line for LILO of 2nd circuit of 132 kV Cumbum - Giddalur line to proposed 132/33 kV Substation at Anumalapalle	17	
3	132 kV DC/SC radial line from 220/132 kV Nellore Substation to the proposed 132/33 kV Kallurpalli substation	5	2019-20
4	132 kV DC/SC line from proposed 220/132 kV SS Atmakur to the proposed 132 kV SS Vinjamur	25	2019-20
5	132 kV DC radial line from proposed 132/33 kV Kallurpalli Substation to the proposed 132/33 kV Koruturu substation	25	2019-20
6	132 kV DC radial line from proposed 220/132 kV Amalapuram SS to the proposed 132/33 kV Mummidivaram SS	15	2019-20
7	132 kV DC Line for making LILO of 132 kV Ramachandrapuram - Amalapuram radial line to proposed 132/33 kV Mummidivaram SS	8	
8	Stringing of 2nd circuit on existing 132 kV Kakinada - Yanam DC/SC Line	42	2019-20
9	Erection of 132 kV DC line for making LILO of 2nd circuit of 132 kV Kakinada - Yanam line to the proposed 132/33 kV Gollapalem SS	6	
10	132 kV DC radial line from 132 kV Noonegundlapalli switching station to the proposed 132/33 kV Kothapalli substation	25	2019-20
11	132 kV DC radial line from proposed 132/33 kV Pachikapallam to the proposed 132/33 kV Penumur substation	20	2019-20
12	2nd circuit stringing on 132 kV DC/SC Line from 220/132 kV SS Nagari to 132 kV SS Pachikapallam	40	

13	132 kV DC radial line from 400/220/132 kV SS Manubolu to the proposed 132/33 kV Kadivedu substation	25	2019-20
14	Stringing of 2nd circuit on existing 132 kV DC/SC Line from 220/132 kV SS Gudivada to 132 kV SS Chigurukota	23	2019-20
15	132 kV DC line from 132 kV SS Chigurukota to the proposed 132/33 kV SS Bantumilli	18	
16	132 kV DC line from 220/132 kV SS Rachagunneri to the proposed 132/33 kV SS Mangalam	30	2019-20
17	132 kV DC line from proposed 220/132 kV SS Naidupet to the proposed 132/33 kV SS Gottiprolu	30	2019-20
18	132 kV LILO of existing 132 kV Kanumolu - Pamarru at proposed 400/220/132 kV SS Gudiwada	4	2019-20
19	132 kV LILO of existing 132 kV Chilakaluripet - Nallapadu at proposed 220/132 kV SS Chilakaluripet	10.5	2019-20
20	132 kV LILO of existing 132 kV Chilakaluripet - Marripalem at proposed 220/132 kV SS Chilakaluripet	10.5	2019-20
21	132 kV DC/SC Line with XLPE UG Cable from proposed 220/132/33 kV SS Amaravati to the proposed 132/33 kV SS Peddaparimi	19	2019-20
22	132 kV DC/SC Line with XLPE UG Cable from proposed 220/132/33 kV SS Malkapuram to the proposed 132/33 kV SS Navuluru	12	2019-20
23	132 kV DC/SC Line with XLPE UG Cable from proposed 132/33 kV SS Peddaparimi to the proposed 132/33 kV SS Navuluru	16	2019-20
24	132 kV DC/SC Line from 220/132 kV SS Brandix to the proposed 132/33 kV Substation APMTZ	30	2019-20
25	132 kV DC Line by making LILO of 132 kV Gajuwaka - Parawada line at proposed 132 kV SS APMTZ	3	
26	220 kV SS Bommur to 132 kV SS Vepakayaladibba	7	2019-20
27	220 kV SS Undi to 132 kV SS Akiveedu	15	2019-20

28	220 kV SS Kamavarapukota to 132 kV SS Dharmajigudem	25	2019-20
29	220 kV SS Undi to 132 kV SS Attili	25	2019-20
30	220/132/33 kV SS Duvva to the proposed 132/33 kV SS Palakollu	20	2019-20
31	132 kV SS Rajam to 132 kV SS Veeraghattam	35	2019-20
32	132 kV SS Palakonda to 132 kV SS Sarubujjili	20	2019-20
33	132 kV DC line 220/132 kV Anrak Sw.Station to Jamathulapalem	40	2019-20
34	132 kV DC line 220/132 kV Anrak Sw.Station to Teeda	20	2019-20
35	132 kV TB vara to VN Puram DC/SC line	8	2019-20
36	132 kV TB vara to Thatipudi DC/SC line	8	2019-20
37	132 kV Garividi to Kondaganredu DC/SC line	9	2019-20
38	132 kV Parvathipuram to GM vasa DC/SC line	18	2019-20
39	132 kV BGC to Burjavalasa	5	2019-20
40	132 kV DC line from 220/132 kV SS Penukonda to 132 kV SS Penukonda	20	2019-20
41	132 kV DC Line for making LILO of existing 132 kV Naidupeta-Gudur line to proposed 220 kV SS Menakuru/ Naidupeta	30.00	2019-20
42	132 kV DC Line from proposed 220 kV SS Menakuru/ Naidupeta to 132 kV SS Menakuru	16.00	2019-20
43	132 kV 630sqmm XLPE Cable with terminal blocks (for 2 LVs) for 220 kV Atchutapuram SS	3.00	2019-20
44	33 kV 400sqmm 1 core copper XLPE Cable with terminal blocks (for 2 LVs) for 220 kV Atchutapuram SS	2.00	2019-20
45	132 kV DC line at the existing 132 kV Simhachalam - Nakkavanipalem & 132 kV Simhachalam - Commonpoint corridor with 132 kV XLPE UG Cable	2.00	2019-20
46	132 kV DC line for making LILO of both the lines from existing 132 kV Peddapuram - Prathipadu line to 220/11 kV LIS SS Ramavaram	16.00	2019-20
		841	

1	132 kV DC/SC Line with XLPE UG Cable from proposed 220/132/33 kV SS Malkapuram to the proposed 132/33 kV SS Uddandrayanipalem	3	2020-21
2	132 kV DC/SC Line with XLPE UG Cable from proposed 132/33 kV SS Dondapadu to the proposed 132/33 kV SS Uddandrayanipalem	7	2020-21
3	132 kV DC/SC Line with XLPE UG Cable from proposed 220/132/33 kV SS Malkapuram to the proposed 132/33 kV SS Krishnayanipalem	6	2020-21
4	132 kV DC/SC Line with XLPE UG Cable from proposed 132/33 kV SS Navuluru to the proposed 132/33 kV SS Krishnayanipalem	3	2020-21
5	132 kV SS Pithapuram to 132 kV SS Annavaram	30	2020-21
6	220 kV SS Garividi to 132 kV SS Nelimarla	30	2020-21
7	220 kV SS Kondapalli to 132 kV SS Kabela	25	2020-21
8	132 kV SS Palasa to 132 kV SS Sompeta	35	2020-21
9	220 kV SS Garividi to 132 kV SS Chipurupalli	10	2020-21
10	132 kV TB Vara - 220 kV Garividi LILO to Gajapathinagaram	36	2020-21
11	220 kV SS Kandukur to 132 kV SS Singarayakonda	30	2020-21
12	Proposed 132 kV SS Chinnarikatla to 132 kV SS Mekalavaripalli	25	2020-21
13	220 kV SS Ongole to 132 kV SS Kothapatnam	30	2020-21
14	220 kV SS Kandukuru to proposed 132 kV SS Ulavapadu	10.5	2020-21
15	220/132 kV SS Gudivada to the proposed 132/33 kV SS Vuyyuru	20	2020-21
16	220/132 kV Narasaraopeta to the proposed 132/33 kV SS Elchuru	25	2020-21
17	Proposed 132 kV SS Kalasapadu to 132 kV SS Komarole	30	2020-21

18	220 kV SS Gunadala to 132 kV SS Gunadala	25	2020-21
19	220 kV SS Chillakallu to 132 kV SS Mukthyala	30	2020-21
20	LILO of 132 kV Kondapalli-Nuzividu line to 132 kV SS Gampalagudem	40	2020-21
21	132 kV SS Irala to 132 kV SS Kakalamitta	20	2020-21
22	132 kV SS Shanthipuram to 132 kV SS Vijalapuram	25	2020-21
23	132 kV DC Line for LILO of existing one circuit of 132 kV R.C Puram - Amalapuram DC line at proposed 220/132 kV SS Siripalli (Amalapuram)	2.00	2020-21
24	132 kV LILO of 132 kV Amalapuram- Kothapeta to proposed 220/132 kV Siripalli (Amalapuram)	2.00	2020-21
		500	
1	132 kV Renigunta-Chandragiri line LILO to 132 kV SS Gandhipuram	5	2021-22
2	132 kV SS Kesinenipalli to 132 kV SS Pullalacheruvu	35	2021-22
3	132 kV Nandyala-Allagadda LILO to 132 kV SS Gajulapalli	20	2021-22
4	220 kV SS Cherivi to 132 kV SS Satyavedu	24	2021-22
5	132 kV SS Penumur to 132 kV SS Poothalapattu	20	2021-22
6	220 kV SS Atmakuru to 132 kV SS Kaligiri	30	2021-22
7	132 kV SS Repalle to Bhattiprolu	17	2021-22
8	132 kV SS Piduguralla to Bellamkonda	19	2021-22
9	132 kV SS Kanigiri to Veligandla	26	2021-22
10	220 kV SS Kandukuru to Ponnaluru	20	2021-22
11	220 kV SS Rachagunneri to BN Kandriga	25	2021-22
		241	

1	132 kV SS Vinjamuru to 132 kV SS Duttaluru	30	2022-23
2	132 kV SS NTS to 132 kV SS Buchireddypalem	10	2022-23
3	132 kV SS Rapur to 132 kV SS Somasila	25	2022-23
4	132 kV SS Rapur to 132 kV SS Dakkili	30	2022-23
5	132 kV Nellore - Atmakuru LILO to 132 kV SS Jonnawada	5	2022-23
6	220 kV SS Racharlapadu to 132 kV SS Vidavalur	15	2022-23
		115	
1	220 kV SS Meenakuru to 132 kV SS Mallam	40	2023-24
2	220 kV SS Manubolu to 132 kV SS Varagali	20	2023-24
3	132 kV SS Chodavaram to 132 kV SS K.Kotapadu	10	2023-24
4	Kasimkota - Pendurthy LILO to Govada	15	2023-24
5	Anrak SS to 132 kV SS Vaddadhi	20	2023-24
6	132 kV SS Kapuluppada to 132 kV SS Bhimili	15	2023-24
7	Brandix to 132 kV SS Rambili	15	2023-24
8	Dairy Farm to 132 kV SS NSTL	10	2023-24
9	Gajuwaka to 132 kV SS Auto nagar	10	2023-24
10	Peddawaltair to East Point colony	5	2023-24
11	Proposed 220 kV SEZ SS to Hamsavaram	25	2023-24
12	Proposed 220 kV SS Gollaprolu to Hamsavaram	30	2023-24
13	Proposed 220 kV SS Prathipadu to Hamsavaram	40	2023-24
14	LILO of 132 kV Kakinada - Peddapuram line to Panasapadu	2	2023-24
15	Proposed 220 kV Ramachandrapuram to Teki	15	2023-24

16	Proposed 132 kV SS Mummidivaram to Uppalaguptam	15	2023-24
17	LILO of 132 kV Amalapuram-Razolu line to Mamidikuduru	3	2023-24
18	Proposed 220 kV SS Korukonda to Gokavaram	10	2023-24
19	132 kV SS Biccavolu to Dwarapudi or Mukkinada	12	2023-24
20	Proposed 220 kV Ramachandrapuram to Dwarapudi or Mukkinada	20	2023-24
21	220 kV SS Nidadavolu to Atreyapuram	20	2023-24
22	132 kV LILO of Bommuru-Nidadavolu to Atreyapuram	15	2023-24
23	Proposed 132 kV SS Gokavaram to Addathigala	35	2023-24
24	Proposed 132 kV SS Jaggampeta to Addathigala	40	2023-24
25	132 kV SS Palakonda to Hiramandalam	23	2023-24

4.5.4 Augmentation of PTR Capacities at 400kV & 220 kV Substations from FY2019-20 to FY2023-24

Augmentation of PTR Capacities at 400kV & 220 kV Substations from FY2019-20 to FY2023-24					
Sl.No	Substation	Existing PTR Capacity in MVA	Proposed PTR Capacity in MVA	Estimated Cost Rs Lakhs	Target year of Commissioning
1	Tekkali	2X100	2X160+1X100	754	2019-20
2	Garividi	2X100+1X160	3X160	754	2019-20
3	Bhimadole	1 x 160 + 2 x 100	2 x 160 + 1 x 100	377	2019-20
4	Gunadala	1 x 160 + 2 x 100	2 x 160 + 1 x 100	377	2019-20
5	Narasaraopeta	3 X 100	1X160+2 X 100	377	2019-20
6	Nunna	2X100	2X100 + 1X160	377	2019-20
7	Bommuru	1X160+2X100	2X160+1X100	377	2019-20
8	Maradam	3X315	2X315+1X500	2916	2019-20

9	Vemagiri	3X315	4X315	2726	2019-20
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9035

1	Nidadavole	3 X 100	2 x 160 + 1 x 100	754	2020-21
2	Bobbili	2x100	2 x 160 + 1 x 100	754	2020-21
3	Renigunta	1 x 160 + 2 x 100	2 x 160 + 1 x 100	377	2020-21
4	A P Carbides	1X160+2X100	2 x 160 + 1 x 100	377	2020-21
5	Kuppam	2X100	1 x 160 + 2 x 100	377	2020-21
6	Gudivada	1X160+2X100	2X160+1X100	377	2020-21
7	Narnoor	2X315	3X315	2726	2020-21

5742

1	Rentachintala	2X100	1X160+2 X 100	377	2021-22
2	Kamavarapukota	3X100	3 x 160	1131	2021-22
3	Kondapally	1X160+2 X 100	2 x 160 + 1 x 100	377	2021-22
4	Brandix	2X100	2X100+1X160	377	2021-22
5	Dairy Farm	2X100	2X100 + 1X160	377	2021-22

2639

1	Parwada	3X100	2X100+1X160	377	2022-23
2	Samalkota	3X100	1X100 + 2X160	754	2022-23
3	Nagari	3 x 100	2 x 160 + 1 x 100	754	2022-23
4	Rachaganneru	2X100	1 x 160 + 2 x 100	377	2022-23
5	Undi	3 X 100	2 x 160 + 1 x 100	754	2022-23

3016

1	Chillakallu	3 X 100	2 x 160 + 1 x 100	754	2023-24
2	Kalikiri	3 X100	2X160+1X 100	754	2023-24
3	Palamaneru	1X160+1 X 100	2 x 160 + 1 x 100	377	2023-24
4	Thimmapuram	2X100	1 x 160 + 1 x 100	377	2023-24
5	Parchur	3X100	2X100 + 1X160	377	2023-24

5 DISTRIBUTION (CAPITAL INVESTMENT) PLAN

The Commission has examined the investments proposed by the licensees in the Resource Plans for 4th Control Period. The Commission, while examining the investment proposals, has reckoned / considered all the views / objections / suggestions expressed by the stakeholders in writing and during public hearings, which have been elaborated in Chapter-II in the Resource Plan.

The total investments (including ongoing Schemes) approved for the 4th Control Period are Rs.9,239 Cr. in respect of APSPDCL and Rs.4,309 Cr. in respect of APEPDCL.

The details of investments as per the Resource Plans for the 4th Control Period is as hereunder:

Table 6 - Approved: Investments - APSPDCL (Rs. Cr.)

S. No.	Item	FY 19-20	FY 20-21	FY 21-22	FY 22-23	FY 23-24	Total
1	Ongoing Schemes	750	339	228	-	-	1,317
2	Substations (New & Augmentation)	264	312	370	434	511	1,891
3	Metering & Associated equipment	55	55	55	55	55	275
4	DTR Additions	405	459	529	629	710	2731
5	Lines, Cables & Network	400	472	554	679	775	2880
6	Technology Upgradation and R&M	0	0	0	0	0	0
7	Civil works and Others	25	27	29	31	33	145
Total (Rs.Cr.)		1899	1663	1765	1827	2084	9,239

Table 7 -Approved Investments - APEPDCL (Rs. Cr.)

S.No.	Item	FY 19-20	FY 20-21	FY 21-22	FY 22-23	FY 23-24	Total
1	Ongoing Schemes	471	41	0.75	0.75	0.75	514
2	Substations (New & Augmentation)	197	143	167	196	224	927
3	Metering & Associated equipment	60	60	60	60	60	360
4	Distribution Transformer Additions	144	182	203	230	266	1,027
5	Lines, Cables & Network	173	196	220	260	302	1,151
6	Technology Upgradation and R&M	57	57	57	57	57	285
7	Civil works and Others	21	21	21	21	21	105
Total (Rs.Cr.)		1,123	701	729	825	931	4309

The following methodology has been adopted by the licensees to arrive at the network elements and accordingly investments for the next 5 years in the Control Period.

Forecasting circle wise total Power Transformer (PTR) capacities and No. of PTRs:

The licensee-wise and circle-wise non co-incident peak demands are arrived based on the year-wise estimated energy requirement with projected loss trajectory on sales for the 4th Control Period and non- coincident load factors of the FY2017-18.

$$\text{Peak Demand (MW)} = \text{Energy Required} / (24 \times 365 / 1000) / \text{Load Factor.}$$

The non co-incident peak demands observed during the FY2017-18 have been used to calculate the diversity factor of PTRs in all circles as per the formula given below:

$$\text{PTR diversity factor} = \text{Total PTR Capacity} / \text{Non co-incident peak demand}$$

The PTR diversity factor calculated as above, has been adopted for each year of the Control Period.

Based on the PTR diversity factor and non-coincident demands, the circle wise cumulative PTR capacities were arrived.

The PTR capacity so arrived is divided by 5MVA (assumed for a basic 33/11 kV SS) to arrive no. of PTRs.

Forecasting circle-wise total Distribution Transformer (DTR) capacities and No. of DTRs:

Using the following formula, DTR to PTR ratios for each year of the Control Period has been arrived by taking FY2017-18 as a base.

DTR to PTR capacity ratio for year t = (DTR to PTR capacity ratio for year t-1) * (LT/(LT+11kV) sales ratio for year t)/(LT/(LT+11kV) sales ratio for year t-1)

Using the following formula, circle wise cumulative DTRs capacity were arrived.

DTR capacity = DTR to PTR capacity ratio * forecasted PTR Capacity

The DTR capacity so arrived is divided by 100 kVA (assumed as basic DTR capacity) to arrive at no. of DTRs.

Line Lengths estimation:

The line length norms (a) LT km per DTR, (b)11 kV km per DTR and (c) 33kV km per 33/11 kV SS have been arrived at based on the actual data of FY2017-18.

The line length required at different voltage levels i.e. 33 kV, 11 kV and LT line have been estimated based on the assumption of maintaining High Tension (HT) : Low Tension (LT) ratio of 1 [average of (a) LT km per DTR, (b)11 kV km per DTR] during the 4th control period for 11 kV and LT lines whereas current standards have been assumed to be continued for 33kV lines.

Based on the methodology described above, the total 33/11 kV SS and DTRs estimated is given in the tables below and the circle wise distribution network elements estimated by the licensees

The Commission while finalizing the investments for the 4th Control Period, has kept in view the following:

As per the Section 42 of the Electricity Act, 2003 read with clause 22 of Regulation 10 of 2013, it shall be the duty of the Distribution Licensee to develop and maintain an efficient, coordinated and economical distribution system in his area of supply and to supply electricity in accordance with the provisions contained in the Act.

The Commission is guided under Section 61 (c) of the Electricity Act, 2003, by the factors which would encourage competition, efficiency, economical use of the resources, good performance and optimum investments while determining the tariff.

Paragraphs 18 and 19 of Distribution and Retail Supply License stipulates that subject to the availability of adequate generating and transmission capacity, the system is capable of providing consumers within its area of supply with an adequate, safe and economical supply of electricity, having regard to quality, continuity and reliability of service.

Historic investments made by the licensees after bifurcation of State.

The Commission after examining the investments with reference to the above points and methodology for arriving network elements and computations of the investment, adopted the same methodology as adopted by the licensees with following changes to arrive at network elements and investments:

The diversity factors considered uniformly at 2.0 for each year of the Control Period for all circles;

The cost data norms as provided by APSPDCL are considered for both the licensees.

5.1 APSPDCL:

As per the National Tariff policy, 2016, all the consumers shall be provided with smart meters whose consumption is more than 200 units. Accordingly, the Commission has limited the investments towards providing smart meters for Domestic consumers.

Cost of the smart meter is taken as Rs. 2500 per single phase meter as per the data given in the ARR filings for Retail Supply Business for FY2018-19 as against Rs.5000 considered by the licensee.

With respect to installation of smart meters for 4,33,000 nos. agricultural DTRs, the Commission had issued following direction in the Retail Supply Tariff Order for FY2018-19.

“The Commission directs both licensees to take up pilot projects for one selected Division each in their respective jurisdictions for progressively providing 100 percent smart meters to all AGL DTRs as per the National Tariff Policy at least within the next two years.

5.1.1 Investments towards unexpected load growth

The licensee has shown Rs. 600 Cr. for 4th control period towards its contribution with respect to schemes to be announced by GoI/Infrastructure requirement due to unexpected load growth in Aqua / Industries. The same has not been considered by the Commission as it is an unsubstantiated expectation as of now and can be provided for as and when needed in exercise of powers of reconsideration and review under clauses 16, 21 and 24 of Regulation 4 of 2005, if approached by the Discoms.

5.1.2 Civil Infrastructure Development:

The Commission has considered 50% of the proposal, to take care of development of infrastructure as the licensee has not furnished any specific details or plans.

No. of PTRs & DTRs required - APSPDCL

Component	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24	Total
Proposed						
33/11 kV SS	241	245	276	308	347	1417
DTRs	18,630	18,780	21,110	23,610	26,550	108680
Approved						
33/11 kV SS	192	216	243	271	303	1225
DTRs	14,666	16,593	18,186	21,621	23,220	94285

No. of PTRs & DTRs required - APEPDCL

Component	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24	Total
Proposed						
33/11 kV SS	178	123	135	152	165	753
DTRs	6510	7810	8670	9780	10650	43420
Approved						
33/11 kV SS	143	99	110	122	133	607
DTRs	5,213	6,600	6,997	7,927	8,710	35448

Line Lengths (km) - APSPDCL

Component	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24	Total
Proposed						
33 kV	1865	1891	2155	2423	2757	11091
11 kV	6829	7048	7972	8975	10163	40987
LT	6815	7032	7954	8955	10140	40896
Approved						
33 kV	1405	1582	1786	1986	2226	8986
11 kV	5003	5605	6253	7350	7932	32143
LT	5003	5605	6253	7350	7932	32143

Line Lengths (km) - APEPDCL

Component	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24	Total for CP
Proposed						
33 kV	1291	927	1018	1145	1244	5625
11 kV	2342	2741	3041	3402	3723	15249
LT	2342	2741	3041	3402	3723	15249
Approved						
33 kV	1034	740	821	915	998	4508
11 kV	1,830	2,271	2,392	2,691	2,989	12174
LT	1,830	2,271	2,392	2,691	2,989	12174

6 Human Resources

Year wise Regular Manpower as per filled posts in APTransco are tabulated below.

Cadre	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20*
CE & Equal	8	12	13	11	13	10
SE & Equal	34	35	33	35	35	35
EE & Equal	139	139	134	139	178	177
ADE & Equal	560	589	582	576	680	685
AEE/AE/AAE	667	633	646	763	622	693
Other Engg staff	13	14	9	11	14	14
FACCA, DY CCA & Equal (DS in P&G Service)	5	5	5	6	6	7
SAO & Equal (AS in P&G Service)	19	20	20	18	24	22
AO/AAO & Equal (PO in P&G Service)	74	84	84	67	63	68
Other	367	332	330	215	223	218
O&M Service	325	309	294	267	244	225
Total	2211	2172	2150	2108	2102	2154

Total Man power in the AP Power sector is tabulated below

Sl.No	Details	AP	AP	DISCO	AP	AP	DISCO	AP	AP	DISCO
		GENCO	TRANSCO	Ms	GENCO	TRANSCO	Ms	GENCO	TRANSCO	Ms
1	2	2017			2018			2019		
	OTHER THAN WORKMEN									
1.	Technical	247	1691	3601	2472	2290	3785	2464	2290	2953
2.	Non-Technical	355	120	982	355	200	1009	355	201	874
	WORKMEN									
1.	Technical	425	223	***	425		**	425		**
2.	Non-Technical	107	766	2386	1070	691	2359	1069	690	6019
3.	O & M and Construction and othe	493	2106	24592	4931	2106	24687	4931	2106	13525
	TOTAL	925	4906	31561	9253	5287	31840	9244	5287	23371